July/August 2015

POINTING TO SAFER AVIATION

vector

The Impossible Turn

Free MetFlight GA

I Learned About Flying From That

Navigating our New Southern Sky

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

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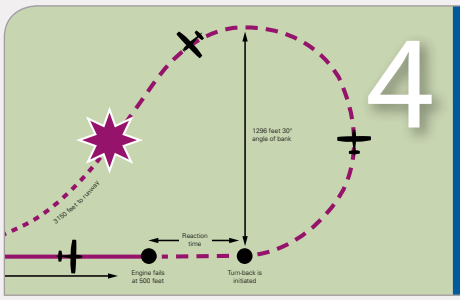
In this issue...

3

Free MetFlight GA

You can now get certified Met information for free as a result of a Government provision in Budget 2015.



4

The Impossible Turn

Takeoff. Power loss. Turn back? No? What then? Long-time pilots give their opinions about what to do after the engine dies. It's never nice, but preparation, prevention, and practice give you the best chance of survival.

8

I Learned About Flying From That

No one was hurt, but an aircraft was left floundering in the shallows of a Northland beach and its pilot facing a huge repair bill. He shares what happened, the decisions he made, and most importantly, what he learned.

12

Navigating our New Southern Sky

The New Southern Sky programme is New Zealand's gateway to performance-based navigation. Here's what you need to know, including proposed dates and equipment considerations.

Cover: The Impossible Turn, see story on page 4. Photo: istockphoto.com/BanksPhotos

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Tel: +64 4 560 9400,
Fax: +64 4 569 2024,
Email: **info@caa.govt.nz**.

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Manager Safety Promotion Bill Sommer.

Editor Peter Singleton.

The *Vector* Team
Charlie Brimmicombe, Lakshmi Guda, Aaron Hailwood, Pen Mackay, Rose Wood.

Design Gusto.

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Free **MetFlight GA**

A Budget 2015 announcement is regarded as a big boost to general aviation safety.

The General Aviation sector has greeted with delight, the announcement in the May Budget of extra funding to MetService, allowing pilots no-cost access to professional aviation weather information.

After four years of user-pays, lobbying from industry, and behind-the-scenes work by the CAA, MetService, and the Ministry of Transport, MetFlight GA became free on 1 July 2015.

Paul Kearney, from Massey's School of Aviation, says it's an amazing development.

"My gut feeling is that people were flying without decent weather reports. But pilots will be back into it and getting proper information before they go flying, which is a huge step forward in safety."

The Government says the service being free of charge will put private GA pilots on the same footing as other outdoor recreational users, such as boaties and trampers.

Long-time GA pilot, Nigel Griffith, says the no-cost access will make life much easier.

"If you're going to Queenstown from Wellington, for instance, you'll be able to quickly access proper current information before takeoff, and monitor it once you're on your way. Assuming you have someone else looking out the window, of course!"

Access to MetFlight GA will continue to be restricted to those who hold a CAA Pilot Licence (PPL, RPL etc), and those who hold a flying certificate or similar with a Part 149 Aviation Recreation Organisation.

metflight.metra.co.nz

How to Log In

Part 61 pilots will need to enter their CAA licence number, and the password is the 'initial grant date' of the licence (which is found lower right hand side).

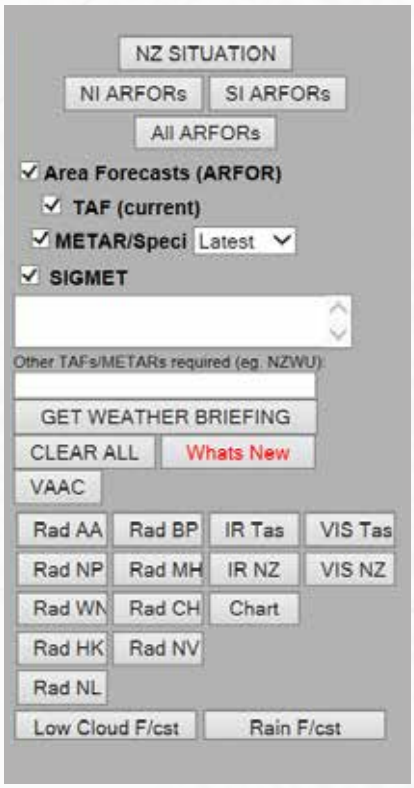
You enter the initial grant date in this form: d/mm/yyyy, ie, with no leading zero on the day, but with a leading zero on the month – for instance, 5/02/2003.

The MetFlight system will recognise the most recent initial grant date where a pilot holds more than one licence type – for instance, rotary and fixed wing. The same applies to those pilots moving between different levels of licence – for instance from PPL to CPL.

For Part 149 pilots, the password will differ between organisations. Some will use issue or birth dates, while other organisations will generate passwords specifically for MetFlight GA. Part 149 Aviation Recreation Organisations will notify members of their username and password.

MetService advises that pilots who've paid a sub covering the 1 July date will get a refund. Email metflight@metservice.com. ■

By selecting the Straits (ST) area, for instance, and clicking "Get Weather Briefing", you can access the corresponding area weather forecast, aerodrome forecasts, and current weather reports.



The MetFlight GA web site gives you access to a range of observations, forecasts, and satellite and radar products.

SIGMETs Now Graphical

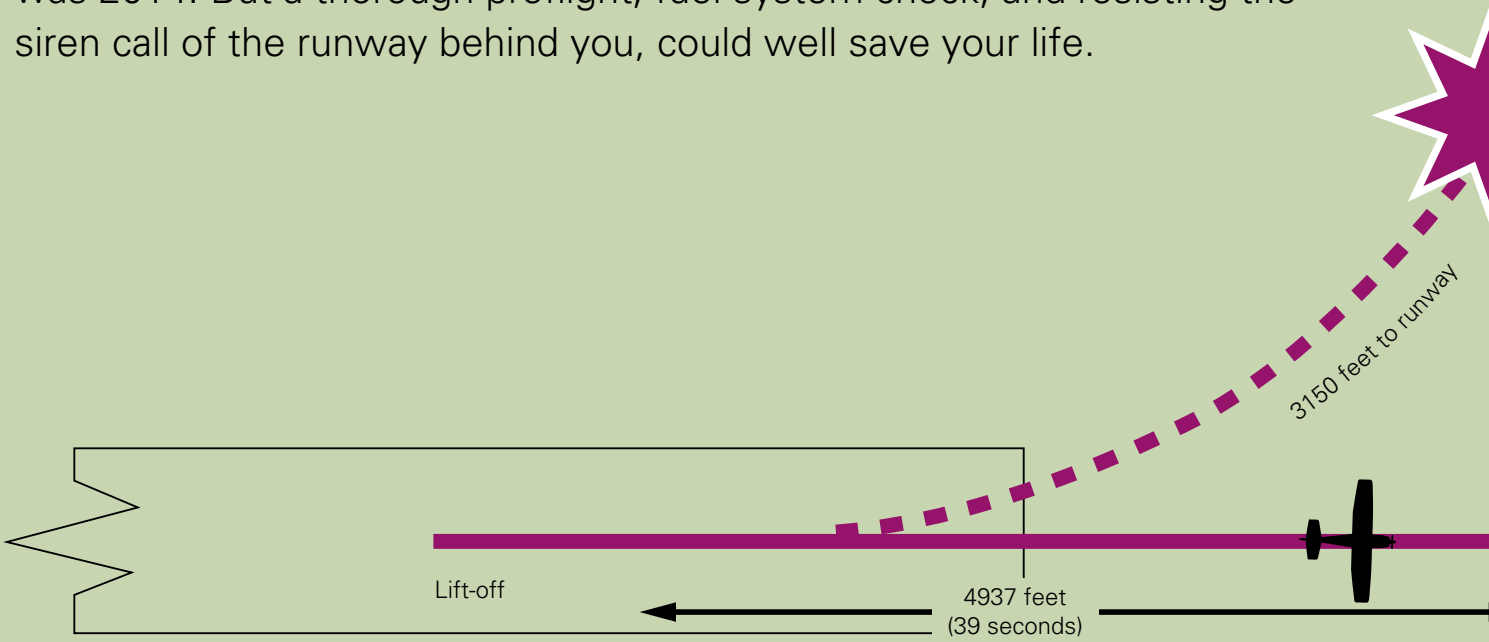
At the time *Vector* went to print, MetService was to release a new product, the Graphical SIGMET Monitor (GSM), by 31 July 2015. The GSM will be available through MetService aviation web services, including MetFlight GA, and is expected to provide easily understandable information on the presence of severe weather phenomena (turbulence, icing, etc).

The GSM is a graphical representation of the standard SIGMET and will update automatically, each time a SIGMET is issued or cancelled. The New Zealand Flight Information Region and the Auckland Oceanic Flight Information Region will be covered in separate issues.

The standard alpha-numeric SIGMETs will continue to be issued as the primary SIGMET product.

The Impossible Turn

Since 2001, there have been 18 accidents, eight of them fatal, following some kind of power loss after takeoff. The worst year for such occurrences was 2014. But a thorough preflight, fuel system check, and resisting the siren call of the runway behind you, could well save your life.



Talk to a long-time pilot and it's bound to emerge that they, or someone they know, has experienced a sickening encounter with a failing, or failed, engine after takeoff.

Long-time instructors believe the so-called 'startle effect' means it can take up to 10 seconds for the pilot to react in any meaningful way, as they try to get their head around the implications of the silence.

And then it is on – an explosion of activity as the pilot desperately tries to get themselves, passengers, and aircraft safely back on terra firma.

The overwhelming influence of what flight examiner Willie Sage calls 'get-back-itis' has many pilots trying to return to the safety of the runway 180 degrees behind them.

That, experienced aviators all say, is just about the worst thing to do.

They say if a pilot does make it back, they're landing downwind which means a longer landing distance. It also means they could be trying to land into oncoming traffic.

But the biggest reason not to attempt a 180 is the height lost in the turn.

Despite that, it appears many – even able – aviators try to do it.

A-category instructor and general examiner, Penny Mackay, estimates up to 70 per cent of the C-category instructors she has checked, believed they could make at least a 90 degree turn toward something that looked safe, like a paddock.

"They had no idea that turning just that much could lose them between 300 and 400 ft in a Cessna 152. They were absolutely amazed when I showed them," she says.

"They wouldn't have even reached the paddock – that loss was just in doing the turn.

"You can tell people about this until you're blue in the face, and you think they get it. But when you pull the power on them at low level with few options, it's a different story. And these are instructors!"

Willie Sage, who's also chief pilot for Sounds Air and Tasman Aviation, has experienced power failure after taking off.

"About 18 years ago I took off out of Turangi in a 172. The engine just stopped dead. Straight ahead was really nasty country."

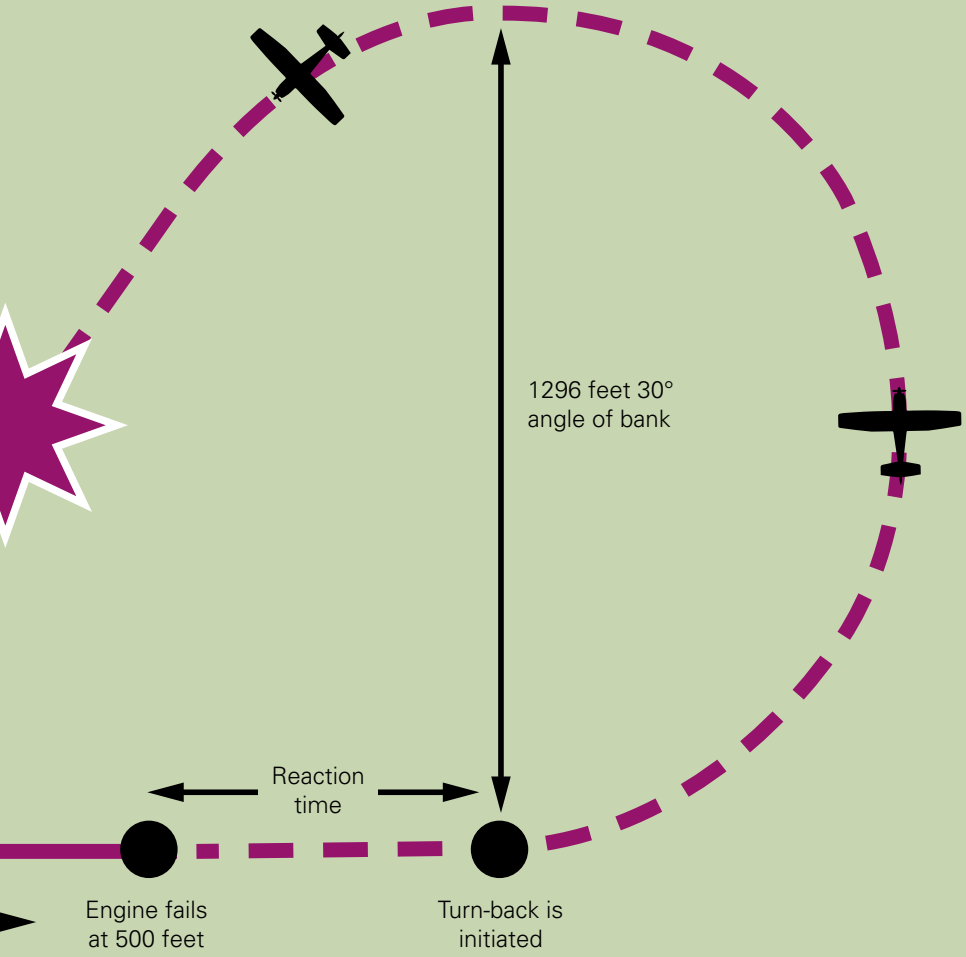
He did turn back but says it was a calculated move because he knew he had the height to do it.

"I've got quite a bit of low-level bush flying experience but really, I got away with it by the skin of my teeth.

"It was a fair bit of good luck to be honest, not skill. I didn't make it back to the airport, but was lucky enough to find a clearing nearby."

Willie says he now thoroughly preflights what he would do, at each particular aerodrome, should the engine fail at 500 and 800 ft.

"I actually look around, before taking off, and see what places exist for an emergency landing. Then as I climb,



Data for a Cessna 172 turning back after an engine failure at 500 feet agl

Conditions and Assumptions

Altitude	Sea Level
Temperature	ISA
Wind	Calm
Climb	75 KIAS
Rate of Climb	688 feet/minute
Glide Speed	65 KIAS
Glide Distance	0.75 NM/500 feet
Angle of Bank	30 degrees

Note that total distance back to the runway from failure point is 7711 feet whereas the aircraft glide capability is only 4560 feet. This means you would land 3150 feet short of the runway.

Data supplied by Transport Canada.

I say out loud '500 feet….800 feet' so I'm totally prepared should the worst happen."

"Some people make it part of their threat and error management," Penny says. "Some people call it an emergency briefing, but whatever it's called, it has to be done before you take off.

"You also have to be careful not to run through the briefing like it is rote learned. Really think about what is being checked.

"For that reason I always say, 'know what paddocks are available and what is in the area when you take off, and imagine those things as you go past them'."

"There's no point," says Willie, "waiting until the engine dies to start thinking 'now where is the wind blowing from, now where is a nice flat paddock or deserted straight road?' You won't have time for that!"

Willie also advises pilots to drill themselves on emergency procedures until they know them "inside out and upside down".

"Then they will be automatic.

"But you know, we're all taught to squawk 7700 on the transponder, and do a MAYDAY call and check everything, but if you have an engine cut out at 500 ft, you've really got no time for anything other than flying the aircraft until it touches down. It's a cliché but it really is aviate, navigate, communicate.

"In my case, I did not look in the cockpit for one second. I had my eyes out looking to where I was going and just kept it flying. If I'd looked inside the cockpit, we would never have made it.

"If you land in a reasonable spot, at the right speed, you're going to be OK."

Penny says the pilot should be looking out for any forced landing zone no more than 30 degrees either side of the aircraft nose.

"Of course that angle widens the higher you are.

"It also depends on other factors, like the angle of the bank, the aircraft, the pilot, whether the aircraft has even some power, and how well the pilot knows their aircraft. It's not always a blanket thing of 'never do this'."

Of course, the wind is always a significant factor in any decision-making in flight, no less in the event of power failure.

So the examiners encourage pilots to practise, so they are familiar with what their aircraft can do, and what they can do.

Penny says, "Go high, and see for yourself with different angles of bank how much height you lose in a turn."

Another potentially fatal tendency in the C-cats she has checked was for them to pull up the nose when they realised they weren't going to make that paddock.

"They raised it, and raised it and raised it. And would have stalled. I told them, 'you're better to keep that nose down and go in, under control, through a hedge or trees, than stall it'."

CAA aviation examiner, and A-category instructor, Marc Brogan agrees. "It should be automatic. Conserve the aircraft's energy. Get the nose down.

Continued over »

Continued from previous page

Photo: Courtesy of Willie Sage

Marc says it's important that instructors clearly understand what to do if the power fails, or partially fails, after takeoff.

"So when they teach it to their students, it's a nice clear exercise, and they, the instructors, don't jeopardise the safety of the flight."

Marc says there are two ways an instructor can teach a student, either: warn them during the briefing that they will be given a prompt that the engine has now 'failed'; or don't say anything prior to takeoff and just tell the student, at some point, 'If the engine failed now, what would you do?'

"It does affect their reaction – anywhere from five to ten seconds," he says, "which does make it more realistic."

Both Penny and Marc say what to do in a partial power loss also needs to be trained, because it is more common and in some ways more complex.

"In a complete shutdown," says Marc, "a forced landing is inevitable. With partial loss, there are more options to consider."

Marc says sometimes you're 'damned if you do, and damned if you don't' because the options to land ahead are terrible, but potentially, in turning too far, the results could be even worse.

"So in the end, all you have is practice, preparation and prevention." ■

Photo: Courtesy of Nelson Aviation College

The Fuel and Ice Factors

The two most likely causes of engine power loss are carburettor icing and fuel system issues – starvation, exhaustion, and contamination.

The need to check fuel quantities, and quality, during the preflight inspection cannot be emphasised enough. Check that the fuel dipstick is for your aircraft, it is clearly marked, and that you understand the difference between 'total' and 'useable' fuel, says CAA safety investigator and long-time instructor, Colin Grounsell.

"On aircraft with selectable fuel tanks – for instance, Cherokee PA28 and PA38 Tomahawk – start with fuel selected to one side, usually the tank with the lesser amount.

"Prior to run-up, change to the other, fuller, tank. That should ensure the engine is able to be fed from both fuel tanks, prior to takeoff.

"Once you have full power set, check the engine instruments to ensure the engine is developing the power that you expected. Listen to the engine during the takeoff roll. If it's running rough or sounds unusual, that should be enough to tell you it's in trouble before you even leave the ground."

Once airborne and faced with an engine power loss...

While lowering the nose and establishing the glide speed, apply carburettor heat to melt any accumulated ice, if that's the cause of the power loss. If that's the case, engine power should be restored, but be aware that the application of carb heat may momentarily make the situation worse as the ice melts.

Carburettor heat also provides an alternate source of air if for some reason the normal airflow to the carburettor has become restricted.

Turning the electric fuel pump on, and changing tanks should restore engine power after a few seconds, if there is an issue with the fuel system.

If engine power is not restored and prior to landing...

Make sure the throttle is closed. That will avoid any unexpected bursts of engine power which will undo your plans to land on the spot you've selected.

To reduce the chances of a post-landing fire, make sure fuel is off, that the mixture is fully lean, and that the ignition and master are both off. While carrying out the above don't forget rule #1...always fly the aeroplane: aviate!

Vinyl Applications – A Hidden Threat

Talking aircraft maintenance? A vinyl decal on the fuselage or tailfin may not strike you as a 'maintenance event'. But it is, and at least one LAME has seen several cases of vinyl decals incorrectly attached to aircraft.

In 1996, all 70 people aboard Aeroperú flight 603 died when it plunged into the Pacific Ocean on its way from Lima, Peru to Santiago, Chile. The reason? An inexperienced employee had left duct tape over vital static ports on the underside of the fuselage, causing a complete failure of multiple flight instruments.

While this is certainly at the extreme end of what can happen, it doesn't affect only big airliners.

In 2002, a NZ Aerospace FU24-950 (Fletcher) crashed south east of Masterton after its tailfin had separated. Microscopic examination found that the cracking on the tailfin was due to metal fatigue which had originated from an apparent cut or score mark in the outer surface of the skin.

That corresponded to the edge of a rubber protective strip applied to the tailfin's leading edge, and then trimmed. The tool used to trim the strip had cut into the metal skin and the cut had then acted as a stress riser from which the fatigue crack originated.

What do these two very different accidents have in common? Well, they're both simple maintenance errors, although in the case of the Fletcher, the maintenance may not have been carried out by a licensed aircraft maintenance engineer (LAME).

Manawatu-based maintenance controller, Adrian Williams, says his company, Aero Support Engineering, has come across instances where decals have covered static ports – which can be as small as 2 mm wide – and vortex generators.

That's dangerous as the static ports feed the instruments details of ambient air pressure, which if incorrect can cause the instruments to be way off, as was the case with the Aeroperú flight.

"A commercial vinyl applicator can do the graphics, but they're not aircraft engineers," says Adrian. "And they don't necessarily understand the potentially fatal consequences that covering a small static port or a vortex generator can have."

Vortex generators are sometimes installed on aircraft wings and tail surfaces. They control airflow over the upper surface of the wing by creating vortices that energise the boundary layer to improve the lift to drag ratio. The vortex generators are small aluminium vanes around 25 – 35 mm long which create more lift.

"While they're very small, they can have a huge effect on aerodynamics," says Adrian. "That's why it's concerning when we see decals over them."

The same principle applies to painting.

"When painting part of an aircraft, its 'static balance' needs to fall within the manufacturer's specified limits," says Adrian.

Static balancing refers to the alignment of centre of gravity with the axis upon which the surface revolves.

"Often balance limits for painted and unpainted surfaces can be substantially different."

John Keyzer, one of the CAA's Aviation Safety Advisers, echoes Adrian's thoughts. "Applying a decal is a maintenance activity and should be carried out or supervised by a LAME or a person who can certify that maintenance." ■

Vinyl decal applied over a vortex generator.

I Learned About Flying From That

A welter of human factors left an aircraft floundering in the shallows and its pilot facing a big repair job. He shares what happened and the decisions he made.

The Good: We got out unhurt, didn't hit any of the throng of beachgoers, my 'co-pilot' thinks I saved his life, good experience is gained by surviving bad mistakes...

The Bad: New wings to be built, undercarriage and fibreglass skin to be repaired, new crankshaft... money and hard work.

The Ugly: Didn't prepare for all threats to the flight, didn't resist pressure to fly, didn't devise Plan B should the worst happen. The unforgiving would say stupid.

The first mistake occurred a week earlier. After rebuilding the engine, we decided to replace the fuel lines. Some difficulty was experienced pulling the new polyurethane tubing through the tunnel between the seats. We fuelled the right tank only, measured the flow and did some test flying.

The second mistake was on the fateful day. New fuel drains arrived and we fitted one in the (empty) left wing tank, but not the right – which had seven litres in it. Fuelled the left tank for a flight to Whangarei, 27 litres, but we didn't check the fuel flow!

The third mistake: leaving the right tank nearly empty to make it simpler to fit the new drain later. The fuel cross-feeds when the fuel valve is turned to both – the normal position – and had we fuelled the right we might have noticed something amiss before fuel starvation eventuated.

Some five miles off Martins Bay Beach at 2500 ft, the engine started to falter. Intermittently it provided some power, and then quit. It didn't look good.

I set up a comfortable glide – without looking at the airspeed indicator I have to say – and eventually landed. Everyone was at the northern end of the beach building sandcastles; we made it to the empty, somewhat rocky southern end.

The manager of the local camping ground turned up; the council had given us permission to land! The police joined the party, keeping in touch with the CAA. Women came to thank us for not mowing down their offspring.

Some ex-RNZAF engineers offered help. We all agreed none of the 27 litres in the left tank was getting to the engine. Locals offered tools, brought cans, and a funnel to transfer that fuel to the right tank.

In an Ardmore workshop. "New wings to be built, undercarriage and fibreglass skin to be repaired, new crankshaft... money and hard work."

Photo supplied by author.

I felt fine, but investigating the problem and transferring the fuel had taken time, and as the day wore on, circumstances changed. It was sunny and hot, I was tiring. Worse, the tide had come in.

I had never landed this plane on a beach – it needs 65 knots to lift off so I didn't trust beaches. I was about to break my own rules. I should have sat in a quiet spot under a tree and thought, "I've been lucky, don't push it".

But I'd had an exhaust valve break, and destroyed the engine a few months earlier at Thames aerodrome. An expensive recovery by road followed. So right now it made sense to take off from the beach. Simple. After all, I'd just landed there.

The constable had cleared the beach. Everyone was watching; television news recording.

The engine sounded healthy, my 'co-pilot' had paced out the 'runway' and removed the stones. Return to Ardmore, that was the plan.

As we gained speed, I lifted the nosewheel to reduce drag. With full right rudder the aircraft rolled straight ahead, but at 50 knots a wave came up. The aircraft swung abruptly, the left wing dug into the sand under the surf, and we nosed over, breaking the prop and bouncing off the right wing.

It was over.

There was a big dent in the left wheel. We had hit a rock in the surf.

Back in the hangar later we found a kink in the new fuel line. Now we knew why we had ended up on the beach!

But why hadn't we checked the fuel flow from the left tank to the carburettor? We'd done a lot of work since the new engine core had arrived, and we had done a lot of checking. But what I hadn't done was sit down quietly and go through everything in my mind. Make sure we'd done everything that needed doing. I usually did.

I had been impatient. Fixated perhaps with running in the new engine. Felt we had mucked around long enough and I wanted to visit my brother in Whangarei. Let's go! NOW!

And, once on the beach, what had I been thinking, attempting to take off again? I knew it wasn't a 'beach' aircraft. Prior to the takeoff roll, I hadn't done all the things I do routinely at unfamiliar or challenging aerodromes.

I hadn't coached myself on what I would do if something went wrong, like a wheel in the sea. That turned a calculated risk into an accident waiting to happen.

A Plan B could still have salvaged the situation. I should have thought about what to do if we hit water: cut the engine. But I wasn't prepared. When it happened I was thinking, this is like hitting a wet stretch at Turangi aerodrome, I can get out of this...

But the conditions were different. The slope of the beach and lack of sufficient rudder authority meant there was no possibility of getting out of the water. I should have decided that before I started. It was obvious.

Had I been pressured into taking off by the expectations of my 'audience', including the television crew? Allowed myself to become an actor, part of a scene with a happy ending? I don't know. I think it was more resignation, feeling fed up. Get home!

I wasn't aware of any symptoms of shock when we reached the beach. Certainly I was relieved we hadn't fired the ballistic parachute. Perhaps I should have felt fear. I didn't. Was my brain numb?

In Germany, if you have a forced landing, you don't fly again that day. I would certainly counsel pilots who survive a life-threatening forced landing to impose that rule on themselves. At least talk to some uninvolved pilots. Two professional pilots did come to see us, but after the crash.

Remember, if you're not at your best you probably won't recognise it; that is the conundrum. You don't know you're not making good decisions… that would take a good decision! ■

Role Equipment – Check, Recheck, Practise

An accident earlier this year in Marlborough shows the importance of role equipment being fit for purpose, and for pilots to be completely familiar with it.

In early February, 2015, a Hughes 369D helicopter was helping fight a fire in Marlborough when it crashed into the Wairau River.

The pilot was unable to fill the monsoon bucket through the bottom 'water dump door', as is normal, because a skirt of material suspended from the bucket was floating up and effectively sealing the door off.

So the pilot began to fill the bucket from the top, by laying it in the river.

When that positioning caused the tension to reduce on two of the four Dynex strops slinging the bucket beneath the helicopter, one strop became caught over the left skid.

Although the pilot descended as soon as he was aware of the hooked-up strop, the river current was so strong, it pulled the bucket away from the helicopter, hauling the machine backwards into the water, with catastrophic effect.

The pilot, who was unhurt, says he's gutted by the accident.

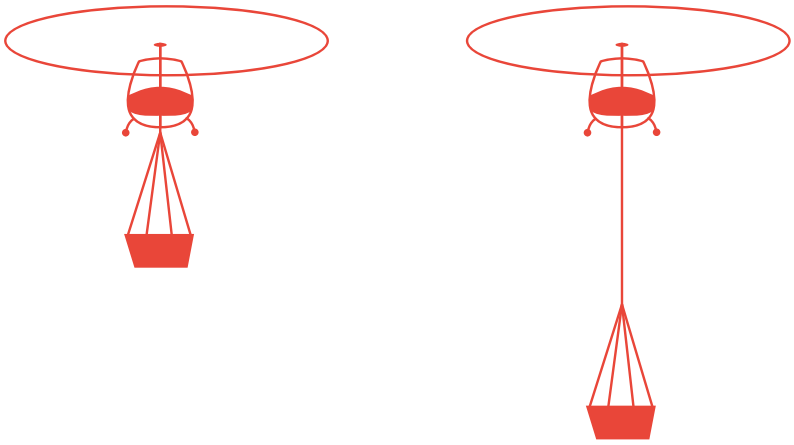
"The problem stands out like a sore toe to me now, because the four-strop rigging was wrong for the job, but I didn't see it."

The company's subsequent investigation found the accident risk would have been reduced if the bucket had been rigged with a single strop (see diagram).

To counter the contribution the bucket skirt made to the accident, the company has fitted a steel hoop to the skirt's hem, preventing it floating into the open door during filling.

CAA Aviation Safety Adviser, Bob Jelley, says there's a wide range of role equipment, and operators should closely consider how they use it.

"Shortcomings discovered during flights and/or maintenance should be discussed with the manufacturer, and engineering changes made accordingly," he says.



As a result of its investigation, the company is using fire bucket harnesses attached to a long line, meaning the pilot has only one rope to worry about. It also distances the helicopter from terrain, obstacles and recirculation.

Diagram supplied by operator.

CAA Helicopter Flight Operations Inspector, Mitch Jones, agrees.

"The bottom line is that we need operators to stop, check, and recheck how they use role equipment. This was not a component or systems failure, but an unlucky accident. The outcome could have been very grim indeed."

CAA's Safety Investigation Team Leader, Paul Breuilly, says it's also important pilots keep current in how to use role equipment appropriately.

"For instance, pilots called on to fight a fire may have currency in lifting loads but not in other aspects of a firefighting operation. They need to practise before facing the real thing.

"Operators also need to make sure that training and competency checks reflect the different roles the pilots, machines and equipment fulfil."

Thanks for Sharing

Mitch Jones applauds the operator involved in the firefighting incident for conducting a thorough post-accident investigation, for making necessary changes, and for sharing their story.

"It wasn't intentional. They just got it wrong, they've admitted to getting it wrong, they've made sure it won't happen again, and they've told others.

"The company's openness means the whole industry can identify risks, and benefit. It's not easy to admit to making a mistake. I can't emphasise enough how much the CAA appreciates such candour."

The pilot says he can't run away from the accident, and has to rise above it.

"If I can stop it happening to someone else, then at least I can take comfort from that." ■

December 1917 – **Avoidable Accidents**

With interest in World War I peaking during 2015, *Vector* thought readers might be intrigued by figures for avoidable accidents gleaned from history.

The following monthly summary of accidents was dredged from the December 1917 records of the Royal Flying Corps.

It appears here exactly as it was produced almost 98 years ago.

Resume of Accidents

Avoidable Accidents

There were 6 avoidable accidents:-

(a) The pilot of a Shorthorn, with over 7 hours experience, seriously damaged the undercarriage on landing. He had failed to land at as fast a speed as possible, as recommended in the Aviation Pocket Handbook.

(b) A B.E.2. stalled and crashed during an artillery exercise. The pilot had been struck on the head by the semaphore of his observer who was signalling to the gunners.

(c) Another pilot in a B.E.2. failed to get airborne. By error of judgement he was attempting to fly at mid-day instead of during the recommended best lift periods i.e. just after dawn and just before sunset.

(d) A Longhorn pilot lost control and crashed in a bog near Chipping Sodbury. An error of skill on the part of the pilot in not being able to control a machine with a wide speed band of 10 m.p.h. between top speed and stalling speed.

(e) Whilst low flying in a Shorthorn the pilot crashed into the top deck of a horse drawn bus, near Stonehenge.

(f) A B.E.2. pilot was seen to be attempting a banked turn at a constant height before he crashed. A grave error by an experienced aviator.

Unavoidable Accidents

There were 29 unavoidable accidents:-

(a) The top wing of a Camel fell off due to fatigue failure of the flying wires. A successful emergency landing was carried out.

(b) Sixteen B.E.2s. and 9 Shorthorns had complete engine failures. A marked improvement over November's figures.

(c) Pigeons destroyed a Camel and two Longhorns after mid-air strikes.

COST OF ACCIDENTS

Accidents during the last three months of 1917 cost £317.10.6 – money down the drain and sufficient to buy new gaiters and spurs for each and every pilot and observer in the Service.

From the records at the Royal Air Force Museum, Hendon, North London. With thanks to (Ret) Captain Brian Dunn. ■

Photo: Courtesy of The Vintage Aviator Limited.

The de Haviland BE2 first flew in 1912. The two-seater became one of the longest serving aircraft of World War I. It was also one of the most multi-functional, used for artillery spotting, reconnaisance, bombing missions, anti-Zeppelin attacks, and transport. At least eight variants were created.

Navigating our **New S**

New Southern Sky is New Zealand's proposed response to increasing air traffic and demands for safer, more efficient airspace management. It's a proposed move to performance-based navigation. Under this proposal, all aircraft wanting to operate in controlled airspace would need operational ADS-B equipment by December 2021.

Having started last year, New Southern Sky (NSS) will continue until late 2023. It considers the effects proposed changes will have on the aviation system as a whole – and the participants within it.

NSS and its proposed associated regulatory framework would define aircraft equipment, operator procedures, training, and approvals required to operate in certain airspace, and to fly specified instrument procedures.

Stage one – which runs until December 2015 – focusses on changes to IFR navigation, and surveillance systems.

You can find a programme timeline and other information at www.nss.govt.nz.

Our Current Focus

During stage one, the NSS Safety Group, comprised of the CAA, Airways, and the Ministry of Transport, is examining if satellites can be used as the sole means of navigation for aircraft flying under IFR. This is known as operating in a 'Global Navigation Satellite System (GNSS) sole means' environment. IFR navigation using GPS with back-up from a ground-based navigation aid, such as a VOR/DME or NDB, is known as operating in a 'GNSS primary means' environment.

Stage one considers the implications of GNSS sole means in the New Zealand domestic Flight Information Region.

Safety criteria will be developed around:

» performance-based navigation (PBN) operations, including aircraft equipment and operator approvals. PBN is a term used to describe technologies that are moving aviation away from a ground-based navigation system toward a system that relies more on equipment on board the aircraft;

» ground-based navigation aids in New Zealand;

» the Airways surveillance system (linked to GNSS through the dependency on satellite-derived information); and

» airspace design.

The criteria will guide decision-making and the development of any new rules and advisory circulars.

GNSS IFR Operations

While any rule development affecting IFR/PBN operations will be strongly influenced by decisions on the use of GNSS, emphasis will also be placed on routes, instrument procedures, and destination/alternate suitability.

Under NSS, the current Part 19, Subpart D *IFR Operations: GNSS* will be

Southern Sky

reviewed. The review will encompass aircraft equipment, pilot qualifications, and rules surrounding IFR flight operations.

Surveillance

New Zealand's radar surveillance network needs to be replaced by 2021. As signalled by NSS in June 2014, Airways proposes to base the new system around Automatic Dependent Surveillance – Broadcast (ADS-B). ADS-B's accuracy is greater than conventional radar surveillance.

ADS-B needs a transponder and GNSS receiver to transmit position data. A GNSS receiver processes information from a GNSS satellite constellation in order to provide position, velocity, and a timing reference.

Under the ADS-B proposal, these technologies would be integrated with Airways' air traffic management system. Information available to air traffic controllers would be updated more frequently and in greater detail.

Airways is defining system requirements, including contingency needs of aircraft that experience an equipment failure or loss of satellite coverage.

Have Your Say

All new policy and any proposed rules arising from NSS (including surveillance and navigation rules) will undergo two rounds of consultation.

Later in 2015, we'll be asking for feedback on potential options and issues identified. That feedback will shape the Notice of Proposed Rulemaking (NPRM).

More information on proposed surveillance and navigation systems will be available soon. To stay informed about consultation opportunities, subscribe to our NSS email notification list on the CAA web site, www.caa.govt.nz, "Email Notification Service", and sign up to *Flight Path* – the monthly NSS newsletter, at www.nss.govt.nz.

ADS-B Equipment

Under the ADS-B proposal, the expected implementation dates for ADS-B are:

» all aircraft flying above FL 245 would need operational ADS-B equipment by 31 December 2018;

» all aircraft in controlled airspace would need operational ADS-B equipment by 31 December 2021.

If you fly only in uncontrolled airspace, you would not need to be equipped for ADS-B.

Need to Upgrade?

Any new rules and advisory circulars will provide information on equipment requirements. We're aware that new types of ADS-B equipment are appearing on the market as other countries implement ADS-B – we'll keep you updated.

Buyer Beware

If you need to upgrade now, or require advice, talk to your avionics supplier, or contact the CAA at nss@caa.govt.nz.

Be careful if buying second-hand equipment – it may not be suitable for use in an ADS-B and/or PBN environment in New Zealand.

Note that Universal Access Transceiver (UAT) equipment from the United States won't work in New Zealand. UAT is a system that requires a dedicated ground infrastructure that will not be implemented here.

UAT equipment is often advertised as ADS-B, so before buying, check the equipment labelling and make sure it's not operating at 987 MHz. ■

WX Matters

"Forecasters sometimes get the aviation forecast wrong. However, a poor forecast never killed anybody. A forecast is just the forecaster's best efforts at predicting what you're likely to encounter on your route. Pilots who've crashed in bad weather usually made bad decisions related to that weather, usually decisions that were beyond their capability."
– Greg Reeve, Meteorologist

Weather is a huge topic, and it's difficult to encapsulate the 2015 AvKiwi Safety Seminars, "*WX Matters*", in just a few pages of text. The following is a summary. To get the full picture, check out the online course at, www.caa.govt.nz/avkiwi. The course includes extensive insight from meteorologists, local weather tips, and interviews with industry experts.

Lessons from ZK-SML

The fatal accident involving ZK-SML is a classic reminder of why a VFR pilot should never willingly enter cloud. Here, the pilot had multiple options available when confronted with poor weather. But he chose to continue with his original plan.

Although classified as a microlight, SML was a high performance aircraft. The Dyn'Aero MCR 01 Club microlight boasts a two-seat fibreglass carbon fibre composite construction, with a cruise speed of approximately 145 knots. SML was also fitted with long range fuel tanks (2000 NM range), and an advanced Electronic Flight Instrument System (EFIS) – though not certificated.

On the morning of 9 April 2011, the pilot of ZK-SML planned to depart from North Shore Aerodrome for a non-stop flight to Ashburton of approximately four hours.

Before leaving home, the pilot got an aviation weather briefing from MetFlight. For the first part of the route the forecast was fine, with 30 km visibility and scattered cloud clearing in the morning. However, the forecast for the Tasman area indicated cloud over the whole region, from 2500 ft with tops at 7000 ft. The Nelson aerodrome forecasts confirmed this.

The pilot departed at approximately 11 am after phoning a friend in Ashburton; who'd said the weather was fine.

At 1:20 pm the radar showed the aircraft tracking to the eastern side of D'Urville Island, northeast of Nelson, at 1200 ft. From here SML followed the inlet to French Pass, where radar data was temporarily lost.

We can assume that the pilot would have seen the cloud covering the Nelson Ranges at the top of the North Island. Pilot reports described the weather conditions as being extremely poor, with a low cloud base of approximately 1200 ft and light drizzle.

It's believed the intended route was to track over D'Urville Island to French Pass, keeping under Nelson controlled airspace, then on to the head of Queen Charlotte Sound, and from there to Wairau Valley township, avoiding the Woodbourne Control Zone.

When radar contact was re-established, it showed SML in the vicinity of Cape Soucis on a southerly heading at 2500 ft and climbing. Radar data was lost again as the aircraft approached the Bryant Range and Mt Duppa (3400 ft).

SML impacted Mt Duppa at approximately 1:45 pm.

On Further Analysis

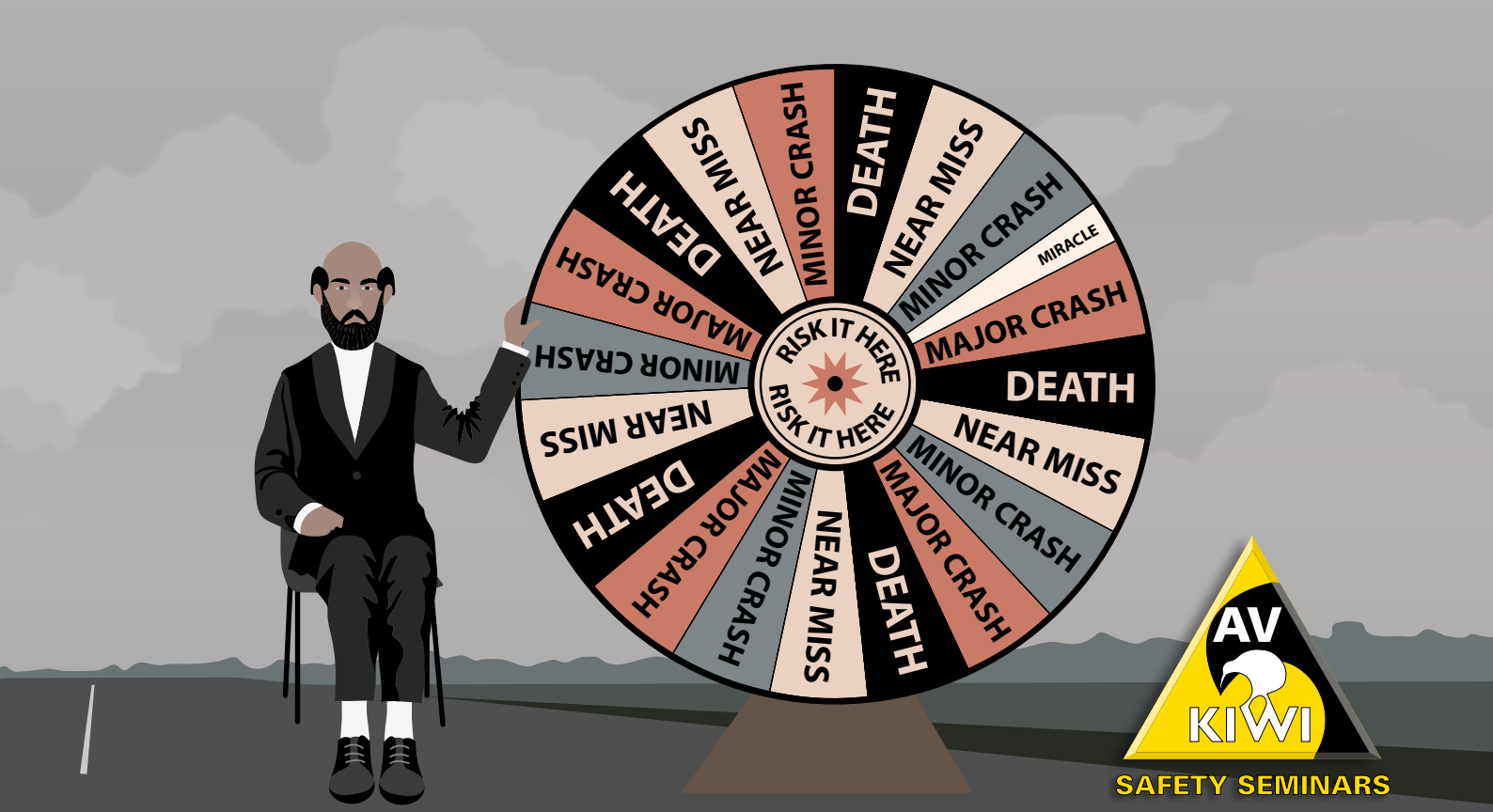
The CAA accident report states, "The pilot had flown this route previously in SML with other experienced pilots. However, this was the first time he had attempted the flight on his own. It's possible he'd never encountered similar weather conditions on previous flights and was therefore lacking experience in dealing with such conditions."

It's believed the pilot had an aversion to flying in controlled airspace and speaking with air traffic control. It's also evident he placed a lot of faith in his EFIS equipment. However, apart from the very unwise decision to enter cloud, the terrain information on the EFIS was flawed.

At some point near the end of the flight, the pilot chose to put blind faith in his equipment, leaving his survival to chance.

Numbers Paint the Picture

According to the US National Safety Transportation Board, the total number of general aviation (GA) accidents per year has declined over the past two decades. However, the relative proportion of GA accidents occurring during instrument



meteorological conditions (IMC) has remained fairly stable, ranging from five to nine per cent of annual GA accident totals. Additionally, about two-thirds of IMC accidents have resulted in at least one fatality. That's three times higher than the fatality rate of all GA accidents!

Since 2000, New Zealand has witnessed 20 fatal accidents, with 36 associated fatalities, where met conditions have been identified as a contributing factor. Those accidents account for 17 per cent of total fatal accidents.

Controlled flight into terrain is the most common accident type. Wind shift plays a role in almost 60 per cent of all weather-related accidents, with more than 60 per cent of those accidents occurring during landing. Questions were posed; are these accidents a result of not getting the weather, not understanding it, or not being trained to manage it?

Many *Vector* accident briefs contain words similar to "experienced an unexpected wind gust, or unexpected sink" – but this begs the question, do the pilots involved in those occurrences really understand the weather?

Inexperience Kills

Pilots involved in a weather-related accident are generally less experienced than pilots involved in accidents where weather is not a factor.

The following figures compare the median total flight hours for pilots involved in the 'weather-related accidents' group, with the median flight hours for pilots in all other accidents (excluding large and medium airlines).

Median flying hours of small aircraft pilots in accidents:

Weather related	All other
580	1328

Median flying hours of helicopter pilots in accidents:

Weather related	All other
1573	1950

Median flying hours of microlight pilots in accidents:

Weather related	All other
252	132

The microlight flight hours could reflect the tendency for microlight pilots to stay closer to home for longer when compared with other pilots, before setting off on their cross-countries.

2015 AvKiwi Safety Seminars

Weather was the topic of the AvKiwi Safety Seminars in 2009 and Rose Wood, Team Leader Safety Promotion, says that demand prompted the team to talk about weather again in 2015.

"Feedback suggests many pilots struggle with weather and want to know more about it. Our role is to raise awareness, so this year we looked at weather with emphasis on what pilots do with the information – they need to understand what the information means.

"We've also developed apps and have a course on the CAA web site. I encourage all pilots to have a look. There are practical tools there, and we already hear that instructors are using the resources.

"Students can use the online course to test their knowledge, providing valuable feedback on their understanding," says Rose.

The 2015 AvKiwi Safety Seminars were attended by more than 2000 people, and were presented in 31 locations throughout the country.

Continued over »

Continued from previous page

2014's Spike in Dual Training Accidents

The CAA is conducting an investigation into the 2014 spike in dual flight training accidents.

After researching the degree of instructor training, common factors began to emerge.

A common theme was the lack of logbook evidence of dual, or solo cross wind landing, or takeoff training. Some logbooks even failed to show evidence throughout prescribed training periods. Naturally, that raised concerns about the standard, or lack thereof, of cross wind training being provided. It's also fair to assume there's plenty of scope to improve New Zealand's record of wind-shift accidents.

Avoid Becoming an Accident Brief

As the adage says, it's better to be on the ground wishing you were in the air, than the other way around.

Carlton Campbell, CAA Aviation Safety Adviser, presented 31 *WX Matters* AvKiwi Safety Seminars in which he urged pilots not to overestimate their abilities.

"As the stats show, a limited level of knowledge or experience greatly increases risk. If you fall into this category, it's all the more important to make sound decisions early. When in doubt, err on the side of caution.

"Most importantly, you need to get some GUTS," Carlton says with a smile.

The acronym, 'GUTS' was coined during the 2013 AvKiwi Safety Seminar *Get the Mental Picture*. It stands for:

Gather

Always use the most up-to-date weather info available. Gather as much information as you can so you're well prepared for your flight, and don't stop gathering information after departure.

Understand

Having all the information you can get your hands on, won't do you any good if you don't digest it, or can't filter what's relevant.

"This is particularly important with Met information, because it is rarely clear-cut," says Carlton.

Think Ahead

Once you've processed the information, you need to use it to form predictions, so you can start preparing for possible eventualities.

"You need to be sufficiently able to make prudent decisions, avoiding the threats clearly evidenced in the statistics," Carlton says.

Self-Review

How did your prediction compare with the actual conditions?

"Identify the areas that need investigation. Get in the routine of figuring out why expected and actual conditions differ. This will ensure you're continually improving your Met knowledge," says Carlton

There's Information All Around You

You should aim to get your head in the clouds before you go flying. This is especially important if you don't fly very often.

Here are a few of the information sources available to you.

MetFlight GA – It's Free!

MetFlight GA, www.metflight.metra.co.nz, is the MetService web site that provides aviation Met for non-commercial use. If you haven't heard already, the cost of MetService providing this web service is now met by the government. See page 3, "Free MetFlight GA".

Internet Flight Information Service (IFIS)

IFIS, www.ifis.airways.co.nz, is provided by Airways . Here you can file flight plans, obtain NOTAMs, and access current ATIS (automatic terminal information service) reports for attended aerodromes.

Webcams

There are a large number of public webcams available on the internet that, when used carefully, can help VFR pilots form an overall 'weather picture'.

When using webcams, always check imagery times to make sure they are current. If there are webcams on the routes or aerodromes you use regularly, look at the imagery frequently (even on days you're not flying) so that you become familiar with hills and other landmarks you may want to use to assess

Understand Every Cloud

Weather can be a puzzle – you've got all the pieces, but you need to fit them together to create the right picture.

Ask yourself: Why is there visible moisture? How did it form? And what hints does it give me about the flight conditions?

Here are a few to get you started:

Altocumulus Lenticularis

The lenticularis cloud alone suggests a very strong wind aloft – at least 20 knots at ridge top level – but given the apparent displacement of the waves in relation to the mountains, it's probably much stronger. The hints of rotor cloud confirm the presence of severe turbulence.

Rotor Cloud

The chaotic nature of the cloud in this image confirms the strong turbulence present. However, even without moisture, but in similar wind conditions, the rotor will still exist – it just won't be visible.

visibility and cloud base. If you're unfamiliar with the aerodrome or route, the images may also help you build a picture of local terrain and aerodrome layout.

When using airport webcams, always verify cloud bases with those reported in AUTO METAR reports (where available).

Identify your Knowledge Gaps – Then Fill Them

Feedback from *WX Matters* highlighted the need for pilots to refresh their Met knowledge from time to time. One pilot who attended the seminar said, "It's amazing how little I remember about weather – it's been 20 years since I studied Met."

When it comes to interpreting Met information, make sure you know which reports and forecasts use degrees true, and which use magnetic to report wind direction. As a general rule, anything provided directly by an air traffic controller will be in magnetic.

TAF Test

Here are a few questions to test your knowledge – you can find the answers at the bottom of this page.

(a) TAF times are in: UTC / GMT

(b) TAF winds are in: True / Magnetic

(c) TAF cloud heights are in: AGL / AMSL

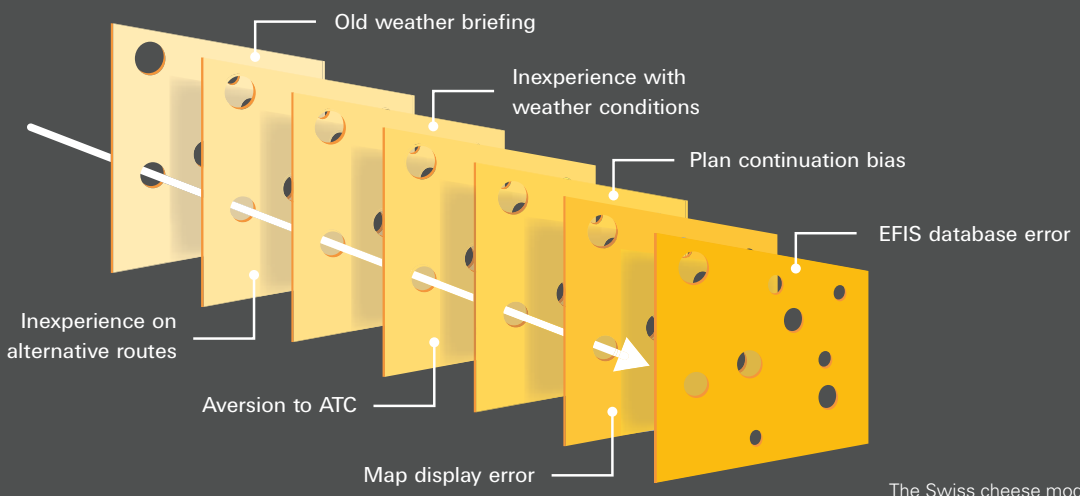
Our Apps Can Help

WX Matters introduced a new way to look at your weather brief. With a bit of electronic wizardry you can now turn it into a picture.

See page 18 for a rundown of iPhone and Android apps created by the CAA to assist you. ■

SML's Swiss Cheese

The slices of cheese represent various factors that make up your safety framework. The holes represent the holes in that safety framework. In SML's case, those holes lined up, making the pilot defenceless.



The Swiss cheese model of safety incidents, Prof James Reason, 2000.

Roll Cloud

Roll cloud on the leading edge of a travelling cumulonimbus. A gust front will precede the roll. In New Zealand, the associated low-level wind shear may be as much as 50 knots. Studies have shown a 35 knot wind shear is enough for most pilots to lose control.

Cumulonimbus

This is an extreme manifestation of visible moisture. Cb clouds can be accompanied by severe turbulence, severe icing, electrical phenomena, hail, microbursts, gust front, tornado, and poor visibility.

Asperatus

Asperatus is an enhanced form of lenticular cloud, where the terrain-induced turbulence below has developed to such a great depth that it's having an affect on the wave cloud above. The turbulent nature of the lower atmosphere is clearly reflected in the bizarre shapes.

Photos: istockphoto.com/DWalker44, istockphoto.com/StephenBonk

TAF test answers: (a) Times are in UTC (b) Winds are in true (c) Clouds are in AGL.

Get Mobile with the CAA

The latest CAA app, GARFOR, is now available to download from both the Apple Store and Android's Play Store. We've got four other apps to help keep you safe in the air. Have you tried them out?

GARFOR

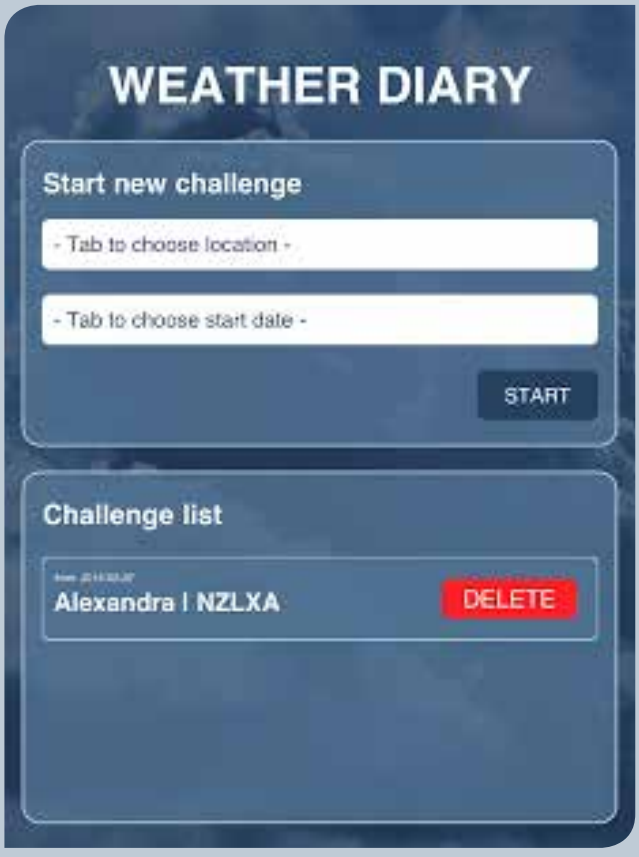
Every pilot knows what an ARFOR is, and with the CAA's newest online tool, you can build a picture to help you understand the weather on your flight. We call it a graphical ARFOR, or GARFOR. This tool helps you to translate the coded forecasts into a picture.

If you were at this year's AvKiwi Safety Seminar, *WX Matters*, you will have already had a chance to see a GARFOR in action.

This app is designed to help you better understand weather, but it should complement, not replace, an aviation forecast. Also, while you can use it on your phone, the icons will probably be too small as it has been designed for tablets and iPads.

MET Decoder

Sometimes a Met report can be a little complex. So put the report into the Met Decoder and it will translate it into plain English, ensuring you have the clearest possible picture of the weather. This is an ideal tool for recreational pilots.



Weather Diary

Planning on flying soon? Start thinking about, and noticing, the weather several days before your flight. Often we don't pay too much attention to the weather in our daily lives, but it's crucial for aviators and it can take a few days of consideration to really notice and interpret what is going on outside.

With Weather Diary, we challenge you to predict how the weather will affect your flight. Look at the forecasts, watch the weather, and gather as much information as you can. Then note down in the app what you expect the weather to do the next day – include some timings too.

The next day you can download the previous day's METAR data and check it against your expectations. Were there differences? If so, why? Take this opportunity to fill in your knowledge gaps.

Graph My Flights

To really improve your flying skills, you need to keep evaluating your flights. You can clock up flying hours, but unless you evaluate your performance you won't know how well you are doing and where to focus your efforts.

Graph My Flights helps you through the three stages of your flight. It has a comprehensive preflight checklist, it encourages you to concentrate on different aspects of your flying, and then gives you the opportunity to evaluate your performance post-flight.

It then graphs the results and shows you how you've done over your last 10 flights.

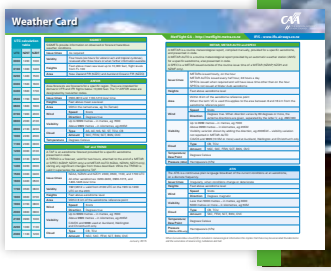
Aircraft Fuel Calculator

This handy calculator helps you plan the amount of fuel needed for your light aircraft flight. We've pre-loaded some sample aircraft templates, but you can also enter figures for your own aircraft.

The Aircraft Fuel Calculator and Graph My Flight apps were created to complement the 2013 AvKiwi Safety Seminar, *Get the Mental Picture* – you can also access the online course at www.caa.govt.nz/avkiwi.

We hope you find our apps useful, but they should be used only as tools to help further your understanding, not as your sole source of information. ■

Met Accessories



The atmosphere is not benign. Since 2000, 36 people have died in New Zealand in weather-related air accidents.

Understand the meteorology. Plan carefully. Follow up what you learned during the AvKiwi Safety Seminar or the online *WX Matters* course by getting your hands on the updated *VFR Met* GAP booklet and the new *Weather Card*.

The *VFR Met* GAP booklet has been completely revised. It contains the 'Get some GUTS' strategy – developed for a previous AvKiwi Safety Seminar – which will guide you in making better inflight decisions about the weather.

The booklet contains new sections on webcams – which have proliferated since the last *VFR Met* guide – with tips on making the best use of them.

A 'GARFOR' – a graphical ARFOR – is an unofficial but innovative method of helping pilots interpret Met information in a very visual way. See page 18 of this issue of *Vector*.

The booklet is free. Send your request to info@caa.govt.nz and we'll have one in the post to you within the following couple of days.

The latest iteration of the CAA *Weather Card*, also free from info@caa.govt.nz, contains some changes and additions that you need to know:

- The symbol //// has been added, denoting that visibility is not reported
- The symbol /// has been corrected to signal that while cloud is detected, the presence of Cb or TCU is not possible
- While NDV is shown on the card (no directional variation – in visibility), its use in METAR AUTO has been discontinued. Refer NZAIP.

Get a good mental picture of the current and expected weather before you decide to fly. Be prepared to change your plans in flight if you encounter unforeseen adverse weather. Be aware of the potential weather, and always have a backup plan.

Enjoy flying with few or no weather surprises. ■

New RPAS Rules Now in Effect

After months of careful planning and consultation, Part 102 of the Civil Aviation Rules has come into effect, and Part 101 has been updated.

For the most part, things won't change for the average pilot. The new rules bring higher risk unmanned aircraft operations into the civil aviation system.

Under Part 101, the operator:

- needs to see the Remotely Piloted Aircraft (RPA) with their own eyes (eg, not through binoculars, a monitor, or smartphone)

Photo: istockphoto.com/DanBrandenburg

- must fly the RPA only in daylight
- must ensure the RPA gives way to all crewed aircraft
- must make sure the RPA does not fly higher than 400 feet above ground level
- cannot fly the RPA closer than four kilometres from any AIP-listed aerodrome, unless as a 'shielded' operation (where the RPA doesn't go higher than the surrounding trees or buildings), or by agreement with the aerodrome operator/ATC
- must get the consent of the owner of any property, or any people, they might be flying over.

If an operator wants to fly their RPA outside those conditions, they need to apply to the CAA for certification under Part 102.

How You Can Help

Many operators will not be pilots and may not understand the Civil Aviation Rules, or even be aware of them. If you see an operator breaching the rules, talk to them and see if they are aware of the rules. If they're not, refer them to the CAA web site, www.caa.govt.nz/rpas.

If you see any RPAs operating in a dangerous manner, you can lodge an aviation related concern with the CAA – call 0508 4SAFETY (0508 472 338) during normal office hours (voicemail after hours), or email isi@caa.govt.nz. ■

Aircraft Hire – Getti

If you don't own an aircraft, you probably hire one when you want to fly. So what should you be thinking about before climbing into that cockpit?

Typically, students tend to do some basic research on who they want to fly with before they start training.

Who they select will also depend on the reason they want to fly. Are they getting a PPL for leisure flying, or a CPL to be a career pilot? Career flying could be aimed at airline operations, corporate flying, bush flying, lifting, spraying, filming, instructing, or offshore flying.

"All these things influence the choice of training provider," says Jeanette Lusty, CAA Team Leader, Flight Operations Adventure Aviation.

"However, when it comes to the aircraft itself, most people take it totally for granted that any flight school or aero club has everything taken care of. Maybe they shouldn't…"

It's never too early to figure out how to select a safe and airworthy aircraft. Someday you'll be on your own and will need to know how.

First Impressions Matter

Check that the hiring organisation or person is the legitimate owner or operator of the aircraft, says Peter Lechner, PPL holder and the CAA's Chief Meteorological Officer. "Whose name is on the certificate of registration? Do they have clear permission to hire out the aircraft? Closely read any hire contract material – are there any fish hooks?"

Make sure that the aircraft is airworthy. Does it look neat and presentable? Signs of fluid leaks, corrosion, or structural damage are all indications that the aircraft is not in good shape.

Tech Log

Once you've had a look at all the external and visible signs, have a look at the tech log of the aircraft.

The aircraft should have a current Certificate of Airworthiness. Any hourly inspections must have been completed and applicable Airworthiness Directives actioned. Check to see if there are any outstanding maintenance issues.

Mark Houston, CAA Flight Operations Inspector Adventure Aviation, says, "If you cannot access the aircraft documents, including the tech log, that's a warning to you. You may be better off looking elsewhere for your aircraft."

He adds, "Any structural changes or modifications to the aircraft that you can see should be CAA approved. For example, if a GoPro camera has been mounted on the aircraft, it requires CAA approval. If anything in the tech log is not clear to you, talk to the aircraft maintainer and sight the log books if possible."

Insurance

Carlton Campbell, CAA Aviation Safety Adviser, says, "It is important to check if the aircraft is insured, and what type of insurance it has. Check with the owner if your planned activity is covered – never assume."

Authorization

Carlton says it is also important to get clarity about the authorization and what it entails. "The operator, usually, through an instructor, authorizes the flight after ensuring that

ng the Basics Right

all flight safety obligations have been met. For example, if you wish to land at an airfield other than those listed in the AIP, does the operator authorization include this?

"Check the flight manual to see what the aircraft is authorized to do. If the aircraft can fly IFR, does the aircraft have instruments that are authorized to do this? Check form 2129," he says.

Fuel

Always check who is going to fill up the aircraft. Also, double check engine oil minima and actual oil levels.

"Another thing that catches people out is the fuel dipstick. Do measurements account for the unusable fuel or not? Ask the owner," says Carlton.

Availability

Marc Brogan, CAA Aviation Examiner Flight Training and Flight Operations, says, "Be aware of any time constraints the aircraft might have. Find out when it needs to be back at base, so that you have plenty of time to do what you want to do, and then get the aircraft back."

Cost

Carlton advises, "Confirm with the owner if Airways and aerodrome charges are included in the hire rate, or if they are separate. Also establish how the aircraft hourly rate is calculated."

That could be based on flight time (takeoff to landing time), or tachometer time (which is linked to engine revolutions per minute), or Hobbs meter time (which measures the time that an aircraft is in use), or by some other means.

"Otherwise, you may end up getting a much bigger bill than what you originally planned for," warns Carlton.

Don't Take Off Just Yet

It pays to check the following, in addition to your normal preflight:

- tyre condition to make sure there is no sign of splitting or visible canvas;
- radio and intercom operability by making a test call to Airways, if available;
- the operability of navigation and landing lights by turning them on, getting out and having a look.

Other Equipment

Make sure you have pickets and chocks on board. First aid kits and survival kits may also be required for certain types of operations. How about control locks, and means of securing baggage? There should be life jackets on board for every person in the aircraft if your route includes flying over water.

And Finally…

Mark Houston says, "Treat the aircraft as though it was your own. Once you are airborne, look and listen out for anything unusual. Provide feedback on even minor snags to the owner afterwards. If in doubt, put the aircraft back on the ground as soon as possible."

"Remember to do a post-flight check to assess the aircraft's condition after landing. Does it need covers, is it correctly picketed or hangared?"

More Information

Vector article "Before You Go", March/April 2013. ■

Introducing David Harrison – CAA's New Training Standards Development Officer

"Good initial training with periodic refreshers are crucial to safe flying," says the CAA's new Training Standards Development Officer David Harrison.

There isn't much David Harrison hasn't done in his 40 years in aviation.

In the Royal Air Force, he was a pilot and weapons instructor on the F4 Phantom and Tornado F3, and a flying instructor on the Tucano turboprop, before becoming responsible for the day-to-day running and standards of Britain's military flying system.

That was followed by a stint as commander at the RAF's busiest flying training base at Linton-on-Ouse. He was also able to fit in a spell as a Hurricane and Spitfire display pilot with the Battle of Britain Memorial Flights. At the same time he became a glider pilot, achieving the FAI silver award of a 5-hour, 1,000 m high flight.

In New Zealand, David worked as the Chief Flying Instructor and examiner with Hamilton's CTC Aviation. That was followed by Aviation Services Limited contract work which put him in contact with a diverse range of training organisations and their students.

David is excited about his new role, which he sees as making sure that training standards help to underpin the shift from an industry controlled by regulation, to one more concerned with effective risk management.

"There are big challenges and exciting developments ahead, like the expansion of the Global Navigation Satellite System, the development of RPAS (drones) operations, and the increasing sophistication of light sport aircraft," David says.

"We need to find out from the aviation community what they want, and work collaboratively to develop systems and guidance with a positive influence on safe and economic flight activities." ■

Fatigue Management – Working Together

Fatigue is recognised as a major hazard because it affects people's ability to do their job safely. It's a big issue, so the CAA is collaborating with the aviation industry on initiatives promoting effective fatigue management through shared responsibility.

The project will see a comprehensive review of current fatigue-related regulations and guidance material, to ensure they're relevant and fit for purpose. They'll be based on scientific principles and knowledge aimed at better managing fatigue risk.

There are four work streams:

- airlines, cabin crew and line management, including ground operations
- air traffic services
- commercial general aviation, including agricultural, rotary and fixed wing, and adventure aviation
- maintenance and engineering.

"This ensures that all areas of the aviation industry can take part. And participation is what we really want," says CAA's Xavier Ruch, the project's lead adviser.

"Because fatigue can affect operational safety, it's important that there is a shared responsibility between organisations and staff to identify and manage fatigue-related risk."

The CAA's Policy and Regulatory Strategy Unit will examine what regulatory framework would best manage fatigue risk.

The CAA has established a panel with representatives from the aviation sector, scientific experts, and government agencies, to ensure that relevant information and technical know-how is used to develop a reporting culture and processes that better manage fatigue risk.

"The panel has already held several meetings and is always looking for more contributors," says Xavier.

"We welcome industry input and so encourage anyone with an interest in fatigue management to get in touch. Then, in the fourth quarter of 2015, we're planning to issue a formal consultation document for feedback.

"We're also working closely with CASA to learn from their experience of recent changes to their regulatory approach."

You can contact Xavier at Xavier.Ruch@caa.govt.nz or phone him on 04 560 9647.

One of the cornerstones of effective fatigue management is knowledge and education, so make sure you check out the resources on the CAA web site, www.caa.govt.nz, "Medical – Fatigue Risk Management". ■

Keep Up to Date

- RPAS
- NSS
- SMS

There's plenty to keep up with!

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Subscribe to our free notification service to receive an email whenever various topics on the CAA web site are updated.

If you're already a subscriber and want emails about new issues like those above, you need to add them to your selection.

www.caa.govt.nz/subscribe

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
8 Jun 2015	15 Jun 2015	20 Aug 2015
6 Jul 2015	13 Jul 2015	17 Sep 2015
3 Aug 2015	10 Aug 2015	15 Oct 2015

See **www.caa.govt.nz/aip** to view the AIP cut-off dates for 2015.

Aviation **Safety Advisers**

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

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

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

John Keyzer (Maintenance, North Island)
Tel: +64 9 267 8063
Fax: +64 9 267 8063
Mobile: +64 27 213 0507
Email: John.Keyzer@caa.govt.nz

Bob Jelley (Maintenance, South Island)
Tel: +64 3 322 6388
Fax: +64 3 322 6379
Mobile: +64 27 285 2022
Email: Bob.Jelley@caa.govt.nz

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-ELO Cessna R172K

Date and Time:	27-Nov-11 at 15:15
Location:	Maraekakaho
POB:	4
Injuries:	0
Damage:	Substantial
Nature of flight:	Private other
Pilot Licence:	Private Pilot Licence (Aeroplane)
Age:	51 yrs
Flying Hours (Total)	582
Flying Hours (on Type)	557
Last 90 Days:	6

The pilot made a late decision to go-around on approach to a farm airstrip. The aircraft was unable to out climb the rising terrain ahead and landed heavily in an adjacent paddock. The undercarriage collapsed and both wingtips and propeller struck the ground.

CAA Occurrence Ref 11/5336

ZK-FWI War Aircraft Replica Focke-Wulf 190

Date and Time:	22-Jun-12 at 14:40
Location:	Levin
POB:	1
Injuries (Serious):	1
Damage:	Substantial
Nature of flight:	Private other
Pilot Licence:	Private Pilot Licence (Aeroplane)
Age:	56 yrs
Flying Hours (Total)	588
Flying Hours (on Type)	2
Last 90 Days:	6

The pilot was positioning the aircraft from Tauranga to Paraparaumu. Due to poor engine condition, the actual fuel consumption was considerably more than the figure used for planning. After 1 hour 40 minutes of flight, the engine lost power through fuel exhaustion. The pilot attempted a forced landing but the aircraft collided with a fence short of the intended landing area.

The poor condition of the engine was discovered during a bulk strip after the accident.

CAA Occurrence Ref 12/2674

ZK-EYB Piper PA-38-112

Date and Time:	27-Feb-14 at 18:05
Location:	Oxford
POB:	2
Injuries (Serious):	2
Damage:	Destroyed
Nature of flight:	Training dual
Pilot Licence:	Private Pilot Licence (Aeroplane)
Age:	33 yrs
Flying Hours (Total)	1900
Flying Hours (on Type)	100
Last 90 Days:	17

The instructor and pilot were conducting a simulated forced landing without power (FLWOP) in preparation for a CPL flight test.

The target paddock was 486 m long, had trees on the approach and overshoot, a fenced dirt road running laterally across it, and another fence running longitudinally down the centre. On the first exercise, the aircraft was too high, so a go-around was performed and the aircraft repositioned. On the second approach, the aircraft continued past the normal go-around point, down the length of the paddock, to a level well below the company minimum of 100 ft above ground level.

During the go-around attempt, the aircraft struck the top of trees crossing into the next paddock. striking the ground in a nose down and wing low attitude. Both pilots suffered serious injuries and the aircraft was destroyed.

The operator's investigation found no evidence of any pre-impact abnormality that would have affected the engine's ability to produce power. Impact marks and propeller damage were consistent with the engine producing significant power at impact. However, the carburettor heat was found in the ON position, which would have reduced the ability of the engine to produce maximum power. The instructor's paddock selection and subsequent decision to continue the approach beyond company minima compromised the flight in terms of obstacle clearance.

This accident highlights the importance of planning and execution of the FLWOP exercise in regards to:

- selection of an appropriate target paddock for the exercise;
- initiation of the go-around from a position where obstacles can be safely cleared;
- adherence to the manufacturer's recommendations for operation of carburettor heat and;
- adherence to SOPs.

CAA Occurrence Ref 14/809

ZK-HON Schweizer 269C

Date and Time:	06-Jul-14 at 8:45
Location:	Seddon 6 NM S
POB:	2
Injuries (Serious):	2
Damage:	Destroyed
Nature of flight:	Hunting
Pilot Licence:	Private Pilot Licence (Helicopter)
Age:	44 yrs
Flying Hours (Total)	605
Flying Hours (on Type)	403
Last 90 Days:	18

The pilot was positioning the helicopter to land and pick up a shooter, when the shooter jumped up unexpectedly and grasped the right skid in front of the forward strut. The shooter would not let go of the skid even when told to by the pilot, possibly not understanding the consequences of his actions.

The resultant change in the centre of gravity was uncontrollable, and the helicopter pitched down and struck the hillside.

The pilot sustained multiple injuries, but not to his head despite his helmet showing impact damage. The shooter suffered serious back injuries.

CAA Occurrence Ref 14/2965

ZK-DCC Cessna 182H

Date and Time:	23-Nov-14 at 15:27
Location:	Thornbury
POB:	4
Injuries (Serious):	1
Injuries (Minor):	2
Damage:	Destroyed
Nature of flight:	Private other
Pilot Licence:	Private Pilot Licence (Aeroplane)
Age:	59 yrs

The pilot believes a wind shift during the takeoff roll caused a tail wind, and loss of climb performance, that led to him aborting the takeoff and over-running the useable airstrip. He recalled looking at the small windsock on his hangar roof and estimating the breeze to be a slight headwind.

He commenced his takeoff roll and realised he had not become airborne where he expected, and that climb performance was lacking. At this point he closed the throttle to land on the remaining airstrip.

It then became apparent that the long grass, wet from heavy rain the previous night, was impairing braking performance, and the aircraft ran through a fence into the closed part of the airstrip. It tipped over onto its back when it ran into a ploughed area.

The pilot will actively monitor takeoff performance and conditions in future, and paint some airstrip fence posts to represent predetermined runway distance used.

CAA Occurrence Ref 14/5485

ZK-CRH Champion 7GCBC

Date and Time:	18-Jan-15 at 11:35
Location:	Hinuera
POB:	2
Injuries:	0
Damage:	Substantial
Nature of flight:	Training dual
Pilot Licence:	Private Pilot Licence (Aeroplane)
Age:	42 yrs
Flying Hours (Total)	9094
Flying Hours (on Type)	22

The aircraft departed Matamata Aerodrome on a training sortie to the airstrip at Hinuera. The first landing was to be a touch and go 'wheel' landing, followed by several more circuits before returning to Matamata.

The approach was normal, and the aircraft touched down on the main wheels 55 m into the strip. The tail was lowered about 120 m further in and as the tailwheel made contact, the aircraft yawed to the right and began drifting towards the right edge of the runway. Application of full left rudder was ineffective, and the instructor closed the throttle as the aircraft left the runway.

The right wing cut a 50-metre swathe through an adjacent maize crop, and the aircraft pivoted about 120 degrees to the right, coming to rest amongst the maize. The empennage was extensively damaged in the accident sequence.

CAA Occurrence Ref 15/280

ZK-RFR Flug Werk FW 190 A8/N

Date and Time:	03-Apr-15 at 14:30
Location:	Omaka
POB:	1
Injuries:	0
Damage:	Substantial
Nature of flight:	Private other
Pilot Licence:	Airline Transport Pilot Licence (Aeroplane)
Age:	63 yrs
Flying Hours (Total)	15,000

On completion of a display practice, the aircraft was landing with a crosswind from the left. At the runway mid-point, the aircraft ground looped to the left, sustaining damage to the left undercarriage, wingtip and propeller.

Investigation found that the right brake actuator had been bent during flight, rendering it unusable. The resulting asymmetric braking may have contributed to the ground loop.

CAA Occurrence Ref 15/1558

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

Britten-Norman BN2A-26

Flap motor

After takeoff the pilot found that the flaps would not retract. The engineers suspected the flap motor commutator and replaced the actuator. Subsequently, the flap limit switch was found to be intermittent and replaced. The aircraft was returned to service. There has been no recurrence of the flap problem.

CAA Occurrence Ref 14/3675

Eurocopter AS 350B2

Cooling duct attach bracket

Part Model:	AS350
Part Manufacturer:	Airbus Helicopters
Part Number:	350A54-1124-20
TSI hours:	10

The starter-generator cooling hose aluminium air inlet tip came adrift from the hose clamp and attach bracket during flight, striking both the tail rotor and horizontal stabilizer.

The cooling hose attach bracket (P/N 350A54-1124-20) on the vertical firewall was found cracked and bent inboard to mid span of the top lug. The direction of the bend and the resultant crack indicated that the duct tip had been subjected to an upward mechanical force at some stage.

The position of the adjustable clamp relative to the flexible duct appeared to have been misaligned on installation, compromising the clamping of metal air inlet duct P/N 350A54-1122-20. The metal air inlet duct then worked loose and was lost in flight.

The hose clamp is required to attach three components together at one junction and so must be installed completely straight. The maintenance operator noted that this can be a challenge to achieve as the cooling duct assembly "tends to not want to sit straight by its very nature and can require some coercion". The firewall bracket, duct tip, hose, and clamp were replaced, along with the tail rotor blades, tail rotor gearbox, and horizontal stabiliser, and the aircraft returned to service.

The CAA Aircraft Certification Unit has been communicating with EASA (European Aviation Safety Agency) with reference to similar occurrences and whether a design change may be required.

CAA Occurrence Ref 15/1189

Pilatus PC-6/B2-H4

Upper flange rudder torque shaft

Part Model:	PC6 B2-H4
Part Manufacturer:	Pilatus
Part Number:	116.35.06.026
ATA Chapter:	2721
TSI cycles:	TSI hours: 98.1
TSO cycles:	TSO hours: 1048.6
TTIS cycles:	TTIS hours: 9825

The rudder torque shaft upper flange attach rivets were found working or slightly loose during 100-hour inspection.

This was possibly initiated by a previous rudder trim failure and subsequent severe flutter at 9102 hours. The item had been inspected at that time. The torque tube was removed, all rivets replaced with oversize Cherrymax rivets, and the torque tube reinstalled.

CAA Occurrence Ref 14/5386

Hughes 369D

Oil cooler blower

Part Number:	369D25630
ATA Chapter:	7920
TSI hours:	10.3

During flight, the pilot heard an unusual noise and vibration, and noticed the engine oil temperature increasing rapidly.

The oil cooler blower shaft was found to have sheared at the drive splines, causing the loss of drive to the blower impeller. No cause for the failure could be determined. A serviceable oil cooler blower was installed.

CAA Occurrence Ref 14/258

Piper PA-25-235

Exhaust manifold

ATA Chapter:	7810

Just after take-off on a glider tow, the pilot noticed a strong burning smell, followed moments later by thickening smoke in the cockpit. The glider was released at 800 ft and the aircraft made a safe landing back at the aerodrome.

Maintenance investigation found a split in the right-hand exhaust manifold. The heat shield had funnelled hot exhaust on to the firewall, causing localised heating. The defect would not have been visible during pre-flight inspection, because of the location of the heat shield on the right-hand manifold. The left manifold is fully visible.

The manifold was repaired and aircraft returned to service.

CAA Occurrence Ref 15/318

Schweizer 269C

Main rotor swashplate

Part Model:	269C
Part Manufacturer:	Schweizer
Part Number:	269A1333-5
ATA Chapter:	6230
TTIS hours:	4275.9

The pilot reported main rotor vibration and cyclic lateral shake at high power settings.

The main rotor swashplate was removed and disassembled. During disassembly it was noted both the upper and lower bearing grease seals were not secured satisfactorily by the installed retaining ring. Significant scoring was noted on the retaining rings, and the bearing cage was distorted, with deformation of up to 0.050 inches. Additionally, the bearing grease was found to be discoloured.

These observations were symptomatic of failure or breakage of the swashplate inner bearing cage. An exchange swashplate was installed.

CAA Occurrence Ref 15/870

RANS S-6S Coyote II

ATA Chapter:	3200
TTIS hours:	734

During taxi for takeoff, the port undercarriage leg detached from the fuselage.

The leg had failed near the junction with the fuselage, and it appeared the failure had originated from an existing defect or crack in the internal surface of the landing gear tube.

Following repair of the aircraft, the owner will replace both undercarriage legs and limit the life to 500 hrs as a preventative safety measure. The leg failed at 734 hrs TTIS.

CAA Occurrence Ref 14/3267

Piper PA-23-250

Propeller governor

Part Manufacturer:	Hartzell Engine Tech
Part Number:	F-6-5A
ATA Chapter:	6120
TSI hours:	42
TSO hours:	864

During cruise, the right-hand propeller feathered without pilot input. The pilot was not able to unfeather the propeller, and made an uneventful single-engine landing.

Maintenance investigation found that the propeller governor had failed internally. The grub screw which sets the governor for either left or right-hand engine rotation had come loose. This caused the oil pump gear in the governor to seize, and in doing so, caused the governor idler gear located within the engine crankcase to shear. The engine was bulk stripped and a new governor installed.

The maintenance provider has amended the applicable work card for governor overhaul to include a torque check of the governor grub screw.

CAA Occurrence Ref 14/5684

NZ Aerospace FU24-950

Magneto distributor gear

Part Model:	IO 349 300-4
Part Manufacturer:	Bendix
ATA Chapter:	7100
TSI hours:	75.55
TSO hours:	456

In level cruise, 5 minutes after takeoff, the pilot heard engine revs increase with loud metallic clanging and severe vibration. Power was decreased and the engine ran smoother with normal mag drops and less noise. The aircraft landed on an airstrip below, where the engine could not be started again. No oil leaks were found inside the engine cowls.

Engineering investigation determined that the rough running was caused by erratic ignition timing. This was due to the distributor gear skipping because of missing teeth. The magneto was repaired and the engine inspected. The aircraft was then returned to service.

CAA Occurrence Ref 15/609

NZ Aerospace FU24-950M

Rudder bar

Part Model:	FU24-950
Part Manufacturer:	Pacific Aerospace
Part Number:	242825
ATA Chapter:	2721
TTIS hours:	14359

While taxiing, the pilot applied left rudder pedal to begin a turn, and the pedal went to the floor due to the torque tube failing in torsion. The torque tube failed due to excessive wear, which reduced the wall thickness to the point where it cracked and failed. The excessive wear was due to inadequate lubrication and inspection of the bearing blocks. The aircraft has a high number of flight hours.

The manufacturer is considering issuing a service bulletin to inspect under the bearing block for excessive wear, and to report any findings to the CAA. If other instances of wear are identified, repetitive inspection or AD action may be issued.

CAA Occurrence Ref 14/3214

Robinson R66

Landing gear skid

Part Model:	R66
Part Manufacturer:	Robinson Helicopter
Part Number:	C014-11
ATA Chapter:	3270
TSO hours:	774

The left-hand skid was found broken just aft of the front undercarriage leg. Corrosion was found on the inside of the skid.

The helicopter date of manufacture is recorded as 8/2012, with total time of 774 hours. The helicopter is used extensively on agricultural suspension spraying. The application uses seawater as a carrying medium, and also contains other highly alkaline products. The net result of the helicopter working with the product and resting in it during landing has allowed the suspension to enter the skids at the drain holes. New skids will be treated internally and powder-coated.

CAA Occurrence Ref 13/5700

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