July / August 2007

VECTOR

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Low Visibility Operations at Auckland Airport

Seen one ILS and you have seen them all? Well think again, as Low Visibility Procedures are closing in on Auckland. Once completed, Auckland will boast one of the first Cat III ILS in Australasia and here's how some of the changes may affect you.

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G-LOC – Could it Happen to You?

G-Induced Loss of Consciousness is not only a danger for fighter pilots – GA pilots are at risk too. G-LOC is not a sign of weakness or lack of the 'right stuff' – it is a perfectly normal reaction to the abnormal environment of flight. We explain why G-LOC occurs, and how you can increase your G-tolerance.

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You and your passengers have just survived an accident during landing – what do you do next? This article steps you through basic survival techniques. Having some survival knowledge and a well thought out plan in such a situation could save lives.

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Night Freight Operations

Have you ever wondered who is flying that pesky plane overhead in the middle of the night? Or thought about what it would be like to work through the night and have the days off? These questions and more were put to the pilots flying night operations – here is what they had to say.

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Cover: *One of the lucky aircraft to land at Auckland International Airport during periods of fog.*

Photo courtesy of Paul Harrison, Kiwi Air Research.

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Low Visibility Operations at Auckland Airport

During a typical year, Auckland Airport users can expect delays, disruptions, or aircraft diversions due to fog. Historically, fog affected Auckland Airport approximately three mornings per year, but due to more extreme weather patterns this number has risen to between 12 and 16 'part days'. Fog is more common during the months of May through to September, but can occur any time when certain conditions present themselves.

Auckland Airport currently uses a Category I (Cat I) Instrument Landing System (ILS) which allows a pilot to descend in cloud to 200 ft agl with forward visibility not being less than 800 m. If the pilot cannot see the runway at this point they must begin a missed approach.

For day-to-day operations, the Cat I ILS is adequate, but it falls short of the mark during periods of persistent fog. During periods of fog there are clearly commercial reasons, and in some cases safety reasons, for wanting to get the aircraft onto the ground, despite the fact that the cloud base and visibility are below the Cat I ILS minima.

As technology has evolved, so have the categories of ILS. Currently, there are three categories of ILS: Cat I, Cat II, and Cat III (Cat III includes several parts). The higher the ILS category, the lower the aircraft is allowed to descend without seeing the ground. For example, during a Cat I approach the aircraft may descend to 200 ft without the pilot seeing the ground, and during a Cat II approach the aircraft may descend to 100 ft without the pilot seeing the ground. The Cat III is different, however, as the pilot doesn't need to see the ground at all.

Auckland Airport is working with Airways New Zealand, and various airlines, to implement Low Visibility Operations (LVO), which will utilise a Cat III ILS.

Airways New Zealand is midway through the upgrade to the current Cat I ILS to a Cat IIIB ILS. When this is completed in May 2008, a correctly equipped aircraft with suitably trained and rated pilots will be able to land on Auckland's Runway 23L with a zero ft cloud base and horizontal visibility of no less than 75 m. After landing, the aircraft can safely taxi to a predetermined holding point in the knowledge that there are no other aircraft in that sector. There will be a total of four sectors, which means that four aircraft can be on the move at any one time.

Because of the restricted movement, aircraft takeoffs and landings will be reduced to six movements per hour at times. This is a big step up from the current zero movements per hour during such conditions.

What are Low Visibility Operations?

Low Visibility Operations at Auckland Airport are classified as operations that take place when visibility and/or cloud base fall below predetermined levels. Currently these levels are when visibility is 1500 m or below and/or the ceiling is at or below 200 ft.

To accurately judge Runway Visual Range (RVR), three pairs of transmissometers have been installed alongside the runway. One pair is located at the touchdown point, the second is located at the mid point, and the third is at the end of the runway.

RVR is the horizontal visibility along the runway as seen from 5 m above the touchdown point.

In order to facilitate aircraft movements during periods of low visibility, Low Visibility Procedures (LVP) must be initialised. The first phase of LVP is the 'safeguarding' phase which 'locks' the airport down. This is expected to take approximately 20 minutes. All airside service entries and exits will be physically locked to ensure that no person blunders onto the runway or associated manoeuvring areas. A general call will be made on the Auckland Ground frequency, 121.9 MHz, and also the Apron frequency 123.0 MHz, to indicate the commencement of LVP.

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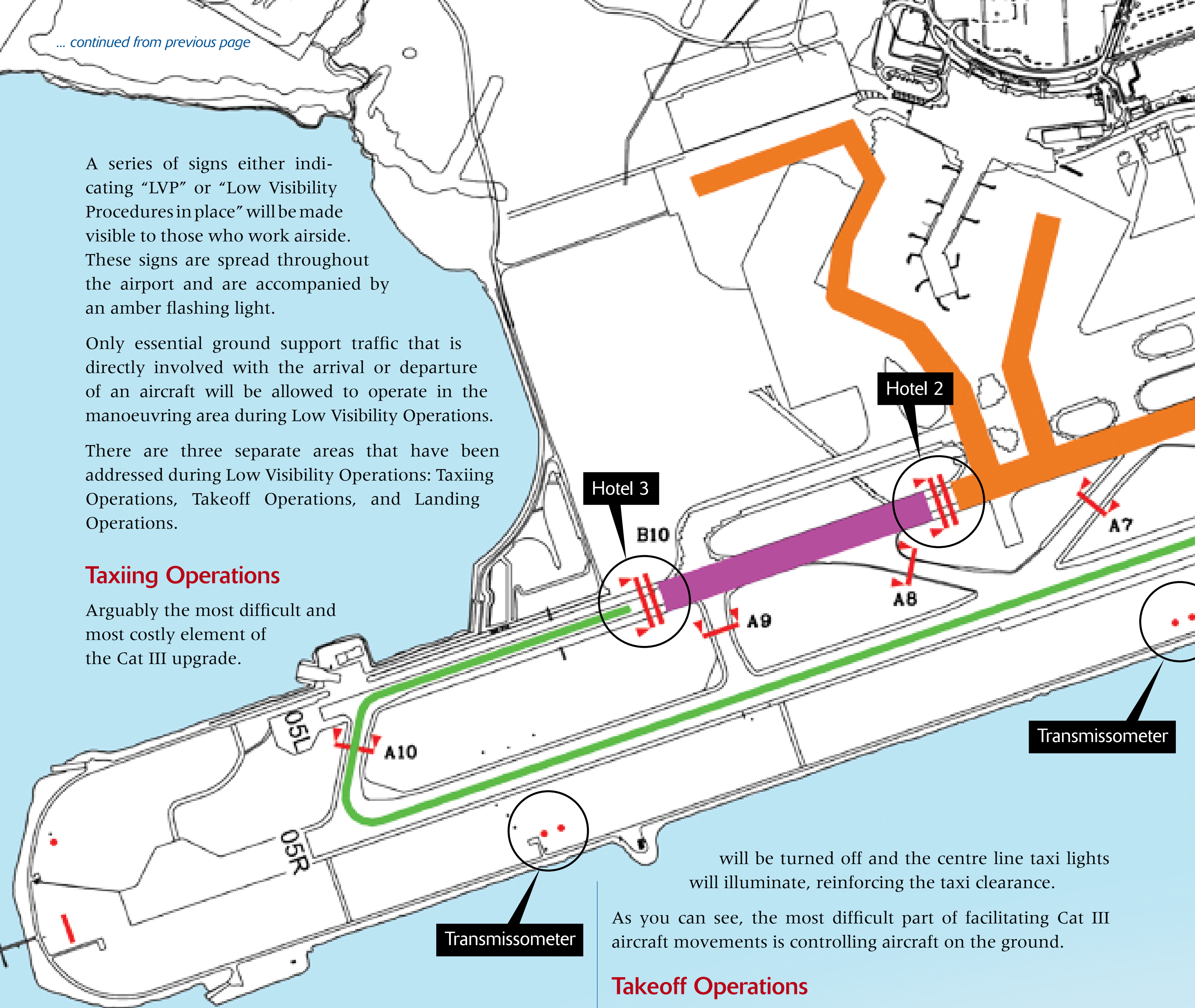


A series of signs either indicating "LVP" or "Low Visibility Procedures in place" will be made visible to those who work airside. These signs are spread throughout the airport and are accompanied by an amber flashing light.

Only essential ground support traffic that is directly involved with the arrival or departure of an aircraft will be allowed to operate in the manoeuvring area during Low Visibility Operations.

There are three separate areas that have been addressed during Low Visibility Operations: Taxiing Operations, Takeoff Operations, and Landing Operations.

Taxiing Operations

Arguably the most difficult and most costly element of the Cat III upgrade.

During LVO Auckland Airport becomes a single directional airport, utilising 23L for all arrivals and departures. If fog is present on the airfield, one can assume that any tailwind component on 23L will be minimal.

A departing aircraft will be cleared to line up and depart from its current holding point A1A. This holding point is also called the 'Cat II/III Runway Holding Point'. An arriving aircraft will land and vacate the runway at A10 and hold at 'Hotel 3'. An onward taxi clearance will be given to the landed aircraft to taxi from holding point 'Hotel 3' to proceed to holding point 'Hotel 2', and so on until the aircraft is clear of the manoeuvring area.

All intermediate taxiways from A9 to A1 will have stop bars illuminated. Stop bars are a row of red lights across the taxiway which indicate that the taxiway is closed. In addition, all taxiway centreline lighting will be turned off on these intermediate taxiways.

When an aircraft approaches a controlled stop bar on the taxiway (05L), the pilot will see a row of red lights. A 90 m portion of the taxiway centreline lighting behind the stop bar will be turned off in order to highlight the fact that the pilot needs to stop. Once the next taxi sector is clear, the pilot will be issued a clearance to proceed. At this point the red lights will be turned off and the centre line taxi lights will illuminate, reinforcing the taxi clearance.

As you can see, the most difficult part of facilitating Cat III aircraft movements is controlling aircraft on the ground.

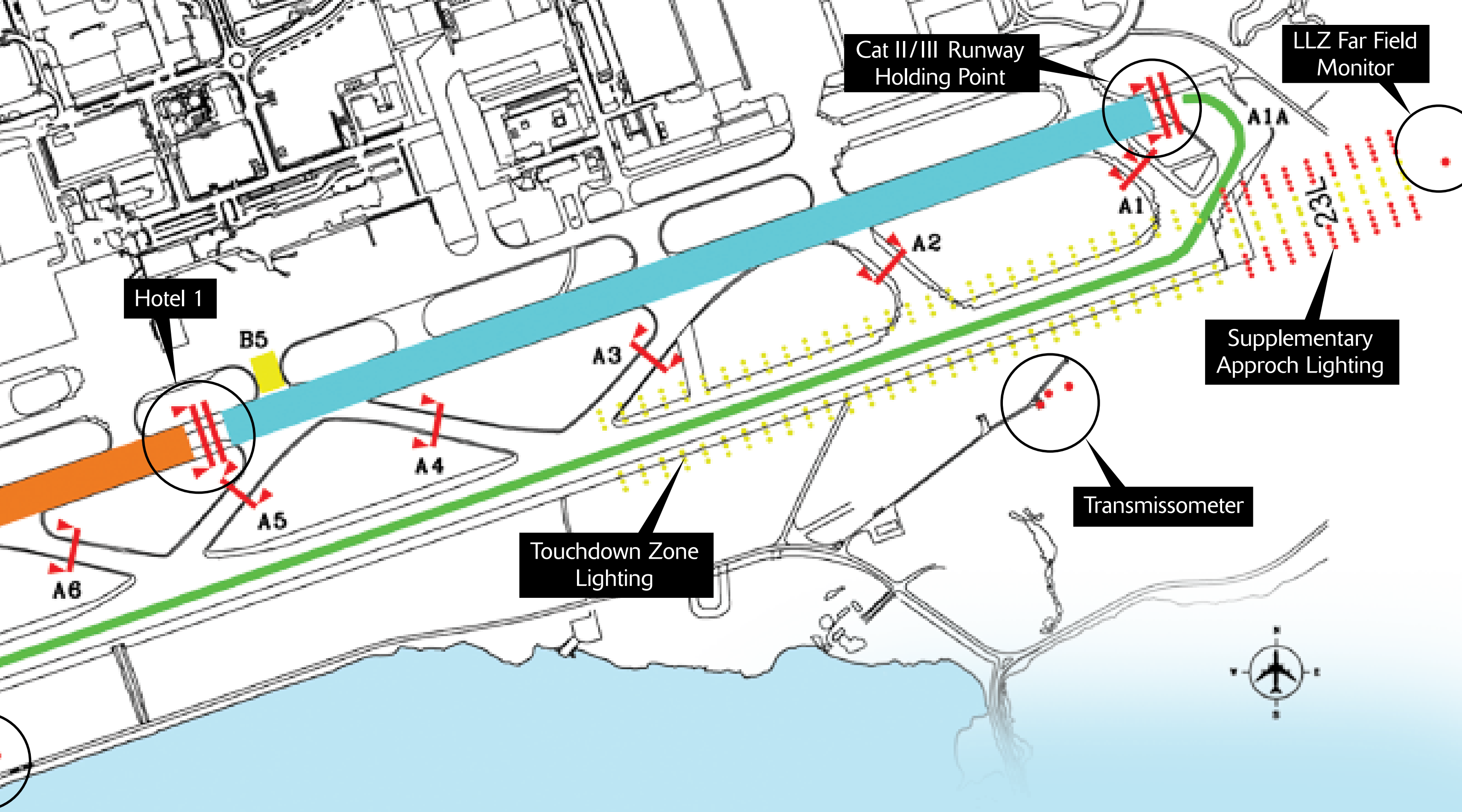
Takeoff Operations

In the past, pilots have been able to depart from Auckland in conditions below those required to land. This will no longer be the case, as the prerequisites for a Cat III ILS will also cover the prerequisites for an RVR departure. This will reduce the departing minima from the current 350 m to 200 m visibility. The zero ft cloud base will remain.

Landing Operations

Due to the precise nature of the CAT II and CAT III ILS, constant monitoring of the signal strength and integrity is required. A far field monitor has been installed to recognise the ILS signal to be that of a CAT II or CAT III ILS. If the monitor detects a poor ILS signal it will warn the tower that the integrity has been compromised and that pilots must now fly an approach with higher minima.

The integrity of the signal can be compromised in many ways, for example, by an aircraft flying or taxiing within the vicinity of the runway. Before a landing clearance is issued, the air traffic controller must confirm that the ILS is operating at the highest level required. The landing clearance needs to be issued to an aircraft on finals before they reach 4 nm from the threshold. This will reduce the chance of the ILS signal integrity being compromised. This also ensures that the runway is clear,



and that any preceding landings have taxied clear to 'Hotel 3'.

Significant works have taken place to increase the approach and touchdown lighting illumination. 300 m of supplementary approach lighting has been installed. This consists of centreline approach lights to complement the existing single row and they now form a barrette which is four lights wide. On either side of the new centreline approach lights, are a series of red barrettes, which are as wide as the touchdown zone lighting.

A strip 900 m long on either side of the touchdown zone accommodates 186 new lights. These lights are called Touchdown Zone (TDZ) lights and should help to illuminate the area in which aircraft should be touching down.

Airside Drivers

All Airside Driving Permits will expire in July 2007, even if the date printed on the permit is for a later date. Drivers who wish to drive airside should contact Auckland Airport for authorisation to do so.

The manoeuvring area edge has been more visibly defined with a red and white chequered line. "If it's Checked then Check", is the airside slogan to reinforce the fact that a clearance is required to operate south of this chequered line.

Each person driving airside will be required to have in the vehicle with them at least one airport chart relevant to the area in which they are currently driving.

Phasing-in of the Cat III ILS

During the resurfacing work that was recently completed on 23L, Auckland Airport and Airways staff took the initiative to combine this scheduled work with some of the physical changes required to install a Cat III ILS. This was done in order to reduce the number of disruptions and costs.

There are many different stages involved in upgrading a Cat I to a Cat III ILS. Here are some of the steps in the process:

RVR Sensors: Installation of the three pairs of sensors and the associated tower monitoring kit for reporting RVR – completed March 2007.

ILS Equipment: General upgrade of existing equipment and commissioning of the Far Field Monitor – completed December 2006.

The 6 month stability trial to Cat II – completed June 2007.

The 12 month stability trial to Cat III – Scheduled for completion in November 2007.

Airfield Lighting: Installation of TDZ and supplementary approach lights – completed May 2007.

Upgrade of the taxiway including stop bars – scheduled for completion in May 2008.

It is intended that Cat IIIB approaches be available from January 2008 at the reduced rate of six movements per hour. With the commissioning of all taxiway centreline lights, stop bars, and control systems this rate will increase to full capacity by 31 May 2008. Full capacity is expected to be 12 aircraft takeoffs and landings per hour.

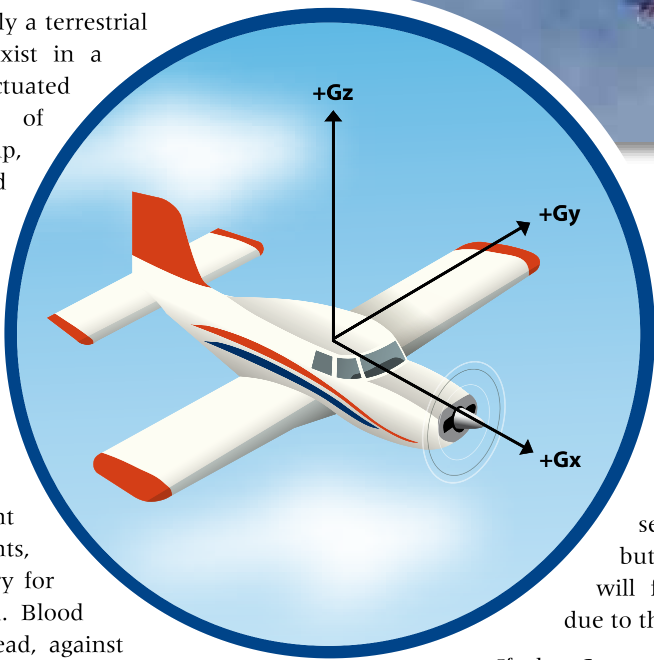
In the interim, suitably equipped aircraft with trained and rated pilots can expect to utilise reduced minima on approach that are incorporated in a Cat II ILS.

To keep up to date with the ongoing changes and progress at Auckland Airport, pilots should take the time to read and understand the *AIP Supplement*. As each milestone is reached in this mammoth project the *AIP Supplement* will reflect any reduction in minima, or highlight any special procedures that may have been put in place. On completion, Auckland Airport will be one of the first airports in Australasia to offer a Cat III ILS, which will help to reduce disruptions due to fog.■

G-LOC is an abbreviated term meaning G-Induced Loss of Consciousness. The letter 'G' represents the acceleration being experienced by a pilot during a manoeuvre. The particular 'G' that can result in G-LOC is technically termed '+Gz' and occurs when the body is accelerated in a headwards direction. It is also called 'positive G'. When standing still on the ground we experience +1 Gz, due to the earth's gravitational pull. A steep turn of 60 degrees angle of bank subjects us to +2 Gz.

G-LOC – Could it Happen to You

The human being, essentially a terrestrial animal, is designed to exist in a +1 Gz environment, punctuated by occasional short bursts of increased +Gz as we run, jump, or fall. We are not engineered to tolerate the prolonged, increased +Gz acceleration of aircraft manoeuvring.



Here is a basic explanation of why G-LOC happens. The brain and eyes require oxygen and sugar (glucose) to function properly. They both have a very small store of sugar, but virtually no stored oxygen. A constant supply of both these nutrients, via the bloodstream, is necessary for normal brain and eye function. Blood is constantly pumped to the head, against gravity, by the heart. This arrangement works well until the body is exposed to increased +Gz which forces blood away from the head, no matter how hard the heart may work. If the +Gz is of sufficient intensity for a long enough time, little or no blood-flow reaches the head. The eyes and brain exhaust their limited sugar and oxygen supplies and cease to function. This is when we suffer G-Induced Loss of Consciousness. A medical definition of G-LOC is "a state of altered perception where one's awareness of reality is absent as a result of sudden, critical reduction of cerebral blood circulation caused by increased G force".

Today, fighter aircraft pilots sustain up to +12 Gz. G-LOC is not, however, a product of our modern age. It has been a danger for pilots as long as humans have been trying anything more adventurous than straight and level flight. It was first documented in 1919, in aircraft such as the Sopwith Camel.

Studies into G-LOC have generally focused on higher performance aircraft, but G-LOC can, and does, occur in lower performance propeller driven aircraft. Several pilots flying CT-4 trainer aircraft have experienced G-LOC. The propeller driven CT-4's performance envelope is nothing dramatic and is certainly less than many general aviation utility and aerobatic aircraft. For example, the CT-4 is limited to operating between +5.5 Gz and –1.8 Gz, while the Cessna 152 'Aerobat' is rated from +6.0 to –3.0 Gz.

What Happens?

As a pilot pulls +Gz they will feel their weight increasing as the seat pushes up hard against their buttocks. Head and arm movements will feel cumbersome and awkward due to the increased weight.

If the G onset is gradual, the next thing a pilot may notice is a dulling of their vision. This is the 'greyout' phenomenon. Greyout may be more prominent at the periphery of the visual fields. It is due to a reduction in the amount of blood reaching the eye. A pilot's peripheral vision actually starts to deteriorate as soon as they move the control column or stick back towards their lap. By the time they notice any 'tunnelling' 75 percent of the visual field is already gone.

If the G continues to increase, 'blackout' may follow. Blackout is a complete loss of vision, because no blood is reaching the eye. The pilot is not unconscious; in fact some pilots have become quite adept at pulling just enough G to black out but not lose consciousness, maintaining control of their aircraft by 'feel'.

Should the G continue to increase and the pilot's tolerance be exceeded, a loss of consciousness will occur rapidly. This loss of consciousness may be associated with jerking and flailing movements of the head and arms. If the G remains high, the pilot will remain unconscious and could, conceivably, suffer brain death.

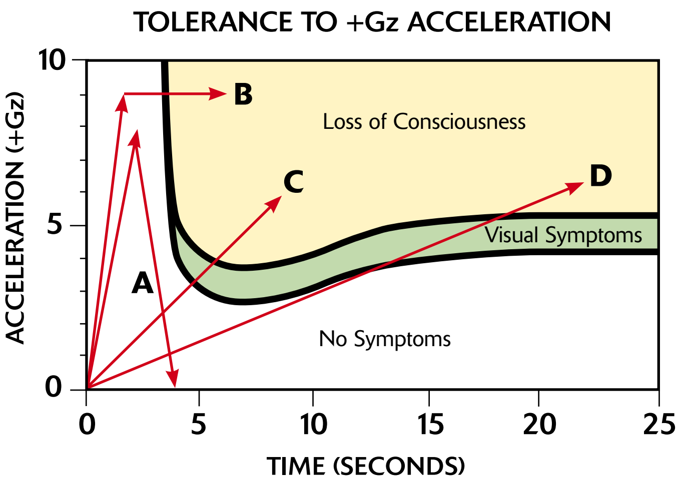
Usually, however, the G is relaxed as soon as G-LOC occurs. Once the G has returned to +l Gz the pilot will remain unconscious for approximately 15 seconds, and then begin to revive. During this brief 'wake up' period of 15 to 30 seconds, the pilot often experiences extreme confusion. Upon reviving fully, they often suffer from complete memory loss of the event. After an episode of G-LOC, a variety of psychological responses may occur, including disorientation, unreliability, anxiety, fear, embarrassment, and a 'give up' attitude.

The gradual onset of G causing greyout, then blackout, then finally G-LOC is illustrated by the lines labelled C and D in Figure 1 below.

Visual warning signs that G-LOC is imminent do not occur if the rate of onset of G is high. For example, a rapid onset of G at +6 Gz per second could exceed a pilot's G tolerance within one or two seconds. In situations where the G rises quickly like this, and then remains high, a pilot will go from fully capable to complete unconsciousness, without experiencing greyout or blackout first. See the line labelled B in Figure 1.

Very rapid onset of G that is not sustained, however, may not result in either visual disturbances or G-LOC. This is what prevents many aerobatic pilots from suffering G-LOC. Although they pull substantial G, they do so for only short periods of time. See the line labelled A in Figure 1.

Figure 1



Centrifuge and flying studies have identified our tolerance to +Gz with reasonable accuracy. G-LOC tends to occur around +4.5 Gz in the unprotected individual, but may occur anywhere between +2 Gz and +6.5 Gz.

The loss of memory after G-LOC is particularly concerning as it leaves the pilot totally unaware that they have been unconscious, and may provide them with a false perception of how well they can cope with G.

Prevention of G-LOC

The only guaranteed way of avoiding G-LOC is to avoid pulling G. Most pilots, however, will not be interested in sticking to straight and level flight or remaining on terra firma. So what can you do to prevent it?

The next best way of reducing your risk of G-LOC is to remain current and practised at pulling G. After a spell away from flying, your G tolerance will have reduced considerably. So if you haven't flown any aerobatics for a month or so, or practised steep and max rate turns since your last BFR, it would be wise to have some dual instruction, or ease into these manoeuvres for a few flights, before going 'all out'.

Your general health plays an important role in your tolerance of +Gz. Any illness, even a minor cold, will reduce your G-tolerance significantly. Adequate rest and sustenance are also essential to maintain maximum G-tolerance. Similarly, any medication you take has the potential to reduce this tolerance. You should consult your Medical Examiner to find out if this is the case for you. Alcohol and caffeine can also have a detrimental effect on G-tolerance.

Building your anaerobic fitness, especially developing strong abdominal and bicep muscles, improves G-tolerance. The length of time your body can tolerate high G can be extended 53 percent by an aggressive anaerobic weight program. There is considerable debate and ongoing research into the relative merits of aerobic and anaerobic fitness in protection against G-LOC. While a reasonable level of aerobic fitness is desirable for effective aircrew performance, there is some evidence that people who are extremely fit, with a low resting pulse, may actually have a slightly reduced G-tolerance.

There are a number of Anti-G Straining Manoeuvres (AGSM), that can be used to increase your G-tolerance. Most AGSMs involve isometric muscle contraction and regulated breathing routines. A properly performed AGSM can enhance a pilot's G-tolerance by around +3 Gz. Correct instruction, training, and lots of practice are essential for the correct performance of an AGSM. An incorrectly performed AGSM is useless.

The following means of prevention are not as accessible to the GA pilot. Aircraft seat angle can have a profound effect on G-tolerance. F-16s have the seat reclined 30 degrees and Soviet Su-25Ms use 35 degrees. This gives approximately 1 G of added protection while still allowing good visibility. A seat reclined to about 80 degrees allows a pilot to easily sustain 15 G but this is of little practical use, as it impairs forward and downwards visibility.

G-suits used by military pilots enhance G-tolerance by 1.5 to 2 G. A G-suit is essentially a series of balloons within a pair of trousers. When G forces on the pilot increase, a valve is activated that pumps these balloons full of air. The pressure of the filled balloons, squeezing against the legs and abdomen, reduces the amount of blood that is forced away from the head and into the legs. G-suits are uncomfortable, hot, and ugly, – but a necessary component of the fighter pilot's wardrobe.

Evidence is emerging that breathing 100 percent oxygen gives some G-protection. The effect of pressure breathing is also being studied. Breathing oxygen under pressure increases the pressure within your chest and literally pushes more blood up towards your head. These means of G-protection, such as the G-suit and seat angle, are really only available to military pilots.

Who Gets G-LOC?

Anyone who pulls G could suffer G-LOC. Although most of the research into G-LOC has a military bias, the problem is not isolated to high performance military jets. The G pulled in a Cessna 152 aerobat during initial aerobatic training is sufficient

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to induce G-LOC. There is even the potential for G-LOC in non aerobatic GA aircraft, as the following New Zealand example demonstrates.

G-LOC can occur in GA aircraft such as the Piper Warrior II

Recently, a 19-year old pilot with a CPL, an Instrument Rating, and an Aerobatic Rating, suffered G-LOC during a max rate turn in a Piper Warrior II. This pilot and a colleague were preparing for their C-Cat Instructor Rating flight tests. They went out on a flight to practise stalling, steep turns, and max rate turns. While the pilot's colleague was conducting a max rate turn, he noticed some resistance to rudder inputs. He looked across to the other pilot, saw that he was convulsing, and immediately rolled out of the turn. The convulsions lasted seven seconds; the pilot regained consciousness after a further five seconds, and returned to normal function after approximately five minutes. Afterwards, the pilot was confused and asked what had happened.

The circumstances leading up to this pilot's G-LOC illustrate how easily G-tolerance can be affected. The night before the flight, the pilot had a maximum of three hours sleep. He worked on an assignment until 3 am and then woke at 6 am on the day of the flight. The flight was conducted at 3 pm. In the 24 hours prior to the flight the only food or drink consumed by the pilot was a pie at 3 pm the day before the flight and a can of V on the day of the flight. He had not done any aerobatic flying recently, and was unprepared for the manoeuvre. At the time, he was reading a map and unaware of the other pilot's intention to carry out a max rate turn.

No-one is too good or too experienced to suffer G-LOC. Even aerobatic competition pilots who have been doing it for years get G-LOC. The G they experience is usually of short duration. This provides some protection, but not immunity. G-LOC is not a sign of weakness or lack of the 'right stuff' – it is a perfectly normal reaction to the abnormal environment of flight.

Other G-related problems

'Redout' is caused by excessive –Gz and can occur during manoeuvres such as outside loops. During redout, vision is lost and you can only see red. Excessive negative G also causes discomfort of the face and eyes as they become engorged by blood and body fluid forced into the head by the G.

Bruising can be caused by excessive positive or negative G. Blood is pushed into the vessels with so much force that the vessel walls break. This often occurs on the forehead and in the whites of the eyes in people not used to pulling negative G. When +Gz is pulled the legs and buttocks can suffer bruising.

Summary

G-Induced Loss of Consciousness can, and does, occur in propeller driven aircraft. It could happen to any GA pilot if they are not careful. The loss of memory that often occurs during G-LOC is particularly concerning, as it leaves a pilot totally unaware that they have been unconscious.

What can you do to avoid it? Awareness about G-LOC is probably the single most important factor in avoiding it.

Maintain good health. Flying is no fun if you are not in tip-top condition – in fact it can be downright dangerous. Stay reasonably fit, and make sure you have adequate rest, food, and drink, before flying.

Maintain currency with your flying. A long break from pulling G reduces your tolerance significantly. If you haven't done aerobatics or max rate turns for a while, ease yourself back into it.

Keep your harness tight. The support of a wide tight abdominal strap may offer a small amount of G-protection, via a mechanism similar to that of a G-suit.

If your flying involves regular G-loadings or high-G, practise and perfect one of the Anti-G Straining Manoeuvres. A good AGSM may mean the difference between G-LOC and successfully completing the vertical eight you have been working on.

This article is based on, "G-LOC, Could it Happen to You?", by Dr. Dougal Watson, CAA Principal Medical Officer, published in *AOPA Magazine* (Australia), Volume 43 Number 8, August 1990. ■

Surviving After an Accident

In many serious accident situations it is likely that some, or all, of the aircraft occupants will receive injuries. These may range from cuts and fractures to serious head and internal injuries. As the pilot-in-command you should know how to identify what type of injuries your passengers have, be able to prioritise their treatment, know what basic first-aid techniques to apply, and have a good knowledge of survival skills. This article covers the basics of post-accident planning and looks at surviving a night out in the open. We hope you will never have to put this advice into practice, but if the worst were to happen it might just help you to save someone's life.

Initial Actions

Vacating the Aircraft

Any post-accident situation requires someone to be assertive and take charge. That person should be you, assuming that you are not badly injured. If you are badly injured, nominate someone else to take control of the situation, particularly if your injuries are going to hinder your mobility. Your first priority should be to get everyone well clear of the aircraft as quickly as possible. This is particularly important if there is a risk of fire or an explosion. The only exception to this may be if you suspect that a passenger has spinal or neck injuries. If this is the case you will have the difficult task of deciding whether the fire risk is greater than the risk of causing a permanent injury to the patient. Try to locate the aircraft first-aid kit (if it is safe to do so), and ensure that the emergency locator transmitter (ELT) has been activated.

Assessing the Situation

Before any consideration can be given to treatment of the patients, it is important to make a very quick assessment of the accident site for potential hazards. Watch out for things such as leaking fuel (and any potential ignition source), and broken power lines, as they can be fatal.

Consider your own safety first before helping your passengers as you will be of more use to them uninjured. Having assembled everyone well clear of the aircraft, and confirmed that everyone is accounted for, you need to make a quick assessment of what injuries your passengers have, and prioritise their treatment. Utilise any able-bodied passengers, and give them clear instructions on how they can help, for example by administering first aid.

Your brain is your most important survival asset. Use it, don't panic. Act with care, and don't do anything until you have thought it through.

Calling for Help

Finding an opportunity to call for help when there are seriously injured passengers who need attention can be difficult. Seek help as quickly as possible (especially if it is nearby), unless there are passengers who are seriously injured and in need of urgent attention.

If you have a cellphone and you have cellular coverage, dial 111 and notify the emergency services of the accident.

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This should be done even if you managed to make a MAYDAY call before losing radio coverage. Try to include in your phone call, accurate location details (to the best of your knowledge), the number of people injured, and the types of injuries involved. This extra information will not only allow the emergency services to locate you more quickly, but will also enable them to bring sufficient resources to handle the situation.

An accident in a remote mountainous area, or heavily bushed area, is considerably more difficult to deal with than in open farmland. It may be some time before help arrives, so be prepared to survive several nights out in the open. The time taken to receive medical help will depend on how accurate your last position report was, whether your ELT is working correctly, the nature of the terrain, and the weather being suitable for search and rescue operations.

Practical First Aid

All pilots are encouraged to attend a first-aid course and regular refresher courses. The Red Cross and St John offer these courses.

It is important to have a well-stocked first-aid kit in the aircraft you fly. For information on the suggested contents of a first-aid kit refer to the March/April 2006 issue of *Vector*.

After stabilising your passengers as best you can, STOP and assess the situation. The STOP acronym should help you do this.

S – Stop Take a deep breath to calm yourself down. Recognise what has happened is in the past and cannot be undone. Deal with the here and now, that is, survival first and foremost.

T – Think Your brain is your most important survival asset. Use it. Don't panic. Act with care, and don't do anything until you have thought it through. The Kiwi 'can do' attitude is one of the best attitudes to have. Stay positive.

O – Observe Look around you and assess your supplies, equipment available, and the nature of your surroundings.

P – Plan Assign priorities to your immediate needs. Develop a plan to survive, and follow it.

If you can STOP, you can survive.

A typical survival kit.

Surviving the First Night

If there is any doubt that you will be found the same day, then you must prepare to spend a night out in the open. Making yourself and your passengers as comfortable as possible throughout the first night will place you in a better position to evaluate the situation, and allow you to decide what your actions should be.

You can significantly improve everyone's survival chances, particularly those who have injuries, by adhering to the following five basic principles of survival.

These are:

1. Shelter
2. Location
3. Water
4. Food
5. Will to Survive

Shelter

Protection from the elements takes top priority. Guard against hypothermia by keeping warm. Seek any natural shelter that the surrounding terrain might offer (this could include the aircraft wreckage if it is safe), and erect some kind of wind-break, preferably one that will also provide some protection if it rains. Use whatever materials are at hand. Make use of items such as: aircraft parts, pickets, seats, cockpit covers, and thermal survival blankets.

Maintaining body heat is extremely important, so utilise whatever extra clothing you have. Huddle together if necessary, and use plant foliage as insulation.

Making it comfortably through the first night will place you in a better position to decide what your actions should be the next day.

Location

Think how you might be able to attract attention. Has the ELT activated? Can the aircraft radio be used? How can I attract the attention of an aircraft searching overhead (flares, smoke, flashing lights, etc)?

Water

Water is far more important than food in a survival situation. Without it you will only survive a matter of days. It is worth expending energy to locate a supply of water before dehydration becomes a problem, because you will have no way of knowing how long it may take before you are rescued. If water is limited, it should be rationed to less than one litre per person per day.

Food

Any food carried on board the aircraft should also be carefully rationed, as you don't know how long it will be before you are rescued. Utilise natural sources of food that might be nearby, but be careful not to expend too much energy gathering it. Every cross-country flight in New Zealand should be conducted with some snack food and water on board.

Will to Survive

The will to survive has been shown to be a key factor in many successful survival stories. By remaining focused, positive, and motivated (this includes keeping your passengers motivated), you will undoubtedly improve everyone's chances of survival.

Suggested Survival Kit

Every aircraft should have a well-equipped survival kit, and the contents need to be checked regularly. The survival equipment that you carry should be suitable for the terrain that you fly over.

The following list is a basic guide only as to what a survival kit should contain, and it assumes you already have a first-aid kit on board. You might like to make alterations or include additional items:

Shelter Lightweight rope, plastic sheeting (also doubles for collecting water), and a knife are all useful for constructing a shelter. Matches (must be waterproof), firelighters are important for starting a fire, and most importantly, a thermal survival blanket for insulation.

Location A cellphone, personal locator beacon, compass, whistle, flares, mirror and torch.

Water A watertight container with a wide opening neck, so that you can fill it with snow to melt and drink.

Food Emergency rations (eg, sweets, chocolate, packet soup, dried fruit, and freeze-dried packet meals), a fishing line (plus spare hooks), and a knife. Powdered drink crystals can be eaten, drunk or even used to mark the snow to indicate your location.

Will to Survive A pocket radio, a small survival handbook, and perhaps something like a pack of playing cards.

Summary

As the pilot-in-command, you can never be too well prepared to deal with an accident. Your responsibility to ensure the safety of all your passengers doesn't end once you are on the ground. A well-prepared pilot will have adequate skills to deal with the possibility of the passengers having moderate injuries, and for surviving for several days out in the open. The last thing that you want, is to have a passenger die after surviving an accident, because you didn't know how to administer accident first aid, or know the basic principles of survival. Although each accident situation is different, following the basics that have been outlined in this article will improve the chances of survival for you and your passengers.

Take the time to read more on first-aid and survival techniques, and attend courses in each. Familiarise yourself with the contents of your aircraft's first-aid kit, and ensure the aircraft is also equipped with a survival kit. Always carry extra food, water, and plenty of warm clothing on a cross-country flight – no matter how short it is, or what type of terrain you will be crossing, or what time of year it is.

Plan ahead by spending a few moments thinking about how you would handle such a situation if it were to happen to you. ■

Aviation Safety Coordinator Course

Auckland

11 and 12 October 2007

Jet Park Hotel & Conference Centre

63 Westney Road (close to Auckland International Airport)

The Safety Coordinator's role is to maintain and promote safe practices by managing risks and raising safety awareness within their organisation. Our course is designed to train the coordinator in implementing and maintaining a safety programme in an organisation.

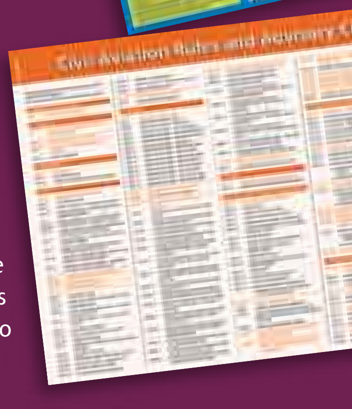
Further information, including enrolment details, will be available on the CAA web site, and in the next issue of *Vector*.

New Products

Safety Around Helicopters Poster

This has been redesigned and updated. One major change to note is that the 'Preferred' and 'Acceptable' areas for approaching a helicopter have been revised.

To obtain copies of this poster contact your local Field Safety Adviser, see page 23, or email: info@caa.govt.nz.



Rules Poster Update

Enclosed in this issue of *Vector* is an updated *Civil Aviation Rules and Advisory Circulars* poster. The most up-to-date information on Rules will always be on the CAA web site, but this poster is useful to have on the office or briefing room wall. Make sure you replace old versions with this updated one – the colour is different to make updating easier.

Carbon Monoxide

One day last winter, an instructor and student were on a cross-country flight from Motueka, and were nearly at Hanmer Springs when the instructor decided to turn back to the north because of adverse weather ahead. After the turn, he did a routine SADIE (Suction, Amps, Direction Indicator, Ice, Engine indications) check, and included in his scan was the carbon monoxide (CO) detector on the instrument panel. He noticed that the 'dot' had turned grey since the last check some 15 minutes earlier, when it was its normal yellowish hue.

Both the cabin air and cabin heat controls were shut off and the upper vents were both opened (these admit air directly into the cabin from inlets in the leading edge of each wing). With the surrounding countryside covered with snow, and an immediate landing not an option, the instructor decided to continue north via the Wairau Valley, while actively monitoring the student's and his own condition for symptoms of CO toxicity. None was apparent, so the aircraft was flown to Nelson and landed.

Subsequent inspection found that the exhaust shroud had come loose and chafed through the actual exhaust pipe, permitting exhaust gases to enter the cabin heat duct. The cockpit CO detector had worked as intended, but it was the instructor's vigilance that saved the day. By including the CO detector in his scan (it was positioned close to the ammeter), he noticed the problem within 15 minutes, and his prompt corrective actions and subsequent monitoring of both crew for symptoms quite possibly averted a major accident.

Winter is upon us again, and when we are out flying, the natural thing is for us to turn on the cabin heater for comfort. In the piston-engine GA aeroplane types many of us fly, the heat source is the engine exhaust system, around which a heater shroud is fitted – fresh air enters the shroud, is heated by the exhaust pipe, and is ducted into the cabin. Many light twins are fitted with combustion heaters that run on avgas from the aircraft fuel system.

CO Detectors Now Required

Because both types of system have been known to develop faults, Civil Aviation Rules now require powered aircraft (note that this includes helicopters) with an airworthiness certificate to be equipped with a means of indicating the presence of carbon monoxide in the cabin, if the aircraft is fitted with an exhaust manifold heater or a combustion cabin heater. See rule 91.509 *Minimum instruments and equipment*, effective from 1 June 2007. Powered gliders are not included in the rule requirement.

CO detectors come in 'card' or electronic types. The card types usually have a central 'dot' that changes colour in the presence of CO – usually, the greater the colour change, the greater the concentration. Electronic types can either be permanently mounted on the panel, or portable – the latter typically plug into the cigarette lighter socket. The card types have a finite life (as little as 30 days, depending on make) once removed from their sealed packaging, and now that they are a mandatory item, their expiry date must be entered in the aircraft logbook. The expiry date should also be written in permanent marker on the actual detector. If the detector has expired, a new one must be fitted before the aircraft is next flown.

Several sport and amateur-built aircraft types have cabin heaters, but are not covered by the new rule. We strongly recommend that owners fit CO detectors regardless, as they can, and do, save lives. Some owners have been doing so routinely anyway – a good example to follow.

An example of a portable electronic CO detector fitted to an amateur-built aeroplane. Photo courtesy of Bob Jelley.

Exhaust System Condition

It goes without saying, but we will say it anyway, that the exhaust system and the cabin heating system must be in top-notch order, not only for winter flying but at any time. There are numerous items to check, and some of these, where accessible, should be looked at on every preflight inspection.

The condition of flanges, gaskets and joints can be checked quite easily on most light aircraft – what you are looking for here are obvious cracks, and those not so obvious, which may be revealed by the presence of combustion products or evidence of heating on adjacent structure or components.

Even without cabin heat selected, CO can find its way into the cabin from a leaking exhaust. Numerous holes in the firewall for control runs, electrical wiring, pneumatic or fluid lines, if not properly sealed, can admit CO from the engine compartment. Of particular importance on some Cessna and Piper types are the nosewheel steering push-rods that pass through from the cabin. The seals or boots on these need to be checked for wear on a regular basis, as they can admit exhaust gases to the cabin if worn.

What does the manufacturer's maintenance manual say about the exhaust system? How often must the heater shroud be removed and the underlying exhaust pipe checked for cracking? Does it say anything about checking for soot inside the cabin hot air duct (a good practice)?

CO is an Insidious Poison

On its own, carbon monoxide is colourless and odourless, so cannot be detected by human senses. In flight, it would normally be accompanied by other combustion products, so at any time if you smell exhaust fumes, suspect the presence of CO in the cabin. Do what our instructor in the introductory paragraph did – shut off the cabin heater and open whatever fresh air vents are available – even the storm window if necessary. Re-check the CO detector. If there is any change from normal, land at the nearest suitable aerodrome.

This should avert any build-up of CO in your bloodstream – remember that the affinity of CO for haemoglobin (the oxygen-transporting compound in your red blood cells) is many times higher than that of oxygen, and the chemical bond is stronger, so exposure to even a low CO concentration over a long period can result in a high concentration in the blood.

Symptoms may vary between individuals, but blood saturation levels below 10 percent are symptomless; above 10 percent, headache, nausea, confusion and reduction of mental faculties may result, and at higher concentrations, loss of consciousness or death may occur. See table for a detailed list of symptoms versus concentration.

One overt symptom of CO ingestion is a flushed or florid appearance, even in cold conditions. If you don't have a mirror to check your face, the fingernails can be a good indicator – blue nail-beds can indicate hypoxia or merely coldness; bright pink can indicate the presence of CO in the blood.

If you have made a diversion as a result of suspecting the presence of CO, arrange to have the aircraft checked before further flight. The cabin heater is not the only way CO can enter the cabin, so deciding to continue solely on the basis of not using the cabin heat is unwise. As indicated earlier, the numerous ports in the firewall are possible entry points; faulty door seals are another.

If you feel that you are exhibiting symptoms of CO poisoning, tell ATC before you land, requesting assistance if necessary. If you have breathing oxygen available on the aircraft, use it. Seek medical advice once on the ground – access to therapeutic oxygen will assist recovery.

Blood CO Concentration (%)	Typical Symptoms
<10	None
10-20	Slight headache
21-30	Headache, slightly elevated breathing rate, drowsiness
31-40	Headache, impaired judgement, breathlessness, increasing drowsiness, blurred vision
41-50	Pounding headache, confusion, marked shortness of breath, marked drowsiness, increasingly blurred vision
>51	Loss of consciousness, death if victim not removed from source of CO

It Does Happen

Carbon monoxide was found to be a factor in a fatal accident involving an amateur-built aeroplane in 2003 (see Occurrence 03/1675 on the CAA web site). Post-mortem tests on the pilot found a blood CO saturation level of 23 percent, and wreckage examination found that the cabin heater shroud had been placed over a slip joint in the exhaust system. The slip joint was not gastight and permitted CO to enter the cabin.

In 1997, a Beechcraft Baron crashed in the Tararua ranges after an apparent loss of control only 20 minutes into a night freight flight, with no indication from the pilot that there was a problem. The TAIC investigation (report 97-012) found that:

- A defect in the combustion heater was likely to have led to an unacceptable level of carbon monoxide in the aircraft cabin, and
- A progressively increasing level of carbon monoxide probably caused significant pilot mental confusion and impairment, and may have led to a loss of situational awareness.

Summary

- Carbon monoxide is a known killer of pilots.
- Carbon monoxide has an effect on the body similar to hypoxia, but it takes longer to clear after the source of CO is removed.
- Carbon monoxide is odourless and tasteless.
- The only sure warning is an up-to-date CO detector.
- Check exhaust and heating systems thoroughly as part of the preflight.
- Be particularly vigilant for the effects of CO if you are using cabin heating.
- If CO is detected or suspected, isolate the source and ventilate the cabin.
- Let someone know of your predicament, and land sooner rather than later.

See also the article "Carbon Monoxide" in the September/October 2004 edition of *Vector*. ■

Back to Basics

Technology, Tips and Traps

The theme of this year's series of 25 seminars, run between 4 February and 18 June was, "Back to Basics", with an emphasis on tips and traps in using technology. Technological innovations available to pilots today can provide large amounts of information, making flying more efficient and arguably safer. There are pitfalls, however, if technology is not used appropriately, if it fails, or if it distracts pilots from other basic tasks.

The first seminar at SportAvex in Ashburton was presented by Jim Rankin, but the rest of the seminars were presented by Dave Horsburgh, Airbus A320 captain, A-cat instructor, Flight Examiner (Airline and GA), and AOPA Safety Officer. The topics covered included the effects of technology, lookout, route planning, and communications.

Technology

What has changed about the way we fly over the last 20 years or so? Quite a lot of things, when you look back – culture, the Internet, security, rules, and airspace, to name but a few. We have different aircraft available, much more sophisticated avionics, and a different operating environment.

Aircraft

Many aircraft are higher performance, and have more sophistication, but are they more reliable? On the other hand, we have an aging fleet with a multitude of trainers from the 60s and 70s still soldiering on.

Avionics

IFR operations are more common; GPS use is widespread; transponders are almost universal; ACAS (airborne collision avoidance system) and TAWS (terrain awareness warning system) are featured on larger aircraft. Tip – keep your transponder ON and selected to ALT at all times when airborne.

Environment

The aviation environment today is more complex, busier, and tends to be more procedural and less 'seat-of-the-pants'. There is more information available to pilots, including Internet weather and NOTAM services.

Some Things Don't Change

Interestingly, Airbus produce a "Golden Rules" card for pilots converting on to type. Despite the high degree of automation of the aircraft, there are some basic principles not to be overlooked. Three of the eight Golden Rules are:

- The aircraft can be flown like any other aircraft.
- Fly, navigate, communicate, in that order. (Sound familiar – aviate, navigate, communicate?)
- One head up at all times. (Remember the Eastern Airlines L1011 Everglades accident?)

Lookout

What is the purpose of lookout?

- To determine the nose attitude of the aircraft.
- To see where we are going.
- To enjoy the view.
- To avoid hitting things.

The old and the new – a contrast between 1940s (DC-3) and current (Boeing 777) technology. DC-3 photo courtesy of the Air Force Museum, Christchurch.

One of the questions in the seminars was, "How many of you have had a near-miss with an aircraft you didn't see until very late?" Each seminar produced a crop of answers, each with their own 'war stories' – some quite hair-raising. The importance of scan was discussed (90 percent looking out, 10 percent looking in) in relation to expectation (where you might see what you expect to see but miss something equally vital), and the phenomenon of 'empty field myopia' where the eyes will focus on a point only a metre or two in front when there is no distant object to focus on.

Some other useful points on lookout:

- Use your passengers to assist.
- See and be seen; see and avoid (turn).
- Make yourself visible to other traffic (lights, transponder).
- Be predictable.
- Communicate.

See the article "See and be Seen" in the November/December 2006 issue of *Vector*.

Route Planning

The straight-line route may not be the safest way to go. Case in point: the ferry of a restored amateur-built aeroplane from Taieri to Christchurch – which way to go? The Northern Gap route had terrain and weather issues to consider; the slightly longer route over more hospitable country proved to be the right choice, as only 10 NM into the trip, the engine stopped. A textbook forced landing into a newly cleared hay paddock was the result, instead of a controlled crash in rough country.

If at all possible, your route should give you the maximum forced landing options, as well as the best options for unplanned diversion for whatever reason, but particularly weather.

Flying to Wanaka from say, Ashburton – have a think about the altitude you would need to transit Burke Pass and Lindis Pass if the cloudbase was 5000 feet (amsl).

GPS Problems

Rule of thumb: never go anywhere with a GPS where you wouldn't go without it. While the position information presented by the GPS is undoubtedly correct, use of the GPS can become a preoccupation at the expense of other important tasks – like flying the aircraft. A GPS can stop telling you where it is if the power supply is interrupted; this includes batteries running out, as several pilots know only too well! At least two pilots at the seminars reported that they had rechargeable batteries run out suddenly with no prior warning. Reading the operating manual in flight is a bit late in the proceedings – you'd be better off reading a map and looking out the window. Do you have the current database loaded? Do you know how to interpret the information your GPS is giving you? Do you have a screen with a pictorial or map display? If so, a useful tip is to set the screen presentation so the direction of travel is at the top of the screen.

A case of probable over-reliance on GPS was the Auster tracking from the West Coast to Alexandra via Twizel in June 2002.

There would have been few better field options for a forced landing.
Photo courtesy of Dave Horsburgh.

The pilots found themselves on top of solid cloud cover in the Mackenzie Basin after having committed to crossing the main divide without sufficient fuel reserves to return to the coast. Near the Lindis Pass, the fuel ran out, and the aeroplane crashed on the side of a snow-covered hill. No flight plan had been filed, and no position reports were made, so the resulting search area was enormous – it was a week before the aircraft was found.

Communications

Why do we talk on the radio? Simply:

- To obtain (and read back) ATC clearances.
- To obtain information.
- To let others know what we are doing.

It would be fair to say that there is a huge variation in the standard of radio calls – and there shouldn't be. Radio work should be clear and concise; you need to know in advance what you are going to say – rehearse it if necessary, and remember the mnemonic for position reporting: PTA-ETA (position, time, altitude, ETA).

When asking for an ATC clearance, it is important you know the airspace and procedures, so that you can understand the clearance you receive.

Most importantly, radio calls are free! A simple position report can narrow down a search area immensely if you happen to go missing on a flight, and this could be the difference between life and death. In the case of the Auster, there were few clues as to its possible whereabouts, and the fact that it was not reported missing for two days did not help the search effort at all.

Next AvKiwi Safety Seminars

That's the AvKiwi series for 2007 – there will be another in 2008, with the theme yet to be decided. (The itinerary and theme will be advertised early in 2008, in *Vector*.) This year's series attracted a total audience of 1037, ranging in size from 105 at the Massey University School of Aviation to only just double figures at one or two provincial venues. Do make an effort to attend next year if there is a venue near you. We'll be pleased to see you! ■

Night Freight Operations

What do you get when there is ….

- ❖ Nobody on the ground to turn the ILS around to the preferred runway?
- ❖ Less in-flight weather information from other pilots?
- ❖ Reduced services from Air Traffic Control?

You get night freight operations in New Zealand.

So how are the pilots around New Zealand dealing with these reduced services? Do they enjoy the challenge? Do they enjoy having days off and working while others are sleeping? These and other questions were put to a cross-section of the pilots undertaking these operations.

"Night flying is fantastic," says Tim Sullivan who flies for 'Air Post' operated by Airwork Flight Operations. Tim is a captain on the Woodbourne-based Fokker F27 that flies nightly from Woodbourne to Wellington, Auckland, and Palmerston North. It returns to Woodbourne around 3:00 am. Airwork holds the contract to move mail around the country on scheduled runs, but they also fly charters.

Those who fly night operations not only have a plan 'B' up their sleeve, but also a plan 'C'. Do you have a plan 'C' when you go out flying?

Tim says there is no secret to how he has maintained his safety, "Night operations require flight crews to maintain a high level of operational discipline and adherence to Standard Operating Procedures (SOP). We only fly published routes and back up every visual approach with an IFR procedure. The moment SOPs are bypassed and shortcuts enter the cockpit, you open yourself up to trouble."

Nico Matsis, a Metroliner captain for Airwork, goes one step further and builds in his own safety margins. Although he believes that his company's Standard Operating Procedures are more than adequate, he wants to be absolutely sure that he is around to see his grandchildren. Nico recalls one flight into Dunedin where fog was so prevalent that, after one approach to minima, they gave the game away and headed to Christchurch. He has no qualms in saying that, "night operations are inherently more dangerous than the same flight undertaken during the day". Nico prefers to fly during the day but loves flying the air ambulance, which is on 24-hour standby to relocate patients to required medical facilities.

Mike Weaver flies Convairs for Air Freight, based in Auckland. Mike emphasises Nico's point about the inherent dangers of night flying.

"During the day when you are flying in instrument meteorological conditions, you can see the weather you are in, and if it gets darker you know that the conditions will get worse. You lose the option to turn around at night because you don't pick up the change in conditions."

There are a couple of perks associated with flying night freight. "The freight usually turns up on time, and it does not have a tonne of carry-on luggage, like when you carry passengers," says Mike.

Willy Neilson says that, "fatigue management is more of an issue for us." Willy works from Vincent Aviation's Wellington base, and flies the Reims 406, single pilot, from Wellington to Christchurch, landing back in Wellington at 2:30 am.

"Being disciplined to sleep during the day, when your body is saying that you should be awake, was the hardest thing to master. Throw in a couple of nights followed by a day shift or two and your body doesn't know where it is at. When you are flying on your own, you have to be one hundred percent sure that you don't make a mistake, as there is nobody there to cross check and pick it up. This is compounded by the effect of high altitude for sustained periods in an aircraft that isn't pressurised."

Willy also recalls, having moved fresh produce (fish) on a few occasions, "If you put the heater on in the cabin you would end up with cooked fish, so you don't, but you end up with a cold pilot instead."

There appears to be a professional understanding among night freight pilots when it comes to technical matters, such as applying separation. Regional hubs such as Palmerston North can be busy at night, and when the tower goes off watch the airspace becomes uncontrolled.

"The pilots will talk among themselves on the radio and discuss who will do an approach first, if there is going to be a conflict," says Tim.

"We work together and show courtesy. If we were flying towards Palmerston North and it appeared that a conflict might arise, I would simply slow the aircraft down nice and early, so as to reduce the chance of needing to enter the holding pattern."

Most pilots that were interviewed believed that the weather at night was generally worse than during the day. Because weather is so changeable, and there are so many variables, it is difficult to ascertain if the weather is in fact worse at night. All the pilots agreed however, that fog is more likely at night, or, more precisely, during the early hours of the morning.

There appear to be two demographics of pilots flying night operations. There are the 'Freight Dogs', with thousands of hours who love the life style and freedom night operations bring, and there are pilots who are only using night operations to build hours.

"The pilots that are here to build hours move on fairly quickly," says Willy.

All of the pilots were refreshed by the controllers' friendly demeanour at night, and on one particular night Willy recalls a conversation between Air Traffic Control (ATC) and a lone pilot.

"They were talking about horse riding and how to tighten up a saddle when you are in it."

Some ATC services are reduced at night, but according to Nico they bend over backwards to help when you need them.

"ATC often help us with filing flight plans, informing us of weather and NOTAM issues, turning on lights, and passing on relevant information to help us in our operations."

Resourcefulness is one skill that all night operations utilise. The team at Stewart Island Flights highlight this in their operations in a Cherokee Six. They move mail between Invercargill and Dunedin. During the winter months, this operation is classified as a night operation, and the team show kiwi flair by getting the mail truck driver to turn the lights on for them. They are one of two operators in New Zealand who operate at night in a single-engine piston aircraft.

The general consensus is that it is lonely out there at night. Strict discipline needs to be adhered to in order to perform safely. The worst hours for fatigue, according to our selection of interviews, are between 2:00 am and 4:30 am. Most agree, however, seeing the sunrise was worth staying up all night for. The odd pilot has also reported having seen a UFO or two.

Whether you are flying a single-engine aircraft or a two-crew B737 on night freight operations, the same considerations need to be addressed. Those who fly night operations not only have a plan 'B' up their sleeve, but also a plan 'C'. Do you have a plan 'C' when you go out flying? ■

New General Managers

General Manager Safety Information

Transport sector specialist **John Kay** will head the CAA's newly formed Safety Information Group, comprising its safety investigation, safety analysis, and safety education functions.

John has extensive experience leading safety, research, and regulatory agencies. Most recently engaged as General Manager Building Controls for the Department of Building and Housing, John is also a former General Manager Operations of the Land Transport Safety Authority, and head of the Authority's Registry Centre.

He is also a former Programme Manager for the Foundation for Research, Science and Technology, and Research Leader for a Crown Research Institute.

A Master of Science graduate, John began his career as an analyst, researching financial investment in science, and has continued to shape a career geared toward roles that benefit New Zealanders.

"I find the transport sector in the broader context, both enjoyable and rewarding, and consider the aviation sector in particular to be crucial to New Zealand. I am drawn to the challenge of getting the sector where it needs to be," John said.

John Kay joins the CAA on 15 August.

General Manager Business Support

Chartered Accountant **Tim Bowron** has been appointed General Manager Business Support, a new position heading the CAA's administration, finance, human resources, information systems, and professional standards teams.

Tim joins the CAA from his most recent role as Manager Corporate of the Legal Services Agency, the crown entity responsible for providing access to legal services, including the funding of legal aid.

The experienced senior manager and chief financial officer has worked in both the private and public sectors, and has international experience in audit and business consultancy.

Tim has provided risk management expertise to the New Zealand Dairy Board, and has also worked for Treasury, providing business analysis.

Tim Bowron joined the CAA in July.

Free Lessons

That's partly what *Vector* is about – passing on the lessons that have been paid for by others, so that you don't have to go to the expense and trauma of learning them first hand. There are too many lessons in life for one person to experience, so taking advantage of others' learning can have some definite material and survival benefits.

One 'free lesson' that stands out is the false glideslope capture by Air New Zealand Flight 60, on a night approach to Faleolo International Airport in Samoa (see diagram below). The glideslope transmitter was radiating in the 'test' mode, resulting in an "on glideslope" indication on the aircraft, regardless of its actual position in relation to the correct slope. Fortunately, the anomaly was detected in time by the crew, and a missed approach was made, followed by a normal landing. The investigation uncovered a hitherto unknown problem with the ILS ground equipment, and the results were disseminated world-wide. See Occurrence Report 00/2518 on the CAA web site.

Fling-Wings and Things

In the November/December 2005 *Vector*, we published an article on rotor strikes, entitled "Strike One, You're Out", and the final section contained the following paragraph:

"There's no place for 'she'll be right' in the case of actual or suspected rotor strikes. Err on the side of caution and have the appropriate checks done – even if it means flying engineers into the site, or in extreme cases, having the machine lifted out. While you are waiting, of course, you can inspect the helicopter to the limits of accessibility, looking for obvious (and not so obvious) telltale signs of damage."

TAIC report 06-004 describes a wirestrike by an R44 helicopter engaged on a low-level coastal search, and recommended, among other things, that pilots be reminded of the need to have the airworthiness of the aircraft assessed after an accident. In this case, the pilot noticed what he thought was minor scraping on the underside of one rotor blade. He reported the accident to his base but did not seek engineering advice. The blade damage was subsequently found to be outside repair limits.

There are too many lessons in life for one person to experience…

The pilot moved the helicopter from the tidal zone on the beach, where it was susceptible to wave damage. A 'command' decision in the circumstances, but the pilot then moved the machine a second time, to ease its recovery by road. The issue was complicated by the fact that the pilot had received an apparently superficial puncture wound in the chest from one of the wires, but this turned out to be a quite serious internal injury. This could have resulted in the pilot's incapacitation on a longer flight, such as an attempt to fly the helicopter home. The report did concede that the physiological and psychological effects of the injury could have affected his decision-making abilities at the time. This led to a recommendation that pilots be reminded to notify the Director of any change in their medical condition.

The topic was dealt with in the July/August 2006 *Vector*, in the article "Reporting Medical Conditions", but not to the extent of a change resulting from an accident. Note that this could be not only an injury from an aircraft accident, but also from a vehicle, industrial, or sporting accident. If the injury is serious enough to warrant time off work, be that in a flying job or not, then it probably requires reporting. The same message as in the 2006 article applies – if in doubt, report it anyway. Don't wait until your next medical before you mention it.

To Move or Not to Move

A further recommendation resulting from the TAIC investigation was that pilots should be reminded of the need to preserve an accident site. This requirement is stated fully in rule 12.101 *Access to aircraft involved in an accident*, reproduced as follows:

(a) Except as provided in the Transport Accident Investigation Commission Act 1990, and paragraphs (b) and (c), no person shall access, interfere with, or remove, an aircraft or its contents that is involved in an accident unless authorised to do so by the Authority.

(b) Subject to the limitations contained in the Transport Accident Investigation Commission Act 1990, the Authority may, for the purpose of its investigation, access, inspect, secure, or remove, an aircraft or its contents that is involved in an accident.

(c) A person may, subject to paragraph (d)—

  (1) remove persons or livestock from the aircraft or wreckage; or

  (2) protect the aircraft, wreckage, or contents, including mail or cargo, from further damage; or

  (3) disconnect or deactivate any cockpit voice recorder, flight data recorder, or emergency location transmitter; or

  (4) prevent obstruction to the public or to air navigation where no practical alternative is available.

(d) Any aircraft wreckage, mail, or cargo removed under paragraph (c) shall—

  (1) be moved only so far as necessary to ensure its safety; and

  (2) be kept in separate distinct areas to indicate from which part in the aircraft it has been taken; and

  (3) where possible, have sketches, descriptive notes, and photographs made of their original position and any significant impact marks.

To obtain the permission referred to in (a), telephone 0508 ACCIDENT (0508 222 433). This is a 24-hour, 7-day monitored number, and the request will be relayed to CAA. Normally, if either CAA or TAIC is intending to carry out a field investigation, the aircraft or wreckage will have to be left undisturbed. In that event, the investigators will normally be in touch to discuss the situation, and organise site security until their arrival.

A Burning Issue

There was another free lesson in the September/October 2005 *Vector*, in the article "Dangers of Static". Free for us that is, but the parties involved in the accident described paid a phenomenally high price. What did we learn from it? Not a lot apparently, according to an insurance loss adjuster who gets to see a lot of different operations around the country. The article mentioned that the engineer was wearing a synthetic polar fleece, which may have been a source of the spark that ignited the petrol vapour. Also described was the loss by fire of an historic aircraft, where the cause was put down to fuel vapour ignition by a spark from the synthetic overalls one of the engineers was wearing at the time.

What did we learn from it? Not a lot apparently…

Our loss adjuster was horrified to see, in several different operations, company staff in uniform polar fleece garments proudly emblazoned with the company logo – nothing intrinsically wrong with that, you would think – but when these same individuals start pumping avgas, watch out!

Also observed have been instances where pilots have failed to connect the bonding lead from the refuelling installation to their aircraft when refuelling. One such pilot, when reminded, said that just touching the fuel nozzle on the side of the filler hole was enough. Is this reckless behaviour, ignorance, or stupidity? A point to consider: if you caused a fire through failing to ensure adequate bonding, you could find yourself under investigation by OSH, the Police, and the insurers seeking to recover their loss. Two of these agencies don't take prisoners; one does.

Free Lessons are all Around

They are, but you may have to actively seek out those that apply to your operation. Apart from *Vector*, there are innumerable sources, including accident and incident reports from here and overseas, other publishers' web sites, chat forums on the Internet, and just 'shooting the breeze' with other aviation people. It can work both ways: if you learn something the hard way, you can share it around so that someone else won't have the same problem in the future. We welcome such contributions, as some of the higher-profile ones can be developed into useful articles. ■

Lessons learnt from this fatal topdressing accident resulted in improved requirements for farm airstrips and fertiliser storage.

Rules Update

There are a number of rules projects from the 2006/2007 programme at 'draft final rule' stage. The Ministry of Transport is currently reviewing these draft final rules, and when approved they will be referred to the Minister for Transport Safety for his consideration and signature.

Draft Final Rules

Ominbus 2005 Rule Fix-Up Project

The Parts listed below have been amended to make various editorial changes, and align the rules with other legislation and international practices. They have also been amended to clarify the rule requirements:

Part 1 *Definitions and Abbreviations*

Part 67 *Medical Standards and Certification*

Part 91 *General Operating and Flight Rules*

Part 108 *Air Operator Security Programme*

Part 119 *Air Operator – Certification*

Part 121 *Air Operations – Large Aeroplanes*

Part 125 *Air Operations – Medium Aeroplanes*

Part 133 *Helicopter External Load Operations*

Part 135 *Air Operations – Helicopters and Small Aeroplanes*

Part 145 *Aircraft Maintenance Organisations – Certification*

Part 11 to be Revoked

The changes proposed in this draft final rule will revoke Civil Aviation Rules, Part 11 *Procedures for Making Ordinary Rules and Granting Exemptions*. This is to ensure there is no inconsistency with the Civil Aviation Act.

Part 135 *Air Operations – Helicopters and Small Aeroplanes*

Pilot Experience Levels

The changes proposed to Part 135 will raise the minimum flight time experience for pilots conducting air operations under Instrument Flight Rules (IFR) and clarify the requirements for consolidation of flight time on different makes and models of aircraft.

The amendments provide a graduated scale for Part 135 pilot experience requirements according to the complexity of the operation.

406 MHz Emergency Locator Transmitters

The changes proposed to Part 91 will amend and update existing Part 91 operating rules to meet International Civil Aviation Organisation (ICAO) operating and technical standards for emergency locator transmitters (ELT) to operate on 406 MHz and 121.5 MHz.

This rule amendment also makes consequential amendments to other Parts to include new definitions in Part 1, to amend maintenance rules in Part 43 to include the 406 MHz ELT, and to amend Parts 121 and 129 to include the ICAO standards for the carriage of the 406 MHz ELT for aeroplanes performing international air transport operations.

Part 91 Update

Issue Assessment Group Part 91

An Issue Assessment Group (IAG) meeting, will be held 18 July 2006 in conjunction with the Aviation Industry Association conference to discuss issues for inclusion in a 'Part 91 update' rule project.

An IAG requires appropriate representation from industry, and representation from the operating groups within the CAA.

IAGs are convened in the early stages of rule development because they focus on identifying and defining the problems associated with an issue, undertaking the risk assessment for each issue, and identifying the solution options. The solutions can be rule based or non rule based.

Here is a list of the issues to be discussed at the Part 91 IAG meeting:

- **Rule 91.311** *Minimum heights for VFR flights*

  A view has been expressed that some pilots view bad weather as a bona fide reason for low flying and that the rule needs to make it clear that bad weather is not a bona fide reason for low flying.

- **Rule 91.229** *Right-of-way rules*

  Long established conventions require joining aircraft to give way to aircraft already established in an aerodrome circuit. These requirements are published in *AIP New Zealand*. It has been noted that the current rules do not support this convention and that the right-of-way rules in rule 91.229 need to be reviewed.

- **Rule 91.511** *Night VFR instruments and equipment*

  Night VFR equipment requirements need to be reviewed.

ACAG Part 91

Listed below are Part 91 issues that do not require an IAG. In consultation with the Aviation Community Advisory Group (ACAG) it was established that rule amendments will be required to address these issues. They will form part of the 'Part 91 Update' rule project.

- **Rule 91.301** *VFR meteorological minima*

  The meteorological criteria in rule 91.301 are complex and there are some apparent anomalies.

- **Rule 91.223** *Operations on and in the vicinity of an aerodrome*

  There is a conflict between the "right of way" priority contained in *AIP New Zealand* Vol.1 and what is contained in the rule.

- **Rule 91.405** *IFR alternate aerodrome requirement*

  MDA is the minimum descent altitude in a non-precision approach. DH is the decision height at which a pilot must decide whether to continue the precision approach or not. Rule 91.405 uses MDA incorrectly and this will be replaced as appropriate by DH.

- Rule 91.523 *Emergency equipment*

  Fire extinguisher specifications listed in Appendix A of Part 91 are out of date. Some of the equipment listed is no longer available, and prohibited from sale under the Ozone Layer Protection Regulations 1996.

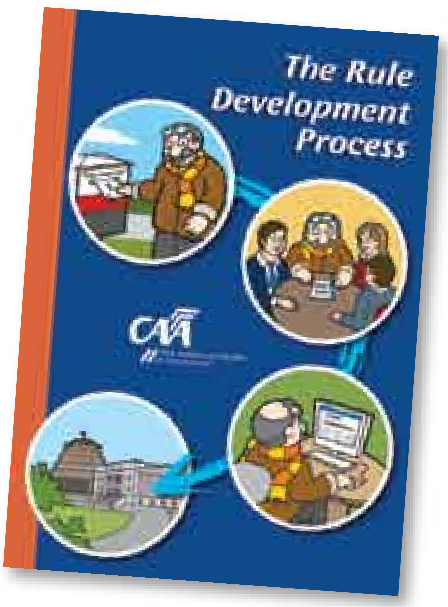
- Optional Equipment Items in Flight Manuals

  Currently, individual aircraft flight manuals are not required to list optional equipment items of operational significance which are installed in the aircraft. To comply with the Transport Accident Investigation Commission's safety recommendations, this needs to be rectified.

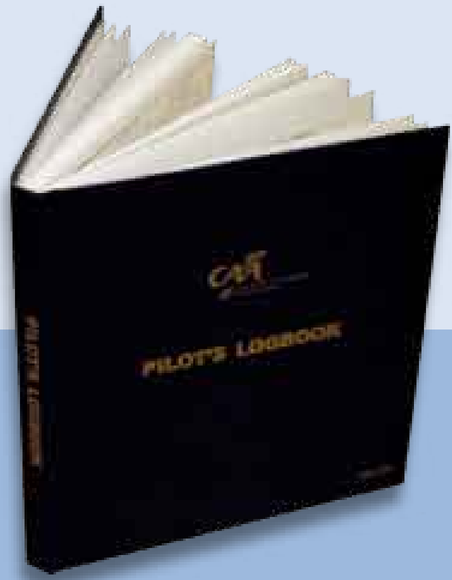
- Rule 91.7 *Portable Electronic Devices*

  Rule 91.7 does not reflect modern medical devices that may be implanted or worn by a person. A means of compliance with rule 91.7 needs to be established for medical devices used in cruise flight, without incurring the cost of testing by the operator.

We publish a booklet, *The Rule Development Process,* that outlines the steps involved in rule development, and the opportunity for all aviation community participants to have their say. You can obtain a copy from your local CAA Field Safety Adviser, or email: info@caa.govt.nz. ■



Accuracy is Essential for Safety



One way in which the CAA promotes safety is by requiring pilots to keep accurate records of their flight hours. A pilot's logbook is a statutory record of their flying experience. If this record is not accurate, it can directly affect the safety of the pilot and the general public.

A logbook containing inflated flight times will reflect a higher degree of skill and experience than the pilot actually has. An operator who employs such a pilot, believing in good faith that they have the requisite qualifications, skills, and experience to do the job, would be placing undue confidence in the pilot's ability.

On 1 May 2007, a helicopter pilot with a Commercial Pilot Licence, an A-Category Instructor Rating, and a General Aviation Flight Examiner Rating, pleaded guilty to a charge alleging that he failed to maintain accurate records in his pilot's logbook.

The pilot was one of an elite group of only 20 active A-Cat helicopter instructors in New Zealand. This group is entrusted with setting and maintaining the highest degree of piloting skills, training, compliance with Civil Aviation Rules, safety culture, and general integrity within the helicopter community.

In August 2006, the CAA carried out a routine audit of a Part 141 Certificated Flight Training Organisation where this pilot was employed as Chief Flying Instructor. A number of discrepancies were found between the flight times logged in the pilot's logbook and the company's daily flight records and timesheets.

Further investigation revealed discrepancies in earlier logbooks dating back to December 2001. The pilot did not face charges relating to the earlier discrepancies, but they were brought to the attention of the Court.

Between 30 January 2006 and 6 April 2006, the pilot made seven false entries in his logbook. This included five occasions where he completed flights but added extra time for each flight, and two occasions where he logged time for flights which did not take place.

The pilot explained that he inflated his flight hours and created fictitious flights in order to increase his flying time in turbine-engine aircraft. This was to improve his chances of employment, because operators generally require 1,000 hours experience on turbine helicopters for insurance reasons.

In sentencing the pilot, Judge O'Driscoll stated that a deterrent penalty was needed to show other pilots in a similar position that there must be strict adherence to the Civil Aviation Act and rules. The judge imposed a total financial penalty of $2,630. In addition, the Director of Civil Aviation suspended the pilot's A-Category Instructor Rating and General Aviation Flight Examiner Rating until 1 March 2009.

Inflating log book hours is a genuine safety concern; for the safety of everyone, pilot's must ensure the hours they log are accurate. ■

Flying NZ Safety Award

Flying NZ (RNZAC) held their annual conference on 23 June 2007 in Blenheim. At the conference dinner Kevin Lloyd, a member of the RNZAC executive, presented their annual Safety Award to Dallas Bean, a Wellington Sector Controller for Airways New Zealand. Dallas was on duty when a Mooney M20 flown by Kevin had an engine failure after departing Wellington IFR. Dallas vectored Kevin away from terrain and to a position from which a successful forced landing was made on Paraparaumu beach.

The story of Kevin's engine failure in IMC was told in the May/June 2007 issue of *Vector*. After the event Kevin and Dallas spoke on the phone but they had not met until Kevin presented Dallas with his award.

Kevin Lloyd (Right) thanks Dallas Bean for his help during his emergency over Paraparaumu.

Maintenance Controller Course

Each year the CAA runs courses for Maintenance Controllers in Part 119/135 organisations, and for those with an interest in the planning and direction of maintenance. The course is in two parts.

Part One is a self-paced learning module. The aim is to introduce you to the Rules that provide the foundation for aviation safety in New Zealand. You will require access to the CAA web site for the pre-workshop module. Part Two is a two-day workshop. This is designed to be hands-on and practical.

Courses in 2007

Ardmore – 19 to 20 September

Hamilton – 26 to 27 September

Christchurch – 15 to 16 August

Each course will be limited to 12 people and a registration fee of $100 is charged.

To register, please complete the form on the CAA web site. For further information, contact John Bushell, GA Airworthiness Coordinator, Tel: 0–4–560 9427, Email: bushellj@caa.govt.nz.

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.

Supplement Cycle	*Effective Date*	*Cut-off Date With Graphic*	*Cut-off Date Without Graphic*
07/11	25 Oct 07	16 Aug 07	23 Aug 07
07/12	22 Nov 07	13 Sep 07	20 Sep 07
07/13	20 Dec 07	11 Oct 07	18 Oct 07
08/1	17 Jan 08	25 Oct 07	1 Nov 07

The Clock is Ticking ...

Draft Civil Aviation Rules mandating the change to 406 MHz ELTs in most New Zealand registered aircraft are currently with Parliament's Regulations Review Committee. The Minister for Transport Safety is scheduled to sign these rules in September 2007, and they will come into force in October 2007.

These rules will require most aircraft, with certain exceptions, to have an automatic ELT installed that operates on both 406 MHz and 121.5 MHz by 1 July 2008.

The draft final rules can be viewed on the CAA web site.

It is important to register 406 MHz ELTs before installation in case they are activated accidentally. Information about registration is on the "Switch to 406" web site, www.beacons.org.nz.

When disposing of old 121.5 MHz ELTs, make sure you remove the battery to prevent inadvertent activation and subsequent waste of search and rescue resources.

SWITCH TO 406 DISTRESS BEACONS www.beacons.org.nz

Type Rating Reminder

New Zealand is one of the few countries where it is optional to put type ratings onto the pilot licence. Most New Zealand pilots only have evidence of the type rating in their logbook. This can cause a problem when a pilot wishes to use their licence overseas, as many countries do not recognise the type rating unless it is shown on the actual licence.

The CAA partly rectified this problem in the last change to Part 61 (11 May 2006), by requiring instructors to send the Director a copy of the type rating information when they issue a type rating, as well as entering it in the pilot's logbook. Where this has happened the CAA is able to verify the type rating issue for a foreign regulator.

When the Personnel Licensing Unit receive this type rating advice it is put onto the pilot's licensing record so that the next time the pilot applies for a licence or rating change, all notified type ratings will be printed onto the new licence automatically.

Pilots may elect to have updated type rating information placed on their licence at any time by completing the forms CAA 24061/04 and CAA 24061/13 (the latter does not apply to helicopter pilots), including photocopied evidence that the type rating has been issued and certified by a New Zealand flight instructor in the applicant's pilot logbook, and the $50 licence amendment fee. Refer to the web site, "Pilots – Aircraft Type Ratings".

A typical example occurred recently when a New Zealand pilot in Nairobi encountered a licensing authority that required all type ratings to be on the licence. Unfortunately, the instructor who issued the type rating in question had not supplied the Director with type rating information, and the pilot asked the CAA to send a letter to the overseas authority confirming that he had a type rating on the aircraft that he wished to fly. The only type rating on the CAA database for this experienced pilot was that for his very first basic training aircraft.

This is a reminder for pilots and instructors to keep the CAA informed, as required by the new requirement under rule 61.55 (a) (2):

61.55 Issue

(a) When the eligibility requirements of rule 61.53 have been met by the pilot, the flight instructor responsible for the type competency demonstration must—

(1) enter the aircraft type rating in the pilot's logbook in a form acceptable to the Director, and

(2) submit a completed copy of the type rating training record to the Director.

How to Get Aviation Publications

Rules, Advisory Circulars (ACs), Airworthiness Directives

All these are available for free from the CAA web site, www.caa.govt.nz. Printed copies can be purchased from 0800 GET RULES (0800 438 785).

AIP New Zealand

AIP New Zealand Vols 1 to 4 are 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).

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".

Field Safety Advisers

Don Waters
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New Plymouth-Taupo-East Cape
Mobile: 027–485 2096
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Email: jelleyb@caa.govt.nz

OCCURRENCE BRIEFS

LESSONS FOR SAFER AVIATION

The content of *Occurrence Briefs* comprises notified aircraft accidents, GA defect incidents, and sometimes selected foreign occurrences, which we believe will most benefit operators and engineers. Individual accident briefs, and GA defect incidents are available on CAA's web site **www.caa.govt.nz**. Accident briefs on the web comprise those for accidents that have been investigated since 1 January 1996 and have been published in *Occurrence Briefs*, plus any that have been recently released on the web but not yet published. Defects on the web comprise most of those that have been investigated since 1 January 2002, including all that have been published in *Occurrence Briefs*.

ACCIDENTS

The pilot-in-command of an aircraft involved in an accident is required by the Civil Aviation Act to notify the Civil Aviation Authority "as soon as practicable", unless prevented by injury, in which case responsibility falls on the aircraft operator. The CAA has a dedicated telephone number 0508 ACCIDENT (0508 222 433) for this purpose. Follow-up details of accidents should normally be submitted on Form CA005 to the CAA Safety Investigation Unit.

Some accidents are investigated by the Transport Accident Investigation Commission (TAIC), and it is the CAA's responsibility to notify TAIC of all accidents. The reports that follow are the results of either CAA or TAIC investigations. Full TAIC accident reports are available on the TAIC web site, **www.taic.org.nz**.

ZK-CSM, Cessna A188, 23 Oct 04 at 16:30, Omihi Stn. 1 POB, injuries 1 fatal, aircraft destroyed. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 63 yrs, flying hours 20,480 total, 5,000 on type, 30 in last 90 days.

The pilot was conducting an agricultural operation engaged in spreading solid fertiliser in suspension with water. The pilot appeared to commence his takeoff normally and continue out of the line of sight of the ground crew, who were alerted to the accident by smoke coming from the direction of the end of the sloping airstrip. The first persons on the scene found that the aircraft was on fire and could see no signs of life. A full accident report is available on the CAA web site.

CAA Occurrence Ref 04/3396

ZK-DAM, Jabiru SK80 Microlight, 13 Apr 05 at 10:30, Warkworth. 1 POB, injuries nil, damage substantial. Nature of flight, private. Pilot CAA licence nil, age not known, flying hours 532 total, 506 on type, 10 in last 90 days.

The pilot over flew the strip to move the sheep aside but they flocked at the end so he flew over them. He failed to apply sufficient power, and the aircraft stalled during the flare on the steep up-hill slope and hit the ground. The nosewheel was torn off and the propeller destroyed. A tail wind also contributed to this accident.

CAA Occurrence Ref 05/1275

ZK-JPY, Foxcon Aviation Terrier 200, 8 May 05 at 11:30, Opotiki. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence nil, age not known, flying hours 1 total, 1 on type, 1 in last 90 days.

The aircraft, a high-wing microlight, was being used for dual circuit instruction at Opotiki aerodrome. Meteorological conditions at the time were reported as no wind with excellent visibility. During landing the nosewheel collapsed, causing damage to the aircraft.

CAA Occurrence Ref 05/1444

ZK-WWH, Cessna U206G, 10 Aug 05 at 8:45, Queenstown Ad. 6 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Aeroplane), age 43 yrs, flying hours 1,858 total, 570 on type, 30 in last 90 days.

On Wednesday 10 August 2005, at about 0845, ZK-WWH, a Cessna U206G, took off from Queenstown aerodrome for Mount Cook aerodrome with a pilot and five passengers on board. Just after takeoff, the pilot encountered control difficulties that culminated in the aircraft striking the runway with its left wing tip and failing to remain airborne. The aircraft was substantially damaged, but no one was injured.

CAA Occurrence Ref 05/2522

ZK-HZH, Robinson R22 Beta, 14 Oct 05 at 14:30, nr Hanmer Springs. 1 POB, injuries nil, aircraft destroyed. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 35 yrs, flying hours not known.

The RCCNZ reported that an ELT had been activated in the Hurunui Ranges near Hanmer Springs. The helicopter was later found, with the pilot uninjured. The pilot had tried to jettison the load, but the dump doors did not open, and the helicopter collided with the terrain.

CAA Occurrence Ref 05/3307

ZK-DAH, Cessna A185E, 19 Oct 06 at 7:40, Mercer. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence CPL (Aeroplane), age 27 yrs, flying hours 1,112 total, 10 on type, 47 in last 90 days.

On touchdown, the aircraft yawed to the right; the pilot over-corrected with rudder and brake. The aircraft then pitched nose down. The pilot tried to correct this movement by moving the control column fully aft but could not prevent the aircraft from flipping over on to its back.

CAA Occurrence Ref 06/3861

ZK-HCA, Robinson R22 Alpha, 26 Nov 06 at 11:10, Hillview Station. 2 POB, injuries 2 minor, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age 22 yrs, flying hours 130 total, 130 on type, 56 in last 90 days.

The pilot reported that the wind was gusting upon landing, which forced the helicopter down, causing substantial damage and minor injuries to the pilot and passenger. The pilot did not fully understand the significance of landing downwind and the requirement of additional power to arrest the high rate of descent. The pilot has undertaken additional training.

CAA Occurrence Ref 06/4355

ZK-AYO, Auster J1B, 30 Dec 06 at 19:00, Kaimata. 4 POB, injuries nil, aircraft destroyed. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 44 yrs, flying hours 104 total, 25 on type, 9 in last 90 days.

A rubber shock cord on the right main undercarriage broke during landing, with the aircraft at close to maximum all up weight. The aircraft was uncontrollable during the landing roll and veered into a ditch beside the runway, suffering significant damage. The aircraft had been in an accident two years previously, during which time the left main undercarriage had sustained damage and had subsequently been repaired. It appears that the rubber shock cord on the right main undercarriage had also sustained damage, which was not detected, and which left the cord in a weakened state.

CAA Occurrence Ref 06/4800

ZK-GFD, Schleicher Ka 6CR, 1 Feb 07 at 14:00, Kaikohe. 1 POB, injuries 1 minor, aircraft destroyed. Nature of flight, private other. Pilot CAA licence not known, age not known, flying hours 62 total, 16 on type, 5 in last 90 days.

The approach and touchdown speed was too fast, and the air brakes were not deployed. On landing the glider bounced and rose about 10 feet. The right wing then lifted due to a crosswind gust, and the glider veered to the left. Going into an incipient spin, it rotated 180 degrees and impacted nose down. The pilot received minor injuries, and the fuselage of the glider was destroyed.

CAA Occurrence Ref 07/492

ZK-HXG, Robinson R22 Beta, 16 Mar 07 at 12:00, Te Kowhai. 2 POB, injuries 1 minor, aircraft destroyed. Nature of flight, training dual. Pilot CAA licence CPL (Helicopter), age 36 yrs, flying hours 1,000 total, 974 on type, 123 in last 90 days.

During an autorotation, the student failed to level the helicopter prior to contact with the ground. The instructor was unable to recover due to the student tensing up on the controls. The helicopter crashed.

CAA Occurrence Ref 07/786

GA DEFECTS

The reports and recommendations that follow are based on details submitted mainly by Licensed Aircraft Maintenance Engineers on behalf of operators, in accordance with Civil Aviation Rules, Part 12 *Accidents, Incidents, and Statistics*. They relate only to aircraft of maximum certificated takeoff weight of 9000 lb (4082 kg) or less. These and more reports are available on the CAA web site, www.caa.govt.nz. Details of defects should normally be submitted on Form CA005 or 005D to the CAA Safety Investigation Unit.

The CAA Occurrence Number at the end of each report should be quoted in any enquiries.

Key to abbreviations:

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

Aerospatiale AS 350B2

Oceania Aviation Ltd NA Cargo Hook Universal Joint P/N A&HCC 0319-3

The helicopter dropped its hook assembly and load during climb out. This was caused by the upper attachment linkage on the hook assembly failing. A detailed fractography inspection was carried out on the failed linkage. It was determined that the linkage failed as a result of a stress crack that had originated from a previous excessive shock loading on the linkage, in combination with coarse machining marks on the surface finish. Actions taken as a result of this investigation were: (1) All linkages will be manufactured to a higher surface finish; (2) The linkages will be manufactured from stainless steel with a 72% increase in tensile strength; (3) The instructions for continued airworthiness have been amended to change the inspection technique from magnetic particle to eddy current inspection; and (4) The old linkages have been removed from service. TTIS 1008 cycles, TTIS 80 hours.

ATA 2550 CAA Occurrence Ref 06/1459

Aerospatiale AS 350BA

Eurocopter AS350BA Main Rotor Blade P/N 355A11-0300-02

The operator reported that one main rotor blade skin came away on the lower surface. This was approximately 470 mm inboard from the tip. The cause of the delaminating of the main rotor blade skin was not established by the overhaul facility.

One possible reason was that the blade was damaged during transit, as a result of the blade transportation box being subjected to a sudden shock load. Shock "g" sensor labels are being considered for the transit boxes. TSI 24.7 hours, TTIS 1377 hours.

ATA 6200 CAA Occurrence Ref 06/1486

Aerospatiale AS 355 F1
Eurocopter AS 355 F1 Cowling

During landing the engine cowl separated and flew up into the main rotor. Scratch marks were found on the rotor blades and cowling. The engine cowl had not been secured and this was not identified during the aircraft pre-flight. There were a number of human factors involved in this incident, including distractions, time pressures, and possible fatigue. The rotor blades were replaced and sent for repair.

ATA 7240 CAA Occurrence Ref 06/2081

Bell 206B
Bendix PT Governor P/N 23065121

During the climb after takeoff, the collective began to feel heavy. The helicopter was returned to base and shut down. Investigation found the PT Governor control shaft was stiff. It was removed and replaced by a serviceable unit. It is suspected that contaminants had entered the bushing bore of the control shaft, causing it to bind. TSI 74.95 hours, TSO 239.95 hours,

ATA 6710 CAA Occurrence Ref 06/1502

Bell 206B
Rolls Royce A250 C20B Power Turbine Outer Shaft P/N 23037413

During disassembly of the power turbine, it was found that the port outer nut, whilst locked, was not torqued. This had allowed the shaft to flex and vibrate while in use. Excessive damage to the curvics had occurred, along with some thread damage and fretting on the bearing area. Also apparent was a 40-mm crack extending from the curvics into the shaft. Oil had been leaking through the shaft and carbon seal. The turbine was repaired iaw the manufacturer's instructions. Shafts, bearings and seals were replaced. TSO 339 hours, TTIS 1930 hours.

ATA 7250 CAA Occurrence Ref 06/4040

Britten-Norman BN2A
Kelly Aerospace Bendix Drive P/N EBB-131A

The bendix drive was destroyed during start. It had all its teeth sheared off and the drive bushing sheared off. The unit was completely destroyed, cause unknown. A new starter motor was fitted to the engine. TTIS 24 hours.

ATA 8010 CAA Occurrence Ref 07/162

Cessna 150L
Brakes

During the landing run, the aircraft failed to stop, and it rolled off the end of the runway into a pond. The pilot reported no braking action was available. The brakes were inspected and found to be fully serviceable. It was reported that the aircraft landed long into the airstrip with a tailwind, and braking action was impaired by the wet grass surface.

ATA 3242 CAA Occurrence Ref 06/1408

Cessna 152
Spark plugs

During climb out, the engine started to run rough. The aircraft landed safely without incident. The cause of the rough running was not established. The cylinder leak test did not identify any issues. As a precaution, the spark plugs were cleaned and tested, new air filter installed and carburettor fuel bowl drained and checked for water. There has been no reported recurrence of the engine problem.

ATA 7420 CAA Occurrence Ref 06/1764

Cessna 172F
Cessna 172F Bulkhead P/N 0513314-1

The righthand brake cylinder lower attachment bolt holes and the rudder torque tube bearing block were found cracked. The damage was attributed to fatigue caused by excessive forces being applied to the rudder and brake assembly. TTIS 7579 hours.

ATA 5310 CAA Occurrence Ref 06/2357

Cessna 172M
Plugs

The aircraft was observed to line up on runway 08, take off, and vacate the zone without a clearance. The pilot did not respond to any radio calls. The Operator contacted the pilot later on and he said he thought the Tower was off watch as he did not receive any replies. He therefore made a series of unattended broadcast calls. Before returning, however, he re-seated the headset plugs. All his transmissions made on the return trip were heard.

ATA 2310 CAA Occurrence Ref 06/3211

Cessna T182T
Cessna T182T Support Angle P/N 0712059-1

The battery box support angles were found to be cracked. Over-tightening of the tie-down bolts, which holds the battery box cover, causes the load to be transferred to the battery box support frame (for the tie-down bolts), and the support angle brackets crack. The brackets have been replaced and a placard affixed to the battery box as a reminder not to over-tighten the tie-down bolts. TSI 71.3 hours, TTIS 815.9 hours.

ATA 5310 CAA Occurrence Ref 06/1449

Cessna T182T
Cessna T182T Flap operating switch P/N S1906-1

The "flap up" operating switch S1007 was found to be broken. This enabled the flaps to move as the attached wiring loom flexed. The flap "up-operating" switch housing was found broken. The switch was replaced and the flap system rigged.

ATA 2750 CAA Occurrence Ref 06/1450

Cessna 185A
Cessna 185A Throttle Support Bracket P/N 0750166-4

The throttle/mixture support bracket was cracked approximately 25 mm horizontally between attachment stud holes and attachment tangs riveted to the bracket. The crack in the support bracket was attributed to misalignment of the rear portion of the induction system, causing the support bracket to be placed under a torsional load. TSI 94 hours, TTIS 94 hours.

ATA 7200 CAA Occurrence Ref 06/1508

Cessna A185F
Cessna 1394T100-7Z Turn and slip indicator P/N C661003-0506

Smoke was seen coming from top lefthand side of the instrument panel. The QRH actions were completed and the aircraft landed. An electric fault caused by the burning out of internal components was identified in the turn and slip indicator. TTIS 5924 hours.

ATA 3421 CAA Occurrence Ref 06/1813

Cessna P206E
Bearing housing P/N DOFF10300J

The operator reported that there was a problem with the alternator. Engineers found that the alternator's rear bearing was missing. It appeared that the case bearing housing was too big for the bearing.

ATA 2420 CAA Occurrence Ref 07/549

Cessna P206E
IO-520-A valve spring

The engine was running very rough through 1600 to 1800 rpm range. Engineers found that #1 cylinder exhaust inner valve spring was broken. The cylinder was inspected and repaired, and new valve springs were fitted at exhaust location. TTIS 301.4 hours.

ATA 8520 CAA Occurrence Ref 07/996

Cessna 207A
Spring

The front luggage door came open during the descent. Engineering found that the luggage door retaining spring had broken. The spring was replaced and the new assembly correctly adjusted.

ATA 5230 CAA Occurrence Ref 07/496

Cessna 210-5A
Narco ATC Transponder P/N AT150

The flight was in uncontrolled airspace and its transponder was indicating an altitude of FL281. The transponder unit was removed from the aircraft and bench tested. The output was found to be indicating an altitude of 27,500 feet when the input was zero feet. The transponder unit was replaced and ground tested satisfactorily in the aircraft.

ATA 3453 CAA Occurrence Ref 06/2951

KHI Kawasaki-Hughes 369HS
Skid

While passengers were disembarking, the front right skid cracked. The aircraft was flown back to base and the skid was repaired; an old fracture was found.

ATA 3270 CAA Occurrence Ref 06/3209

Piper PA-28-140
Muffler P/N 99482-00

While taxiing the aircraft, with cabin heat selected, the pilot noticed a distinctive exhaust smell in the cockpit, and the CO detector had developed a darkened spot. It was found that the tailpipe had not been installed correctly when fitted, such that it was not supported within the muffler gusset. The tailpipe created stresses on the muffler, which gave rise to cracks developing.

ATA 7810 CAA Occurrence Ref 06/2800

Piper PA-31-325
Lycoming LTIO-540-F2BD Lefthand engine

The aircraft was climbing on an IFR passenger flight to Auckland when the pilot requested a turn back due to an engine problem. When downwind the pilot advised the problem was rectified, and he requested that the flight continue as planned to Auckland. The pilot had leaned the mixture in flight when the engine restored itself to running smoothly. The engine is reported as having a plug fouling problem. Engine leak downs have been checked, and the operator was planning to change the engine at the earliest opportunity. TTIS 1600 hours.

ATA 7100 CAA Occurrence Ref 06/1574

Robin R2120 U
O-235-L2A cylinder P/N LW 11633

An oil weep was found coming from the number 4 cylinder. A 30 cm long crack was found running around the inside of the cylinder wall circumference in line with the external join between the cylinder head and the cylinder barrel. The crack most likely originated from a stress raiser created during the manufacturing process. TTIS 1250 hours.

ATA 8530 CAA Occurrence Ref 07/369

Robin R2120 U
Avions Pierrce Robin Robin 2120U Stabiliser Attachment Bearing P/N GE8EC2

The stabiliser control appeared to be very stiff to operate. A loud squeaking noise was then heard from the stabiliser attachment bearing bracket area when the control surface was moved. The lefthand and righthand bearings were replaced. TTIS 1243 hours.

ATA 2700 CAA Occurrence Ref 06/1631

Robinson R44
Textron Lycoming O-540-F1B5 No1 Conrod P/N LW13937

During a scheduled overhaul of the engine it was determined that the number one connecting rod big end did not have the correct clearances. Investigation by the manufacturer established that the connecting rod big end diameter dimension was below the specification limits. It most likely has been like this from new. The incorrect assembly of the end cap on the connecting rod had allowed it to be attached on to the crankshaft without having clearance problems. The connecting rods have been superseded and are no longer manufactured. TTIS 2199.4 hours.

ATA 7100 CAA Occurrence Ref 06/2171

Robinson R44 II
Robinson Upper Bearing P/N C006-6

A "rumble/whine" was heard from the upper main rotor gearbox bearing during shutdown. The bearing was found contaminated with water, and no evidence of lubricating grease remained. The helicopter had been operating in an agricultural role, and water contamination may have occurred during the washing of the aircraft. TSO 707.7 hours, TTIS 707.7 hours.

ATA 6320 CAA Occurrence Ref 07/161

Every Occurrence Counts

For every fatal accident there are 600 related occurrences.
Reporting occurrences and defects helps to prevent accidents.

0508 ACCIDENT (0508 222 433)

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