July/August 2016

POINTING TO SAFER AVIATION

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From Footy to Flying

The Long Road to ZQN Night Ops

The Danger of Accumulated Stress

What happened here?

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

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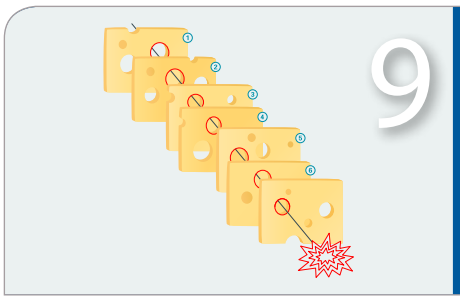
"Good evening Queenstown." The massive safety project – two of them actually – underpinning the introduction of night operations into the South Island resort.



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Cover: Richie McCaw is taking some of what he learned about rugby into the air. See next page. Photo courtesy of John McCaw/McCaw Media.

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From Footy **to Flying**

Former All Blacks Captain Richie McCaw learned a lot about performance and safety on the rugby field. Richie tells *Vector* what he's taking from that into the air.

"You use your peripheral vision, and your head is up, and you're taking in the things in front of you and around you."
Photo courtesy of John McCaw/McCaw Media.

Preflight

Preparation is everything. It gives you confidence and helps you perform better.

If the ABs played poorly, and we weren't as focused as we should have been, when we analysed it post-match, we could always track it back, at least partially, to a lack of preparation. We didn't quite fix something as well as we should have.

I ended up having a preparation routine, so when I got to game day, I was confident that I'd done everything I could.

It's easy to pay lip service to preparation, especially if it's the same routine every week. Just 'checklisting' stuff, you know, 'yeah, that's fine, yeah, that's fine, done that, ticked that box,' and you get on the field and it's a bit different. You realise why it's important to be genuine in your preparation. Those drills you thought you could miss and it would be okay. Then it doesn't work and you think 'Oh God, I should have done them.'

Often a few little things missed in preparation can add up to a lot during a game.

So I'd get to Friday and I always gave myself a bit of time to think about what was going to happen the next day, and made sure I'd thought about what could happen, before I got on the field.

If you don't do that, each little 'what if' comes at you once you start playing.

Anticipating a Weather Change

Being flexible means that when the game wasn't going the way we expected it, we could easily change tack.

The opposition might have thrown something at us that was completely different from what we'd been expecting. But in your prep, you'd get ready as much as you could for those differences as well.

We'd do our homework on who we were playing and what the game was going to be like, and we'd get out there, and the opposition wouldn't play the way we thought they would. So we had to be flexible. 'Change the game plan, because this isn't working'.

The night before a game, I'd take some time on my own and consider what could go wrong, 'What happens if we end up with a guy sin-binned? Or two guys sin-binned? How am I going to deal with that? What will I do if we're ten points down with five minutes to go? What are my options?'

So the next day, you're hoping it doesn't happen but if you get there, and it does happen, you've got somewhere to start, 'Oh that's what I thought about.' I wasn't left feeling helpless, I had things up my sleeve to try.

Also, what you don't want after the match, is everyone looking at the game again, and saying to you 'It was obvious, why didn't you change?' And all you can say is, 'Well, I don't really know, it just wasn't the way I was expecting it to be.'

When Things Go Wrong

Forget the mistake you just made, you've got other things to take care of right now.

On the rugby field, you concede a try or whatever, and if you dwell on that mistake, you're not going to focus on what you've got to do right now.

Your attention has to be on the here-and-now. You're ten points down and there's ten minutes left in the game. Is worrying, and cursing yourself for the error, and being really tense, going to help?

It's about what you can do right now that can maybe turn that situation around.

So you have to stay engaged, stay thinking, keep watching what's happening.

As Captain, I'd always be trying to think ahead to avoid those mistakes, 'If something happens at a certain point in the game, this is the decision I'll make, this is the option I'll take'. Not thinking ahead, I'd run the risk of the decision being made for me, when I'd be out of options.

For Instructors, CFIs, Operators

A high-performance activity is unforgiving of mistakes. Lessons have to be learned quickly.

Early on, if someone new to the team made a mistake, I used to get a bit frustrated with them, because the consequences of that mistake could be quite big.

Then one of the coaches said to me, 'Did you give him everything he needed to avoid making that mistake, all the information, all the resources? Or did you assume that just because he's a Crusader now, he should know everything?'

And it made me realise that often when someone makes a mistake, the failure is that of the people around them. What did they not do or say that they probably should have?

If a mistake is made, I look at the learning environment first, for why. Apart from it being fair, it's the best way for someone to eliminate mistakes as much as possible, as quickly as possible. That's good for the whole team.

Leave Your Ego Outside the Cockpit

When I became New Zealand Captain, I felt like everyone was looking at me and I had to know it all. I had to be the one to make the decisions.

But I had a lot of good senior players around me, especially early on, who'd captained provincial sides, and who knew just as much as, if not more, than me. But I felt like I had to prove myself to them a little bit.

When I became more comfortable, I wasn't worried about how we got the right answer, as long as we got it. And it didn't always have to be coming from me. One of the other boys would decide to do something and I'd think it was good.

When you mature, you don't care where that right idea comes from, if it's the right one, then just get on with it.

What I did do, was make sure we had an environment where dialogue was pretty regular. And me as Captain, I was just as vulnerable as they were, in terms of feedback. I mean, they could give me advice and I'd take it.

You've got to have an environment where you're all debating things, so even if we said, 'Well, this weekend we're going to do this,' and not everyone agreed, we'd make sure we had a proper debate over it.

Sometimes you don't get consensus, but it's really important everyone feels like they've had their say, and it's considered, especially if they don't agree. Because once a decision is made, you have a better chance of buy-in from everyone.

Richie getting some flying tuition in a Douglas DC-3.

Know When Not to Fly

Sometimes as Captain, I'd have to say to the guy who was limping around the field, staying staunch, 'Hey mate, it might be time to get the other guy out here. Go and sort yourself out because you're only going to make it worse.'

I had to do the same and put my hand up when things weren't right. We always came back to what was best for the team. When you're trying to be tough and gutsy, but really you can't perform, it's actually not good for the team.

We had an environment where you could say, 'Look, I'm struggling here.' And if it was the right thing for the team, then no-one took it wrongly. If it was genuine that you couldn't do your job right, or you were endangering yourself, then you put your hand up.

I'm not saying we always played with things 100 per cent. Sometimes we did play when things weren't quite right, but you'd discuss it with the doctor and the physio first to make sure they were okay with it.

There were several times when I'd been training during the week, hoping I'd come right. I'd get to Thursday and I just knew I couldn't play. Actually, it was a relief to make the decision. You don't want to let the team down, but actually you're letting the team down by not saying so.

If it was obvious you shouldn't play, that wasn't so bad. The really tough decision, that took some maturity, was if things were marginal.

I'd go to someone I trusted and ask them what they thought I should do. I'd say to the doc, 'This is the way I'm feeling. What's your opinion, do you think I could make things worse, by playing?' Talking to other people usually made the decision quite clear.

Situational Awareness

On the rugby field, you have to be very aware of what's happening around you. You need to know where people are coming from. You use your peripheral vision, and your head is up, and you're taking in the things in front of you and around you.

When you're under the pump, it's easy to lose spatial awareness. You drop your head, and your eyes start gazing at one thing, you know, that 'thousand-mile stare'.

We learned that when you're under pressure, the brain sort of shuts down and you don't see anything, so how can you decide what to do then? Whereas you want to be up and looking and taking in what's being offered to you.

So you lift your head up and suddenly, you can see what's going on, and you can make proactive decisions and you feel better – 'Hey, where do I go now, what do I do now?'

In some games, I'd be head down with that tunnel vision, and kind of lose where I was in the game, but I'd catch myself and I'd force myself to look up and I'd see the stands and the far posts, and then the peripheral vision would start opening up.

Then I'd be back to the moment and not worried about what I'd done or what might happen as a result. It became 'okay, what do I do now?' ■

Photo courtesy of John McCaw/McCaw Media

The Long Road to **ZQN Night Ops**

What it took to bring NZ613 into Queenstown at 19:20 hrs on 23 May 2016.

Where it really began was in 2004 when Qantas trialled Required Navigation Performance (RNP) technology at Queenstown.

The GPS-based technology allowed aircraft to follow precise paths through the unfriendly surrounding terrain and, crucially, lowered the altitude decision point.

Prior to that, according to Air New Zealand's Manager of Aircraft Operations, Captain Graham Cheal, if the cloud was lower than 3000 feet above the airport, aircraft had to divert. RNP lowered that cloud limit to a minimum of 250 feet.

Apart from the confidence RNP brought to airlines and their passengers that they stood a better chance of getting in and out of Queenstown, it also made the prospect of night flights more real.

In 2012, Queenstown Airport Corporation called together Air New Zealand, Jetstar, Qantas, and Airways. With risk specialists Navigatus facilitating, the group explored what risks would exist with night flights.

"It was a massive and extremely thorough risk assessment," says Graham Cheal. "The group looked at every possible risk, things from VFR helicopters straying into airspace, to engine failure, to adverse wind, to loss of situational awareness, to runway overrun.

"Every threat to safety was put into an enormous model, past research was consulted, probabilities calculated, mitigations identified, and their effectiveness assessed. All that gave us a modified probability of the risk of operating into Queenstown at night."

That huge project, called the Foundation Safety Case (FSC) proved that, theoretically, night flights could be done as long as all the controls were in place.

Once the FSC reassured the CAA and its sister regulator, CASA, that the level of risk involved in night operations was mitigated to an acceptable level, the regulators accepted the FSC, in May 2014.

The airlines then began a second huge project, preparing their Operator Safety Case (OSC), detailing how they were going to comply with the controls outlined in the FSC.

CAA's General Manager, Air Transport and Airworthiness, Mark Hughes, led the CAA team involved in the Queenstown project. He says the CAA set performance objectives which gave airlines flexibility as to how they approached those controls.

"That approach allowed the airlines to choose the combination of technology, training, and procedures best suited to their operation to achieve safety objectives and to obtain CAA approval."

Graham Cheal says to comply, Air New Zealand invested in technology such as Head Up Display (HUD) which gives increased stability of approaches and better touchdown positions for landing.

The airline also invested in a Runway Overrun Prevention System. This continually calculates the aircraft's energy state (airspeed, wind speed and direction, etc) and will warn the pilot if the landing distance required to stop is greater than that available.

The airline also imported a human factors specialist from England, who brought with him, among other things, electronic 'eye-tracker' glasses worn by the pilots during sim training for Queenstown night operations. The trainers could see exactly where pilots were looking during different phases of flight.

Graham Cheal says the biggest controls the airline worked on were the weather limits and how to determine an effective decision altitude.

Photo courtesy of Airways

"In the simulator we started with the worst possible visibility/cloud base and then slowly improved the weather looking for improvements in visual cues and performance. One of the different techniques at night is to have a higher cloud base limit than the decision altitude. That gives the pilot time to build their situational awareness before having to make their decision to continue the approach."

Twenty-four Air New Zealand crews went through special training, with the captain exposed to 'overlearning' – repetition of a task to take skill way beyond proficiency. At the same time, the first officer, separately, was learning specialist monitoring skills.

"The OSC was, like the FSC, a very comprehensive job. For me, it was eight months of up to 14-hour days," says Graham Cheal.

It was a process from which traditional commercial rivalries were absent, with the pilots of Air New Zealand and Jetstar collaborating on finding answers to issues raised by night operations.

"We worked together in the FSC workshops, identifying risks and solutions. And later during the OSC process, we shared data, we compared the results of the sim. Sometimes we'd solve some problem and share that with them. Other times they'd solve something for us," says Captain Cheal.

Meanwhile, on the ground, the runway was being widened from 30 m to 45 m – to diminish the risk of an excursion – and its surface greatly improved. A comprehensive airfield lighting project, managed by Airways, was under way.

"That was certainly a lesson in coordination," says Mike Clay, Queenstown Airport's General Manager, Operations. "For six months, every night the runway would be handed over to the Downer/Beca team who were doing the actual upgrading, and they handed it back ready to go before the first scheduled flight next morning."

Technical Director for Airports with the engineering company, Beca, is Tristan Hughes. He notes that the construction team was acutely aware of the potential safety risks to aircraft, including Foreign Object Debris (FOD) from construction. Downer carried out FOD walks each morning before handover to airport operations.

"Contingencies were also put in place should equipment fail. We had replacements ready, and even a crane was on standby to lift an immobilised piece of equipment off the runway."

Over at Queenstown Tower, things were a little more straightforward.

On finals for Runway 23 Queenstown: the Head Up Display in the Air New Zealand A320 simulator. Photo courtesy of Sam Goris.

"Our big piece of work was three years ago," says Clayton Lightfoot, Chief Controller. "We put in a Performance Based Navigation route structure, which reduced the complexity of Queenstown's airspace, and allowed us to more than double the traffic we could handle.

"In terms of night ops, more than half our staff trained and worked elsewhere, including at night, and the rest had to learn only a few subtle things about visual separation at night.

"All we really needed to teach staff was which switch to push to turn on the lighting!"

Mark Hughes says the communication, collaboration, cooperation and coordination of everything and everyone involved made the massive project a pleasure to be a part of.

"When you distil it down, for the CAA team, it was an application to extend the privileges of a document holder and a certification exercise. It was just a very, very big one, involving lots of participants."

That approach was echoed by Nick Jackson from CAA's Aeronautical Services.

"We had to stand back from the excitement of what the development represented, and just concentrate on whether or not the improvements complied with the Civil Aviation Rules."

Mark Hughes says the safe touchdown of NZ613 in May represents a great result for everyone.

"It means an increase in the operating window, thus an increase in capacity, which is good from a commercial point of view, but we have all done it in a way that is safe.

"The public can absolutely have confidence in that. It's been tested so many times along the way. I personally have full confidence in it." ■

Changes for the **Agricultural Sector**

Changes that came into effect in April 2016 have seen the agricultural rating structure split into three specializations: top dressing, spraying, and an aerial vertebrate toxic agent (VTA) rating. There's also a new category of flight examiner for agriculture.

Alongside these changes, the pilot chemical rating refresher requirement has been increased from three to five years, and some of the privileges that an E-cat instructor previously had have been removed. For example, an E-cat can no longer test for Grade 1 and 2 agricultural pilot rating issues. That's now the job of the agricultural flight examiner.

"E-cats still train pilots and do annual competency assessments," says Gary Langman, CAA's Senior Technical Specialist – Agricultural. "They can also separately issue aerial top dressing, aerial spraying, and aerial VTA ratings, but the initial prime agricultural rating, which will include at least one of these specialised ratings, must be issued by the agricultural flight examiner."

An agricultural flight examiner must also hold an E-category Flight Instructor Rating. Therefore the examiner has all the privileges of an E-cat instructor, providing they're current. Previously, to be current, E-cats had to hold only an agricultural rating and have completed 10 hours of operational flying in the previous 90 days. Now, they must pass a competency assessment every two years to remain current.

As was the case previously, you'll initially receive your prime rating (Grade 2), then after 1000 hours of productive agricultural flying you can sit the Grade 1 test. Now, once you have your Grade 2, you may also add one or more of the specializations by completing further training and being assessed for the ratings.

One of the drivers for the change is safety. Three years ago, the CAA undertook a sector risk profile on agricultural aviation and that highlighted deficiencies in pilot training standards. Creating the agricultural flight examiner aligns the agricultural sector with the airline and general aviation sectors.

"This is trying to lift standards and minimise risk," says Gary. "So now pilots have to be assessed in each competency rather than just getting a blanket rating.

"In many ways, this is just codifying what is already happening in a large part of the industry.

"Often, if you did your training in aerial topdressing only, then an operator would only allow you to perform that. You'd need to do further training before the operator would allow you to do spraying or VTA."

The CAA recognises that VTA is essentially topdressing but with extra controls due to the highly toxic nature of the material being dropped. An annual competency assessment for VTA can be done at the same time as an aerial topdressing assessment, providing all the extra controls and requirements are covered off in the ground session, usually by oral assessment.

Previously, the all-encompassing agricultural rating didn't always assess particular areas of expertise. That meant a pilot could do the most convenient competency check at the time, but then do most of their work in a different competency.

"The flight examiners will assess all new E-cat instructors and conduct their biennial competency checks," says Gary. "That should raise the overall standards of agricultural pilots." ■

Photo: istockphoto.com/tntemerson

The Danger of **Accumulated Stress**

Here's a tale of apparently small things leading to a big mistake that could have killed someone.

Like many pilots, I wanted to attend the Warbirds Over Wanaka show at Easter.

I had made plans to fly my helicopter to the event to take part in the Sports Aviation display, so I was going to be letting people down if I didn't get there.

The preceding week at work, things had not gone well, with some jobs going over time, and a particularly difficult software problem.

Throughout that week, the weather reports had been variations on a theme of cloud and/or rain, with unstable fronts racing up and over the South Island.

It was raining steadily in Christchurch on Thursday morning, so I finished up some last-minute things at work, and headed out to Rangiora Airfield to start the journey. On the drive out, the weather improved. At the airfield, the day was fine and clear – hooray!

I'd checked the (now free) MetFlight weather along the route, which was marginal, though the auto report from Timaru, my first stop, was okay.

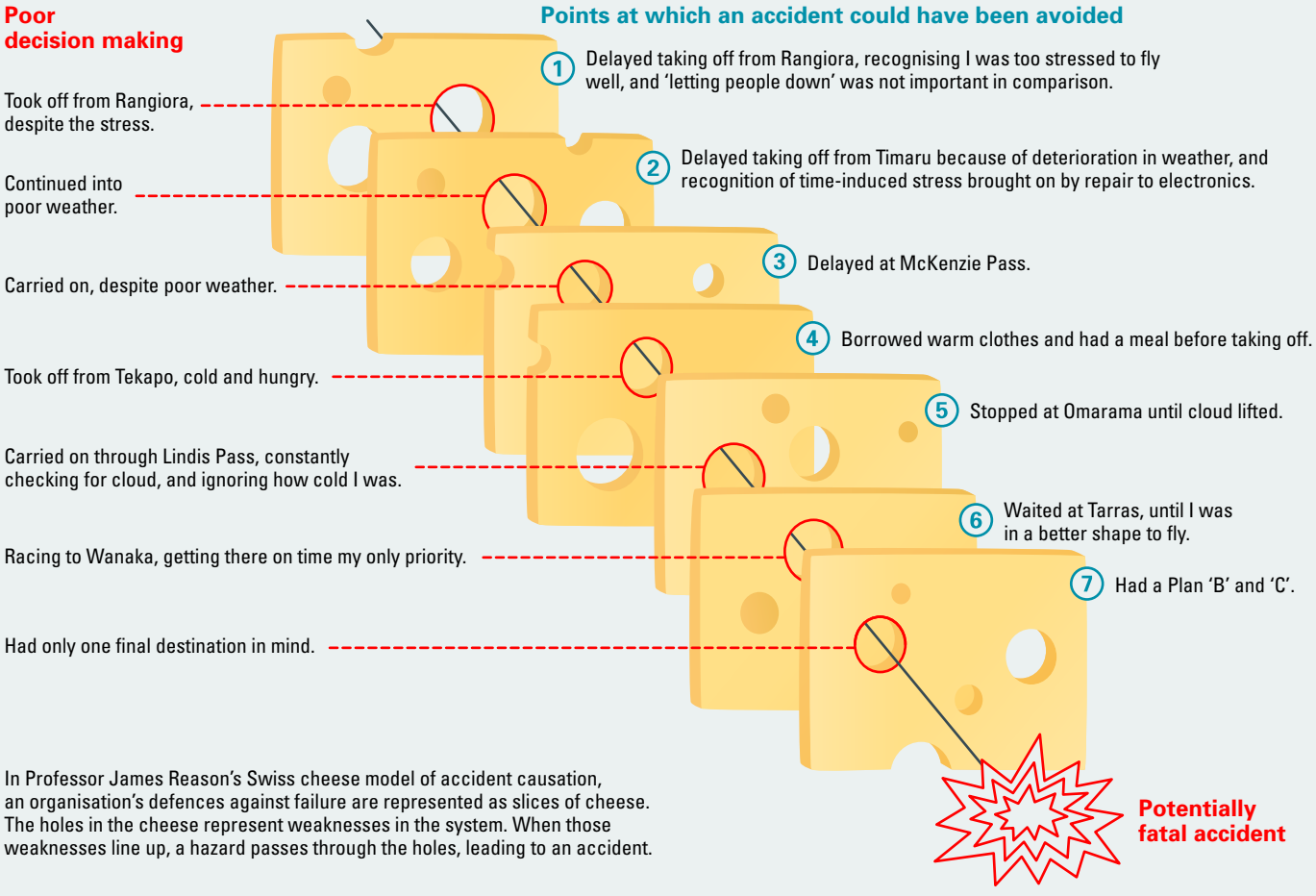
I phoned a friend living at Timaru and the weather was reported as overcast but clearing. So I pushed the helicopter out, locked the car in the hangar and set off.

A fine day deteriorated into low overcast as I approached Timaru, which took some 20 minutes longer than planned because of a head wind.

During fuelling at Timaru, a small electrical problem emerged, which took a while to fix safely, so the day was getting on.

I took off and headed for the McKenzie Pass, only to find low cloud blocking it.

I went along to Burkes Pass, and eventually the cloud lifted for a clear run through to the Mackenzie Basin.



In Professor James Reason's Swiss cheese model of accident causation, an organisation's defences against failure are represented as slices of cheese. The holes in the cheese represent weaknesses in the system. When those weaknesses line up, a hazard passes through the holes, leading to an accident.

By now I was too low on fuel to get to my next fuel stop of Omarama, so stopped instead at Tekapo – more delays, more expense, and closer to letting my fellow exhibitors down.

Once at Tekapo, a southerly squall blew up the Basin, and phone calls to a friend who was driving to Wanaka confirmed that the weather was poor.

Reluctantly, I decided to stop for the night at Tekapo, despite letting folk at Wanaka down. I was very well looked after by the people at the airfield, who rang round and found me the last bed in town, and gave me a lift in. Great service, and I could feel the worries of the last days receding, despite not making it to Wanaka on the appointed day.

A good night's sleep and a brisk walk back to the airfield to find a good flying day, but with cloud to the south.

Despite the warming walk, I'd arrived at Tekapo with only the clothes I was wearing (the rest were in a Wanaka-bound car) and I was not dressed for the cold morning.

Just after 0830 I was in the air, with the trip scheduled to take 55 minutes, well within my safe range of 1 hour 20. I might yet make it before Wanaka Airport closed for the show, but crikey, that draught coming in was cold!

Approaching Omarama, there was lots of low cloud, and a higher layer of overcast, but I could see the hills of Lindis in front, so a safe way through to the foot of the Pass, and sunshine on the hills.

I flew towards the Pass, keeping a wary eye out behind to make sure the cloud wasn't closing in.

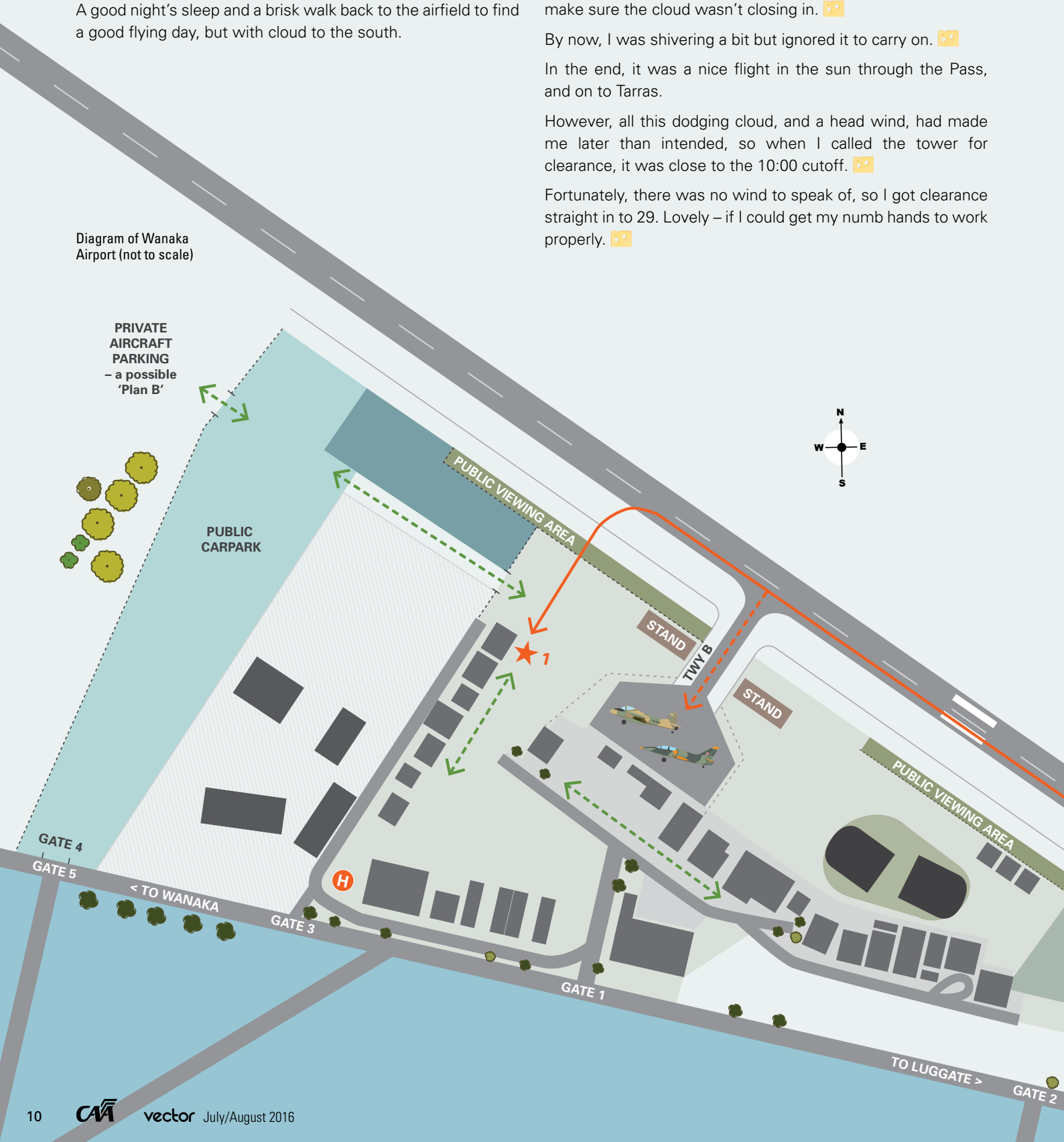
By now, I was shivering a bit but ignored it to carry on.

In the end, it was a nice flight in the sun through the Pass, and on to Tarras.

However, all this dodging cloud, and a head wind, had made me later than intended, so when I called the tower for clearance, it was close to the 10:00 cutoff.

Fortunately, there was no wind to speak of, so I got clearance straight in to 29. Lovely – if I could get my numb hands to work properly.

Diagram of Wanaka Airport (not to scale)



On final, the tower cautioned me about aircraft waiting on Taxiway B. As I approached the taxiway, I could see planes both sides waiting, and thought that they would not be pleased to have a helicopter blowing them around as I taxied past.

I obtained clearance to continue down the runway and 'round the back', meaning going around the end of the stand and over to my destination.

Here, now, was my first serious mistake – not making myself clear to the controller, who had another destination in mind.

I had also made a second major blunder, in that I had requested a non-standard landing zone. This means I had passed out of the controller's responsibility, and made myself responsible for making sure the landing zone was clear and safe for all concerned.

I continued down to the end of the stands, and while there were several people in orange vests about, there didn't seem to be any obvious crowd control. But there was a clear path to my display destination, and a good area clear to land in.

By now, I thought I was in danger of holding up the start of the show, so I high-hovered over to the display area outside the hangar, and, making sure no-one looked like they were going to cross the empty space, set down. Not my best set-down – my hands didn't seem to be working quite as they should. But why weren't the orange jackets making sure no-one was crossing, as I *was* expected?

Except I wasn't expected.

My cold, overstressed brain had reverted to a previous arrangement: initially landing in the helicopter drop-off area, then once the marshals ensured the display area was clear of public, flying over and landing in it, which would avoid having to manhandle the machine on its minuscule ground wheels.

When I did land, I was quickly – and rightly – condemned for an incredibly stupid piece of flying.

I had ignored some basic safety precautions, including that it was entirely my responsibility to make sure the area was clear and safe – not the crowd control people. (It's in the rules, 91.127.)

Then there were the clear instructions in both the show literature and the NOTAM about NO PROP TURNING areas. I had just landed in one, in direct contravention of the NOTAM I had read the day before.

My two stupid and dangerous decisions could have cost lives – why had I made them?

On reflection I realised I'd accumulated a considerable number of small stresses, each one insignificant, but adding up to a serious load on the brain.

They led to some very poor decision-making:

Get-there-itis: there were several points when I should have stopped the trip.

- Before it began, I knew I had a lot on my mind even before I went to Rangiora to open the hangar (the 'S' in 'I'm Safe').
- At Timaru, with marginal weather ahead.
- At Mackenzie Pass, when the weather made my planned journey impossible.
- In the morning at Tekapo, cold and with no breakfast (the 'F').
- At the Lindis Pass, when the cloud meant I was constantly looking over my shoulder.
- At Tarras, the reporting point for Wanaka. (I'm in a helicopter, I could have landed in a paddock and waited.)

Ignoring the cold: It wasn't until I'd been on the ground for a few minutes, and was drinking a coffee and standing in the sun, that I started to shiver. I'd actually passed through the shivering stage and into, I believe, the beginnings of hypothermia while flying, but told myself to ignore it and carry on.

Not inconveniencing anyone: Relative to possible injury or death, annoying a few pilots for a moment while I taxied to my cleared destination is way down the list.

No Plan B: I had only the final destination, the display area at the hangar, in mind. Always have plan B (and C) in mind.

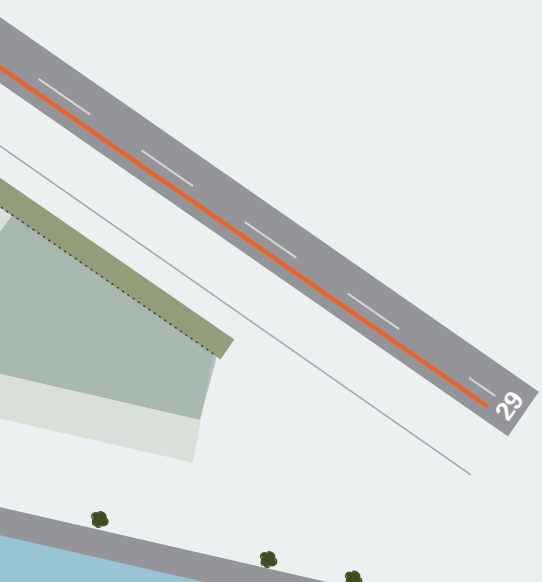
I could have…

- set down at the end of the taxiway and wheeled past;
- high-hovered over the aircraft to the apron;
- continued to the visiting aircraft park;

…but none of those options occurred to me at the time because I hadn't planned ahead.

Had the flying gods not been smiling on this day, the result of my stupid decisions – brought on by stress and cold – could have been fatal.

It's not an experience I wish to repeat. ■



Key

- Hangars and other buildings
- H — Where pilot should have landed
- 1 — Display area
- Landing spot
- Route of helicopter on arrival at Wanaka
- Walkway

A New Approach to Fatigue

Better scientific knowledge and operational experience has led to a re-think, globally, about managing fatigue in aviation. The question now is, do the current rules and regulations in New Zealand still work or do they need updating to reflect that shift?

Fatigue can be a contributing factor to accidents because it affects people's ability to do their job safely.

It's not just a pilot issue – it affects air traffic controllers, maintenance staff, and cabin crew.

Professor Philippa Gander is a world leader in the physiology behind fatigue-related impairment.

She's Director of the Sleep/Wake Research Centre at Massey University and is on the CAA's Fatigue Risk Management Panel (FRMP).

The traditional, and sole, approach to managing fatigue through limiting duty hours and minimum rest periods is not consistent with what is now understood scientifically, she says.

"The rules might require that you fly no more than, say, eight hours, but that doesn't deal with the actual causes of fatigue. You could be alert after 10 hours of duty if you had recently slept well. On the other hand you might fly only six hours and be absolutely exhausted because it's the middle of the night and you've flown several demanding duty days in a row."

Prescriptive limits, internationally recognised as a valid means of managing fatigue, need to be complemented by an organisation's risk management processes. Just because a duty is legal doesn't mean it's safe, says Mark Hughes, CAA's General Manager Air Transport and Airworthiness.

The CAA is reviewing current fatigue-related regulations and guidance material to ensure they're fit for purpose and are consistent with recognised good practice.

The rules haven't essentially changed since they first came out in the mid 1990s, says the project's lead advisor, Xavier Ruch.

"We've completed a policy analysis, and a discussion document will be put out to the public in the next few weeks for feedback. It outlines what we believe are the best ways to make improvements."

It's a complex issue that will require a combination of interventions to achieve the best safety outcomes for different aviation sectors.

"They can also be proactive and assess their systems and start making improvements in internal reporting and training. Managing fatigue is a shared responsibility – we all have a role in this."

One Size Doesn't Fit All

"Larger airlines tend to have systems and dedicated resources to manage fatigue. They can gather a lot of data. Smaller operators can't quite do the same thing. We need to be mindful of what it means for small operators to effectively manage fatigue risk," says Xavier.

John Sinclair, Executive Officer of the Helicopter Association and the Agricultural Aviation Association, says it's a balancing act between setting rules with prescriptive limits while still recognising operational circumstances.

Mark Funnell, the Operations Manager for Skydive Taupo and sister companies, says the current system works quite well for them because the guidelines are fairly broad.

"You can think a bit more laterally about how you want to manage your fatigue and it gives you more options to adjust it for your organisation."

John Sinclair is also on the CAA's Fatigue Risk Management Panel and says it's easier for companies with scheduled services to fit into the current prescriptive limits.

"What works for one might not work for another. Typically a lot of GA operators can be on call at any time. You take a helicopter operator, it's the nature of their work, it's unpredictable."

Operators need to identify how the nature of their activities can potentially affect crew fatigue, says Xavier. The CAA's fatigue project, with industry input, aims at providing guidance that will help.

Knowledge and Competence

John says the sector has recently developed a simple fatigue management guide, which shows members how to assess themselves.

He says building sector awareness is a good start and admits it's an area that can be improved.

"We all need to upskill because fatigue hasn't been investigated as a root cause of incidents and accidents to the extent that it should have."

A good understanding of the causes and consequences of fatigue, and mitigation strategies, are an essential part of reducing the risks it poses.

A Culture of Reporting

The culture of an organisation plays a big part in managing fatigue, says Tim Rayward, Operations Manager Air Safaris, in the Mackenzie Country."If people feel tired they should be in a position where they can say that, because everybody's fatigue levels are different."

"It's quite hard to put a square box around fatigue because we're all different. That's why it's important to look at your operation, what you're doing, and getting a good culture around fatigue." That approach will help identify the hazards and allow an organisation to manage the associated risks and run an effective fatigue scheme.

Being more proactive and systematic in the way we manage fatigue is aligned with the CAA's whole approach to aviation safety, says Mark Hughes.

He says while the bigger operators have more resources, smaller operators can tailor their systems to the size and the complexity of their operation.

"Fatigue management systems need to be effective in practice, and a good company safety and reporting culture will help to identify where changes are needed."

A Systems Approach

In 2011 there were big changes in the International Civil Aviation Organization's (ICAO) standards for international operators.[1]

"That's sort of the watershed where fatigue management approaches were firmly anchored on scientific principles, knowledge and operational experience," says Xavier Ruch.

The changes also made it explicit that companies would need to use their Safety Management System (SMS) to manage fatigue-related risks and think about how fatigue can affect their safety performance.

Philippa Gander says it's no longer sufficient to simply adopt the limits when operating under prescriptive rules.

"You still have to manage fatigue as a hazard in your SMS."

She says that approach is consistent with the new Health and Safety at Work Act 2015.

"It's the same process – identifying hazards and their associated risks, mitigation, and monitoring. That's what the Act requires and that's also now what ICAO is saying."

For more information on fatigue go to the CAA web site, www.caa.govt.nz, "Medical". ■

1 ICAO's standards and guidance material on fatigue: http://www.icao.int/safety/fatiguemanagement/Pages/default.aspx



What happened here?

Sifting the lessons from the wreckage

An interview with Hugh de Lautour, 22,000-plus hour power pilot, shown at AvKiwi 2016, held audiences rapt as he recounted the story of his glider's out-landing and ground loop.

AvKiwi Safety Seminars 2016, *"What Happened Here? Sifting the Lessons from the Wreckage"*, put attendees into the shoes of an accident investigator. Thirty two groups, from Invercargill to Kerikeri, a total of 2203 attendees, witnessed six accidents/incidents that were representative of common themes seen in New Zealand over recent years.

One of the accidents, featuring a high-performance glider, GSW, showed that having high-time experience in one area of expertise, doesn't counterbalance the risk of having few hours in another.

Hugh's Tale

The view from the the ground at Centennial Park, Taupo, hinted at a really good 'street' (a line of clouds with lift potential). On the strength of the cloud formation, Hugh decided to take GSW, a Ventus cT motor glider, out for a leisure flight.

Like any *Air Crash Investigation* story, the plot thickened – Hugh revealed that the motor had proved troublesome in previous flights. It would start, but it didn't function well enough to let the glider climb.

GSW was towed to roughly 4000 feet out to the northwest of the club. But after setting off under the street, it didn't fulfill the promise of expected lift. He turned back to Centennial Park, and that's where Hugh's plan changed and he decided to give the motor a try.

"I had plenty of height – a good 3500 feet – so I decided to start the motor and see if attempts to fix it had been successful. In the past, when I tried to run the motor I was always over the field."

Once deployed, the Ventus cT's motor needs a windmilling start. Hugh put the glider into a dive and the motor started with some success.

"As in previous flights, when I tried to climb, the motor began to fade. I focused on the motor, then dived a bit more, and a little further again, then I looked out the window…'Oh dear'! I was too low, and what's more, I didn't have the security of the field under me. I decided to give the motor away and head back to Centennial Park."

After cutting fuel to the motor, Hugh began the labour-intensive process of retracting it. To retract the motor in this model of glider, a switch needs to be held down. To complicate matters, the motor can't be stowed while it's still windmilling – the process must be paused halfway to let the blades settle.

"One of my hands was flying the glider, the other was retracting the motor, and as I juggled the two tasks, I stared out at Centennial Park, wondering, 'am I going to make it?'

"I knew there was another airfield between myself and Centennial Park, Aratiatia strip, but I lost sight of it. So rather than risk getting myself into a worse situation, I decided I'd go for the largish paddock that was right in front of me.

"I still wasn't configured for landing as my left hand had been occupied with the motor. I didn't have the gear down, but I was able to operate the speed brakes. I didn't change the flap setting as leaving it seemed to be the safest option."

The glider touched down with a bit more speed than it should have. To avoid falling victim to a rapidly approaching fence at the far end of the paddock, Hugh ground-looped the glider. The fuselage was torn apart by the force, but Hugh walked away unharmed.

Mistakes Are Lessons

"My first mistake," says Hugh, "was changing my initial plan and attempting to start the motor. A quick change of plan is seldom a good idea unless you really think it through. Also, I think it was compounded by the fact I'd had the glider for only three months. The drag from the motor cuts the glide ratio down from about 40:1 to 16:1. In retrospect, once I had got the motor away, I probably could have made it back to Centennial Park if I was more familiar with the glider's performance."

The CAA often sees accidents where the pilot wasn't familiar with how all the aircraft systems worked, or worse, did not know how their aircraft handled in all phases and configurations of flight.

Distraction also played a large part in the accident, as evidenced in the official report, "*Due to the excessive drag caused by the under-performing sustainer motor, the pilot became distracted by the problems with the sustainer motor and did not monitor his height loss and its influence on his landing plan.*"

While some distractions can't be avoided, they can be minimised. See the article "Avoiding Distractions" on page 16.

Prepare and Keep Planning

More than one pilot has been embarrassed by the farmer's son's comment, "Why didn't you land on my dad's airstrip? It's just over the fence."

Preparation is the key to a safe out-landing. Don't run out of altitude and ideas all at the same time. Always consider your out-landing options, and keep updating those options as suitable landing areas diminish.

"I did have options available, but I persisted longer than I should have trying to get the motor going, which, in the end, ran me out of options," says Hugh.

Gliding NZ's instructor handbook says, "*The pilot must have selected a suitable field at any time a landing appears likely – that is, below 2000 feet agl.*" This doesn't mean you must carry out a landing, but it does mean that you should be thinking about your options whenever you are below 2000 feet.

While it's tempting to think you can squeeze a few more miles out of your current height, don't try to stretch the final glide. There have been far too many instances of that turning out badly – and in New Zealand, at least one fatality. ■

Online Course

GSW's out-landing and ground loop is just one of six accidents or incidents profiled on the *What Happened Here?* online course. Take a tour with us and learn the lessons you will hopefully never have to learn through your own experience.

www.caa.govt.nz/avkiwi

Reporting Occurrences

The booklet *How to Report Occurrences* is available to help pilots, engineers, and operators through the process of reporting an occurrence. For a copy, email info@caa.govt.nz, or ask your Aviation Safety Adviser.

You can report accidents and incidents online, by email,over the phone, and now with a handy app, called *Here and Now*, available on iOS and Android.

The app uses your phone's GPS functions to pinpoint the exact location of the accident or incident. You can also attach photos to your report by using the '+' button under the location map.

GSW's emergency paddock landing in 2013 after departing from Centennial Park in Taupo. After losing sight of Aratiatia strip (left image), the pilot elected to land on a large paddock directly in front of him. The glider touched down with a bit more speed than it should have, and the pilot ground-looped the glider to avoid a fence at the far end of the paddock. The fuselage was torn apart by the force.

Avoiding **Distraction**

Quit your hashtagging, put down your cellphone, and stop flicking through filters to make the Southern Alps look even prettier than they are. You're flying an aircraft, so that's what your mind needs to be on right now. The text to pick up some milk can wait. Just fly the plane!

Anyone doing any task can get distracted. But the potential for disaster is much greater in aviation.

Some major air disasters have resulted from air crew and air traffic controllers being distracted. Sometimes inattention will result in only a cautionary tale, sometimes in a large scale accident investigation. Neither are good. So how do we mitigate the risks of distractions?

What is a Distraction?

Distractions come in different guises.

At the most serious end of the scale, in Madrid in 2008, 154 fatalities resulted from Spanair flight 5022 attempting to take off without the flaps extended. The flight crew were chatting during the checklists.

At the other end of the scale, you could be distracted by passengers pointing out some cute ducks, and crash the helicopter – this actually happened in New Zealand.

Or maybe you have a passenger violently vomiting? The sound and smell of that is going to be hard to push aside when you're trying to concentrate on flying.

Some distractions can't be avoided. A warning signal going off in the cockpit is going to distract you from what you're doing, but it's bringing your attention to something important. Or air traffic control may contact you with important information, distracting you from what you were doing at the time. All aircrew are potentially affected by such legitimate distractions. In 1972, 101 people died in a crash into the Florida Everglades, when the crew of Eastern Air Lines flight 401 got distracted by a faulty light bulb.

It is important to prioritise all the tasks you have on at the time. For example, the ATC call, or the cockpit alarm, may be the most important thing you need to attend to.

Otherwise, remove the distraction wherever possible. Then re-establish your situational awareness. Identify what you were doing; asking yourself at what point you were interrupted; and decide what action will get you back on track.

Always remember the basics of flying: aviate, navigate, and communicate.

When deciding what action to take, have a Plan B should things not go as planned. Keep a lookout for an alternative place to land. If the distraction can't be mitigated, you should get on the ground as soon as you can.

Checklists

If you're going through a checklist at any stage of the flight, be it a preflight or during an engine failure, and you get interrupted or distracted, start again from the beginning.

You might be sure you know where you're up to, but checklists are designed to be followed methodically, so you need to ensure you're not missing any step.

If you or your co-pilot are going through a checklist, or are on the radio, make sure anyone with you knows not to interrupt you unless it's urgent.

While Air Safaris' Matthew Hollands is aware of potential distractions around him, he keeps his focus on flying.

Sterile Cockpit

In commercial aviation, a sterile cockpit environment means the crew doesn't engage in any non-essential activities, including conversations, during critical phases of flight. This is usually from pushback until passing 10,000 ft on climb, and on descent through 10,000 ft all the way through to stopping at the gate.

These same principles can be applied to GA, including recreational flying.

Cameras

In-flight photos and video are spectacular. The views are incredible and it can give you a perspective that you can't get anywhere else. Plus it can record great memories for you and your passengers.

Before the flight, establish agreement with your passengers about the use of cameras. That way everyone knows exactly what's expected and when they can use their camera during the flight without causing distraction. A flash going off in the cockpit could temporarily blind your view – especially if flying at night – so ensure the flash is off before takeoff.

Cellphones

It should be obvious that a phone in the cockpit is a big distraction danger. No matter how hard you try, it's difficult to ignore a ringing phone, or even the chirp of a text message. Even if you do ignore it, the sound will have potentially broken your train of thought. What important step could you have missed because of such a distraction?

Turn the phone off, or at least put it on silent and out of reach, especially when you're in the most critical stages of flight: preflight, taxi, takeoff, and descent/landing.

Several accidents, some fatal, have occurred when a phone call has been a factor.

But It's Not Just Pilots…

LAMEs have their own issues with distraction. Their work, often very technical, needs concentration. So it's just as important as it is for pilots, for them to turn off their cellphone before embarking on a task. That text message will still be there at the next break, and if voicemail is set up, an important call won't go missing.

The mere awareness of knock-off time approaching can be a distraction, as thoughts turn to post-shift activities and away from the task still to be done.

It's important therefore, that if a task can't be wound up by day's end, go back a few steps the next day, to make sure nothing was missed during that end-of-the-day concentration wander.

And if someone else is taking over the task after the end of the shift, ensure handover notes are detailed enough so any 'non-focus' moves will be picked up. ■

"Line Up and Wait… **I said WAIT!**"

When issued with a clearance or departure instruction, you need to keep your headspace in the right kind of airspace. The biggest threat to your inner cockpit zen is confirmation bias.

Confirmation bias is a tendency to search, or interpret, information in a way that confirms given preconceptions.

Always listen carefully when communicating with air traffic control (ATC), as the misinterpretation of a single word can alter the entire context of a clearance or instruction.

ATC uses standardised phrases to reduce the risk of occurrences, such as runway incursions, and takeoffs without a clearance.

If you're ever unsure, "say again" is your best friend.

"Cleared for Takeoff"

In the aviation environment, the phrase TAKEOFF should only ever be used as part of a takeoff clearance. At other times the words DEPARTURE or AIRBORNE are used.

Be aware that an air traffic controller is, in most cases, unlikely to clear an aircraft for takeoff until the pilot has actually called 'ready'.

"I've had two turboprop aircraft depart without a takeoff clearance this year," one New Zealand air traffic controller remarks.

"In both cases, given the traffic situation at the time, those aircraft could have departed safely (the release had been obtained), but neither pilot had actually reported 'ready'.

"In situations where the pilot reports 'ready' and cannot be cleared for takeoff, another instruction such as 'line up and wait', or 'hold position' would normally be issued."

Some Possible Takeoff Misinterpretations

VFR Departure Clearance

Tower: *XYZ leave control zone via SEAGROVE 2000 feet or below report SEAGROVE.*

A departure clearance instructs a pilot how to leave controlled airspace after departure. Usually, the departure clearance will be given in a separate transmission from the takeoff clearance, to prevent the two being confused.

Departure Instruction

Tower: *ABC turn left after departure.*

The key word which accompanies the above left turn instruction is DEPARTURE. Until the word TAKEOFF is issued by ATC, the aircraft's wheels must stay firmly planted on the ground.

Traffic Information

Tower: *ABC traffic is a Cessna operating in the Matakana sector 2500 feet or below.*

Giving traffic information is the controller's way of helping you paint the big picture – don't misinterpret it as a takeoff clearance.

Photo: istockphoto.com/Chalabala

Note that relevant traffic information will be issued whenever ATC is aware of conflicting aircraft if separation is not required. It's your job to sight that traffic (if necessary) and maintain a safe distance.

Conditional Line-up

Tower: *Fastair 354 report the blue Dash 8 on final in sight.*

Fastair 354: *Blue Dash 8 in sight.*

Tower: *Fastair 354 behind the landing Dash 8 on short final line up behind.*

Fastair 354: *Behind the landing Dash 8, line up behind, Fastair 354.*

If the preceding aircraft causing the condition is on final, a conditional line-up instruction will contain the key word BEHIND at the beginning and end of the instruction.

If the preceding aircraft is occupying the runway, or taxiing in front of the aircraft receiving the clearance, the controller will use the word AFTER, instead of BEHIND, in a conditional line-up instruction.

It's worth noting that the controller will only issue a conditional line-up clearance if they consider that the aircraft receiving the clearance can see the aircraft causing the condition.

Helicopter Departure Investigation

The CAA conducted a theme investigation to analyse the reasons for helicopter takeoffs without a clearance. A theme investigation tries to identify common themes in a set of aviation accidents and incidents.

The analysis revealed three locations where 61 per cent of incidents predominantly occurred involving helicopter takeoffs without a clearance. They were Nelson, Hamilton, and Palmerston North.

Matt Harris, CAA Safety Investigator, explains that the potential consequences of a departure without a takeoff clearance is classed as 'high risk'.

"At those three aerodromes, there's a large amount of commercial traffic, and that raises the risk. We determined that the helicopter occurrence rate is approximately seven times higher than the fixed wing rate at the same three aerodromes," says Matt. ■

Further Reading

Advisory Circular AC172-1 *Radiotelephony Manual* – see www.caa.govt.nz, "Advisory Circulars".

Plane Talking booklet – email info@caa.govt.nz for a free copy.

Plane Talking online course – go to www.caa.govt.nz/avkiwi.

Alternative Process for **Determining Cardiovascular Health**

The CAA has adopted an alternative process for determining cardiovascular health which, for many participants, may cost less. The new process may not be the best option for everyone, however.

"We've recently reviewed cardiac imaging methodologies and accept that CT coronary artery calcium scoring (CT calcium scoring) is a useful way of assessing cardiovascular risk," says Dougal Watson, CAA's Principal Medical Officer.

The calcium test will only be applied to participants who are judged to have an elevated cardiovascular risk. There are many factors that determine cardiovascular risk including age, blood pressure, and whether someone smokes.

"If you have a CT calcium score of 0, then you may not need another test for five years," says Dougal. "That could make it cheaper and easier than the current process."

However, if the test comes back higher than 0, then you will need to follow the existing process which usually involves an exercise stress electrocardiography test, incurring the cost of both tests.

The CAA suggests that you discuss with your doctor which process will be best for you.

"We will be looking at our cardiovascular risk protocols in more depth in the future," says Dougal. "However, this interim step should make the process easier for many applicants without affecting safety." ■

Photo: istockphoto.com/Nerthuz

SMS Implementation

Implementation plans are flowing into the CAA for approval. If you're still unsure how to go about yours, here's some advice from two companies whose plans have been approved.

Getting Started

"This was the most difficult part," says David Norris, Quality Assurance Manager for the Hamilton-based Kiwi Balloon Company. "But using the structure of Revision 1 of AC100-1 really helped. It breaks down the components of SMS and provides explanations. Setting up a table using the template from Annex D created a means of making a structured start to building the gap analysis."

Assessing Risk

Tim Rayward, Manager of Flight Operations at Air Safaris, in the Mackenzie Country, says most aviation operations would have been assessing and managing risk for years.

"There's no need to reinvent the wheel. We just looked at what we already had in our exposition, our SOPs, our training manuals, checklists and so on. It was almost all there already.

"The challenge for us was in documenting it in a coherent way, so anyone coming in from outside can quickly see what we are doing."

David Norris kick-started his company's process by looking at its existing health and safety hazard assessments which, in part, incorporated risks.

"I then added in risk scores for all stages. That included a risk rate for the hazard or risk, then a second risk rate, once controls have been put in place. I used the risk matrix from CAA SMS Booklet 4."

The company also updated its safety policy to incorporate SMS. That has the added benefits of bringing up to date any documentation, for both the new health and safety legislation and SMS.

"Updating the policy also shows a commitment by the company to SMS," David says.

Tailoring it for Your Company

David says using the gap analysis template, he worked through the Kiwi Balloon Company exposition to see what matched.

"Most of the body of SMS exists within the exposition. Start with the operational aspects because getting those into place and working gets the system nominally operational.

"Then I was able to assess where the shortfall was, what action or task was required and briefly summarise that, assigning staff members to those tasks."

Tim believes rather than companies starting with the SMS documentation and looking at how they already comply, they should do it in reverse.

"You could lose your way a bit starting with SMS requirements. It's better to look first at what you have in play, then match it to the SMS material.

"For instance, to comply with the rules, we have fuel management policies to manage the risk of running out of fuel. So that's all in place. Really, it's not like we need to do anything more."

Working With the CAA

David Norris says he enjoyed working with the CAA staff on the implementation plan.

"I think we're all learning and everyone needs to share knowledge and experience.

"It's far better for people in the aviation industry to see CAA as a facilitator rather than a regulator policing the rules. Too many people regard ignorance of what SMS entails as a defence."

Other Bits

Both companies made use of the evaluation tool, which provides key indicators and means of compliance acceptable to the CAA.

Photo:

Plans – **Top Tips**

David Norris advises that companies really take their time working through the evaluation tool. "You cannot take shortcuts with this. The CAA will be looking for the detail of 'Element 0' which is in the evaluation tool, to appear in your application with the gap analysis."

The evaluation tool (CAA form 24100/2) is at www.caa.govt.nz, "Forms".

David says one set of risks every operator needs to think about is 'what if I cannot run the business or fly the aircraft?'

"The risk that needs to be considered in an SMS is what action will be taken if, say, a pilot leaves during the peak of the business operation. SMS is also about sustaining the business."

David says the SMS implementation plan should include how long the company estimates it will take for each SMS task to be completed. He also says included in the thinking about SMS should be the consideration of the cost to move to a Safety Management System.

Up and Running

David says once the operational side of SMS is in place, he'll concentrate on the management aspects, including monitoring.

"SMS cannot be put on a shelf to gather dust. Whether or not the SMS hazard and risk documentation has been part of an internal review will be a key part of any CAA audit. The documentation may not need to be changed, but it does need to be reviewed.

Building a Culture

Tim Rayward says apart from the nitty gritty of keeping documentation and procedures updated, there is a 'big picture' approach that will keep SMS fresh.

"You can have a Safety Management System sourced in your exposition and other safety documentation, and there is nothing wrong with that," he says.

"But you can go further and make your SMS your safety 'umbrella', and take it into every aspect of your operation. For instance, with active staff involvement, with regular round table staff meetings about safety, with a robust reporting system, with the QA pilot and manager talking about safety every single day.

"At Air Safaris, risk and safety is not something 'added on' to our business-as-usual. It forms the basis of our business-as-usual.

"For us, SMS will be a way of thinking, not just compliance."

The Assessment

The CAA says the Kiwi Ballooning Company clearly identified the current state of the organisation, where it wanted to be and therefore where the gaps were.

"David identified what was needed under SMS," says CAA's SMS team member Adrian Duncan. "He looked at what the company needed to meet those requirements. And crucially, he documented everything.

"Then he took the information he'd gathered about the 'gaps', assigned time and resources and people to them, and that showed a clear plan of how the company was going to get there."

SMS team member Austin Healey says Air Safaris' implementation plan was impressive in that it provided an overall picture of how they intended to proceed, supported by a clear and logical timetable of activities, risk management and governance.

"It was just what we were looking for to give us confidence that the plan could succeed," he says.

For more information about SMS, go to www.caa.govt.nz/sms.

To keep up to date with developments in SMS, subscribe to our email notifications at,

www.caa.govt.nz/subscribe

For free booklets on implementing a Safety Management System, email sms@caa.govt.nz. ■

Tim Rayward, "SMS will be a way of thinking, not just compliance." Photo courtesy of Air Safaris.

Part 135 **D-Cat Privileges Reviewed**

Recent occurrences led the CAA to conduct a review of the D-cat instructor privileges, and as a result, some Part 135 expositions may need updating.

The D-cat was initially introduced in the mid-1960s as an airline pilot qualification to utilise a highly experienced pool of airline pilots who didn't want to become fully-fledged instructors.

To ensure it wasn't misused, privileges were restricted to instrument flight training and type ratings.

Driven by demand for non-airline type role training in other sectors, particularly for Part 135 operations, the D-cat instructor rating has become a staple in such role training as sling loads, night vision imaging systems, and multi-engine instruction.

The Issue

The CAA has determined that action needs to be taken to clarify the use of D-cat instructors within some Part 135 operations.

When the rating was conceived, the intention was that the operational privileges afforded to a D-cat by their employer should be exercised only within that same air operation.

Due to developments within aviation, however, D-cat privileges have gradually expanded within the operational training sphere, and some of the Part 135 training programme requirements have not kept pace.

Read in isolation, Part 61 restricts the D-cat instructor ratings to instrument flight training and type ratings. But if Part 61 is read in conjunction with Parts 121, 125, and 135, the rules allow D-cats to provide operational flight instruction, so long as they have sufficient role experience.

Because the skills required to give initial flight instruction are totally different to those required for operational instruction, D-cats are restricted to operational flight training only. Pilots receiving operational instruction are already qualified, and in many cases, have considerable flight experience.

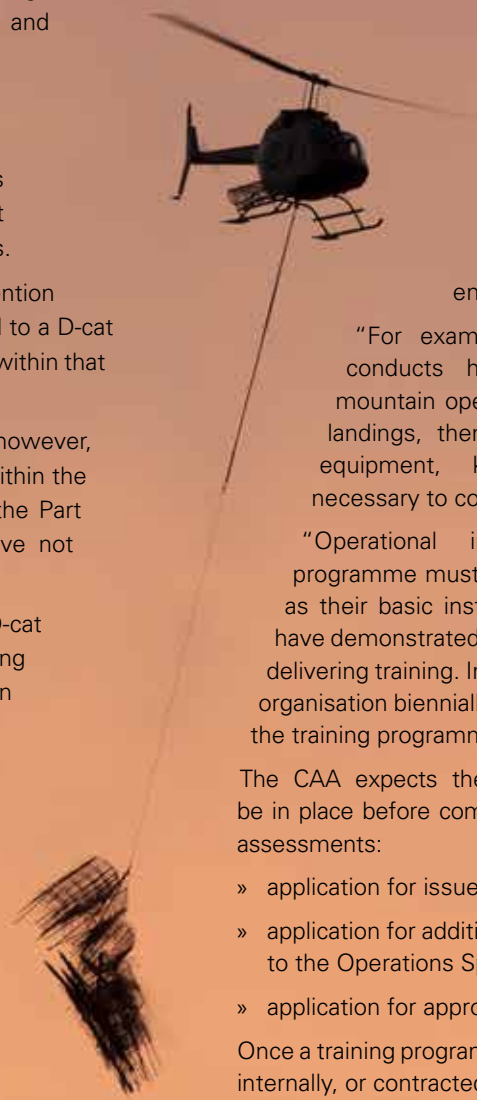


Photo: istockphoto.com/SanderStock

The Answer

Some Part 135 operator expositions will need to be updated to ensure they comply with rule 135.553, which requires that they contain the training programmes and syllabuses. These training programmes must be accepted by the CAA.

A, B, or D-cat instructors with suitable role experience will continue to deliver the training programmes, and those approved instructors need to be named in your exposition. Training programmes must ensure that all crew members are sufficiently trained and competent to complete required duties.

Bill MacGregor, CAA Principal Aviation Examiner, says rule 135.553 training programmes need to reflect an organisation's scope of activities and risk environment.

"For example," says Bill, "if the organisation conducts high-tension power line surveys or mountain operations, including heli-skiing and snow landings, then the programme must describe the equipment, knowledge, skills and techniques necessary to conduct that operation.

"Operational instructors delivering the training programme must hold an A, B, or D-cat instructor rating as their basic instructional qualification. They must also have demonstrated experience in the role in which they are delivering training. Instructors must also demonstrate to the organisation biennially that they remain competent to deliver the training programme."

The CAA expects these improved training programmes to be in place before completing the first of any of the following assessments:

- application for issue or renewal of an AOC; or
- application for addition of flight crew training privileges (M6) to the Operations Specifications; or
- application for approval of an SMS implementation plan.

Once a training programme is established, it may be conducted internally, or contracted to a Part 141 training organisation, but it remains the responsibility of the organisation to ensure the programme is properly implemented. ■

Safety Reporting in **Adventure Aviation**

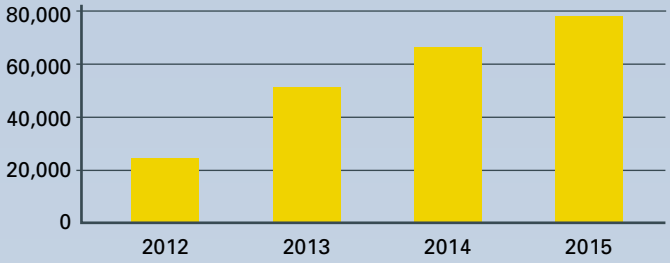
With activity burgeoning in adventure aviation, the CAA is keen to work with the sector to distribute safety information and 'lessons learned'. That's why all Part 115 operators should make it a priority to report all occurrences, including accidents or incidents.

Information from Statistics New Zealand shows that visitor arrivals in 2015 increased 10 per cent from 2014, the first time the percentage increase has reached double digits.

That growth is the driver behind the increased activity in the adventure aviation sector.

Forecasts by the Ministry of Business, Innovation, and Employment suggest that tourist numbers will grow at a rate of 4 per cent annually through to 2021 (*NZ Tourism Forecasts 2015–2021*).

Adventure Aviation Parachute Flights



That's why it's important that operators undertake high-quality, information-driven safety management, and reporting of occurrences is critical to that.

The key to safety management is getting information about potential risks. In the words of safety scientist James Reason, this means:

> *"Creating a safety system that collects, analyses, and disseminates information on incidents and near misses on a regular basis, as well as regular proactive checks on the system's vital signs."*

At the CAA's Part 115 Industry Day earlier this year, Joe Dewar from the Intelligence and Risk Analysis Unit proposed working with the sector to establish a safety programme based on disseminating information to operators.

It's been more than four years since the implementation of Part 115 *Adventure Aviation – Certification and Operations*, which saw the formation of a regulated adventure aviation sector in New Zealand.

It's incumbent on Part 115 operators to report any occurrences but it appears that's not always happening.

"They are doing more flights than what the stats are telling us," says Jeanette Lusty, the CAA's Team Leader Flight Operations Adventure Aviation.

"We had a unit review meeting recently and we had a case that didn't look right. They recorded 80 flights but when we went and asked them, they'd in fact done 3000."

"It just gives us the wrong picture which could well send us down the wrong path for risk assessment."

Making it easier for operators to file reports is part of the CAA's proposal.

"Because Part 115 is relatively new there's a lot of education we need to get across. But more importantly, under the new programme I'm proposing, there are benefits to the operator that can come from this," says Joe.

The CAA releases some Part 115 accident and incident reports primarily via its web site, but under the proposal, targeted information would be systematically distributed to adventure aviation operators.

"What I'm saying is we're going to give it back to industry, we're going to show operators the lessons learned, we're going to give them other information useful to what they do.

"Things like tourist numbers, when and where that's going to develop by area, information relevant to the sector. As soon as operators start joining this information cycle by submitting occurrence reports and investigation findings we can make them a much more informed operator."

Operations Manager at Skydive Auckland, Fiona McLaren-Baldwin, is in charge of the reporting of occurrences to CAA.

"We have a trend-monitoring system which we use to record near misses and incidents. Any important findings we are eager to share with other industry operators. Learning from other people's near misses or incidents helps to prevent them from happening to your own organisation," says Fiona.

Joe Dewar sees it as treating safety information alongside other key business data.

"So basically putting safety intelligence on the same level as business intelligence."

Feedback

Please contact Joe with your feedback on the proposal and suggestions for how it could be developed, email: joe.dewar@caa.govt.nz.

To report occurrences online go to: www.caa.govt.nz/report. ■

Electrical Load Analysis – Does Your Aircraft Need One?

As aircraft are increasingly reliant on electrically powered gadgets, the CAA is turning its focus to the importance of the aircraft having a robust and adequate electrical system.

Having an up-to-date and complete Electrical Load Analysis (ELA) for each aircraft in New Zealand has always been a necessity – albeit an often-ignored one.

So the CAA is now focusing on it, with a new Advisory Circular giving guidance on how to perform an ELA.

An Electrical Load Analysis report is a document providing evidence of two things. Firstly, that the aircraft's electrical system – generation, storage, and distribution – is capable of running all the electrically-powered equipment on the aircraft, under all flight conditions.

And secondly, it testifies to the fact the battery is grunty enough to keep the aircraft's emergency systems going, should the electrical system fail.

It requires the listing of each item of equipment or system in the aircraft, how much power they require, and the identification of when each is used during the different phases of flight.

"The number of applications is rising for approval to utilise modern navigation systems," says Andy Rooney, CAA's Team Leader of Avionics. "And features of modern aircraft are increasingly powered by electricity. So it's essential everyone knows how robust the electrical system is."

A complete and up-to-date ELA will be mandatory for aircraft coming into the country, for aircraft whose operators are seeking navigation approvals, and for those looking at modifying electrical and avionics systems.

"It will be another tick in the airworthiness box," says Andy Rooney.

He says any time an aircraft is modified, the electrical load may change.

"So really, the ELA is a living document and should be constantly updated to reflect the aircraft's configuration.

"Eventually we would like to see one in every Aircraft Logbook in New Zealand."

Andy Rooney says, despite the ELA having always been a fundamental airworthiness document, the CAA is not applying the necessity for one in retrospect – that is, to aircraft already in the country – unless they are being modified or seeking navigation approval.

"Happily, we are already seeing growing numbers of ELAs being submitted. So there are already good maintenance people out there doing a thorough job of installing a modification."

For more information, see *Advisory Circulars* on the CAA web site, www.caa.govt.nz. ■

Glass cockpits, like the one in this BK-117 helicopter, are increasing demand on aircraft electrical systems.

Photo courtesy of Graeme Gale/HeliOtago NZ

HIMS Brochure

This issue of *Vector* includes a brochure from HIMS NZ.

HIMS (Human Intervention Motivation Study) is a programme for managing substance use disorders in the aviation community.

A cornerstone of HIMS is the understanding that substance dependence is a treatable medical condition. HIMS is modelled on well-established overseas programmes which have assisted thousands of pilots in getting back to work.

The programme is supported across the aviation industry with employers, unions, and the CAA working together to preserve careers and further flight safety.

To order more brochures, email hims.simon@gmail.com. For more information on HIMS, visit www.hims.org.nz.

Correction

In the article "Reporting Drone Occurrences" in the March/April 2016 *Vector*, we reported that there were 198 occurrences involving drones reported to the CAA in 2015. Unfortunately, duplications were not removed from this figure and the correct figure is 121. We apologise for this error.

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 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
1 Aug 2016	8 Aug 2016	13 Oct 2016
29 Aug 2016	5 Sep 2016	10 Nov 2016
26 Sep 2016	3 Oct 2016	8 Dec 2016

See **www.caa.govt.nz/aip** to view the AIP cut-off dates for 2016.

Aviation **Safety Advisers**

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

Don Waters
(North Island)
Mobile: +64 27 485 2096
Email: Don.Waters@caa.govt.nz

Carlton Campbell
(South Island)
Mobile: +64 27 242 9673
Email: Carlton.Campbell@caa.govt.nz

John Keyzer
(Maintenance, North Island)
Mobile: +64 27 213 0507
Email: John.Keyzer@caa.govt.nz

Steve Backhurst
(Maintenance, South Island)
Mobile: +64 27 285 2022
Email: Steve.Backhurst@caa.govt.nz

Report Safety and Security Concerns

Available office hours (voicemail after hours).

0508 4 SAFETY
(0508 472 338)
isi@caa.govt.nz
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-FDP Cessna 180

Date and Time:	24-Jan-2016 at 10:30
Location:	Taumarunui
POB:	2
Damage:	Substantial
Nature of flight:	Private other
Age:	70 yrs
Flying Hours (Total):	1000
Flying Hours (on Type):	900

While approaching to land on a farm airstrip, considerable sink was encountered on short final. The pilot began a go-around, but the aircraft struck rising ground. That caused the right-hand undercarriage leg to fail. The aircraft became airborne again and the pilot was able to continue to fly the aircraft. He made an emergency landing at Taumarunui Aerodrome where the aircraft sustained damage to the right wing and propeller.

CAA Occurrence Ref 16/231

ZK-NSN Piper PA-31

Date and Time:	26-Apr-2015 at 22:15
Location:	Whenuapai
Damage:	Minor
Nature of flight:	Training dual

The operator reported that the aircraft landed with the landing gear in the fully retracted position after the pilot's various attempts to extend the gear failed.

A joint operator and CAA investigation determined that the landing gear selector lever cable locking mechanism had failed. It was further determined that the mechanism had been superseded by a Service Bulletin dating back to 1971, but had not been carried out. The investigation also found the manufacturer's Illustrated Parts Catalogue for the serial number effecting the aircraft to be incorrect in its depiction of the type of selector locking mechanism supposed to be fitted.

The manufacturer and the Federal Aviation Administration were advised of the accident and the anomalies identified in the Illustrated Parts Catalogue, along with the existence of the Service Bulletin affecting a number of aircraft still in service.

CAA Occurrence Ref 15/2015

ZK-CBN Druine Turbulent Ultra Light

Date and Time:	05-Feb-2014 at 18:36
Location:	Te Awamutu
POB:	1
Damage:	Substantial
Nature of flight:	Private other
Pilot Licence:	Private Pilot Licence (Aeroplane)
Age:	56 yrs
Flying Hours (Total):	2000
Flying Hours (on Type):	50

The afternoon's flight was the pilot's third flight of the day from their own airstrip. The takeoff was normal to about 100 ft when the engine suddenly returned to idle. The pilot landed the aircraft straight ahead and level. The aircraft landed heavily and broke up on impact injuring the pilot's back and covering his legs in fuel. The pilot was able to get out of the aircraft prior to the first responder's arrival.

The aircraft was powered by a Volkswagon engine which had an unusual throttle linkage system that failed. The cable to the carberator broke and that allowed the engine to go to idle power.

A superior design suggested by the pilot was to have a simple push pull cable with a light spring to retain a full throttle setting.

CAA Occurrence Ref 14/468

ZK-HOL Composite Helicopter KC518

Date and Time:	08-Nov-2014 at 09:12
Location:	Stillwater
POB:	1
Nature of flight:	Test
Pilot Licence:	Private Pilot Licence (Helicopter)
Age:	58 yrs
Flying Hours (Total):	11760
Flying Hours (on Type):	260
Last 90 Days:	24

During a test flight, the helicopter developed a low frequency vibration with a partial loss of control. The crew managed to manoeuvre it to a position where a landing was attempted but the machine rolled over as it was about to land. The non-flying crew member received a very minor injury during the evacuation.

Investigation found that the single link scissor pitch rod end had failed on the threaded portion. The part had not been over-torqued and had failed progressively over a short time.

As a result of this incident the designers are now going to introduce a double scissor link for both the rotating and non-rotating mechanisms.

CAA Occurrence Ref 14/5242

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

Cessna 172R

Fuel injector

Shortly after takeoff, the crew felt a shudder and the tower advised them that smoke was trailing behind the aircraft. Full power was maintained downwind and they continued to feel the shudder. The engine parameters remained in the normal range throughout. No further issues were encountered and the aircraft landed safely.

The aircraft had been modified with the fitting of a Centurion TAE125-02-114 diesel engine. The maintenance investigation found that a diesel fuel injector was faulty. This resulted in incomplete combustion in one cylinder, producing the visible exhaust smoke.

The fuel injector was replaced and the aircraft returned to service.

CAA Occurrence Ref 16/2359

Diamond DA 42

Relay rack bonding

ATA Chapter:	2400

During a simulated right engine failure, the left engine shut down on its own, and the aircraft had a complete momentary electrical failure. The instructor took control, and after 5 seconds the left engine started on its own and electrical power was restored.

During the maintenance investigation, subsequent engine ground runs resulted in sporadic random shutdowns of one, or both engines simultaneously, and electrical outages varying from screen flickers on the PFD/MFD, to complete loss of electrical power on the airframe for several seconds.

The problem was traced to a faulty earth return on the relay rack. The earth return path resistance had become too high causing arcing during times of heavy electrical load.

The relay rack was detached from the aircraft. Anchor nuts were removed, surface irregularities removed, new anchor nuts fitted and new hardware used to re-attach relay rack. Bonding then tested satisfactory. Further electrical checks and a ground run was carried out.

CAA Occurrence Ref 14/5239

Embraer EMB-820C

Fuel tank vent

ATA Chapter:	2810

During takeoff, approaching 85 knots, the right engine started to surge with the aircraft drifting slightly to the right. The pilot decided to continue the takeoff, with the aircraft taking some time to get airborne. Once airborne, an engine instrument check revealed the right engine RPM and fuel pressure fluctuating. The engine also appeared to be down on power. The pilot did a circuit and landed safely.

Maintenance investigation found that a wasp had blocked the right-hand fuel tank vent resulting in a reduced fuel flow to the engine. The wasp was removed and all fuel tank breather lines checked clear. The operator has since made plugs with "Remove Before Flight" tags that are fitted to the vents while the aircraft are parked.

CAA Occurrence Ref 16/1523

Hughes 369D

D/S couplings

Part Model:	500D
Part Manufacturer:	MD Hughes
Part Number:	369D25501-9
ATA Chapter:	6500

The manufacturer's programme of maintenance for drive shaft couplings was changed from 'inspection' to 'replace' by Directive in December 2014. This was overlooked until a logbook flight hours audit was requested by the operator in May 2015. The aircraft was immediately grounded, and parts changed as per the maintenance directive.

CAA Occurrence Ref 15/3113

Pacific Aerospace Cresco 08-600

LH rear attachment

Part Manufacturer:	Pacific Aerospace
Part Number:	241117 & 243028
ATA Chapter:	5700

During scheduled maintenance, the left hand rear wing mounting bolt was found to be loose in the attachment hole. The maintenance investigation determined that the mounting hole was worn due to cyclic loads, causing fretting of aluminium mounting fittings. The rear wing spar doubler fitting was replaced, and the fuselage wing mounting fitting was replaced.

CAA Occurrence Ref 16/1765

Aviation Safety Coordinator Course

Nelson
13 to 14 October 2016

Quality Inn Nelson
40 Waimea Road, Nelson

Auckland
10 to 11 November 2016

Sudima Auckland Airport
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 understand the role of a safety coordinator, or for those who are already in a safety role, to refresh your skills:

- 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).

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