January / February 2003

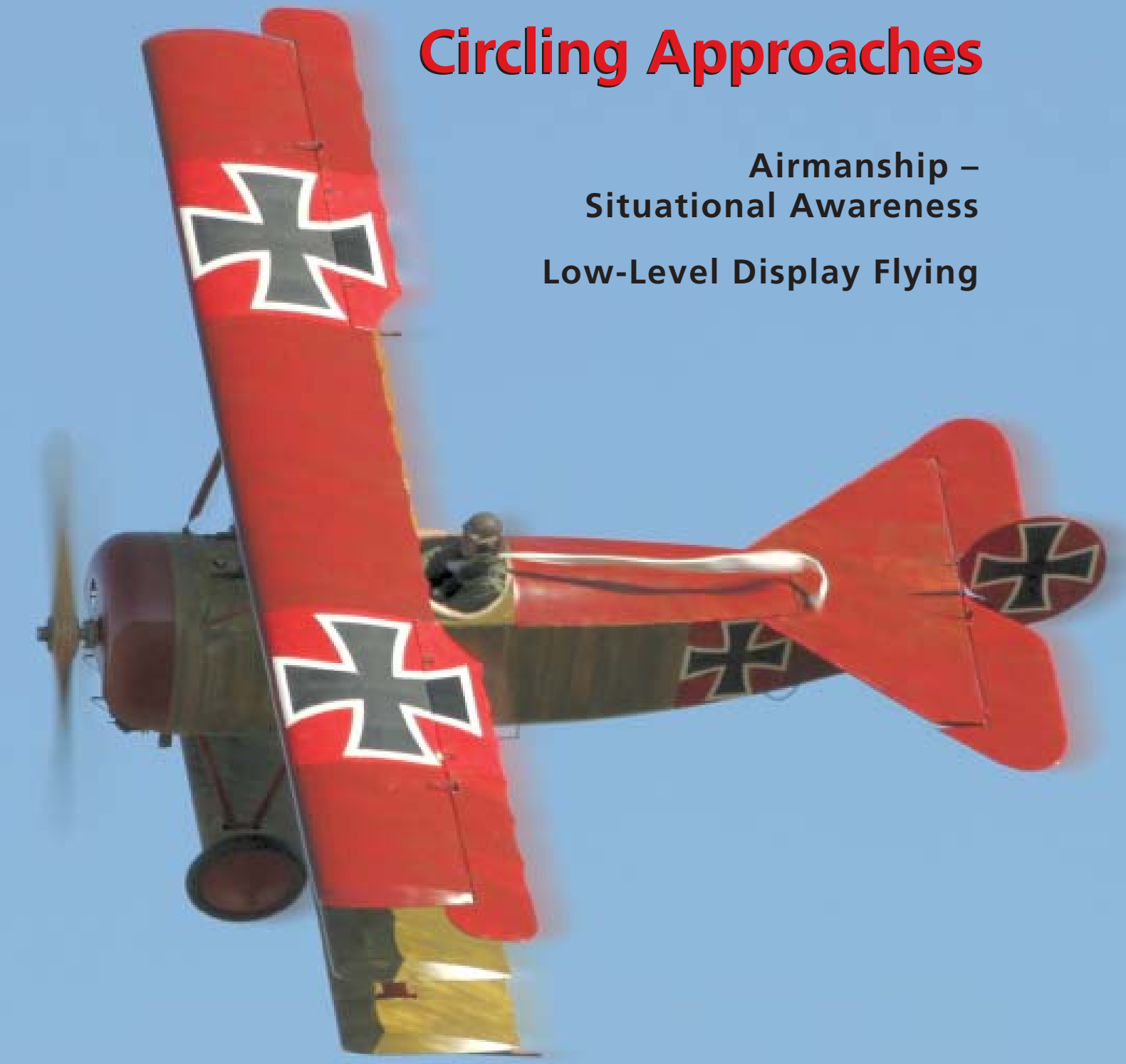
VECTOR

Pointing to Safer Aviation

Circling Approaches

Airmanship – Situational Awareness

Low-Level Display Flying



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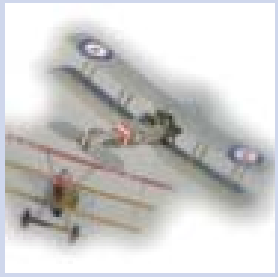

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Cover Photo:
A Fokker Triplane, flown by John Lanham, is put through its paces at the Christmas Wings Air Display at Omaka in preparation for the up-coming Classic Fighters Airshow at Easter. Photograph supplied by Warbirds Over New Zealand.

Circling Approaches

The following has been adapted from 'Hard Landing' by Brent McColl and Andrew Warland-Browne published in the September/October 2001 edition of *Flight Safety Australia*. It addresses the dangers of conducting circling approaches. Although written for Australian IFR pilots, the lessons learnt and advice given are just as relevant to the New Zealand IFR environment, considering our large number of circling approaches. It should be essential reading for all IFR-rated pilots.

The circling approach takes place close to the ground, at low speed, and in poor weather. Without doubt it is one of aviation's most difficult procedures. How can you reduce the risks?

The Accident

At 7:16 pm on Friday 11 June 1993, a Piper Chieftain with seven people on board – two pilots and five passengers – began a visual circling approach at Young Aerodrome in NSW. Conditions were far from ideal. It was dark, there was light rain, and there were significant patches of cloud below the minimum descent altitude (MDA).

To remain clear of the cloud base the pilot descended to 2000 feet amsl, 750 feet above the aerodrome elevation and 400 feet below the MDA.

The aircraft passed over the northern end of the runway heading east, and soon after made a right turn to the south as if joining the right downwind leg for Runway 01. South of the aerodrome, the aircraft made two right turns and headed north as if joining the downwind for the reciprocal runway. At some point the aircraft left 2000 feet on a slow descent. The Australian Transport Safety Bureau (ATSB) later hypothesised that it was possible that "once the pilot-in-command had deliberately descended below MDA to remain clear of cloud, further descent was unintended. A further possibility is that the pilots were distracted by having to deal with a landing gear malfunction." The ATSB were unable to prove conclusively that the aircraft suffered landing gear problems, but there was some evidence to suggest that this might have been the case.

Abeam the aerodrome the pilot once again turned to the east, overflew the aerodrome and joined the downwind for Runway 01 for the second time.

Shortly after, the aircraft turned onto an apparent base leg and crashed into trees 275 feet above aerodrome elevation. All seven occupants of the ill-fated flight were killed.

"Once visual, and having decided to make a landing approach", reported the ATSB, "the pilot-in-command descended below the MDA of 2400 feet in order to maintain visual reference. Having descended below 2400 feet, the minimum obstacle clearance provided at circling altitude was no longer guaranteed."

Circling Approaches – The Risks

The circling approach is one of aviation's most hazardous procedures. A report published by the International Civil Aviation Organisation several years ago concluded that straight-in approaches (those aligned with the landing runway) are 25 times safer than traditional circling approaches.

While the number of airports offering straight-in approaches has increased dramatically with the advent of GPS non-precision approaches, there are still many airports in Australia and around the world where visual circling is required.

The risks can be reduced, but there are no shortcuts. Safe circling approaches demand detailed pre-flight planning, practice, a high degree of situational awareness, discipline, and a willingness to execute a missed approach at the first sign of trouble.

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Circling Basics

Circling begins with the aircraft established clear of cloud in the circling area.

From there it is up to the pilot to manoeuvre the aircraft into position for landing. This may involve one turn or several, and it should be similar to a normal visual circuit.

Each circling approach is different and is affected by a range of factors including: the alignment of the instrument approach and the runway, the location and height of the surrounding terrain, and the weather around the airport. At some airports there are areas where circling is not permitted, say to the east of a north-south runway.

Although circling is something that is only done by instrument pilots, it is strictly a visual procedure. Visual contact with the runway must be maintained at all times, and visibility must be greater than or equal to the minimum specified on the instrument approach chart. If visual reference is lost at any stage you must carry out a missed approach. No ifs, no buts, no excuses. You must start again at the minimum safe altitude or divert to another airport.

Circling Area

Circling can be performed only within a specified boundary known as the circling area. The dimensions of the circling area depend on the performance category of the aircraft. (See Figure A).

The circling area is based on arcs centred on the threshold of all usable runways. These arcs are then joined by tangents. The radius of the arcs vary according to aircraft performance category.

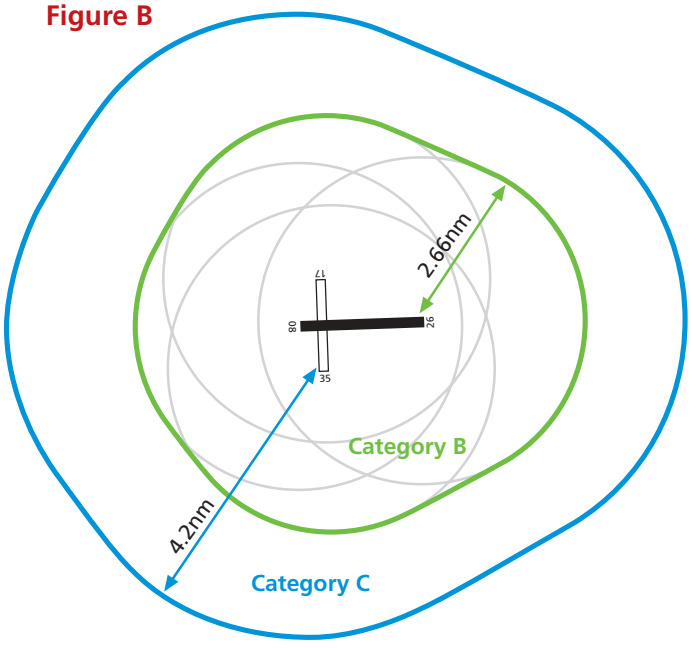
Looking at Portland as an example (refer to Figure B and Figure C), you can see how the circling area is defined. Using the inner Category B example, arcs centred on each runway threshold are drawn with a radius of 2.66 NM (shown in light grey). Straight lines then connect each arc forming the circling area shown in green. Also shown is the slightly larger Category C circling area (depicted in blue) at 4.20 NM, which allows for the larger turning radius of faster Category C aircraft types.

Figure A

Aircraft Category	*Vat (Knots)	Max Speed for Circling (Knots)	Circling Area Radius (NM)	Min Obstacle Clearance (ft agl)
A	<91	100	1.68	295
B	91–120	135	2.66	295
C	121–140	180	4.20	394
D	141–165	205	5.28	394

* Vat based on 1.3 times Vs in the landing configuration at MAUW.

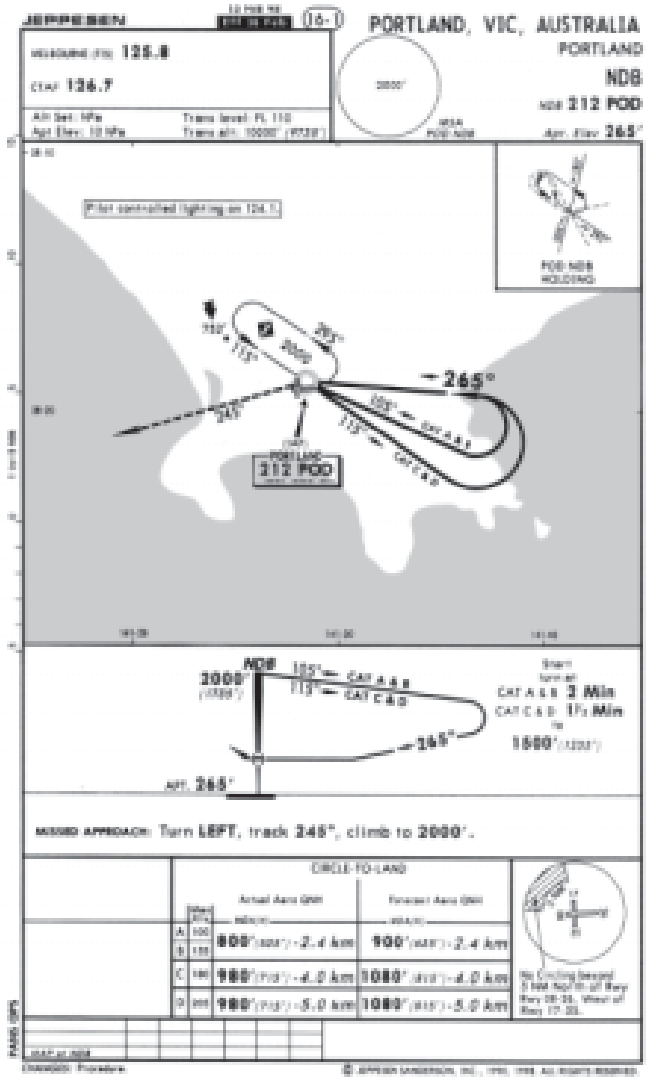
Figure B



A circling restriction is noted at the bottom of the Portland chart due to the high terrain (indicated by the 752-foot spot height) approximately 3 NM to the northwest of the field.

Note that circling restrictions in the New Zealand AIP are denoted by a shaded semi-circle that details specific track information. More specific written instructions are also normally included beneath the approach minima table.

Figure C



Circling Altitude and Descent

Visual circling begins at or above the circling MDA. The MDA is specified on the Instrument Approach Procedure chart.

There are two types of MDAs: a circle-to-land MDA, and a straight-in landing MDA. The straight-in landing MDA is only

applicable if the landing runway centreline is aligned with the final approach segment of the instrument approach. (Aligned in this context means within ±30°of the final approach segment for Category A and B aircraft, or within ±15°for category C and D aircraft.) You may descend to the straight-in MDA only if a straight-in landing is intended. If a circling approach is required, you cannot descend below the circling MDA. (*Refer to the OPS section of the* ***Planning Manual*** *for specific details.*)

You may descend below circling MDA during daylight hours provided that **continuous** visual reference with the runway threshold has been established and **can be maintained**, and that the aircraft is in a position from which a descent to a landing on the intended runway can be made using **normal** manoeuvres and descent rates to the touchdown zone. The aircraft must be within the circling area, and the visibility must also be equal to or greater than that prescribed for the instrument approach procedure.

For descent below circling MDA at night, there is the additional requirement that the pilot must be able to maintain **continuous** sight of the approach lighting or aerodrome lighting. Be aware of the 'black hole effect', as a number of CFIT accidents have occurred during circling approaches at night due to this phenomenon.

Our recommendation would be that you **do not** leave the circling MDA at night until you can maintain a constant 3°descent profile all the way to the runway using the approach lighting system. This is the safest way we know to ensure obstacle clearance.

Plan Your Approach

Consider a circling approach into Portland, Victoria, on a typical Portland winter's day. A front moving east at 20 knots is forecast to arrive at Portland around the same time as you, bringing broken cloud at 1,000 feet, 3,000 metres visibility in drizzle and a wind change from 300°at 15 knots to 190°at 25 knots. Add to that intermittent lowering of the cloud base to 400 feet and visibility down to 2000 metres in drizzle, and a circling approach looks almost certain.

You will also require an alternate. Furthermore, if intermittent conditions are experienced they will dictate a missed approach and possible diversion to your alternate.

As a prudent pilot you will have planned for the missed approach and the flight to the alternate. You will also have planned whether you had sufficient fuel to conduct a further approach to Portland or whether you had to divert immediately.

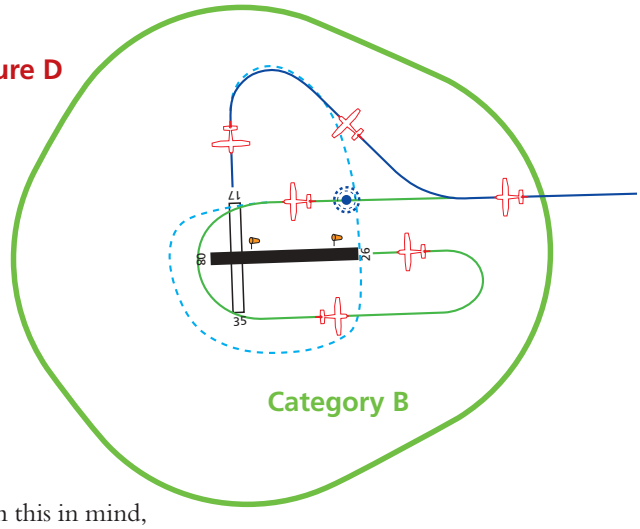
Using the forecast wind for your destination, take out the approach plates for the airport and start examining your options.

Let's assume you are flying a Piper Chieftain (a Cat B aircraft) and you expect to land well before nightfall. The circling MDA is 900 feet amsl on forecast QNH (635 feet above aerodrome level) and you require 2400 metres visibility.

As long as you remain in the circling area and keep clear of obstacles, you are permitted to manoeuvre as required to align the aircraft with the intended runway. (Note: In VMC, you should conform to the published circuit direction.) On arriving in the circling area your objective is to sight the intended runway and keep it in sight as you manoeuvre for a landing.

When you plan your circling approach, you should be aware that it is far more difficult to keep the runway in sight if you put it on the righthand side of the aircraft. Wherever possible, plan to fly the approach with the runway on your left.

Figure D



With this in mind, some possible flight paths are shown in Figure D.

In the event of a southerly, I have chosen a track that will intercept a left base for Runway 17. Alternatively, I could track overhead the nav aid and then make a continuous lefthand turn to join downwind lefthand for runway 17 (depicted by the dashed blue line). However, if the wind is a westerly I would plan to track upwind for Runway 26, with a left turn to join a left circuit. In both cases, the approach has been designed to keep the runway in sight throughout, while giving me the opportunity to catch a glimpse of the primary windsock at the intersection of the two runways.

Cloud permitting, I will remain at 900 feet on area QNH (the circle-to-land MDA) and descend only when I am established on the normal descent profile. The MDA is 635 feet above aerodrome elevation, so I can expect to intercept a normal descent profile somewhere late on base.

Missed Approach

If you lose visual reference while circling, you must execute a missed approach as specified on the approach chart. Irrespective of your location in the circling area you should climb towards the landing runway, intercept the missed approach track overhead the runway and continue climbing until you reach the altitude specified in the missed approach procedure.

Summary

The circling approach is a high-risk procedure. It takes place close to the ground, at low speed, and in poor visibility. It is also a very difficult procedure to practise.

Perhaps more than any other procedure, it requires detailed planning, and strict adherence to the procedures outlined in the AIP. Above all, you must be prepared to carry out a missed approach if the workload becomes unmanageable or you simply feel uncomfortable with the approach.

Once established above the minimum safe altitude, you will have time to collect your thoughts and evaluate whether or not you should divert to an alternate. While your passengers may not be thrilled about being dropped off miles from their intended destination, you can take comfort in the knowledge that you might have just prevented a repeat of the tragedy that claimed seven lives on 11 June 1993. ■

For further reading on this topic, refer to an excellent article on a recent Air China Boeing 767 CFIT accident in South Korea called 'Circling Traps' in the September 2002 issue of *Business and Commercial Aviation*. Try **www.aviationnow.com/bca** to obtain a copy of the article.

Photograph courtesy of Paul Harrison.

Out of Control?

Two serious, and potentially fatal, accidents have recently occurred in DH82 Tiger Moth aircraft where the master control stick (the rear control stick) was removed and then reinstalled without replacing the through bolt (refer to item A on the accompanying diagram). The clamping collar (item B) is then relying only on a 'friction grip' between it and the control stick for its retention. In both of these accidents the rear control stick actually pulled out of the clamping collar while in flight, the consequences of which were somewhat adverse.

Owners, operators and pilots of Tiger Moth aircraft, and other vintage aircraft with similar control systems, are reminded that the master control stick is **not** permitted to be removed as it is **not** listed in Part 43, Appendix A – *Pilot Maintenance*. Rule 43.51 requires such work to be supervised and certified by a licensed aircraft maintenance engineer or a person holding a relevant maintenance approval.

Maintenance involving the disturbance of flight controls requires two further very important steps to be performed:

- Duplicate Inspection as required by rule 43.113
- The above persons must certify the maintenance as having been performed correctly by making a Release to Service statement in the aircraft logbook and/or relevant maintenance records as required by Rule 43.105.

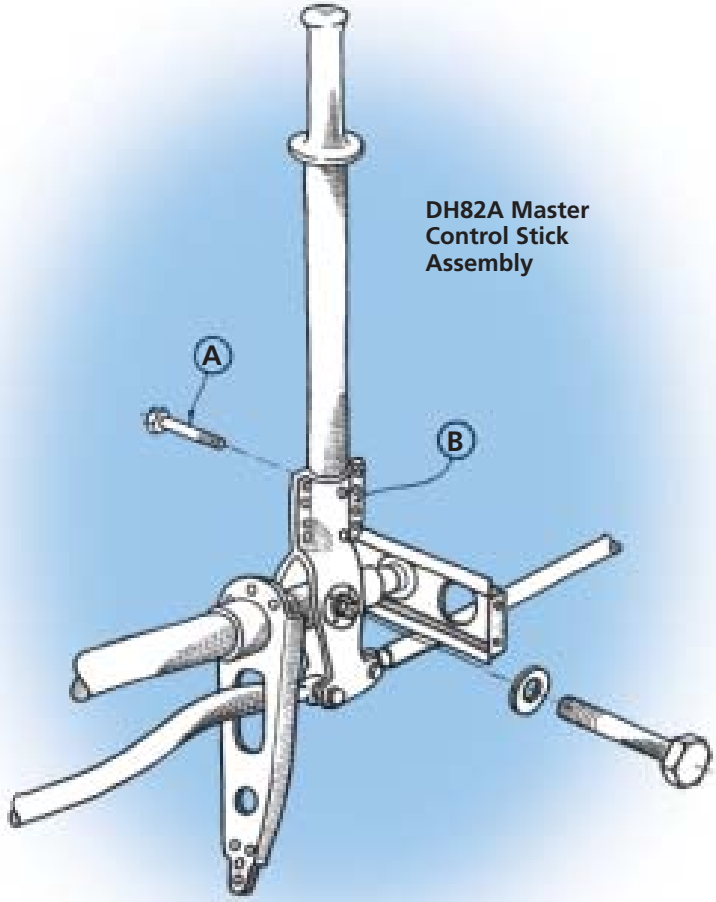
If a master control stick is removed while the aircraft is operating in the field, then the required maintenance recording of the work performed, Duplicate Inspection, and Release to Service should be done on the Technical Log. The Technical Log then becomes part of the maintenance records for that aircraft and should be retained with its other maintenance records. Remote recording with relevant details as specified in Rule 43.69 can also be done via a loose-leaf logbook entry, which should then be placed in the aircraft's logbook.

To some, all this may seem a cumbersome process, but remember one thing – the rules have been developed over many years as a result of numerous incidents and accidents in order to see that such events do not repeat themselves.

Flight controls are a critical flight safety system in any aircraft. Do not take them for granted! Do it right! Do it safely! ■

Photograph courtesy of Paul Harrison.

The rear control stick of a DH82A with its attachment assembly exposed.



Item 'A' – The missing through-bolt on master control stick.
Item 'B' – The clamping collar.

Airmanship – Situational Awareness

In the last issue of *Vector* a model about airmanship was developed and discussed under the title "Measuring Up". An easy way of remembering this model was to use the 'D's – *Detect, Determine, Decide, Do, Discipline*. This article continues that series by considering the first of these – detection – otherwise known as situational awareness.

What is Situational Awareness?

Just about every pilot would be familiar with the term 'situational awareness', commonly abbreviated to 'SA'. Ask a group of pilots what it stands for, however, and you will likely get a number of different answers. So what is SA?

Imagine yourself in bed in your house in the middle of the night, when all is dark and quiet. You have to get up, perhaps to answer nature's call. To avoid waking everyone else in the house, you do so without turning on the light. The chances are that you will be able to safely navigate your way through the house in the dark, without too many bumps and bangs. How?

Try closing your eyes now, and imagine the journey from your bedroom to the front door. Because you have walked around the house hundreds of times before, you will have developed a 'mental model' of the location of all the obstacles, doors, furniture and paraphernalia that fill your house. This mental model will enable you to safely make your way around, even in the dark.

Now try doing the same thing in an unfamiliar environment, say a hotel room or a friend's home. Without the benefit of an accurate mental model, the chances are good that you will bang into something, end up in the wrong room, or something equally as embarrassing. Within our homes, an incorrect mental model, or loss of SA, may result in nothing more than a bruised leg or an annoyed partner. In aviation, the same loss of SA can, and all too often does, have more severe consequences.

Think back to your first few flights, or even to the time you learnt how to drive a car. How good do you think your SA was then compared with now? In the early stages of your flying or driving career, your focus was on learning specific handling skills. SA was slowly developed along the way, partly as a result of experience, partly because you now had the time to take in more of what was going on around you, and partly because as you gained experience you were learning the sorts of things that you had to look for.

What Do You Need to be Aware Of?

Gaining and maintaining SA is therefore an active process of seeking information about the world around you and creating a mental model of that world. It includes an awareness of a host of factors, including:

- Your **aircraft**, its systems, fuel state, and how well it's performing
- The **environment**, including weather conditions
- Your **location**, now and in the near future
- **Airspace**, other users of, or obstacles in that airspace
- An **awareness** of yourself and how you are performing

That's a lot of things you have to be aware of. How do you do that?

How to Gain SA

SA requires the use of all your senses. Aviation tends to be dominated by the visual sense – we get most of our information by looking at and for things. That does not mean that the other senses are not also important. For example, a lot of information about other traffic comes from listening to the radio – not just to radio calls directed at you, but those between other aircraft or ATC. The ATIS is another source of information to help build a mental model of conditions at your destination. The stall warning and even the sound of the engine are other things you can listen for.

You get a surprising amount of information from your sense of touch or feeling. Turbulence, 'G' vibration, and control feedback all help to build a model of how the aircraft is performing and what we are doing with it.

You can smell things like fuel vapour, and maybe smoke or fumes, though most of us would prefer not to! Hopefully you won't have to taste them.

All these inputs, combined with your knowledge and

Continued over ...

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experience, add up to form a mental model upon which you base your decisions about how to fly the aircraft and what to do next. Some of this information will be registered by the pilot automatically, but the majority requires the pilot to be actively seeking it. As an example, you won't necessarily see something outside the aircraft unless you are actively looking around. This can be tiring, and difficult to do well over an extended period, but it is essential if you are to be assured of as good a mental model as possible.

Loss of SA

A close study of the accident statistics tells us that, of the 80 percent due to human factors, a significant number are as a result of a loss of SA. By loss of SA what we really mean is that the mental model generated by the pilot is either incomplete or inaccurate.

An incomplete model comes about because vital information is missing from the picture. For example, the pilot may not have listened to the radio and has missed vital traffic or weather information. We don't have to be in flight to miss information. An incomplete pre-flight briefing can set the pilot up because he or she has missed something in the NOTAMs, weather brief, or even in the aircraft Tech Log.

Imagine that you are once again called upon to wander your house in the dark. Normally – not a problem. Tonight, however, your partner has left the vacuum cleaner in the hall – the result is a stubbed toe and a lot of swearing. In this case the mental model was incomplete because you were unaware of something that had changed.

An inaccurate model can come about because of one of the peculiar failings of the human mind – an ability to make the facts fit a preconceived mind set. Because we believe something to be true, we possess an extraordinary ability to ignore or modify facts that don't fit the picture, not just in aviation but also in all facets of our life.

As an example, consider the pilot on a cross-country flight from New Plymouth to Taupo who managed to land at Thames, believing that he was indeed at Taupo. For this to have happened, the pilot must have ignored all sorts of information – his heading, elapsed time, terrain, airfield layout and even lack of radio traffic on the local frequency. To us sitting comfortably on the ground such a lapse in SA seems incredible, but the fact is that it can and does happen.

Summary

SA is the process of obtaining information to build up an accurate mental model of the world around us – in particular those things that may affect us. Building SA is an active process requiring the pilot to continuously look for new information, using all means and senses available to him or her. It also requires that the pilot question all such new information to ensure that it fits the big picture.

Our model must fit the facts, rather than making the facts fit the model. If it doesn't seem quite right, then in all likelihood it's not right. Such information should not be ignored in a hope-for-the-best 'she'll be right' attitude. Rather, any ambiguity should be addressed by seeking new information, or finding other ways to determine what is really going on.

So much for 'Detect'. The next article in this series will discuss the next 'D' in the mnemonic – 'Determine'. This is all about relating all your experience and knowledge as a pilot to the situation you have detected, in order to determine the significance of what you have observed, and to determine some possible courses of action. ■

Tips for Good SA

- **Plan thoroughly, including weather, NOTAMs, route study and map preparation.**
- **Maintain an active and systematic lookout. (Brief others in the aircraft to point out any aircraft they see as well.)**
- **Regularly keep an eye on the weather conditions behind you.**
- **Always note possible forced landing options.**
- **Listen out on appropriate frequencies for traffic and weather information – actively listen to what you are hearing.**
- **Regularly scan all instruments.**
- **Actively monitor fuel consumption.**
- **Keep an accurate in-flight log.**

Situational Awareness Video

The CAA has recently released a video considering the subject of SA, which is complementary to this article. For information on how to borrow or purchase a copy, refer to page 12.

More Carburettor Icing!

Photograph courtesy of John Managh.

Readers are encouraged to share their aviation experiences in order to alert others to the potential pitfalls. We do not accept anonymous contributions. If you tell us who you are, we will not publish your name unless we have your permission.

The following account was submitted by John Managh of Napier.

Carb Icing?

I planned to leave Tauranga on 25 October 2002 at about 8:45 am to return to Napier in my Piper Tomahawk. The air temperature was 15°C, dew point 14°C, pressure 1010 hPa and the wind about 7 knots. The aircraft was approximately 100 lbs under its gross maximum weight, as I had loaded extra fuel due to anticipating low-level cloud along the route. The aircraft had flown only 15 hours since its last 100-hour check, so the spark plugs were therefore either new, or re-gapped and clear of lead deposits.

The engine run-up checks were completed satisfactorily (including a normal rpm drop upon the application of carb heat) and an uneventful takeoff was made. Shortly thereafter, I was clear of the control zone and had lodged a VFR flight plan over the radio. Low cloud was seen ahead on the intended track so I extended laterally to go around it.

A short time later two small, but distinct, hiccups were felt from the engine – they caught my attention! The temperatures and pressures were normal, airspeed 100 knots, rpm approximately 2425, full rich, and altitude was 900 feet amsl. My initial thoughts were water in the fuel, although the pre-flight fuel sample was clear.

At this point I was mentally looking for a problem. Very shortly thereafter I noticed that the rpm had dropped back by about 200. Hey, the airspeed was dropping too. I checked the mixture and throttle settings. No, they hadn't changed. Then, virtually at the same time, matters became a little more interesting. The engine started to run roughly. Hmmm, I thought, carb icing. Full carb heat, electric fuel pump ON, and change tanks.

The engine smoothed out, but rpm was still down to about 2200, speed to 80 knots, and altitude to 600 feet amsl. Not good!

By this stage I had already turned away from the high ground ahead of me back towards the coast. A Pan call was made reporting my predicament and that I was returning to Tauranga.

I tried switching the magnetos from BOTH to LEFT. Immediately the engine stopped and backfired a couple of times – interesting! I switched to the RIGHT magneto, whereupon the engine ran okay, but at a reduced rpm. I decided to go back to BOTH as I wanted to hedge my bets. Height and speed were still dropping off.

By this time I was over the beach at about 450 feet amsl 10 miles east of Tauranga. The beach was very long and the wind light. I thought that, if necessary, I would land straight ahead on the beach. I opted not to carry out a precautionary landing as the idea of doing a slow turn into wind at low level with the engine already at max power did not appeal.

I think that the prolonged application of carb heat had cleared the ice by this point as I had now gained over 100 feet. I was getting quite close to residential areas and the aerodrome. The beach and reasonable paddocks were available to me as forced landing areas.

A concern with such a prolonged application of carb heat with a lean mixture was possible engine detonation. The oil pressure was okay but oil temperature was very high. A combination of hot air into the carburettor plus the reduced effects of ram air to cool the engine had caused the oil temperature to rise. (I had previously adjusted the mixture to find best power, but at the time it didn't seem to improve matters so I left it FULL RICH in order to maximise engine cooling.)

I carefully positioned downwind for a righthand circuit onto grass 07. I kept in close in case the engine stopped at the last minute and a glide approach was required. 'Make it a good one' I thought to myself, as a go-around may have been challenging with the reduced power available. An uneventful landing was made.

Outcome: The left magneto had died in flight whilst experiencing a severe case of carb icing.

Vector Comment

Our thanks go to John for sharing this experience. Well done for handling a situation with effectively two simultaneous, but unrelated, engine problems so well, for making a Pan call and continuously assessing the options while returning to land at Tauranga.

Having identified the problem with the LEFT magneto, the decision to go back to BOTH was a good one. In your case, it appears the LEFT magneto was completely unserviceable but if, for instance, a magneto is firing intermittently and retaining some percentage of use, it is better to fly on BOTH to utilise that extra percentage. If, however, you experience problems with BOTH selected, it is then better to select the individual one to achieve smooth running.

It is great to see that one *Vector* reader's experience (Kevin Langford's account of carburettor icing in the last issue of *Vector*) can prompt another to write in with their account of a similar incident or problem. It means we can all learn from the experience.

Please keep sending in your experiences as we see this 'Share Your Experience' column as being a very effective way to raise awareness of pertinent flight safety issues. ■

Photograph courtesy of Warbirds Over New Zealand.

Low-Level Display Flying

1903–2003: A Century of Aviation

In December 1903 Orville and Wilbur Wright first achieved what men had dreamed of for centuries, 'sustained control of a powered airborne vehicle in the three planes of roll, pitch and yaw'.

100 years later, we will celebrate this wonderful event and many more since. New Zealand will possibly even have the privilege of being the first country in the world to hold commemorative aviation events in the Centennial year.

Looking at the New Zealand aviation events calendar, I note that there are some 18 events between January and Easter that are likely to involve display flying of some kind or other. Five or six of these will be full-scale airshows.

It will be a wonderful season for aviation enthusiasts and for display pilots. At least I hope it will be! To use the old cliché, an accident can spoil your whole day, or season.

For many pilots with popular display aircraft, it is likely to be an extensive and tiring period, with long ferries, hard days and inevitable frustrations. For the experienced this can be demanding, for the inexperienced, dangerous.

Display pilots, **please** take care in 2003!

The following article is reproduced courtesy of the Australian Defence Force, Directorate of Flying Safety, and comes from their safety magazine *Focus 2001,* "Display Flying". While clearly aimed at military display pilots, it still has much valuable advice for both new and experienced civil aviation display pilots of all aircraft types, irrespective of performance. Please read it carefully.

John Lanham
GM General Aviation
CAA of New Zealand

Low-level display flying is demanding both mentally and physically. It is not easy – and never kid yourself that it is. If you want to become an experienced display pilot such things as wind, temperature, cloud, configuration, density altitude, and terrain all affect the display you will fly. This article provides a guide to achieving a safe work-up, followed by a safe and impressive flying display. While it was originally prepared with the recently retired Macchi jet trainer in mind, the principles are universal for medium performance aircraft.

Planning Your Display

Firstly, consider your audience and the venue. Most audiences are impressed by simple things like speed, noise, and the unusual, eg, a hammerhead. (Even the crew room critic comes under the genuine title 'most'). If you are an inexperienced display pilot (generally the case), don't waste your time trying to perfect manoeuvres requiring great skill – just plan to use manoeuvres which reinforce that expectation. 'Blow' an eight-point roll and with it, at the very least, goes your credibility. Better to stick with a four-point roll, or even a nicely executed slow roll!

Spend a good deal of time planning your sequence. A single aircraft display should not be too long – about seven minutes is ideal, or the audience will lose interest. Try to provide a reasonable mixture of manoeuvres (vertical/horizontal), and only use manoeuvres that make the aircraft (and therefore you) look impressive.

A word of warning – avoid limit manoeuvres; they impress very few in the audience and take away the flexibility you will require should the weather inhibit you on the day (apart from the obvious 'grey-hair territory' that limit manoeuvres result in).

You will need to know exactly how much height is required for your vertical manoeuvres and to establish just how much height you require to recover or pull through from the top of a manoeuvre, or to pull out from the vertical; work on a 4-G recovery for these figures. No one of any consequence can tell you're pulling four, and you retain flexibility, room for error, etc. Obviously, the height required is tied into a speed at commencement, so you must establish go-no-go criteria for certain gates in your manoeuvres. These gates are always based on a speed, altitude, and attitude datum.

The Work-up Phase

Before attempting to put your sequence together, perfect the individual manoeuvres at normal aerobatic altitude (above 4000 feet), and establish the gate figures for them. Once you are happy with your consistently skilful capacity in each manoeuvre, start combining them to see if your sequence flows – 'flat' spots in a show lose your grip on the spectators. Invariably your originally designed display will be changed as time goes by. Try to identify flat spots early though, and be prepared to make changes.

Having strung things together, take your authorising officer (or supervisor) for a ride to convince him or her to allow you down to 2000 feet agl. This is no big step, but gets you closer to the density and datums for your display. Once you have it 'squared away' at 2000 feet agl, take your supervisor up again to get cleared to 1000 feet agl.

Before you are cleared you will be taken through all the critical errors with your low-level aerobatics. What your supervisor may not be able to show you, and why he or she should do

several rides with you at 1000 feet and ultimately at 500 feet (the big step), is the greatest danger of all to the display pilot – **distraction!** Distraction is the great grey-hair converter, insidious in the extreme – and terribly, terribly dangerous. Unfortunately, it is also the hardest aspect for the supervisor to get across to the budding display pilot.

Avoiding Distraction

Although you can never negate all potential sources of distraction, you can limit them somewhat. The following will help you (but will not totally solve the problem).

- **FOD**. Remove all chance of FOD in the cockpit. Pens, pencils, kneepads, etc, are not what you need floating past your eyes as you roll inverted. My eyes have been there, and I guarantee yours would follow the path of the FOD too, rather than the attitude of the aircraft.
- **Strap-in**. Ensure you are strapped in firmly and that all straps are tucked away. A shoulder strap across your visor serves the same purpose as FOD. Also, ensure the seat height adjustment is locked correctly – most disconcerting to slip a notch when inverted!
- **Radio**. Practise your display on a discrete frequency and brief ATC on why you are going to be on it. You need 100 percent concentration on your task, so ask ATC to establish comms before making any requests or queries. If they must interfere, cease your practice and set it up again once you've cleared the problem.
- **Inverted check**. Always conduct an inverted check prior to practising. The aims of this are: to confirm the inverted attitude at your rolling speed, to ensure engine serviceability (slam accelerate it), and to verify the inverted time which should be available.
- **Practice venue**. Use the same practice venue wherever possible.

Low-level aerobatics greatly reinforce the concept of attitude flying, for where you point the aircraft ultimately decides where it will go. While attitude control is critical, however, so are the gates mentioned earlier.

Never commit the aircraft to entering or continuing a manoeuvre if outside your gate limits. You should have gate figures (airspeed and altitude) for entry to **all** manoeuvres and for an escape from them. Remember, these gates over-the-top/for-pullout should not be the absolute limit for the manoeuvre, but should allow for some degree of error. If you are pushing the gate figures, you are probably in error anyway.

Your display axis should allow an ideal viewing angle for the crowd of below 30°, with an occasional 45° maximum – people lose interest when their neck hurts! Generally this means two display datums, one for looping and one for rolling manoeuvres.

Wind will be the most frustrating aspect in flying your sequence. For this reason alone, every aspect of the display must be committed firmly in your memory, as most of your time will be taken up adjusting for wind effect (a great distraction in itself). When extending in wind while inverted, be careful to ensure level or climbing flight is held, and reconfirm your gate before pulling through. A quartering tailwind pushes you into your datum position quickly – don't let it rush your entry into a rolling manoeuvre. Simply roll faster to maintain your display symmetry if you're running late. Too often budding display pilots exit a wingover into a descending entry to a roll or Derry turn – dangerous stuff!

If possible, once you have your display completely squared away, practise at the venue. At the least, practise over the base. But remember, having an audience will psychologically pressure you to accept errors you would not otherwise have accepted, and to continue. For this reason, take your supervisor along over the base/venue a couple of times to get you past this pressure period.

There are plenty of 'aces' in the crew room who would delight in criticising your display. Pick one or two (preferably including your authorising officer/supervisor) and stick with them.

The golden rule of display flying is **never perform an 'off-the-cuff' manoeuvre**. Fly only what you have practised.

General Considerations

Other considerations which should be remembered are:

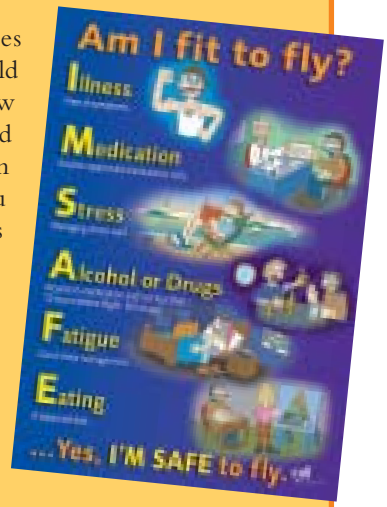
- **Practice sessions**. Make sure you are fresh and in the right frame of mind. No more than three run-throughs each session or you will forget the finer points.
- **Changes to sequence**. If you change something, move your practice height up again commensurate with the extent of the change.
- **Frustration.** If you become frustrated with your practice session, give it away – you'll only get worse!
- **Altimetry**. If you can set QFE, so much the better.

Conclusion

Display flying is demanding, but it is a very satisfying sport. Most display pilots I know have, however, frightened themselves at least once. They generally frightened themselves because they became too **casual** or **overconfident** – normally after four or five months of display flying. Stay totally professional and it shouldn't happen to you! ■

I'M SAFE Poster

The CAA has recently revamped the existing A4 two-colour I'M SAFE poster into full-colour A3 and A4 versions. The poster's new format uses positive wording and humorous cartoon imagery to reinforce the important I'M SAFE message to pilots, engineers and air traffic controllers.



If your organisation does not have this poster, or would like to upgrade to the new version, please cut out and retain the copy provided on page 19. Alternatively, you can obtain A3 or A4 copies by contacting your local Field Safety Adviser (see the advertisement in this issue for their contact details) or the Safety Education and Publishing Unit.

Tel: 0–4–560 9400
Email: **info@caa.govt.nz**

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 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. It also outlines what you can do to help reduce the number of false ELBA activations from a Search and Rescue point of view.

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% 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, and explains what steps you are required to take if you detect a medical problem that may affect your performance in the cockpit.

Fuel Management — 38 min. 2002
This video is in two parts; the first looks at flight planning and in-flight fuel management, and the second covers basics such as refuelling, de-fuelling, and what to do if something goes wrong. The video is designed to complement the *Fuel Management* GAP booklet, also produced by CAA.

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.

Light Twins — 23 min. 2001
Flying a light twin-engine aircraft, particularly on a commercial operation, is very demanding of a pilot's skill and experience – the accident statistics confirm this. This video, which is aimed at pilots who are about to complete a light-twin rating or those that are converting to a more sophisticated machine, covers basic twin-engine aerodynamic principles, engine failures, single-engine performance, weight and balance considerations, airframe icing, and organisational safety culture. It stresses the importance of receiving a thorough type rating and being totally familiar with your aircraft's systems, its performance limitations, and the engine failure drills.

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.

Mountain Survival — 24 min. 2000
This video, based on a THL alpine survival training course for their pilots, covers the basic principles of survival, suggested survival kit contents, how to maximise the insulative values of different clothing types, ways to utilise the aircraft fuselage as a primary means of shelter, using a Zdarsky sack, building a snow mound, using a cooking stove, and finally the importance of positive leadership. Although intended primarily for pilots involved in commercial high-country operations, the information covered in this training video is also relevant to the recreational flyer who might occasionally operate in and around mountainous terrain.

On The Ground — 21 min. 1994
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
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 along with 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.

Situational Awareness — 15 min. 2002
This video gives pilots a practical insight into situational awareness (SA), what it is, how to get and maintain SA on a given flight, and the signs or symptoms that indicate you may be losing situational awareness. This is a video for pilots of all experience levels.

Survival — 19 min. 2000
Set at a crash site in the bush, this 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.

Survival - First Aid — 26 min, 2001
Survival - First Aid highlights the importance of pilots being competent in first aid, to be able to assist their passengers if injuries are suffered as a result of a forced landing. It deals with essential first aid techniques but does not purport to be a complete first aid course. This video complements two other survival videos in our series: Survival, and Mountain Survival

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 – Getting it Right — 28 min. 2000
This video covers a wide range of weight and balance considerations for single and twin-engine fixed-wing aircraft. Helicopter weight and balance considerations are also dealt with.

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-Grow — 19 min. (Agricultural operations.)
Going Down — 30 min. (Handling emergencies)

Outside Productions

(may be borrowed, but not purchased, from CAA)

Mountain Flying — 66 min. 2000
(produced by High Country Productions, C/o John Richards, R D 2, Darfield Tel: 0–3–318 6838)

This video covers the importance of pilot proficiency and knowing your aircraft, details a precautionary landing exercise, and discusses valley-flying and ridge-crossing techniques. A great deal of practical advice and experience is included. The latter half of the video takes the viewer on a scenic flight through the Southern Alps. *Mountain Flying* is intended to encourage interest and stimulate discussion on safe mountain-flying techniques rather than to be used as a formal training video.

NZ 60 – 'A Free Lesson' — 32 min. 2002
(Produced by Air New Zealand)

This CRM training video deals with how to recognise and react to erroneous ILS indications. It is relevant to all pilots who conduct ILS approaches.

To Borrow: The 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 (except Outside Productions): 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".

Letters to the Editor

Readers are invited to write to the Editor, commenting on articles appearing in *Vector*, recommending topics of interest for discussion, or drawing attention to any matters in general relating to air safety.

Flight Information Services

I refer to the 'Share Your Experience' article on carburettor icing in the November/December 2002 issue of *Vector*.

It can be inferred from the article that the pilot was not entirely satisfied with the service received from Christchurch Information. I would like to explain what I believe Airways was doing even though, because of the time lapse, I can only find an abbreviated record of the incident in the Air Traffic Services (ATS) log. (Voice tapes are not kept this long.)

Firstly, Christchurch Information does not have a radar screen. Upon the pilot concerned reporting the nature of the problem, his position and intentions, the FIO contacted the appropriate radar controller and the ATS Supervisor. The aircraft target was then observed on radar. The SAR Co-ordinator, the NZ Police Southern Communications Centre, and Air Safaris Tekapo were all advised.

I am unable to determine whether the FIO attempted to contact the pilot again, but I can confirm that the aircraft was radar-monitored until it descended out of coverage and that the SAR Co-ordinator and NZ Police were advised. Air Safaris at Tekapo were warned that the aircraft was intending to land there. Contact with Air Safaris was also maintained until it was confirmed the aircraft had landed safely.

I hope this explains what we were doing at the time of this incident.

John McKenzie
Sector Manager
Christchurch ATS Centre
January 2003

Free 406 Beacon Seminars

A commercial supplier of ELTs, Safety and Aviation Supplies, is holding a range of informative seminars in April 2003 on the transition from 121.5 MHz to 406 MHz ELTs. Attendance is free of charge, and dates will be finalised once numbers are assessed for each major location.

You can register your interest with the company at **www.aviationsafety.co.nz** or phone 0800 809 911.

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AIP Supplement Cut-off Dates

Do you have a significant event or airshow coming up soon? If so, you need to have the details published in an AIP *Supplement* instead of relying on a NOTAM. This information must be promulgated in a timely manner, and should be submitted to the CAA with adequate notice (within 90 days of the event). Please send the relevant details to the CAA (ATS Approvals Officer or AIS Coordinator) at least one week before the cut-off date(s) indicated below. Note: If your AIP *Supplement* requires an illustrated graphic you need to add another 5 working days to this date.

Supplement Cycle	*Supplement* Cut-off Date (with graphic)	*Supplement* Cut-off Date (text only)	*Supplement* Effective Date
03/04	13 Feb 03	20 Feb 03	17 Apr 03
03/05	13 Mar 03	20 Mar 03	15 May 03
03/06	10 Apr 03	17 Apr 03	12 Jun 03

Accident Notification

24-hour 7-day toll-free telephone

0508 ACCIDENT
(0508 222 433)

CA Act requires notification "as soon as practicable".

Aviation Safety Concerns

A monitored toll-free telephone system during normal office hours. A voice mail message service outside office hours.

0508 4 SAFETY
(0508 472 338)

For all aviation-related safety concerns

OCCURRENCE BRIEFS

Lessons For Safer Aviation

The content of *Occurrence Briefs* comprises 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 accessible on the Internet at CAA's web site **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 that 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 Unit.

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. Full TAIC accident reports are available on the TAIC web site **www.taic.org.nz**.

ZK-RAG, RAF 2000 GTX SE, 6 May 00 at 10:30, nr Mokau. 1 POB, injuries 1 fatal, aircraft destroyed. Nature of flight, private other. Pilot CAA licence nil, age 51 yrs, flying hours 50 total, 50 on type, 29 in last 90 days.

The pilot had attempted to take off from a sloping agricultural airstrip. The wreckage of the gyrocopter was found in the gully at the end of the strip. There were no witnesses to the accident. It is likely that the pilot attempted a takeoff with less main rotor rpm than required, resulting in severe flap-back and propeller and ground strikes, which resulted in a failure to become airborne in a controlled manner.

A full report is available on the CAA web site.

Main sources of information: CAA field investigation.

CAA Occurrence Ref 00/1198

ZK-MWM, EAA Acro Sport, 13 Nov 00 at 14:00, Hastings. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 53 yrs, flying hours 900 total, 120 on type, 15 in last 90 days.

The homebuilt aircraft had just landed on the grass runway when it flipped over on its back.

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

CAA Occurrence Ref 00/3482

ZK-DOP, Piper PA-32-300, 17 Jul 01 at 08:20, Great Mercury Is. 4 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Aeroplane), age 32 yrs, flying hours 1812 total, 32 on type, 44 in last 90 days.

The aircraft was making an approach to land on a beach in a northerly direction. (The beach is often used by pilots as a suitable place to land.) During the flare, the aircraft started to drift to the left. The pilot attempted to correct this, but the left main wheel touched down first, slewing the aircraft through about 90 degrees to the left. The aircraft came to rest in approximately 30 cm of water. The aircraft suffered substantial damage to the undercarriage, propeller, the leading edge of the lefthand wing, and the lefthand tip tank.

The owner of the island advised that from time to time subterranean water appears on the southern end of the beach and can create soft patches, which are hard to distinguish until driven over.

Main sources of information: Accident details submitted by pilot and operator.

CAA Occurrence Ref 01/2452

ZK-DEL, Piper PA-28-140, 11 Nov 01 at 09:45, Ashburton. 1 POB, injuries nil, damage minor. Nature of flight, training solo. Pilot CAA licence nil, age 42 yrs, flying hours 51 total, 51 on type, 12 in last 90 days.

The aircraft was landing in a crosswind when it veered off the airstrip and collided with a fence.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 01/3744

ZK-HTK, Robinson R44, 3 Dec 01 at 14:30, Urewera National Park. 3 POB, injuries 2 fatal, 1 minor, aircraft destroyed. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Helicopter), age 42 yrs, flying hours 894 total, 350 on type, 74 in last 90 days.

On Monday 3 December 2001 at about 1430 hours, Robinson R44 helicopter ZK-HTK was on a commercial transport flight from a remote campsite in the Urewera National Park to Ruatahuna, carrying two hunters whose recovery had been

delayed by bad weather. While flying over the highest terrain en route, where the weather was probably worst, the helicopter collided with trees, fell to the ground and burnt. One survivor was rescued two days later.

The pilot's low experience probably contributed to his perseverance with the flight in conditions of low cloud and poor visibility.

Main sources of information: Abstract from TAIC accident report 01-012.

CAA Occurrence Ref 01/4009

ZK-DJM, Cessna A185F, 5 Dec 01 at 15:50, Napier Ad. 4 POB, injuries nil, damage substantial. Nature of flight, parachuting. Pilot CAA licence CPL (Aeroplane), age 26 yrs, flying hours 505 total, 5 on type, 27 in last 90 days.

The aircraft groundlooped after landing in gusty conditions, causing damage to the undercarriage, wingtip and tailplane.

Main sources of information: Accident details submitted by pilot and operator.

CAA Occurrence Ref 01/4010

ZK-HEZ, Robinson R22 Beta, 14 Jan 02 at 11:00, nr Fox Glacier. 2 POB, injuries 2 fatal, aircraft destroyed. Nature of flight, hunting. Pilot CAA licence CPL (Helicopter), age 33 yrs, flying hours 2000 total, 1990 on type, 25 in last 90 days.

The helicopter was on deer-hunting operations in the Balfour Range. When it did not return for refuelling at the expected time a search was commenced. The wreckage was located later in the day.

No definite cause for the accident was determined, although a lack of available helicopter performance at the operating altitude was considered to be a likely factor.

A full report is available on the CAA website.

Main sources of information: CAA field investigation.

CAA Occurrence Ref 02/71

ZK-SEV, Cessna 207, 19 Jan 02 at 10:00, Gertrude Saddle. 6 POB, injuries 6 fatal, aircraft destroyed. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Aeroplane), age 25 yrs, flying hours 635 total, 13 on type, 98 in last 90 days.

At 0931 hours on 19 January 2002, ZK-SEV took off from Te Anau for Milford Sound. At about 1000 hours, the aircraft collided with the side of a mountainous valley at an elevation of approximately 4400 feet amsl, 500 metres southeast of Gertrude Saddle (11 kilometres from Milford). The pilot and five passengers died in the collision.

The aircraft probably had not reached a suitable altitude to cross Gertrude Saddle safely, and the pilot probably left his decision too late to turn back in the valley to gain more height.

Main sources of information: Abstract from TAIC accident report 02-001.

CAA Occurrence Ref 02/97

ZK-GBD, PZL-Swidnik PW-5 "Smyk", 7 Feb 02 at 16:45, Arapuni. 1 POB, injuries 1 minor, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age not known, flying hours 404 total, 29 on type, 64 in last 90 days.

The pilot had selected a paddock for an outlanding when he became aware of an obstruction that would preclude it being completed safely. An attempt to land in an alternative paddock was made, but with little height remaining to manoeuvre, the glider's right wing clipped a tree causing it to impact the ground.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/282

ZK-PPL, Ultravia Pelican PL, 9 Feb 02 at 08:30, Stratford. 2 POB, injuries 2 minor, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 68 yrs, flying hours unknown.

The aircraft bounced a number of times on landing. A go-around was attempted with the aircraft in a very high-drag attitude. When it was obvious that the aircraft was not accelerating, the pilot closed the throttle. The aircraft overran the grass vector and travelled through a fence and over a stock track, and plunged into a large drain.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/303

ZK-JAT, Micro Aviation B22 Bantam, 9 Feb 02 at 09:30, Stratford. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age 42 yrs, flying hours unknown.

Fuel starvation caused the engine to fail. The aircraft hit a fence during the subsequent forced landing.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/300

ZK-DAM, Jabiru SK80 Microlight, 10 Feb 02 at 19:00, Warkworth. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age not known, flying hours 313 total, 296 on type, 59 in last 90 days.

The approach over some trees was too high so the aircraft was sideslipped to lose height, but it floated some distance before touching down. During the landing roll the brakes locked up, which placed extra weight on the front wheel. This in turn caused the nosewheel fork to collapse and the aircraft to slew into a small rise. The propeller and a wingtip were also damaged.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/1504

ZK-AYO, Auster J1B, 15 Feb 02 at 16:40, 8NM NNW Rangiora. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence ATPL (Aeroplane), age 44 yrs, flying hours 10600 total, 30 on type, 200 in last 90 days.

The pilot commenced the takeoff in calm conditions, but encountered a tailwind during the takeoff roll. He elected to abandon the takeoff, and, realising there was insufficient space in which to brake to a halt, attempted a groundloop. The aeroplane slid sideways into a fence.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/411

ZK-FVE, Micro Aviation B22 Bantam, 16 Feb 02 at 16:00, Pikes Point. 1 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence nil, age 59 yrs, flying hours unknown.

After completing a precautionary landing during a test flight, the aircraft hit a concealed tree stump and overturned.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/403

ZK-HZD, Hughes 269C, 18 Feb 02 at 14:00, Mt White Station. 3 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Helicopter), age 27 yrs, flying hours 368 total, 60 on type, 36 in last 90 days.

The pilot tried to abort the landing, but a skid touched the ground and the helicopter toppled over.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/413

ZK-REY, Progressive Aerodyne Searey, 19 Feb 02 at 08:30, Pikes Point. 1 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence nil, age not known, flying hours unknown.

During the landing roll, the main landing gear axle separated from the gear leg. A modified axle has since been supplied by the manufacturer.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/463

ZK-HOH, Robinson R44, 19 Feb 02 at 09:30, Opihi R. 1 POB, injuries 1 serious, damage substantial. Nature of flight, ferry/positioning. Pilot CAA licence CPL (Helicopter), age 49 yrs, flying hours 7500 total, 500 on type, 150 in last 90 days.

The helicopter was positioning for agricultural operations in the Fairlie area; the pilot was following the Opihi River at low level in poor weather (low cloud and drizzle). At the confluence of the Opihi and Opuha Rivers, the helicopter collided with a domestic powerline spanning the river. The height of the line was estimated at 10 metres above the riverbed.

The helicopter landed heavily in the riverbed.

Main sources of information: Accident details submitted by operator and pilot.

CAA Occurrence Ref 02/412

ZK-DPD, Cessna 177RG, 20 Feb 02 at 14:15, Tauranga. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 55 yrs, flying hours 349 total, 100 on type, 11 in last 90 days.

The aircraft was on a flight from Hamilton to Tauranga when the pilot landed on Runway 07 with its undercarriage inadvertently retracted. The pilot believed that this oversight was due to a number of distracting factors. While joining, the pilot was advised to hold over Tauranga City and to maintain 1500 feet or above, and was then cleared to join on a right base for 07 maintaining 1500 feet. On final for 07 the pilot was given an unrestricted descent, but felt uncomfortable with the height and profile of the aircraft. There was also another Cessna in the 07 circuit at the time who was not sure of the accident aircraft's position, in addition to two gliders landing on the 03 cross-grass runway ahead, which further distracted the pilot.

Main sources of information: CAA field investigation.

CAA Occurrence Ref 02/430

ZK-GLA, Schempp-Hirth Nimbus-2, 26 Feb 02 at 15:30, Acheron River valley. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age not known, flying hours 119 total, 18 on type, 20 in last 90 days.

The glider became caught in a sinking pocket of air and the pilot was forced to make an 'out landing' in rough terrain. In doing so, the tail separated from the fuselage and the left wing was damaged.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/513

ZK-AUE, De Havilland DH 82A Tiger Moth, 2 Mar 02 at 14:00, Matamata. 2 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 59 yrs, flying hours 8000 total, 800 on type, 105 in last 90 days.

The pilot was completing a high-speed taxi on the manoeuvring area for Runway 28, when the starboard wingtip contacted the parachute-landing turret.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/561

ZK-HIJ, Robinson R22 Beta, 12 Mar 02 at 19:01, Whataroa Valley. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence ATPL (Helicopter), age 34 yrs, flying hours 4000 total, 40 on type, 260 in last 90 days.

The helicopter lost rotor rpm while on approach to land. It touched down heavily and tipped over. The operator reported that the instructor may have misjudged the tailwind and downslope components of the landing.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 02/702

ZK-TWA, Cessna 210N, 10 Apr 02 at 14:50, 34 km SW Oamaru. 1 POB, injuries 1 fatal, aircraft destroyed. Nature of flight, private other. Pilot CAA licence CPL (Aeroplane), age 60 yrs, flying hours 3525 total, 2115 on type, 171 in last 90 days.

On Wednesday 10 April 2002 at about 1435 hours, Cessna 210N ZK-TWA departed from Dunedin, bound for Masterton. The aircraft did not arrive at Masterton, but was not reported overdue until the next day. After a search, the aircraft was found on Friday morning near Conical Peak, 34 km southwest of Oamaru. The aircraft was destroyed and the pilot did not survive.

The aircraft had struck the side of a ridge in an upright attitude, having descended as it approached the ridge, due either to pilot inattention or incapacitation.

Main sources of information: Abstract from TAIC accident report 02-004.

CAA Occurrence Ref 02/1019

ZK-FXN, Bolitho Trike/Sierra 1, 12 Apr 02 at 11:00, Feilding Ad. 1 POB, injuries nil, damage substantial. Nature of flight, training solo. Pilot CAA licence nil, age not known, flying hours 40 total, 4 on type, 7 in last 90 days.

The pilot was on his first solo flight on type. After taking off towards the west, the aircraft was seen to pitch up steeply, carry out a right turn through about 270 degrees, cross Runway 10/28, and land heavily.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/1111

ZK-DZM, NZ Aerospace FU24-950, 19 Apr 02 at 08:00, Mauriceville. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 37 yrs, flying hours 5000 total, 4700 on type, 174 in last 90 days.

The aircraft landed on the farm airstrip a little to the right of the centre. The propeller and nosewheel hit a bank, and this resulted in substantial damage.

Main sources of information: Accident details submitted by pilot and operator.

CAA Occurrence Ref 02/2050

ZK-EUH, NZ Aerospace FU24-954, 26 Apr 02 at 08:00, Opunake. 1 POB, injuries nil, damage minor. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 59 yrs, flying hours 19968 total, 11237 on type, 270 in last 90 days.

During the takeoff roll the pilot realised that the park brake was still applied. The brake was released, but by this time approximately one third of the strip had been used and the aircraft was not accelerating as it should. The fertiliser was dumped and the aircraft became airborne, but it clipped the fence at the end of the strip with its right wing. The pilot decided to divert to Stratford, where the aircraft was landed safely.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/1262

ZK-LTS, Pacific Aerospace Cresco 08-600, 2 May 02 at 12:50, Piopio. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 58 yrs, flying hours 26120 total, 2300 on type, 329 in last 90 days.

The aircraft was on a normal approach to the airstrip and, with a tailwind of 8 to 10 knots, the pilot was aiming to touch down in the first quarter of the strip. The right mainwheel, however, clipped the threshold of the airstrip and broke off. The aeroplane slid up the airstrip and collided with an embankment.

Main sources of information: Accident details submitted by pilot and opertor.

CAA Occurrence Ref 02/1366

ZK-EFM, NZ Aerospace FU24-950, 3 May 02 at 07:30, Masterton. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 53 yrs, flying hours 18200 total, 13800 on type, 162 in last 90 days.

The lefthand main undercarriage leg collapsed on landing at a farm airstrip after the top scissor link attachment bolt snapped. Damage was sustained to the lefthand undercarriage, outer wing, aileron and flap. Repairs were carried out in the field to enable the aircraft to be ferried back to Masterton.

The main undercarriage top scissor link bolts are changed at every 300-hour inspection. This particular bolt, however, had been in service for only 21 hours since new. The failure of the bolt was in the plain shank area – not an area where bolts normally fail. A heavy landing a short time before the accident may have been the reason for failure.

Main sources of information: Accident details submitted by operator plus further enquires by CAA.

CAA Occurrence Ref 02/2051

ZK-UFS, Piper PA-28-181, 11 May 02 at 11:30, Raglan. 2 POB, injuries nil, damage minor. Nature of flight, training dual. Pilot CAA licence CPL (Aeroplane), age 45 yrs, flying hours 1130 total, 45 on type, 26 in last 90 days.

The aircraft suffered poor braking action on the wet grass upon landing and skidded into the boundary fence at the end of the runway.

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

CAA Occurrence Ref 02/1638

ZK-HPB, Agusta AB206B, 7 Jul 02 at 08:50, Chancellor Shelf. 5 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to A. Pilot CAA licence CPL (Helicopter), age 34 yrs, flying hours 2138 total, 222 on type, 79 in last 90 days.

The helicopter was the second of two to depart from Fox Glacier Heliport for Chancellor Shelf, where a snow landing was to be made. The lead helicopter, an AS350, was piloted by the base senior pilot, who landed on a previously flagged landing area. Surface definition was "fair to poor", in flat lighting conditions. Visibility was unrestricted, and there was no wind.

The senior pilot advised HPB to remain airborne until he could walk to a position where his presence would provide a reference point for the pilot of HPB, additional to that of the AS350. The senior pilot marshalled HPB into the landing area, where it was brought to a low hover. At this point the pilot decided to turn HPB to the right in order to avoid having the passengers exit towards the tail rotor of the AS350. In making the turn away from the positive reference points, the pilot lost positive ground reference and touched down with right drift, causing the helicopter to roll over.

Main sources of information: Accident details submitted by pilot and operator.

CAA Occurrence Ref 02/2044

ZK-JPB, Cessna 172M, 29 Aug 02 at 12:30, Motiti Island. 1 POB, injuries 1 minor, damage substantial. Nature of flight, training dual. Pilot CAA licence CPL (Aeroplane), age 58 yrs, flying hours 30646 total, 29000 on type, 154 in last 90 days.

The aircraft struck an electric fence during the takeoff roll before becoming airborne off the terraced airstrip. It subsequently descended through a row of dead willow trees and into a pond.

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

CAA Occurrence Ref 02/2548

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 005D to the CAA Safety Investigation Unit.

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

Key to abbreviations:

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

Fletcher FU24-950M – Lycoming exhaust valves corroded, P/N LW 16740

The aircraft engine began to run roughly.

Inspection revealed that No 2 cylinder exhaust valve head was imbedded in the exhaust port. Sulphidation corrosion of the exhaust stem had eroded approximately 40 percent of the stem away, causing a loss of strength, and resulting in subsequent valve head separation. The remaining exhaust stacks were removed and the other exhaust valves inspected. They were found to have less severe corrosion. Rectification work was carried out on the affected valves.

TTIS 2100 hrs; TSO 2100 hrs.

ATA 8500 CAA Occurrence Ref 01/1232

Piper PA-23-250 – Emergency exit panel falls out

The aircraft had just taken off from Ardmore when the emergency exit window popped out. The pilot made a circuit and landed back at the aerodrome. The panel was found about a month later, in a paddock close to Ardmore. The exit is the middle window on the left side of the cabin, and it is operated by a handle recessed into the cabin wall. The handle is normally guarded by a pullout clear-plastic cover. The exit is operated by removing the plastic handle guard and twisting the handle to the rear; the window may then be pushed outward away from the fuselage.

Neither the pilot's pre-flight inspection nor a recent maintenance inspection had detected any abnormality with the exit. No conclusive reason could be found for its departure. The operator has subsequently amended its inspection procedures and placarding requirements.

ATA 5220 CAA Occurrence Ref 00/4415

PA28-140 – Defective fuel metering causes flooding

The engine began to run roughly and lose power while the aircraft was flying downwind. It was found that the engine would run only at full power. The pilot closed the throttle and managed to complete a successful forced landing without power.

Engineering investigation revealed that the carburettor fuel metering valve seat was leaking, causing flooding of the carburettor bowl. A new needle and seat were installed. The engine was ground run and the aircraft returned to service.

ATA 7300 CAA Occurrence Ref 02/1781

Piper PA-32R-300 – Back-up gear valve damaged

During stall training, the landing gear was selected UP and then DOWN several times. On the last occasion, the gear failed to retract even though it unlocked. When DOWN was selected, the gear locked into place normally.

Engineering inspection found a damaged O-ring in the back-up system valve. This effectively caused the gear to operate as if in emergency over-ride. All the valve seals were replaced, and the landing gear has operated normally since.

TTIS 2957 hrs.

ATA 3230 CAA Occurrence Ref 00/3430

Piper PA-34-200T – Downlock spring causes undercarriage problems, P/N 587 261

The pilot selected gear DOWN with no effect. A visual hold was carried out while the emergency gear extension procedures were carried out. The nosegear 'down and locked' green light did not illuminate, despite the nosegear appearing to be 'down and locked' in the cowl mirror. An emergency was declared. Upon first flap selection, however, the green light illuminated. A normal landing was then carried out.

Inspection revealed that one of the hydraulic motor springs had caught on the side of the alignment cage and lost contact with the commutator. The downlock over-centre spring had also lost tension and was replaced.

TTIS 5837 hrs.

ATA 3200 CAA Occurrence Ref 01/1326

Pitts S2A – S4LN-204 magneto casing loose, P/N 10-163045-3 and P/N 10-163005-11

The aircraft was carrying out aerobatic manoeuvres when the pilot noticed engine oil spraying over the canopy, accompanied by a hot-oil smell. He immediately began a descent for Queenstown and requested priority to land. The aircraft landed safely without the engine having to be shut down.

Engineering investigation revealed that screws holding the magneto halves together had loosened, allowing oil to escape. All the screws were torque-tightened and marked. The screws will be checked every 50 hours.

ATA 7400 CAA Occurrence Ref 02/2733

Robinson R22 Alpha – Seat belt buckle fails

During a post-accident inspection, a seat belt buckle was found to have failed in overload. Closer examination of the buckle showed the failure to be the result of intergranular corrosion. The corrosion was most likely due to moisture held in the seat belt webbing. The operator indicated that the condition is difficult to detect.

TTIS 5036 hrs; TSO 149 hrs.

ATA 2510 CAA Occurrence Ref 01/1339

Cut out and retain

Am I fit to fly?

Illness

Free of symptoms.

Medication

Aviation-approved medications only.

Stress

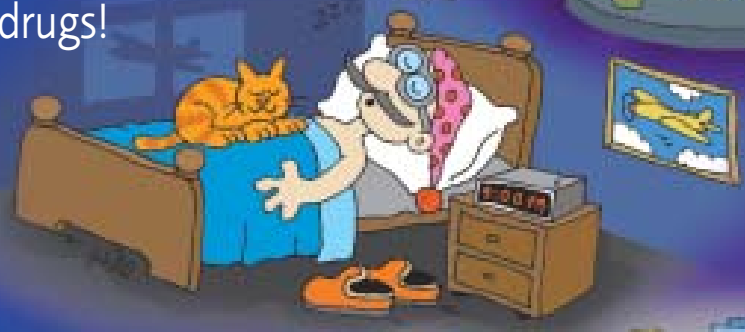
Managing stress well.

Alcohol or Drugs

Alcohol in moderation and not less than 12 hours before flight. NO drugs!

Fatigue

Good sleep management.



Eating

A balanced diet.

...Yes, I'M SAFE to fly.

CAA
CIVIL AVIATION AUTHORITY OF NEW ZEALAND