July / August 2009

POINTING TO SAFER AVIATION

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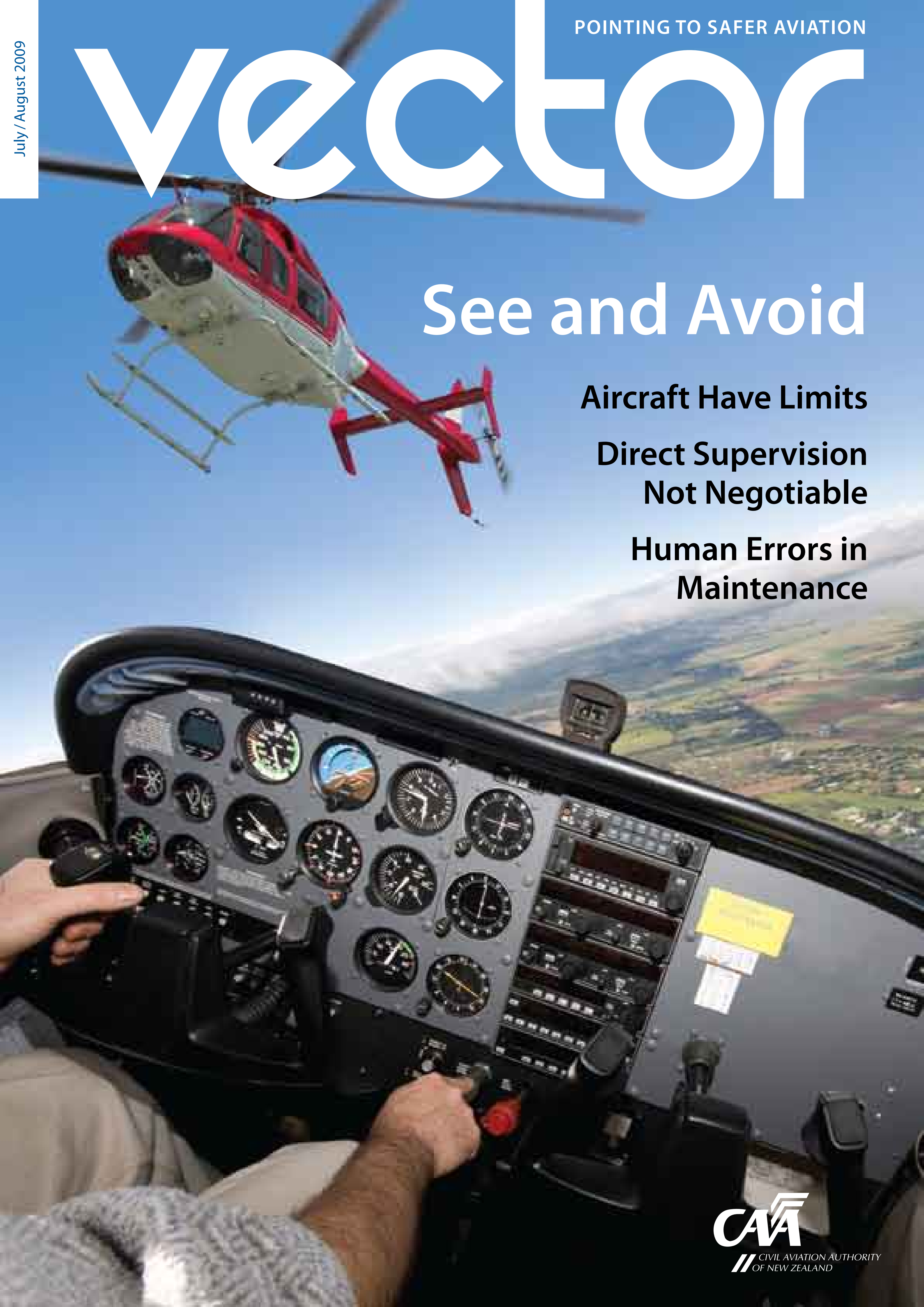

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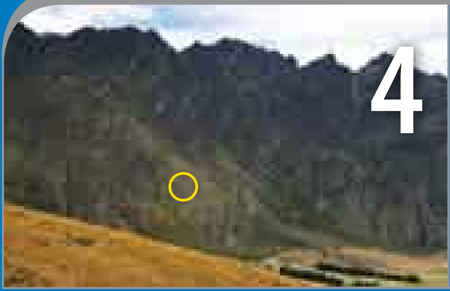
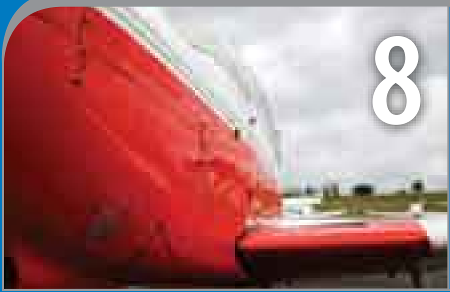


See and Avoid

Even when pilots are vigilant about looking out, human factors reduce the chance that aircraft will be seen and successfully avoided. These human factors are not errors, they are limitations of the human visual and information processing system.



Aircraft Have Limits

All aircraft have structural limits. A good understanding of what they are, and how it's possible to unintentionally exceed them, is critical to making sure your aircraft doesn't come apart in the air.

Direct Supervision Not Negotiable

Two recent cases have shown a lack of understanding of the direct supervision required when unqualified maintenance personnel carry out work on an aircraft.

Human Errors in Maintenance

Mistakes made during aviation maintenance can have serious consequences. Meet the 'Dirty Dozen' of human errors in aviation maintenance and find out how you can reduce or eliminate them.

Cover: This is a mock-up, but it can happen – see page 4 "See and Avoid".

In this issue...

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Manager Communications Bill Sommer.

Editor Peter Singleton.

Safety Education Publishing Team
Lakshmi Guda, Cliff Jenks, Anna McClay, Clare Ferguson, Rose Wood.

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Gusto

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Weather Diversions

At this time of year, weather diversions become a distinct possibility on every cross-country flight. It's all very well planning and familiarising yourself with alternate routes in case Plan A can't be executed, but make sure you have enough fuel to carry them out, or know where you can get it.

Every year, the operator of Raetihi Aerodrome, Selwyn Ward, sees several aircraft land due to the weather in the central North Island. "The thing that catches them out is a front approaching from behind, while flying over rising ground. The weather looks okay in front, but it doesn't take much of a change to be in trouble if the cloud lowers a bit and the ground keeps rising. The space of 10 minutes can make a huge difference."

However, Selwyn is very pleased to see aircraft using Raetihi Aerodrome as a bad weather alternative.

"A lot of people are making better safety decisions these days, because there is a lot more weather information available to them. If they are wise enough not to press on, they pop in and see us here at Raetihi."

You should be aware that the minimum height rule (91.311) does not permit flight below 500 feet due to bad weather. You are expected to turn back, divert, or land before you get to the 500 foot minimum safe height. Similarly, a Special VFR clearance does not approve flight below 500 feet, or 1000 feet over a congested area.

A few of the aircraft who have diverted to Raetihi have not had a lot of fuel to spare. If you are planning a trip in this area, be aware that there are very few places in the central North Island where avgas is available.

There is **no** avgas at: Turangi, Chateau, Raetihi, Ohakune, Karioi, Boyd, and Rangitaiki aerodromes. Only three aerodromes in the area do have avgas: Taumarunui (Shell), Taihape (Mobil), and Taupo (Shell and BP). The one-way ag strip at Taihape, however, is not for the faint-hearted. It is only 455 metres long, with a slope of 1.68, and an elevation of 1550 feet.

Always refer to *AIP New Zealand, Vol 4* to figure out where along your route, or alternate routes, you can access fuel. ■

See and Avoid

Limitations of this Principle

Even when pilots are vigilant about looking out, there is no guarantee that other aircraft will be seen. Human factors at various stages in the process can reduce the chance that a threat aircraft will be seen and successfully avoided. These human factors are not errors, or signs of poor airmanship. They are limitations of the human visual and information processing system that are present, to varying degrees, in all pilots.

Seeing and avoiding involves a number of steps. First, you must look outside the aircraft. Second, search the available visual field and detect objects of interest, most likely in peripheral vision. Next, an object must be looked at directly to be identified as an aircraft. If it is thought to be a collision threat, a decision must be made on what evasive action to take. Finally, you must make the necessary control movements and allow the aircraft to respond.

Workload

Many tasks require the pilot to direct attention inside the aircraft.

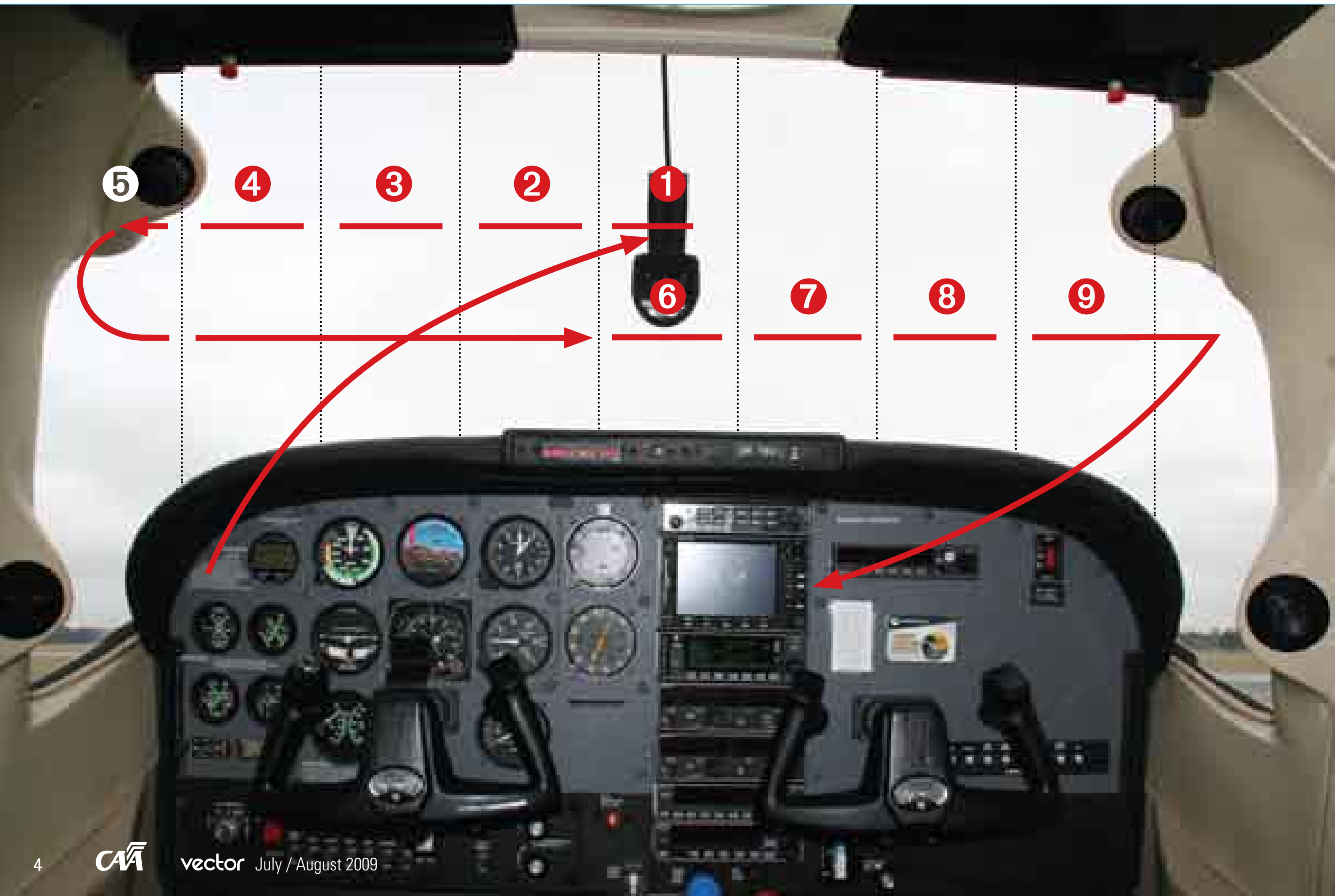
Cockpit workload is likely to be high near airports, where traffic is most dense, and where an outside scan is particularly crucial. Most of these cockpit tasks are essential; however some of the workload is less critical and could be performed at other times.

In addition, pilots flying aircraft with advanced glass cockpits can find they spend more time 'heads-down', as they interact with the technology at their disposal, and less time looking out as they would in less advanced aircraft.

Don't let cockpit workload and modern technology reduce the time you should spend in traffic scans.

Obstructions

Most cockpit windscreen configurations severely limit the field of view available to the pilot. Visibility is



most restricted on the side of the aircraft furthest away from the pilot. Obstructions include window-posts, bug splatter, sun visors, wings, and front seat occupants. The instrument panel itself may obstruct vision if the pilot's head is significantly lower than the standard eye position specified by the aircraft designers.

An obstruction wider than the distance between the eyes, such as window-posts, will not only mask some of the view completely, but will make other areas visible to only one eye. A window-post can also act as a focal trap for the eyes. The presence of objects around 50 cm away can result in the eye being involuntarily trapped at that focal length, making it difficult to see distant objects.

Limitations of the Visual Scan

Accommodation is the process of focussing on an object. The human eye is brought into focus by muscle movements that change the shape of the eye's lens. Visual scanning involves moving the eyes in order to bring successive areas of the visual field onto the small area of sharp vision in the centre of the eye.

Pilot scans are often unsystematic. Areas of sky near the edges of windscreens are generally scanned less than the sky in the centre, and the scan may be in chunks that are too large, leaving large areas of unsearched space between fixation points. A thorough and systematic search is not a perfect solution, however, as in most cases it would take an impractical amount of time.

FAA Advisory Circular 90-48 C recommends scanning the entire visual field with eye movements of 10 degrees or less. They estimate that around one second is required at each fixation. So to scan an area 180 degrees horizontal and 30 degrees vertical could take 54 fixations, so 54 seconds. However, the speed at which our eyes can accommodate to an object, and the degree of accommodation, degrades with age. Only a young person can accommodate to a stimulus in one second. The average pilot probably takes several seconds to accommodate to a distant object. This can also be affected by fatigue. So in reality, the scene would have changed before the pilot had finished the scan.

A big part of the answer is using a practical scanning technique – one that doesn't take too long to complete, but still gives you a good chance of seeing conflicting traffic. By fixating every 20 degrees, it should be possible to detect any contrasting or moving object in each visual block. Across the total scan area, this involves 9 to 12 blocks, each requiring one to two seconds for accommodation.

Here are two scans that have proved themselves. One method is to start at the far left of the windscreen and make a methodical sweep to the right, pausing in each block to focus. The other is to start in the centre, moving progressively to the left, then swinging quickly back to the centre and repeating the scan to the right. Look out the side windows before beginning the scan cycle again.

Scanning 10 degrees up and down horizontally is also a good idea, and allows you to spot any aircraft below and climbing, or above and descending.

Continued over »

» Continued from previous page

In high-wing aircraft there is a considerable blind spot created by the lower wing when in a turn.

To partially overcome this problem, you should lean forward to look through the side of the curved windscreen. Move both your head and upper body for a better view.

In the circuit, a systematic lookout before turns is crucial. This is due to the potentially large number of aircraft in close proximity to each other, and the high workload. Start your scan by looking in the direction opposite to the turn as far as the cockpit vision allows. Then move your eyes to scan in the direction of the intended turn, finally raising/lowering the wing to give you a view above and below. Once this scan is complete, a turn can be initiated.

On descent and climb-out, make gentle 'S' turns to ensure no-one is in the way.

On final do not fixate on the touchdown point. Look in front and behind this point for other traffic.

Limitations of Vision

The eye has a built-in blind spot at the point where the optic nerve exits the eyeball. Under the normal conditions of binocular vision the blind spot is not a problem as the area of the visual field falling on the blind spot will still be visible to the other eye. However, if the view from one eye is obstructed, then objects in the blind spot of the remaining eye will be invisible. You can compensate for this by moving your head and upper body during your lookout.

Acuity, or sharpness of vision, varies across the visual field. In daylight, acuity is greatest at the centre (fovea), in low light it is fairly equal across the whole retina, and at night it is greatest in the periphery. There are times when an approaching aircraft will be too small to be seen because it is below the eye's threshold of acuity. Peripheral acuity can be reduced by factors such as vibration, fatigue, and hypoxia.

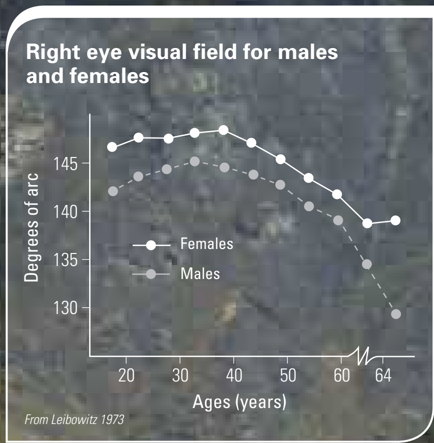
Empty field myopia occurs in the absence of visual cues, causing the eye to focus at a relatively short distance. In an empty field such as blue sky, the eye will automatically focus at around 56 cm. It therefore requires an effort to focus at greater distances. To combat this, look for a cloud or distant terrain to focus on.

The average person has a field of vision of around 190 degrees, although it varies from person to person, and is generally greater for females than males. The field of vision begins to contract after age 35. In males, this reduction accelerates markedly after 55.

In addition to the natural reduction caused by age, a number of physical and psychological conditions can cause the effective field of vision to contract even further.

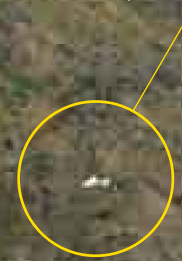
A comfortable and alert pilot may be able to easily detect objects in the corner of the eye, but the imposition of a moderate workload, fatigue, or stress, will induce tunnel vision. It is as though busy pilots are unknowingly wearing blinkers. This has also been observed under conditions of hypoxia and adverse thermal conditions.

The limited mental processing capacity of the human can present problems when they need to do two things at once. An additional task, even an unstressful one, such as radio work, performed during a traffic scan can reduce the effectiveness of the search by reducing the pilot's eye movements and effectively narrowing the field of view. Experiments conducted by NASA indicated that a concurrent task could reduce pilot eye movement by up to 60 percent. The key is to carefully prioritise your tasks.



From Leibowitz 1973

Contrast between the colour of the terrain and the aircraft helps to identify this as a target.



Direct glare from the sun and veiling glare reflected from windscreens can effectively mask some areas of the view. Direct glare is a particular problem when it occurs close to the target object. When the glare source is 5 degrees from the line of sight, visual effectiveness is reduced by 84 percent. A good pair of sunglasses will help combat this.

Traffic Characteristics

Atmospheric Effects

Contrast is the difference between the brightness of a target and the brightness of its background. A dark aircraft will be seen best against a light background and vice versa. Contrast is reduced when the small particles in haze or fog scatter light. Not only is some light scattered away from the pilot, but some light from the aircraft is scattered so that it appears to originate from the background, while light from the background is scattered onto the eye's image of the aircraft.

Contour Interaction

Complex backgrounds such as ground features, or clouds, hamper the identification of aircraft due to contour interaction. This occurs when background contours interact with the form of the aircraft, producing a less distinct image. Camouflage works because it breaks up contours and increases interaction. In order to see an aircraft, the pilot must detect the contour between the aircraft and its background.

Lack of Relative Motion

If two aircraft are converging on the point of impact on straight flightpaths at constant speeds, then the bearing of each aircraft from the other will remain constant up to the point of collision. From each pilot's point of view, the converging aircraft will grow in size, but remain fixed at a particular point on his or her windscreen. The human visual system is better at detecting moving targets than stationary targets, yet in most cases, an aircraft on a collision course appears as a stationary target in the pilot's visual field.

Effectiveness of Lights

The visibility of a light largely depends on the luminance of the background. Typical daylight illumination is generally sufficient to overwhelm even powerful strobes. In theory, to be visible at three nautical miles on a very dark day, a strobe light must have an effective intensity of around 5000 candelas. In full daylight, the strobe must have an effective intensity greater than 100,000 candelas. Most existing aircraft strobes have effective intensities of between 100 and 400 candelas. While strobes are not likely to be helpful against bright sky backgrounds, they may make aircraft more visible against terrain or in conditions of low light.

Evasive Action

Even when an approaching aircraft has been sighted there is no guarantee that evasive action will be successful. It takes a significant amount of time to recognise and respond to a collision threat and an inappropriate evasive manoeuvre may increase rather than decrease the chance of a collision.

The total time to recognise an approaching aircraft, recognise a collision course, decide on action, execute the control movement, and allow the aircraft to respond, is estimated to be around 12.5 seconds. The reaction time for older or less experienced pilots is likely to be greater than 12.5 seconds.

Summary

Many limitations of see-and-avoid are associated with the physical limits of human perception, however there is some scope to improve the effectiveness of see-and-avoid.

- Use a practical scanning technique and accommodate to an appropriate distance when searching for traffic.
- Keep the windscreen, windows, and top of the instrument panel clean and clear of obstructions.
- When cleaning windows, wipe in a vertical motion to reduce false horizons.
- Minimize head down time by having charts folded properly, and don't be distracted by technology in the cockpit.
- Navigation and anti-collision lights should be used at all times.
- Make accurate position reports and listen to other position reports to paint a situational picture.
- Turn your transponder to Mode C (or Mode A).
- Scan constantly – 90 percent outside the aircraft, 10 percent inside the aircraft.

The information in this article comes from a report by the Australian Transport Safety Bureau (ATSB) and an article in *Flight Safety Australia*. ■

Aircraft Have Limits

Just because you have 'slipped the surly bonds of earth', does not mean you can ignore the sage advice of the Starship Enterprise's Chief Engineer Scotty when he says, "I cannae change the laws of physics Captain." No one can.

Whatever you are flying – a hang glider, a paraglider, a glider, a microlight, a helicopter, or an airliner – you must know the limits of your aircraft. When combined with a sound knowledge of the way forces act on your aircraft, you should be able to operate within your aircraft limits at all times.

Principles of Flight

Any time an aircraft is airborne, it is subject to at least three forces: lift, drag, and weight. An aircraft under power will also be subject to thrust. In stable level flight, these will be balanced, which also includes any tailplane force required to balance pitching moments. Lift will be equal to the aircraft weight, plus or minus (normally plus) the tailplane force. This tailplane force is normally much less than the lift force, so the lift and weight can be considered equal. *(Fig 1)*

The Four Forces

The heavier the aircraft, the more lift required to maintain level flight.

The heavier the aircraft the greater the load imposed on the airframe.

The extra lift required at heavier weights means that more drag will also be generated. So the heavier the aircraft gets, the faster it tends to slow down. This may be your only direct indication of increased loading.

A heavier aircraft flying in turbulence will also tend to ride better, since it will respond less to a given gust, again giving the impression of a smoother ride and less stress to the airframe. This is quite wrong. While the response to turbulence is reduced, the actual loads on the airframe will increase. Compare an empty trailer to one full of sand, going over pot holes. The full trailer bounces a lot less but is subject to much more loading.

Load Factor and G Limits

The ratio of lift produced to aircraft weight is called the load factor, and it is a measure of the acceleration in the direction of the manoeuvre.

$$\frac{L}{W} = LF$$

The pilot perceives this load factor as the G-force experienced.

In a 60-degree turn, the lift is twice the weight, making the load factor 2, or 2 G.

$$\frac{2}{1} = 2$$

All aircraft have load-factor limits, both positive and negative, with the negative limits generally being around half the positive limits.

These limits are found in the Aircraft Flight Manual and relate to the aircraft at its maximum all up weight (MAUW). You can fly at the 'limit load' without any resultant deformation of the aircraft. Beyond this – normally another 50 percent – is the 'ultimate load', at which point the aircraft structure has been calculated to fail. Between the limit load and ultimate load, some deformation or damage to the aircraft can be expected. The 'buffer' is there to allow for miscalculations by designers, manufacturing defects, and ageing aircraft – not for pilots to help themselves to.

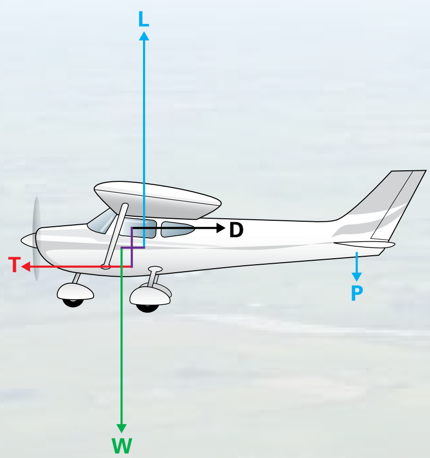


Fig 1

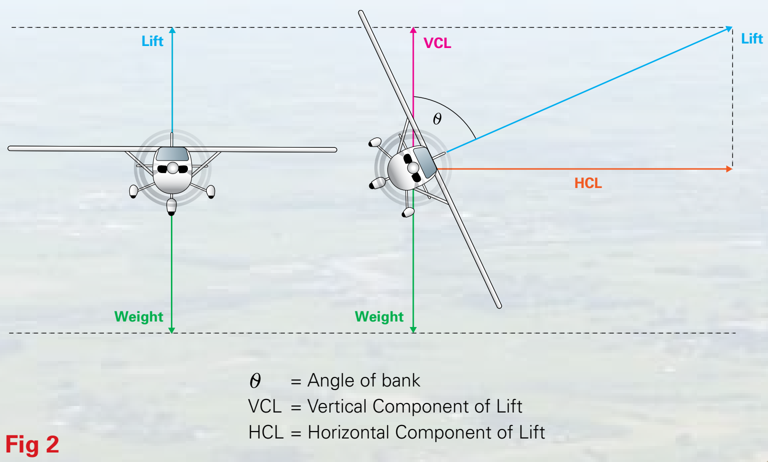


Fig 2

Turning

Whenever the aircraft is manoeuvred, the lift required changes.

As we said above, an aircraft in a 60-degree angle of bank turn experiences a load factor of 2. Effectively your aircraft (and everything in it) now weighs twice its original weight. *(Fig 2)*

In order for the wings to provide that additional lift, the angle of attack is increased, and an increased angle of attack results in increased drag (induced drag increases by about 300 percent in this situation) and a reduced airspeed (unless you add power).

With weight effectively increased in the turn, the stall speed increases (because stall speed increases with increasing weight).

In addition, when aileron is applied to roll the aircraft, the up-going wing is producing more lift than the down-going wing. It is therefore possible to exceed the design strength of the up-going wing while still below the overall aircraft limits. This can be achieved by applying aileron when G is already applied – known as 'rolling G' – or in some cases simply by applying aileron at high speed. Be cautious about application of aileron whenever under G or at high speeds.

When the aircraft is turning, you are increasing the stress on the airframe. Turbulence increases that stress even further, so rolling the aircraft into a steep turn while yanking back on the control column may just rip its wings off. *(Fig 3)*

Photo courtesy of Ross Gray

Know Your Limits

Some microlights and some amateur-built aircraft have very little information available on their speed and G-limits. It is up to you to know these limits and there are a couple of ways you can find them if they are not included in the operating manual. You might like to try the designer's web site. Alternatively you could contact the designer directly. Another option is to contact your national organisation, such as the SAA or Part 149 organisation.

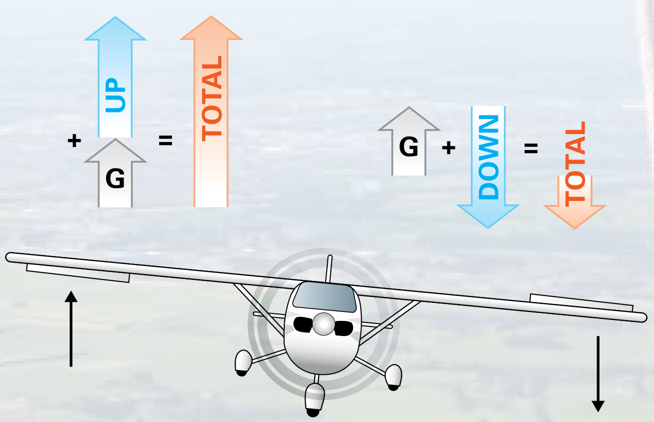


Fig 3

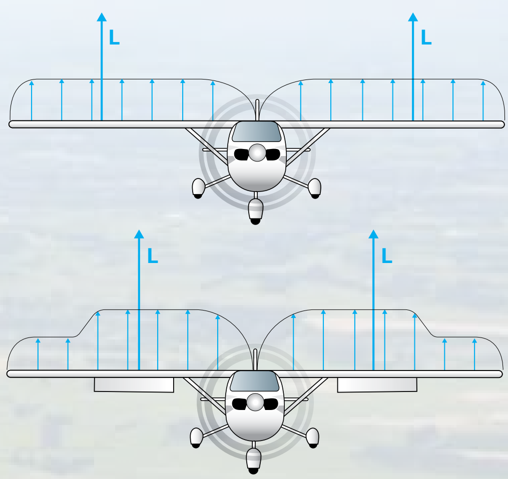


Fig 4

Continued over ››

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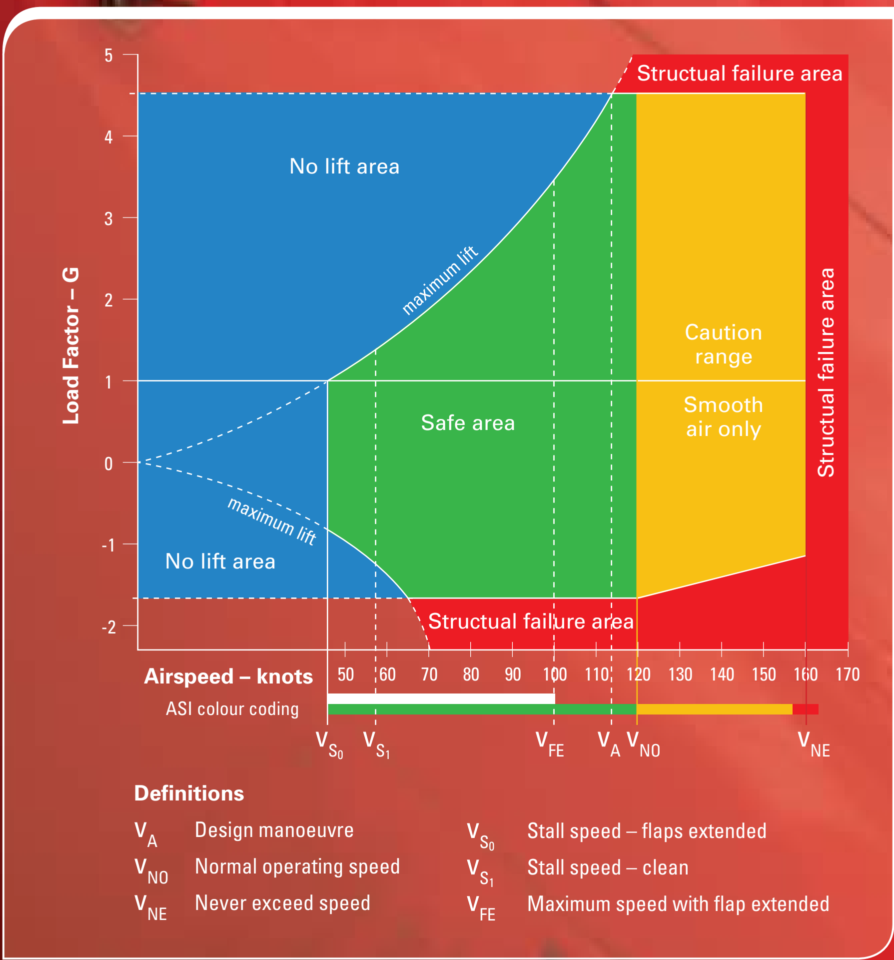
The Manoeuvre Envelope (V_N diagram)

A simple way of presenting this data is by using the V_N diagram. This is a graph of G against speed. Together, speed and G limits provide the 'flight envelope' of the aircraft: what it is allowed to do, what it cannot physically do, and what it should not do. Anything outside the envelope is beyond the limit load the airframe was designed for.



Blue Area

The blue area represents a combination of speed and G that the aircraft is physically incapable of reaching. The aircraft will stall before enough lift can be generated to produce the G force that can damage the airframe.

The curved lines between the blue area and the other areas are the stall lines, for both normal and inverted flight.

Green Area

The green area shows the speed and G combinations where there is no aero-dynamic restriction on aircraft operation. But there may be other limits, such as flap, gear limiting speeds or G. Refer to the Aircraft Flight Manual for details.

Yellow Area

The yellow area depicts speed and G combinations where there is some limit on the airframe. These are often related to use of aileron.

Red Area

The red area is a no-go, in which you are likely to cause damage, either through too much G or from the drag forces produced at excessive speed.

Manoeuvring Speed (V_A)

Practically, V_A is the maximum speed you can fly and not overstress the aircraft, as the wings will stall before you can pull enough G. When the manufacturers determine a value for V_A, they are not worried about breaking the wing, but are worried about breaking *other* important parts of the aircraft, such as the engine mounts.

Some caution is required with this speed because it is set for the MAUW of the aircraft. At weights below this, the aircraft can generate more G at a given speed. This means that the V_A reduces as weight decreases, making it easier to inadvertently overstress the aircraft. Check the Aircraft Flight Manual for the V_A speeds at lighter weights.

In turbulence, particularly when in a descent, speed control is critical to ensure V_A is not exceeded – thereby threatening structural integrity. Even in smooth air when descending from above terrain, awareness of potential turbulence, such as passing in the lee of a high mountain or range, requires anticipation of appropriate speed control.

With moderate to severe turbulence, maintain a speed below V_A.

Be cautious about elevator inputs when operating beyond V_A.

Tied-in with manoeuvring speed is the concept of 'normal operating speed' (V_{NO}), the speed that should only be exceeded in smooth air. Beyond V_{NO}, loads imposed by turbulence may overstress the airframe.

V_A reduces as weight decreases.

Flap

Lift distribution changes when flaps are deployed. Flaps cause more lift to be generated, and therefore increase the wing-bending forces. Excessive lift generation or high speed can overload the flaps and their attachment points to the wings. Aircraft therefore have lower limits for both G and speed when flap is deployed. *(Fig 4 on page 9)*

High Speeds

As speed increases, drag increases in a squared relationship – double the speed equals four times the drag. Go fast enough, and these drag forces may be sufficient to damage the airframe. All aircraft have a 'never exceed speed' (V_{NE}) above which some damage can be expected.

Changing speed also changes the lift distribution over the wings and tailplane. To produce the required lift at higher speeds requires less angle of attack, maybe only a few degrees. But most wings are designed with 'washout' or reduced incidence at the wingtips, to enhance stall characteristics. This can lead to the outer sections of the wing producing little or even negative lift. This changes the wing bending forces and at high speeds wing bending limits can be exceeded.

Flutter

Flutter is the term given to a flexing or vibration of part of the airframe due to higher-than-normal speeds. Ailerons and outer wing sections are most susceptible, particularly on aircraft with high aspect ratio wings and reduced torsional stiffness, such as gliders and some amateur-built aircraft. Once started, flutter can self-excite causing significant damage.

Fatigue

Fatigue is cumulative damage to the aircraft structure caused by repetitive loads that, by themselves, do not exceed limits, but over a period of time add up. Take a paperclip and bend it. One cycle of bending won't break it, but do it enough times and it will fail. Fatigue is generated every time the wing is loaded – even a takeoff generates fatigue. Higher loads and a higher cycle rate hasten the process. Excessive repetitive G-loading, or flying in turbulence, all adds up.

Material Specs

If you are approved to work on your aircraft, then it is your responsibility to keep your aircraft in an airworthy state. Particularly, this includes using appropriate parts – especially if those parts contribute to its strength.

If the critical parts of your aircraft are not made of the correct materials, then you are eroding the safety margins designed into your aircraft – especially if you are unwittingly overloading it. ■

Direct Supervision **Not Negotiable**

In two recent cases, the direct supervision of unqualified maintenance personnel required by Civil Aviation Rules, has not occurred.

Rule 43.51 says that a person must not perform maintenance on an aircraft or component in New Zealand unless:

- they are a current Licensed Aircraft Maintenance Engineer (LAME) rated on the aircraft type; or
- they are a current, type rated, CASA LAME registered under the Trans-Tasman Mutual Recognition Act; or
- they are authorised by a Part 145 certificated maintenance organisation; or
- they hold a current certificate of maintenance approval; or
- they perform the maintenance under the direct supervision of an appropriately qualified person.

Advisory Circular AC43-1, Revision 4 says that a supervisor must:

- have considered the competence of those performing the tasks, and their capability to meet the performance requirements detailed in rule 43.53;
- know when the maintenance is being undertaken;
- be immediately available, in person, for consultation with, and to provide advice and direction to the person/s carrying out the work; and
- directly observe the work being done at important stages, to approve or disapprove of the work.

It is a joint responsibility, however, between both the supervisor and the persons performing the maintenance, to ensure the work is carried out properly. Those performing the maintenance must be aware of, and meet the performance requirements in rule 43.53 and ensure they are being directly supervised.

Case 1

In March 2008, the manager of a maintenance company, and a contracted

LAME, were convicted of manslaughter after a helicopter worked on by their organisation crashed, killing the pilot and seriously injuring a passenger.

The R22 was brought in for a 100-hour check, as well as the replacement of the main rotor blades and the tail rotor drive shaft. After collecting his helicopter, the owner flew for approximately two hours back to his home base. He then took a passenger on a short hunting trip of around 40 minutes flight time. As he was approaching to land at the end of this trip, the tail rotor drive shaft failed at the flange connecting it through the aft flex plate coupling to the tail rotor gear box.

The maintenance company did not have a full-time helicopter rated LAME on staff at the time. The work on the helicopter was carried out by tradesmen who were not helicopter rated LAMEs. A LAME was contracted to supervise, inspect, and certify work carried out by the tradesmen. The LAME worked day-shift for another maintenance organisation on the aerodrome, so was not able to be on site full-time. He made visits between his rostered work hours.

The tail rotor drive shaft was incorrectly assembled by the tradesmen. They were then instructed to install it back into the tail boom by the manager of the company. The manager had not checked with the LAME if this was okay. After installation, the drive shaft assembly (in particular the aft flex plate coupling) could only be viewed by the LAME through an inspection aperture about the size of a 50 cent piece.

High Court Judge Wild said to the LAME at sentencing, "The jury found that was unacceptable, and I agree. Every LAME who gave evidence at your trial stated emphatically that the assembly of the aft flex plate coupling could only be adequately and reliably inspected before it was installed into the tail boom.

"I think the position may be that you did not want to put your friend…and his business, and the young engineer…to the time and trouble of having to take the tail boom off…so that you could inspect it properly. It is that shortcut which the jury thought was a major departure by you from the standard of care required."

Certificates for duplicate inspections of the work carried out on the helicopter were also not completed. Judge Wild said, "The jury formed the view that it was quite unacceptable for…the manager…to allow [the owner] to fly the helicopter away when those duplicate inspection certificates had not been completed."

The judge stated that the responsibility for ensuring that the company had proper and adequate maintenance practices and procedures, and that they were adhered to, rested with the manager.

A month before the helicopter was released to service, a CAA Aviation Safety Adviser (Airworthiness) visited the company after concerns about a lack of direct supervision had been expressed by one of the tradesmen working there. The Aviation Safety Adviser spoke to both the tradesman and the manager, emphasising the need for direct supervision, and referring them to Part 43 and Advisory Circular AC43-1 for a practical explanation of the requirements.

The LAME was sentenced to 300 hours community work and reparations of $10,000. The manager was sentenced to 300 hours community work and reparations of $25,000.

Case 2

In May 2007, a company pleaded guilty and was convicted on one charge of operating an aircraft contrary to Civil Aviation Rules, for failing to ensure that only persons authorised in accordance with rule 43.51 performed maintenance on the company's helicopter.

The company convicted operates a helicopter from one of its fishing ships. During the fishing season the ship is away at sea for lengthy periods and the helicopter must be maintained at sea. The company engaged a LAME on a contractual basis to maintain the helicopter, however the LAME was not on board the ship while it was at sea.

The pilot employed to fly the helicopter performed maintenance on it on a number of occasions while at sea. The pilot had no formal maintenance qualifications and the maintenance performed was beyond the scope of what is permitted to be carried out by a pilot.

Pilots can only complete maintenance tasks listed in Part 43 Appendix A. These tasks can be done without significant disassembly or removal of panels, other than non-structural access panels or fairings. Before pilots undertake such maintenance, they must be authorised in writing by the aircraft operator, and they must have completed training appropriate to the task, by an appropriately licensed and rated LAME.

The pilot who carried out maintenance on the helicopter was not directly supervised by a LAME, although he was in regular email contact with him. The LAME subsequently completed loose leaf entries in the aircraft logbook, detailing the work that had been carried out unsupervised at sea, certified the logbook and released the aircraft to service.

The pilot's employment agreement with the company required that he perform maintenance on the helicopter, even though he was not qualified to do so unsupervised. District Court Judge, A A Zohrab, said in his decision, "It is incumbent upon a defendant company in such a situation where they own and operate a helicopter, to ensure that it is properly maintained. In my view, it is not sufficient simply to delegate those responsibilities to a licensed aircraft maintenance engineer. They have an obligation to ensure that they know exactly what the situation is with respect to who was able to do the work and where and when it can be done."

This illustrates the importance of having a trained maintenance controller, who fully understands their role and the rule requirements.

The total financial penalty for the company was $15,650. The LAME pleaded guilty to three related charges, and was fined $1,000 on each, plus costs of $630.

Summary

Two of the key elements to direct supervision are that the supervising engineer is physically present and able to observe the maintenance being carried out, as much as is necessary to ensure it is being carried out properly, and that they are immediately available to give advice or answer questions. Their role does not end there – they are also responsible for ensuring that the rule 43.53 performance standards are met by those carrying out the maintenance. ■

Time in **Pilot Logbooks**

Pilots should remember that their logbooks need to contain accurate records of their flying hours.

Also, Civil Aviation Rules do not permit the recording of simulator time as flight time in pilot logbooks. Under rule 61.29, pilots cannot count simulator time towards total time, including pilot-in-command time.

The CAA has recently sent out a letter to all Part 121 and Part 125 operators reminding them of this.

Relevant Rules

Part 1, *Definitions and Abbreviations*, defines flight time as "the total time from the moment an aircraft first moves for the purpose of flight until the moment it comes to rest at the end of the flight including all associated push back, taxiing and subsequent holding time."

Rule 61.29 spells out the requirements for the recording of simulated in-flight instrument time and actual in-flight instrument time.

Rule 61.33 refers to the crediting of ground time.

Pilots are required to familiarise themselves with these rules, which clearly state how to record time in the logbooks, including time spent in synthetic flight training devices.

Recording Time

Approved zero flight time synthetic training devices (simulators) used by airlines for conversion training are still classed as synthetic training devices and time in such devices cannot be logged as flight time.

Much of the time a pilot spends in synthetic training devices is not simulated instrument time. At the end of a training detail, the instructor will confirm how much instrument time has been flown, and should certify either the logbook or a logbook sticker as applicable. This is the time that may be logged as ground instrument time.

Up-to-date, Accurate Logbooks

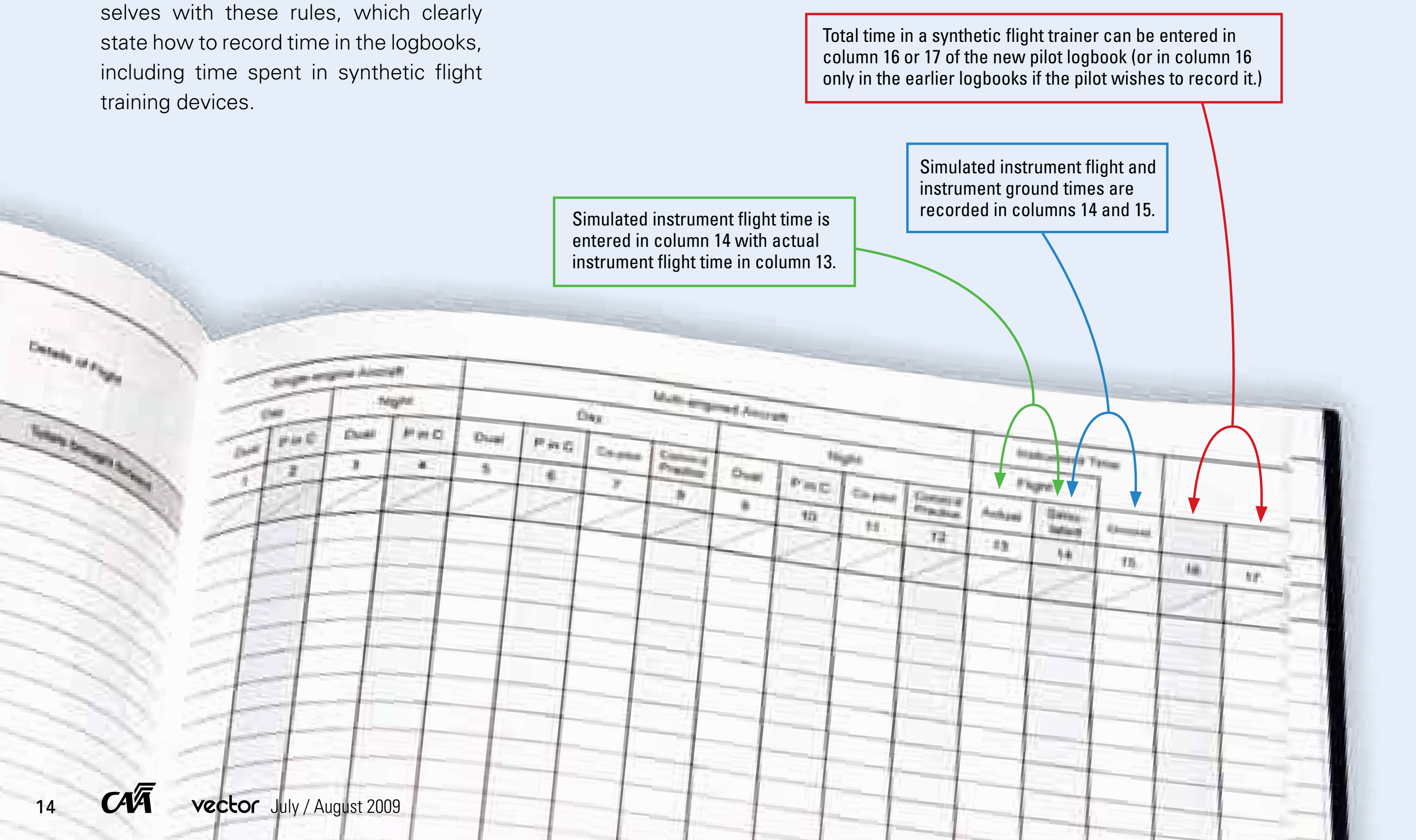
Rule 61.29(a) states that a student pilot and the holder of a pilot licence issued in accordance with Part 61 must maintain an accurate and up-to-date logbook. Student pilots and pilot licence holders are also reminded of sub-paragraphs (e), (f) and (g) which convey other important points to keep in mind, that are outlined below.

An incorrect entry in a logbook may be altered only by putting a line through the entry and by adding the correct information either beside the entry or on a new line.

Recording information in your logbook in a misleading manner or altering information by, for example, removing or gluing together pages, leaving spaces on pages, etc, is likely to be in breach of the requirement under rule 61.29 to maintain an accurate logbook. If you are looking at a career as a pilot, this could also mislead a future employer, or an operator that you want to hire an aircraft from.

Every entry in the logbooks must be made within seven days after the completion of the flight, except in the case of flight on an international air transport operation. In such cases, the entry must be made within 14 days of the flight. If a pilot is engaged in an operation away from the base where the logbook is normally kept, the entry in the logbook must be made within 48 hours after return to base.

Pilots must sign below the last entry to certify the correctness of the entries. ■



Human Errors in **Aircraft Maintenance**

All of us make mistakes – this is a fact. However, mistakes made during maintenance present a "significant and continuing threat" to aviation safety, according to a report recently published by the Australian Transport Safety Bureau (ATSB) on human factors in aviation maintenance. And yet, the first human factors training courses for maintenance personnel were offered only in the 1990s, 20 years after airlines began providing similar instructions for flight crew members.

Only in recent years have aviation maintenance errors been recognised as a symptom of wider problems in the work place. The industry has developed human factors training, following new requirements by the International Civil Aviation Organization (ICAO) for maintenance personnel to understand human factors principles.

The CAA's Part 66 licence syllabus for Human Factors – Subject 17 – was changed in December 2008 to meet these ICAO requirements and to standardise the syllabus, based on the European Aviation Safety Agency (EASA) Part 66 requirements.

The Dirty Dozen

One of the first and most recognised training programmes for understanding human errors in maintenance was developed by Gordon Dupont for Transport Canada. It lists the 12 most common ones and calls them the 'Dirty Dozen'.

The challenge with the Dirty Dozen is that – while appearing to be obvious, familiar, and just common sense – they can be elusive. Their danger is often disguised by myriad routine distractions, even while they are right under your nose.

Add to that the unique hazards of an aviation maintenance environment, such as extreme heat or cold, strenuous actions, confined spaces, and the 'time is money' factor prevalent in the industry, and it all adds up to a potential disaster.

Although not specifically listed in the Dirty Dozen, the element most commonly attributed to maintenance-related aircraft accidents is failure to follow procedures. This can be the result of any one or more of the 12 factors, and it highlights the need to stay on top of your game to recognise all possible warning signs.

The Dirty Dozen are outlined below, with suggested solutions. If these areas can be minimised or controlled, a very high percentage of maintenance-related incidents can be eliminated.

Continued over »

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"The element most commonly attributed to maintenance-related aircraft accidents is failure to follow procedures."

Complacency

Overconfidence from repeated experience on a specific activity.

"I've checked it 1000 times and never found anything wrong."

Expect to find errors and don't sign for it if you didn't do it.

Lack of knowledge

Failure to have training, information, and/or the ability to conduct a particular task.

"This is the third one to break! What is going on?"

Don't be afraid to ask, and always use up-to-date manuals for the work you are doing at the time.

Lack of team work

Failure to work together to complete a shared goal.

"I thought you were going to do it, I am too busy."

Discuss how the job should be done, and make sure everyone understands and agrees.

Distraction

An unlimited number of possible events/conditions that interrupt one's ability to focus on a specific task.

"I'll just answer my cellphone, it will only take a minute."

Go back 3 steps when you return to the job on hand, and use detailed checklists when required.

Fatigue

Physical or mental exhaustion threatening work performance.

"I'll be glad when this double shift is over – I have not had a day off in three weeks."

Have others check your work, and always watch for signs of fatigue in yourself and in others.

Lack of resources

Lack of people, equipment, documentation, time, parts, etc, to complete the task.

"One part is still on order so I guess this will have to do."

Order parts before they are required, and have a plan for loaning equipment should it be required. Ensure there are enough people on hand to complete the work in the time available.

Pressure

External or internal forces demanding high-level job performance. This can be real or perceived.

"We are going to be late and I will lose my customer to another operator if you don't get the aircraft out today. It's going to be your fault if this happens."

Communicate concerns and ask for extra help when necessary.

Lack of assertiveness

Failure to speak up or document concerns about instructions/orders or actions of others.

"Listen! I own the aircraft, I pay the bills, I am the pilot and I think it's safe to fly!"

Put safety first and remember it's alright to say no.

Safety Nets Can Prevent Accidents

Lack of communication

Failure to transmit, receive, or provide sufficient feedback in order to complete a task.

"I thought you told me that you were going to torque up that bolt if you had time."

Never assume anything, and document work to be done and work already completed.

Norms

Standard practices, usually undocumented, adopted by an organisation or group.

"Never mind the maintenance manual, we'll do it my way – it's a lot quicker."

Existing norms don't make it right; always follow best practices.

Stress

Physical or mental condition resulting from external forces. It may affect health and quality of work.

"In these tough economic times I am not sure how much longer I may have a job. We have a baby on the way, my wife has to stop work, and we still have the mortgage; and mum's talking about moving in with us."

Take a rational approach to problem-solving and take a short break when needed.

Lack of awareness

Failure to see a condition, understand what it is, and predict the possible results.

"All the rule said was fit it where it was easily accessible."

Don't let your work conflict with an existing repair. Have you ever thought, "I'm glad I'm not going to have to be the person who has to do this the next time?" Look at the big safety picture.

Any one of the above factors in itself may not be the single cause of an accident. However, when a number of these factors collectively join together, sometimes with other contributing factors, they can form the links in a chain of events.

This chain of events can result in an aircraft accident. If any of the contributing factors can be removed, the accident may be prevented.

Safety Nets

To prevent accidents, there are 'Safety Nets' that can be put in place. They may break a link in the chain, or prevent it from forming.

Some of them are:

- **Regulation** – The CAA Rules and Advisory Circulars.
- **Training Programmes** – Introduce a dedicated Maintenance Human Factors Training Programme into your company.
- **Company Policy** – An Exposition or Operator's Manual.
- **Procedure** – A manufacturer's Maintenance Manual or other Acceptable Data.
- **Practice** – How individual engineers perform the task at hand.

Being aware of maintenance human factors issues is important to everyone involved in maintenance. The CAA is considering running some initial Maintenance Human Factors Training. If interested, please contact Aviation Safety Adviser, John Keyzer, email: keyzerj@caa.govt.nz.

This article gratefully acknowledges material from:

Gordon Dupont, System Safety Services

AeroSafety World, Feb 2009 (Flight Safety Foundation magazine) – "Maintenance Matters – Error Management", by Linda Werfelman

FAA Aviation News, May/June 2009 – "Nuts, Bolts, and Electrons, At War with the Dirty Dozen", by Martin Bailey

More information:

UK Civil Aviation Authority – www.caa.co.uk/cap715 and www.caa.co.uk/cap716

System Safety Services – www.system-safety.com

FAA Maintenance Human Factors web site – http://hfskyway.faa.gov/hfskyway/index.aspx ■

Finding **Gisborne**

It doesn't sound that hard – but finding Gisborne VFR can be quite a challenge.

Navigating to Gisborne using only your dead reckoning and map reading skills is difficult. All direct routes from the south, west and north-west are over some of the most rugged terrain in New Zealand, with very few clearly defined features like towns, power lines, railway lines and road intersections along the way. Wind changes, off course drift, and heading accuracy need to be monitored closely when travelling such a significant distance over 'tiger country'. The turbulence produced by strong south-west and north-west wind conditions can also make accurate tracking difficult.

The relatively high terrain en route means that cloud cover sitting at 3500 feet or below significantly impacts visual cues when map reading. If the horizontal visibility (or your height) prevents you from seeing the coastline, it can be very hard to reorient yourself if you become unsure of your position.

To make matters worse, radio coverage with Gisborne Tower beyond 20 NM and below 3000 feet is very poor, and there is no radar coverage to the south of Gisborne and east of the main ranges below 6000 feet. So radar assistance is not an option. Gisborne Tower does, however, have VHF direction finding equipment, which may provide basic navigation assistance.

The upshot of all this is – if you have access to a GPS – use it. They are invaluable in this situation. Even if you have a GPS, always have a plan B. Think through an alternate route in case the one you planned doesn't work out.

Photo taken from five NM north of Wairoa at 2500 feet. The cloud base is approximately 3600 feet.

Approaching Horoto from the southwest. Poverty Bay is only just becoming visible. The peninsula in the distance is Tuaheni Point, not Young Nicks Head (which is obscured by the terrain)

Taken just north of Mahanga Beach.

Here are some tips on navigating to Gisborne.

Direct from Wairoa

Track direct to Horoto VRP. Listen to the ATIS on 126.4 MHz, and make initial contact with Gisborne Tower (127.3 MHz) when abeam Whakapunaki VRP. You will normally be asked to report at Horoto for joining instructions.

These photographs show how difficult it is to identify the VRPs on this route. If you struggle to find them, a good option is to turn east until you reach the coast, then follow the coast north to Gisborne. Report at Bartlets VRP for joining instructions.

From Wairoa via the Coast

This is the usual bad weather route to Gisborne. Follow the coast from the Wairoa River mouth, past Nuhaka, towards Mahanga Beach. At Mahanga Beach, turn left and follow the coast, and listen out on the Tower frequency for traffic leaving Gisborne via the coast. Listen to the ATIS, then contact the Tower abeam Bartlets (this VRP is actually half a NM inland). You will normally be instructed to report at Muriwai for joining instructions (note this is not at the tip of Young Nicks Head). Turbulence on this route can be nasty in a westerly. Tracking off the coast slightly can help, but visibility may become an issue in bad weather.

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From Wairoa, follow the coast to Mahanga Beach. You will not get Gisborne Tower here if below 3000 feet, but Napier Tower has good reception here.

Approaching The Lake on track from Rotorua.

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From Rotorua, Tauranga, Whakatane and Opotiki

Approaching from any of these places will take you over the main ranges to the west of Gisborne. The highest terrain within five NM either side of the direct track from Taupo is 4107 feet, and from Rotorua is 4348 feet. A ceiling of 5000 feet is recommended for these routes. Tracking via Opotiki, rather than direct, will give you more forced landing options. If you have not flown this route before, a ceiling of 4000 feet or higher is recommended.

Listen to the ATIS and make contact with the Tower when between 15 and 20 NM from Gisborne. You will normally be instructed to report at The Lake VRP, or Te Karaka VRP (if you are further north) for joining instructions. Te Karaka is on long final for Runway 14 at Gisborne. To find it, look for where State Highway 2 and the Waipaoa River meet. The Lake is much harder to find because it is obscured until you are almost on top of it. In drought conditions it may even be dry. It is situated in front of the last ridge before the Poverty Bay plains. To find it, head towards Tuaheni Point until you see The Lake.

From East Cape via the Coast

This is the bad weather route from the Bay of Plenty and a fantastic scenic flight. Just remember that it is significantly longer than the direct routes.

You will not receive the ATIS or Gisborne Tower north of Gable End Foreland unless you are above 3000 feet. North of Tolaga Bay, position reports should be made on Napier Tower FISCOM 125.6 MHz.

Report approaching Makarori, and expect joining instructions at that point. Look out for training aircraft on the edge of the zone at Makarori.

Remember, the Gisborne Tower staff are there to help. Don't be afraid to ask for assistance if you 'temporarily' find yourself unsure of your position. If you are unable to contact Gisborne Tower, try Napier Tower (124.8 MHz). The extended range repeater aerial on Whakapunaki provides good coverage up the East Cape.

Thanks to Phil Granger for the information used in this article. Photos courtesy of the RNZAF. ■

Approaching the control zone boundary from the northeast.

Inspection of Non-Certificated **Maintenance Organisations**

The CAA's GA Airworthiness team have been carrying out inspections of all non-certificated maintenance organisations and individual aircraft engineers around the country.

These organisations and engineers work under the provisions of Part 43 *General Maintenance Rules and Part 66 Aircraft Maintenance and Personnel Licencing.*

Airworthiness Coordinator, John Bushell, says, "The CAA is carrying out an assessment of each maintenance organisation's awareness and compliance with Part 43, to ensure that they meet the minimum requirements of the rule as applicable to the size and scope of their organisation. The inspections are chargeable, and findings will be issued if necessary."

These inspections have been well received by the 20 maintenance organisations visited so far. It is planned to visit all of the approximately 78 non-certificated maintenance organisations over a 12-month period.

One of the maintenance organisations visited has been Skysales Aviation. Chief Engineer, James McNutt, says, "The inspection is a good thing for the industry. It's an excellent way of finding out if you're doing things correctly and if your interpretation of Civil Aviation rules is correct.

"The inspection process is relatively straightforward and it would be great if everybody doing maintenance under Part 43 and Part 66 are to be inspected."

As part of these visits, the visiting Airworthiness Inspector discusses the merits of having an Engineering Procedures Manual (EPM) and Quality System. The CAA provides a template and guidance material to those organisations that wish to voluntarily develop their own EPM and Quality System, to help them with this process.

For more information on these inspections, contact:
Airworthiness Inspector, John Skene,
email skenej@caa.govt.nz.■■

CAA Airworthiness Engineer John Skene listens as James McNutt, Chief Engineer, Skysales Aviation, explains a point to him.

Loose Objects

Unsecured items in and around helicopters can be a deadly and significant safety hazard.

One operator remembers the day a $10 tarpaulin was picked up by the downwash of a Hughes 369 and hurled through the main rotor disc – causing over $350,000 worth of damage. The transmission, rotor head, drive shaft, engine, blade, and other components all needed overhauling or replacing. Additional to this were the significant insurance costs – not just the excess but the future premium increases, and the loss of revenue while the helicopter was on the ground.

Inside

A more recent incident has highlighted the need to secure items inside the helicopter properly. A box sitting on the front seat of an R22, secured only with the inertial reel harness, slipped sideways off the seat and jammed the cyclic, giving the pilot a nasty surprise, and causing a loss of control on landing.

Frank Robinson (founder of the Robinson Helicopter Company) tells the story of a friend who put a tree stump on the seat of an R22 and secured it with the inertial reel harness. The stump fell forward, jamming the cyclic forward. The pilot could not get it back on to the seat and crashed through the roof of a shop – killing himself but luckily nobody else!

Many a situation has occurred where an unsecured item has worked its way out of an open door. Far too often, the item passes through the tailrotor on its way to being lost.

Keeping a cabin tidy is just as important. Anything that can work its way into an open crevice probably will. Rob Mills, Flight Operations Inspector Rotary Wing recalls, "I once had to ditch a Jet Ranger, and when it came to exiting the helicopter, the stuff that had been lying around the cabin – like spare headsets, maps, and tie-downs – was caught up around my feet. It made me think quite carefully about cabin tidiness." Camera lens caps, pens, spent ammunition cartridges and loose seatbelt buckles are particularly bad offenders. Anything that can work its way into an open crevice, probably will.

Outside

Making sure loose items in landing areas are secured is equally important. Even objects that seem weighty, like helicopter doors, can be sucked up through the rotor blades. Even something that seems innocuous, like a plastic bag, can cause significant vibration and damage to the blades.

Briefings

There is something about the noise, the smell, and the 'invisible' rotor disc that disconnects a person's brain when they are around helicopters.

A thorough briefing for everybody in and around a helicopter is essential, even if they think they know what they are doing – it's often the experienced person who tends to do the most dangerous things.

In your briefing, cover all the things you want them to do, all the things you don't want them to do, and then watch them like a hawk – always expecting the worst. And tell them to resist the urge to put their heads down and run, like they've seen in the movies! They must see where they are going at all times.

The CAA has a number of resources available to help with your briefing. There are two *Safety around Helicopters* posters, one works particularly well with non-English speakers, and the *Safety around Helicopters* DVD.

For a copy of the posters, or to borrow a copy of the DVD from the CAA library, email us at info@caa.govt.nz. You can also buy a copy of the DVD – details are on the CAA web site, www.caa.govt.nz. ■

Aviation Safety Advisers

Don Waters
North Island, north of a line, and including, New Plymouth-Taupo-East Cape
Tel: 0–7–376 9342 Fax: 0–7–376 9350
Mobile: 027–485 2096
Email: watersd@caa.govt.nz

Ross St George
North Island, south of a line New Plymouth–Taupo–East Cape
Tel: 0–6–353 7443 Fax: 0–6–353 3374
Mobile: 027–485 2097
Email: stgeorger@caa.govt.nz

Murray Fowler
South Island
Tel: 0–3–349 8687 Fax: 0–3–349 5851
Mobile: 027–485 2098
Email: fowlerm@caa.govt.nz

John Keyzer
Maintenance, North Island
Tel: 0–9–267 8063 Fax: 0–9–267 8063
Mobile: 027–213 0507
Email: keyzerj@caa.govt.nz

Bob Jelley
Maintenance, South Island
Tel: 0–3–322 6388 Fax: 0–3–322 6379
Mobile: 027–285 2022
Email: jelleyb@caa.govt.nz

Clarification

The "Medicals Made Easier" article in the March/April 2009 *Vector* dealt with changes in the routine medical tests required for medical certification. The article did not discuss the requirements that had not changed. One requirement that has not changed is the need for routine audiometry (detailed testing of hearing function) for initial Class 1 medical assessments. Details concerning this, and the other routine medical requirements, can be found in the General Directions document itself, "Timetable for Routine Examinations – General Directions Notice 2009". See the CAA web site, www.caa.govt.nz, "Medical – General Directions".

Aviation Safety Coordinator
Training Course

Christchurch

Thursday 20 and Friday 21 August 2009

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

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

Attend this FREE two-day course for new Aviation Safety Coordinators, or to refresh and re-inspire existing ones –

» you will get a comprehensive safety manual;

» access to all of the latest CAA safety resources and support; and

» lunch is provided (accommodation, transport and other meals are not provided).

Location is close to Christchurch airport:
Sudima Hotel Christchurch Airport
cnr Memorial Ave and Orchard Rd

Check the CAA web site, www.caa.govt.nz, under "Seminars and Courses" for an enrolment form and further information. Places are limited, and they usually fill up quickly, so please enrol early.

Or contact Rose Wood,
Tel: 0–4–560 9487, Fax: 0–4–569 2024,
Email: woodr@caa.govt.nz.

Chief Pilot/ Senior Person
Workshop

Dunedin

14 and 15 September 2009

The aim of the Workshop is to give people a full awareness of the responsibilities of being a "senior person responsible for flight operations". They should leave with the knowledge required, and the tools to do the job.

The Workshop will cover:

» the Civil Aviation Act 1990;

» Civil Aviation Rules and the operator exposition as they apply to the Chief Pilot/Senior Person role;

» practical aspects of SOPs;

» records and rosters;

» crew and staff management;

» training and checking responsibilities;

» safety culture; and

» professionalism in the aviation environment.

The Workshop is aimed at persons with Senior Person responsibilities in organisations holding a Part 119/135 Air Operators Certificate. It also has relevance to Part 137 agricultural Chief Pilots and to Chief Flying Instructors. The venue is the Kingsgate Hotel, Dunedin.

The cost of attending is $250 per person. An application form is on the CAA web site, www.caa.govt.nz, see "Seminars and Courses".

Inspection Authorisation (IA) Initial Course 2009

Auckland

30 September to 2 October 2009

A Part 66 IA Certificate is an additional qualification, over and above holding a Part 66 AME Licence, to perform and certify the following two maintenance functions:

1. an Annual Review of Airworthiness (ARA)
2. conformity of Major Modifications and Repairs.

If you are interested in attending this course, please contact:

Mark Price
AME Examiner
Tel: 0–4–560 9619
Email: pricem@caa.govt.nz

Flight Instructor Seminar

August 2009

For all instructors in the aviation community

Masterton – 4 and 5 August (Copthorne Solway)

Ashburton – 11 and 12 August (Hotel Ashburton)

Hamilton – 18 and 19 August (Hamilton Airport Motor Inn)

Places are filling fast, so register now!

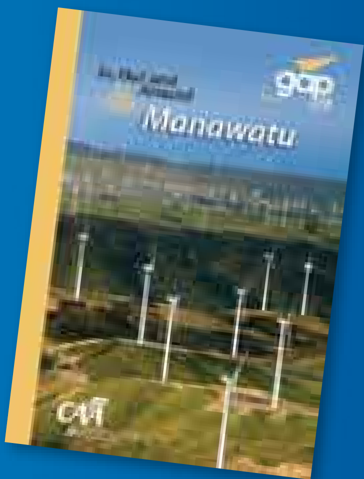
The theme for 2009 is Change, and the seminar will include related topics from role changes to changes in the life of an aircraft. "Detect a Change" is a session that will use Threat and Error Management techniques. There will be a specialist speaker on learning who will discuss how adults learn, and structuring course material.

All current Part 149 Instructors and Part 61 Instructors are invited to register. The registration form is on the CAA web site, www.caa.govt.nz. All registrations must be accompanied by evidence of instructor rating currency (ie, copy of last renewal flight test report) and the $100 registration fee (this includes all meals over the two days and accommodation on the first day of the seminar. It is non-refundable but substitutions are possible).

New Products

In, Out and Around Manawatu

The Manawatu is one of the busiest and most complex pieces of airspace in New Zealand, and is home to aerodromes at Palmerston North, Ohakea, Feilding, Wanganui, and Foxton. This GAP booklet is designed to give pilots information, tips, and warnings about operating in and around this airspace.



How to Get Aviation Publications

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

All these are available free from the CAA web site. Printed copies can be purchased from 0800 GET RULES (0800 438 785).

Aviation Safety & Security Concerns

Available office hours (voicemail after hours).

0508 4 SAFETY

(0508 472 338)

info@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)

The Civil Aviation Act (1990) requires notification "as soon as practicable".

Planning an Aviation Event?

If you are planning an event, large or small, such as an airshow, air race, rally, or major competition, the details should be published in an *AIP Supplement* to warn pilots of the activity.

The published cut-off dates for the AIP are listed below, but you must advise the CAA ***at least one week*** before those dates, to allow for inquiries and processing. Note that, even if you have applied to the CAA for an aviation event authorisation, this does not automatically generate an *AIP Supplement* or airspace request.

Email the CAA, aero@caa.govt.nz. Further information on aviation events is in AC91–1.

Effective Date	***Cut-off Date With Graphic***	***Cut-off Date Without Graphic***
22 Oct 09	10 Aug 09	17 Aug 09
19 Nov 09	7 Sep 09	14 Sep 09
17 Dec 09	5 Oct 09	12 Oct 09

Accident Briefs

More Accident Briefs can be seen on the CAA web site, www.caa.govt.nz.
Some accidents are investigated by the Transport Accident Investigation Commission, www.taic.org.nz.

ZK-DRR RANS S-6S Coyote II

Date and Time:	26-Feb-08 at 18:00
Location:	Waimate
POB:	2
Injuries:	0
Damage:	Substantial
Nature of flight:	Private Other
Pilot Licence:	Nil

The pilot reported that, during takeoff, the aircraft veered off the runway into a fence. The aircraft received substantial damage.

CAA Occurrence Ref 08/757

ZK-EMQ NZ Aerospace FU24-950

Date and Time:	13-Mar-08 at 7:30
Location:	Maniatoto
POB:	2
Injuries:	0
Damage:	Substantial
Nature of flight:	Agricultural
Pilot Licence:	CPL (Aeroplane)
Age:	39 yrs
Flying Hours (Total):	5600
Flying Hours (on Type):	2000
Last 90 Days:	72

Upon landing, the lefthand undercarriage leg failed, resulting in the aircraft vacating the airstrip and coming to rest on the left wing, with minor damage. The oleo cylinder fractured below P/N 245116 clamp. The departing undercarriage contacted the LH flap, inflicting damage. There was also damage to ribs P/Ns 241589L and 241314-1L, and to aileron tip fence P/N 08-24011-13.

CAA Occurrence Ref 08/1320

ZK-CML Fletcher FU24-950M

Date and Time:	12-Apr-08 at 6:45
Location:	Kutarere
POB:	1
Injuries:	0
Damage:	Substantial
Nature of flight:	Agricultural
Pilot Licence:	CPL (Aeroplane)
Age:	49 yrs
Flying Hours (Total):	10898
Flying Hours (on Type):	160
Last 90 Days:	91

While turning onto a sowing run, the aircraft made contact with a pine tree, damaging the RH outer wing section. The pilot noticed two holes in the leading edge, so he jettisoned his load and returned immediately to the airstrip. He carried out a successful landing with no further damage.

CAA Occurrence Ref 08/1738

ZK-DZC NZ Aerospace FU24A-950

Date and Time:	26-Apr-08 at 11:15
Location:	Kaihoka Lakes
POB:	1
Injuries (Serious):	1
Damage:	Destroyed
Nature of flight:	Agricultural
Pilot Licence:	CPL (Aeroplane)
Age:	34 yrs
Flying Hours (Total):	3500
Flying Hours (on Type):	1928
Last 90 Days:	203

During takeoff the topdressing aircraft collided with a low hill. The pilot lost control soon after the collision. During the ensuing crash he was seriously injured and the aircraft was destroyed. Cause factors reported by pilot were a possible tail-wind component, and the aircraft may have been overloaded for the conditions.

CAA Occurrence Ref 08/1714

ZK-OUI Cessna 172R

Date and Time:	11-Jun-08 at 14:00
Location:	Hamilton
POB:	1
Injuries:	0
Damage:	Substantial
Nature of flight:	Training Solo
Pilot Licence:	Nil
Flying Hours (Total):	27
Flying Hours (on Type):	27
Last 90 Days:	27

The accident C172 was taxiing on the apron following the yellow taxi line, when the pilot misjudged the clearance between his aircraft and an Alpha, which was parked to the left of the taxiway with the engine running. The left wing of the taxiing C172 went through the rotating propeller of the Alpha, approximately 1 m of the wing being sliced off.

CAA Occurrence Ref 08/2461

ZK-RLA Micro Aviation Bantam B22J

Date and Time:	14-Jul-08 at 12:30
Location:	Ruahine Corner
POB:	1
Injuries:	0
Damage:	Substantial
Nature of flight:	Private Other

Engine failure shortly after takeoff resulted in a hard landing after an almost 180-degree turn was conducted to avoid trees. Pilot suspects carburettor ice caused the engine stoppage.

CAA Occurrence Ref 08/2934

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.

Key to abbreviations:

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

Aerospatiale AS 350BA

Coupling Shaft & Coupling Flex

Part Model:	AS350BA
Part Manufacturer:	Aerospatiale
Part Number:	350A35 - 1101 - 21
ATA Chapter:	6300
TTIS hours:	12548.3

The maintenance organisation reported that the flex disk (1 plate) had cracked and the attach bolt to coupling shaft was loose, causing flange hole wear to the hole and flange surface of coupling shaft. The maintenance provider suspects that prior to the last installation of the shaft, the shaft was repainted. It appears the paint at the coupling flanges was not removed at the attach holes, which has allowed a clearance to occur between the bolt head and flange, allowing the bolt to work over time. This movement has caused the flex disk to crack. Replaced coupling shaft, bolts and flex plate. Inspection to be carried out in 100 hours. A similar aircraft maintained by the maintenance provider will be inspected at the next hangar visit.

CAA Occurrence Ref 08/3813

Aerospatiale AS 355 F1

#1 Fuel Control Unit

Part Model:	A250 Series
Part Manufacturer:	Aerospatiale AS355F1
Part Number:	23070606
ATA Chapter:	7100
TSI hours:	46.05
TSO hours:	1057.15

Failure of the #1 engine FCU caused an uncommanded shutdown of the #1 engine when the condition lever was advanced from ground idle to flight idle. #1FCU replaced. Starts and power checks subsequent to FCU replacement found to be satisfactory without any further symptoms as previously described. FCU removed and sent for inspection and rectification.

CAA Occurrence Ref 08/2985

Alpha R2160

Radio

Part Model:	R2160
Part Manufacturer:	Alpha
ATA Chapter:	2310

The aircraft operating in the circuit appeared to have a communication failure on final approach. The aircraft landed safely. On a subsequent phone call from the pilot, it was revealed that the pilot could hear the Tower transmissions, but the Tower could not hear those from the aircraft. The reason the aircraft failed to transmit could not be determined; the pilot had no problems with the radios until short finals, at which point they could hear the tower but the tower could not hear either of the crew members. After landing the aircraft comms system worked normally.

CAA Occurrence Ref 08/3107

Cessna 152

Alternator Wiring and P-Clamp

Part Number:	MS 21919WD C9
ATA Chapter:	2420
TSI hours:	13

The aircraft low voltage warning light came on as the aircraft was approaching Takaka. The pilot decided to return to Paraparaumu and while doing so lost use of the transponder and radios. The pilot received assistance from a ground based instructor and landed at Paraparaumu safely. Investigation revealed the alternator wiring chaffing inside a support P-clamp attached to the engine oil sump. Deterioration of the clamp due to oil and vibration allowed chaffing of the wire and shorting to ground. The wiring was repaired as required and a new P-clamp fitted. A ground run was carried out and was satisfactory.

CAA Occurrence Ref 08/4255

Cessna 172M

Wheel Rim

Part Manufacturer:	McCauley
Part Number:	C163003-0101
ATA Chapter:	3241

The lefthand main wheel outer flange separated from the hub assembly during taxiing. The spat was damaged and the aircraft was stranded on the taxiway. Maintenance investigation found that the bolts attaching the wheel flange to the hub had pulled out. A replacement wheel assembly was fitted.

CAA Occurrence Ref 09/17

Nanchang CJ-6

Isolation Valve

Part Model:	CJ-6
Part Manufacturer:	Nanchang
ATA Chapter:	3200

The undercarriage did not fully retract when selected up. The pilot extended the undercarriage, and the aircraft landed safely. Maintenance investigation found that a valve in the aircraft's pneumatic system had malfunctioned; this prevented sufficient pneumatic pressure reaching the landing gear actuators when the gear was selected up.

CAA Occurrence Ref 08/2840

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