November / December 2000

VECTOR

Pointing to Safer Aviation

IN THE LINE OF FIRE

PERSONAL MINIMUMS

PLANNED AHEAD?

CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND

VECTOR

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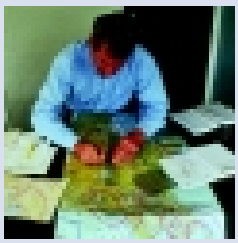
The CAA Rules are one level of minimums designed to keep you safe. But you can go one step better by setting, and adhering to, your own personal minimums every time you go flying.



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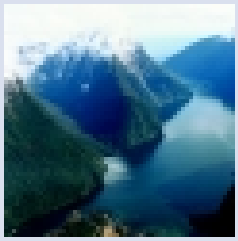
The root causes of many accidents can generally be traced back to inadequate pre-flight planning and poor enroute decision-making. *Planned Ahead?* reviews some of the key flight planning techniques that help minimise the chances of things going wrong.



Page 15 Mount Cook and Milford Sound Area Checklists

The Mount Cook and Milford Sound areas are both popular summer destinations for many pilots, but can be hazardous to those unfamiliar with their geography, weather, and aviation procedures. A pullout designed to act as a checklist for pilots who are planning on venturing into these areas has been developed to assist with pre-flight planning.

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Cover Photo:
Photographs courtesy of RNZAF and the NZ Army.

In the Line of Fire

The steady stream of airspace incursions into Central North Island military operational areas (MOAs) has prompted this article. The Army, Air Force, Airways Corporation, and CAA are concerned about the very real dangers posed to aircraft safety by these airspace incursions. The content of this article is relevant to all pilots who fly in this region; it should be taken seriously.

All photographs courtesy of RNZAF and NZ Army.

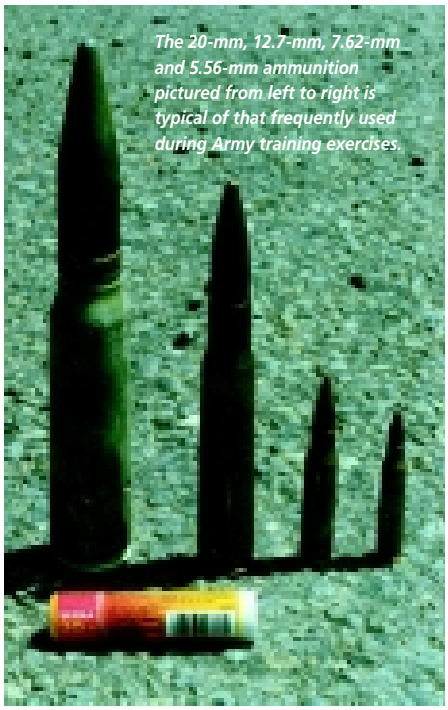
In the central North Island there are two military operational areas, NZM300 and NZM301, that are akin to permanently restricted airspace. They are clearly marked on the Ohakea VTC as PERMANENT in red type and extend from the surface to FL150. Between them is the famous 'Desert Road (or Waiouru) VFR Corridor'. This allows VFR traffic to transit north or south over the central plateau through (and avoiding) these Army and Air Force training areas.

Unfortunately, there are almost weekly incursions by VFR traffic into these areas. These are known by either direct observation made by military personnel on the ground or by radar at the Ohakea Air Traffic Control Centre.

To the VFR pilot, the incursion may not seem like much of an issue. Pilots may assume that because they cannot see or hear any activity, nothing is happening. Not so. Certainly you won't see the ordinance or the blast wave, you're unlikely to hear anything before it is too late, and neither the Air Force nor the Army are likely to be on the frequency you are using – so they can't warn you.

To the Army and the Air Force, these incursions are both inconvenient and costly. Their patience and tolerance is wearing thin.

This article outlines some facts in relation to MOAs and covers why some are permanent, what that means, what the implications are, and what pilots need to do to avoid them.



The 20-mm, 12.7-mm, 7.62-mm and 5.56-mm ammunition pictured from left to right is typical of that frequently used during Army training exercises.

Military Operational Areas (MOAs)

Military Operational Areas are established to encompass intensive military operations, including live firing. Within any portion of an active MOA, a prior entry clearance is required from the designated controlling authority – this will be either an ATC facility or a military agency. Details can be found in the RAC section of the AIP *Planning Manual*.

The activity status of a MOA falls into three classes. Some are permanently active, some are activated by NOTAM and some by AIP *Supplement* (one reason why studying both these information sources is important).

Permanent MOAs

MOAs that are designated as **permanently active** are so for some pretty good reasons. These are the sites of **intense** military training and operations. This includes live firings by the army – which means bullets, projectiles, and shrapnel in the air. There can also be detonations on the ground (blasts and shrapnel) that can endanger aircraft.

The live firing may also come from airborne sources (Skyhawks, Macchis and Iroquois). The danger of an airborne collision or 'near miss' is very real too.

Another reason why these MOAs are designated as **permanently active** is because they can be activated at any time (weekdays and weekends, any hour day or night). Civilian hours and routines do not apply.

Live Firing in NZM300 and NZM301

Army Activity

The following land-based ordinance can be in operation within these areas at any time:

- **Small-arms firing** involves calibres of between 5.56 mm and 7.62 mm. The projectiles can be hard-nosed or tracer. Depending on angle of fire, the trajectory can take them to approximately 2000 feet agl with a range of up to 1.8 NM. There is also ricochet potential.
- **Heavy machine guns** with a calibre of 12.7 mm have a range of between 2.5 and 3.5 NM and may have an explosive head. Depending on elevation, the projectiles can reach up to 7000 feet agl.
- **Mortars** with a calibre of 81 mm are a high-explosive bomb. They can reach a height of 10,000 feet agl and have a range

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of 3 NM. The impact point and the target will also create a 250-metre (820-foot) danger sphere with shrapnel and debris from the blast.

- **105-mm artillery** can hurl a projectile to at least 15,000 feet agl with a range of up to 8.5 NM. The 155-mm artillery used on deployment exercises by the Singaporean Army at Waiouru can reach an altitude of 38,000 feet agl and has a range of up to 17 NM. The 155-mm ammunition has a danger radius of 900 metres; that is 2950 feet above ground level if you happen to be flying above the impact point!

A Singaporean Army gun crew prepares to fire their 155-mm Howitzer into the adjacent MOA. 155-mm shells are regularly fired into NZM301 during joint overseas training excersises. With a muzzle velocity of around 2,500 ft/sec they are capable of a 38,000-foot and 30-kilometre tradectory.

Pictured from left to right are 81-mm mortar, 105-mm high-explosive, 155-mm high-explosive and 155-mm high-explosive extended-range shells.

- **Ground-based explosions** (essentially blowing up things) have a 1000-metre danger sphere as blast, shrapnel and debris will go in all directions. Larger explosions require a safety sphere of at least 2000 metres (ie, over 6500 feet agl).

The destruction of a large quantity of obsolete ammunition in NZM301. Note the considerable amount of debris being accelerated vertically from the core of the explosion.

In addition, mortar and artillery ammunition can have proximity fusing, which is essentially a miniature radar unit in the nose of the shell or bomb. It will explode at, or near to, a radar signature – which could be your aircraft! Ammunition can also be set to destruct at the end of a safety range.

The results of 50-calibre explosive ammunition being detonated near aluminium and steel plates.

Over the next couple of years, the NZ Army will be receiving new weapon systems. These will include a 25-mm cannon mounted on the LAV III Armoured Personnel Carrier. This weapon fires high-explosive and armour-piercing ammunition to a range of over six miles. It is designed to destroy light armoured vehicles. Imagine what a shell would do to your aircraft!

Air Force Activity

NZM300 and NZM301, and their neighbouring MOAs, are used extensively by the Air Force. An appreciation of the airborne activities that may be taking place in these areas should encourage pilots to navigate a little more accurately.

"...155-mm ammunition has a danger radius of 900 metres; that is 2950 feet above ground level if you happen to be flying above the impact point!"

Skyhawks and Macchis are likely to operate in these areas as pairs or in groups. They can be operating near ground level or at altitude and at very high speed. In the heat of combat training, your aircraft will not figure significantly in the equation. While the Skyhawk has aerial-intercept radar, its work and settings are for the designated mission. You are an 'intruder'.

These aircraft can be armed with, and use, any of the following ordinance:

- **Bombs**. These come in two sizes: 500-lb free-fall and 2000-lb laser-guided high-explosive devices. Either of these passing through your aircraft on its way to a target would put an end to your flying. Both bomb types have a debris hemisphere of 3000 metres horizontally and 1000 metres vertically. The latter is more than 3200 feet agl, if you happened to be flying over the detonation point. There are also smaller practice bombs; these are inert, but one through your wing or rotor blades would certainly do a lot of damage.

A 500-lb free-fall general purpose bombs used by Skyhawks for training exercises.

- **Rockets**. CRV 7 rockets can be launched from either aircraft type. They are 70 mm in diameter and can have a solid or high-explosive head. Either way, the kinetic energy is huge, as they travel in excess of Mach 1. They can be fired singly or in multiples.

Skyhawk CRV-7 rocket launching pods.

- **Cannon and machine guns**. Skyhawk aircraft have 20-mm cannon, the shells of which can be a high-explosive, armour-piercing incendiary, or armour-piercing tracer. From a level firing platform these cannons have a range of approximately 6 NM. The .50 calibre (12.7-mm) machine guns on the Macchi have a range of up to 3 NM. Typically, these aircraft are operating in a ground strike or attack role. This means that bombs, rockets, cannon or machine-gun fire will be delivered at speed towards a ground target. The delivery angle is about 20 degrees nose-down. If you are underneath and ahead you are endangering yourself and others. A good lookout on your part is no substitute for not being there in the first place.

The Iroquois helicopter can also be armed with a .50 calibre machine gun mounted in the waist position. Live firing usually takes place at low level, so staying well clear is a good idea.

On occasions, unmanned aerial vehicles (military drones) are operated within the Central North Island MOAs.

Navigating Around NZM300 and NZM301

Reports from the Ohakea Radar Centre and the Army base at Waiouru suggest that three types of unauthorised entries are occurring into these MOAs:

- aircraft transiting north-south outside the VFR corridor;
- aircraft transiting east-west that manage to get into either the northern or southern portions of NZM301; and
- incursions that suggest the pilot in command doesn't have much of an idea of where they are or what the airspace means and why.

The north-south VFR corridor between NZM300 and NZM301 is clearly depicted on the Ohakea VTC, with flight path markers and communications notes. (There are further notes on the "VFR Procedures" panel of the Ohakea VTC.)

Note that the VFR General Operations pages of the VFG clearly advise pilots to refer to the Ohakea VTC before flying through the Desert Road Corridor. The **topographical chart should not be used** as a substitute chart for this information, as it does not display complete aeronautical details.

The main problem appears to be with pilots flying a 'direct track' north or south from, say, Waiouru to Turangi or Taupo, or vice-versa. By flying a direct track you run the risk of flying into one of the MOAs. (This is not a time to rely on GPS; rather, use your eyeballs.)

Positioning with reference to State Highway 1 within the confines of the corridor will hold you closer to the actual corridor boundaries and is a much safer option. Remember though that the Desert Road Corridor is very narrow (less than 0.5 NM either side of the Highway in some places), meaning that accurate navigation and a good lookout for on-coming traffic is needed at all times.

Pilots also need to be careful with course changes at the northern and southern ends of NZM301. If you head east over Waiouru township (as you may do if flying to Napier or Hastings for example), you are heading into NZM301 – and very active areas of it too!

The corridor is only one nautical mile wide at it narrowest point (not a lot of room), so it is critical to keep close to State Highway 1, keeping it on your left.

(Be aware that, if you are keeping a constant slant angle range to the road, the higher you are, the further away from the road you will be – and the greater the possibility of infringing the edge of the MOA.)

Because of the confined corridor, it is important to transmit on 119.6 MHz: your intentions on entry, every 10 minutes, and on exit.

Turn your lights on.

The east-west incursions on the northern and southern boundaries of NZM301 probably stem from the understandable desire to fly the shortest track over some inhospitable country, which lacks a lot of prominent visual navigation features. Neither of the northern or southern boundaries of NZM301 are straight lines, so a sizeable buffer, along with some accurate map reading, needs to be applied to remain outside of this permanently active airspace.

It is the third group of pilots who are less predictable and who cause many of the difficulties. To end up wandering around on a 'scenic' in the middle of permanently restricted airspace, or to track clean through the middle of such an area, suggests an absence of flight planning and a disregard for the safety of others. And, believe us, it does happen!

Lake Moawhango, just to the northeast of Waiouru, seems to attract some pilots, who then head off into NZM301 for a look.

Continued over ...

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Other pilots have been known to orbit over the summit of Mt Ruapehu on a 'scenic' and track too far east, infringing NZM300. Meanwhile, others in helicopters seem to think it is OK for them to sneak in with hunters into the eastern side of NZM301 in the Kaimanawa region – be aware that the area is used for military training purposes right to the boundaries, despite its apparent remoteness. Such flights are likely to be observed and recorded by ground-based Army stations in the area.

Incursions of this third kind in the midst of an exercise, are far less predictable than aircraft 'clipping the edge' of a MOA but holding a constant heading. They are also costly in terms of the interference to planned activity involving numerous personnel and military hardware. It is not surprising that, in cases of this nature, positive and direct steps will be taken to trace the aircraft concerned, and to review the incursion with the pilot.

So, first and foremost, plan your navigation to remain clear of these permanently active MOAs, and constantly confirm your in-flight position from ground to map as you approach the airspace concerned. If you are in any doubt, confused on some aspect, or are lost (it isn't easy country to navigate in marginal weather) call Ohakea Control on 126.2 MHz. They would much rather give you a little guidance, than to have to deal with the consequences of an incident or worse.

Other MOAs and Danger Areas

While the focus of this article has been on central North Island MOAs, there are others around New Zealand where live firing operations present similar hazards to aircraft.

At the entrance to Kaipara Harbour, for example, are NZM101 and NZM103. Neither is permanently active, but they are used for live firing. Directly to the west of Ohakea is NZM304, which is also a military firing range. Further out to sea is NZM308, which is used for aerial target firing.

In the central South Island there can be a variety of Army and Air Force firing activities taking place in NZD921 and NZD922. Activities are often of a similar intensity to those of the central North Island MOAs. A danger area should be treated with caution, and entered **only** after consideration has been given to the hazards contained within it.

Naval danger areas where GA aircraft are likely to stray include NZD122 and NZD128 near Whangaparaoa. Other MOAs where naval and joint naval and air force live firing may take place are further off shore.

A new danger area, NZD325, has been established south of Waiouru over the Ngamatea Swamp. This is activated by NOTAM for artillery firing into NZM301. Our advice is to avoid it as a matter of course.

Not all danger areas are used by the military; some mark civilian explosive storage areas, blasting areas, hot gas efflux, and model aircraft flying locations.

Key Points

The focus of this article has been on central North Island MOAs. These are permanently active, and aircraft without an authorisation **must not** be in there. Apart from the danger they present to others, and the inconvenience and cost, they are really endangering themselves. There have already been a number of near misses. And, at the current rate of incursion, the potential is there for circumstances to combine one day to create a tragedy. Let's try and prevent that!

The general lessons in relation to all MOAs and Danger Areas are pretty simple:

- Have current charts, check the most recent AIP *Supplement,* and obtain the relevant area NOTAMs if your intended track takes you anywhere near a MOA.
- Know that a MOA must not be entered without an authorisation.
- Know what **permanently active** means.
- Know the whereabouts of danger areas near your intended track, and determine their status (know what dangerous activity exists within) before getting airborne.
- Navigate with care and precision in proximity to these airspaces, both laterally and vertically. Do not rely on straight-line navigation, as this has been at the heart of a number of incursions into MOAs in the heat of battle!

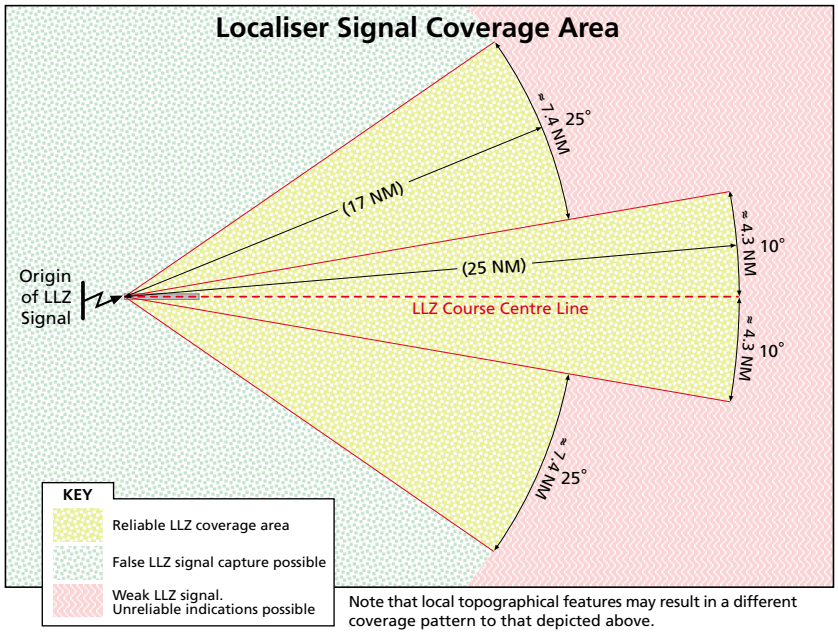
In short, **don't** put yourself in the line of fire! ■

The valuable assistance of Squadron Leader Jim Jennings, RNZAF Ohakea; Captain Colin Huston, NZ Army Waiouru; and Bill Penman, ACNZ Ohakea in the preparation of this article is gratefully acknowledged.

Erroneous ILS Signals

Recently, the CAA sent a letter to all holders of instrument ratings regarding the detection of erroneous ILS signals. This was prompted by a serious overseas incident where an aircraft experienced significant glideslope errors while on an ILS approach.

If you hold an instrument rating and, for some reason, did not receive this letter, please contact Rose Wood (CAA Safety Education and Publishing Unit, Tel:0–4–560 9400, or email: woodr@caa.govt.nz) and she will send you a copy.



Note that local topographical features may result in a different coverage pattern to that depicted above.

False Capture

We would like to re-emphasise the point that was made in the letter, that receiving an erroneous ILS signal is not the same as 'false capture' of an ILS signal.

'False capture' of localiser information, for instance, results from the pilot arming the localiser instrumentation too soon. Doing so could set the aircraft up to fly an approach some miles off the approach track. On the other hand, an erroneous ILS signal as referred to in the letter, results from a fault with the ILS equipment. This could involve both the localiser and glideslope signals being incorrect.

To minimise the chance of 'false capture', the aircraft's localiser should not be armed until it is approximately within a 35-degree arc either side of the localiser beam. This can be confirmed by monitoring which radial is being crossed as the aircraft nears the localiser track and arming after the appropriate radial is reached. ■

Over-Torquing the R22

The Robinson R22 was flying at about 50 feet agl when it started vibrating badly. This was followed by a loss of power. An emergency landing was made, resulting in significant damage to the helicopter.

Indications were that the main drive belts had failed. Further engineering investigation, in conjunction with the helicopter's manufacturer, revealed that this was the case and that there were a number of probable contributory factors:

- The belt-tension actuator settings were found to be outside factory limits.
- There were signs that the helicopter's drive train had been repeatedly over-torqued.
- The drive belt pulleys may have been misaligned. This is inconclusive, however, as it may have occurred as a result of the impact.

Vector Comment

Once the investigation was completed, Robinson Helicopter Company provided some pertinent operational safety information in respect of over-torquing the drive system. Their advice is as follows:

"Fatigue cracking of the seal retainer plates is an indication of frequent over-torquing. It is easy for pilots to over-torque the Beta 2 with the higher power available from the O-360 engine.

"A few pilots, out of 'operational necessity', knowingly exceed manifold pressure and torque limits on frequent occasions. By their own choice, they become 'test pilots', hoping that the design safety margins will keep them alive to fly another day. Other pilots inadvertently over-torque the R22, particularly those flying low-level and making frequent collective inputs while keeping their eyes outside the cockpit.

"Over the years, over-torquing of R22s has resulted in cracked flex plates, spalled main rotor transmission gears, cracked upper steel tube frames, and reduced lives for tail rotor gearboxes and other components. Based on this experience, Robinson Helicopter Company has made many design improvements to 'beef up' the R22. Helicopters equipped with these latest improvements are having very few problems due to over-torquing with the power available from the O-320 engine.

"However, with the additional power available from the O-360 engine in the Beta 2, new problems relating to drive train torque could occur. The Beta and Beta 2 are both limited to the same power, but the Beta 2 has a greater power margin. The increased performance makes the Beta 2 easier to fly, especially when in a tight spot at high altitude and temperatures. A pilot may temporarily add collective to avoid an obstacle, and the governor will automatically add throttle in an attempt to maintain rpm. By the time the pilot checks the gauges, the manifold pressure is back within limits. Where the R22 Alpha or Beta may have had a slight rpm drop and a small over-torque, the Beta 2 could have a significant over-torque due to the increased power margin.

"Keeping a Beta 2 within power and torque limits requires a little more attention to manifold pressure limits. Pilots who carefully fly the Beta 2 within manifold pressure limits will not have problems. Pilots who do not take precautions are taking their chances. Helicopters that accumulate significant numbers of over-torques will eventually start to have problems." ■

Summer Currency

It's once again fast approaching that time of year where many of us begin dusting the cobwebs off our logbooks and taking to the air to enjoy a bit of summer flying. As the accompanying graph shows, it is during this period (December to March) that there is a large increase in the number of general aviation accidents.

While such a blip in the accident graph is largely a simple function of increased flying hours, part of it relates to some of us being less current than we think we actually are.

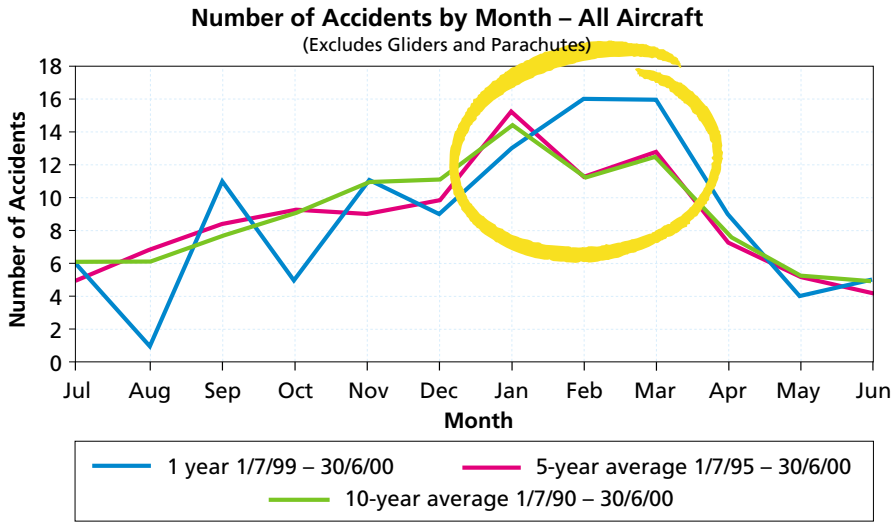
In the interests of reducing the accident rate over the summer period, we urge you to think twice before heading off on that ambitious cross-country flight in possibly less-than-perfect conditions – especially if you haven't flown much over the winter months. Consider waiting until you have successfully completed a few less demanding flights before contemplating it.

Equally, a lack of currency can be just as big a factor when the intended flight is a 'local' only – a crosswind landing or a short-field takeoff can be just as demanding on your skills as the enroute decision-making involved in a cross-country flight.

If it has been a while since you have practised some of these skills, then consider a dual refresher at your local flight-training organisation – it will be money well spent. It can also provide an opportunity to ask an instructor, or a more experienced pilot, to help you brush up on your bookwork. When was the last time you did a performance chart, a weight and balance, or planned a cross-country to the same standard as was required for your PPL (or CPL) syllabus?

Take the time to refresh your skills. Remember that pounding around the circuit for a while brings many facets of flying together within a short space of time (and doesn't cost too much!). A short circuit session at regular intervals is a good way to keep up to scratch. Keeping current reduces your chances of becoming an accident statistic.

Things can get pretty busy with the large variety and volume of aviation activities that take place over summer – so let's be careful out there! ■



Personal Minimums

Do you have personal minimums? Do you stick to them?

As we move into the period of the year that is more active in relation to airshows, rallies and other flying events, it is a good time to sit down and think about your personal minimums. These apply to all aspects of your flying but are particularly important for cross-country flights, especially those into unfamiliar territory.

Planning to Fly Safely

Most accidents and incidents occur because the pilot failed to consider some critical factor during the pre-flight planning. Most errors that lead to accidents are made **prior** to takeoff. There is usually no one thing that causes an accident – it takes several things to lead up to it. If you take precautions to break the 'chain of events' leading to an accident, you can prevent it.

The Av-Kiwi Safety Seminars over the last few years have emphasised the need for good decision-making, and last year they focused on long-distance VFR flight planning. Key elements covered were having well thought out alternatives – including staying on the ground – plus the need for current information (ie, weather, NOTAMs, AIP *Supplements,* special procedure information, and a briefing from another pilot with local knowledge and experience). This year's series of seminars have built on this planning and decision-making theme by focusing on arrival and departure considerations at controlled and uncontrolled aerodromes.

Better planning does prevent problems. The accompanying article in this issue, "Planned Ahead?", steps you through some planning considerations.

One aid to planning is to use checklists to make sure that nothing is overlooked. The checklist this article describes is called the "Personal Minimums Checklist". A blank copy is included with this issue. From it you will develop and record your own personal minimums.

Creating a Personal Minimums Checklist

The CAA Rules are one level of minimums. Companies and organisations generally have another, ie, standard operating procedures and other forms of in-house rules, which may be more stringent than the CAA Rules. But the final level of decision-making and discipline lies with the individual – here you need to have your own personal minimums, which may be even more stringent than the previous two.

These personal minimums will change as you gain flying experience, and they can vary according to your currency on the type of aircraft and nature of the operation involved – what you were comfortable with some months ago when you were current, you may not be so today. Individual well-being is another important factor that must be taken into account when setting and applying personal minimums.

The four major categories of risk factors that the Personal Minimums Checklist addresses are: (P) Pilot, (A) Aircraft, (V) Environment and (E) External Pressures – PAVE.

The idea is that you sit down and set limits for yourself under these categories. You may wish to consult with an instructor, or your peers, before doing so.

How the Checklist Works in Practice

The checklist is designed for use on the ground as part of pre-flight planning.

Having set these limits in the cold hard light of day, so to speak, and recorded them on paper, your decision when under pressure on the day is much easier. For example, you should not be tempted to press on a bit further into weather conditions below your pre-determined minimums, or to takeoff or land in a crosswind beyond your personal limit. Having thought these limits through beforehand, it takes away some of the pressure on the day.

The important thing is to **stick to your limits**.

Use your personal minimums checklist to PAVE the way to a safe flight. If you have an item that is marginal in a one risk factor category, you should consider your options very carefully. If you have marginal items in more than one category, you could be headed for trouble.

Summary

We are now entering the season when there are more flying events to encourage pilots into the air – this is good. But, issues of competency, experience and currency come into play. We believe that if every pilot consistently followed a Personal Minimums Checklist, we would have a much safer aviation fraternity on the move.

To conclude, we have chosen one particularly apt statement that is highlighted in the Personal Minimums Checklist.

Warbirds Over Wanaka 2000

We don't have to look far to find evidence of pilots who do not have personal minimums, or who do but fail to comply with them. This can become more evident when there is extra pressure to fly, when the importance of the trip tends to overshadow good airmanship.

In the months following this year's Warbirds Over Wanaka Airshow, many stories came to light about the general lack of airmanship exhibited by many pilots travelling to and from the airshow.

The weather had a major part to play for VFR flights both to and from Wanaka this year, and it appears that many pilots had not thought through (or didn't follow) their personal minimums. They had not thought sufficiently about backup contingency plans (or had not been willing to implement them).

We have heard stories of aircraft pushing the limits in low-cloud-base and bad-visibility conditions on their way to Wanaka – and again on the way home. In situations like this, do we tend to adopt a 'stream mentality' and abandon responsibility for our own situation and actions? How many of you abandoned your good sense to follow the crowd?

A lack of airmanship was also displayed in relation to procedures at unattended aerodromes en route.

The number of airspace infringements en route over the period, and the lack of knowledge of the special procedures in place around Wanaka, also bear testimony to the fact that many pilots did not carry out sufficient pre-flight planning. It should hardly need reiterating, but such planning should include appropriate current maps and documents **and** contingency plans in the event of not getting through when you had hoped – better to miss a day of the show than not to arrive at all.

Consideration for your passengers is also very important, and it appears that some pilots forgot this. Pushing on into poor weather may upset your passengers – you don't want to put them off flying in a light aircraft for life. Especially if you have a less experienced pilot on board, consider that they may be feeling uncomfortable with your limits; setting a good example is more important than trying to impress with your superior skill. Remember the adage: A **superior pilot** is one who stays out of trouble by using **superior judgement** to avoid situations that might require the use of **superior skill**.

It is to be hoped that many pilots have had second thoughts about their decision-making over last Easter.

It appears, however, that some enjoyed telling their 'war stories' without a thought for what might have happened had luck not been on their side. These 'heroes' often then imply that those who did have the good sense to land and sit out the worst of the weather were 'wimps'.

Yes! Some pilots did study the procedures and make good weather-related decisions – a pat on the back for you if you were one of those. ■

Importance of trip:

The more important the trip, the more tendency there is to compromise your personal minimums, and the more important it becomes to have alternative plans.

Planned Ahead?

The accident statistics provide us with numerous examples of serious occurrences that could have been avoided if only the pilot had taken more care when planning the flight, had set some realistic personal minimums, and had been more assertive when it came making the correct enroute decisions. Many lives have been needlessly lost because of this. Why is this so? Let's look at some of the reasons why we sometimes fail in this area, and review some of the key flight-planning and enroute decision-making techniques.

PRE-PLANNING

The root causes of many accidents, which involve things like pressing on into deteriorating weather, poor mountain flying technique, inadequate aircraft performance, etc, can generally be traced back to inadequate pre-flight planning and poor enroute decision-making.

A lack of pre-flight planning usually relates to the pilot not having the necessary skills to interpret correctly all the available information in the first place, being complacent about the need to flight-plan thoroughly, or being under some financial or time constraint to complete the flight.

"…it is worthwhile to make provision for at least one other safe alternative route – a plan B."

The external pressures that can be placed on a pilot are considerable. (For the purposes of this article, our advice will assume that all flights involve passengers.) These include keeping the cost of the flight to a minimum, getting themselves and their passengers to the destination on time, and getting home again in time for work. All of these can influence a pilot's judgement to the extent that they set off in conditions that are less than suitable for their level of experience and below the personal minimums they may – or should – have set.

No one sets out to fail in the area of pre-flight planning, but sometimes we inadvertently set ourselves up to do just that by not planning ahead sufficiently and by leaving too much to chance. It makes far more sense to remove some of the variables rather than to hope that everything falls into place on the day. Explaining the limitations of VFR travel by light aircraft to your passengers, arranging alternative transport, and taking an extra few days off work in the event that the weather takes a turn for the worse, are all examples of measures that you can take well in advance of the flight to reduce the risks.

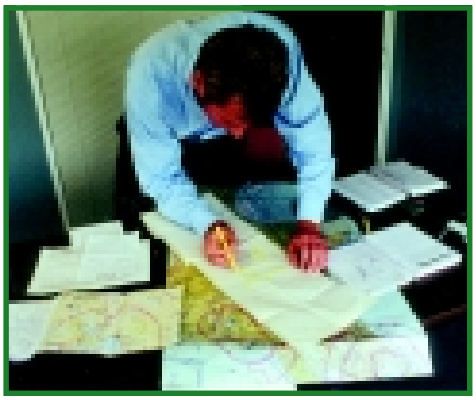
Let's look at what can be done to remove some of these pressures simply by planning the flight at least several days in advance.

Aircraft Limitations

When planning a trip away with friends or family, it is a good idea to explain to them early on in the proceedings the limitations of travelling by light aircraft – especially if they are new to this style of air travel.

Points to be discussed with your passengers should include:

- That there are no guarantees of getting to the destination at the planned time due to the possibility of weather being a limiting factor, and no guarantees of getting back home again on time either.
- That there is the possibility that you may have to turn back or divert once airborne if the weather conditions unexpectedly deteriorate en route. Additionally, the possibility of taking an alternative route (which is quite likely to be longer) due to weather constraints should also be discussed. The financial implications of both of these scenarios should be clarified at this point.
- Passenger weights should be obtained and a preliminary weight-and-balance calculation done based on these values plus the fuel required for the longest leg of the trip. From this, the weight available for baggage should be determined and communicated to your passengers. Many passengers are familiar only with the 20 or more kilos that can normally be taken on commercial aircraft. It is important to make it clear to them that if they turn up on the day with any more than you have specified, that it will be left behind.



Alternative Route(s)

By this stage you should have planned the optimum route for your trip, having carefully studied the charts, and taken into account terrain, airspace, and aerodrome considerations. While in this preliminary flight-planning mode, it is worthwhile to make provision for at least one other safe alternative route – a plan B. In planning this alternative route, take the same level of care as you do with your primary route. This might involve talking to a pilot with experience of that route, or contacting a local operator to gather more information.

Having a well-researched plan B takes a lot of pressure off you and is worth the extra effort.

Alternative Transport

It is always a good idea to have a plan C if it is essential that you get to your destination – especially if the trip is a fairly ambitious one and the weather has not been particularly settled. Doing so takes most of the pressure off you to get there by air.

Having a plan C is as simple as arranging to take the car, or finding out what bus, train or airline services are available.

Extra Accommodation

The eventuality that you reach your destination but can't get back on the planned day should always be allowed for. If you are going to be staying with friends or family it may be easy – just ask to stay another night or two. But if you have accommodation booked things are more complicated.

It does, therefore, pay to make accommodation arrangements that are flexible. Know what your options are for staying an extra night or two, so that you can always fall back on them if the weather deteriorates.

Extra Time Off

The pressure to get back home because you or your passengers have to start work the next day can be very intense. Because of this, it is wise to mention to your employer (ask your passengers to do the same) that there is the chance that you may have to take an extra day or two of leave if you get stuck somewhere. Most employers will understand it is a safety issue and oblige quite happily (provided you don't ask too often).

Long-term Forecast

Planning your flight well in advance also provides the opportunity to monitor the synoptic situation so that you can begin to form a picture of what is happening. This helps you to have a better understanding of what the weather conditions over the duration of the trip might be. For instance, if it becomes apparent that the weather is likely to be poor, you might have seriously to consider postponing the trip there and then – at least everyone will know where they stand that way. Also, if it looks like the weather will be no good for the return trip, you may still have to consider the possibility of postponing, as there is little point in putting yourself under pressure to get back home because you are stuck somewhere.

Having advance understanding of the synoptic situation also allows you to make a more informed assessment of the weather forecast (and reported weather) you obtain on the day.

Some informative web sites for both long-term and short-term weather forecasts are **www.met.co.nz** and **www.bom.gov.au.**

The second has a variety of synoptic charts, which are particularly useful for monitoring the progress of weather systems from the west and south of the country several days in advance.

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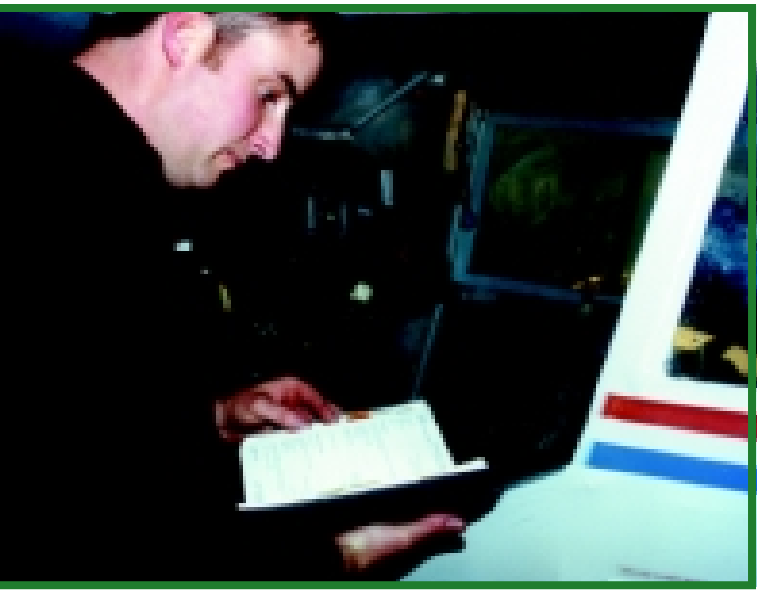
Talk to a Local

It is sometimes worth obtaining local knowledge of an area or route (including aerodrome information) well before the trip. A few minutes spent on the phone talking to a local operator can be worth its weight in gold – most are very happy to help and will probably offer you plenty of other advice and local tips as well.

Refuelling Options

Check the Operational Data page in the VFG for each aerodrome you plan to visit, to confirm that there will be fuel available and that it is correct brand for your aircraft's fuel card. (If a fuel pump has no specified oil company, it is probably Air BP – whose logo was deleted in recent issues of the VFG.) Not having this information might put you in the position, when in need of fuel, of having to fly to another aerodrome with less fuel on board than you are comfortable with.



Study the AIP

By now you will have spent a reasonable amount of time studying the charts and have worked out primary and alternative routes. Now, if you have not already done so, turn your attention to studying the VFG (don't forget about the VFG Change Notices), the AIP *Supplement*, and the AIP *Planning Manual*. Of course all these documents must be up-to-date versions.

It is important that you check the *Supplement* and the applicable sections of the *Planning Manual* to determine if there is any information that might affect your flight. Don't just rely on getting the area NOTAMs on the day, as they are not the sole source of all temporary aerodrome and airspace information.

The *Supplements* often contain important information about temporary danger and restricted areas; the *Planning Manual* contains airspace and aerodrome information of a more permanent nature.

You might consider transferring as much general information on to your pilot log card as you can at this point. This ensures that everything that is required for the flight is noted in a thorough manner, reducing the possibility of missing some items when doing the final planning (possibly in a rush) on the day.

Personal Minimums

It is important that you set yourself some personal minimums and stick to them when making important pre-flight and enroute decisions.

Personal minimums take into account a wide range of criteria under the headings pilot, aircraft, environment, and external pressures. They are an invaluable tool in assisting you to decide if a particular situation (route, weather, aircraft type, etc) is within your personal limits.

We have enclosed a "Personal Minimums Checklist" pamphlet, and a "Cross-Country Considerations" pamphlet, with this issue of *Vector*. Additional copies can be obtained from your local flight-training organisation, CAA Field Safety Adviser, of the Safety Education & Publishing Unit (Tel: 0–4–560 9400). We strongly advise that you take the time to complete these checklists, and that they be kept in your flight-planning satchel as a reference.

ON THE DAY

Weather

The most up-to-date weather **must** be obtained prior to the flight. Weather that was issued that morning, for example, should not be used to plan a flight in the afternoon. It is equally important to devote a generous amount of time to weather interpretation – especially when conditions are borderline – so that you can have a good think about how the conditions might affect your flight. Using a highlighter pen to mark the key points as you read the forecast is sometimes useful – particularly when you read it for a second time (which is another good idea).

Be honest with yourself when trying to form a picture of what is happening though. If you're not sure, ask someone who has more experience to help you. Remember that the MET section of the *Planning Manual* has much useful information about de-coding aviation weather forecasts.

If, having deciphered the weather forecast (you might want to talk through the pros and cons with an experienced pilot), you do not feel comfortable with the conditions, it's time to tell your passengers so. Making such a decision requires a fair amount of personal discipline, courage even, but it is made considerably easier by the fact that you have a set of personal minimums to guide you, and a plan C to fall back on.

If you decide to proceed with the flight with the intention of seeing what the enroute conditions are like, do so **only** on the basis that you will divert or turn back when they surpass a specified value (eg, "I will divert or turn back if the visibility and cloud base deteriorates below XYZ"). This requires that you maintain an awareness of what the weather is doing behind you (always having an out) and that you be able to recognise when the conditions are about to fall below the limits you've set.

NOTAMs

If weather forecasts are important, so too are the latest NOTAMs.

Sometimes though, the screeds of NOTAMs that roll off the printer can be a bit daunting. Minimise the number of NOTAMs you receive by knowing the boundaries of the NOTAM areas and requesting only those that are applicable to your route. NOTAMs should be read carefully – highlighting the ones that will affect your flight is a good idea.

Talk to a Local

If the weather conditions are somewhat average on the day, it is prudent to call the local operator(s) again to gauge their assessment of the conditions en route. Taking the trouble to

make such a call could end up saving you a lot of wasted time and money – it might even save your life.

File a Flight Plan

It is essential that you file a flight plan or submit a SARwatch. They are reasonably priced (and soon you will be able to file them over the Internet).

Survival Equipment

Be prepared – whatever the time of year and whatever the route. Take a cellphone (if you have access to one), a survival kit, extra food and water, some sturdy footwear, and plenty of warm clothing. Lifejackets should always be carried as a matter of course, even if you are not planning to cross water.

ENROUTE DECISION-MAKING

Because you have planned the flight thoroughly and have a number of contingencies in place, any deterioration in the weather en route will be far easier to deal with. As you aren't under so much pressure to get to the destination, you will be able to make the decision to divert or turn back purely from a safety perspective. It is important, however, that such in-flight decisions are made as early as possible during the flight.

Divert

The decision to divert en route depends on a number of factors: where you are in relation to your alternative route(s), the weather and terrain in between, the weather conditions along the new route, and the fuel remaining.

Although there are many variables to weigh up here, once the decision to divert has been made it is a relatively simple process to fly the new route, as most of the planning has been done beforehand. Also, any financial concerns that your passengers might have about the extra costs associated with diverting (even if it involves doubling back on your track) will already have been resolved, thus removing much of the pressure to continue along the original route.

Fuel-required calculations should be revised and flight plan or SARwatch details amended as soon as practicable.

Turn Back

If the conditions ahead look dubious and diverting is not an option, then it is time to apply those personal minimums and make the decision to turn back. Your passengers will not think that you have failed them – remember you already briefed them on the possibilities of having to turn back and discussed the implications of such an eventuality. Instead, they will see you as a pilot who makes safe and sensible decisions. They may even be very relieved and grateful that you have made that decision!

Precautionary Landing

If the weather starts to close in around you (especially from behind), slow the aircraft into the bad-weather configuration and give serious consideration to conducting a precautionary landing – preferably before the conditions deteriorate too much further.

There are plenty of instances where pilots have come to grief by trying to press on when faced with deteriorating weather, when they could have concluded the flight safely by conducting a precautionary landing. The fact that the aircraft may become damaged during the precautionary landing should not influence your decision here, as the aircraft can always be repaired. It is far better for you and your passengers to walk away from a damaged aircraft with some minor cuts and bruises only – than never to walk again.

SUMMARY

Safe and successful cross-country flying (or any flying for that matter) comes down to thorough planning.

If possible, begin pre-flight planning **several days in advance**:

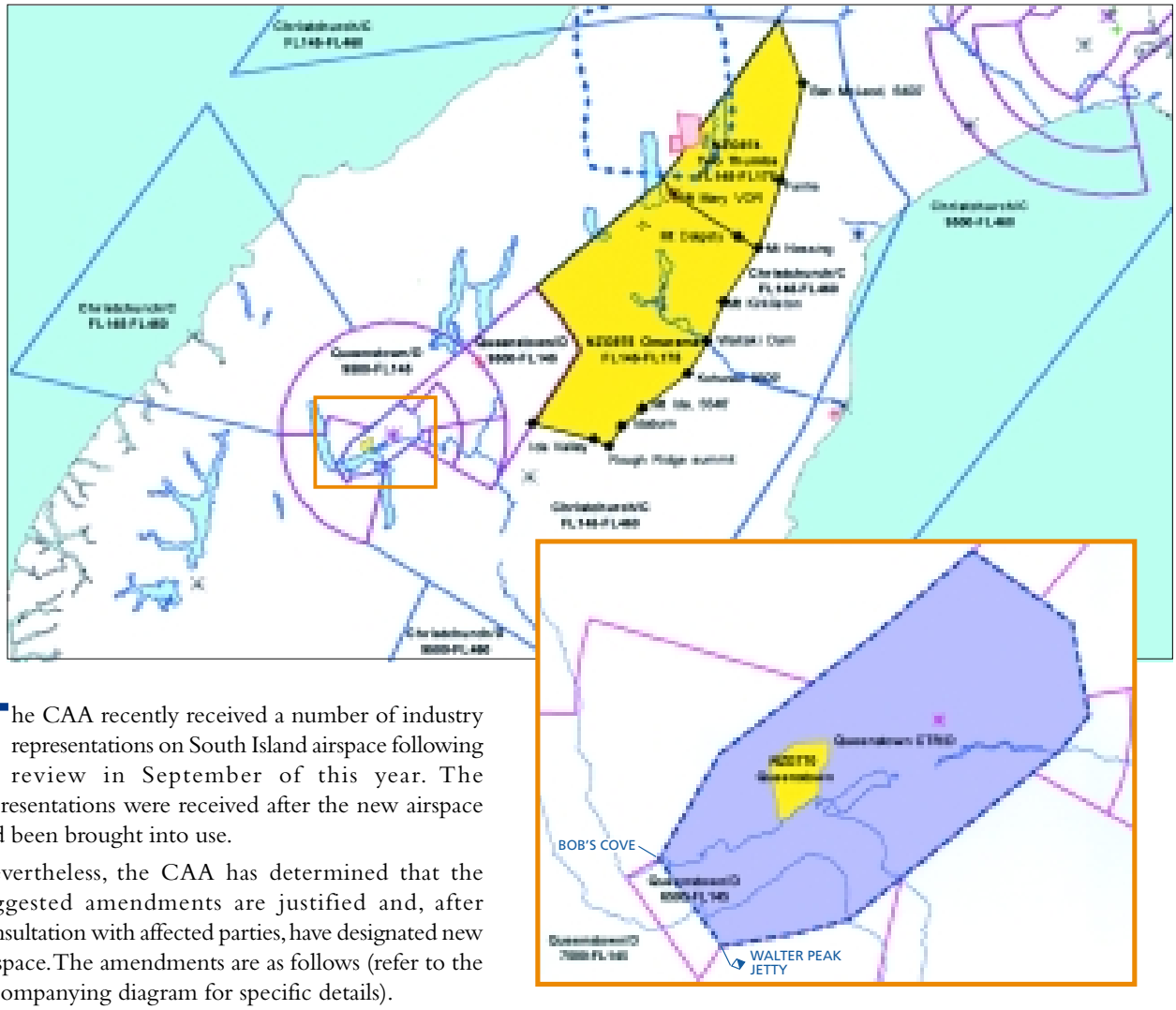
- Ask yourself, is the proposed flight within my capabilities as a pilot? Ensure that you have a set of up-to-date personal minimums to refer to.
- Brief your passengers about the realities of flying VFR.
- Verify passenger and baggage weights and advise passengers.
- Study the applicable charts and AIP documents thoroughly, and plan the route.
- Plan an alternative route.
- Arrange alternative transport, extra accommodation and time off work for you and your passengers.
- Check the long-range weather forecast.
- Gain local knowledge of the route(s) and destination(s).

Allow plenty of time **on the day** to be sure that final pre-flight preparation is not rushed:

- Obtain the most recent weather and NOTAMs and check them **carefully**. If in doubt, discuss the conditions with a more experienced pilot.
- Apply personal minimums to all pre-flight decisions.
- File a flight plan or SARwatch, and ensure suitable survival equipment is carried.

Make the decision to divert, turn back or conduct a precautionary landing early. Stick to your personal minimums religiously, and remember people will admire you more if you made safe and prudent decisions rather than ones that involve 'pressing on'. ■

South Island Airspace Update



The CAA recently received a number of industry representations on South Island airspace following its review in September of this year. The representations were received after the new airspace had been brought into use.

Nevertheless, the CAA has determined that the suggested amendments are justified and, after consultation with affected parties, have designated new airspace. The amendments are as follows (refer to the accompanying diagram for specific details).

- The upper controlled airspace over the central South Island is amended from a lower limit of FL175 to a lower limit of FL145 (effective 25 January 2001).
- Two new general aviation areas, Two Thumbs (NZG974) and Omarama (NZG975), are established to allow access for general aviation purposes between FL145 and FL175 when required (effective 25 January 2001).
- The Lake Wakatipu VFR transit lane (NZV776) is disestablished, and that area effectively becomes part of the control zone (effective 22 March 2001).
- The Queenstown general aviation area (NZG770) is re-established (effective 22 March 2001).

Because the visual charts will not be updated until September 2001, it is recommended that affected airspace users copy the accompanying diagram and attach it to their current VTC or topographical chart for future reference. ■

Cockpit Instrument Ergonomics

While taking off down-slope from a glacier, with a lean fuel mixture set for best power, the engine of the Cessna A185F appeared to lose power approximately half-way through the takeoff run. The pilot aborted the takeoff at a late stage. The aircraft stopped in a crevassed area, suffering only minor damage.

A subsequent in-depth engineering investigation found no fault with the engine. However, the dual manifold-pressure and fuel-flow gauge fitted to this particular aircraft indicates maximum fuel flow in the five o'clock position. The fuel-flow needle moves clockwise as the throttle is opened – the opposite direction to gauges fitted to the other aircraft of the same type in the company's fleet.

This unexpected illusion presented by the unusual gauge compromised the pilot's decision-making process, resulting in an aborted takeoff with minimal distance remaining. This type of gauge was subsequently found to have been made obsolete by the manufacturer in 1967.

This incident could have easily resulted in a serious accident in what was essentially a perfectly serviceable aeroplane being operated within its normal parameters. It highlights the desirability of standardising all instrumentation across an organisation's aircraft fleet. ■

Mount Cook Area Checklist

– Summer tips for operating in the Mackenzie Basin and Mount Cook environs –

The assistance of Geoff Ensor of Air Safaris and Russell Baker of Air Fiordland in the preparation of this pullout is gratefully acknowledged.

CUT OUT AND RETAIN

The Mackenzie Country and its associated portion of the Southern Alps is a very beautiful area indeed, but it is one that can be extremely hazardous to those pilots unfamiliar with the local geography, weather, and aviation procedures. It is an area in which thorough and professional pre-flight planning is absolutely essential if a flight is to be conducted safely. This pullout has been developed to assist with the planning process and is designed to act as a checklist for pilots who are planning on venturing into the area.

Weather

Carefully check the area weather well in advance and again just prior to the flight to try and form a mental picture of what is happening – and what is going to happen. Knowledge of upper wind direction and strength, combined with advice from someone who knows the area, will greatly assist with planning a safe route. If it is looking doubtful ask yourself "Do I really need to do this flight today? Are the conditions suitable for my passengers?" If the answer is no, we suggest it is best left for another day.

MBZ

An MBZ (mandatory broadcast zone) encompasses the area of most intensive tourist aircraft activity. Know the MBZ boundaries, be on 118.6 MHz, and give clear and professional calls as per the special procedures outlined in the VFG. Listen out prior to entering the area, if practicable, to gain an appreciation of the level of activity.

Special Procedures

Pages 11 to 13 of the Operations section of the VFG contain vital information and should be read thoroughly before the flight. These pages detail collision avoidance information, the designated reporting points, and the specific traffic-flow procedures that must be observed.

Radio Procedures

Accurate and competent radio work is absolutely essential to flight safety when operating within this area – specific requirements are discussed on pages 11 and 12 of the Operations section of the VFG.

Local pilots are familiar with well over 100 different reporting points; you may recognise just a few of them, and in fact may only be sure of your position relative to major mountains and glaciers. If you give **short** and **precise** calls advertising your position (relative to a geographical feature you are sure of), your present altitude, your direction of flight and intentions, local operators will maintain a lookout for you and adjust their flight paths if necessary.

CALLSIGN/POSITION/ALTITUDE/DIRECTION

Short, well thought out, accurate radio calls are vital to everyone's safety.

Mount Cook/Westland Chart

This chart is a 'must-have' item for those who are unfamiliar with the area. The 1:150 000 scale enables much more detail to be shown. Just as you use a VTC when approaching Auckland or Wellington for example, it is important that a transition is made to this special chart as soon as you enter the Mount Cook/Westland area. They can be obtained from Aviation Publishing by phoning 0800 500 045.

High and Wide

Generally speaking, the higher and wider from the terrain that you fly, the less likely you are to conflict with local commercial traffic. The greater your height the greater your margin of safety. Aim for 10,000 feet amsl and above (bearing in mind the allowable time period at this altitude without oxygen).

Read the Mountain Flying GAP

The CAA GAP booklet, *Mountain Flying,* gives a very good overview of operations in mountainous terrain and is a 'must-read' before venturing in to this area. There is also a CAA safety video on mountain flying, which includes advice from experienced local operators.

Environmental Concerns

Local scenic operators are working closely with Department of Conservation staff to mitigate the effect of their activities on other National Park users. Any effort you can make to steer clear of wildlife, climbing or walking parties, and mountain huts, will be very much appreciated by everyone. ■

Milford Sound Area Checklist

– Summer tips for operating in the Milford Sound area –

A flight into and around Milford Sound is one trip that many pilots would love to make. It is a flight, however, that requires thorough and professional pre-flight planning to minimise the risks, of which there are many. Like most things, it's alright when you know what you're doing!

This pullout has been developed to assist with the planning process and is designed to act as a checklist for pilots who are planning on venturing into the Milford area this summer.

Weather

Check the weather carefully – conditions can deteriorate rapidly in Fiordland. Cloud below 3000 feet amsl may very quickly obscure the passes en route to Milford Sound.

Talk to a Local Pilot

Local pilots will be able to assist you with any queries you might have about flying in the Milford Sound area.

Special Procedures

The Milford Sound arrival and departure procedures detailed in the VFG should be read thoroughly before the flight. You should have it clear in your mind, **before** getting airborne, what arrival and departure procedures and radio frequencies are relevant to you and what calls will be necessary. The collision avoidance frequency (119.2 MHz) should be monitored at all times when within the Milford Sound VFR special procedures area.

Have the Appropriate Charts

The Milford VTC is essential. Thoroughly familiarise yourself with the terrain and reporting points – if you are unsure, ask someone who knows. Remember that NZR701 (the Homer Tunnel restricted area) can be active, so check the area NOTAMs.

Busy Periods

There is intensive air transport activity at Milford, especially between 15:00 and 16:00 NZDT over the summer period. Check with Queenstown or Milford based operators on the day's planned aircraft movements – busy periods should be avoided where possible. Note that parking at Milford Sound aerodrome during these peak times is limited. Be careful to brief your passengers before allowing them to alight at Milford, due to the limited apron space and proximity of the runway. Allowing unsupervised passengers near operating aircraft is an unacceptable risk.

Read the GAPs

Shortly to be released (March 2001) in the CAA's GAP booklet series is *In, Out and Around … Milford,* which provides a comprehensive overview of operating in the Milford area. Another 'must read' before heading off into the Milford area is the *Mountain Flying* GAP. This booklet gives a very good overview of operations in mountainous terrain. There is also a CAA safety video on mountain flying which includes advice from experienced local operators.

For borrowing or purchasing the video, see details on CAA safety videos contained within previous issues. The GAP booklets can be obtained from your local flight-training organisation, CAA Field Safety Adviser, or the CAA's Safety Education & Publishing Unit (Tel: 0–4–560 9400). They can also be viewed on the CAA web site (**www.caa.govt.nz**) along with a wide range of other safety publications.

Environmental Concerns

All local operators are working closely with Department of Conservation staff and local land-based users to minimise the effects of their activities on other National Park users. Any effort you can make to reduce the impact of aircraft noise on walking parties (particularly those on the Milford, Hollyford, Caples, Greenstone, and Routeburn tracks) will be very much appreciated by everyone. Local operators ask, in particular, that aircraft should remain well clear (ie, above 5000 feet amsl) of MacKinnon Pass to minimise the effects of aircraft noise. ■

Attention all New Zealand Tourist Flight Operators!

– 2001 Tourist Flight Operators' Safety Seminar –

Following on from the success of the mountain flying safety seminar held at Omarama in May of this year, a clear message emerged that tourist flight operators should meet on an annual basis to share ideas and develop strategies that will improve safety and quality across the industry. See the July/August 2000 issue of *CAA News*, and also this issue, for further details.

It is anticipated that next year's seminar will be scheduled to take place from 30 to 31 May at Omarama. Full registration details and seminar objectives will be published in subsequent issues of *Vector/CAA News*. So if you are a tourist flight operator, fixed-wing or rotary, pencil this one in your diary, and watch this space for further details!

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 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 (including flammability and static electricity, contamination and the health aspects in handling fuel), 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
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 than came very close to being accidents. This video consists of two short sketches that carry safety messages for all helicopter pilots.

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.

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 – 19 min (Agricultural operations.)
Going Down – 30 min (Handling emergencies)

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: 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.

Hand-Swing Starting

Pat Scotter's letter in the September/October issue of *Vector* did a lot to inform us of the hazards of hand-starting aero engines. His account of how even licensed pilots will sometimes act inappropriately reminded me of good advice I received when familiarising myself with the multi-crew environment: 'Trust nobody; check everything yourself'.

It also reminded me of the following anecdote, which further illustrates the truth of Pat's penultimate paragraph:

> A topdressing pilot enlisted the help of the farmer to help hand-start his Tiger Moth, parked at the top of a sloping topdressing strip.
>
> "Close the throttle fully when she fires," the pilot instructed.
>
> The engine started on the first swing, but the rpm increased instead of slowing to a tick-over.
> The pilot raced after the departing Tiger Moth and eventually managed to climb onto a wing, from where he could close the throttle.
>
> "You didn't do as you were told", he accused the farmer.
>
> "You didn't tell me it was still in gear", was the reply.

Learn by the mistakes (and experience) of others; we can't live long enough to make them all ourselves.

Guy Clapshaw
Pakuranga
September 2000

What Else is Wrong Here?

Your picture of Hughes 269 (300) and question of "What's Wrong Here?" (*Vector*, July/August 2000) had me thinking for a while, and in fact I did not pick up at first that the centre passenger did not have a shoulder harness on. Subsequently, on looking in the Hughes 300 Flight Manual, it does in fact state that the centre passenger should wear a shoulder harness.

On closer inspection of your photograph, I noticed something that could be potentially very dangerous, and the middle-seat passenger might very well be pleased he did have a full shoulder harness on. This is the fact that the dual controls are still installed on the passenger side, and if the dual collective is still installed, then the middle-seat passenger will be sitting right on top of it. With full duals installed, the Hughes 300 effectively becomes a two-seat helicopter, as the middle-seat position is removed for the installation of the dual collective.

In some helicopters the complete installation and removal of the dual controls is a time-consuming and difficult business, and this is so in the Hughes 300. However, they can be partially removed quite easily where the only remaining part of the dual controls left installed is the 'yoke' to which the cyclic is attached, which is generally out of harm's way in terms of any potential interference by a passenger. The potential for disaster is huge if the dual controls are left installed while carrying passengers, as involuntary and unexpected actions by some passengers have to be experienced to be believed!

The Flight Manual does state that the dual controls are to be removed if passengers are carried.

In the case of this picture in *Vector*, I suspect that the picture was taken purely for the demonstration of the middle-shoulder-harness issue, and the fact that the duals were installed while passengers were on board, was simply overlooked.

Keep up the good work with *Vector* – it is a very worthwhile, educational magazine.

Simon Spencer Bower
CEO/Chief Flying Instructor,
Canterbury/Wanaka Helicopters
August 2000

Vector Comment

Well spotted. As you mention, the photograph was a posed one, and in seeking to illustrate one safety issue, we inadvertently portrayed another. Thank you Simon for pointing that out. ■

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

24-hour 7-day toll-free telephone

0508 4 SAFETY
(0508 472 338)

For all aviation-related safety concerns

IA Course

The CAA will hold a two-day Inspection Authorisation course in Wellington on 6 and 7 December 2000.

The course, which is followed by a written examination, is one of the prerequisites for the granting of a Certificate of Inspection Authorisation. It is also a means of meeting the requirements for Part 145 Maintenance Organisations to grant authorisations that allow the certification of conformity for major modifications and repairs.

Contact Mark Price (Examiner AME) or Rex Kenny (Sport and Recreation Coordinator/AME Specialist) on 0–4–560 9400 for further information and enrolment details.

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 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.

ZK-HDT, Robinson R22 Beta, 16 Jan 99 at 1215, Wentworth Station. 2 POB, injuries 1 serious, 1 minor, damage substantial. Nature of flight, hunting. Pilot CAA licence CPL (Helicopter), age 47 yrs, flying hours 16593 total, 5700 on type, 150 in last 90 days.

While involved in a hunting operation, the pilot smelt something burning and decided to carry out a precautionary landing. As he was doing so, there was a bang and the engine "revved up", but power to the main rotor was lost. An autorotation was attempted but the aircraft fell the last 10 to 15 feet, resulting in a heavy landing.

The power loss to the main rotors was due to broken drive belts. The drive belts had been replaced approximately 50 hours earlier, at which time there were some indications of wear in the anodised coating in a groove of the upper sheave. The sheave was not replaced at that time. The manufacturer's Maintenance Manual requires that the sheaves be replaced where any sheave groove is found to be worn. Wear can rapidly accelerate, resulting in belts rolling, breaking, or coming off. New belts are required to be pattern-matched to the sheaves.

It was not positively determined, however, whether the wear in the upper sheave was a contributory factor in this accident.

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

CAA Occurrence Ref 99/23

ZK-HIM, Hughes 269C, 5 Dec 99 at 1140, Wainuiomata. 2 POB, injuries 1 minor, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Helicopter), age 36 yrs, flying hours 87 total, 87 on type, 10 in last 90 days.

The helicopter was on short final for a paddock landing site, when the engine began running roughly. One witness, who was familiar with engines, said that it sounded as if the engine had 'dropped a valve'.

The pilot attempted to flare the machine, which landed heavily on its right skid in a tail-low attitude, striking the ground with the tailrotor at the same time. The skid collapsed and the helicopter rolled onto its right side. The (Pointer) ELT operated on impact.

A leak-down check was performed on the engine at a later date, and revealed that the exhaust valve on the No 3 cylinder was defective, preventing any compression from being developed in that cylinder. A high leak-down rate (50/80) was also noted on the No 2 cylinder. The nature of the exhaust valve defect on the No 3 cylinder was not established during the field check, but should become apparent when the engine is stripped down. The engine had run approximately 1325 hours since new (1980), but had had a top overhaul at 1240 hours TSN.

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

CAA Occurrence Ref 99/3455

ZK-CEB, Piper PA-25-235, 14 Dec 99 at 1300, Te Kowhai Ad. 1 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 50 yrs, flying hours 1850 total, 700 on type, 12 in last 90 days.

While taxiing for departure, the aeroplane collided with a concrete trough that the pilot had not sighted. The left-main undercarriage leg was bent rearwards and the propeller sustained minor tip damage.

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

CAA Occurrence Ref 99/3737

ZK-HYE, Hughes 269C, 18 Dec 99 at 1524, nr Kawerau. 3 POB, injuries 3 fatal, aircraft destroyed. Nature of flight, private other. Pilot CAA licence PPL (Helicopter), age 37 yrs, flying hours 210 total, 50 on type, 5 in last 90 days.

The helicopter was on a private local scenic flight about three nautical miles north of Kawerau. Approaching to land, it struck a power line and impacted the ground nearly inverted. The resulting fire destroyed most of the helicopter.

Main sources of information: Abstract from TAIC Accident Report 99-006.

CAA Occurrence Ref 99/3649

ZK-GMZ, Grob G103 Twin II, 26 Dec 99 at 1430, nr Lake Station. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age not known, flying hours 42 total, 39 on type, 2 in last 90 days.

The glider was winch-launched from Lake Station, and after release the pilot flew across to Maggie's Ridge in search of lift. He encountered a 5-knot thermal and attempted to circle to become established in it. After turning about 180 degrees, the glider stalled and entered an incipient spin to the left. The pilot recovered with no space in which to manoeuvre and found himself heading straight for the ridge, and the glider collided with trees on the ridge top. The pilot's low overall experience and lack of recent experience were the dominant factors in this accident.

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

CAA Occurrence Ref 99/3783

ZK-FPZ, De Havilland Canada DHC-2 Beaver Mk 1, 31 Dec 99 at 1955, Hastings. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence CPL (Aeroplane), age 23 yrs, flying hours 1800 total, 143 on type, 70 in last 90 days.

The aircraft touched down and as it slowed it nosed over. It was found that the pilot had inadvertently applied the park brake during the course of the flight.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 99/3692

ZK-BGI, Cessna 180, 13 Jan 00 at 0940, Ohakune. 4 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence CPL (Aeroplane), age 56 yrs, flying hours 1200 total, 50 on type, 9 in last 90 days.

The aeroplane was landing on grass vector 04 at the Ohakune strip. About 600 metres from the threshold, when speed had reduced to about 20 knots, the aeroplane veered to the right. The pilot was unable to control the yaw and initiated a groundloop in an attempt to avoid the adjacent fence. After a direction change of about 70 degrees, the tailwheel failed and the spring dug into the grass surface, abruptly stopping the yaw. The aft fuselage suffered some bending as a result.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/32

ZK-DUJ, NZ Aerospace FU24-950, 18 Jan 00 at 1205, Wangaehu Valley. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 53 yrs, flying hours 25100 total, 90 on type, 95 in last 90 days.

While approaching to land on a short airstrip, a tailwind lifted the aircraft as it crossed a bank on the threshold. The pilot (recently converted on type after many hours on piston-engine aircraft) instinctively closed the turbine engine power lever, inadvertently putting the propeller into beta range. The aircraft nose dropped, but the pilot had insufficient height recover the low nose attitude. The nose leg piston snapped and the aircraft proceeded up the strip on its nose.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/92

ZK-JAA, NZ Aerospace FU24-954, 26 Jan 00 at 0705, South Kaipara. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 59 yrs, flying hours 15629 total, 7075 on type, 45 in last 90 days.

After the aeroplane had been loaded, the pilot began taxiing for takeoff. He had moved about one metre only when the left tip of the tailplane struck the loading vehicle that had, unbeknown to the pilot, moved towards the aeroplane again.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/159

ZK-HIQ, Robinson R22 Beta, 24 Feb 00 at 0810, Alexandra. 1 POB, injuries nil, damage substantial. Nature of flight, ferry/positioning. Pilot CAA licence CPL (Helicopter), age 48 yrs, flying hours 17000 total, 6000 on type, 172 in last 90 days.

The helicopter was flying at about 50 feet agl when it started vibrating badly. This was followed by a loss of power. An emergency landing was made resulting in significant damage to the helicopter. Indications were that the main drive belts had failed. Further engineering investigation, in conjunction with the helicopter's manufacturer, revealed that this was the case and that there were a number of probable contributory factors:

- The belt-tension actuator settings were found to be outside factory limits.
- There were signs that the helicopter's drive train had been repeatedly over-torqued.
- The drive belt pulleys may have been misaligned. This is inconclusive, however, as this may have occurred as a result of the impact.

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

CAA Occurrence Ref 00/407

ZK-MCB, Aerospatiale-Alenia ATR 72-212A, 13 Apr 00 at 1315, Wellington. 0 POB, injuries 1 serious, damage nil. Nature of flight, transport passenger A to B. Pilot details not applicable.

The passengers had proceeded to disembark the aircraft, when an elderly lady fell down steps and broke her arm. A pip pin had dislodged causing the handrail to collapse. The design of the pip pin was found to be deficient as the tag was connected to the pin release, which could be snagged, thus removing the pin from the handrail.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 00/1134

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 Unit.

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

Aerospatiale AS 355F1 – Turbine bearing fails

Twice that day a chip detection light had illuminated and was rectified by engineering. It was decided to fly the machine from its current location to its maintenance base for further engineering investigation. During this flight the chip light came on again. This time the pilot elected to shut down the engine rather than carry on with the flight.

Further investigation revealed that the No 5 turbine bearing had failed.

ATA 7250 CAA Occurrence Ref 98/3457

AESL Airtourer 115 – Inlet valve spring breaks

The pilot was performing aerobatic manoeuvres, and when the throttle was opened the engine did not respond. A forced landing in a paddock was carried out with no damage to the aircraft.

Further investigation revealed broken number one inlet valve springs. TSO 71 hrs.

ATA 7220 CAA Occurrence Ref 99/1557

Beech 76 – Nose gear actuator O-ring fails, P/N 105-384000-1

The nose gear failed to retract after takeoff. The aircraft returned for an uneventful landing.

Investigation revealed that the forward O-ring on the nose gear actuator failed to retain hydraulic pressure, allowing fluid to escape. The system did not activate normally owing to the lack of hydraulic pressure. TTIS 6804 hrs; TSO 51 hrs; TSI 51 hrs.

ATA 3200 CAA Occurrence Ref 99/1789

Bell 206B – Number eight N1 bearing locks up, P/N 6898734

On engine start up, the N1 drive appeared to be 'locked up'. The lock-up was caused by a carbon build up in the number eight bearing seal area. TSO 291 hrs.

ATA 7200 CAA Occurrence Ref 99/2320

Cessna 152 – Mixture cable breaks, P/N 9862010-3

The student and instructor were practising forced landings without power above an airstrip. The instructor pulled the mixture out to simulate an engine failure. Unfortunately, the mixture control cable snapped in the process, which necessitated a real forced landing on to the airstrip.

An engineering investigation concluded that it appeared to be a fatigue break of the cable. Inner cable condition can not readily be checked during maintenance, making it difficult to detect any deterioration. TTIS 8652 hrs; TSO 8652 hrs; TSI 10 hrs.

ATA 7600 CAA Occurrence Ref 99/2193

Hughes 269B – Engine oil system hose fitting loose

Smoke was smelt in the cockpit during the cruise, which appeared to be coming from the instrument panel. The electrics were switched off and the pilot located a suitable precautionary landing site. On landing, the tail rotor clipped a small bush and the helicopter settled onto the ground.

Further investigation revealed that the smoke was due to oil leaking from a loose oil fitting and dripping onto the engine.

ATA 8550 CAA Occurrence Ref 99/1866

Kawasaki BK117 A-4 – Chip detector O-ring damaged, P/N M25988/1-011

The aircraft was three minutes into the flight when the low-oil pressure light for the number one engine came on. A check of the oil pressure gauge indicated falling oil pressure. The engine was shut down, the pilot advised the tower, and a precautionary run-on landing was carried out.

Further investigation revealed that oil was leaking from one of the engine chip detector O-rings, which was damaged. This chip detector sealing O-ring was inadvertently damaged during normal inspection and cleaning. Both engine detector O-rings were renewed.

ATA 7200 CAA Occurrence Ref 99/1505

Micro Aviation B22 Bantam – Carburettor incorrectly adjusted

The pilot experienced a gradual loss of power so he carried out a precautionary landing to check the engine.

Investigation by the pilot identified a lean mixture. The pilot had recently adjusted the mixture on the engine by lowering the carburettor needles.

ATA 7300 CAA Occurrence Ref 99/2207

Piper PA-46-310P – Hydraulic motor fails to operate

The pilot of the aircraft declared an emergency due to an unsafe nosegear indication and flap failure when selected. Ground staff confirmed, on a fly past, that the gear had not extended. The emergency extension procedures were carried out but failed to rectify the problem. A call was made to the owner of the aircraft, who had experienced this problem previously.

He suggested carrying out a stall to assist the gear extension spring. This idea worked, and the aircraft was landed safely. Further investigation revealed that the hydraulic motor had a dead segment preventing its operation. The manufacturer was advised. They recommend that the emergency extension spring should be replaced every two to three years and the accumulator pressure every six months.

ATA 2910 CAA Occurrence Ref 99/1459