Pointing to safer aviation

Spring 2020

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FLIGHT PLANNING

NOT A QUICK ONCE-OVER

Romeo, Romeo wherefore art thou?

ADS-B – from sceptic to convert

VNCs are getting an update

Unite against COVID-19

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

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// VNCs ARE GETTING AN UPDATE

Cover photo: A Kaikoura dawn from Vaughn Davis' Piper Arrow. Photo courtesy of Vaughn Davis. See "Flight planning – not a quick once-over" on page 10.

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// FLIGHT PLANNING – NOT A QUICK ONCE-OVER

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CIVIL AVIATION AUTHORITY OF NZ

PUBLISHED BY THE Communications and Safety Promotion Unit of the Civil Aviation Authority of New Zealand, PO Box 3555, Wellington 6140.

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Published quarterly at the beginning of each season.

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New Zealand Government

ISSN 1173-9614

I learned about radio telephony from this //

ROMEO, ROMEO WHEREFORE ART THOU?

This pilot has many, many years of flying experience and his story comes from when he was a student. What it says about correct radio procedure is a lesson for today as much as it was then.

With initial solo flights completed, the students were flying solo as often as possible to increase confidence and flying skills.

It was mid-morning and half a dozen student pilots were in the circuit at a satellite aerodrome, landing, turning off the runway, taxiing slowly back to the holding point, lining up on the runway when cleared, and taking off, repeating the exercise six or seven times in an hour.

The engine of the Percival P.56 Provost was a 550-horsepower multi-cylinder radial – quite a powerful and complicated piece of machinery for an ab initio training aircraft. Our instructors had continually emphasised the importance of monitoring the engine instruments in flight, for should some malfunction, like low oil pressure, go undetected, the engine would begin to overheat, and eventually fail and stop. »

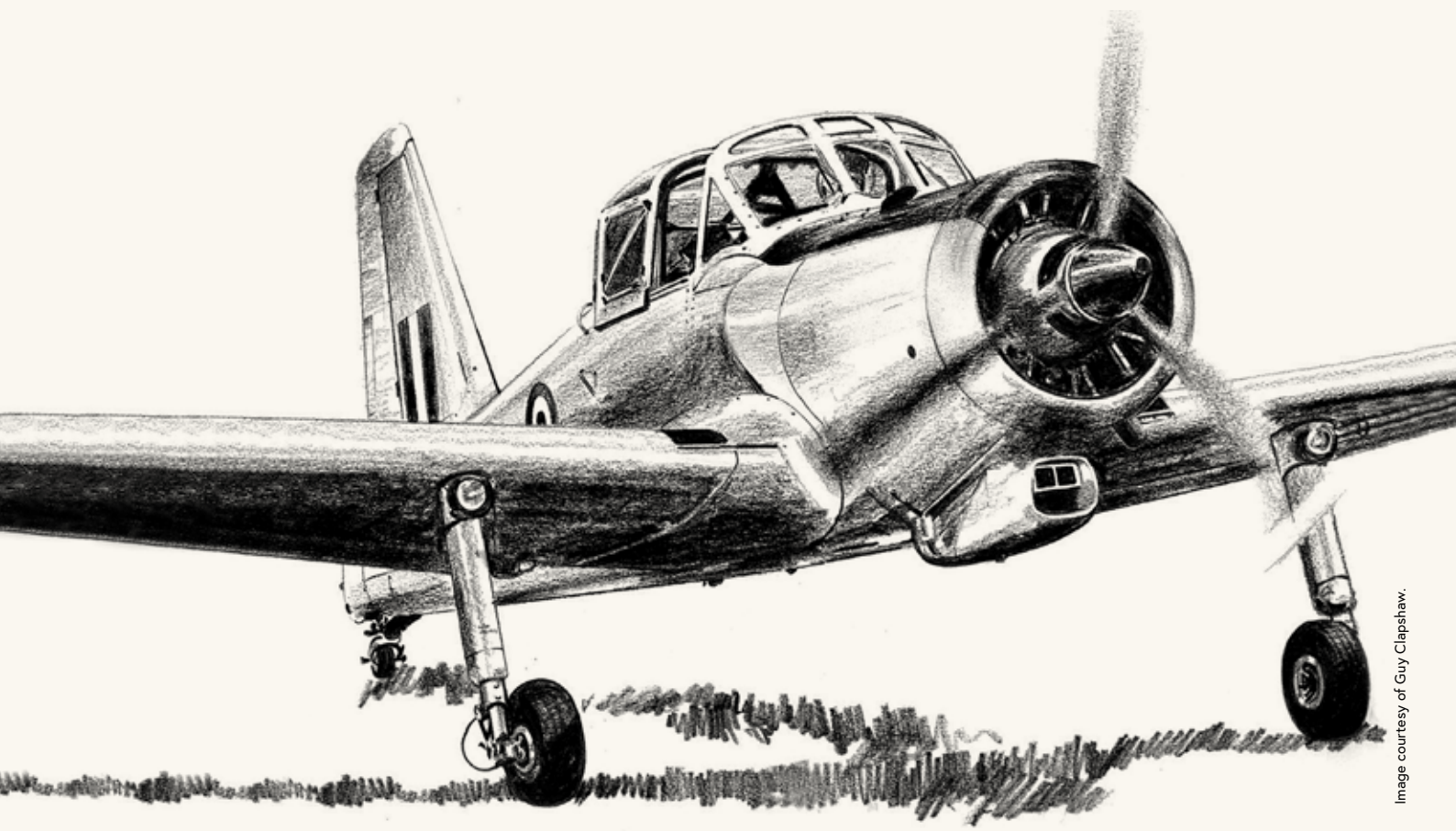


Image courtesy of Guy Clapshaw.

// "In an emergency, clear and timely communications help get the quickest and most appropriate response." *Plane Talking*, p5.

The unfortunate pilot would then be faced with the choice of a deadstick forced landing, or a parachute jump over the side, neither of which was particularly desirable.

So students quickly developed the habit of continually monitoring their instruments in flight.

On the ground, when the engine was only ticking over slowly, temperatures and pressures dropped below the normal in-flight operating range.

Today's student had soloed for the first time a week previously and was now on his second solo detail.

Five other students were in the circuit when he called.

"Tower, this is Romeo Romeo, my oil pressure is only 15 psi."

There was a pause on the radio channel until the student's instructor asked, "Romeo Romeo, what is your oil pressure now?"

"Fifteen pounds still," his student answered calmly. Fifteen pounds per square inch was a dangerously low figure. The normal operating range varies between 70 and 80 psi. A lower figure in flight could indicate imminent oil pump failure or a bad oil leak.

The instructor gestured to the duty air traffic controller to alert the fire crew and medical section, then get the station engineering officer on the phone.

"OK, now what about your oil temperature – is that excessively high?"

"Negative sir, it's 60 degrees."

"All right, that's well within limits. Now open your oil cooler fully and tell me if you can see any oil streaks on the windshield or fuselage."

A brief pause ensued while the student checked for traces of oil.

"No evidence of oil anywhere that I can see. But I'm..."

His instructor cut across him. "OK, OK, now what's your cylinder head temperature?"

This question was the important one. If the cylinder head temperature exceeded its upper limit of 230 degrees C, the engine would eventually seize and stop. The inexperienced student pilot would then be faced with the formidable task of a deadstick landing in whichever field or paddock he could find, in the 60 seconds before the aircraft hit the ground.

"A hundred and fifty degrees," the student replied quietly and calmly.

"The fire crew's alerted and the medical section's on standby," the senior air traffic controller reported. "But the station engineering officer is away."

The instructor grimaced – it would have been good to have had a technical opinion on the problem.

The senior air traffic controller radioed the circuit traffic. "All solo aircraft in the circuit continue orbiting at

// His chances of successfully carrying out a deadstick landing away from the airfield without damage or injury were slight. //

circuit height. Romeo Kilo and Hotel, you are to proceed back to main base with your instructors. Remaining aircraft keep orbiting."

Each aircraft acknowledged its understanding – the circuit was being cleared for an emergency. Beside the control tower, the crash crew's fire truck rumbled into life.

The instructor spoke again, in carefully measured tones. "OK, Romeo Romeo, the final approach and runway have been cleared of all aircraft. What's your oil pressure now?"

"Er, 15 sir...but I'm..."

"OK, is it steady or fluctuating?"

"Fluctuating, sometimes it drops to 12 but..."

"OK, OK, don't worry too much about the amount of pressure, don't panic – just be grateful some lubrication is getting to the engine."

There was another long pause on the radio. Other students tried to imagine their mate alone in the cockpit with his problem. His chances of successfully carrying out a deadstick landing away from the airfield without damage or injury were slight. His was a fast, heavy aircraft – it glided at 100 mph and came down fast. Everybody hoped like hell the oil pressure would hold out long enough for the student to make it back to the airfield.

The instructor picked up the microphone.

"Romeo Romeo, the approach path and runway are clear. Try moving the pitch lever back about eight centimetres. This should stabilise the oil pressure. Then check your oil cooler's fully open."

After a short pause, the student confirmed he'd done as instructed.

"Oil pressure fluctuating or steady?"

"Still fluctuating. Pulling the pitch lever back didn't make any difference to the revs."

"That indicates an oil leak in the propeller," the instructor swore to himself. "The temperatures and pressures will go off the bloody clock once all the oil's drained away."

He picked up the microphone again. "Romeo Romeo, head straight for the airfield for a straight-in approach to runway one seven . . . or two three if you prefer. The wind's a light southerly. Emergency services are alerted. What's your present position and altitude?"

"Um...I'm parked on the taxiway in front of your control tower, sir..."

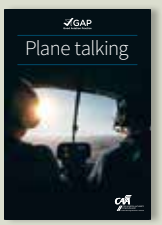
The student had been on the ground all the time! Taxiing back from his previous landing, with the engine ticking over slowly, he'd checked his engine instruments and had noticed their readings were considerably different from what they normally registered in flight.

So he thought it best to report it...

What they all could have done better:

- Stuck to standard operating procedures.
- Used correct radiotelephony procedure.
- Instead of jumping to conclusions, the instructor should have treated the 'emergency' as a MAYDAY. That would have established the facts at the start, including position, height, and nature of the problem.
- More student instruction on engine operation and management would have avoided embarrassment!

// PLANE TALKING



For your free copy of the CAA's Good Aviation Practice booklet *Plane Talking*, email publications@caa.govt.nz

// Tim Hughes says ADS-B makes available to all, the sort of situational awareness that the FLARM warning system has provided to glider pilots for years.

ADS-B – FROM SCEPTIC TO CONVERT

Tim Hughes, a recreational aviator for 36 years, wasn't sold on ADS-B at first. Then he thought through the safety benefits.

At first, I was unconvinced by the requirement for ADS-B to be mandated. It's less economic than viable alternatives, but the safety case puts it all in a different light.

ADS-B Out does just one thing. It broadcasts your position, altitude, velocity, aircraft ID, and some other essential facts. Nothing more. The benefits of ADS-B depend entirely on what someone else does with that data.

From a safety perspective, ADS-B data is used in three main ways by:

- air traffic control
- other pilots
- search and rescue.

Air traffic control

It might have been nice, in some parallel universe, if a new aviation technology arose to fill an unmet need, and delivered that benefit so well that it was simply adopted by all because of its value. It would make the buying decision easy and need no mandate.

In practice in New Zealand, ADS-B has arrived primarily because the ATC radar network was near end of life, and something had to be done. It made no sense to refresh the surveillance system with old technology.

So, here we are.

Photo courtesy of John McCaw.

If you want to use transponder-mandatory controlled airspace you'll have to have a suitable transponder, hence the ADS-B mandate. In this case (in my opinion) ADS-B is a 'dis-benefit'. You need additional capital to get the same service you had before.

The expense is somewhat offset. Airways avoided a great deal of cost because an ADS-B receiver network is much cheaper than radar. The government has given back much of that saving as a subsidy to aircraft owners who equip with ADS-B in the world's most generous grant scheme of its kind.

Commercial operators may be able to absorb the remaining cost. With half the New Zealand fleet involved in low-cost non-revenue operations, however, sport and recreational aviators who make light use of controlled airspace have to decide if the benefits are worth it.

For me, the next two safety cases make all the difference.

Search and rescue

Far and away, the most frequent need is to find aircraft in an emergency. ADS-B is a backup method in addition to emergency locator beacons.

Airways has extended the surveillance system coverage well outside controlled airspace as part of the ADS-B system upgrade, so you're more likely to be tracked – but not deep in the mountains.

ADS-B can also be picked up by the Aireon satellites, however, and Aireon provides a free-of-charge emergency aircraft location service. One call, and RCCNZ can have the last known location of a missing aircraft. Search and rescue may as well start there – it's likely they won't have to look very far.

Other pilots

For VFR operations, see and avoid works reasonably well. There are very, very few airborne collisions. Yet, as VFR aviators, most of us at some point have been 'jumped' to some degree, surprised by nearby aircraft we would have preferred to have noticed sooner.

It's no surprise then, that most pilot commentators have focussed on the advantage of ADS-B In. It's the one truly new feature enabled by ADS-B, and one of a VFR pilot's greatest-felt needs.

I've been a recreational aviator for 36 years, and recently started gliding. I've never felt as safe in an aeroplane as when flying a glider – there's so much less to go wrong! Gliders, however, tend to concentrate in areas of lift, where collision avoidance is front of mind.

For gliding, the parallel universe exists. For 15 years, gliders have used 'FLARM', a short-range collision warning system designed for GA. It was quickly taken up en masse, without a mandate, because the improved situational awareness was so worthwhile.

ADS-B makes that feature available to all. There's just no question that an air situation display showing aircraft equipped with ADS-B in your area is a great tool to supplement your visual scan and radio watch.

It works for IFR traffic too. Once every few years something happens to air traffic control, and it's temporarily disrupted. During these outages, airborne IFR flights use TIBA procedures (traffic information broadcasts by aircraft) to self-organise continued flight to safe landings.

The system is accepted and proven, but how much better would it be to also have an air situation display in the cockpit showing all relevant aircraft on a map?

Business value

The safety benefits are great, but my top pick for the value of ADS-B is actually commercial.

ADS-B has democratised access to air traffic surveillance data; think Flightradar24 and the like. My day job as a data scientist and operations researcher has made me aware of the millions in value that the data can unlock.

For airports, airlines, and organisations supporting air transport, there are solid opportunities to improve many things: on-time and environmental performance, capacity, asset utilisation, flexible scheduling in the ramp-up after COVID-19, logistics, fleet tracking, and more. To identify what you're missing, you'll need good data science.

But first, it will help if the aircraft in your world have ADS-B.

Tim Hughes spent 20 years working for Airways in air traffic management software engineering, data science, and strategic research. He has since worked as a research consultant to the air traffic management industry.

// APPLICATIONS FOR THE ADS-B GRANT

To the end of July, there have been 650 applications for the ADS-B grant. In total, $880,000 has been paid out in nearly 300 grants. Check out how to apply, on the back cover of this *Vector*.

new southern sky

ELECTRICAL LOAD ANALYSIS – A REMINDER TO OWNERS

Has your aircraft's electrical system been changed since manufacture? If so, it needs an electrical load analysis to, among other things, reassure you the battery can support the aircraft should the electrical systems fail during flight.

An ELA is both a procedure and a document. It's specific to your aircraft and is a crucial part of its records.

An ELA details:

- the complete aircraft electrical system, listing the primary generation systems
- the electrical storage systems
- the electrical loads

and, if applicable

- any alternate electrical generation and storage systems.

The 'procedure' part of an ELA tests the loading on the electrical system at various phases of flight during normal operation.

The ELA 'document' is evidence that in an emergency, there's sufficient energy reserve to power critical systems to allow for a safe landing within a specified timeframe – and that the emergency procedures can be complied with during that time.

It also tests the endurance of the aircraft's main battery, should the electrical generation systems fail in a 'worst case' scenario, eg, night IFR.

So, should your aircraft have a current ELA?
Yes, it should.

Are you now thinking, 'if my aircraft should have a current ELA, why doesn't it have one?'

That could be because your aircraft doesn't have an electrical system to analyse. Or it could be that your aircraft is in the same configuration as when it was

// Skyline Aviation in Hawkes Bay carried out an electrical load analysis when it upgraded its King Air B200 with a Garmin G600 TXI Avionics suite.

delivered from the manufacturer, and its certification requirements at the time of manufacture are still being met.

But if your aircraft's electrical system has changed in *any* way since manufacture, or you're bringing an aircraft into New Zealand, an electrical load analysis has to be performed.

In December 2019, the CAA updated Advisory Circular AC21-11 & AC91-23 *Electrical Load Analysis* (Revision 1) to provide greater clarity and guidance on what's expected.

Despite this, the CAA's product certification team is still seeing lots of ELAs not meeting requirements.

> // The ELA document is a fundamental part of the aircraft's records so keep in mind that you should be given a copy. //

Expect your maintainer to ask

As noted in the July/August 2016 *Vector* article, "Electrical Load Analysis – Does Your Aircraft Need One?" the CAA isn't demanding retrospective ELAs – that is, to aircraft already in the country.

But, as the AC advises, the CAA does expect an ELA to be updated or created whenever the aircraft is electrically altered.

So when you take your aircraft in for a modification that puts a load on the electrical system, alters the electrical generation system or the electrical storage system, expect your maintenance provider to ask whether you have an ELA.

The ELA document is a fundamental part of the aircraft's records so keep in mind that you should be given a copy.

Some are generated using custom software or spreadsheets. While you may not be given a copy of that software, you should be given a suitable and compliant document for your records.

// SOME QUICK QUESTIONS AND ANSWERS

Q. Why do I need a separate ELA when the maintenance manual has an electrical load chart?

A. It's true that many aircraft manufacturers do include an electrical load chart in the maintenance manual for all possible OEM configuration options.

The problem is that some of this equipment may not be installed, and more importantly, the charts don't perform a load analysis of the data.

The charts are valuable in creating an ELA specific to your aircraft, but are not an ELA in their own right.

Q. Why do I need an ELA for a new radio that draws less power, when I've been flying around for years with no issues?

A. Any design change or alteration to an aircraft requires evidence that the applicable certification requirements are still being met.

An ELA provides that evidence, even though the change has improved the performance of the electrical system.

Q. Do I still need an ELA if, as a test, I power up my aircraft while it's on the ground and it's using only the battery and the battery lasts 30 minutes?

A. A test regime may be used but the test method must be meaningful, and the results must be analysed and documented.

Remember that the electrical loads on the ground may not be the same as in the air because the systems might not be in their normal operating condition.

Q. Why does my ELA have to meet much broader requirements than those I need, for how I fly my aircraft – such as for night VFR, when I fly my aircraft only day VFR?

A. Even though you may operate the aircraft only day VFR, you need to provide evidence that the applicable certification requirements are still being met for all scenarios that the aircraft was designed for. That includes the worst-case scenario for most GA aircraft – night IFR in inadvertent icing conditions.

For more information, read the December 2019 revision of Advisory Circular AC21-11 & AC91-23 *Electrical Load Analysis* to understand better what is expected regarding an ELA and for guidance on creating one.

FLIGHT PLANNING

NOT A QUICK ONCE-OVER

// Kāpiti pilot Liana Mosca carefully plotting the optimum route for her weekend cross-country.

Photo courtesy of Aeropath.

Just going through the motions when you plan a flight could imperil you and your passengers should something unexpected happen. Proper preparation will minimise the risks posed by your flight going awry.

Personal minimums

A pilot serious about good flight planning will begin by asking themselves, 'do I have the skills to safely make this particular flight on this particular day in this particular aircraft?'

Your personal minimums should be higher – or more restrictive – than the legal minimums, and set on the day of the flight, taking into account your currency, competency, and the conditions on that day.

Included in that assessment of your ability to safely fly that day, you need to be brutally honest about your own well-being: your level of fatigue, or degree of stress, for instance.

Those personal minimums should not be 'amended' during the flight to suit your desire to get to your destination, or the demands of your passengers.

Take the time, be methodical

If your answer is 'yes' to the question 'is this flight within my capabilities as a pilot?' you next need to spend enough time to do your homework properly.

Rule 91.217 *Preflight action* says a pilot-in-command must collect and understand all available information relevant to that flight.

That information includes:

- Current meteorological information
- Fuel requirements and considerations
- Alternate aerodromes available
- NOTAMS and AIP Supplements
- Aerodrome conditions
- Aircraft performance data.

South Canterbury Aero Club CFI Aaron Pearce always starts with the weather.

"Can I even depart? What are the enroute conditions? What are they like at my destination? There's no point going on to plan a flight if the weather isn't playing ball.

"I next go to NOTAMS and AIP Supplements. Can I get into the aerodrome I want to get into?

"I always do my flight plan checks in the same order. That way I don't forget anything."

Selecting a route

There are several things to take into account when you're working out your best route using a visual navigation chart[1]. They include minimum safe altitudes for the terrain you're flying over, aerodromes you'll be flying near, airspace designation, and refuelling options.

Once you've decided on your optimum route, get as much relevant information as you can into a flight log, leaving your calculations until you have the most up-to-date weather information.

Sharn Davies, the CFI at Marlborough Aero Club, says one of the most important aspects of flight planning is to really 'think it through'.

"Actually sit down with your map and your charts and think about the route you're going to fly, and any alternatives that may be required due to weather."

Sharn says he observes people flying into the aerodrome clearly unprepared.

"They might not be sure where and how to join. They may not be familiar with any local procedures – which are noted at the bottom of the Vol 4 charts – circuit directions, and parking areas.

"If you're heading somewhere unfamiliar, take the time in the week before to actually *think about that flight*," he repeats. "Call a local about the airfield procedures."

Andrew Sims, CFI of Wellington Aero Club, says one of his biggest tips to pilots is 'draw on your maps'. »

1 There are new, improved VNCs on the way. Check out the article 'VNCs are getting an update' on page 20.

"For example, approximately where you think you're going to make that radio call, or where the airspace is approaching where you need to descend.

"Nowadays a lot of pilots will whip up a plan on their iPad®. That saves you a lot of time but you've still got to take yourself through, step-by-step, as to what your action is," Andrew says.

Shannon Mickleburgh is the assistant CFI at Massey University's School of Aviation and agrees with Andrew Sims.

"You've got pencils – draw all over the chart. Make notes. If you've got an electronic app, you can draw markers to provide yourself with cues.

"As long as you've done the flight in your head beforehand, all you need is a subtle reminder to kick-start where you need to go from there," Shannon says.

> // ...when you're starting out, you need to take that extra time to learn where you're going. //

Plan B

Always consider at least one alternative aerodrome and plan for that as carefully as you do your favoured route.

Shannon says there's no reason why you can't have at least three routes planned out beforehand.

"If you're looking, particularly, at doing cross-country flights, you could plan multiple different routes. Think about the routes that you want to do, then based on the weather forecast, you could start narrowing them down. So 'OK, maybe a South Island trip isn't going to work tomorrow, maybe we should go across to New Plymouth' or something like that.

"Obviously, the more skilled you get, the better you'll become at planning on the day.

"But when you're starting out, you need to take that extra time to learn where you're going," Shannon says.

Weather

Begin your Met check early on the day of the flight, then track the evolving weather situation.

Obtain the most up-to-date weather information before departure and leave enough time to interpret the data.

Shannon says thinking about the weather well ahead of time can dictate how you plan.

"For example, do you really want to be going across to the East Coast in a strong norwesterly. Obviously down south, a big consideration is dealing with the wind, and flying through the valleys down there."

Aaron Pearce says use all the resources available to you.

"Don't use just MetFlight – there are lots of tools out there: webcams and apps that will help build on the mental weather picture MetFlight gives you.

"Call the local aero club – they're always more than happy to pass on the advice of a current pilot weather report.

"Calling a friend who lives there and can look out the window for you is better than guessing.

"Build a big picture of what you think the weather is going to be doing."

Check your NOTAMs and AIP Supplements

It can never be said enough. Always check current NOTAMs (www.ifis.airways.co.nz) and AIP Supplements (www.aip.net.nz), which are free.

If you're uncertain about the contents of an airfield NOTAM, contact the aerodrome operator.

Some danger areas, military operating areas, and restricted areas are active only when advised by NOTAM – see AIP New Zealand ENR 5 for further details.

Shannon Mickleburgh says some pilots don't think enough about altitudes and airspace in their planning.

"For example, they're at VFR cruising altitude of 6500 feet, but they're not giving any thought to the fact that the airspace actually steps down as they get closer to their destination aerodrome.

"Or they're not planning a top of descent appropriate to that, or they haven't considered that they could just do controlled VFR to get there," Shannon says.

Staying on the radar

Filing a flight plan with Airways (www.ifis.airways.co.nz) is quick, easy, and inexpensive.

Photo courtesy of Maritime NZ.

// If you've filed a flight plan, Airways is trying to find you the moment your uncancelled SARTIME ticks over. Just 15 minutes later, the Rescue Coordination Centre is also on the case.

If you've filed a flight plan, and have a forced landing, you've given yourself the best chance of being found.

Frances Dowdle, Manager of Air Traffic Support Services at Airways, explains how it works.

"When you file a flight plan, you're asked to provide a SAR (search and rescue) time. If, for example, you filed your VFR flight plan and said your SARTIME was going to be 0500 UTC, if the SARTIME has not been cancelled by 0500 UTC, we're immediately alerted that the flight is overdue.

"We then have 15 minutes to carry out a series of tests to try to locate and contact you. If we can't raise you or confirm that the aircraft is still flying within that 15 minutes, we have to notify the Rescue Coordination Centre."

Frances says you can update your flight plan.

"You can change your route and update your SARTIME with Christchurch Information at any stage along the route. You can also do that when you're on the ground by ringing the National Briefing Office."

Two final things about making it easier for everyone if your flight goes awry – the first is a tip from Frances: don't let UTC conversion trip you up! New Zealand Daylight Time (NZDT) is 13 hours ahead of Coordinated Universal Time (UTC).

And finally – if you're having a family member or friend provide flight following, make sure they know what steps to take if things go badly.

Weight + fuel

Pilots need to assess their weight and balance before they take off.

Warren Sattler is the head of flight training standards at Ardmore Flying School and says pilots often don't take enough care in assessing payload.

"I've lost count of the number of times newly licensed pilots arrive to take their friends for a flight with no thought to useable payload. 'It's a four-seater isn't it?' is as much as they consider.

"The CAA seat allocation is supposed to be 190 pounds. But when those people say, 'oh that's a four-seater', they give no consideration as to how much weight is going to be in each of those seats.

"And an aircraft like a Cessna 172 is a marginal three-seater.

"They can end up severely overloaded. People just don't do the maths."

Warren says pilots often end up pruning fuel down to the absolute minimum to get the payload on board.

"I always start by calculating payload. Take off what you want to put in the cabin and then what's left over is your fuel allowance – does it work or doesn't it work?"

Aaron Pearce says calculating your fuel endurance, and knowing when you're going to run out of fuel, is the next biggest thing after weather, in planning a flight. »

// Begin your weather check early in the day.

Photo: istockphoto.com/AscentXmedia

Despite that, Shannon Mickleburgh says fuel is one of the biggest things students tend to skim over.

"They spend all this time doing a fantastic navigation log but then run out of time and don't do the fuel.

"In VFR flight, calculating fuel as accurately as you can is probably the most important thing. So when you're in the air, you can cross-check, 'how much fuel have I got and can I actually carry on with the flight?'"

Finally, many pilots have been caught out with the wrong fuel cards or expired fuel cards. Check the AIP for who the fuel providers are at each aerodrome you plan to visit, and that your fuel card for that provider is still operable. And remember your pin!

Prepare for the worst

A precautionary landing is unlikely but you should still make provision for one.

During flight planning, list what you think you should be carrying, given your route, then prioritise.

Here's a basic checklist to get you started:

- charged-up cellphone, and charger
- survival kit
- extra food and water
- life jackets
- suitable clothing (warm) and footwear
- credit card and cash.

Make sure you include all survival equipment in your weight and balance calculations.

Cockpit management

Aaron Pearce says cockpit management is pretty big during a cross-country flight.

"Fold your map to a size that's workable and practise with your map on the ground, so you're not having to open the map out in the cockpit.

"We fly with a clipboard; everything's kept within reach. If you need to, use your passenger or your backseat passengers to hold and pass you things.

"Print out the plates you intend using, rather than sitting a Vol 4 on your lap."

And finally...

Carry spare oil.

Take pickets and chocks to secure the aircraft if you plan on leaving the aircraft unattended.

Remember that the only useless clean rag and windscreen cleaner are the ones you leave behind.

// PLANNING A FLIGHT?

Check out *AIP New Zealand* ENR 1.10 "Flight Planning"

Get your free copies of the Good Aviation Practice booklets, *Airspace*, and *Survival* by emailing publications@caa.got.nz.

STALL RECOVERY AND MINIMISING HEIGHT LOSS

A heads-up that the way students learn to minimise height loss during stall recovery could give them grief if they decide to apply to the airlines.

In ab initio flight training, instructors teach the stall with four aims: for the student to be able to control the aeroplane to the point of stall; to recognise the symptoms of the approaching stall; to experience the stall itself; and to recover with minimum height loss.

The student needs to know about stalling so they can recognise one drawing near, and recover from it, especially during approach and landing.

Typically – as if readers of *Vector* needed reminding – the stall happens because the angle of attack of the wing is too high for air to flow smoothly over it. About 15 degrees is the limit. The amount of lift the airflow is producing is insufficient to support the weight of the aircraft.

"To recover from a stall," says CAA Aviation Safety Advisor Carlton Campbell, "you check forward to reduce the critical angle where it's stalled to where the wing is flying again. In that recovery the check forward is 'unstalling' the aircraft.

"Then applying full power allows us to minimise loss of height in that recovery process. And that's obviously critical if the stall occurs close to the ground."

Carlton says this manoeuvre is taught well in the GA environment, but the 'law of primacy' is causing a headache for airlines.

"The stall situation in an airliner, particularly a swept wing jet is typically at an altitude where height loss is not a problem," he says.

"But airline recruits are so focussed on minimising height loss, they're putting in the power, raising the nose and bringing it back to a climb attitude. They're risking putting the aircraft into a secondary stall.

"There have been airliner accidents attributable to the crew holding the nose up in a low speed/stall situation.

"Airlines are saying the focus on minimising height loss is not the most important consideration for them.

"So instructors need to make students aware, early in their training, that minimising height loss is important in one context, but that there are other contexts, such as in the airlines, where minimising height loss does not take precedence."

// A HEADS-UP...

Katrina Witney, CAA Flight Examiner and Flight Standards (theory and syllabus), says many students are in a rush to minimise the height loss.

"They're too quick to apply power and raise the nose.

"They need to check forward sufficiently to break the stall, *then pause*, giving the aircraft a chance to recover before minimising height loss.

"Without taking that time, they run the risk of putting the aircraft into a secondary stall.

"Not only could this affect their flying if they enter the airlines, it's also not good GA practice."

SLOW FLIGHT
IMPORTANT TO TEACH WELL

When CAA Aviation Safety Advisor Carlton Campbell asks instructors, "Why do we teach slow flight?" he says the answer sometimes shows the instructor doesn't really know. And if instructors don't really know, they won't teach it properly.

Carlton Campbell says skills and experience in slow flight are important for at least three crucial phases of flight.

"But sometimes, if I'm visiting a training organisation, I'll invite myself into the briefing room, and after listening for a while, I've posed a question or two about slow flight.

"I'm disturbed at how often the response indicates the instructor doesn't understand why they're teaching it, so what messages are they delivering to the student?

"It's important to appreciate 'slow flight' in a fixed-wing is not a configuration used for operational purposes as students are sometimes led to believe. Operationally, we would use the poor visibility configuration."

Carlton, a former CFI of Wakatipu Aero Club, says it's important a student experiences operating the aircraft more slowly than standard speed.

"A student needs to develop confidence in slow flight, and to appreciate that small, smooth inputs will prevent inadvertently putting the aircraft into an undesired state such as stalling."

Carlton says there are four phases of flight where the pilot is transitioning through slow flight: during take-off; flaring to land; and during a low-level go-around. The fourth is in the air during approaches to stalls in lessons (although this final one is not major, because they are done with plenty of height).

"But the three other phases are close to the ground and need the pilot's assurance and sure handling," says Carlton.

"In the take-off, we open the throttle and accelerate down the runway – and the period we're calling slow flight is a relatively quick transition because we accelerate through to best rate of climb or best angle of climb speed to climb away.

"Similarly, the period during flaring to land is a comparatively short transition.

"But the go-around is a longer time in the slow flight phase, and often not anticipated. International and CAA statistics indicate there are problems with the way many pilots handle this.

"You're flaring to land, when the runway suddenly becomes unsafe to land on – because stock are running on it, or an aircraft hasn't cleared the runway yet – and you need to go around.

"You have full flap extended, meaning there's a lot of drag, so you're slow, and you need to go to full power. The slow flight transition, then, through to the best rate of climb or best angle of climb, while retracting flap, takes a bit of time.

"In that phase – because quite often we're reacting rather than having anticipated that go-around – we can make hasty decisions, and sometimes put ourselves into

a situation of approaching an inadvertent stall while low-level.

"A slow flight lesson at altitude will build confidence and skills, so we can go through that transition phase with no reactive responses: it's anticipated, it's familiar. We're confident the aircraft is going to behave as we expect it to, because we're going to handle it appropriately."

A-cat examiner Penny Mackay believes there's a great deal of confusion about what 'slow flight' actually is.

"At times I'm being shown some pretty fast slow flight, in my opinion!

"Slow flight is usually conducted in calm conditions or light winds and – as per the Flight Training Standards Guide – 1.2Vs is calculated for the aircraft, and used.

"But varying weather conditions, wind shear and gustiness have an effect on slow flight.

"Gusts can suddenly increase the angle of attack and decrease speed. Pilots need to anticipate this possibility."

"Some pilots seem only too happy to demonstrate slow flight without any thought of such conditions where they need to fly a little faster.

"This, of course, translates into a lack of thought about conditions in take-offs, landings and go-arounds."

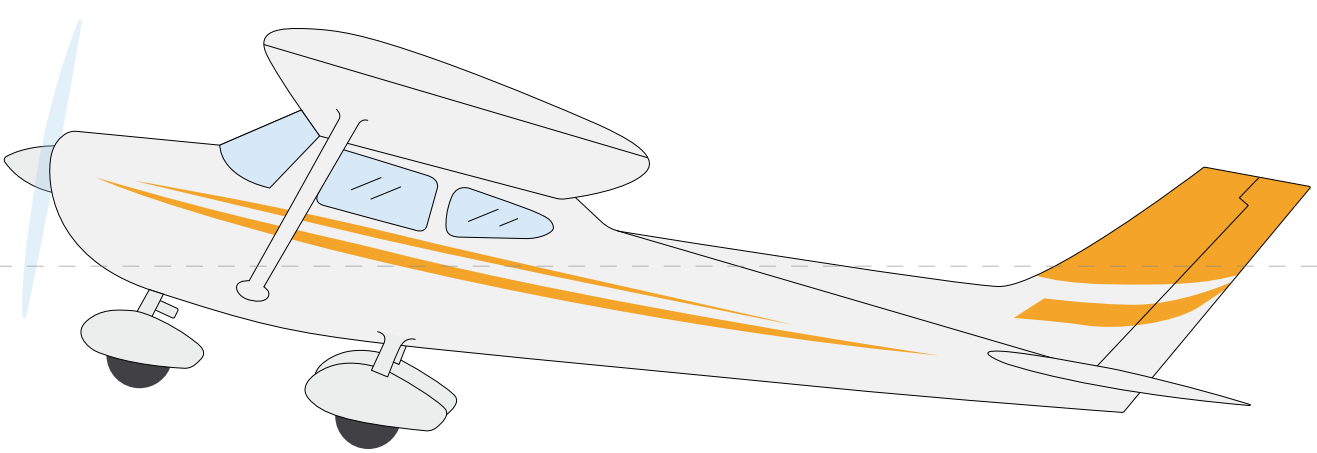
Slow flight hasn't been in the PPL syllabus for long. It was introduced as a formal part of ab initio training after much discussion and comparison with training regimes in other countries.

"Traditionally, it had been taught by experienced instructors," says Carlton, "but not necessarily by all instructors.

"So it was introduced only a few years ago, and I think there's been a bit of instructional 'creep'. We've had a bit of 'clone teaching clone', and the depth of knowledge and understanding around it has waned.

"We need to reinforce the objectives and reinforce the principles so we're getting quality training around it."

// Some pilots seem only too happy to demonstrate slow flight without any thought of such conditions where they need to fly a little faster. //



// To fly level at lower than normal airspeed, a higher than normal nose attitude is required. A small increase in power is then needed to maintain the desired altitude.

// Your SMS processes should "reflect what you actually do, and they need to be appropriate for the size and scope of your organisation."

SMS – TOP TIPS

A number of operators' SMS certification dates have been extended out to 2021 due to the impact of COVID-19. As you approach your certification date the CAA's nine SMS specialists share some key and pithy advice.

Penny Stevenson

Keep your audit programme real. Gather up your SOPs and your hazard register, and go sit in a truck for a while, and watch what's actually happening 'out there'.

Do the processes and procedures you're watching actually match what you have on paper? Think about how they could be improved.

It's guaranteed you'll find hazards you hadn't thought about, and you'll have a better understanding of how it all really works.

In so many ways, it beats sitting behind a desk.

Simon Carter

Make your formal safety policy the same as your informal safety message to staff – short and to the point is best.

Look at your risk controls – are they really in place? Or just a set of ideas?

Have you included contacting the rescue coordination centre as an initial action in your emergency response plan for an overdue aircraft?

Charlotte Brogan

Make sure you *really* understand the SMS processes documented in your manual, especially if you've used an outside consultant to write that manual.

Take responsibility for those processes – they should reflect what you actually do, and they need to be appropriate for the size and scope of your organisation.

Be prepared to explain those processes to us at certification.

Georgina Steadman-Adams

Be sure you understand what safety goals, objectives and indicators are, and how to make them effective.

Safety goals are big statements of where you want to be (eg, everyone home safely every day).

Safety objectives are what you're going to do to get there (eg, staff are aware of their safety responsibilities and accountabilities).

Safety indicators are how you're going to measure whether you're achieving, or not achieving, your objective. For example, 100 percent completion of SMS training and 100 percent completed competency assessments – by asking 'open' and 'show me' questions to ensure understanding is met.

Having one safety goal with a few objectives is a good way to ensure you're measuring your company's performance against where you want to be (your safety goal).

Alan Daley

Any specific SMS training in your organisation, internal or external, should be recorded in staff training records. This includes the training of managers and senior persons, and shows that the responsibilities to upskill staff have been met.

Practise your emergency response plan (ERP) before your CAA certification visit. Every organisation I've dealt with has taken away lessons from doing this. Their ERP is improved, and staff and management understand their respective responsibilities and actions. Record this practice scenario in your appropriate safety meeting records.

Trevor Jellie

Think of SMS as meaning '*simple* management of safety' – don't overcomplicate or overthink it.

Management of safety is all about managing risk. Risk can be managed only if the hazards creating that risk are known. Make sure all your procedures and practices (eg, reports, investigations, audits, reviews, training and meetings) identify hazards in what you do. 'Thread' those hazards from the initial place where they are reported and recorded, through your risk assessment process, onwards to your hazard and risk register.

The register is the 'go-to' record of the level of risk you choose to operate with. It should be very familiar and well-worn!

Velma Scholz

SMS should be at the core of all your business and operational activities. It's a priority then to really understand the processes involved, and take responsibility for them.

All staff need to receive training on SMS as it applies to their position. A good starting point for smaller operators would be for the safety manager to follow up training with a discussion to make sure everyone understands their duties and responsibilities, and how their individual commitment to safety can benefit the whole organisation.

This requires the safety manager to come up with everyday practical examples.

In terms of identifying hazards and assessing their risk, start with a bit of whole-of-staff brainstorming.

Linda Cook

Teamwork.

Get everyone in the same room, including contractors and other third parties, to identify hazards and associated risks.

You'll be amazed at the hazards the group will identify. You'll also be surprised at how many risks are shared through the organisation.

This exercise will help identify where additional training may be required, and where SOPs need changing. It will clarify responsibilities, and the best means of communicating controls to staff.

When you review your hazard register, come together again. Skype meetings are an ideal way to include those who cannot make the trip to your meeting.

This process can serve as a valuable tool for measuring how effective your controls are. It will help provide CEOs with evidence when they're asked, 'how does your organisation monitor the effectiveness of its controls, and how do you engage key stakeholders in this process?'

Kill two birds with one stone – review aviation-related hazards and health and safety hazards at the same time. Both the CAA and WorkSafe require you to review your hazards and how effective your controls are.

// HOW TO BE A SAFETY MANAGER

For your free copy of the CAA's Good Aviation Practice booklet *How to be a safety manager*, email publications@caa.govt.nz

VNCs ARE GETTING AN UPDATE

The November 2020 visual navigation charts are smaller, more accurate and clearer than their predecessors. There are other important differences – and pilots need to understand those before flying with the 2020 VNCs.

Size matters

If you buy a new set of VNCs in November, the first thing you'll notice is they're slightly smaller – moving from B1 to A1 size. That means you can fold them more easily into an A4 or A5 size – standard for pilot kneeboards.

The old B1 format had become a 'non-standard' size that few modern printing presses could produce economically, says the Aeronautical Information Management (AIM) team at Aeropath, who produce the charts.

"The B1 format had reached a point where it was going to cost significantly more to maintain, and we didn't want to increase the cost of the charts," says Matt Day, who leads the AIM team. "So working with the CAA and after surveying our chart users, we've reduced the sheet size and will be reducing their cost."

The improvements

With the move to the smaller size, Aeropath says it's taken the opportunity to improve the readability of the charts.

They're a lot sharper and clearer than previous charts, and they feature enhanced symbols for obstacles, aerodromes, visual reporting points and danger areas.

// Symbology in current VNC

// Symbology in new VNC

All images courtesy of Aeropath.

Matt says previous VNCs had many elements overlapping, particularly in busy areas like Manawatū.

"The new VNCs are less cluttered. Obstacles lower than 150 feet above ground level, for instance, are no longer displayed and neither are minor roads. This has improved chart readability.

// The current VNCs have given way to the new VNCs (example below) which are less cluttered.

// New VNC

"In addition all chart elements have been reprioritised. For instance critical obstacles now take precedence over less important features. They're larger, clearer, and aren't hidden behind airspace lines."

Over the past two years Aeropath has been working with the defence force to verify obstacles that have been identified over the years by both civilian and military pilots.

Matt says it was a major undertaking.

"But now all obstacles have been merged into a central set for the country and each one (there were more than 1000) has been cross-checked against known survey data, satellite and LiDAR imagery to make sure its location and height are accurate."

Other improvements include a faint black outline on all red danger symbols, making them more readable under red light at night; updated terrain, spot heights, roads, power lines and towns; and two new terminal charts, Manawatū and Queenstown, both at the 1:125 000 scale.

The charts have also been produced in the latest New Zealand Transverse Mercator 2000 projection which also makes them more accurate than previous charts.

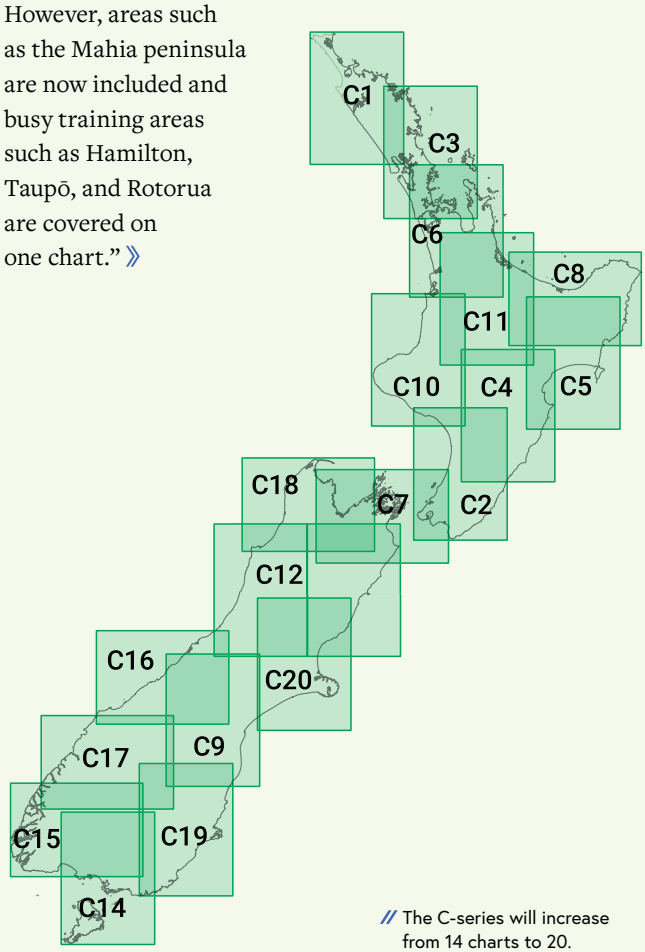
Check the differences

It's crucial pilots understand the two key differences between the current charts and those rolling off the press in November.

Firstly, there's a change in the numbering of the charts and the areas they cover.

"With the move to a slightly smaller sheet size," says Matt, "the coverage area of individual charts will change. That means within some chart scales, the physical number of charts in each series will increase to cover the same area at the same scale.

"For instance, the current C-series (1:250 000 scale) comprises 14 charts. In the new format, there will be 20. However, areas such as the Mahia peninsula are now included and busy training areas such as Hamilton, Taupō, and Rotorua are covered on one chart." »



// The C-series will increase from 14 charts to 20.

//...not all information is displayed on all charts.//

To see what charts you need for a given area, visit www.vnc.aeropath.aero. You can select a chart scale and see where the chart boundaries are. Clicking an area will give you the list of charts covering it and a link to the store to buy it.

Secondly, pilots need to remember that different VNCs are designed for different purposes and *not all information is displayed on all charts*.

The higher scales show more area, but less low-level detail, and are better suited for long distance planning, while the smaller scales provide less area and more detail for local navigation.

The A and B-series charts (1:1 000 000 and 1:500 000 scales) don't show all low-level information such as low-flying zones or obstacles. The C-series charts (1:250 000) do show low-level information, but not all airspace information above 9500 feet.

For a detailed list of the differences between chart scales, see "Visual Navigation Chart (VNC) Scale Differences" at aviation.govt.nz > Airspace & Aerodromes > Airspace.

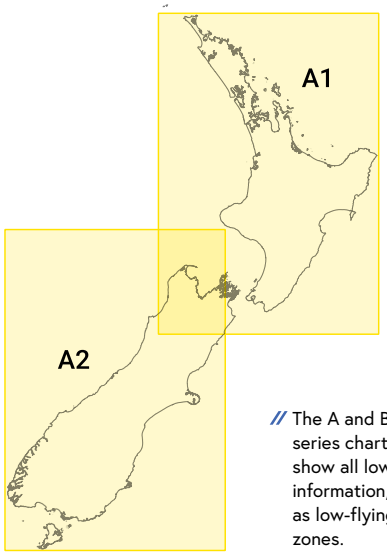
"How do I get the new VNCs?"

The 2020 VNCs will be available from early October and are effective from 5 November. They can be bought from normal suppliers or www.aipshop.co.nz.

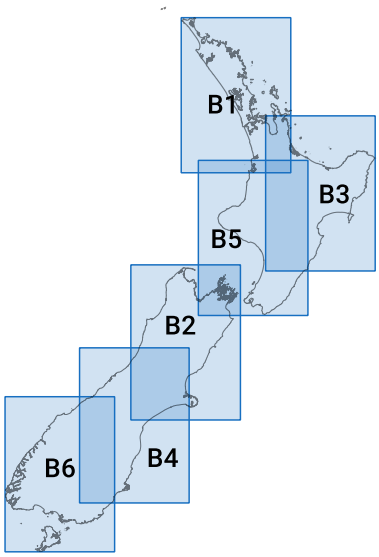
The following electronic flight bag applications are licensed through Aeropath to incorporate the VNCs:

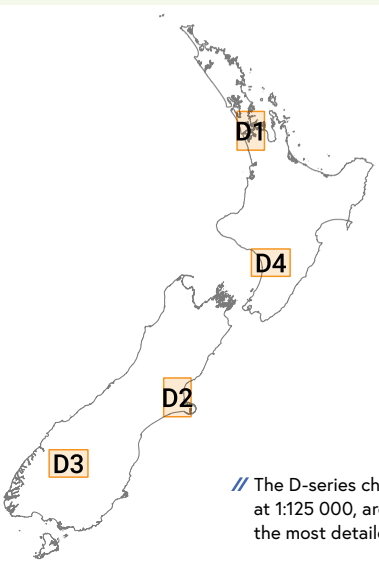
- Air Nav Pro
- AvPlan
- OzRunways

Guidance on the use of EFBs is in Advisory Circular 91-20 *Guidelines for the Approval and Use of Electronic Flight Bag Devices*.



// The A and B-series charts don't show all low-level information, such as low-flying zones.





// The D-series charts, at 1:125 000, are the most detailed.

// AIRSPACE

For your free copy of the CAA's Good Aviation Practice booklet *Airspace*, email publications@caa.govt.nz

DON'T ASSUME NEW = SAFE

This owner's story illustrates why it's important to always inspect the spanking new equipment that just arrived by courier. Make it part of your SOPs.

// Life vest with light and CO_2 cylinder.

Back before...

I haven't always had good luck with life vests. The first time I used one was in Lyttelton Harbour during RNZAF pilot training. Even though Wigram had a perfectly good swimming pool we could have used, someone decided it was important to our professional development to be kicked out of a hovering Huey into the not particularly warm sea.

As we'd been trained to, once in the water I gave the inflation handle a sharp pull to trigger the CO_2 cylinder, which inflated my vest with a satisfying hiss. Sadly, this was followed by a much less satisfying hiss as the jacket immediately deflated. (In fairness this was a training unit, so had probably had a pretty hard life.)

I should have known the manual inflation valve wouldn't be much help, but drills are drills, so I gave it a go. No dice.

Ordinarily I'd have been out of options. That day though, just for fun, I'd packed a toy rubber duck in the pocket of my flying overalls (carefully tethered with string).

I deployed my duck. It filled with water and turned over.

Luckily, part two of the exercise was to be winched back into the Iroquois and flown to a nearby pub, so my lack of buoyancy that day was more annoying than fatal.

And now...

I was reminded of this first experience earlier this year when upgrading my aircraft's passenger life vests because the old ones were due an inspection. »

After a bit of research, I settled on a set of waistbelt-mounted replacements that conformed to New Zealand Standard NZ5823[1], and ordered them in from a local specialist supplier.

As all good over-water aviators know, a key requirement for aviation life vests is a light. For some reason mine hadn't been fitted when I stopped by to collect my order, so rather than keep me waiting the retailer gave me three light units, an instruction slip and some fasteners so I could DIY them.

I don't know about you, but I don't open up life vests very often, so was quite interested to see what was in there (and hopeful I'd be able to get them back in their pouches afterwards).

The big reveal

And interesting it was! Two of the three were exactly as you'd expect, with a CO_2 bottle, trigger mechanism and manual inflation valve to attach the light to. The third one just had an empty fitting where the gas bottle was meant to go.

I fly a single-engine aircraft and, IFR routes being what they are, a lot of that flying is over water. In some cases, an engine failure would end, all going well, with me and my passengers swimming.

If I hadn't agreed to fit my own lights, I might not have known about the missing cylinder until its next annual inspection. Or, if I'd been especially unlucky, halfway across Cook Strait trying to remind my sinking passenger how to use the manual inflation valve.

Naturally, I informed the retailer, who sent me the missing CO_2 cartridge and promised to carry out an internal investigation.

I also reported it as a safety incident at aviation.govt.nz/report.

And in the future...

I will always double-check my safety gear when I buy it, and after it's been serviced.

As aircraft owners, we're religious about making sure our engines are properly maintained and checked before every flight. It makes just as much sense to pay attention to the gear we'll rely on if that first line of defence fails.

1 These are a marine life jacket accepted for aviation use under Part 91 Appendix A.14 Emergency equipment.

SUSTAINABLE *VECTOR*

For a while now, the *Vector* team has been looking for ways to deliver the magazine to you that are kinder to the environment. This is what we've come up with, as our first step in that journey.

This copy of *Vector* has arrived at your place in a bag made of fast-degradable material that, depending on your local council's recycling guidelines, you may be able to dispose of in your recycling bin. It has a recycling code of 4 LDPE (low-density polyethylene). To check, go to www.recycle.co.nz. Even if the material ends up in landfills, because it degrades faster than standard plastic, it's less likely to escape into the environment, block drains and waterways, become a visual pollutant and harm wildlife. To learn more about the material, which is made in New Zealand, go to www.epi-global.com.

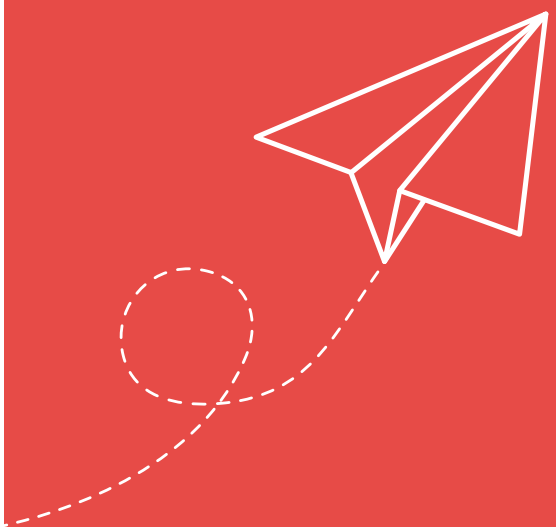
Vector also now has a recyclable address cover sheet. We've stopped using a sticky label for your address because the glue wasn't environmentally friendly.

The material for the cover sheet and the magazine itself is sourced from sustainable, ethically harvested forests. That's what the FSC logo bottom right of page 2 is all about: it stands for Forest Stewardship Council – a global not-for-profit organisation that sets the standards for what a responsibly managed forest is, both environmentally and socially.

Both the cover sheet and magazine are printed using vegetable-based inks and water-based sealers.

At *Vector*, we will continue to look for ways we can get even better at supporting the environment. In the meantime, please think about recycling the bag and cover sheet.

And should you wish to also discard – *gasp* – the magazine, that too can be recycled.



WE WANT TO HEAR FROM YOU

The *Vector* team is keen to get your views on all things to do with aviation safety. We're introducing a 'letters to the editor' section to the magazine, starting in the summer issue, which will be distributed around 30 November.

Please send your thoughts to vector@caa.govt.nz. We want ideas and observations that contribute positively towards safer aviation.

We'll publish a selection in each edition, and the ones we cannot find room for in the magazine, we'll publish on our website, www.aviation.govt.nz.

We might have to edit or shorten letters, or we may not be able publish them at all, if they're outside *Vector*'s mandate of being all about aviation safety.

We look forward to hearing from you.

AVIATION SAFETY ADVISORS

Contact our aviation safety advisors for information and advice. They regularly travel around the country to keep in touch with the aviation community.

John Keyzer – Maintenance, North Island
027 213 0507 / john.keyzer@caa.govt.nz

Carlton Campbell – South Island
027 242 9673 / carlton.campbell@caa.govt.nz

Neil Comyns – Maintenance, South Island
027 285 2022 / neil.comyns@caa.govt.nz

HOW TO GET AVIATION PUBLICATIONS

AIP New Zealand

AIP New Zealand is available free from www.aip.net.nz. Printed copies of Vols 1 to 4 and all aeronautical charts can be purchased from Aeropath on 0800 500 045, or shop.aeropath.aero.

Pilot and aircraft logbooks

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

Rules, advisory circulars, airworthiness directives

These are available free from the CAA website. 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 aero@caa.govt.nz.

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

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

For more info, visit aviation.govt.nz > Safety > Airshows.

CAA cut-off date	Aeropath cut-off date	Effective date
23 Sep 2020	30 Sep 2020	03 Dec 2020
21 Oct 2020	28 Oct 2020	31 Dec 2020
04 Nov 2020	11 Nov 2020	28 Jan 2021
02 Dec 2020	09 Dec 2020	25 Feb 2021

Visit aviation.govt.nz/aip to view the AIP cut-off dates for 2020.

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)
aviation.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 website, aviation.govt.nz, Safety > Aircraft accident briefs. Some accidents are investigated by the Transport Accident Investigation Commission, www.taic.org.nz.

Pacific Aerospace Cresco 08-600	
Date and time:	26-Jan-2018 at 10:30
Location:	Mt Dampier Station
POB:	1
Damage:	Substantial
Nature of flight:	Agricultural
Pilot licence:	Private pilot licence (A)
Age:	26 yrs
Flying hours (total):	2596
Flying hours (on type):	2256
Last 90 days:	242

The aircraft's climb performance was not as expected and it encountered sink just after take-off, forcing the pilot to jettison the load.

The airstrip was 1200 feet ASL with a light south-easterly tailwind. Other environmental conditions that morning included an increasing temperature and high humidity.

The product being spread was dicalcic which is known not to jettison as quickly as granular fertiliser. Consequently, the aircraft's tailplane struck a fence post at the end of the airstrip. The pilot still had limited control and was able to circle back and land safely.

The tailplane assembly was replaced and the aircraft returned to service. The operator has introduced several operational changes to help mitigate reoccurrence of this issue.

CAA Occurrence Ref 18/376

Schweizer 269C	
Date and time:	21-Jun-2018 at 21:15
Location:	Catlins
POB:	1
Nature of flight:	Private other
Pilot licence:	Private pilot licence (H)
Age:	33 yrs
Flying hours (total):	1100
Flying hours (on type):	750
Last 90 days:	65

During take-off from a ridge to descend down to a hut, the engine shuddered and lost RPM along with rotor RPM. The pilot attempted to turn back to the ridge, trying to maintain height and RPM. However, the helicopter's left skid contacted the ground, pitching the helicopter on to its nose, which resulted in the main rotor blades striking the ground.

Following main rotor contact with the ground, the pilot immediately exited the helicopter, which rolled approximately 60 metres down the slope. The pilot then approached the helicopter once he was sure it was safe to do so and ensured that the ELT had been activated. The pilot was rescued several hours later by the first responders.

An engineering investigation was not carried out due to the helicopter not being insured and the fact that it took approximately six months for the helicopter to be recovered from the accident site. It was considered that no useful information was likely to be obtained after such an extended period in the open.

The pilot and operator suspect that a sticking valve caused the loss of power. This defect had previously occurred approximately 100 hours earlier and had been rectified.

CAA Occurrence Ref 18/4614

De Havilland DH 82A Tiger Moth	
Date and time:	01-Jul-2018 at 12:30
Location:	Ardmore
POB:	2
Nature of flight:	Private other
Pilot licence:	Private pilot licence (A)

The aircraft's engine stopped and it carried out a forced landing in a nearby field. The landing gear collapsed in the soft ground and the aircraft slid to a stop. Neither occupant was hurt.

The engineer who recovered the aircraft found there was approximately 15 litres of fuel in the tank and that the engine ran well when tested at a later date. One of the pilots suspected that the engine stopped due to carburettor icing and a low power setting while conducting stall practice.

On learning of the low fuel state, the pilot also thought that fuel starvation may have been a factor as the fuel line may have un-ported. The cause of the engine failure is therefore considered more likely to be one or a combination of both the above factors. The aircraft is currently out of service.

CAA Occurrence Ref 18/4845

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 website, aviation.govt.nz, Aircraft > GA defect reports.

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

Piper PA-28-181

Cylinder section

Part model:	O-360-A4M
Part manufacturer:	Lycoming
Part number:	05K21104
ATA chapter:	7200
TSI hours:	5.3
TTIS hours:	1608.3

During climb-out from a simulated engine failure after take-off, at approximately 700 feet the engine started running rough with a loss of power below 2000 RPM.

The aircraft was positioned for a close downwind and an emergency declared to ATC. The aircraft landed safely.

The maintenance investigation found the No.3 cylinder to be cracked around a large portion of the combustion chamber. The No.4 cylinder had been replaced during the previous month for the same reason.

The CAA notes that prior to this event, Continuing Airworthiness Notice (CAN) 85-009 *Lycoming Parallel Valve Cylinder Assemblies* was published on 23 April 2018. The CAN advises of possible cylinder head cracking affecting cylinders within a certain serial number range.

On 11 October 2018 Lycoming issued Mandatory Service Bulletin 634 advising that affected cylinders could not be repaired, reconditioned or re-fitted if removed from the engine for any reason.

The CAA issued Airworthiness Directive (AD) DCA/Lyc/224 *Lycoming Parallel Valve Cylinder and Head Assemblies – Replacement*, effective 25 October 2018. The AD requires replacement of all affected cylinder and head assemblies at the next removal of the cylinder assembly, or at next engine overhaul, whichever occurs first.

CAA Occurrence Ref 18/5386

Eurocopter AS 350 B2

Main Rotor servos

ATA chapter:	6200

During an unscheduled inspection, the engineer identified that the part numbers for the Fore Aft Servo (P/N SC5084) and the Lateral Servos (P/N SC5083-1) were not compatible in accordance with the installation task card of the aircraft maintenance manual.

The organisation contacted the installer to advise them of the error and verified that no other aircraft in the fleet had incompatible parts installed.

CAA Occurrence Ref 18/5983

Pacific Aerospace 750XL

Flame arrestor

Part model:	750XL
Part manufacturer:	Pacific Aerospace
Part number:	11-57131-2
ATA chapter:	2800
TSI hours:	150
TTIS hours:	5559

During maintenance it was noted that the fuel tanks were under negative pressure when the fuel caps were removed. The maintenance investigation found that the filter support plug was fitted backwards in both flame arrestor canisters. This appears to have restricted the airflow into the fuel tanks through the vent system. A drawing was obtained from Pacific Aerospace to determine the correct orientation.

It was also determined that the 750XL maintenance publications did not describe any technical procedures for the servicing or correct assembly of the flame arrestors that form part of the lightning protection system. Pacific Aerospace have now incorporated new procedures in the new 750XL maintenance manual (Section 26-30-00, pages 401 and 601).

The 750XL IPC will be amended at the next manual amendment to incorporate the flame arrestor filter P/N 11104-70B and shims 11-57141-1.

The 750XL training powerpoint will also be amended to include information regarding the lightning protection on the fuel vent system and ongoing maintenance requirements.

CAA Occurrence Ref 18/6088

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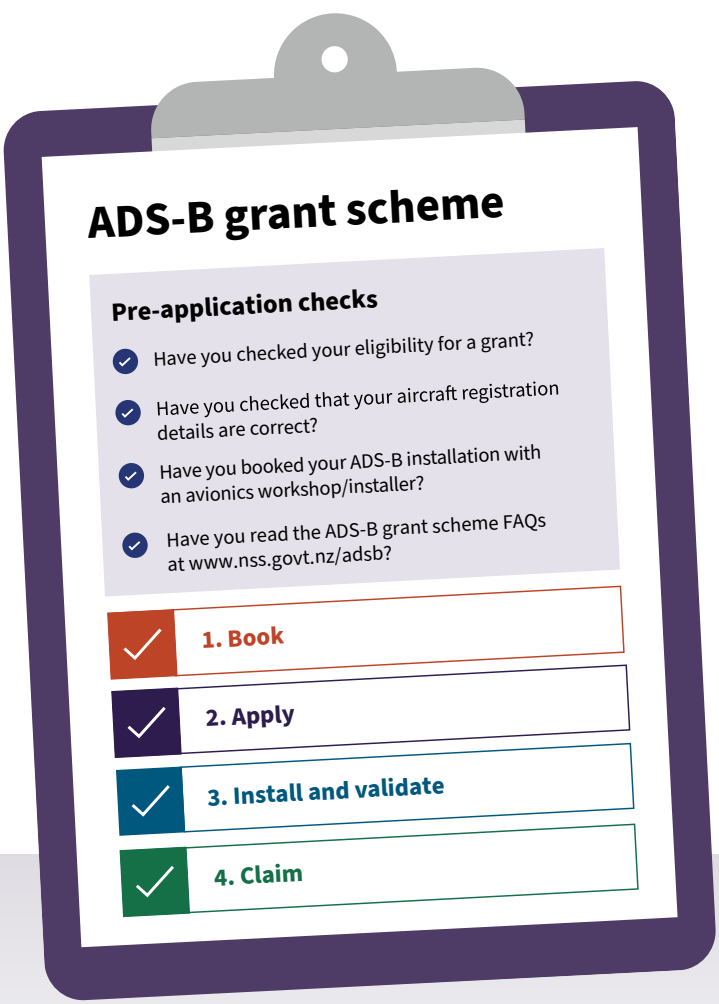

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