January / February 2000

VECTOR

Pointing to Safer Aviation

WIRE STRIKE AVOIDANCE

WOODBOURNE AND YOU

SPECIAL VFR

CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND

VECTOR

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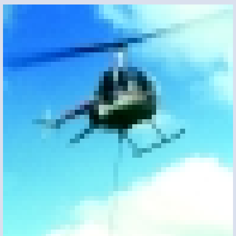
It is therefore vital that these pilots learn and put into practice the most effective methods of defence against the threat of a wire strike.

Wire Strike Avoidance looks at some key aspects of working in the wire environment, drawing on material from articles in previous issues of this safety magazine and from information presented by Bob Feerst of Utilities Aviation Specialists Inc during a series of seminars in 1998.

Page 8 Woodbourne and You

Some pilots continue to misunderstand ATC clearances and instructions when operating in and around the Woodbourne CTR. Up to two non-compliances with ATC procedures by pilots are occurring each week, with itinerant pilots being a particular problem.

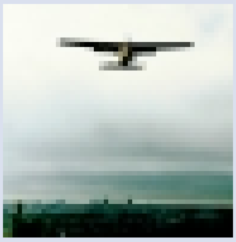
Find out why this is happening and what you can do to operate safely in and around the Woodbourne CTR.



Page 11 R22 Conversion

John Clements (CFI North Shore Helicopter Training) believes that some fixed-wing pilots making the transition to the Robinson 22 helicopter in particular, can get themselves into trouble and that this has been a contributing factor in a number of fatal New Zealand helicopter accidents.

In this article he explains what can go wrong and offers some strategies that should help reduce the risks.



Page 13 Special VFR

Most of us should be familiar with the VFR meteorological minima associated with operating an aircraft in a control zone, below which we must have a Special VFR clearance, but sometime it is not clear if ATC are obliged to issue this clearance or whether the pilot must request it.

Special VFR explores this question and looks at what operating under a Special VFR clearance means to you as pilot in command.

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Cover Photo:
A Schempp-Hirth Discus soars in wave lift at approximately 15,000 feet above Mt Aspiring.
Photograph courtesy Tony Passmore

Wire Strike Avoidance

Photograph courtesy of Dunstan & Kinge

Wire strikes continue to be one of the most devastating accidents for professional pilots and crews whose job requires them to fly in the low-level wire environment. The statistics show that wire strike accidents are not confined to this group, but those regularly working at low level are at greatest risk, and it is therefore vital that these pilots learn and put into practice the most effective methods of defence against the threat of a wire strike.

We look at some key aspects of working in the wire environment, drawing on material from articles in previous issues of this safety magazine and from information presented by Bob Feerst of Utilities Aviation Specialists Inc during a series of seminars in 1998.

Introduction

There have been 73 reported wire-strike accidents in New Zealand between 1979 and 1999 in which 32 lives have been lost and a further 27 people were seriously injured. Helicopters top the list with 44 accidents, aeroplanes had 22, microlights four, gliders two, and one involved a balloon.

Most accidents occurred during 'aerial work' activities such as spraying, topdressing or survey/inspection work, resulting in 12 people dead and 10 seriously injured.

On the other hand there were five accidents on air transport activities which resulted in a total of 13 fatalities and 10 serious injuries. These five accidents represent only 7 percent of the total accidents but roughly 40 percent of the fatalities and serious injuries. Another accident (which is classed as Policing in the accident data but involved a change of mission mid-flight from air transport) resulted in three fatalities.

There were 17 accidents on private operations (nearly a quarter of the total) resulting in four fatalities and seven people seriously injured. Most of these were associated with takeoff and landing but five, including two of the microlight accidents, involved low flying.

These statistics show that greater discipline and safety awareness is needed in the private and air transport sectors – the obvious message is to stay out of the wire environment. The majority of wire strikes occur below 100 feet. Low flying is asking for trouble, and for the takeoff and landing situation special care should be taken to check out the suitability of landing areas in relation to size and obstacles on the approach paths, such as wires.

Photograph courtesy of Ted Hawker

So the first defence is to avoid unnecessarily flying below 500 feet above ground level. For those involved in 'aerial work' operations, this applies particularly to transit flights

"It is a sad fact that the vast majority of wire-strike accidents are entirely preventable."

It is a sad fact that the vast majority of wire-strike accidents are entirely preventable. For those who must work in the wire environment, an understanding (by all the crew) of the specialised skill needed to operate an aircraft in the vicinity of wires is essential.

'Aerial work' accidents often involve high-time experienced pilots who can be caught out by a lapse in concentration through fatigue, distraction, or possibly complacency.

Constant situational awareness is necessary.

Limitations of Vision

If we must fly in among the wires, it would obviously be to our advantage if we could see them. Can we see wires in time to avoid them? At fixed wing speeds or helicopter transit speeds, the answer is normally – **no**.

The eyeball is a very versatile apparatus that serves us well. Even with 'perfect' sight, however, it has physical limitations in its performance. One such limitation is its power of resolution – that is, the minimum size of an object that can be registered. This limitation is caused by the physical size of the cones in the central part of the retina where the detail that we see is picked up.

The usual country powerline or telephone wire when viewed from a safe (in flying terms) distance makes too small a visual angle for it to register on the cones. How then do we ever see it?

Against a plain contrasting background such as the sky, the eye has a compensating mechanism that relies on this contrast. In effect, we perceive the break in continuity of the background rather than 'seeing' the wire itself. Our mobile computer, the brain, happily translates this into seeing.

Continued over...

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Reduce the contrast and break up the background, however, and we are thrown back on to the basic visual mechanism limited by the cone size. The wire literally disappears. It is not 'camouflaged', it is beyond the limits of the eye to see it, and no matter how hard we stare, squint or move our heads we will never be able to see it. We are wasting our time looking.

When flying in conditions of low visual stimulus, for example a solid grey overcast or a clear blue sky, the eye does not have any specific feature to focus on and relaxes to a focal length of about three to four metres. Therefore, while you think you are maintaining a good lookout (for wires) your eyes are focused just beyond the cockpit. Pilots need to be aware of this and to periodically focus on some distant object on the horizon. (This is obviously easier if there are clouds to focus on.)

So whether we can see a wire will depend on its size, background, and the direction of the light source.

If we can't rely on seeing the wire, then what can we do? (Wire marking is not a topic we intend to discuss here, but it is probably readily agreed by all who must work down amongst wires, that while marking can be very effective, it is not the only answer for all situations.) The first step is to realise the limitation of our eyes; if we know we can not rely on seeing wires, then we must learn to forecast their presence.

Understand The Environment

Knowledge of the dynamics of the wire environment creates the applied situational awareness necessary for low-level flight operations.

Understand the basics of our power and telephone systems. In situations such as power-line inspection, the crew may know more about the environment than the pilot. Training should be undertaken to utilise this knowledge and CRM techniques applied, so that the whole crew can work as an efficient team.

Remember that any time you are below the ridge tops you are in the wire environment. All pilots working near wires should learn what clues to look for.

Wire Presence and Visibility

Knowing that we can not rely on seeing the wire itself, one of the best clues is to look for the associated structures (pylons, poles, etc). If you note the direction the insulators are pointing, you will know which way the wires are heading – if a wire is making a turn, the insulators will generally show the change in direction.

Wires can be different colours and this affects their visibility. The larger ones are all aluminium and are very visible against some backgrounds. (They are shiny when new and may catch the light but as they oxidise the glint or shine diminishes and they will blend in with a grey background.) The smaller wires can be copper, which when it oxidises turns greenish which can then blend in with some backgrounds. Do not assume when you see wires on a structure that you have seen them all – different wires can blend with different backgrounds. Complex backgrounds can quickly obliterate the wires.

Photograph courtesy of Canterbury Helicopters

Nature produces very few straight lines, so if you perceive a straight line in a landscape (it may only be an impression) exercise caution.

If you are working close to a wire, be aware that when you move the wire has the potential to disappear because lighting conditions have changed. When a wire changes direction, it also has the potential to disappear for the same reason.

> *"Never plan or make runs in to a rising or setting sun."*

When the light source changes, the visibility of a wire can change. For example we may be able to see a wire in a shady situation but when the cloud moves and the sun comes out, the wire can disappear.

Normally when we put the sun behind us we can see targets on the ground more clearly. This is not necessarily so with wires. You may be turning away from the glare of the sun but the background will most likely have changed, possibly making the wires invisible. (For example, the problem of empty field myopia can occur with a blue sky background.)

Having Seen the Wire

In many accidents, pilots have seen the wire but hit it anyway. Why?

With a lack of relative background, we can't tell how close or what size a wire is. Never judge distance from a wire by the wire itself – always cross-reference it with a structure. Our lack of familiarity with an object can affect our ability to judge it. For example, unless we know the size of different types of wire, or see them against an object of known size, we have nothing to base our judgement on. This is one reason why it is important to learn as much about the distribution system's different types of wire and their hardware as you can.

There are visual illusions involved with judgement of horizontal and vertical lines – so again it is important to look for the structures, not just the wires themselves.

Type of Wire

The sag in spans of wire varies with weight, temperature and loading (thermal heating). For instance, with large spans there may be a 40-foot difference in sag between morning and evening. Spans of wire do not only move up and down, they will also swing sideways.

A static or earth wire is generally strung above the main phase wires. The earth wire is thinner and less visible. It is strung above the heavy phases as a lightning conductor. There is not as much sag in the smaller wire and therefore the earth wire can be a substantial distance above the phase wires.

Do not assume a uniform distance between the earth wire and phase wires – it can vary along the line with varying span distances.

Again look for conductors to forecast the presence of the earth wire.

It is often said that if you fly over the top of a tower, you won't hit a wire. In 90 percent of cases this is true – you won't hit anything which is attached to the tower but a wire can break loose from the tower and float above it (this will mainly occur where there is poor maintenance of the lines).

Any time a wire makes a turn there normally needs to be a guy wire backing the pole where the wire changes direction. Sometimes there is not room to take the guy wire to ground in the required direction to support the structure and there may be an overhead wire to another pole which is guyed (for instance across a railway line). Because guy wires tend to be tighter and stronger, hitting a guy wire can be more likely to have fatal consequences.

Avoidance Techniques

As we said earlier, the first defence is to avoid unnecessary flying below 500 feet above ground level. For those involved in 'aerial work' operations, this applies particularly to transit flights.

The second defence is fully understanding the nature of the wire environment and realising the limitations of the human eye.

Then, for each flight:

Gather Information

Gather as much information as possible about wires in the area. If the area is a farm get the farmer to confirm the nature and location of all wires and significant obstructions on the property, especially in the treatment area and en route to and from the airstrip or helipad. They may also be able to warn you of such hazards on neighbouring properties adjacent to their boundaries. All these wires and obstructions must be visually located during the subsequent inspection survey.

Photograph couresty of Canterbury Helicopters

Treat with caution any assurances that there are no dangerous wires – farmers are apt to forget about old, seldom used lines, flying foxes, electric fences, etc, and even newly erected aerials and cables. Carry out a further inspection if in doubt.

Use a check list of questions to ensure that no item is overlooked. If necessary, use a map of the area to positively identify and mark in each hazard.

Reconnaissance and Observation

Continual observation of the terrain in your general area of operations enables early recognition of current or likely erection of power and telephone lines in relation to farm building projects. Before commencing work, always make a reconnaissance of the total area at a safe height.

During this reconnaissance, look for signs of wires – remember, you can't rely on seeing the wires themselves.

Look for likely locations, such as across rivers or valleys, around buildings, on construction sites. Beware, however, for although these sorts of places are more likely to harbour wires, **anywhere** is a potential wire site.

Look for signs associated with wires: pylons, poles, aerials, flying fox cars, vegetation patterns. Transmission lines often have vegetation altered to assure access for maintenance; grazing patterns may indicate that the farmer uses an electric fence, but may not necessarily indicate its present position!

Continued over...

Some New Zealand accident examples

Private

- At the conclusion of a brief local flight the pilot descended the helicopter over the Dart river. The helicopter collided with a pair of electric fence feeder wires spanning a dry channel between the eastern bank and an adjacent island and shortly afterwards struck the river bed. The pilot received fatal injuries, but the passenger survived the accident.
- At the conclusion of an evening scenic flight in company with two other microlight aircraft, the pilot had descended to a low altitude. Flying toward the setting sun, the aircraft collided with 11,000 volt power supply lines which were suspended about 25 feet agl. It pitched nose-up, stalled and impacted the ground in a steep nose-down attitude. One seriously injured.
- During a turn away from the terrain in deteriorating weather, the aircraft collided with a power pole near the Titiokura saddle. The pilot received fatal injuries, and the aircraft was destroyed.

'Aerial Work'

- During the day's first spray run adjacent to tall pine trees, the helicopter struck power conductors which wrapped around the main rotor pitch change links. All cyclic and collective control was lost, causing the aircraft to pitch nose-down and impact in an almost inverted attitude.
- During a spray run the helicopter struck a telephone wire that at first paralleled the field but then changed direction and cut across the crop to a pole hidden by trees.
- During climb-out the helicopter flew from shadow into severe sun glare and struck a disused electric-fence wire. Control was lost and the helicopter impacted heavily onto its skids and spray tank. One seriously injured.
- While being landed into the sun the helicopter collided with a powerline which the pilot had normally avoided by approaching from a different direction.
- The helicopter was being flown on agricultural spraying work in hilly country. After spraying the side of a ridge the helicopter was turned in the adjacent gully. During the turn it collided with elevated power conductors spanning the gully and descended out of control to the ground. Fatal.

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Positively locate all power pylons, power and telephone poles, including those partly obscured by trees, those with cross-arms denoting secondary lines and those forming part of a fence line. Positively locate the direction of wire runs and spur lines, especially electric fence lines or feeder lines slung between saddles on ridges, radio and TV aerials, supporting guy wires on structures, and flying fox cables. Beware of smaller wires slung in close proximity to major lines.

During the reconnaissance, use circling manoeuvres, as these will vary the light conditions and reflections and thus increase the chances of detecting wires or their supports. Finally, make a low-level reconnaissance if possible. This may enable you to detect some wires that were not visible when viewed against the background of mother earth.

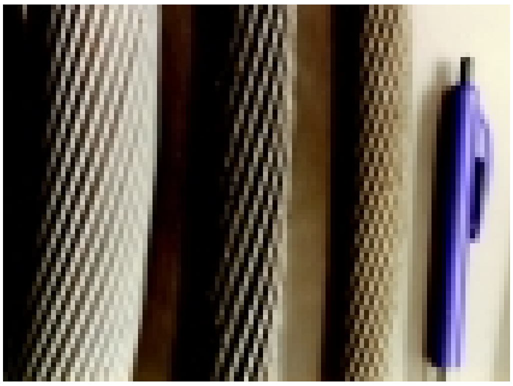
If you conscientiously carry out all of the above precautionary procedures, you should have a good idea of the location of all the wires that are a hazard to your operations. **But**, you must not rely on having found them all.

Memory and Awareness

When you are operating at low level, the task in which you are engaged is of secondary importance. There are just two matters of primary importance, maintaining control of the aircraft, and avoiding obstacles. If you fail to meet those objectives, then you will fail to meet the secondary ones as well. The moral is, therefore, don't become preoccupied with secondary objectives to the exclusion of primary ones. Wires are the most insidious of the obstacles that you must avoid, so, stay awake to them.

With jobs such as line inspection, it is very important that the pilot does **not** assist with the actual inspection. The pilot's job is to fly safely and look for cross-wires, etc.

Be constantly aware of the existence and potentially lethal nature of wires at all times. Don't let complacency, boredom or sleepiness interfere with your mental attitude to wires. If this requires some form of memory jogger, use any suitable method that is guaranteed to gain and maintain your attention. Etch "WIRES" into your mind.



Avoid Misjudgement

You know where the wires are, you are awake to their presence, you can even see them – yet it is still possible to have a wire strike through misjudging your distance from them.

If in doubt, fly above the height of the supporting poles or pylons.

Cross lines at an angle, and over, or at least near, the pylons.

If you can see high-tension transmission lines, beware of the earth wire that is often strung above them. Again, above pylon height will keep you above trouble.

Some more New Zealand accident examples

'Aerial Work'

- During a powerline inspection, the helicopter is thought to have collided with some 11,000 volt lines that crossed over the lines that were being inspected. During the crash sequence it hit a power pole before crashing to the ground and catching fire. The pilot was killed and the passenger received serious injuries.
- As the helicopter was about to touchdown it collided with a previously unsighted electric-fence wire. Control was lost when the wire wrapped itself around the mast and disrupted the control rods.
- While inspecting one powerline, the helicopter hit another. Two seriously injured.
- The pilot was aware of one wire across the gully in the area being sprayed. The helicopter struck another wire which the pilot had not been warned about, and the damage sustained by the aircraft rendered it uncontrollable.
- While descending from a reversal turn, the aircraft struck power conductors suspended in a long span across a valley. The conductors were broken by the impact and the top of one empennage separated from the aircraft. The pilot flew the aircraft back to the airstrip using the remaining empennage and landed without further incident.
- The aircraft collided with a high-tension power conductor during a topdressing sortie. The collision caused the aircraft to dive into the ground out of control. The pilot received fatal injuries in the accident.

Air Transport

- While the helicopter was on a local sightseeing flight from Queenstown it was descended into a canyonous section of the Shotover River and collided with an elevated cableway. It fell out of control to the riverbed and was largely consumed by fire. The five occupants received fatal injuries.
- While attempting to land at Tiraora Lodge the pilot was dazzled by low sun and elected to overshoot. The aircraft made a low turn to avoid high ground, struck a telephone wire and descended out of control into the sea. The pilot and five passengers were rescued but suffered varying degrees of injury.

If you are working the area, establish pull-up points during your reconnaissance – and stick to them.

It may be practical to take an altimeter reading of the highest, or some other specific, point of the wire.

Don't attempt to 'just miss' wires, but give them a wide berth. Remember – never judge your distance from the wire by the wire itself.

If you are flying a helicopter, keep your speed down. At 40 knots you can easily turn away from a wire that it would be impossible to avoid at 80 knots.

If you have to takeoff or land over wires, your main defence is a thorough understanding of the performance and capabilities of both your aircraft and yourself. Glider pilots, in particular, need this skill for outlandings.

Lighting Factors

Never plan or make runs in to a rising or setting sun. If you can't avoid sun glare by completing the job across or down sun, delay the operation until such time as glare conditions become less hazardous. But remember the point that turning away from one enemy (the glare) may introduce another (such as a blue sky background) which can render wires invisible.

Beware also of operating in rain showers; this can result in misjudgement of height and distance from wires through disorientation or visual illusion.

Always have a clean windscreen.

Ferry Flights

Maintain regulatory minimum height above terrain during all ferry flights. If a bad-weather route has to be followed, ensure you have carried out a recent reconnaissance in good weather to identify the location of newly erected wires and other hazards.

Discipline

Without a strong sense of discipline, you are bound to succumb to temptations that inevitably lead to dangerous, unplanned manoeuvres. Develop your personal minimums and safety rules and adhere to them rigidly on every operation.

Conclusion

The statistics prove that wire-strike accidents continue to happen and that they can be lethal.

Two key factors to avoid becoming a wire-strike statistic are to understand the limitations of the human eye and to be aware of the visual illusions that can trap you.

Learn as much about the wire environment as you can – such as the sizes of wire and nature of structures on different distribution systems from major pylons down to small private feeder lines. Be aware of all the different types of wire hazards such as powerlines, telephone lines, flying-fox cables, electric fences, etc.

Using this knowledge, gather information, carry out a reconnaissance at a safe height, and apply appropriate avoidance techniques.

In multi-crew situations, carry out joint training to ensure efficient teamwork and use of all resources – the key is education and communication. A pro-active approach to wire-strike avoidance will save lives, aircraft, and your business.

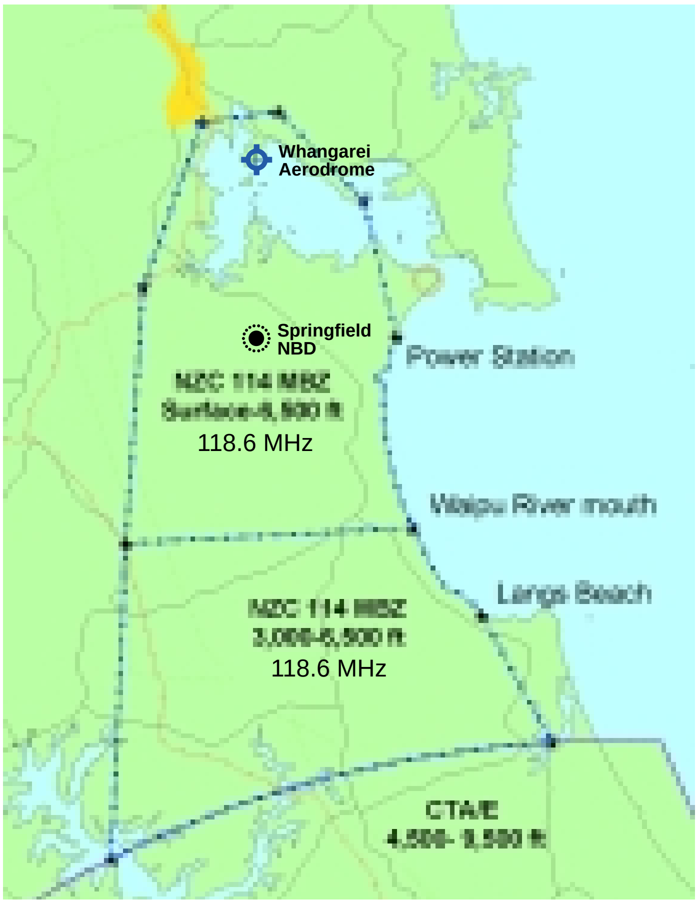
Above all, whether flying alone or in a crew situation, maintain a disciplined approach to the job. ■

Whangarei Airspace Changes

On 27 January 2000, the current Whangarei mandatory broadcast zone (NZC116) and approach conditional area (NZC117) will be de-activated and replaced by a new mandatory broadcast zone (NZC114).

This change has come about after consultation with local operators who requested the change. It was felt that one large MBZ that encompassed the Whangarei aerodrome would afford pilots a greater level of safety than did the old approach conditional area and its adjacent MBZ. Having just one type of special use airspace will also ensure that all aircraft are radio-equipped and make regular position reports. In addition, landing or anti-collision lights must be on (if fitted).

Refer to AIP *Supplement* AIRAC cycle 00/1 (effective 27 January 2000) for further details on the changes to this airspace. The AIP is always the official source of such changes, and the current Supplement should be checked prior to any flight. If you regularly fly through the Whangarei area, you may wish to attach a copy of the AIP *Supplement* illustration to your current chart until 15 July 2000, when the new aeronautical charts are published. The 15 July 2000 Topographical Chart will not only reflect these changes, but also will depict the final instrument approach track from the Springfield NDB to the aerodrome in the same way that the Taupo VTC does. This will help VFR traffic to determine more accurately where IFR aircraft are likely to approach from. ■



Woodbourne and You

Woodbourne air traffic controllers report that some pilots continue to misunderstand ATC clearances and instructions when operating in and around the Woodbourne Control Zone (CTR). Up to two non-compliances with ATC procedures by pilots are occurring each week, with itinerant pilots being a particular problem. Woodbourne controllers are finding that a significant proportion (up to a quarter) of itinerant pilots are having problems complying with the clearances and instructions issued to them – a situation that is not particularly satisfactory.

Incidents have included:

- aircraft holding to the east of the Woodbourne aerodrome (ie, in the middle of the instrument approach sector) when they have been asked to hold to the north or south of it;
- pilots not being familiar with the location of important reporting points (this includes some pilots navigating with reference to out-of-date VTCs);
- aircraft in the Omaka circuit infringing the Woodbourne circuit; and
- pilots changing the runway in use at Omaka without informing the Woodbourne Tower.

Pilot Disorientation

Much of the confusion about holding to the north of Woodbourne (to remain clear of the instrument arrival/departure fan) seems to be due mainly to geographical disorientation. This appears to be a particular problem for southwest-bound traffic originating from the North Island (especially Wellington, see accompanying diagram) wishing to enter the Woodbourne CTR. Some pilots believe that they are approaching the CTR/aerodrome from the north when in fact they are directly to the east.

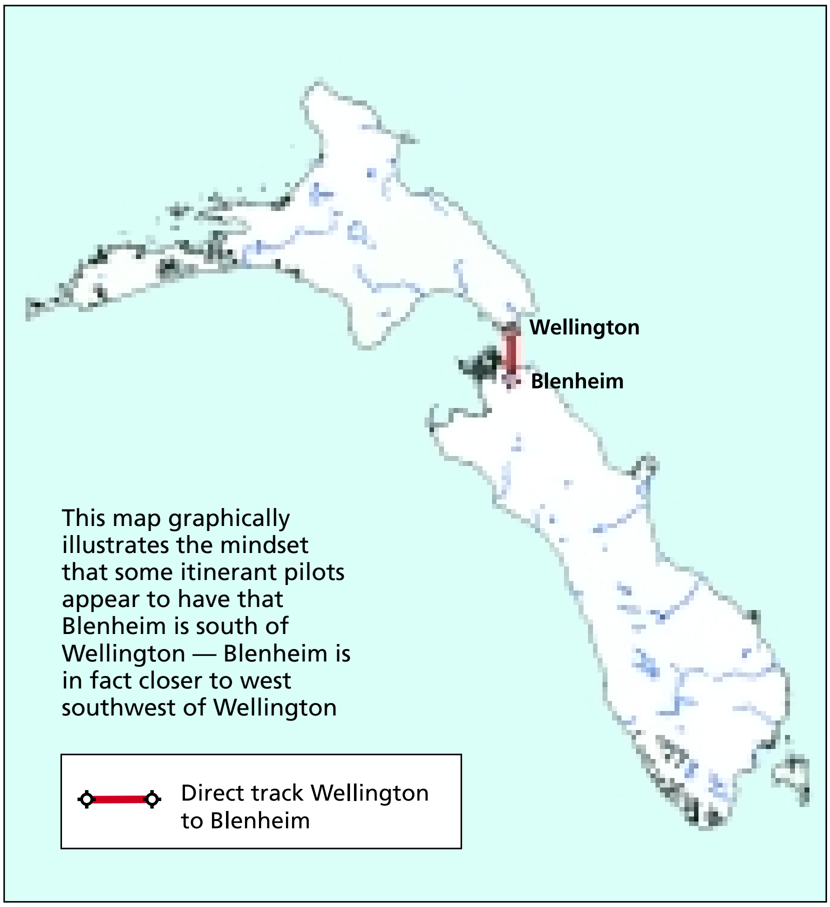
"Omaka is unique in that it is an uncontrolled aerodrome that is in very close proximity to a controlled aerodrome…"

Traffic originating from the south that is bound for Woodbourne or Omaka has a similar problem. Pilots often believe that they are to the south of the Woodbourne CTR and make a joining call to that effect, when they are really to the west (eg, in the Wairau Valley). This means that inaccurate traffic information may be passed to outbound aircraft or other joining aircraft, thus increasing the risk of a conflict.

Inaccurate position reports due to pilot disorientation within the CTR can cause confusion too. For example, if an aircraft cleared to join Omaka from the east reports its position as being several miles to the north of the field, when in fact it is to the east, the result is confusion. The controller would momentarily think that the aircraft had strayed into the middle of the instrument arrival/departure fan, while any traffic climbing out of Woodbourne to the east might have to take evasive action.

These disorientation problems highlight the north-south mindset we all tend to have of New Zealand's orientation. A common assumption is that the two islands are aligned north to south, when in fact they are orientated northeast to southwest. The Wairau valley system, in which Woodbourne and Omaka are located, is orientated east to west, and this adds to the confusion.

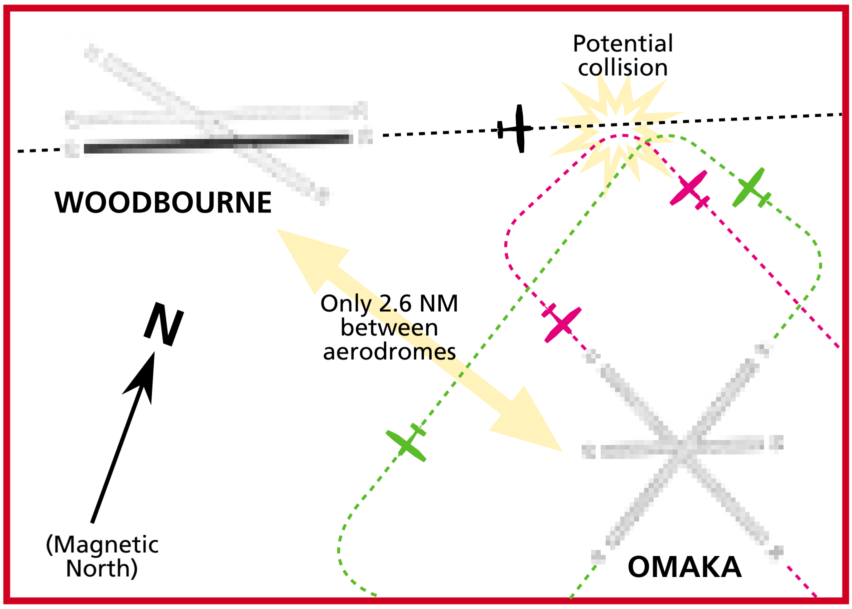
When departing Omaka to the south, many pilots accept a clearance to vacate the Woodbourne CTR to the south and then proceed east to White Bluffs and follow the coastline. If this is combined with a quick over-fly of Blenheim, the result can cause unexpected difficulties for both controllers and other traffic. Always think about your departure track before getting airborne – confirm direction and anticipated heading.



This map graphically illustrates the mindset that some itinerant pilots appear to have that Blenheim is south of Wellington — Blenheim is in fact closer to west southwest of Wellington

If you want to detour over the township, make sure your clearance allows for that. If you want to deviate from the clearance given, then make the appropriate request to ATC – they will only disallow it for a very good reason.

In order to address these problems, the four CTR sectors were renamed and three new reporting points were introduced in the middle of last year, but pilot disorientation continues. Woodbourne controllers do their best to keep things simple by asking pilots to report at easy-to-find reporting points and by issuing simple clearances and instructions. But the Woodbourne Tower does not have radar coverage, and it operates procedurally, so controllers rely on pilots making accurate position reports.



Aircraft late downwind in the 12 circuit at Omaka can easliy conflict with traffic climbing off 07 at Woodbourne.

Aircraft making a wider-than-normal circuit for 01 at Omaka may also conflict with traffic climbing off 07 at Woodbourne.

When making a position report approaching any aerodrome, it is good practice to check the compass and directional indicator (DI) to confirm your bearing (eg, if the DI indicates a northwest heading, then you are southeast of the aerodrome) before making the call. If you are reporting your position using a geographical point, it is still important to monitor the compass and DI to ensure that you maintain an awareness of your position relative to the aerodrome.

Overlapping Circuits

Infringements of the Woodbourne circuit by traffic operating in the Omaka circuit also continue to be a problem. Woodbourne is only 2.6 nautical miles to the west of Omaka, and circuits conducted on Runways 01 or 12 at Omaka have the potential to cause conflict with Woodbourne traffic (see accompaying diagram).

Omaka is unique in that it is an uncontrolled aerodrome that is in **very** close proximity to a controlled aerodrome that can have a reasonably high number of traffic movements. Omaka is one of only two unattended aerodromes in the country that are contained within a control zone, but it does not have the added protection of an ATZ around it. It is therefore important that pilots (especially itinerant pilots) are familiar with, and abide by, the local procedures (check the notes on the Omaka aerodrome chart). The following are points to consider when operating out of Omaka:

- All aircraft wishing to depart the Omaka circuit must obtain a clearance from the Woodbourne Tower during its hours of service. It is vital that Woodbourne tower knows about **all** traffic movements within the CTR.
- All aircraft must notify the Woodbourne Tower that they have landed at Omaka.
- Aircraft wishing to operate in the Omaka circuit must first call the Woodbourne Tower and state their intentions (ie, the runway they wish to use and the duration of the flight). While circuit movements are uncontrolled, pilots should be prepared to comply with instructions from the Woodbourne Tower so that adequate separation is maintained from aircraft arriving or departing the Woodbourne circuit. Pilots should also notify Woodbourne Tower if they wish to change the runway in use at Omaka or conduct cross-wind circuits – this is important.
- It is important that pilots maintain an awareness of their position relative to the Woodbourne circuit, particularly when in the 01 circuit or late downwind in the 12 circuit. Circuit patterns should be kept **tight** when using these runways.
- If you are a visiting pilot, ensure that you are familiar with local procedures – ringing ahead to obtain a briefing from a local operator is always a good idea.

New Frequency

Pilots should note that both Woodbourne and Omaka have a new attended/unattended aerodrome frequency, 122.8 MHz. This change occurred after the VFG was published but has been promulgated by VFG Change Notice. Pilots should be using this new frequency, which has better coverage than the old 118.1 MHz (this is now the secondary frequency for Woodbourne). Omaka uses 122.8 MHz only.

"A common assumption is that the two islands are aligned north to south, when in fact they are orientated northeast to southwest."

Summary

Being able to successfully navigate your way around an unfamiliar control zone, and to comply with joining instructions, comes down to being prepared. Disorientation and confusion can be avoided by studying the topography, airspace, reporting points, and local procedures (on **up-to-date** charts) well in advance of the flight.

If you are ever unsure of your position relative to an aerodrome, use the aircraft DI to establish a bearing, then estimate your distance and report position accordingly. This method of reporting position is preferable (and likely to be more accurate) in situations where it is difficult to give a precise geographical position report.

Potential conflicts with Woodbourne traffic can be kept to a minimum when joining, vacating, or operating in the Omaka circuit by being familiar with, and abiding by, the local procedures. A common-sense approach, good situational awareness, and a good lookout should be maintained at all times when judging your proximity to the Woodbourne circuit – the wider the berth you can give it the better.

Finally, if you are ever unsure how to comply with an ATC instruction or clearance, ask the controller for confirmation of what it is they want you to do and they will usually be more than happy to help. ■

How To – Fill the gap

The CAA publishes two series of information booklets.

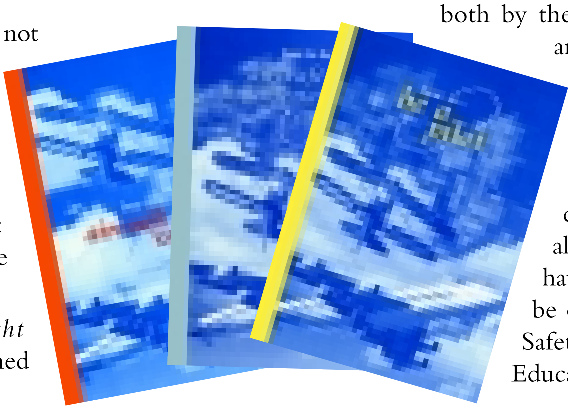
The **How To** series aims to help interested people navigate their way through the aviation system to reach their goals. The following titles have been published so far:

How to be a Pilot	*Published*	*1998*
How to Own an Aircraft	*Published*	*1999*
How to Charter an Aircraft	*Published*	*1999*
How to Navigate the CAA Web site	*Published*	*1999*
How to be an Aircraft Maintenance Engineer	*Published*	*1999*

The **GAP** (**G**ood **A**viation **P**ractice) series aim to provide the best safety advice possible to pilots. The following titles have been published so far:

Winter Operations	*Published*	*1998*
Bird Hazards	*Published*	*1998*
Wake Turbulence	*Published*	*1998*
Weight and Balance	*Published*	*1998*
Mountain Flying	*Published*	*1999*
**Flight Instructor's Guide*	*Published*	*1999*
Chief Pilot	*Published*	*2000*

How To and **GAP** booklets (but not *Flight Instructor's Guide*) are available from most aero clubs, training schools or from Field Safety Advisers (FSA contact details are usually printed in each issue of *Vector*). Note that *How to be a Pilot* is also available from your local high school.



Bulk orders (but not *Flight Instructor's Guide*) can be obtained from:

The Safety Education and Publishing Unit
Civil Aviation Authority
P O Box 31-441, Lower Hutt
Phone 0–4–560 9400

* The *Flight Instructor's Guide* can be obtained from either:

- **Expo Digital Document Centre**, P O Box 30–716, Lower Hutt. Tel: 0–4–569 7788, Fax: 0–4–569 2424, Email: expolhutt@expo.co.nz
- **The Colour Guy**, P O Box 30–464, Lower Hutt. Tel: 0800 438 785, Fax 0–4–570 1299, Email: orders@colourguy.co.nz

Chief Pilot GAP

Chief pilots have a difficult job – often thrust between the rock of commercial pressures and the hard place of meeting a myriad of safety requirements.

A new **GAP** has been produced by the CAA, with the help of experienced and successful chief pilots, to assist newcomers to the role. The booklet outlines what is expected of a chief pilot, both by the CAA and by company management, and it provides advice on how to achieve these goals.

Checklists are provided to help chief pilots get the details right. This booklet is available free for anyone who is considering becoming a chief pilot, or is already in the role, as well as those who have a more general interest. Copies may be obtained through your local CAA Field Safety Adviser or by contacting the Safety Education and Publishing Unit. ■

Alcohol and Flying Don't Mix

There have been several recent alcohol-related incidents recently – never underestimate the dangers of mixing alcohol and flying. This applies at all levels of flying activity, from microlights to 747s.

While most pilots have a responsible attitude towards alcohol and flying, there are still some who just don't seem to understand that flying while under the influence of alcohol, or with a hangover, is dangerous and irresponsible.

You should **never** attempt to pilot an aircraft unless you are confident that your blood alcohol level is **zero** and that you are free from the effects of a hangover. Only you will know whether you are safe to fly or not (or at least you should) so be honest with yourself. Avoid a late night and too many drinks if you intend to go flying the next day. Remember that your body takes time to metabolize alcohol (approximately one standard drink per hour), and while your blood alcohol level may have returned to zero by the following day, it is possible that you may not be free from the effects of a hangover. Flying can be a demanding discipline at the best of times, so don't make it any more difficult than it is by flying with a hangover.

Plan ahead and think moderation. Alcohol and flying don't mix, so **don't take the risk** – it's not worth it. ■

R22 Conversion

The Robinson Helicopter Company observes that there have been several unexplained helicopter accidents involving "high time fixed-wing pilots" who had converted to R22 helicopters. We should ask ourselves why these accidents, and others involving low-inertia rotor helicopters, might have occurred? John Clements (CFI North Shore Helicopter Training) believes that some fixed-wing pilots making the transition to the R22 in particular, can get themselves into trouble and that this has been a contributing factor in a number of fatal New Zealand helicopter accidents. In this article he explains what can go wrong and offers some strategies that should help reduce the risks.

There are operators throughout the world who have used the Robinson R22 extensively for many years with no incidents of note. One operator has used 10 or more R22s for years with no incidents at all. At North Shore we have operated R22s for about 14 years and have had but one training accident (rollover on liftoff), which was entirely preventable. This incident does highlight, however, that one must be ever vigilant and **concentrate at all times**.

We have no doubts about the reliability and integrity of the R22. It is a splendid helicopter so long as it is used sensibly. So why might pilots who have learnt to fly in fixed-wing aircraft experience problems when converting to the R22? Here are a few reasons why and some safety tips.


Photograph courtesy of North Shore Helicopter Training

Never Let Go of the Cyclic

In an aeroplane it is standard procedure to trim the aircraft and take both hands off the controls. In an R22 it is okay to take your hand off the collective lever but **not the cyclic stick**. If you do, the helicopter will quickly roll, and any subsequent grabbing of the cyclic to correct the roll may lead to mast bumping, rotor head separation, and death. Some fixed-wing pilots may have fallen into this trap. Always use the cyclic trim for cruise flight. It does not entirely 'trim' the helicopter but makes the cyclic far less floppy. You can also use a bit of cyclic friction to assist you.

Performance Graphs

We have found that **some** helicopter performance graphs (including the R22's) can be too optimistic. For fixed-wing aircraft it is standard operating procedure to calculate takeoff and landing performance by reference to the performance charts. In an R22 you don't need to do that. You need to do your own performance check, which you will be taught. For takeoff it is very simple. If you need to climb out steeply, you need two inches of manifold pressure available over what is required to hover. If you haven't got that, **don't even think about it!** You can try going vertically to see whether you can clear obstacles in front of you, but if you can't get above them **don't go. Never fly at the obstacle(s).**

Resist the Urge to Pull Back

A run-on landing may be necessary in certain emergencies. In fixed-wing aircraft it is instinctive to pull back on the stick when approaching the ground (round-out). With helicopters, it is necessary to ease forward on the cyclic when approaching the ground to remain in translational lift and to level the skids – thus avoiding a heels-down landing and possible nose-down bounce. So when you have that urge to 'pull back' – **don't** – ease forward instead.

Converting Excess Speed to Height

The basic fixed-wing technique for an engine failure is to close the throttle and convert excess speed to height. This procedure gives you an initial climb, which is quite comforting. In R22s, and other low-speed helicopters, that does not work.

If you **think** the engine is beginning to lose power, then **lower the collective lever partially or fully** (you have a very limited amount of time in which to do this). If you have any excess speed after lowering the collective lever (unlikely at R22 cruise speeds), you can flare slightly. This will help with rotor RPM but not much else. In the event of an engine failure, you must be prepared to lower the collective lever and actually initiate quite a high rate of descent. It is a completely different technique that, unrecognised, may have cost some fixed-wing pilots dearly.

Stalling Characteristics

An aeroplane wing generally stalls at low speed; a helicopter blade stalls at a much higher speed (ie, retreating blade stall). The recovery action is the same – to reduce the angle of attack. But the method of achieving it is quite different. For fixed-wing aircraft the pilot must push the control column forward to unstall the wing. But for a helicopter, the pilot must first **lower the collective lever** to reduce angle of attack and then apply **back cyclic stick** to slow the helicopter down.

The instinctive action for a fixed-wing pilot may, therefore, be to push the cyclic forward rather than lower the collective lever. Such an action might slightly reduce the angle of attack but will **increase** IAS to the degree where the rotor will probably stall anyway – a terminal experience that is to be avoided! Note that if the IAS is approaching V_{NE}, lower the collective lever slightly and reduce the airspeed to avoid the possibility of retreating blade stall.

Navigation Logs

Keeping a navigation log card up to date is relatively straightforward when flying a fixed-wing aircraft. It is simply a case of correctly trimming the aircraft and taking your hands off the control column to update the log. Not so easy when flying a helicopter though – especially the R22. Even if one is left-handed it is not sensible to try to keep a log card. You must concentrate on flying the helicopter and **never let go of the cyclic stick!** Keep a mental nav log instead. You might consider asking a passenger (if you have one on board) to write down information for you. Good flight planning and preparation is the key to success.

Use the R22 sensibly and you won't have a problem. Push the envelope and it will bite. Read this article often – especially if you are a fixed-wing pilot. ■

Safety Videos

The following safety videos are available. The New Zealand titles have been produced for the CAA by Dove Video Productions. Note: the instructions on how to borrow or purchase are detailed at the bottom of this item (ie, don't ring the editors.)

Civil Aviation Authority of New Zealand

Airspace and the VFR Pilot – 47 min, 1992
A light aircraft flight from North Shore to Ashburton exposes two VFR pilots to the world of controlled airspace.

Apron Safety – 14 min, 1992
Aviation workers and those using airfield aprons are exposed to a number of potential hazards. This video highlights the potential dangers on the tarmac, and in particular the problems associated with inadequate passenger supervision between the terminal and the aircraft. The examples and advice are relevant for anyone involved in working at an airport, and this very much includes pilots.

Collision Avoidance – 20 min, 1993
What causes aircraft to collide? How is it best to avoid a collision? This video examines the problem, including collision-risk levels, traffic awareness, use of radio, scanning techniques, etc. (The limitations of the human eye aspect is covered in *Mark 1 Eyeball*.)

Decisions, Decisions – 30 min, 1996
When flying we make one decision after another, but are they always right and on what basis are they made? While in the past pilots made decisions, good or bad, based largely on their experience, research has now shown that pilots can be trained to make better decisions, whatever their experience level. This video will help you analyse your own responses and work towards improving your decision-making.

Drugs and Flying – 21 min, 1995
Drugs and flying are incompatible. This programme looks at the adverse affects that drugs (both recreational and medicinal) can have on your performance as a pilot. It details the types of medication that pilots must avoid prior to flying an aircraft.

ELBA – 14 min, 1987
This video looks at the function, uses, and limitations of the emergency locator beacon (now more commonly called an ELT). It outlines from a Search and Rescue point of view what you can do to help reduce the number of false ELBA activations.

Fatal Impressions – 6 min, 1995
This short video carries a vital message, namely, "Low flying can kill". Ideally, it is the sort of video that makes good viewing before a group discussion on the topic of low flying.

The Final Filter – 16 min, 1998
At least 75 percent of accidents can be regarded as 'human factor' accidents. This programme looks at the role that the 'human factor' plays in the everyday decisions that we make as pilots in the general aviation environment. It not only looks at how we can better understand and evaluate our performance as safe pilots, but also presents a number of scenarios that help illustrate how that performance can be influenced. We are ultimately 'the final filter' in the decision-making process. Understanding how to evaluate our performance in different situations can allow us to break the chain of events that can lead to an accident.

Fit To Fly? – 21 min, 1995
Pilots must apply self-discipline when assessing their everyday fitness to fly. This video examines how to conduct this self-assessment of your physical and mental well-being. It explains what steps you are required to take if you detect a medical problem that may affect your performance in the cockpit.

Fuel in Focus – 35 min, 1991
What is fuel? What are the problems associated with its use in aviation? This video covers the fundamentals of fuel ie, flammability and static electricity, contamination and the health aspects in handling fuel. It covers practical fuelling procedures, and other aspects such as fuelling from drums and cans.

Fuel Management – 32 min, 1991
There have been many accidents over the years as a result of poor fuel management. This video looks at how to manage fuel and fuel systems when flying a light aircraft. Topics covered include: pre-flight planning and checks, understanding your aircraft's fuel system, managing fuel usage, and leaning techniques.

It's Alright if You Know What You Are doing – Mountain Flying – 32 min, 1997
This programme views the topic through the eyes and comments of several pilots with a wealth of experience in the particular skills and knowledge required for flying in areas of mountainous terrain. Both fixed-wing aircraft and helicopters are catered for. The comments cover weather, planning, illusions, awareness, techniques, and more – with the key message being to stay within both your limits and those of the aircraft. The comments are recorded against a background of some magnificent footage of a variety of aircraft operating in the high country of southern New Zealand.

Mark I Eyeball – 24 min, 1993
Seeing is believing. Or is it? This video describes and illustrates some of the limitations of the human eye. The associated topic of seeing and avoiding other aircraft is covered in Collision Avoidance.

Mind That Prop/Rotor – 10 min, 1994
The human body offers little resistance to the motion of an aircraft propeller or a helicopter blade. This video shows how accidents involving people being struck by propellers and rotor blades can occur, sometimes with fatal results. It also emphasises the pilot's responsibility regarding the safety of passengers and others around aircraft.

Momentum and Drag – 22 min, 1998
This video looks at the two important values, momentum and drag, and how these differ in different classes of aircraft. Understanding the differences is crucial when transitioning from one class of aircraft to another. The topic is relevant for all pilots, whether they fly a microlight or a wide-body jet. It is particularly important if a pilot plans to convert from one end of the scale to the other, but even moving from a Cherokee to a microlight, for example, can be hazardous.

On The Ground – 21 min, 1994
This video is a wide-ranging guide to operating safely on aerodromes, particularly the larger airports. Runway and taxiway markings, standard marshalling signals, taxiing tips, and windsock indications – it's all there.

Passenger Briefing – 20 min, 1992
This video opens with a dramatic courtroom scene, which demonstrates the importance of always briefing passengers before a flight. The video will be of interest to all pilots and operators, no matter how small or large your aircraft or operation.

Radar and the Pilot – 22 min, 1990
This video is an introduction to the uses and limitations of air traffic control radar for pilots. The video covers primary radar and secondary surveillance radar, radar coverage, shows the SSR radar screen display, and outlines the radar flight information service.

Rotary Tales – 10 min, 1999
Over a recent five-year period there were 133 accidents in New Zealand involving helicopters. Thirteen pilots died and 19 passengers. There were, during this same period, many more incidents involving helicopters that came very close to being accidents. This video consists of two short sketches that carry safety messages for all helicopter pilots.

To The Rescue – 24 min, 1996
This video covers all aspects of transporting passengers in need of medical attention, whether from an accident site, or during inter-hospital transfers. The emphasis is on the view that these passengers should be able to expect at least the same level of safety as that offered any fit and well passenger. Pilots must avoid being captured by any sense of drama.

You're On Your Own – 15 min, 1999
Flying single-pilot IFR, particularly in light twins, is the most demanding of tasks and yet, so often, it is undertaken by the least experienced. This video is designed to assist you to better understand IFR cockpit management and flight planning issues. It emphasises the need for careful pre-flight planning, thinking ahead, and being aware of both the aircraft limitations and your own limitations as pilot. Pilots who regularly fly in this environment also offer some practical advice.

Weight and Balance – 16 min, 1987
This is a theoretical and practical look at the weight and balance problems affecting light aircraft, including a flight preparation simulation.

We're Only Human – 21 min, 1999
This video looks at the compromise between our physiology, the environmental demands of flight, and the design limitations of our aircraft – and how these can affect our performance as pilots. It takes a close look at the effects of flight on our physiological and sensory systems and investigates the influence of cockpit ergonomics.

We're Only Human complements our previous release *The Final Filter*, which deals with decision-making aspects of the 'human factor'. Other titles relevant to our minds and bodies are *Mark I Eyeball, Fit To Fly?, Drugs* and *Flying*, and *Decisions, Decisions*.

Wirestrike – 16 min, 1987
Every year there are incidents involving light aircraft and wires. This video attempts to show the nature of the problem and how best to avoid a wirestrike.

Also available

Working With Helicopters – 8 min, 1996
(re-release date)
A brief look at the practical aspects of working around helicopters.

(Note that the above programmes have been produced over a number of years using three formats, Low-band, SVHS and Betacam. Programmes are being progressively replaced, and it is the intention to eventually offer all programmes in Betacam.)

Civil Aviation Authority, Australia

The Gentle Touch – 27 min (Making a safe approach and landing.)

Keep it Going – 24 min (Airworthiness and maintenance.)

Going Too Far – 26 min (VFR weather decisions.)

Going Ag – 19 min (Agricultural operations.)

Going Down – 30 min (Handling emergencies)

To Borrow: Tapes may be borrowed, free of charge. Contact CAA Librarian by fax (0–4–569 2024), phone (0–4–560 9400) or letter (Civil Aviation Authority, PO Box 31–441, Lower Hutt, Attention Librarian). **There is a high demand for the videos, so please return a borrowed video no later than one week after receiving it.**

To Purchase: Obtain direct from Dove Video, PO Box 7413, Sydenham, Christchurch. Email dovevideo@yahoo.com. Enclose: **$10 for each title** ordered; plus **$10 for each tape** and box (maximum of 4 hours per tape); plus a **$5 handling fee** for each order. All prices include GST, packaging and domestic postage. Make cheques payable to "Dove Video".

Special VFR

Most of us should be familiar with the VFR meteorological minima associated with operating an aircraft in a control zone, below which we must have a Special VFR (SVFR) clearance. Sometimes, however, it is not clear if air traffic control (ATC) are obliged to issue this clearance or whether the pilot must request it. In this article we explore this question and look at what operating under a SVFR clearance means to you as pilot in command.

What is SVFR?

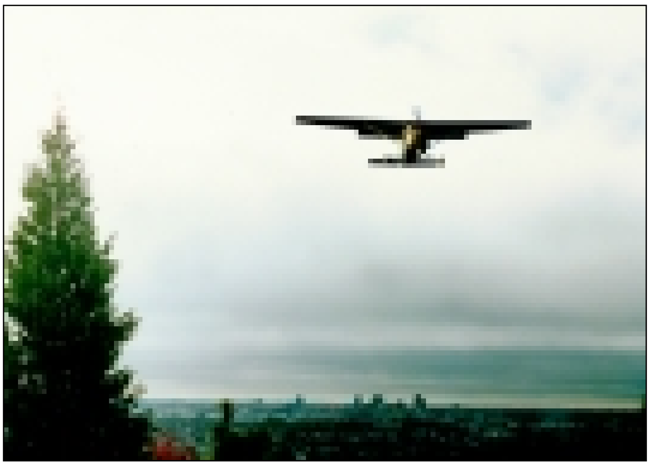
A Special VFR clearance allows you to perform a VFR operation within a **control zone (CTR),** provided certain conditions are met, in weather conditions that are less than the VFR meteorological minima prescribed for that airspace.

VFR Meteorological Minima within a CTR		
Airspace	**Distance from Cloud**	**Flight Visibility**
Class C or D Control Zone	2 km horizontally 500 feet vertically	5 km

VFR Met Minima at Aerodromes within a CTR		
	Cloud Ceiling	**Flight Visibility**
Day and Night	1,500 feet	5 km

When Does SVFR Apply?

A controller will issue, or you can request (this point is discussed later in the article) a SVFR clearance to operate within a CTR when the weather conditions fall below the minima outlined in the accompanying tables.



What Does Being SVFR Mean?

While being cleared SVFR allows you greater flexibility to operate when conditions are below those required for normal VFR operations, it does have some restrictions attached to it. To comply with these the flight must be conducted in the following way:

- Clear of cloud.
- By day only.
- In an aircraft that is radio equipped.
- In compliance with any ATC clearances and instructions.
- With a cloud ceiling of not less than 600 feet and a visibility of no less than 1500 metres. Note that helicopters may operate below these minima provided that they comply with some additional criteria, which are outlined in rule 91.303 *Special VFR weather minima*.

Compliance with the above criteria does not, however, mean that you will automatically be granted a SVFR clearance. Air traffic control have additional separation requirements that apply between SVFR and other aircraft, and they may decline a request to operate SVFR in times of high traffic density (particularly when IFR traffic is on instrument approach or departure). It should also be stressed that a SVFR clearance is **not** an authorisation to operate below the minimum legal height for VFR flight, and it should never be used as an excuse to 'push the limits' a little further. It is simply a clearance that allows you to continue operating in a CTR below visual meteorological conditions (VMC), but within more stringent parameters.

If you wish to transit a control zone SVFR, you should relay an ETA for the selected entry point to the aerodrome controller five to ten minutes before reaching that point. That way your request is more likely to be granted when your aircraft reaches the CTR boundary.

SVFR Clearance – Issued or Requested?

Recent reports suggest that there is some confusion as to whether the onus is on the controller to pass a SVFR clearance to the pilot or whether it is part of pilot-in-command responsibility to request one.

Controllers are required to ensure that they **pro-actively** pass a SVFR clearance to pilots when they know that aircraft are operating in conditions below VMC. This means passing an amended clearance to **all** aircraft operating within the CTR that are affected by deteriorating weather.

On the other hand, there are occasions when a controller will be unaware that weather conditions have deteriorated, or that the aircraft wishes to operate closer to cloud than VMC, and will not know to issue a SVFR clearance. Aerodrome controllers sometimes can't accurately determine what the weather conditions are at the extremities of the CTR, and they rely on pilot reports to form a picture of what is actually happening.

The pilot in command must accept ultimate responsibility for the safe and legal operation of the aircraft. Pilots should request a SVFR clearance when they suspect that conditions have fallen below VMC, or they wish to operate closer to cloud than VMC, and when ATC have not already issued a SVFR clearance. There is no excuse for not requesting one when it is obvious that SVFR conditions apply.

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Summary

For pilots, determining if weather conditions are above VMC during the course of a flight can, at times, be difficult – especially when they are fluctuating. We suggest that if conditions do begin to change during the course of a flight, and you are in some doubt as to whether they are above VMC, that you request a SVFR clearance. That way you remain legal, and the controller becomes aware that conditions have deteriorated and applies the required separation between you and other aircraft.

If you are a controller, recognise that not all pilots will request a SVFR clearance when conditions require them to do so. Utilise pilot reports and weather information to determine if conditions warrant SVFR within the CTR, and pro-actively pass a SVFR clearance if you consider it to be appropriate. ■

Letters to the Editor

Standard Overhead Joins

I write to express the concern of many of our members regarding non-compliance with the standard circuit procedures at unattended airfields and your confusing article in the July/August 1999 issue of *Vector*.

It is our observation, over a number of years, that many incidents could have been avoided if the basic circuit joining procedure was adhered to. These incidents have occurred at fly-ins, Safaris, RNZAC competitions, and at low-density traffic airfields.

I note that in a recent Marlborough Aero Club newsletter they plainly stated that the standard lefthand 1500-foot agl overhead join shall be complied with. Even in places like Paraparaumu, what is wrong with the standard rejoin? Everyone knows where aircraft are likely to appear from? It is imperative that a uniform procedure is worked out and made mandatory if the present rejoining procedure is going to be tampered with or is no longer a requirement.

We have always admired your publications and efforts to improve pilot safety, but the article just fudged and confused this very important safety issue.

The following is part of an article printed in the May 1999 issue of the AOPA magazine:

One of the first things taught to a student pilot is the correct way in which to depart and rejoin the circuit pattern. The reason is very basic – to avoid a mid-air collision. As one of my first instructors bluntly stated, "Do everything possible to avoid a mid-air because it will be your last!" So why do pilots tend to 'switch off' after leaving a controlled environment?

Surely it is commonsense to join at 1500ft agl? The reasons shouldn't need to be mentioned, but to refresh memories: to observe the wind direction, runway in use, traffic in circuit, to give time to plan descent on the non-traffic side, and to make visual contact and identify with the transmissions of other aircraft in the circuit.

A joining aircraft flew straight in at 500 feet for the active runway and failed to make visual, or radio, contact with another aircraft, which was established in the circuit turning onto final at the same height. Positive evasive action had to be taken by the instructor in the circuiting aircraft to avoid a mid-air collision over a built up area!

Other reported incidents of non-conforming circuit rejoining procedures involved a high-performance twin and a turbine helicopter. Both of these pilots displayed a remarkable amount of very poor airmanship and common sense. If these simple procedures had been adhered to these hazardous incidents would not have occurred.

C. James McKenzie
AOPA
November 1999

Vector Comment

Thank you for your letter on this important topic.

We certainly agree that a better understanding of, and adherence to, the standard overhead join by many pilots would reduce the number of incidents at unattended aerodromes around the country. Poor airmanship (or human factors) and a lack of common sense are often factors in a great proportion of joining incidents, as you point out.

The *Vector* article that you refer to was intended to make pilots think about whether the overhead join is **always** the safest way of conforming with an aerodrome's traffic pattern when opposite-direction operations are taking place. It did not intend to discourage pilots from using what is a tried and tested procedure. In fact, it emphasised that the standard overhead join is appropriate at the majority of unattended aerodromes most of the time.

Our research prior to writing the article indicated that there are a number of unattended aerodromes around the country (eg, Paraparaumu, Ardmore, North Shore, and Masterton) where conducting an overhead join while opposite-direction circuits **are in use** could be dangerous.

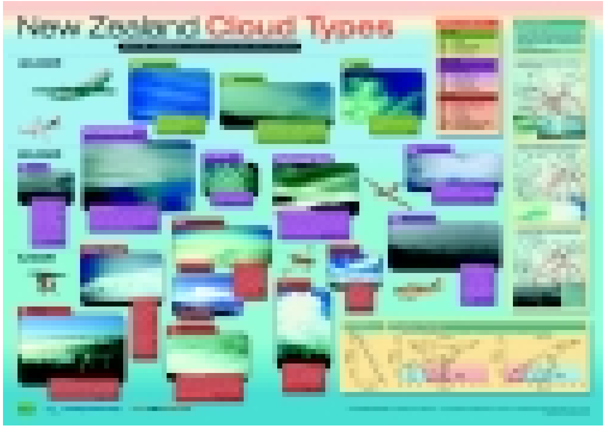
Paraparaumu probably best illustrates the dangers, as it often has gliders and tugs operating in a contra-rotating fashion to powered fixed-wing aircraft. Joining overhead in such a situation would not only mean letting down on top of other traffic, but also could result in a head-on collision with another aircraft already established in the downwind of the opposite-direction circuit.

We take your point about the dangers of joining straight-in, but these are probably less than those associated with letting down on to the active side of a circuit pattern, provided that the pilot ensures that such an approach does not conflict with another aircraft already established in the circuit. We advocate that if a pilot has any doubts about the whereabouts of other circuit traffic that they should remain clear of the circuit pattern until they can safely re-sequence themselves. Joining downwind is certainly preferable to a straight-in approach – a point that we could have expanded on more in the article. It is important to note that joining the circuit directly has certain conditions associated with it (which were not met in the incident that you quote).

We feel that, provided a pilot maintains a good lookout, listening watch, situational awareness, and makes appropriate joining calls, the risks of an incident are small. We don't think that there is any easy answer that can be uniformly applied to the many different situations that occur at unattended aerodromes. The answer would seem to be the application of a 'common sense approach' (based on the standard overhead join) and sound airmanship by pilots. Encouraging pilots to let down into an active circuit traffic pattern would be contrary to this philosophy. ■

New Poster – New Zealand Cloud Types

The CAA, in conjunction with MetService and Air BP, has just released a new poster featuring cloud types.



This large colour poster contains 16 high-quality images of the cloud types that are most relevant to New Zealand aviation – particularly general aviation.

Each image is accompanied by a description of the cloud type and the potential danger that it might pose. Synoptic charts that indicate where some of the more common cloud types occur within different pressure systems are also included, along with cross-sections of idealised cold and warm fronts.

This poster will no doubt be a useful asset to have on the wall of any aviation organisation – especially in the flight-planning room, where most weather forecast interpretation takes place. The poster will not only be a useful training aid for student pilots, but also it will help refresh the memories of more experienced pilots.

Your local CAA Field Safety Adviser will be distributing them free-of-charge to your organisation over the next few months. If for some reason you do not receive one, then please contact them. Their contact details can be found below. ■

New Safety Video

In many forced-landing situations it is possible that some, or all, of the aircraft occupants will receive injuries. As 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.

Survival is a new safety video that has just been released by the CAA. Set at a crash site in the bush, this 19-minute video deals with the actions that you must take as pilot in command immediately following a crash landing and gives advice on how to survive in the open. A WestpacTrust Rescue helicopter paramedic talks about the type of information that rescue services will need from you (assuming that you have cellphone or are in radio contact) to effect a quick and successful rescue. A suggested list of contents for an aircraft survival kit is also included.

This video is relevant to all pilots of all experience levels and should be viewed sooner rather than later, as you never know when you might have to call on such skills. It can be borrowed free of charge from the CAA Library or purchased directly from Dove Video. See *Safety Videos* in this issue. ■

0508 ACCIDENT

The CAA is still receiving a considerable number of accident notification calls on the old 0800 number. We remind readers that the correct toll-free accident notification number is 0508 ACCIDENT (0508 222 433). You should call this number as soon as practicable if you are involved in, or witness, an aircraft accident. The number is staffed 24-hours a day, seven days a week (via the CAA's National Rescue Coordination Centre). The 0508 ACCIDENT number is published in every issue of *Vector*. If you have an 0800 accident number written down somewhere handy, we hope very much you never need to refer to it, but please update it – just in case.

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Publications

0800 GET RULES — (0800 438 785) for CA Rules, ACs, CAA (saleable) Forms, CAA Logbooks, Part 39 Airworthiness Directives, and copies of the *Flight Instructor's Guide.*

CAA Web Site, http://www.caa.govt.nz for CA Rules, ACs and Airworthiness Directives.

0800 500 045 — Aviation Publishing, for AIP documents, including Planning Manual, IFG, VFG, SPFG, VTCs, and other maps and charts.

Accident Notification

24-hour 7-day toll-free telephone

0508 ACCIDENT

(0508 222 433)

CA Act requires notification "as soon as practicable".

Mountain Flying? — Ask the Professionals

OCCURRENCE BRIEFS

Lessons For Safer Aviation

The content of *"Occurrence Briefs"* comprises all notified aircraft accidents, GA defect incidents (submitted by the aviation industry to the CAA), and selected foreign occurrences that we believe will most benefit engineers and operators. Statistical analyses of occurrences will normally be published in CAA News.

Individual Accident Reports (but not GA Defect Incidents) – as reported in *"Occurrence Briefs"* – are now accessible on the Internet at CAA's web site (http://www.caa.govt.nz/). These include all those that have been published in *"Occurrence Briefs"*, and some that have been released but not yet published. (Note that *"Occurrence Briefs"* and the web site are limited only to those accidents, which have occurred since 1 January 1996.)

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 CAA 005 to the CAA Safety Investigation and Analysis Group.

Some accidents are investigated by the Transport Accident Investigation Commission, and it is the CAA's responsibility to notify TAIC of all accidents. The reports which follow are the results of either CAA or TAIC investigations.

ZK-JEM, Cessna A185E, 3 Jan 99 at 1205, Ryans Creek. 5 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence ATPL (Aeroplane), age 38 yrs, flying hours 6469 total, 230 on type, 208 in last 90 days.

The aircraft developed a severe tailwheel shimmy while landing on runway 22 at Ryans Creek. The pilot was flying from the righthand seat, when his left rudder pedal, which was of the stowable type, became unlocked. Deprived of full directional control, the aircraft weathercocked to the right, forcing the left undercarriage wheel assembly to break away. The left leg dug into the ground, tipping the aircraft on to its left side.

Engineering investigation found that one element of the dual cable, which unlocks the stowable pedals, had failed. Additionally, one of the associated locking plates was bent, allowing the locking pin to disengage under load.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 99/2

ZK-GTR, Schempp-Hirth Ventus B/16.6, 4 Jan 99 at 1600, Maramarua. 1 POB, injuries 1 fatal, aircraft destroyed. Nature of flight, private other. Pilot CAA licence nil, age 59 yrs, flying hours 1650 total, 800 on type, 22 in last 90 days.

The glider was on a club-contest task that comprised two laps of a triangular course originating from, and terminating at, Drury. On the fourth leg, ZK-GTR was in company with two other aircraft, but near Maramarua the pilot reported that he was going to land. He did not, however, give any reason for his intention to land. A ground witness observed the glider pitch up from level flight and enter a steep nose-down spiral from which it did not recover before striking the ground.

A post-mortem examination of the pilot found severe coronary artery disease, which probably resulted in an in-flight incapacitation and loss of control. No indication was found of any pre-impact aircraft defect.

Main sources of information: CAA field investigation.

CAA Occurrence Ref 99/1

ZK-JBZ, AESL Airtourer T6, 8 Jan 99 at 1105, Reeve Ad. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 36 yrs, flying hours 230 total, 43 on type, 28 in last 90 days.

Before the flight, the pilot checked the conditions at the aerodrome with the local operator. On arrival overhead, he elected to land on runway 35, with a slight upslope and tailwind. His final approach speed was 80 knots, which resulted in a touchdown some 100 metres past the intended landing point. The pilot decided not to initiate a go-around once on the ground so applied heavy braking, which was insufficient to prevent the aircraft running off the end of the runway and down a bank.

Main sources of information: Accident details submitted by pilot and operator plus further enquiries by CAA.

CAA Occurrence Ref 99/7

ZK-BXM, Sud Aviation Gardan GY80-180, 9 Jan 99 at 2013, Montalto, Canterbury. 3 POB, injuries 3 fatal, aircraft destroyed. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 58 yrs, flying hours 233 total, 115 on type, 15 in last 90 days.

The aircraft was seen to be flying low in poor weather before a crash impact was heard. The aircraft impacted the hillside while turning, presumably in an attempt to avoid the terrain, but had not been configured for flight in poor visibility. Upon impact the aircraft bounced, rolled inverted, continued for a further 60 metres, and then caught fire.

The pilot had checked the destination weather with relatives before departing Gore, but did not request flight planning assistance from the national briefing office. An aircraft seen flying at low level in poor conditions within 30 minutes of his departure from Gore was probably BXM, but there were no other confirmed sightings of ZK-BXM until minutes before the accident.

The pilot had called Christchurch Information one hour and 45 minutes into the flight and requested the cloud cover at Christchurch, but no position report was given at that time. A good radar plot was obtained that showed an aircraft initially at 7500 feet amsl tracking up the McKenzie basin and crossing the Two Thumbs Range before turning down the Rangitata River. After descending towards the Rangitata Gorge the pilot was confronted with very low cloud and reduced visibility. The aircraft track, and witness reports, suggest that the pilot could not have determined a safe heading in such poor conditions.

Main sources of information: CAA field investigation.

CAA Occurrence Ref 99/10

ZK-HNN, Bell 206B, 13 Jan 99 at 2115, nr Waipawa. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 40 yrs, flying hours 3500 total, 1500 on type, 145 in last 90 days.

The pilot of the helicopter was finishing a spray job in near-dark conditions and had just turned his landing and taxi lights on to aid sighting a power line beyond the end of the spray run. As he pulled up at the end of the run, one of the lights failed, popping the circuit breaker through which the other light was also supplied. For reasons unknown, the instrument light circuit breaker also popped, depriving the pilot of instrument indications as well. He attempted to bring the helicopter to a hover and land, but touched down with slight sideways drift causing it to roll onto its side.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 99/20

ZK-HJG, Hughes 269C, 16 Jan 99 at 2100, Jackson Bay. 2 POB, injuries nil, aircraft destroyed. Nature of flight, private other. Pilot CAA licence CPL (Helicopter), age 21 yrs, flying hours 1250 total, 120 on type, 170 in last 90 days.

During the final approach to a river-flat landing area the aircraft began to sink. The 50-kilogram load was jettisoned, but a heavy landing still followed. The pilot believes that he misjudged the tailwind conditions and used an inappropriate approach manoeuvre.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 99/24

ZK-HTU, Enstrom 280FX, 30 Jan 99 at 1815, Hastings. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Helicopter), age 48 yrs, flying hours 556 total, 13 on type, 22 in last 90 days.

The helicopter was on final approach to the operator's home base, when the engine lost power and the rotor rpm decayed. The pilot was able to retrieve rotor rpm but the reduced power available compelled him to land short in a neighbouring orchard. The landing was controlled, but rotor strike with the surrounding trees could not be avoided.

The cause of the engine power loss was the failure of both springs on the inlet valve on one cylinder, resulting in a loss of compression on that cylinder.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 99/158

ZK-RGS, Micro Aviation B22 Bantam, 7 Feb 99 at 1530, Auckland. 1 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 46 yrs, flying hours 370 total, 50 on type, 20 in last 90 days.

Shortly after the aircraft became airborne the engine failed. The pilot did not have sufficient height to reach the airfield and ditched the aircraft in shallow water near the aerodrome. The probable cause of the power loss was a failure of the rear main bearing.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 99/231

ZK-CEX, Piper PA-18, 26 Feb 99 at 2000, Dingle R. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence CPL (Aeroplane), age 24 yrs, flying hours 675 total, 2 on type, 148 in last 90 days.

The aircraft started to yaw while landing on a private airstrip beside the Dingle River. The pilot was unable to maintain directional control and the aircraft ran off the edge of the strip into some trees near the riverbank. Due to the damage and time of day, the pilot activated the emergency locater beacon. The two occupants were rescued the next morning.

The pilot had only two hours experience on type and had performed some circuits on the same day so that he could carry a passenger on this flight. The pilot usually flew an aircraft with toe brakes and was not familiar enough with the Piper Cub's heel brakes.

Main sources of information: Accident details submitted by pilot and operator plus further enquiries by CAA.

CAA Occurrence Ref 99/474

ZK-EVL, Piper PA-38-112, 16 Mar 99 at 1028, Tauranga. 1 POB, injuries nil, damage substantial. Nature of flight, training solo. Pilot CAA licence PPL (Aeroplane), age 23 yrs, flying hours 93 total, 89 on type, 5 in last 90 days.

The pilot had difficulty in locating the threshold of grass runway 25. Its position, as depicted on the Tauranga chart in the VFG, was not as expected due to the work in progress on the eastward extension of sealed runway 25. The pilot landed short of the threshold and ran into a shallow drain. The nosewheel folded back, damaging the propeller and lower cowls.

A NOTAM drawing attention to the work in progress was subsequently issued. The aerodrome operator has since improved the threshold markings of grass 25 and a new landing chart has been issued.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 99/709

ZK-DZC, NZ Aerospace FU24A-950, 9 Feb 99 at 0930, Paturau. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence ATPL (Aeroplane), age 58 yrs, flying hours 20464 total, 7658 on type, 101 in last 90 days.

The aircraft approached with a slight tailwind and encountered a downdraught close to the ground. The pilot under corrected and the right-main landing gear became detached when it touched down short of the airstrip. The right wing was damaged as it settled onto the strip surface.

Main sources of information: Accident details submitted by pilot and operator plus further enquiries by CAA.

CAA Occurrence Ref 99/234

ZK-HSD, Hughes 369D, 28 Feb 99 at 1200, Gisborne. 1 POB, injuries 1 minor, damage substantial. Nature of flight, other aerial work. Pilot CAA licence CPL (Helicopter), age 34 yrs, flying hours 9500 total, 9000 on type, 90 in last 90 days.

While on a fire-fighting operation the helicopter's engine failed at about 150 feet agl. The pilot jettisoned a load of water and carried out an auto-rotational landing into a pine forest. The pilot was able to safely exit the aircraft.

Further investigation revealed a possible defect with the fuel control unit.

Main sources of information: Accident details submitted by pilot plus CAA engineering investigation.

CAA Occurrence Ref 99/459

GA Defect Incidents

The reports and recommendations which follow are based on details submitted mainly by Licensed Aircraft Maintenance Engineers on behalf of operators, in accordance with Civil Aviation Rule, *Part 12 Accidents, Incidents, and Statistics*. They relate only to aircraft of maximum certificated takeoff weight of 5700 kg or less. Details of defects should normally be submitted on Form CAA 005 to the CAA Safety Investigation and Analysis Group.

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

Gulfstream American GA-7

Hydraulic line leaks

The righthand undercarriage leg failed to retract, remaining fully extended. The pilot called for a full-stop landing but made a touch-and-go instead. On the second takeoff, both main undercarriage legs remained at about 30 degrees to the wing, while the nosewheel remained fully extended. GEAR DOWN was selected, and the aircraft landed safely with three green indications confirmed.

One of the landing gear retraction lines was found to have a pinhole in it, allowing hydraulic fluid to escape when GEAR UP was selected.

ATA 2900 CAA Occurrence Ref 98/1126

NZ Aerospace FU24-950

Lycoming bearing damaged

The engine was noticed to be running rough.

Further inspection revealed metal in the oil filters. Engine strip-down report shows signs of detonation in the No 8 cylinder, resulting in the exhaust valve seat dislodging and damage to the cylinder bore. Bearing damage had also been caused by molten aluminium in the oil system. The cause of the detonation could not be determined. TTIS 7498 hrs; TSO 92 hrs.

ATA 8500 CAA Occurrence Ref 98/2382

Partenavia P 68B

Generators fail

The pilot reported the failure of both electrical generators, meaning that only battery power was available. Generator function was restored before landing.

Further investigation could not detect or isolate the reason for the fault. The aircraft was returned to service. Some time later, the fault re-appeared and was traced to a recently overhauled alternator.

ATA 2400 CAA Occurrence Ref 98/1172

Partenavia P 68B

Radio filter fails

Shortly after takeoff, intermittent sparks and a white electrical flame were noticed to be emanating from the front of the lefthand engine in the vicinity of alternator. The lefthand electrical system was isolated and no further problems were experienced. The aircraft returned to the departure airfield.

Inspection revealed that the lefthand engine radio filter had failed, causing sparking that was visible to the pilot through the engine cowling.

ATA 2420 CAA Occurrence Ref 98/1266

Piper PA-23-250

Down-lock spring jams, P/N 83302-21

The lefthand main landing gear failed to show a 'down and locked' indication. A fly past the tower showed that the gear was in fact down and locked.

Further inspection revealed that the down-lock spring had broken and become jammed underneath the down lock, preventing the microswitch from activating.

ATA 3230 CAA Occurrence Ref 98/1663

Piper PA-32R-300

Undercarriage leg fails to lock

During type-rating training, the emergency landing gear was selected to demonstrate how it worked. While all three legs extended, the lefthand main gear failed to lock and give a green indication. A normal gear extension was successfully performed and the aircraft landed safely.

Engineers discovered that when the aircraft was repainted the undercarriage was not masked off, which resulted in moving parts being over-sprayed. This is thought to have caused the unsafe gear indication. The assembly was cleaned and the problem has not since re-occurred.

ATA 3230 CAA Occurrence Ref 98/1546

International Occurrences

Lessons from aviation experience cross international boundaries. In this section, we bring to your attention items from abroad which we believe could be relevant to New Zealand operations.

Australia

Occurrences

The following occurrences come from the November 1997 edition of *Asia Pacific Air Safety* which is published by the Bureau of Air Safety Investigation (BASI), Australia.

Boeing 747-200 – Main landing gear tyres delaminated during takeoff

As the aircraft rotated, controllers observed smoke coming from the mainwheel tyres. Closer examination of the landing gear using binoculars showed substantial damage and tyre loss to at least two of the mainwheel assemblies. The crew was advised of the situation but elected to continue to the planned destination. Advice was received later the same day that the aircraft had landed safely.

Runway 19 was later closed for several hours after inspection revealed the presence of several large pieces of tyre tread and other debris that covered almost the entire length of the runway. A small section of the left gear door actuating rod was also found on the runway.

The investigation confirmed that two tyres on the left inner body gear had failed. Marks on the taxiway showed that the first tyre was flat approximately 500 metres before line-up at the departure threshold.

The second tyre had burst five metres into the takeoff roll. There were score marks on the main runway from both rims for a distance of 1350 metres.

Specialist examination of the recovered tread section for both tyres showed that both had failed as a result of tread delamination. The report advised that the cause for the first delamination was a sudden loss of inflation pressure, most likely caused by foreign object damage. The second tyre delaminated as a consequence of overload due to the first failure. Information received from the operator shows that one of the failed tyres had been retreaded on three previous occasions, and that the other tyre had been retreaded five times.

United Kingdom

Occurrences

The following occurrences come from Summer 1999 edition of *Flight Safety Bulletin*, which is published by the General Aviation Safety Council, United Kingdom.

Piper PA-28-140 – Pilot impaired by alcohol

The pilot reported that he was doing circuits on Runway 20 at Canterbury to maintain currency. Two passengers were on board. Runway 20 has 670 metres of rolled chippings, with the first 487 metres uphill and a further 183 metres level, before the ground drops sharply to the A2 trunk road. The road has lighting poles, and those in the overrun area are of reduced height to minimise the obstacle height.

A witness said the first takeoff run was longer than usual. On the first approach the aircraft appeared high and floated almost to the top of the uphill section before touching down. The second approach was similar. Power was applied about halfway along the final 183 metre flat section of runway, and the aircraft did not appear to get airborne before the runway end. One of the passengers (who was unlicensed) occupied the front left seat. The licensed pilot (who did not hold a flying instructor rating) occupied the front right seat and was wearing only a lap harness. The aircraft left the end of the runway and flew over the A2 road, striking a lighting pole with the right wing before crashing into the tops of trees. There was a fuel spillage but no fire.

A passing motorist assisted and alerted the emergency services, but the three occupants of the aircraft were already safely clear of the wreckage.

The Police took a blood sample, which showed the pilot's blood had an alcohol content of 88 mg per 100 ml. The maximum permitted for motor vehicle drivers in the UK is 80 mg per 100 ml of blood. The CAA has taken action against the pilot.

Cessna 310L – Pilot fails to notice unsafe nosegear warning

The pilot was distracted by a passenger while carrying out checks before landing at Liverpool. Immediately prior to touchdown he noticed there was no green nosewheel indication, although there had not been any aural warning. He applied power and selected GEAR UP but felt the aircraft touch the runway, followed by the right propeller striking the ground. He reselected GEAR DOWN, leaned off the mixtures and switched off the magnetos. The aircraft slid along the runway on its belly and was evacuated. The aircraft was damaged beyond economic repair.

Normal indications are three green lights with all three legs fully down and locked, one red light if any leg does not agree with the selection made, plus a warning horn, which sounds if the throttles are reduced below 12 inches Hg manifold pressure with the gear up or if the red light is illuminated.

The GEAR UNSAFE/IN TRANSIT red light filament was unserviceable before the accident, and the pilot knew this. The warning horn was out of adjustment and only sounded when the throttles were fully closed.

The accident could be explained by the pilot's very late decision to go around and the rapid selection of GEAR UP allowing the aircraft to sink onto the, now unsafe, main gear.

Piper L18C (Modified) – Rapid throttle movement cause over-rich cut

The aircraft was landing at Sandown after banner-towing practice when the pilot attempted to apply full power, but the engine failed to respond. It landed heavily on the right wheel. The landing gear collapsed and the propeller struck the ground, stopping the engine, as the pilot tried to taxi across the perimeter track. The engine and carburettor performed satisfactorily on a subsequent rig test.

The pilot reported that most of the flight had been at 1000 feet with carb heat selected at the time of the power loss. He considered that rapid throttle movement may have caused an over-rich cut. The possible combination of residual carburettor ice and an overly rapid throttle opening would cause a greater divergence from correct mixture than would occur without carb ice.