November / December 2004

VECTOR

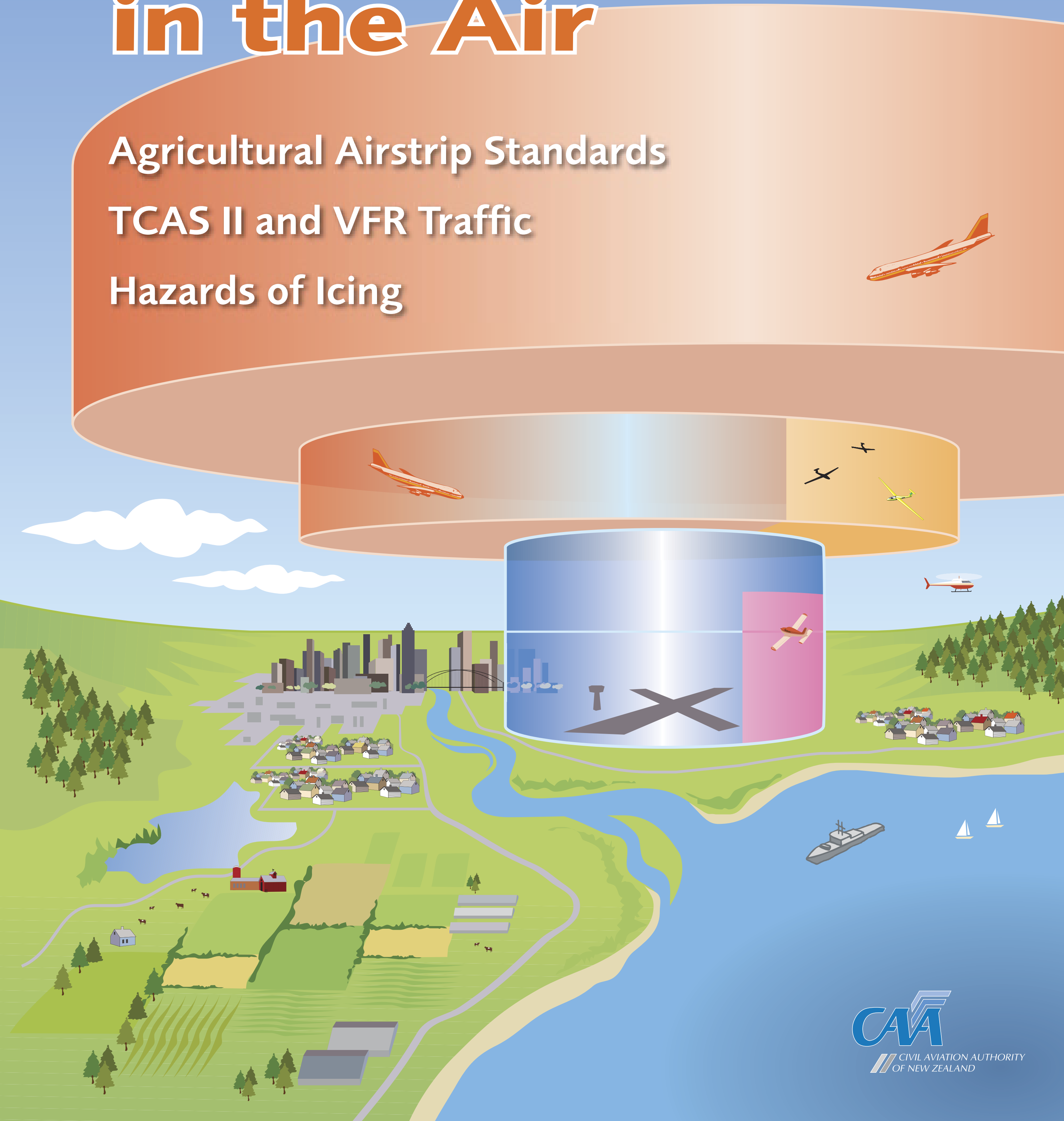
Pointing to Safer Aviation

Changes in the Air

Agricultural Airstrip Standards

TCAS II and VFR Traffic

Hazards of Icing



CIVIL AVIATION AUTHORITY
OF NEW ZEALAND

VECTOR CAA NEWS

Published by: the Communications and Safety Education Unit of the Civil Aviation Authority of New Zealand, P O Box 31–441, Lower Hutt, New Zealand. Tel: +64–4–560 9400, Fax: +64–4–569 2024, Email: publications@caa.govt.nz. Published six times a year, in the last week of every odd month.

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Design: Gusto Design & Print Ltd.

Publication Content

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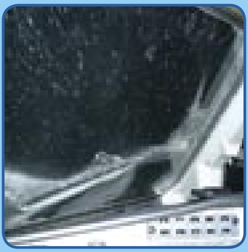

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Changes in the Air

On 5 August 2004, Civil Aviation Rules, Part 71 *Designation and Classification of Airspace* came into force, amalgamating the previous Part 71 and Part 73. This has resulted in a number of significant airspace changes. Some of these will be seen on the new *Visual Navigation Charts* (VNCs) effective 25 November 2004.

A summary of the major airspace changes is provided in this article. For more information, refer to the latest CARRIL and rule updates (Part 71 and Part 91) provided on the CAA web site (www.caa.govt.nz).

Controlled Airspace

In Class D airspace, IFR traffic is **no longer separated** from VFR **at night**. This means IFR flights are provided with traffic information about VFR flights, during the day and at night. This is in line with ICAO standards.

Special VFR operations, below normal visual meteorological conditions (VMC), can now be approved by air traffic control (ATC) in any controlled airspace, not just within control zones.

Sectors can now be designated within control areas, as well as control zones – these portions of controlled airspace are now generically termed 'controlled airspace sectors'.

Transponder Mandatory Airspace

All New Zealand controlled airspace will be designated as transponder mandatory (TM) on 25 November 2004. With air transport aircraft now carrying Traffic Collision Avoidance Systems (TCAS), the upper portion of some mandatory broadcast zones (MBZ) have also been designated TM. Previously, only controlled airspace within radar coverage could be designated TM.

VFR Transit Lanes

VFR transit lanes are portions of controlled airspace (not used by IFR traffic) that change classification to uncontrolled airspace **during daylight hours**. A transit lane allows VFR aircraft to transit through the airspace, without a clearance from air traffic control (ATC). The alphabetical prefix is changing from a V to a T, for example NZT 978 (T978 on charts). For those of you who remember the old 'kopter' lanes and 'victor' lanes, these terms are no longer being used.

General Aviation Areas

General aviation areas (GAA) are portions of controlled airspace that become uncontrolled airspace during daylight hours, **but only when they are active**. GAAs are designated as permanently active during the day, by ATC approval, or by notification to ATC. The rule was amended to clearly state that GAAs can only be activated during the day. Like VFR transit lanes, GAAs are not special use airspace because they do not impose special operating rules.

Area QNH Zones and Transition Layer

Area QNH zones are used to indicate the common QNH setting for an area. (The terminology now matches that of Australia).

The upper limit of the QNH zone is the transition altitude, which will be raised in New Zealand on 25 November 2004 from 11,000 feet to the new figure of 13,000 feet. The transition layer will extend to FL150, which will be the lowest available flight level. Note: FL160 becomes the lowest flight level available when the QNH is 980 hPa or less. This change was made to reduce the number of altimetry settings required for regular VFR flights at these altitudes – in particular, parachute operations.

Some countries do not use a transition layer. In New Zealand, however, it was retained because of our steep air pressure gradients. The transition layer ensures a minimum vertical separation of 1,000 feet between the highest altitude using local QNH settings and the lowest flight level using 1013.2 hPa.

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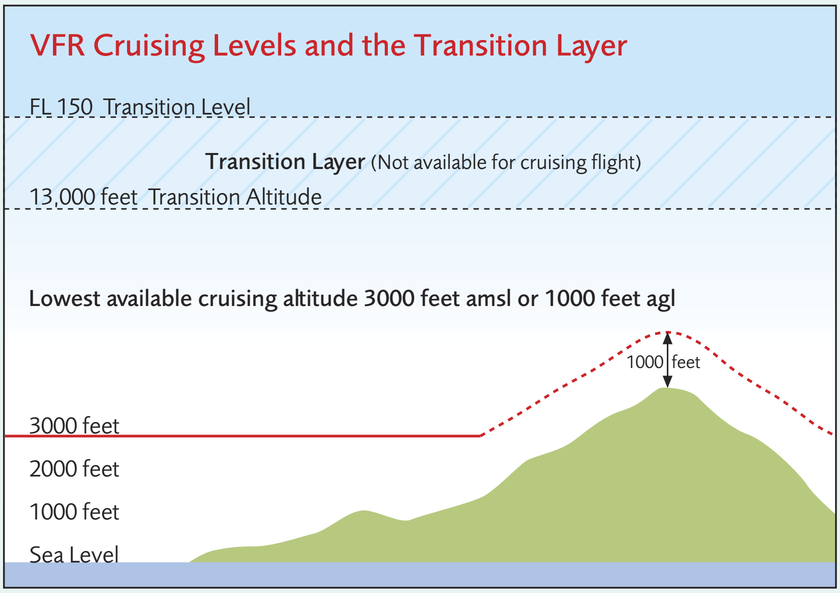

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The raising of the transition altitude means there is a change in the range of magnetic track cruising altitudes and levels. Cruising levels start at 3000 feet amsl, or 1000 feet agl, whichever is the higher.

Restricted Areas and Danger Areas

The term for the gatekeeper of a restricted area, or danger area, changes from 'controlling authority' to 'administering authority'. This is to reduce the possibility of confusion with air traffic control, and it also matches Australian terminology. There are now clear requirements for pilots to comply with conditions specified by the administering authority within a restricted area, and to ensure that safety of the aircraft will not be compromised for operations within a danger area.

Military Operating Areas

Military operating area (MOA) replaces the term 'military operational area'. (The new term is the same as that used in the USA.) New Zealand registered aircraft must obtain prior entry approval from the designated administering authority for New Zealand MOAs in domestic, or in international airspace.

Mandatory Broadcast Zones

Mandatory Broadcast Zones (MBZ) are no longer a type of conditional area, a term that is no longer used. The unique alphanumeric code for MBZs will now be, for example NZB 972 (B972 on charts).

MBZs have additional radio reporting requirements; before entering a runway for takeoff, and when joining an aerodrome traffic circuit. The requirement to report vacating an MBZ has been deleted. Pilots conducting parachute operations into an MBZ must broadcast on the MBZ frequency before dropping.

An example of the new ***Visual Navigation Charts***.

Volcanic Hazard Zones

Volcanic hazard zone (VHZ) is the other type of conditional area that takes on its own identity. The alphanumeric code for VHZs will be, for example, NZV 313 (V313 on charts). There are new requirements for pilots to check NOTAMs and meteorological information before entering a VHZ.

Low Flying Zones

Low flying zone (LFZ) is the new term for a low flying area. This brings it into line with other airspace that always has the surface of the earth as the lower limit (for example, control zones).

Unless there is a genuine reason for a specific low level operation (training is not one of them), all flights (except landings, balked landings, and takeoffs) must be conducted **500 feet** above the highest obstacle within a **150 metre** horizontal radius of the aircraft. Congested areas have a 1000 ft height requirement. Low flying training must be conducted within a designated LFZ.

Some requirements for operating in a low flying zone are clarified. A pilot must be briefed by the using agency on the conditions of use and must comply with these conditions. There is no longer a limitation on the number of aircraft that may operate within a low flying zone. The decision about the number of aircraft is best made at a local level after consideration of operational requirements, the size of the LFZ, and the type of aircraft involved. That number will then be included in the conditions of use of the LFZ.

Mountainous Zones

Mountainous zones are now designated to allow for increased obstacle clearance for IFR flights where it is considered necessary.

Parachute Landing Areas

Parachute landing areas (PLA) are, as the name suggests, the main landing target for parachute operations, and are represented on charts by a parachute symbol. Parachute drop zones (PDZ) used to be a column of airspace associated with a PLA and had an arbitrary radius of three nautical miles. Due to the varying nature of parachute flight paths, which may extend well beyond three nautical miles, PDZs are no longer formally designated.

Disestablished Airspace Types

In order to simplify the number of airspace types and their rules, PDZs, approach conditional areas (ACA) and aerodrome traffic zones (ATZ) are no longer being used. MBZs and special procedures areas (SPA) are used, where necessary, to ensure an appropriate level of safety.

Model Aircraft

A consequential change to the rules covering model aircraft operations (Part 101) during the Part 71 review, now allows this activity to take place above 400 feet agl at aerodromes (clear of the active runways), when approved by the Director and the aerodrome operator.

Aviation Events

The changes to Part 71 require a **minimum** of 90 days notice for temporary airspace that may be needed for aviation events. Please note the "Planning an Aviation Event" information in every issue of *Vector*.

Conclusion

On 5 August 2004, a number of airspace changes came into effect with the revision of Part 71. On 25 November 2004, further changes will come into effect associated with the release of the new VNCs. To assist with understanding these changes, an updated *New Zealand Airspace* GAP and *New Zealand Airspace* poster can be obtained by contacting your local Field Safety Adviser (see the advertisement in this issue for their contact details), or email info@caa.govt.nz.

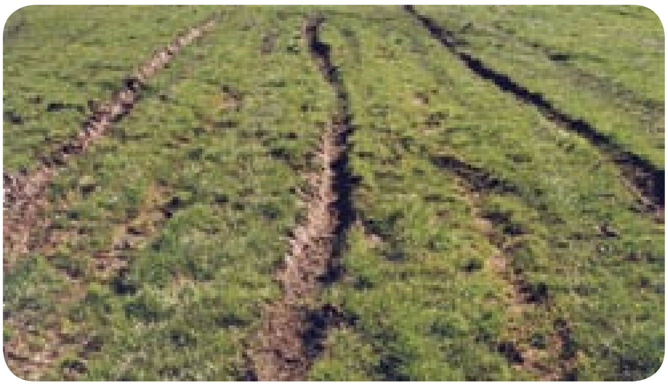
For more information, refer to the latest CARRIL and rule updates (Part 71 and Part 91), provided on the CAA web site (www.caa.govt.nz). ■

Agricultural Airstrip Standards

This is the second in a series of articles focusing on reducing the agricultural aircraft accident rate. The first article dealt with the dangers of overloading with regard to aircraft structural design and performance limits. We will now turn our attention to airstrip design and maintenance standards; fertiliser storage; agricultural industry employer responsibilities under the Health and Safety in Employment (HSE) Act and industry safety initiatives.

Poor Airstrip Condition

The aircraft was flown to a farm airstrip, then loaded with a small amount of agricultural product. An extremely soft airstrip surface condition, combined with a quartering tailwind, degraded the aircraft's performance to the extent that it was unable to become airborne within the available takeoff distance. The load was jettisoned, but the aircraft struck a fence and scraped the ground with its left wingtip and aileron. The aircraft did become airborne, but was unable to be effectively controlled and turned back into a lefthand orbit towards rising terrain, subsequently striking the ground. The pilot received serious injuries.



The airstrip used by the accident aircraft.

Industry Safety Issues

The CAA often receives reports of inadequate agricultural airstrips and occasionally about inadequate bulk fertiliser storage bins around the country. The majority are well maintained, however, and do not pose a safety hazard. The CAA, and others in the agricultural aviation industry, would like to see airstrips and bulk bins not currently meeting industry standards improved to help prevent accidents like the one above.

Although this problem ultimately affects agricultural pilots, a large part of the solution to it lies in increasing airstrip owner and transport company awareness of the safety issues through education. It is only through a collective approach that significant headway on improving the situation will be made. This theme will be borne out throughout the article.

Agricultural Airstrips

Proper agricultural airstrip design and maintenance is critical for a safe operational environment. There are airstrips that are either inherently dangerous by merit of their location, or have slowly fallen into a state of disrepair over time. Often the latter can be insidious, as pilots and landowners unconsciously accept finer and finer safety margins until there is no margin left at all. This situation can easily be rectified though, through routine maintenance to the standards outlined in the sections below. While this is primarily the responsibility of the landowner, as an agricultural operator/pilot, it is in your interests to ensure that the airstrip is kept up to the required safety standard.

Improvement of badly located airstrips is somewhat more difficult. Basic airstrip design, with respect to advising a landowner when building or improving an airstrip, is also dealt with in this section.

Then there are those airstrips that have been used safely for years and years, but with the advent of larger capacity aircraft may no longer be suitable for current purposes. If not already undertaken, operators of large-capacity machines may need to complete a review of these airstrips with respect to takeoff performance and obstacle clearance.

Design and Standards

The following airstrip design and condition criteria must be considered when providing airstrip design/maintenance advice to the landowner, or when initially assessing an airstrip (new airstrips or ones that have not been used for some time) for safety before commencing agricultural operations. If a particular airstrip does not meet the criteria, it is important that this is clearly communicated (preferably in writing) to the airstrip owner, along with suggested corrective action.

Location

The suitable location of an agricultural airstrip with respect to surrounding terrain, obstacles, slope, elevation and the prevailing wind is essential for safe aircraft operations. The majority of agricultural airstrips in New Zealand are well situated with respect to maximising aircraft takeoff performance and ensuring obstacle clearance within the flight path.

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Some, however, are not and can be marginal even in favourable conditions.

Whether providing design advice or initially assessing an airstrip for safety, it is important that such 'situational' factors are considered first and foremost. Some airstrips will never be safe, no matter how favourable the operating conditions on the day, because the location is wrong.

Dimensions

An airstrip is defined as a rectangular area symmetrically including the runway, which is a suitably smooth area for the landing and takeoff of aircraft. The strip area is intended to reduce the risk of damage to aircraft running off a runway and to protect aircraft flying over it during takeoff or landing operations.

When determining if a runway is of sufficient length, the main consideration is that the fully loaded aircraft must be in controlled flight by the time it reaches the end of the runway in ISA conditions and with nil wind. Any conditions encountered during operations that are significantly worse than ISA, or tailwind components for example, must be allowed for by reducing the takeoff weight accordingly. It is important that an awareness of these factors is maintained at all times, as conditions can and do change rapidly.

The airstrip dimensions are particularly important because they act as a safety buffer should the aircraft depart the runway unexpectedly.

Each aircraft type will vary, but generally speaking most agricultural aircraft need around 600 metres to get safely airborne on a flat sea-level airstrip. This distance increases to approximately 650 metres at 2000 feet amsl and 700 metres at 3000 feet amsl. Naturally, these distances can be reduced if the airstrip slopes downhill.

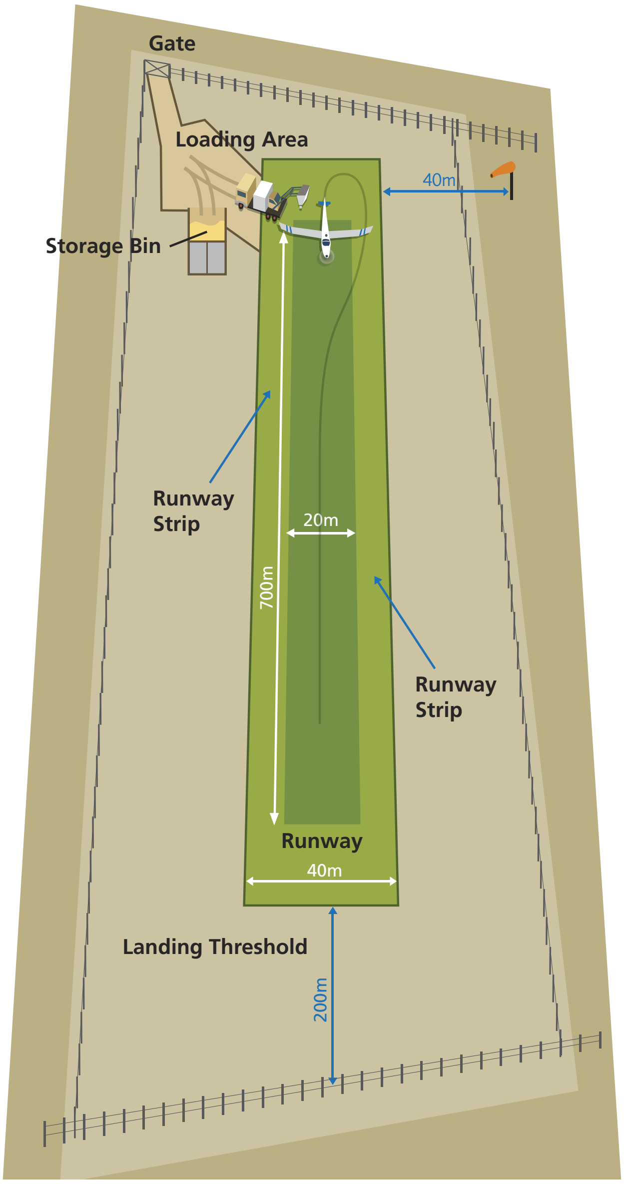
Where a third party risk (eg, a house) is identified within the takeoff area, Part 137 requires that the takeoff distance available be 1.2 times greater than the takeoff distance specified in the Flight Manual after taking a number of other factors into account.

Refer to the *Takeoff and Landing Performance GAP* for more information on determining takeoff distance.

The minimum runway width is 15 metres, but 20 metres is desirable. The desired strip width is 40 metres with a minimum of 30 metres if terrain or other obstacles make 40 metres unobtainable. (See the accompanying Airstrip Layout Example diagram.)

The strip dimensions are particularly important because they act as a safety buffer should the aircraft depart the runway unexpectedly. This provides an area for the pilot to either stop the aircraft, or continue and get airborne.

One-Way Airstrip Layout Example



Surface and Slope

The runway surface should be smooth, hard wearing and well drained. Note that the amount of clover in the grass should be kept to a minimum, as it contributes to poor braking action and makes directional control difficult. The runway should be of evenly graded surface and of sufficient strength to support the weight of a fully loaded aircraft. The runway surface should be slightly elevated (not greater than 200 mm to prevent erosion) with respect to the level of the strip to provide adequate drainage. A good rule-of-thumb test to see if the runway surface is up to the task, is to drive a vehicle (a Series 1 Land Rover!) along it at approximately 80 kph. It should be capable of providing a well controlled and comfortable ride. Vehicle usage on the runway surface, other than runway inspections, should be kept to a minimum to avoid rutting. Cartage of bulk product to the bin should, where necessary, be along the side of the strip rather than down the middle.

It is recommended that cattle should not be grazed on the airstrip for several weeks before use to avoid fresh manure and heavy pugging – particularly during prolonged wet periods. Landowners should be advised of this and the need to keep vehicles off the airstrip. Fresh manure is very corrosive to the aircraft and pugging puts unnecessary strain on the undercarriage. Pugging can also significantly reduce braking action and directional control. Takeoff distances may also be increased. Dry baked-on manure has been known to jam control surfaces.

The airstrip must be kept pest free (rabbits, hares, wild pigs, etc) to minimise the effects of burrows/diggings on aircraft undercarriage.

The maximum average slope should not be more than 20% (a one metre fall for every five metres travelled horizontally) for a single-direction airstrip, and 2% for a two-direction airstrip. Airstrips that slope excessively not only limit go-around options, but can mean that it is impossible to stop during an aborted takeoff. A large amount of power may also be needed to get up to the turn-around area if the aircraft is landed short.

Loading/Turn-around Areas

The proper design and maintenance of airstrip loading/turn-around areas is an aspect that is very often overlooked. It is important to get their design right to minimise undercarriage side loading forces, and to ensure that the area does not become excessively rutted and boggy during repeated manoeuvering.

Because some aircraft are unable to turn tightly, the area needs to be fairly large. The aircraft should be able to commence its takeoff run once fully loaded without having to complete its turn to minimise undercarriage side loading forces. There must be plenty of room for the loader to move freely between the bulk bin and the aircraft so that there is no risk of inadvertently hitting the aircraft.

Rutting can be kept to a minimum by ensuring that the load area surface is well compacted and drained. This will enable operations to safely continue during wet periods.

It is important to ensure the surface condition of the airstrip is suitable to minimise undercarriage stress.

Fencing

A significant number of agricultural aircraft incidents/accidents are caused by fence strikes. The risk of this happening can be **greatly** reduced by removing **all** fencing (including temporary electric fencing) within 200 metres of each end of the runway, or from the landing threshold in the case of a one-way airstrip. This should be done for the duration of the topdressing. The landowner needs to be advised of this well in advance. If this is not possible, the threshold will have to be inset accordingly and a reduced payload may have to be carried.

If possible remove the fence at either end of the strip or adjust the threshold accordingly.

Livestock

There are many reports on record of damage to aircraft caused by collision with livestock. Each occurrence is an unwanted expense to the operator. It is vital that the entire airstrip (including the bulk bin and loading area) is well fenced to keep stock out prior to, and during, topdressing operations. Even so, an inspection of the airstrip for rogue stock should be completed before the first landing.

Ideally the entire airstrip should be well fenced to keep stock out prior to, and during, top dressing operations.

Obstacle Clearance

Every agricultural pilot knows just how critical the initial phase of flight can be after takeoff in a heavily laden aircraft. An obstruction within the takeoff path can be extremely hazardous, especially if the aircraft needs to maintain (or lose) height to accelerate to best angle of climb speed. The worst-case scenario must be allowed for as unexpected tailwinds or downdraughts may be encountered at the worst possible time and the angle of climb will be drastically reduced.

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An obstruction within the takeoff path can be dangerous especially if the aircraft needs to maintain (or lose) height to accelerate to best angle of climb speed.

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If an overshoot from the landing approach is required, an obstruction in the climb-out path could present a significant hazard.

Where a third party risk is identified within the takeoff area, the flight path must be such that the aircraft will clear all obstacles (eg, trees, poles and electric fence supply wires) by at least 50 feet plus 0.025D vertically and 30 metres plus 0.1D laterally. (D is the horizontal distance travelled by the aircraft from the end of the takeoff distance available.) There should be no obstruction within 200 metres of the runway threshold. Where possible this margin should be increased. (See accompanying Takeoff Area Flight Path – Third Party Risk diagrams.)

Windsocks

An awareness of wind direction and strength at all times is essential to safe operations. A number of agricultural accidents are reported to have been attributed to unexpected tailwind components on takeoff or landing. While most pilots will have a good feel for what the wind is doing most of the time, a professional agricultural pilot will **always** check the windsock before **every** takeoff and landing.

Ideally, the windsock should be located at least 40 metres to the side of the takeoff area on a one-way airstrip (so it may be clearly seen before the takeoff roll is commenced) and a similar distance adjacent to the strip mid-point on a two-way airstrip. Some airstrips located in confined terrain, where the wind is likely to swirl, may require a windsock at each end. It may be worthwhile considering carrying your own windsock (it need only be a simple durable coloured ribbon on a short pole) in case it is necessary to supplement on-site windsocks.

Maintenance

It is easy for the gradual deterioration of an airstrip over the years to go unnoticed. Airstrip maintenance is normally the landowner's responsibility. If you feel that some things are not up to standard, however, and that maintenance is spasmodic, suggest that they formalise some sort of regular maintenance programme (eg, drainage, runway surface condition, fencing, tree trimming, etc). They may need your advice as to what the programme should cover. Get them to fax you a copy of the maintenance record before commencing the first job of the season to prevent any nasty surprises once on site.

Assessing Conditions

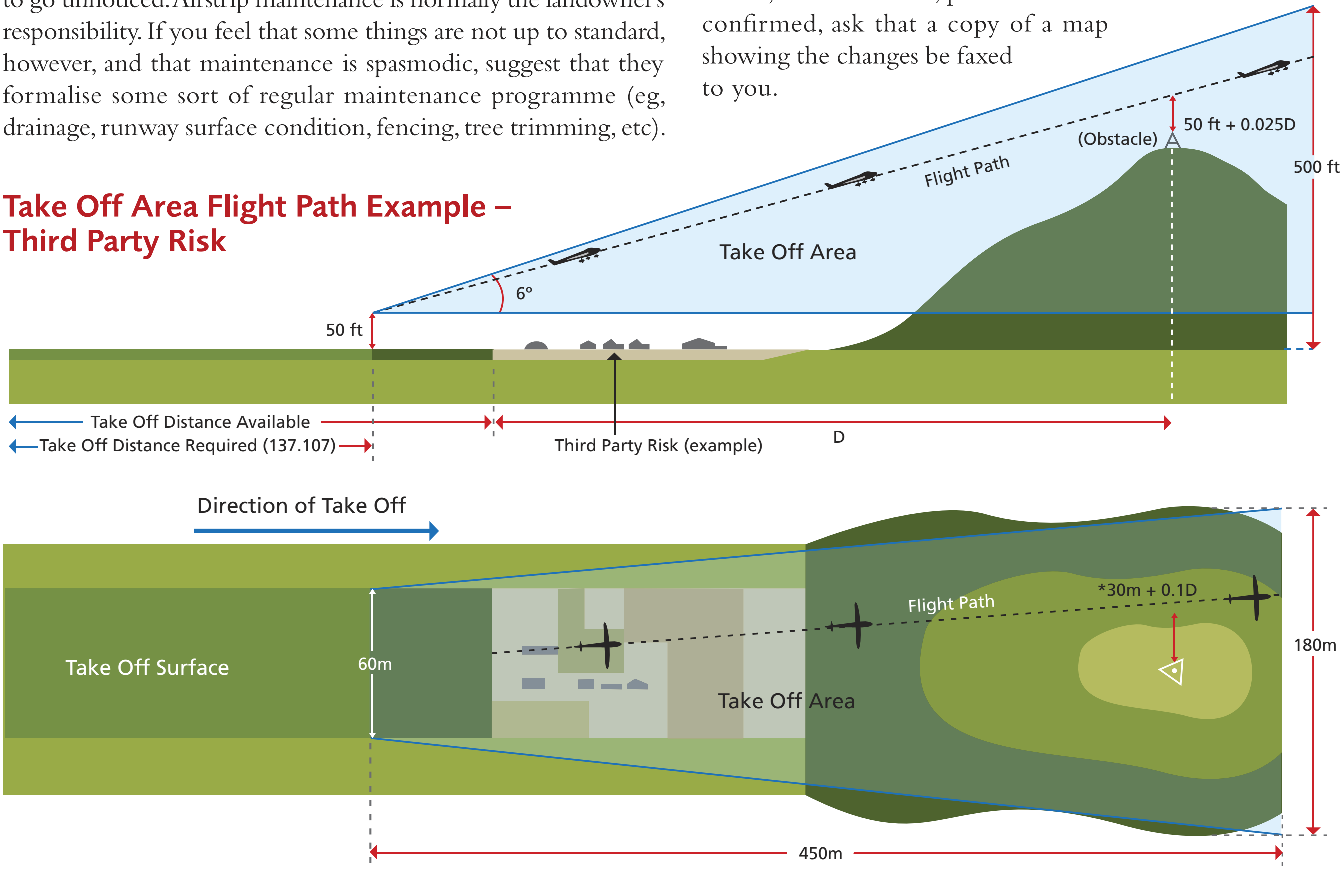
So far we have discussed airstrip standards from the point of view of providing the landowner with design/maintenance advice, or when making an initial safety assessment. This section will focus on things to look out for prior to, and on the day, before commencing operations. In other words, carrying out a risk assessment. Note that a sample risk assessment checklist is included as part of the Best Practice Guidelines (refer to the Industry Safety Initiatives section for details).

Prior Assessment

Where possible, as part of your risk assessment, talk with the airstrip owner to find out if anything has changed since you last operated there – not only on the airstrip, but the entire operational area. You need to know such things as how much recent rain there has been, airstrip grass length and surface condition, and have stock recently been on it (manure levels and ground pugging caused by cattle). Have all obstacles in the flight path been removed? **Double check** that electric fence wires, powerlines or aerials have not been erected, and that any fences agreed to be removed have **actually** been removed.

Making initial contact will help prevent the pressure situation you sometimes get by just turning up and hoping that everything will be OK. Making the right decision with regard to safety in such a situation can be difficult and it's often how accidents happen. If some aspects are not up to standard, stress the importance of correcting them to the owner **before** you arrive or postpone the job until they can be rectified. If changes to fences, electric fences, powerlines or aerials are confirmed, ask that a copy of a map showing the changes be faxed to you.

Take Off Area Flight Path Example – Third Party Risk



* Angle of bank not to exceed 20°. Obstacles greater than 150m laterally may be disregarded.

Where possible talk with the airstrip owner to find out if anything has changed since you last operated there.

On-the-Day Assessment

If possible, get your loader driver to inspect the airstrip as the final part of the risk assessment (as per the criteria already mentioned) before the aircraft arrives. This should eliminate the possibility that the airstrip owner has missed something during the prior assessment. Any problems may then be able to be communicated to the pilot/base by phone/radio, before the aircraft leaves for the ferry flight to the airstrip. The loader driver should be well trained in what to look for, and should document the risk assessment using a simple risk assessment checklist. Many loader drivers today are experienced professionals. They are an asset. Use their experience.

If an inspection by the loader driver is not possible, then the pilot should complete at least one inspection pass to check the condition of the runway surface, and to look for obstacles in the takeoff and landing path. This advice applies even if you are familiar with the airstrip, as things may have changed.

It can be difficult to do, but do not let yourself become pressured into starting the job if you feel an unacceptable hazard(s) exists – it is ultimately your neck on the line if something goes wrong. The hazard(s) **must** be rectified before any topdressing begins.

Be alert to changing environmental conditions throughout the day that might adversely affect aircraft performance. Monitor the condition of the airstrip, and watch out for stock wandering onto it.

Bulk Product Standards

The second part of this article will deal with fertiliser bulk bin standards.

The importance of having the correct grade of dry product available to spread on the day cannot be stressed enough. Whoever orders the fertiliser must specify that it is for aerial application. Check with the farmer when carrying out the initial risk assessment of the airstrip that the correct grade of product will be delivered and stored in a watertight bulk bin.

A 'rural press' article (see Industry Safety Initiatives for details) will cover farmer and transport company responsibilities for bulk product cartage and storage. Bulk product standards will also be promoted to the wider fertiliser industry via the Best Practice Guidelines in the near future.

Bulk Bin Maintenance

Bulk bin maintenance is normally the landowner's responsibility. If you feel that a bin is not up to standard, outline what those standards (refer to the Best Practice Guidelines for details) are, and stress that you would like the situation corrected. Usually, the only time that you as the operator see the entire bulk bin including the floor and sides, is after the last load goes into the aircraft. This is an opportune time for your loader driver to assess the continuing suitability of the bin, recording the bin characteristics to add to your airstrip register. This may also be the opportunity to suggest an annual maintenance programme (eg, weather-proof checks on the walls and roof, drainage away from the bin, unimpeded access, etc) to the airstrip owner. They may need your help as to what the programme should cover. Get them to fax you a copy of the maintenance record before commencing the first job of the season from that airstrip.

Ideally, the bulk bin should be fully enclosed to prevent the product from becoming damp. If the bin has been exposed to the weather, it is essential to reassess the suitability of the product.

Assessing Product Quality

Upon arrival, the loader driver should ensure that the product has been well stored, is of the correct grade, appears dry, and is free of clumps and contaminates. If sample equipment is to hand, conduct a flow-rate test. (Note that Lincoln University staff are currently testing a wide variety of fertiliser samples to try and develop an accurate and easy-to-use field test. This should be

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Constantly check the hopper for product bridging.

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available to industry in approximately six months time.) Product condition and flow rates (assuming suitable testing equipment is available) should be periodically checked between loads. The pilot must be notified if there is a problem.

Indications of damp product may be confined just to the top/side layer of the bulk bin. If this is the case, the product should be well mixed and the situation reassessed. (Mixing should **only** be attempted if the dampness is **confined to thin localised surface layers.**) If this still does not prove satisfactory, then more dry product should be brought in and mixed thoroughly.

If this is not an option, the payload **must** be reduced to a point where aircraft performance will permit a safe recovery should the load hang up. The loader driver should also check the hopper for product bridging from time to time. Again, as with airstrip risk assessments, it is vital that the loader driver has been adequately trained in what to look for.

As with assessing airstrip conditions, if you feel that the product is not up to scratch, and there is a risk of a load hanging up, do not hesitate to postpone the job until the problem is sorted out.

Industry Safety Initiatives

Best Practice Guidelines

The CAA, NZAAA, OSH Service of the Department of Labour, Federated Farmers, MAF, Road Safety Forum and Rural Women are currently working together to develop a set of Best Practice Guidelines to improve agricultural airstrip and bulk bin standards. The guidelines will also help define landowner, fertiliser manufacturer, cartage firm and agricultural operator responsibilities under the HSE Act. These guidelines will be an invaluable tool in helping identify and minimise hazards in the workplace. They should be released for circulation to all interested parties (including fertiliser manufacturers and cartage firms) by late 2004. Visit the CAA web site (www.caa.govt.nz) and click on "HSE Unit – Best Practice Topdressing Guide" to view the draft document version 4.6, and provide us with your input.

The development of an airstrip and bulk bin standards summary leaflet for land owners (as per the Best Practice Guidelines) for inclusion in farm account mail-outs is being considered by the CAA.

Newspaper Article

In addition to the guidelines, the CAA will be producing an article (similar to this one) aimed at landowners and transport operators, outlining their responsibilities under the HSE Act in terms of airstrip/bulk bin standards and regular maintenance. It will be published in a number of 'rural press' type newspapers in the near future. The article should not only increase awareness of the airstrip standards that the topdressing industry requires, but also help improve understanding of aircraft performance and safety issues.

Copies of the article will be made available from the CAA to agricultural operators wishing to include such information in their customer newsletter/account mail-outs.

Accreditation Scheme

The NZAAA has initiated an industry-based accreditation scheme that requires aerial agricultural operators to achieve high levels of quality assurance in safety, the delivery of services, and environmental responsibility. The accreditation scheme includes all the elements of ISO 9001:2000 and encompasses six codes of practice, which currently includes the Code of Practice for Fertiliser Use. This will be replaced in due course by the SpreadMark Code of Practice.

To date there are 30 operators either accredited or working toward attaining accreditation. Already, some large users of agricultural aircraft are requiring their suppliers to hold NZAAA accreditation to be eligible to undertake their work. The NZAAA executive is actively promoting the scheme to Regional Authorities, end users, and the NZAAA members as an excellent form of satisfying quality assurance requirements.

For further information on the benefits of the scheme and how to become part of it, visit these web sites: www.aia.org.nz (AIA/NZAAA) and www.growsafe.co.nz (NZ Agricultural Education Trust).

Airstrips Register

A number of operators are now compiling a register of airstrips. Those that fall below standard are discussed with the landowner, hazards pointed out, recorded, and corrective action recommended. Inaction by the landowner at this stage may mean that operators are no longer prepared to work off their airstrip. This approach has been very successful. We think that it is a good one and would like to see it applied industry wide. Hopefully the release of the Best Practice Guidelines and publication of a 'rural press' article will provide additional impetus.

A number of operators are now compiling a register of airstrips.

Safety in the Workplace

HSE Act

The HSE Act 1992 promotes the management of health and safety in industry, and requires employers, principals and contractors (this includes fertiliser manufacturers, cartage firms, airstrip owners, farmers, and agricultural operators) to take 'all practicable steps' to eliminate, isolate or minimise workplace hazards. The Best Practice Guidelines provide comprehensive information and advice about how to implement procedures to help employers achieve this.

An employer is obligated to make sure that **all** staff are suitably experienced/trained and have the correct equipment for the job at hand. This includes things like:

- Ensuring the pilot is suitably experienced and has received a thorough briefing/check out on the local hazards before operating off any airstrip.
- Ensuring the provision of appropriate safety equipment (helmet, safety harness, etc).
- Ensuring that the loader driver is thoroughly trained and briefed on the specifics of the job before work commences.

Company training policy should be clearly defined, along with a comprehensive and up-to-date training record for each employee, as part of the company's health and safety programme.

By the same token, all employees must take responsibility for their own actions, with respect to their safety and the others around them, while in the work place.

Although not mandatory, the observance of these guidelines by employers, principals and contractors is highly recommended. Taking sensible and reasonable measures to protect your company from possible legal action by avoiding accidents makes good long-term economic sense. There are also strong social and moral reasons for doing so.

Administration of HSE

The CAA has been designated by the Prime Minister to administer the HSE Act with respect to aircraft in operation.

The CAA's philosophy in administering the HSE Act is based on the premise that an acceptable level of health and safety is maintained only if all agricultural industry participants comply with the standards outlined in the HSE Act and Regulations, Best Practice Guidelines and their own documented company health and safety systems. These are designed to be minimum standards, and anything less than full compliance is considered unacceptable.

Employers are encouraged to implement and maintain their own health and safety management systems to ensure compliance, and are expected to monitor their effectiveness as a normal part of their company's quality assurance programme. (CAA HSE Unit staff are happy to provide guidance/information, and as appropriate, training). Action to correct any hazardous situation is expected to be initiated by the employer.

As previously mentioned, a minimum level of voluntary compliance is expected and this will always be the CAA preferred option. In the event that a non-compliance continues, however, the CAA must be seen to take positive action and it has a number of tools at its disposal to help achieve this.

For more information on the HSE Act, and how the CAA administers it, visit our web site and select "HSE Unit – CAA HSE Policy**".**

Conclusion

While most airstrips and bulk bins in New Zealand are perfectly safe to use, some are not. They have the potential to become the first link in a chain of events that can lead to a fatal accident. To help break this chain of events and prevent an accident from occurring, we suggest that you always keep the following in mind:

- Provide clear advice to the landowner/cartage firm operator with regard to airstrip standards and fertiliser storage as outlined in the Best Practice Guidelines.
- Always carry out an initial airstrip and bulk bin risk assessment, taking into account all the factors mentioned, well before commencing operations from a new airstrip, or one that has not been used for some time. Travel to the site to do this. In all other circumstances, conduct a prior risk assessment by talking to the landowner over the telephone a suitable time before work is scheduled to commence. This should include checking that the correct grade of dry product has been delivered. Arrange to have hazards removed as soon as possible.
- If possible, the loader driver should conduct a risk assessment before the aircraft arrives and report any problems to the base/pilot straight away.
- Thoroughly mix any damp or clumpy fertiliser that is **confined to thin surface layers only** with dry fertiliser. Consider getting new dry product delivered to assist with this. If still in doubt, reduce aircraft loads accordingly and check the hopper for product bridging from time to time.
- The HSE Act requires employers and others to take 'all practicable steps' to minimise workplace hazards.
- Obtain a copy of the Best Practice Guidelines from the NZAAA or CAA web site and make up a risk assessment checklist tailored to your company's operation.
- Consider forming an 'airstrips register' with other local agricultural operators. Outline to landowners what the minimum airstrip and bulk bin standards are and suggest corrective actions where appropriate.

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As an agricultural operator, you should not have to put up with paying the price in terms of lost lives, equipment damage and increased insurance premiums because farmers are not prepared (or not aware of the need) to upgrade unsafe airstrips and substandard bulk bins.

If you have reservations about an airstrip we encourage you to communicate this to the CAA, NZAAA and particularly with other operators in the area. It is only by **sharing such information** that unsafe airstrips and bulk bins are likely to be eliminated. An operator who accepts a contract knowing that another has already refused it may be considered to be undermining acceptable safety standards within the industry. ■

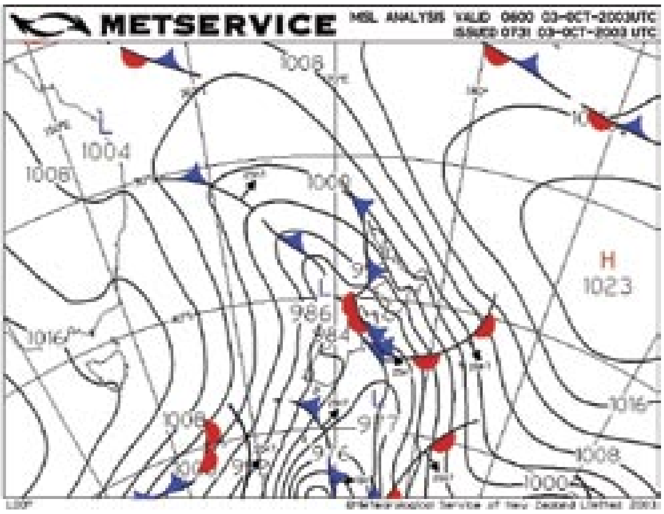
Hazards of Icing

The Convair 580 was on a scheduled night freight flight from Christchurch to Palmerston North, when it was observed on radar to enter a tightening left turn and disappear. Attempts to contact the aircraft were unsuccessful, and a search for the aircraft was started.

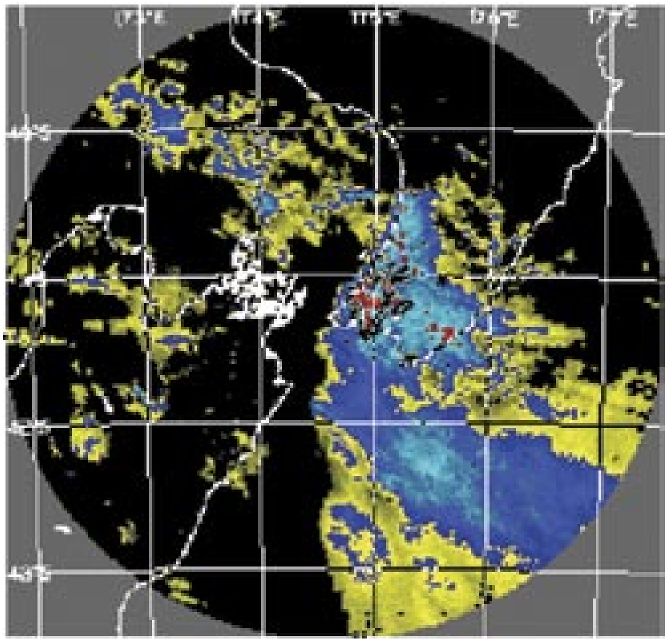
The aircraft had impacted the sea about 10 km north of Paraparaumu about vertically and at high speed.

After crossing Cook Strait, the aircraft probably became heavily iced up while descending through an area of severe icing, and stalled after flying level for a short time. The crew was unable to recover from the ensuing spiral dive, and the aircraft broke up as it descended.

As the Convair crossed Cook Strait, the aircraft's weather radar should have indicated to the crew, an area of significant weather ahead, identifying the passage of a trough with its associated frontal band. (This information would have been presented in a format similar to the weather radar picture provided by MetService.) On the radar, the frontal band had a clearly defined trailing edge, which was near the Kapiti Coast at the time the aircraft flew past Paraparaumu. The Convair would have flown along the trailing edge of the frontal band, and descended through the area of enhanced precipitation that extended from 14,750 feet to 18,000 feet. With the freezing level at about 9500 feet, the temperature as the aircraft descended below 18,000 feet would have been between -6 and -15 degrees C. With supercooled water droplets present, conditions were conducive to severe icing.



Mean sea level analysis chart issued at 1931 on 3 October 2003. The chart shows an active trough of low pressure crossing country, with a very strong and moist north to northwesterly flow ahead of a large frontal band (courtesy of the New Zealand MetService).



Radar weather map for 2130 on 3 October 2003. Note the cells of heavy precipitation (red areas) around Paraparaumu (courtesy of the New Zealand MetService).

Reference: Transport Accident Investigation, Aviation Occurrence Report 03-006.

Airframe Icing

Airframe icing is the accretion of ice on any exposed surface of an aircraft due to the freezing of supercooled water droplets on that surface. The two basic requirements for ice to form are visible moisture, and subfreezing temperatures. Icing conditions are, therefore, generally found while flying in cloud in the temperature range of 0 to -30 degrees C, but this will vary according to the water content, water droplet size and exposure time.

The presence of icing on an aircraft can be hazardous. Ice alters or destroys the smooth flow of air over the wings and control surfaces, thereby reducing lift and increasing drag. Ice also increases aircraft weight and can affect the stability or controllability of the aircraft while also increasing the aircraft's stall speed. Additional power may be required to maintain aircraft performance, or the wing's angle of attack to the airflow may need to be increased to maintain level flight. The problem with these courses of action is that power may be limited and by raising the aircraft nose, ice forms on the exposed underside of the aircraft, compounding the problem.

Types of Airframe Icing

Clear Ice (also known as glaze ice)

Clear ice occurs when large super-cooled water droplets spread out or flow back (often termed 'runback') as they freeze, allowing trapped air to escape. The result is clear, high-density ice that is heavy and difficult to remove. The larger the water droplets, or the slower the freezing process, the more the ice will run back and form behind the leading edge – rearward of any anti, or de-icing equipment. Clear ice is often associated with, but not restricted to, cumulus cloud within the first 6000 to 8000 feet above the freezing level.

Rime Ice (also known as opaque ice)

Rime ice occurs when supercooled water droplets freeze quickly, perhaps due to the smaller size of the droplet, or if the droplet temperature is colder than –15 degrees C. The ice traps air giving a rough, opaque, crystalline deposit that is fairly brittle. Building up on the leading edges of aircraft, it can dramatically affect performance, but is easier to dislodge. Rime ice is usually associated with stratiform cloud where large water droplets are less common.

Hoar Frost

Hoar frost forms when an aircraft skin temperature is below 0 degrees C, and moist air freezes on contact without going through the liquid state (this process is termed deposition). The potential effect of hoar frost can be underestimated as the layer of ice is generally thin and clear but, nevertheless, the resultant changes in weight and airflow over the wing will affect performance. Hoar frost normally occurs on the ground and should be removed before flight. It can also occur in flight, whenever the skin of the aircraft is very cold and the flight path takes the aircraft into warmer moist air.

Freezing Rain

Freezing rain occurs when rain falls from a warm cloud layer which lies above a cold air mass with a temperature below 0 degrees C. Freezing rain is normally associated with flight through a warm or cold front. An aircraft can be quickly enveloped in ice (usually clear ice) and performance may quickly degrade. There have been reports where aircraft have been unable to maintain level flight after less than a minute or so of exposure to freezing rain.

Forward section of the accident aircraft.

Tailplane Icing

While ice can form on any exposed surface, the leading edge of a larger radius object will have a lower collection efficiency than a smaller radius object. The larger the radius, the greater the pressure wave in front of the surface, which deflects the air, and moisture, around it. According to the United States National Aeronautics and Space Administration (NASA) Lewis Research Center, ice occurring on the tailplane can be two to three times thicker than ice on the wings. The tailplane has a higher collection efficiency because of its smaller leading edge radius and chord length. Aircraft aerials will also act in a similar manner, and will often "ice up" before any ice can be seen on the leading edges of the wings.

Tailplane Stalling

The horizontal stabiliser on a tailplane provides longitudinal stability by creating a downward force (or negative lift) to compensate for the nose-down pitching moments of the wings and fuselage. Should the tailplane stall, the aircraft nose would suddenly pitch down and the control yoke may be abruptly snatched forward.

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AIREP Specials

One of the findings in the Transport Accident Investigation Commission (TAIC) report on the accident of the Convair 580, was that "Pilots' awareness of the presence of potentially hazardous conditions would be increased if other pilots commonly sent AIREPs (air reports) when such conditions were encountered."

The presence of severe icing, while able to be forecast with some accuracy, can only be confirmed when actually encountered. Reports of actual icing encounters, as well as other weather phenomena, can play a significant role in helping to alert pilots to potentially hazardous conditions, and therefore allow them to take appropriate avoiding action.

The lack of AIREP Specials generally, and on the evening of the Convair accident, as reported by MetService, may have been due to a reluctance among pilots to report, or it may have reflected an unintended interpretation of the wording in the AIP. ("When hazardous conditions are encountered which, in the opinion of the pilot are, or may become severe enough to warrant a SIGMET, an AIREP Special should be made to the nearest ATS unit immediately.") Pilots may have believed that if severe weather conditions were encountered, an AIREP Special was required to be made **only** if a SIGMET had not already been issued. Pilots should make an AIREP Special **regardless** of the SIGMET status to help reinforce everyone's general appreciation of the current weather conditions.

Section GEN 3.5 of the AIP has been amended (AIRAC cycle 04/12, effective 25 November 2004) to read: "When hazardous conditions are encountered which, in the opinion of the pilot are, or may become severe enough to warrant a SIGMET, an AIREP Special should be made to the nearest ATS unit immediately, **even if a SIGMET has been issued.**

On receipt of an AIREP Special, ATS should immediately, and certainly within 15 minutes, advise MetService of the report. MetService would then issue a new SIGMET stating that, for example, severe icing was forecast and observed.

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Factors that affect a tailplane stall include:

- shape, texture and location of any ice
- increase in aircraft speed, or power
- degree of gustiness or turbulence
- increase in flap setting
- pilot's pitch control input.

Tailplane Stall Recovery

Because the tailplane works in the opposite sense to the wings, recovery from a tailplane stall is opposite to the traditionally taught wing stall recovery. For a wing stall recovery, airflow must be restored to the wings upper aerofoil surface, while for a tail stall, airflow must be restored to the lower aerofoil surface.

Recovery Actions:

- immediately raise flaps to the previous setting
- pull aft on the yoke (assistance may be required)
- reduce power if altitude permits
- don't increase airspeed, unless it is necessary to avoid a wing stall.

Summary

Should you encounter significant in-flight airframe icing, the most prudent action is to immediately climb, or descend, until clear of the freezing band. If already established in a descent, the descent should be continued minimising any power, configuration, and attitude changes. The aircraft should be manually flown to assist in identifying the severity of the icing. If a tailplane stall does occur (probably identified by a lack of any normal pre-stall warning buffeting and a sudden stall at high speed), flap should be raised to the last setting, immediate aft elevator applied, and if possible, power reduced. Airspeed should not be allowed to increase significantly. ■

*For more information on icing, refer to our video, **Airframe Icing** and to the GAP booklet, **Aircraft Icing Handbook.** See also previous **Vector** articles: "Airframe Icing" July/August 2002, "More on Icing" May/June 2001, "Ice" March/April 2001.*

A to Z of Flight Planning

Including:

- New Visual Navigation Charts
- New Airspace Poster
- New Airspace GAP Booklet
- MetFlight-GA – a new FREE internet weather service for GA pilots

An Av-Kiwi safety seminar presented by Jim Rankin, RNZAF Instructor, will focus on pre-flight planning and in-flight considerations. Mystified by airspace? Len Wicks, CAA will be on hand to help you understand airspace, recent changes to airspace, and the new VNCs.

For further information, check out the CAA web site, **www.caa.govt.nz**.

Seminar Schedule

(duration approximately 2 hours)

Blenheim – Wednesday 1 December, 19:00
Marlborough Aero Club, Omaka Aerodrome

Christchurch – Thursday 2 December, 19:00
Canterbury Aero Club

Dunedin – Friday 3 December, 19:00
Otago Aero Club, Taieri Aerodrome

Hamilton – Wednesday 24 November, 19:00
Waikato Aero Club

Hastings – Thursday 9 December, 19:00
Hawkes Bay & East Coast Aero Club

Hokitika – Sunday 5 December, 15:30
Hokitika Aero Club

Invercargill – Saturday 4 December, 11:30
Southland Aero Club

Masterton – Friday 10 December, 19:00
Heliflight Wairarapa Ltd, Masterton Aerodrome

Motueka – Wednesday 1 December, 10:00
Nelson Aviation College

New Plymouth – Tuesday 23 November, 19:00
New Plymouth Aero Club

Palmerston North – Friday 26 November, 18:00
Manawatu Districts Aero Club

Queenstown – Saturday 4 December, 18:30
Terminal Building, Queenstown Aerodrome

Rotorua – Wednesday 8 December, 19:00
Rotorua Aero Club

Tauranga – Thursday 25 November, 19:00
Tauranga Aero Club

TCAS II and VFR Traffic

*This article was taken from **ACAS II Bulletin** No 4, May 2004, produced by the Eurocontrol (European Organisation for the Safety of Air Navigation) ACAS Programme.*

Introduction

The Traffic Alert and Collision Avoidance System (TCAS), is an instrument integrated into other systems in an aircraft cockpit. It consists of hardware and software that provides a set of electronic eyes, enabling the pilot to 'see' the relative positions and velocities of other aircraft up to 40 miles away. The instrument sounds an alarm when it determines that another aircraft will pass too close. TCAS provides a last resort collision avoidance facility should all other separation and avoidance methods fail.

There are two different versions of TCAS, for use on different classes of aircraft. TCAS I, indicates the bearing and relative altitude of all aircraft within a selected range (generally 10 to 20 miles). The Traffic Advisory (TA) portion of the system, with colour-coded symbols, indicates aircraft which may be potential threats. When pilots receive a TA, they must visually identify the intruding aircraft. TCAS I does not offer traffic avoidance solutions, but it does supply pilots with important data so that they can determine the best course of action.

In addition to a traffic display, the more comprehensive TCAS II provides pilots with resolution advisories (RA) when needed. The system determines the course of each aircraft; climbing, descending, or flying straight and level. TCAS II then issues an RA advising the pilots to execute an evasive manoeuvre necessary to avoid the other aircraft, such as "Climb" or "Descend". If both aeroplanes are equipped with TCAS II, then the two computers offer deconflicting RAs. In other words, the pilots do not receive advisories to make manoeuvres that would effectively cancel each other out, resulting in a continued threat.

Operationally, TCAS has proven to be very effective, and this includes encounters with VFR traffic squawking altitude on Mode C.

VFR Traffic Transponder Mode and TCAS II Alerts

The alerts triggered by TCAS II depend on the transponder mode of the intruder.

- **"OFF" or "STAND-BY"**: TCAS II cannot detect the intruder, and therefore, there is no alert at all.
- **"ON"**: ie, without altitude reporting: TCAS II will only generate a Traffic Advisory (TA) to help the pilot achieve a visual contact. The TA, however, is unable to show whether the aircraft is at the same altitude or not.
- **"ALT"**: TCAS II can trigger TAs and Resolution Advisories (RAs). An RA, if followed, protects the VFR traffic, as well as the traffic equipped with TCAS II, from collision.

For maximum safety benefit from TCAS II, VFR aircraft must squawk ALT(Mode C).

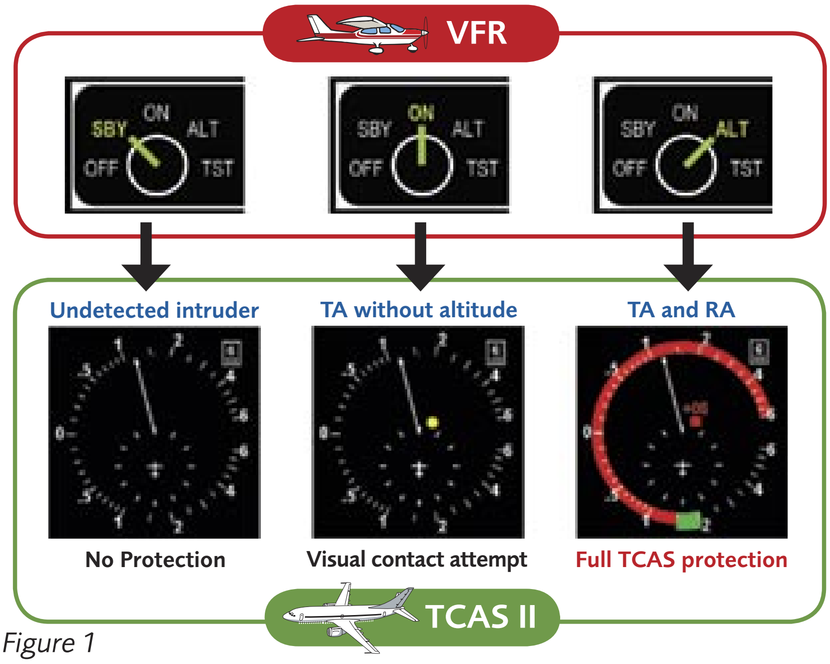

Figure 1

An Example of a TCAS Resolution between IFR and VFR Traffic in Class D Airspace

A PA28 flying VFR is transiting a TMA, in Class D airspace. It is level at 5500 feet (mode C reports show 5400 feet).

An Embraer 145 (E145) is climbing on departure, on a reciprocal heading, passing 3000 feet.

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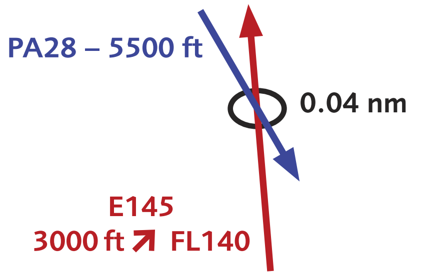
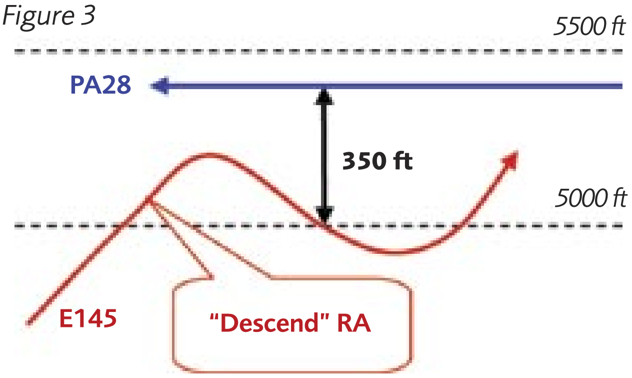
The E145 is cleared to climb to FL140 by the approach controller, and to "expedite through 5500 feet due to VFR traffic at 12 o'clock, 10 nm, opposite route". See figure 2.

Figure 2



The controller also provides traffic information to the PA28 about the E145, "12 o'clock, opposite route, passing your altitude". Then, he provides further traffic information to the E145 (traffic at 12 o'clock, 4 nm). About 15 seconds later, the E145 receives a **"Descend" RA**, when passing 5100 feet. The pilot follows the RA correctly and initiates a descent.

Figure 3



Four seconds before passing the E145, the PA28 pilot reports visual contact.

As a result of following the "Descend" RA, the E145 passed about 400 feet below the PA28. Simulations indicate that **without TCAS, the separation between the aircraft would have been only about 100 feet and 0.04 nm.**

The E145 pilot, **who never saw the VFR traffic**, filed a near miss report because IFR separation was not provided against the VFR PA28. The controller remarked that he had provided the appropriate and correct traffic information. The controller reported that the near miss was unjustified because the PA28 had visually acquired the E145 and reported that it had passed clear.

Although the approved procedures appeared to have been applied, it is clear that TCAS II helped to solve a real risk of collision.

Types of RAs between IFR and VFR Traffic

In the normal operating altitudes of VFR traffic, RAs will occur if VFR traffic operates within 500 feet (vertically) of IFR traffic.

Depending upon the TCAS II altitude thresholds and the current vertical separation between the IFR and VFR traffic, different types of RAs can be generated as shown in figures 4 and 5.

In Class D airspace, a frequent encounter between IFR and VFR traffic is when **both aircraft are level and 'separated' by 500 feet.** In these encounters, TCAS will generate a "Monitor Vertical Speed" RA, which does not require a vertical deviation.

Operational experience shows that **VFR traffic sometimes do not maintain level flight perfectly.** If there is a significant vertical deviation, "Climb" or "Descend" RAs will be generated onboard the TCAS equipped aircraft.

TCAS and Aerodrome Traffic Pattern

Feedback from controllers and pilots shows a perception that RAs generated in the aerodrome traffic pattern are unnecessary and sometimes disruptive.

The TCAS alert time in this environment is only 15 seconds before a possible collision. The aircraft, therefore, are in very close proximity (less than 1 nm) and the time for an effective avoiding manoeuvre is very short.

In the example shown in figure 6, provided that the lateral distance between the final approach path and the downwind leg is at least 0.5 nm, the VFR traffic on the downwind leg (VFR1) will not trigger an RA onboard the TCAS equipped IFR traffic on the final approach. (In addition, TCAS does not generate any RA below 1000 feet.)

If the IFR on the final approach receives an RA, this confirms that the separation with the VFR traffic on the base leg (VFR2) is inadequate.

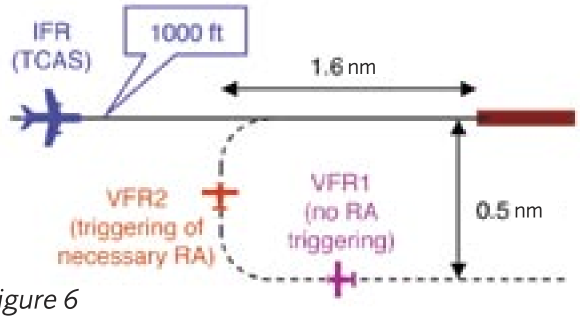


Figure 6

Figure 4

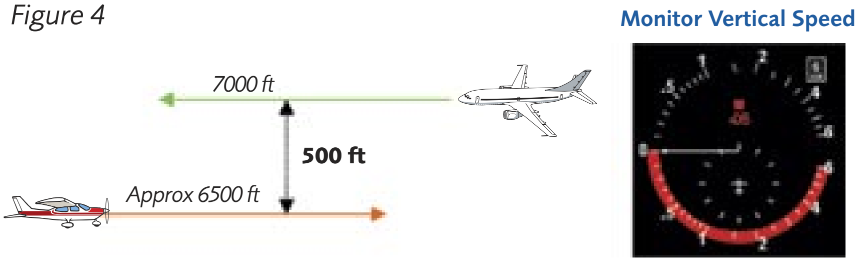
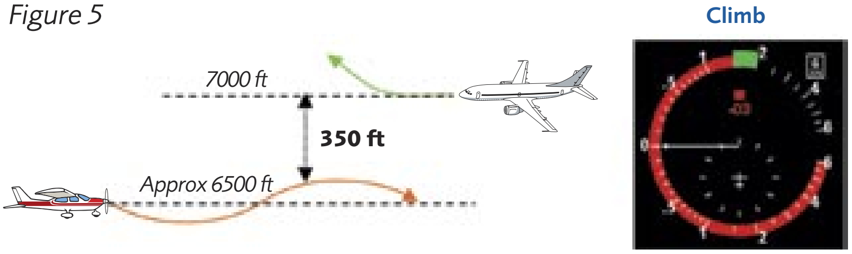


Figure 5



Conclusion

Airborne Collision Avoidance System (ACAS) monitoring programmes have highlighted a significant number of TCAS events involving TCAS equipped IFR traffic encountering VFR traffic. In these events, the day was saved because the RAs were followed!

Where IFR and VFR traffic are not separated by ATC, (Class D and Class G airspace), and when VFR traffic operates in close proximity to the IFR traffic (often at a vertical separation of 500 feet or less) there is a high probability that RAs will be generated. RAs generated in the aerodrome environment **should not** be dismissed as unnecessary and disruptive. They demonstrate that a risk of collision exists.

Pilots must still maintain a good lookout, and not rely entirely on TCAS to prevent an unsafe situation from developing. **TCAS provides last resort collision avoidance**, not normal separation standards.

To trigger RAs, **TCAS needs intruders to squawk ALT (Mode C).** VFR pilots are strongly encouraged to select **ALT** on their transponder when flying in all classes of airspace. ■

Transponder Airworthiness Directives

Three Airworthiness Directives (ADs) have been added to the avionics AD schedule this year. These are intended to address problems that may occur when Mode C transponders are interrogated by TCAS signals. The following ADs – DCA/RAD/24, DCA/RAD/25, and DCA/RAD/26, require the accomplishment of software upgrades, or modifications, for Narco AT150, Terra TRT250, and Garmin GTX330 transponders. Although the Narco and Terra are reliable Mode C transponders, when interrogated by TCAS equipped aircraft, they may give erroneous information, or not reply at all.

While Mode S is not currently used by Air Traffic Control in New Zealand, a number of domestic and foreign aircraft are TCAS equipped. These ADs are designed to ensure that aircraft fitted with Narco AT150, Terra TRT250, and Garmin GTX330 transponders; are able to be interrogated correctly by TCAS equipped aircraft.

New Poster and GAP

New Zealand Airspace

These products can be obtained by contacting your local Field Safety Adviser (see the advertisement in this issue for their contact details), or the Communications and Safety Education Unit.

Tel: **0–4–560 9400**

Email: **info@caa.govt.nz**

Accident Notification

24-hour 7-day toll-free telephone

0508 ACCIDENT
(0508 222 433)

CA Act requires notification "as soon as practicable".

Aviation Safety Concerns

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

0508 4 SAFETY
(0508 472 338)

For all aviation-related safety concerns

Field Safety Advisers

Don Waters
(North Island, north of line, and including, New Plymouth-Taupo-East Cape)
Tel: 0–7–823 7471
Fax: 0–7–823 7481
Mobile: 027–485 2096
e-mail: watersd@caa.govt.nz

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OCCURRENCE BRIEFS

Lessons for Safer Aviation

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

Accidents

The pilot-in-command of an aircraft involved in an accident is required by the Civil Aviation Act to notify the Civil Aviation Authority "as soon as practicable", unless prevented by injury, in which case responsibility falls on the aircraft operator. The CAA has a dedicated telephone number 0508 ACCIDENT (0508 222 433) for this purpose. Follow-up details of accidents should normally be submitted on Form 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 that follow are the results of either CAA or TAIC investigations. Full TAIC accident reports are available on the TAIC web site www.taic.org.nz.

ZK-VAF, Reims/Cessna F406, 22 Aug 03 at 12:00, Darwin. 9 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Aeroplane), age 28 yrs, flying hours 2600 total, 550 on type, 150 in last 90 days.

The aircraft was being operated on a passenger charter flight from Darwin to Tindal, in Australia. During the takeoff roll, at approximately 85-90 knots, the nose landing gear (NLG) collapsed causing both propellers to strike the ground. The aircraft slid to a stop, the pilot shut down the engines, and all occupants evacuated the aircraft uninjured.

An examination of the aircraft following the accident, revealed that no damage was evident to any NLG components, or the NLG attachment structure. The NLG rigging was checked and reported to be within tolerances. Damage to the aircraft included abrasion damage to the lower forward fuselage and NLG doors. Both propellers were substantially damaged.

The accident was investigated by the New Zealand CAA and the Australian ATSB. The cause was determined to be the installation of the incorrect NLG actuator locking washer, and the incorrect adjustment of the NLG actuator micro switch. This resulted in the actuator's internal mechanical locking mechanism being prevented from engaging when the NLG was lowered, and made it possible for the NLG to collapse if the external dynamic loads overcame the over centre mechanism of the NLG drag brace assembly.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 03/2452

ZK-DGY, Pacific Aerospace CT/4 Airtrainer, 1 Nov 03 at 12:42, Ardmore. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 21 yrs, flying hours 179 total, 8 on type, 4 in last 90 days.

The aircraft lost power during the climb, and the pilot carried out an emergency landing into a paddock. The aircraft was substantially damaged, but no injuries to the pilot and passenger were sustained. A CAA field investigation, plus engineering tests, could not determine the cause of the engine failure.

Main sources of information: Rescue Coordination Centre.

CAA Occurrence Ref 03/3122

ZK-RKW, Aero Designs Inc. Amateur-built Pulsar XP, 11 Dec 03 at 15:00, Paraparaumu Ad. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence ATPL (Aeroplane), age 63 yrs, flying hours 22290 total, 5 on type, 130 in last 90 days.

The nosewheel on the aircraft collapsed after a hard landing, causing substantial damage to the aircraft.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 03/3606

ZK-HNW, Hughes 369HS, 3 Jan 04 at 08:49, Milford Sound. 2 POB, injuries 2 fatal. Nature of flight, private other. Pilot CAA licence PPL (Helicopter), age 27 yrs, flying hours 200 total, 100 on type, 10 in last 90 days.

The helicopter was on a private tour of the South Island. After leaving Queenstown, bad weather meant that the passenger and the pilot, spent the night at the Howden Hut on the Routeburn Track. They left the following morning, again in bad weather, and got to 8,500 feet over Lake Adelaide, about 10 nautical miles from Milford. They had a moving-map GPS, and the pilot communicated with Milford Flight Service about carrying out a GPS letdown into Milford Sound. The aircraft made no further contact and has not been recovered.

Main sources of information: Accident details submitted by ATS.

CAA Occurrence Ref 04/3

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 9000 lb (4082 kg) or less. These and more reports are available on the CAA web site www.caa.govt.nz. Details of defects should normally be submitted on Form CAA 005 to the CAA Safety Investigation Unit.

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

Key to abbreviations:

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

Aerospatiale AS 350D

Dunlop main rotor lateral control

While in the hover to facilitate the loading of a fertiliser bucket, the pilot experienced what he understood to be a total hydraulics failure. But there wasn't any activation of the warning lights or horn. The cyclic had suddenly become very heavy, with a marked left tendency. After releasing the underslung load frame, the pilot performed a successful run-on landing. The engineering investigation suspected the right lateral control servo bypass valve sticking. Further stripdown could not confirm this, but the overhaul agency remarked that some servo components were worn to limits. On previous flights the controls had exhibited some resistance when the cyclic lever was moved rapidly to the right. The operator suggests that emphasis be given to good pre-flight hydraulic checks to identify cyclic control resistance, and proper recording in the tech log of any restrictions or notchiness. The overhaul agency recommends routine effective cleaning of the control system components to prevent accelerated wear. TTIS 1763 hours.

ATA 6730 CAA Occurrence Ref 04/857

Cessna 177B

Electrical wiring

It was reported that shortly after reducing the power for a simulated forced landing, smoke was noticed coming from underneath the control panel on the co-pilot's side. The door had to be opened, as the smoke was causing difficulty in breathing. The instructor then told the student to turn the master switch off. The smoke cleared before this was done with no other problems.

It appears that when DCA/CESS177/23 was embodied 25 years previously, the engineers had not properly protected the loom in the console area. The loom had then chafed on the surrounding structure causing a short circuit.

ATA 3900 CAA Occurrence Ref 04/2128

Cessna 207A

Oil sump/dipstick

It was reported that the pilot noticed oil leaking from the engine at the end of the flight. The cowls were removed and oil was found leaking from the sump. The engine oil dipstick was found to have chafed through the bottom of the sump over approximately 600 hours. The sump was replaced, and the dipstick shortened by an inch. The engine fitted to this aircraft is a Bonair 550 conversion. Two other Bonair converted engines were checked and found to have wear patterns on the dipsticks. All three engines had incorrect part number dipsticks. One standard 520 engine fitted to another aircraft was checked and was found to have an incorrect part number dipstick and similar dipstick wear patterns. Teledyne Continental SIL 00-7A provides data on the correct part number dipstick applicability for all engine models and aircraft types. This highlights the importance of checking both for wear on the base of the dipstick and for applicability against the available data.

ATA 8500 CAA Occurrence Ref 04/506

Hughes 369D

Bendix C20B power turbine governor

The pilot reported to the engineers that the engine was operating "erratically". The governor was removed and sent away for repair. It was reported that the internal components of the power turbine governor were found to have excessive wear and corrosion. TSO 808 hours.

ATA 7200 CAA Occurrence Ref 04/959

Pacific Aerospace Cresco 08-600

Cresco longeron stress band

During a scheduled inspection, with the hopper removed, the stress bands were found cracked outboard of the longerons. The manufacturer indicated it was probably due to the relative flexibility of the stress band joint. The stress band was trimmed as per the manufacturer's instructions to remove the cracking. TSI 100 hours, TTIS 5476 hours.

ATA 5300 CAA Occurrence Ref 03/3344

Robinson R22 Beta

Main rotor blade

The helicopter was engaged in lifting moss when the pilot felt an unusual vibration and elected to carry out an immediate precautionary landing.

The pilot found that both the upper and lower surfaces on one main rotor blade had a 140 mm skin crack from the trailing edge to the spar. CAA investigation determined the crack had propagated from the existence of small paint blisters and stress corrosion points on the trailing edge. The manufacturer issued a service bulletin to address the problem of skin corrosion causing cracking (AD DCA/R22/23C refers).

Although in this instance, the 100-hour detailed inspection had been completed, the full content of the interim part of the airworthiness directive had not been carried out. In omitting to complete the 25-hourly detailed visual and tactile inspection of the trailing edge, the pilot may have inadvertently allowed the crack to propagate undetected. The pilot believed that regular cleaning of the blade surfaces would be sufficient to reveal any discrepancies in the blade skins, and was unaware of the details of the service bulletin. Routine cleaning did not alert the pilot to the very small discrepancies in the paint surface from which the crack originated. TSI 48.1 hours, TTIS 1523.3 hours.

ATA 6210 CAA Occurrence Ref 03/3086