January / February 2002

VECTOR

Pointing to Safer Aviation

New VFR Flight Plan – It's Here!

Ways To Hurt Your Aircraft – The V_N Diagram

Tiedown Knots

CAA
CIVIL AVIATION AUTHORITY OF NEW ZEALAND

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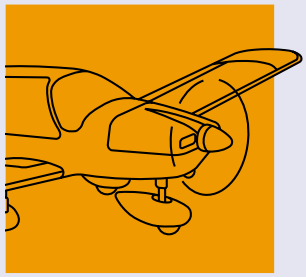
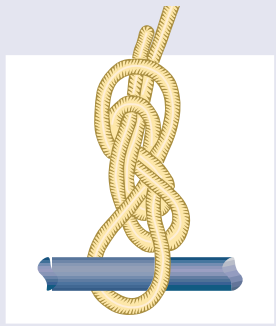




Publications Purchase

0800 GET RULES (0800 438 785) – Civil Aviation Rules, Advisory Circulars, Airworthiness Directives, CAA Logbooks and similar Forms, Flight Instructor's Guide, Aircraft Icing Handbook.

www.caa.govt.nz, CAA web site – Civil Aviation Rules, Advisory Circulars, Airworthiness Directives, CAA application forms, CAA reporting forms. (Note that publications and forms on the web site are free of charge.)

0800 500 045, Aviation Publishing – AIP documents, including Planning Manual, IFG, VFG, SPFG. All maps and charts, including VTCs.

Cover photo:

Filing a VFR flight plan will soon be cheaper and easier thanks to improvements made to the Internet Flight Information Service website.

Photograph of Rotor Cloud courtesy of Peter Knudsen

Ways to Hurt Your Aircraft – The VN Diagram

In a previous article titled "Ways to Hurt your Aircraft" in the July/August 2001 issue of *Vector*, ways of overstressing your aircraft were discussed. The article deliberately avoided too many details about airframe loading and instead concentrated on general aerodynamic principles. This article goes into these technical details in more depth.

Let's look at an aircraft structural limitations example. An aerobatic aircraft has the following limits on its airframe:

"At an all up weight (AUW) of 2500 lb the aircraft has a stall speed of 63 knots, a VA of 148 knots (at 4 G) and limit loads of +6 G and –3 G, a VNE of 209 knots, an inverted stall speed of 85 knots, unrestricted use of aileron up to VA or 4 G, no aileron deflection allowed beyond 4 G, but reduced aileron deflection allowed above VA, reducing linearly to 50% deflection by VNE. Negative G limits reducing from –3 G at VA linearly to – 1.4 G at VNE."

A bit of a mouthful, and fairly hard to remember. Also, if you were in the game of operating the aircraft to its limits, maybe for aerobatic competitions, could you easily calculate the stall speed and maximum G loading you would get at, say, 120 knots? How about the negative G limit at 180 knots?

An easier way of presenting all of this data, and finding the answer to these questions, is by using the VN diagram. This is quite simply a graph of G against speed. Together, speed and G limits provide the 'flight envelope' of the aircraft – what it is allowed to do, what it can not physically do, and what it should not do.

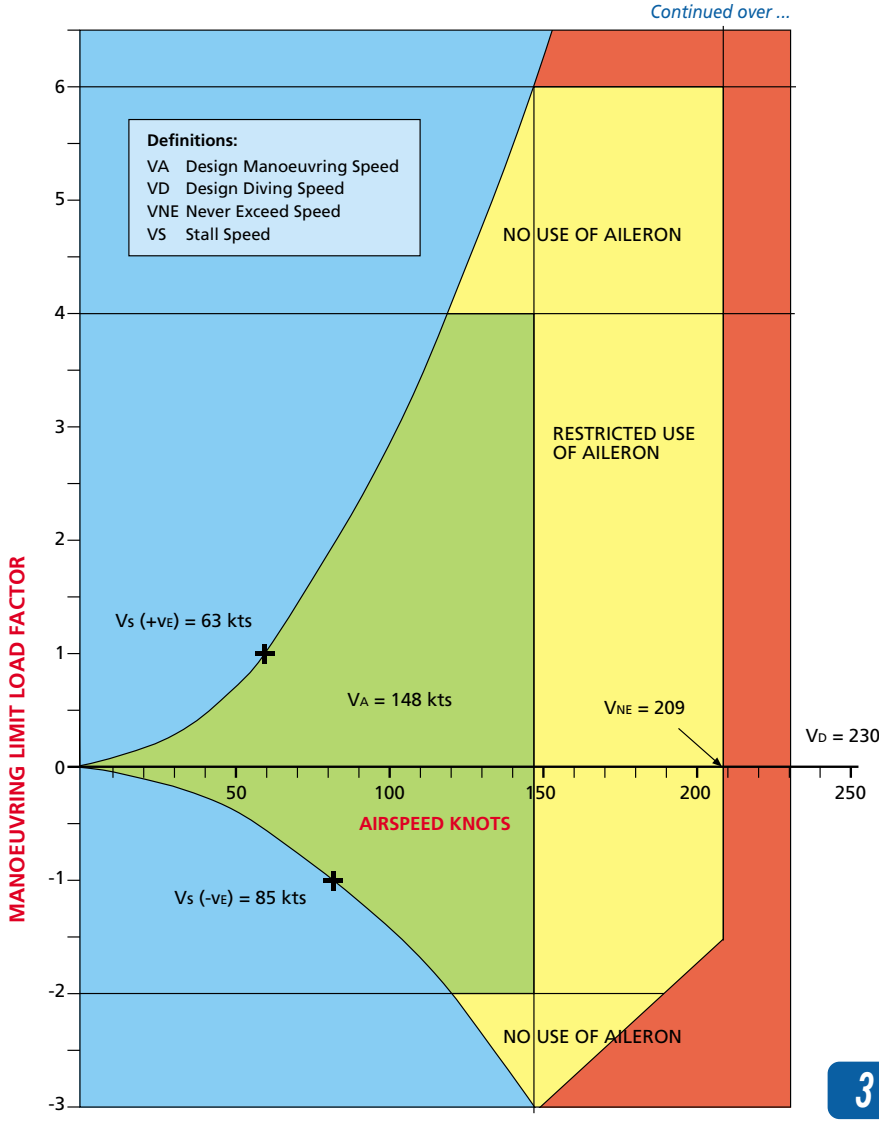
Refer to the accompanying diagram, which has been divided up into four areas as follows:

Blue Area

The blue area represents a combination of speed and G that the aircraft is physically incapable of reaching. The aircraft will stall before enough lift can be generated to produce the G force that can damage the airframe.

The curved lines between the blue area and the other areas are the stall lines, for both normal and inverted flight. Remembering the good old lift formula $L = C_L \frac{1}{2} \rho V^2 S$, and taking $\frac{1}{2} \rho$ (air density), and S (the wing area) to be constants for a given aircraft, then lift generated is proportional to C_L (the co-efficient of lift) and V^2. We also know that C_L reaches a maximum value, as the aircraft is about to stall. So at the stall, lift is proportional to V^2. The G force the aircraft experiences is in turn a function of lift divided by aircraft weight (G = L/W). Therefore, if the aircraft is producing twice as much lift as it weighs, both it and its pilot will be subject to 2 G. If we again assume weight to be a constant, then G is proportional to lift, which at the stall is proportional to V^2. The stall lines are therefore curves that show a squared relationship.

Continued over ...



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Green Area

The green area shows the speed and G combinations where there is no aerodynamic restriction on aircraft operation. (There may be other limits, such as flap or gear limiting speeds or G – refer to the aircraft Flight Manual for details.)

Yellow Area

The yellow area depicts speed or G combinations where there is some limit on the airframe. These are often related to use of aileron. In this diagram, the aircraft is limited to no aileron application above +4 G or below –2 G, and a restriction on the amount of aileron that may be used as speed increases above 146 knots.

Red Area

The red area is a no-go, in which you are likely to cause damage, either through too much G or excessive speed.

Further Points to Note

- The green area extends below the normal stall speed, right down to zero airspeed. Remember that the stall is a function of angle of attack, not speed. You can quite happily fly the aircraft in un-stalled flight well below the normal (level flight) stall speed, but the amount of lift that can be generated will not be sufficient to keep the aircraft level. Aircraft engaged in aerobatics regularly fly at speeds well below the normal stall speed – you just can't do it for too long before gravity takes over though!
- As speed increases, the G that can be produced also increases to the point that the maximum G load for the aircraft is reached. This occurs at VA, or the maximum manoeuvring speed. Up to that speed, full elevator may be applied without G limits being exceeded (although good airmanship and passenger comfort might dictate a gentler use of the controls). Beyond VA, abrupt application of full elevator will overstress the aircraft, so some caution is required when operating within this speed range.
- The stall line curve for normal flight is steeper than that for negative G or inverted flight. Unless you are flying in a purpose-built aerobatic aircraft with a symmetrical wing section, the aircraft wing is more efficient at producing lift the right way up. So for a given speed, the aircraft will produce less lift (and hence G) inverted than it would in normal flight.
- The speed axis in the VN diagram is usually depicted for EAS (Equivalent Airspeed, which is the IAS corrected for instrument error, temperature and compressibility), which is a measure of the aerodynamic load on an aircraft. For most light aircraft, given an accurate ASI, it is near enough to the IAS. For some aircraft the TAS (or Mach Number) may become the limiting factor, and the VN diagram will not depict all the information required to safely operate the aircraft. For instance, the VNE on many aircraft reduces with altitude due to the effects of flutter. Other information that is not contained in the VN diagram includes any flap limits (either G or speed related), or landing gear limits.
- In the accompanying VN diagram, the negative G limit initially follows the stall line to the maximum allowable negative load (–3 G) then steadily reduces as the maximum speed is reached. This is due to the effect of washout, which is designed to ensure that the wing tips stall after the wing root, thus providing roll control and stability right up to the stall. Washout also means that in normal flight, the lift distribution over the wing is greater at the root, reducing towards the wing tips. Now imagine the aircraft is flying inverted. Washout becomes 'wash in' and the wing tips are at a higher angle of attack than the wing root, and thus are producing more of the lift. At higher speeds this puts an unacceptable negative bending load on the wing structure, hence the reduced negative G limit.
- Finally, remember that the VN diagram is for a stated weight, normally the MAUW. At weights below this, the aircraft can generate more G at a given speed. This means that the VA reduces as weight decreases, making it easier to inadvertently overstress the aircraft. Operation close to the limits of the flight envelope should only be undertaken where absolutely necessary and with suitable training. Always refer to the aircraft Flight Manual for any specific limits. ■

2002 Australasian Regional Air Safety Seminar

— Investigation and Safety Topics in the 21st Century —

The New Zealand and Australian Societies of Air Safety Investigators hereby gives notice of this seminar, and invites papers for presentation on contemporary issues relevant to aircraft accident investigation and prevention, with particular reference to the Australasian region. Seminar details are as follows:

Where: Crowne Plaza Hotel, Auckland

When: Saturday and Sunday, 8–9 June 2002 (arrival reception Friday night)

Cost: Registration for ISASI members is NZ$325, non-members NZ$375 (registration covers Friday night reception, all seminar sessions, meals, and a CD copy of papers). The 'partner' fee is NZ$120, which covers reception, breakfasts, and Saturday banquet only.

For further information about this seminar and how to register, please contact the NZSASI secretary:

Peter Williams
Ph: 0–9–256 3915 (wk), 0–3–355 6620 (hm)
Email: prwilly@xtra.co.nz or peter.williams@airnz.co.nz

If you wish to give a presentation at the seminar, please provide an abstract (approximately 100 words) plus personal details to John Goddard by 1 February 2002:

John Goddard
C/o Transport Accident Investigation Commission
PO Box 14025
Christchurch Airport
Christchurch
NEW ZEALAND
Ph: +64–3–358 9801
Fax: +64–3– 358 9194
Email: j.goddard@taic.org.nz

Attention Display Pilots!

– Some Thoughts for 2002 –

Photograph courtesy of the Alpine Flight Collection.

An introduction from John Lanham, General Manager of General Aviation.

As part of the CAA's Summer Safety Initiatives Programme for 2002, and with the New Zealand air display season about to commence, I asked Ray Hanna if he would offer a few words of caution to our increasing number of display pilots.

Ray is perhaps the world's most accomplished and experienced display pilot of Warbird aircraft, and he has been flying them for over 50 years. He is the owner of The Old Flying Machine Company based at Duxford Aerodrome in the United Kingdom, and he is the leader of the Breitling Fighter four-aircraft display team, which performs throughout Europe during the northern summer. Ray is a New Zealander, owns a home in Wanaka, and has been a regular and valued performer at Warbirds over Wanaka since 1990. We are privileged to reproduce his comments.

With the New Zealand summer display season about to commence, and following a tragic year in Europe, it is perhaps timely to remind pilots of ex-military aircraft ('warbirds') to review all facets of their display flying. In fact, this is a very worthwhile annual in-depth exercise, and it should be followed up as the season progresses by continuous monitoring and criticism of one's personal performance.

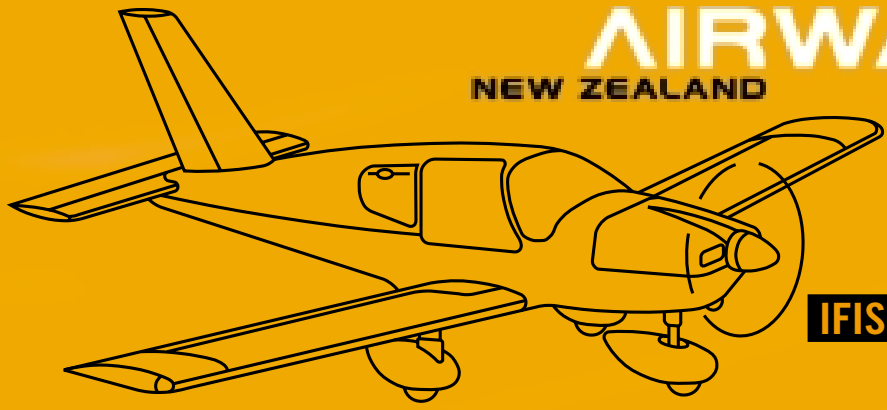
Following four accidents in one weekend (June 2001), the United Kingdom CAA asked the following questions of all display pilots:

- **Personal Ability** – Have you assessed your own limitations? Be cautious and not optimistic of your capabilities – have someone **properly qualified** to review and criticise your flying.
- **Currency** – Are you **adequately** current on type for the intended display? If the honest answer is no, then additional training is necessary. It costs more, but it is definitely cheaper than having an accident.
- **Aircraft Serviceability** – Are you, the pilot, **absolutely certain** that the aircraft has been correctly and adequately prepared? Over familiarity on the walk-around frequently results in missing an item. Look properly at the controls, fasteners, wires, rods, locks, covers, caps, hoses, lines, clips, fuel, oil, coolant, wheels, legs, brake lines, etc. It **does** pay.
- **Aircraft Limitations** – Is the proposed flight well within the permitted envelope? It must be!
- **Display Manoeuvres and Criteria** – Warbirds are not high-performance aerobatic aircraft – keep it simple – no negative G, **ever.** When rolling, place the axis of the roll well above the horizon (barrel rolls in particular). For loops, have a practised minimum entry speed, then add 20 knots. Speed is energy, which at low level is your most valuable asset. Please, **no** low and slow flypasts with gear and flap down – total potential disaster!
- **Emergencies** – Are you immediately able to respond to an engine failure, a hydraulic or electrical problem, smoke, or a fire? Know your aircraft and its systems.

Chuck Yeager is frequently asked how he has managed to survive for so long. His invariable answer is "experience and luck", though I'm not sure that I personally would not have put luck ahead of experience. There is not much to counter bad luck other than total preparation, and of course experience is a huge asset.

On a final note, be cautious – we all know that experience can lead to complacency – avoid complacency by **regularly** reviewing your personal act!

Ray Hanna
Wanaka
December 2001 ■



AIRWAYS NEW ZEALAND

IFIS INTERNET FLIGHT INFORMATION SERVICE

New VFR Flight Plan – *It's Here!*

It has been a long time in the making, but well worth the wait. After an extensive consultative and rule-making process, the new VFR Flight Plan is here and will be implemented on 24 January 2002.

The new and simplified VFR flight plan will replace both the existing VFR flight plan, VFR Standard Plan, and SARWATCH options and will be fully integrated with the Airways IFIS web site. (A flight plan is required whenever an aircraft intends to operate 50 nautical miles or more from shore, or when an alerting service is required.) The new flight plan, for all intents and purposes, closely resembles the existing SARWATCH whereby the aircraft receives an alerting service based upon the SARTIME provided by the pilot.

Pilots on the new VFR flight plan will receive a similar level of in-flight information as they have done in the past. HAZMET (hazardous weather information) and NOTAM advisories will be broadcast on the FISCOM frequencies, but details of these will **not** be proactively passed to individual aircraft – pilots will need to ask for specifics. Flight plan information will be lodged in an electronic database, which can be accessed by each ATS unit if required. The database will not generate a flight progress strip like it currently does when a flight plan is lodged, which means that the Flight Information Officer (FIO) does not have your details to hand at their work station. They can, however, interrogate the electronic database at any time to pull out your flight plan should you exceed your SARTIME.

The new flight plan will also be supported by the allocation of permanent designated SSR transponder codes for enhanced Search and Rescue purposes. Routine weather and NOTAM information, electronically broadcast on a dedicated Flight Information Service Broadcast (FISB) frequency, will also be provided. More on these two new features later.

A number of different charging options will be available depending on how a flight plan is lodged, with significant savings being possible if filed via the Internet in conjunction with Airways' new Electronic Ticket option.

This article details how to access the new flight plan form, fill it in, file it, amend it and terminate it. The article also covers other pertinent points associated with charging options, allocation of designated transponder codes, position reporting, in-flight information, and FIS broadcasts.

Further information can be obtained by referring to the special *AIP Supplement* on the new VFR flight plan (effective 24 January 2002), which should be retained until the VFG is replaced in September 2002. The Supplement can also be viewed on the IFIS web site by clicking on **Publications/Documents Available Online** and then selecting **AIP Supplement 24 January 2002** in the table that appears.

Accessing the New VFR Flight Plan

There are two ways to access the new flight plan – live via the IFIS web site or simply by using a conventional paper copy.

To access the Internet option, log on to the Airways IFIS site (www.ifis.airways.co.nz) and, if you have not already done so, register as a user at no charge. Selecting **Flight Plans/VFR Flight Plan Activation** will bring up the interactive flight plan form.

Alternatively, a paper copy (duplicated below) of the flight plan form can be printed directly off the IFIS site (select **Flight Plans/VFR Flight Plan Form**). Duplicate copies can then be made for future use.

VFR FLIGHT PLAN
1. Aircraft Registration
2. Aircraft Callsign
3. Type of Aircraft
4. Route _____
5. SARTIME
6. Fuel Endurance
7. Persons on Board
8. Other Information _____
9. Pilot in command
10. Contact Number
11. Operator
File on **www.ifis.airways.co.nz** or Phone **0800 NBOPLN** (0800 626 756) or Fax **0800 NBOFAX** (0800 626 329)

Completing the Data Fields On-line

While most data fields on the new flight plan form are self-explanatory, some need a little further explanation (see the on-line flight plan form sample below for details). Each data field in the on-line flight plan form is accompanied by a help option (denoted by blue underlined text) that can be selected if desired. This is a very useful function and we recommend that it be utilised.

Route

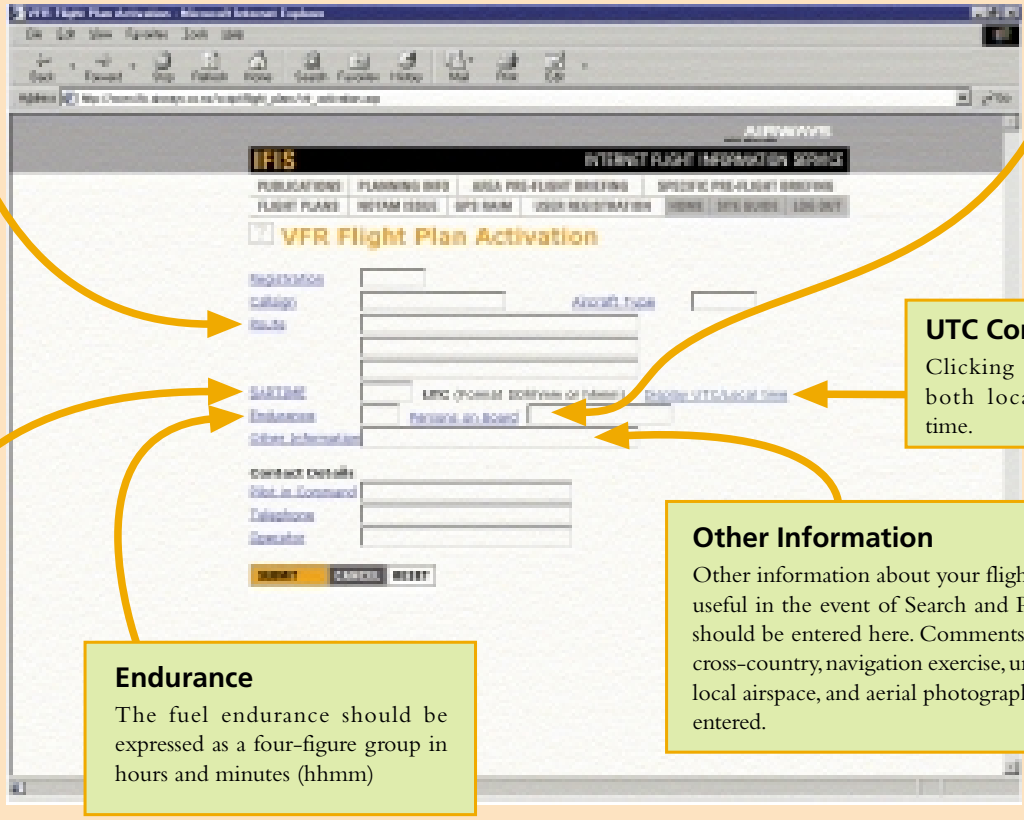
The VFR flight plan route should be described as a series of points defining the route that you intend to fly. This may be as simple as departure point and destination point, or it could include any reporting or turning points you intend to use plus estimated elapsed times and estimated brief landing times. The degree of detail provided here may determine how quickly emergency services can find you should the need arise.

The route field is free text and can be typed in as such. However, entering a four-figure location indicator of an attended unit (eg, NZCH) in this field, will automatically send the flight plan to that ATS unit. This information may assist the ATS unit(s) to provide you with a more streamlined aerodrome control service. (Pilots submitting their flight plan via phone and requiring it to be forwarded to an ATS unit(s), should request this when filing.) It is important to note that the alerting service is activated by the National Briefing Office based on the SARTIME and not by the ATS unit.

Persons on Board

Advise the total number of persons on board. Insert TBN (to be notified) if the total number of persons is not known at the time of filing and is to be provided to ATS on first contact. If you are filing a flight plan with intermediate landings and the number of persons on board will be different for each leg, then specify the numbers of persons on board for each leg by separating the numbers with an oblique stroke '/'.

For example: 1/2/1 indicates one person will be on board for the first and third legs of the flight, while two persons will be on board for the second leg of the flight.



UTC Conversion

Clicking here displays both local and UTC time.

Other Information

Other information about your flight that may be useful in the event of Search and Rescue action should be entered here. Comments like first solo cross-country, navigation exercise, unfamiliar with local airspace, and aerial photography can also be entered.

Endurance

The fuel endurance should be expressed as a four-figure group in hours and minutes (hhmm)

SARTIME

SARTIME is the time at which Airways will commence Search and Rescue action if you are missing or have neglected to terminate your flight plan. It is therefore preferable that you terminate **well before** (at least 15 minutes) the SARTIME you have nominated – doing so will avoid unnecessary and costly Search and Rescue action. In fact, it will be an offence under the Civil Aviation Rules if you fail to terminate your flight plan before the nominated SARTIME.

Enter the time in UTC (format ddhhmm: **D**ays, **H**ours, **M**inutes or hhmm: **H**ours, **M**inutes) when you intend to terminate your flight plan. Allow sufficient time to get to a telephone or Internet terminal to terminate your flight plan. (Terminating once on the ground is the safest option, particularly when landing at a remote aerodrome – but be sure that there is phone coverage on the ground before deciding to do so.) Pilots on multi-leg flights can nominate a SARTIME relative to the first destination and should then update the SARTIME after each landing or takeoff. This update, however, must always be made before the existing SARTIME expires. The SARTIME can be amended as often as you like for no extra charge.

Continued over ...

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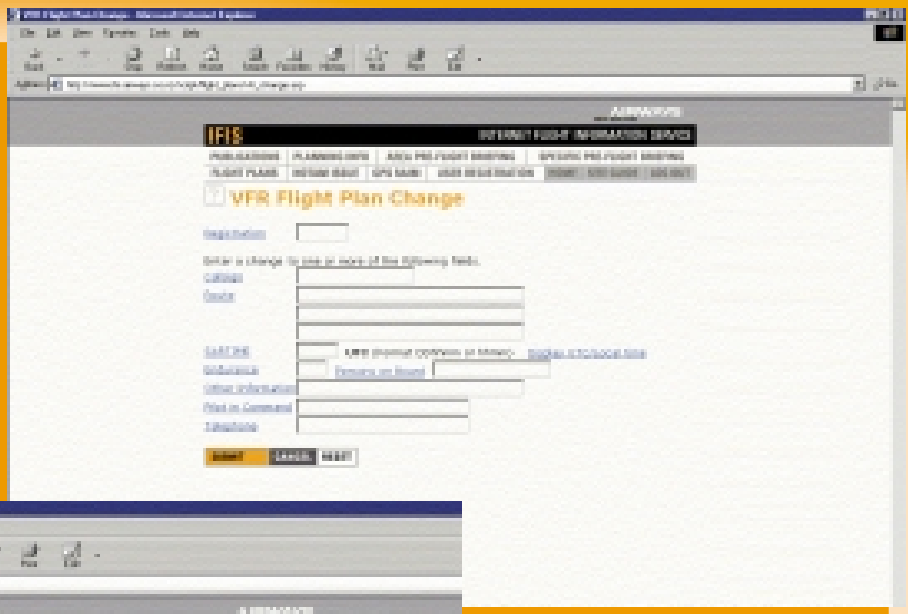
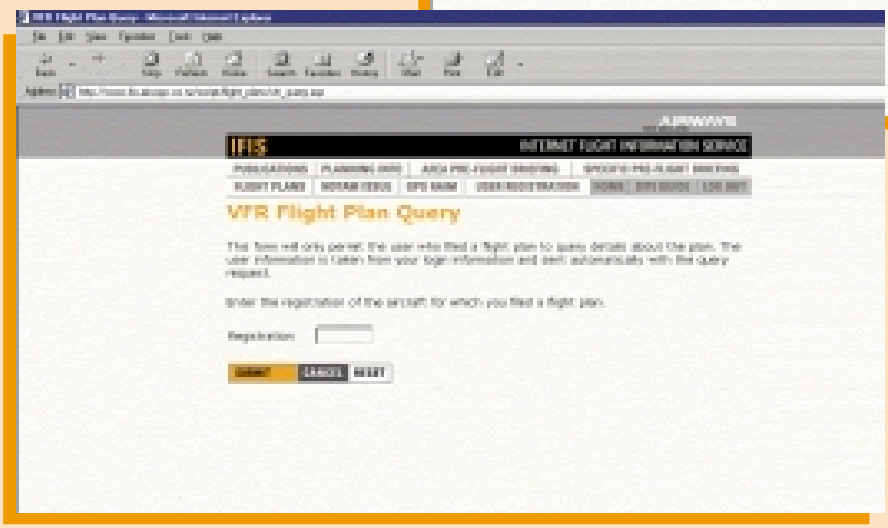
Filing and Amending VFR Flight Plans

Note that a VFR flight plan submitted over the Internet or via fax is not accepted until you receive confirmation of its successful activation via return email or fax. (Note that all prices quoted below exclude GST.)





Phone/Fax

Flight plans can still be filed, amended or cancelled by phoning or faxing the National Briefing Office on 0800 626 756 (ph) or 0800 626 329 (fax) at a cost of $6.50 – one charge for all services.

Radio

Flight plans can be filed over the radio at a cost of $6.50. There is no charge for making amendments.

Internet

Having correctly filled in the data fields, simply click on the submit button at the bottom of the screen to send the flight plan. The base cost is $4.50 for filing via the Internet, which can be reduced to $3.60 if an electronic ticket is used.

You can amend your flight plan at any stage by selecting the **Change an Active VFR Flight Plan** option (depicted above) and re-entering the data you wish to change. This will automatically update the original flight plan you lodged in the Airways database.

You can review the flight plan details you have just submitted by selecting the **Query Active VFR Flight Plan** (depicted above) if you are thinking about amending them.

Note that cancellation of a flight plan (ie, you have submitted a plan but are then unable to fly) should be notified to the National Briefing Office by phone to circumvent the flight plan charging process.

Favourites Option

You may save filed VFR or IFR Flight Plans and pre-flight information queries as favourites for easy re-submission in the future. This option will replace the VFR Standard Flight Plan service previously provided by Airways. You may save up to 20 flight plans using the favourites option. If you wish to file a flight plan similar to one of the saved favourites, 'load' the favourite, make any minor changes including adding the SARTIME, and submit the flight plan.

Electronic Ticketing

Electronic tickets offer good discounts over the existing Airways standard prices and are a great way to save money – especially if you fly regularly. Electronic tickets are purchased in advance and 'clipped' every time an Airways service is used. When the ticket expires (expiry is not time-related), the customer is invoiced for a new ticket and given a printout of the previous ticket's usage. Pricing details are outlined below.

Number of Units	Cost (Excludes GST)
50	$45
100	$90
250	$225
500	$450

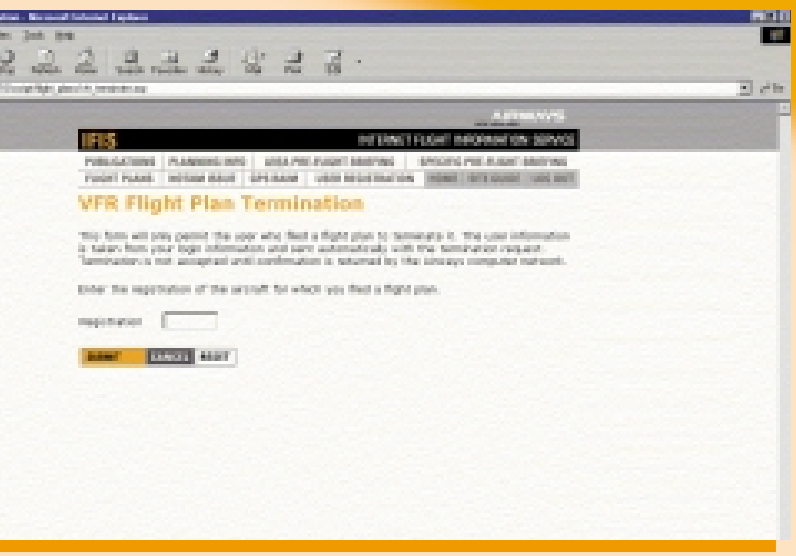
Service			
Weight	**Aerodrome Charge** (Applies at attended aerodromes)	**Flight Plan** (For VFR flight plans filed by phone, fax or RTF)	**IFIS Flight Plan** (For a VFR flight plan filed via IFIS)
0-1650kg	5 units	6 units	4 units
1651-3000kg	7 units	6 units	4 units
3001-4000kg	8 units	6 units	4 units
4001-5000kg	9 units	6 units	4 units

To purchase an electronic ticket for your aircraft contact Airways Customer Accounts Ph: 0800 500 045 or E-mail: custacct@airways.co.nz.

Terminating a VFR Flight Plan

Search and Rescue action will be initiated at the SARTIME specified unless the flight plan has been terminated by the pilot prior to that time. It is important that pilots **always** request that their flight plan be terminated, even when landing at a controlled aerodrome, as this is no longer done for you.

Flight plan termination may be via the Internet (select **Terminate an Active Flight Plan**), telephone, or over the radio.



Terminating IFR and Proceeding VFR

Pilots cancelling IFR over the radio and proceeding VFR will be required to provide an aircraft registration, unless already using it, and SARTIME to facilitate Search and Rescue capability for the remaining VFR portion of the flight.

Designated Transponder Codes

A limited number of permanent designated SSR transponder codes will be available to VFR aircraft for alerting service purposes. Applications for these codes may be made to John McKenzie at Airways mckenzj@airways.co.nz. The pre-allocated transponder code will be displayed in the message acknowledging acceptance of a flight plan via the Internet or fax, or passed verbally by the ATS staff accepting the flight plan. The designated transponder code is a discrete code that, if entered into the aircraft's transponder, will enhance Search and Rescue action in areas of SSR coverage. The aircraft's position and altitude are continuously recorded by radar and are available for Search and Rescue action if required. A chart detailing SSR coverage is contained within the special new VFR Flight Plan *AIP Supplement*.

VFR Position Reporting

There is no operational requirement for pilots of aircraft on the new VFR flight plan to make position reports. However, pilots operating outside radar coverage or without a designated transponder code, are encouraged to make position reports at regular intervals for their own safety. These are noted by the FIO and will be used to help locate an aircraft should it exceed its SARTIME.

Flight Information Service

An in-flight information service is provided by a FIO broadcasting HAZMET and NOTAM advisories on 'Christchurch Information' to "all stations". Such advisory broadcasts alert pilots to any new SIGMETs, SPARs, SPECIs on unattended aerodromes, and amended TAFs that may have just been issued, with a summary being broadcast on the hour. New NOTAM advisories are broadcast in the same way, with a summary of new NOTAMs received in the previous 90 minutes also being broadcast on the hour.

It is important to note that individual aircraft will **not** be proactively passed the contents of HAZMET and NOTAM reports in-flight (as was the case under the old full flight plan system), so pilots must ensure that they maintain a careful listening watch on the appropriate FISCOM frequency and ask for full details if so required.

Pilots are able to request any other information that may be of use to them free of charge, and are encouraged to do so. For example, if it is decided to divert to an aerodrome where NOTAM or weather information has not been obtained, it should be requested.

Flight Information Service Broadcast

A FISB to aircraft has been introduced for the top of the North Island. The service, 'Northern Flight Information', broadcasts all available METAR, SPECI and TAF information on 126.8 MHz from a transmitter located at Seagrove on the south side of Manukau Harbour. Limited information on special use airspace activation is also broadcast.

Broadcasts commence at five minutes past the hour and every 10 minutes thereafter.

Summary

A large amount of time has been invested by Airways, the CAA and other parties to make this more streamlined and cost-effective VFR flight plan option a reality. Its on-going success will depend on how well it is utilised over the coming few years. We hope you will support what we believe to be an excellent service provided at a very reasonable cost.

For further information, contact John McKenzie, Airways, on 0–3–358 1631 or mckenzj@airways.co.nz ■

Tiedown Knots

Our recent article "Tiedown Techniques" (Sep/Oct 2001) prompted a letter (published Nov/Dec 2001) regarding appropriate knots for tying down aircraft. We decided the topic warranted elaboration.

The weakest link in the tiedown can be the knot you tie, and it is therefore important to understand a little about various knots and how to tie them properly. The knot should neither slip nor loosen, and it should be easy to undo.

A knot can fail in three ways: it can come undone through vibration and general movement when there is little load on it, it can pull out when load is applied, or it can break under load. Any break usually occurs where the rope enters the knot.

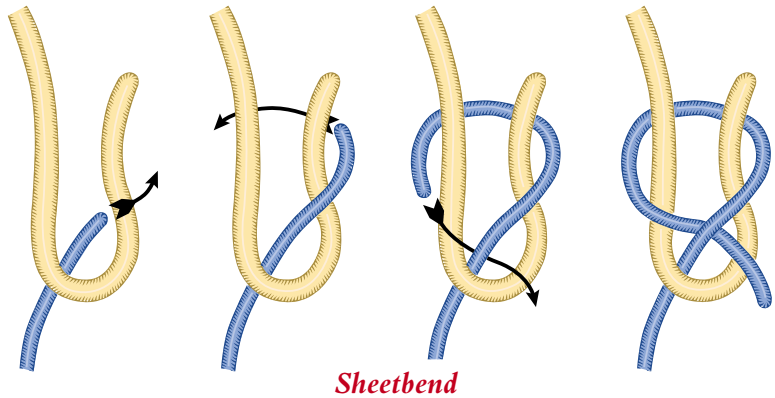
The ultimate strength of a knot is a matter of design – some knots are naturally stronger than others. Security, on the other hand, can often be improved by the manner in which the knot is finished off. But making a knot more secure may also make it more difficult to undo when the time comes, so there is no point in making a knot as secure as possible – only as secure as necessary.

The US FAA Advisory Circular on aircraft tiedowns recommends the *bowline* and the *square knot* (or *reef knot*). Research suggests that a reef knot is not suitable for aircraft tiedowns. It is an excellent general-purpose knot for tying two pieces of string or twine (of equal thickness) together, but it is not a long-term or secure knot, and it is used mainly in bandaging, tying parcels, etc.

For a more secure method of bending two ropes together, use a *sheetbend*.

Sheetbend

The sheetbend is the most commonly accepted knot for joining two ropes together and probably the best, particularly if the ropes are of different sizes. The thicker rope of the two is used to form a bight, and the thinner rope is passed up through the bight, around the back of the bight, and then tucked under itself.



Sheetbend

The knot should be tied with the ends of the ropes coming off the same side of the knot. However it can easily be accidentally tied with the ends coming off opposite sides of the bend, when it is known as the *lefthanded sheetbend* – this version is to be avoided, as it is less secure.

Bowline

The bowline is closely related to the sheetbend. The bowline is the most useful and one of the simplest ways of putting a fixed loop in the end of a rope. It is easy to tie and untie, it doesn't slip or jam, and it has a high breaking strength.

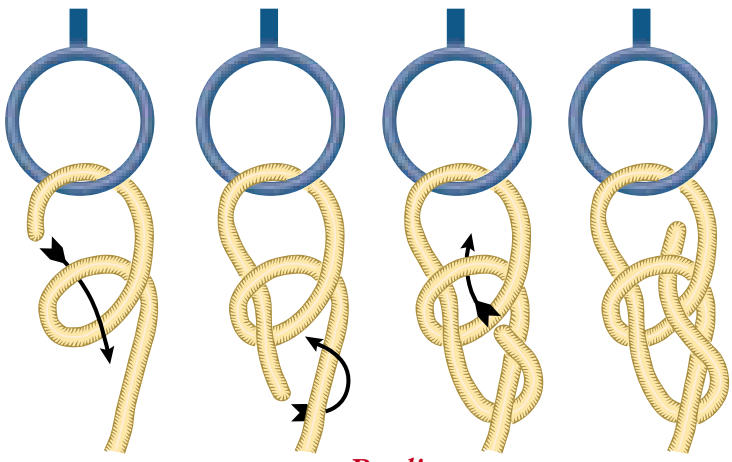
It is perhaps the best way to secure a rope to a tiedown ring. It's also very good for attaching the tiedown rope to the anchors in the ground.

For added security, you can finish the knot with a stop knot such as a *figure of eight* knot to remove any possibility of the bowline slipping.

Form a small loop (the direction is important), and pass the free end of the knot up through the loop, around behind the standing part of the rope, and back down through the loop.

A chant used by many to remember this knot is "The rabbit comes out of the hole, round the tree, and back down the hole again", where the hole is the small loop, and the rabbit is the running end of the rope.

In the same way that a lefthanded sheetbend has the running end of the rope coming out of the wrong side of the knot, a *cowboy bowline* is a bowline that also has the running end of the rope



Bowline

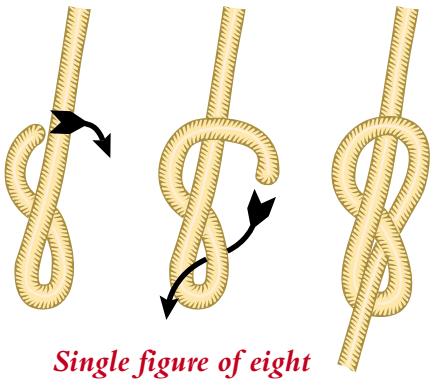
coming out of the wrong side of the knot. It suffers the same problems as the lefthanded sheetbend, and is to be avoided.

To quickly identify if you have tied a normal bowline or cowboy bowline, check to see that the running end exits the knot on the inside of the loop.

Figure of Eight

Single

The *single figure of eight* is a useful 'stop' knot to temporarily bulk out the end of a rope or cord. The finished knot looks like its name. It is useful to temporarily stop the ends of a rope fraying, before it is whipped.

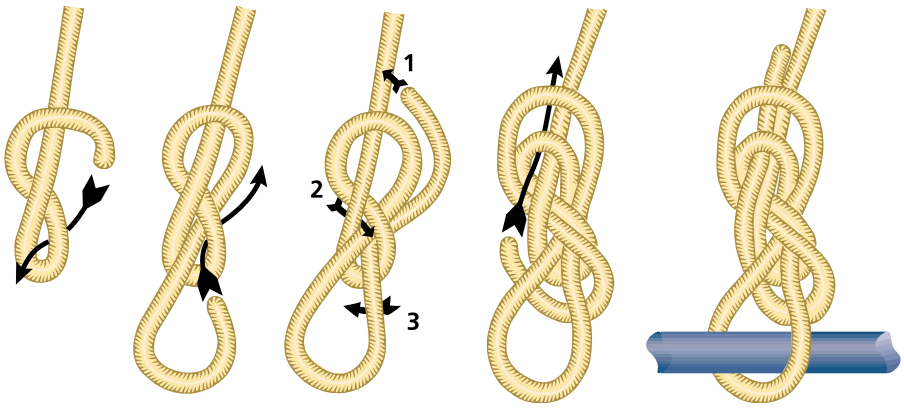


Single figure of eight

Double

The *double figure of eight* knot builds a non-slip loop at the end of a rope. It is popular with rock climbers (as it is safer than a bowline) who tie their belay rope to their carabiner or harness.

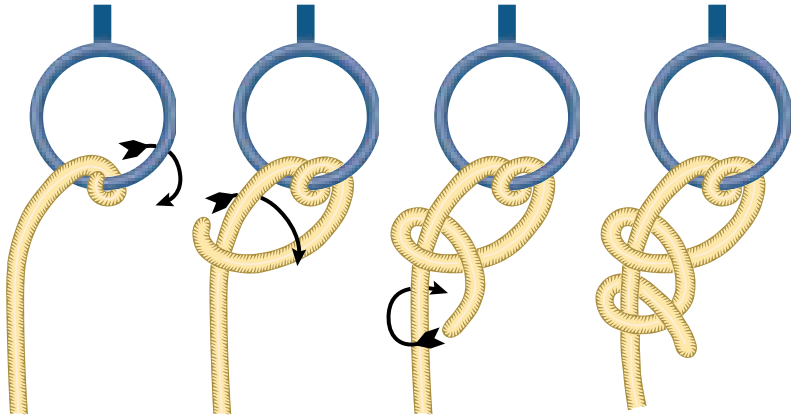
Tie a single figure eight knot near the end of the rope, loop the end of the rope around the carabiner or harness straps and retrace the figure eight.



Double figure of eight

Round Turn and Two Half Hitches

A *round turn and two half hitches* is used to secure a rope to a pole or ring, or to start or finish a lashing. It does not jam.



Round turn and two half hitches

It is a good knot for securing a rope to the tiedown ring, and it is commonly used by many pilots. While it is easy to tie, it can be more difficult to untie, especially when the rope is wet.

Pass the running end of the rope over the pole or through the ring twice. Then pass the running end over the standing part of rope, and tuck it back up and under itself, forming a half hitch. Repeat this for a second half hitch.

Conclusion

To become proficient in the art of tying knots requires practice, but it is a useful skill. Although there are many hundreds of possible knots, most of us need only be familiar with a few of the most commonly used ones.

There are many books available on the subject. Learning to tie knots using illustrations can be difficult. Fortunately in this age of technology there is a better way. There are a number of web sites (particularly those of boy scout troops) which have animated diagrams to assist in learning to tie a range of useful knots. (Try www.troop9.org and click on **Knots**)

Make sure that you protect your aircraft adequately with suitable tiedown rope (and a properly spliced loop in the end of the rope makes tying down easier), and that you have the requisite knotting skill to make sure the tiedown does its job.

Some Knotting Terms

A *bend* is used to join two ropes.

A *hitch* is used to tie to an object.

The *bight* is the curvature of a rope when its direction is changed from that of a straight line, to the maximum of a full circle. Any point within this curvature is said to be in the bight.

The *strength* of a knot is the force required to break a rope containing the knot. The *security* of a knot is related to the force required to make the knot slip or capsize to an unwanted form.

Whipping is a series of turns of sail twine or similar, forming a lashing at the end of a rope to prevent fraying. ■

When 'Chicken One' Refused to Fly

SHARE YOUR EXPERIENCE

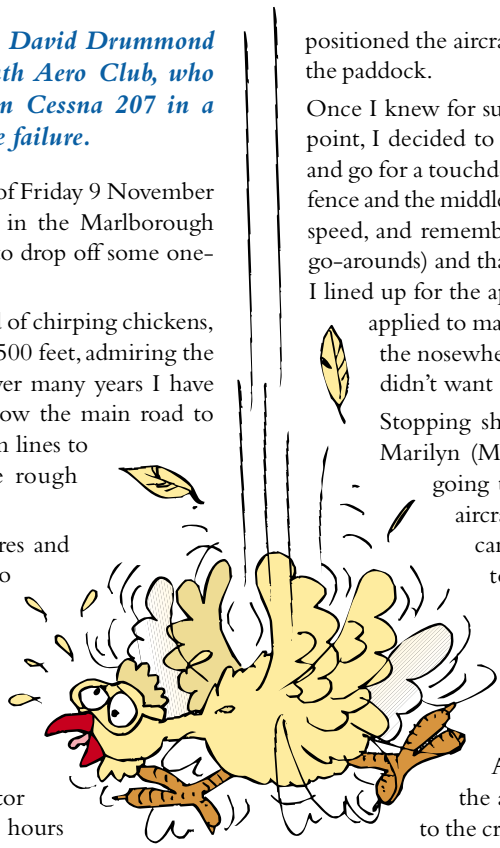
Readers are encouraged to share their aviation experiences in order to alert others to potential pitfalls. We do not accept anonymous contributions. If you tell us who you are, we will not publish your name unless we have your permission.

The following contribution comes from David Drummond (alias 'chicken man') of New Plymouth Aero Club, who successfully force-landed his fully laden Cessna 207 in a paddock following a catastrophic engine failure.

We were to fly south on the morning of Friday 9 November to enjoy a nice relaxing weekend in the Marlborough Sounds, stopping at Pine Park on the way to drop off some one-day old chicks.

Airborne out of New Plymouth with a load of chirping chickens, we were cruising at an altitude of around 2500 feet, admiring the scenery as we worked our way south. (Over many years I have found that the easiest way south is to follow the main road to Stratford and then pick up the high-tension lines to Wanganui, which takes you around the rough country to the east.)

The flight was going well. The temperatures and pressures all looked normal, but this was to be short-lived and our plans were about to change dramatically. (I am in the habit of checking the T's and P's every quarter of an hour, ie, 1/4 past, 1/2 past, etc, which has worked well for me and is an easy way to monitor the engine's status.)



Six nautical miles east of Hawera, the motor stopped without warning. I guess all those hours of sitting in the lefthand seat of this particular aircraft and regular forced-landing practice were about to pay off.

Trouble checks: propeller still spinning but no revs on the engine RPM counter, no fuel flow (except with the electric fuel pump on), and no manifold pressure. The rest of the checks didn't matter, because I then knew that I was landing, no matter what.

"Six nautical miles east of Hawera, the motor stopped without warning."

Remember trim to conserve height, speed back to 90 knots. Paddock, yes the one in front will do – great. Then I realised that the aircraft was not flying very well, and with its high nose attitude I was having difficulty maintaining sight of the chosen paddock. Lowering the nose and increasing the speed to 105 knots improved things and provided better visibility.

A Mayday call to Christchurch Information on 129.8 MHz. You'd be surprised how long that takes, as you know that you don't want to repeat any of it – so you need to get it right first time. I imagine that the Information Officer's heart rate increased on hearing the words Mayday Mayday Mayday!

While putting out the Mayday call, I was able to have a good look around – and hello, another paddock that is even better than the first one. Then just out to my right, a third paddock, no wires, no stock, and grassy – keeping in mind all the time that I must maintain my airspeed and not try and stretch the glide too far. Once I decided that this was 'the paddock' and that it was nice and close, I had more than enough height and airspeed to make it. I then positioned the aircraft to touch down right in the middle of the paddock.

Once I knew for sure that I was able to achieve my aiming point, I decided to lose more height by lowering the nose and go for a touchdown point that was halfway between the fence and the middle of the paddock. Applying flaps to reduce speed, and remembering that I only have one chance (no go-arounds) and that this landing had better be a good one, I lined up for the approach. All my concentration was then applied to making it a good landing. I wanted to keep the nosewheel well clear during the touchdown, as I didn't want to collapse it.

Stopping short of those big round hay bales that Marilyn (Mrs Drummond) was sure that we were going to hit, we extracted ourselves from the aircraft to give each other a big hug. I then cancelled the Mayday call, which I was able to do from the 'good old' cellphone. Information downloaded from the on-board GPS later showed that we had glided 1.95 NM in one minute 19 seconds and lost around 1700 feet, a rate of descent of 1300 feet per minute.

At no time did we feel any vibration in the aircraft or hear any unusual noises prior to the crankshaft breaking. The engine was going just fine, and then it suddenly stopped.

If you ever have the misfortune to have something like this happen to you, always be confident that you can retain control of the situation, and you will be safe. At no time did Marilyn or myself think that it was going to turn out any differently than what it did. Remember, forced-landing technique is a discipline that should be constantly practised – it's not just something we do when BFR time comes around.

Also remember, as I did on this occasion from conversations with older more experienced pilots around the bar and at the club house, Aviate, Navigate, Communicate.

We went and did some circuits in the Club's C172 shortly afterwards just to enjoy the sheer pleasure of flying.

Thanks to all the support that we received from New Plymouth Aero Club members and staff along with those calls received from other people within the aviation industry.

By the way, the chickens continued their journey by road with no ill effects.

Vector Comment

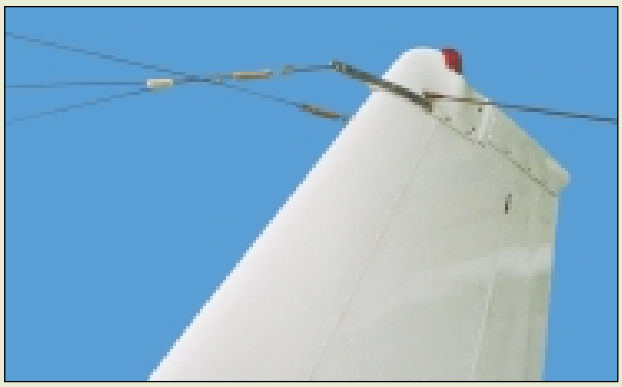
Thank you to David for sharing this sobering experience with *Vector* readers. It shows just what can be achieved when confronted with the unexpected. David's currency in the C207 and familiarity with the forced-landing drills (both through practice and mental rehearsal) all paid off when it counted. Well done David.

When was the last time you practised a forced landing without power? ■

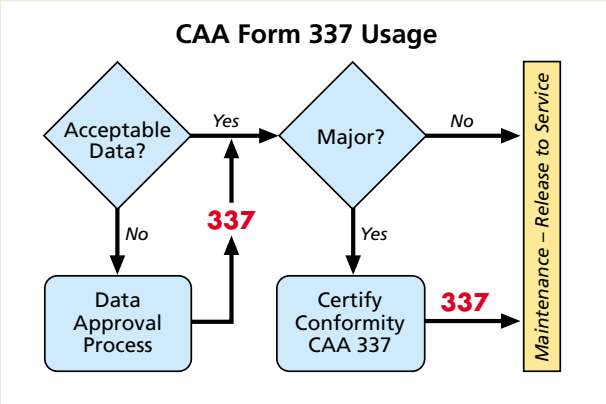
Unapproved Mods

The CAA is becoming increasingly concerned about the number of unapproved modifications being made to general aviation aircraft. Problems typically relate to the fitting of aircraft role equipment such as spray and spreader gear, camera mounts and hatches, parachute doors and fixtures, air ambulance equipment, and aircraft abrasion strips.

It seems that some owners and operators are not following the correct process when it comes to making such modifications. Adjustments being made to existing modifications without prior approval are also of concern. Whenever a modification is being considered, the following process **must** be followed properly. Consult your LAME/IA (Inspection Authorisation) and refer to AC43-9A *Modifications, repairs, and the Form CAA 337* for assistance with the modification process:



Two examples of modifications that require CAA approval are pictured above.



Step 1. Determine if there is Acceptable Technical Data appropriate to the modification being considered. Acceptable Technical Data is listed in Civil Aviation Rule Part 21 *Certification of Products and Parts* Appendix D. If this can be determined, go to Step 3.

Step 2. If there is no Acceptable Technical Data, or the data is not applicable to the work being carried out, it must be 'Approved' by the CAA or a Part 146 *Aircraft Design Organisation – Certifications* organisation. A Form CAA 337 Design Change must be raised and submitted detailing the proposed modification.

Step 3. Determine if the modification is considered major* or not. If it is not, the work can be performed by an approved LAME and then 'Released to Service' in accordance with Part 43 *General Maintenance Rules*.

Step 4. A Conformity Check (carried out by an IA and detailed on a CAA Form 337) is required if the modification is considered major, prior to a 'Release to Service' being issued. This Conformity Certification phase is a critical part of the process, and it ensures that the modification has been carried out exactly as detailed in the Acceptable Technical Data. Any changes or variations observed during the Conformity Check then need to be rectified or approved.

It is important that the above process is properly followed, no matter how inconsequential the modification may seem, and that on-going adjustments or changes are not made without the appropriate prior approval. The consequences of not doing so could be dire.

Some other problems noted by the CAA include modifications being installed on aircraft that they are not applicable to, and other modifications being installed in such a way that they affect existing modifications (ie, 'mod on mod'). It is important to realise that only the original modifier can install a Form 337-approved modification – a Supplemental Type Certificate (STC) is required if the installation is to be performed by another party.

Additionally, all installations need to be maintained on an on-going basis. Civil Aviation rule 21.19 *Issue of certificates* requires, as part of the approval process, that instructions for continued airworthiness be developed. These then become part of the maintenance programme for the aircraft so fitted.

This article has pointed out some of the issues, and the basic process, that need to be considered when making a modification to an aircraft.

Reference must always be made to the relevant Civil Aviation Rules and Advisory Circulars throughout the whole process to ensure that it is carried out correctly. Modifications can be expensive at the best of times, so it pays to try and get it right first time. The last thing you want is for the CAA to audit your aircraft and find unapproved modifications, because you will be asked to have them removed and start all over again – the correct way.

Any questions can be directed to the CAA's Certification Unit – they are there to help! ■

***Major modification** means a modification that could potentially affect the safety of an aircraft or its occupants where, as a result of its embodiment, one or more of the following incidents may occur:

1. structural collapse:
2. loss of control:
3. failure of motive power:
4. unintentional operation of, or inability to operate, any systems or equipment essential to the safety or operational function of the aircraft:
5. incapacitating injury to any occupant:
6. unacceptable unserviceability or maintainability.

(Major modifications and repairs are defined in CAR Part 1 *Definitions and Abbreviations* and are explained in AC 43-9.)

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.

Aircraft G Limits

The article "Ways to Hurt Your Aircraft" was interesting and informative but contained a statement in the discussion on Load Factors and G Limits that could be misleading.

To say "Negative G limits are generally around half the positive limits" suggests the aircraft design allows twice the strength under positive G loads. That is not usually the case for light aircraft.

For light aircraft where inverted manoeuvres are not prohibited, a commonly quoted limit range is +3.8 G to –1.9 G.

Arithmetically one **number** may be twice the other but, in fact, such aircraft are capable of withstanding slightly greater load in the negative G flight environment.

The fallacy stems from overlooking the fact that when parked outside the Aero Club, before you even light the fires, the whole aircraft is subject to a positive G load of 1. (And if it weren't for that we wouldn't need aircraft!)

So that design range allows flight to a positive stress limit of a further 2.8 G (3.8 minus 1) or the aircraft would be capable of withstanding up to 2.9 G (from +1 to –1.9) if encountering negative stress forces.

Similarly, an aerobatic aircraft certified at +6 to –3 G will take stress to a further 5 G positive or could fly an outside loop with –3 on the G-meter (which read "1" before takeoff) to an added stress of 4 G (from +1 to –3).

And if you think that is confusing, try Flight Planning in summer when, as well as adjusting for 12 hours, you also have to remember to add or subtract 1.

R Sumpter
Whangarei
August 2001

Vector Comment

Thank you for your letter, which raises some valid issues. You are partly correct, but there is more than meets the eye on first inspection. As you point out, when the aircraft is sitting on the ground, it is subject to a force of one G. That load, however, is generally **not** being imposed on the wings, but rather on the undercarriage and fuselage. Indeed, in a number of aircraft, the fuselage is holding the wings up. In the days of biplanes, they had 'flying wires' to hold the fuselage up when the wings had the load in flight, and 'landing wires' to hold the wings up when on the ground. Fly an aircraft like the Tiger Moth and you will see one set of wires tighten up as you get airborne, and relax as you land. A more common example is a big jet. The wings noticeably droop on the ground, then bend up on takeoff as the wings take the load (Boeing 747 wingtips move about 2.5 metres we understand). For an aircraft with the undercarriage attached to the fuselage, such as a Cessna 172, the wings are bending down on the ground. Load paths and bending moments may therefore be quite different on the ground from in the air.

The G baseline for an aircraft designer, as specified in airworthiness regulations, is zero G. The aircraft must be capable of withstanding **flight loads** above and below this, and in this context, the positive design loads are normally twice that of the negative loads. As you correctly point out, in normal flight one G worth of positive load is already used up just to keep the aircraft flying level.

Readers are invited to refer to the article on the V_N diagram in this issue of *Vector* for more information on aircraft airframe loading and limits.

AIP Supplement Cut-off Dates

Do you have a significant event or airshow coming up soon? If so, you should have the details published in an *AIP Supplement* – relying on a NOTAM is not as effective, and the information may not reach all affected users. In order that such information can be promulgated in a timely manner, you need to submit it to the CAA with adequate notice (at least 90 days before the event). Please send the relevant details to the CAA (ATS Approvals Officer or AIS Coordinator) at least one week before the cut-off date(s) indicated below.

Supplement Cycle	*Supplement* Cut-off Date	*Supplement* Effective Date
02/3	24 January 02	21 March 02
02/4	21 February 02	18 March 02

Field Safety Advisers

John Fogden
(North Island, north of line, and including, New Plymouth-Taupo-East Cape)
Ph: 0–9–425 0077
Fax: 0–9–425 7945
Mobile: 025–852 096
fogdenj@caa.govt.nz

Owen Walker
(Maintenance, North Island)
Ph: 0–7–866 0236
Fax: 0–7–866 0235
Mobile: 025–244 1425
walkero@caa.govt.nz

Ross St George
(North Island, south of line, New Plymouth-Taupo-East Cape)
Ph: 0–6–353 7443
Fax: 0–6–353 3374
Mobile: 025–852 097
stgeorger@caa.govt.nz

Murray Fowler
(South Island)
Ph: 0–3–349 8687
Fax: 0–3–349 5851
Mobile: 025–852 098
fowlerm@caa.govt.nz

Bob Jelley
(Maintenance, South Island)
Ph: 0–3–322 6388
Fax: 0–3–322 6379
Mobile: 025–285 2022
jelleyb@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

24-hour 7-day toll-free telephone

0508 4 SAFETY
(0508 472 338)

For all aviation-related safety concerns

OCCURRENCE BRIEFS

Lessons For Safer Aviation

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

Individual Accident Reports (but not GA Defect Incidents) – as reported in *Occurrence Briefs* – are 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.)

This issue contains a number of accidents that have been withheld from publication until now due to insufficient information. Efforts have been made to source the missing information, but some data fields and synopses remain incomplete.

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-GKD, Schleicher ASW 19B, 25 Jan 96 at 17:55, Matamata. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age not known, flying hours not known.

The pilot landed the glider short of the airfield on farmland, sustaining substantial damage in the process.

Main sources of information: Unknown.

CAA Occurrence Ref 96/157

ZK-GCF, Slingsby T.43 Skylark 3F, 30 Nov 97 at 18:20, Whakapara. 1 POB, injuries 1 minor, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age not known, flying hours 411 total, 0 on type, 1 in last 90 days.

The pilot failed to correct quickly enough for a crosswind component while on final approach. This caused the glider to drift towards a downwind fence where the airstrip was narrow and cars where parked. The pilot then over-corrected for the drift, straightened up, but forgot to round out. The glider impacted with the ground, ground looping into the boundary fence. The pilot reported that the slow correction for the crosswind was due to the slow roll characteristics of the Skylark.

Main sources of information: Accident details submitted by another operator.

CAA Occurrence Ref 97/3439

ZK-CKG, Jodel D.11, 4 Jul 99 at 12:00, Kaikohe. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 76 yrs, flying hours 6447 total, 410 on type, 0 in last 90 days.

On a local test flight, the aircraft engine failed, and a forced landing was attempted in a paddock not far from the aerodrome. The landing was heavier than normal, and both undercarriage stub axles failed. Resultant damage occurred to the left wing, the propeller and the lower nose cowl. The pilot attributed the engine failure to carburettor icing.

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

CAA Occurrence Ref 99/2233

ZK-CEY, Cessna 172D, 15 Jul 99 at 16:30, Patoka. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 46 yrs, flying hours 480 total, 400 on type, 20 in last 90 days.

The aircraft landed on a slightly downward-sloping airstrip, encountered poor braking owing to early-evening dew, and collided with the fence at the far end of the strip. There was also a slight tailwind at the time.

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

CAA Occurrence Ref 99/2221

ZK-TSD, Piper PA-34-200T, 16 Jul 99 at 10:30, Ashburton Ad. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence CPL (Aeroplane), age 57 yrs, flying hours 6931 total, 1030 on type, 56 in last 90 days.

The aircraft was on a dual exercise for the removal of a multi-engine endorsement. On a practice asymmetric approach to Runway 06 at Ashburton, the training pilot instructed the trainee to carry out an overshoot (with both engines). During the overshoot, the training pilot failed an engine, and the trainee pilot elected to close the throttles and land straight ahead. The aircraft was inadvertently landed wheels-up, sustaining substantial damage to the engines, propellers and undercarriage.

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

CAA Occurrence Ref 99/2106

ZK-RAK, RAF 2000 GTX SE, 14 Sep 99 at 12:00, Tauranga. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence PPL (Aeroplane), age 23 yrs, flying hours 340 total, 15 on type, 15 in last 90 days.

Taxiing after completion of a dual circuit-training sortie, the flying pilot held the stick in an incorrect position for the gusty wind conditions. The aircraft tipped backwards, and then rolled on to its right side, sustaining damage beyond economical repair.

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

CAA Occurrence Ref 99/3815

ZK-FLO, Cessna A152, 16 Sep 99 at 16:28, Ardmore Ad. 2 POB, injuries nil, damage substantial. Nature of flight, flight test. Pilot CAA licence PPL (Aeroplane), age 27 yrs, flying hours 1575 total, 800 on type, 70 in last 90 days.

While the aircraft was on finals for Runway 21, the engine stopped. The aircraft undershot the runway and hit the boundary fence (post and rail). Despite an extensive investigation of the fuel system, no definite cause for the engine failure was determined.

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

CAA Occurrence Ref 99/2699

ZK-DLS, NZ Aerospace FU24-950, 28 Sep 99 at 17:50, Raetihi. 1 POB, injuries nil, aircraft destroyed. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 46 yrs, flying hours 8700 total, 8100 on type, 130 in last 90 days.

The aircraft was taking off on the final sowing sortie, after which the pilot was to return to home base. The pilot reported that, on the takeoff roll, the engine appeared to overspeed and that the aircraft failed to get airborne. It subsequently sank into a shallow gully off the end of the strip. After the accident, one propeller blade was found to be free to rotate about its feathering axis. Metallurgical analysis indicated that the pitch change knob on the subject blade failed as the result of ductile overload. A second pitch change knob was also bent and cracked but had not separated from the blade. The overload sustained by the pitch change knobs was determined to have occurred at impact, not in flight.

No reason was established for the failure to become airborne.

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

CAA Occurrence Ref 99/2831

ZK-RCO, RAF 2000 GTX SE, 20 Oct 99 at 15:00, Tauranga. 2 POB, injuries nil, aircraft destroyed. Nature of flight, private other. Pilot CAA licence CPL (Aeroplane), age 30 yrs, flying hours 260 total, 42 on type, 50 in last 90 days.

The gyrocopter made a normal approach and landing into a 20-knot headwind, but after touchdown was struck by a sudden crosswind gust and rolled over. The aircraft was damaged beyond economical repair.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 99/2946

ZK-KAI, Cessna U206G, 23 Nov 99 at 15:45, Pitt Is. 6 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Aeroplane), age 30 yrs, flying hours 266 total, 56 on type, 26 in last 90 days.

On approach, the aircraft crossed the threshold higher and faster than normal. This resulted in a touchdown further down the strip than anticipated. The aircraft then crossed the formed road (which is at right angles to the strip) and was forced into the air again. The tail area impacted with the road crown, causing skin damage to the rear fuselage.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 99/3398

ZK-AHD, Piper J3C-50, 16 Jan 00 at 12:00, Masterton Ad. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 62 yrs, flying hours 731 total, 35 on type, 13 in last 90 days.

On landing, the aircraft strayed off Runway 06 and hit a hay bale. The aircraft suffered a bent wing and possible spar damage.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 00/44

ZK-AEJ, De Havilland DH 60M Moth, 9 Feb 00 at 14:30, Dargaville Ad. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence ATPL (Aeroplane), age 49 yrs, flying hours 14000 total, 250 on type, 250 in last 90 days.

On approach to Runway 04, the pilot elected to land on the "sealed strip". On touchdown in a slight crosswind, the aeroplane yawed left off the runway crown. The yaw was exacerbated by the crosswind, causing the pilot to lose directional control. The aircraft then ran into a ditch beside the runway.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/300

ZK-ETJ, Cessna A152, 9 Feb 00 at 19:00, Waipukurau. 2 POB, injuries nil, damage minor. Nature of flight, training dual. Pilot CAA licence PPL (Aeroplane), age 32 yrs, flying hours 653 total, 196 on type, 130 in last 90 days.

The aircraft struck a sheep on landing, sustaining minor nosewheel damage.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/343

ZK-CXM, Cessna 177B, 11 Feb 00 at 14:30, Slipper Is. 4 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence CPL (Aeroplane), age 47 yrs, flying hours 413 total, 96 on type, 35 in last 90 days.

On landing, the aircraft encountered a tailwind gust. A go-around was not possible so maximum braking was applied. The aircraft had almost stopped when it contacted a low fence and nudged a small shed. Damage was limited to the engine cowl and left wing's fibreglass tip.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 00/428

ZK-EUF, NZ Aerospace FU24-954, 2 Mar 00 at 15:00, Motunau. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 28 yrs, flying hours 4400 total, 4114 on type, 87 in last 90 days.

The aircraft was spreading lime on a property when it collided with wires in a gully. The impact was taken on the nosewheel, which collapsed back against the fuselage. The pilot flew the aircraft to a suitable field, shut down the engine, and made a forced landing.

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

CAA Occurrence Ref 00/532

ZK-LAY, NZ Aerospace FU24-950M, 10 Mar 00 at 09:30, Te Miro. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 62 yrs, flying hours 26400 total, 20000 on type, 22 in last 90 days.

On the first flight after refuelling, the aircraft was taking off on an uphill strip with a quartering tailwind. The pilot commenced jettisoning the load when he realised he was not going to get airborne. The aircraft collided with a deer fence and a water trough on the lower side of the strip.

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

CAA Occurrence Ref 00/614

ZK-EUH, NZ Aerospace FU24-954, 11 Mar 00 at 13:30, Urenui. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 57 yrs, flying hours 18200 total, 9327 on type, 164 in last 90 days.

The loading vehicle was reversing away from the aeroplane after loading, and collided with the outer leading edge of the tailplane.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/617

ZK-HJS, Hughes 369E, 23 Mar 00 at 06:30, Alexandra. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 48 yrs, flying hours 11256 total, 21 on type, 120 in last 90 days.

The pilot forgot to remove the main rotor tiedown before start. During the start sequence, the tiedown broke, but not before one blade had been distorted. The distorted blade then struck and damaged the tail boom.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/659

ZK-BNM, Piper PA-18-150, 17 Apr 00 at 16:30, Geraldine. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence CPL (Aeroplane), age 32 yrs, flying hours 2390 total, 60 on type, 200 in last 90 days.

The aircraft was configured for a maximum performance takeoff. As the tail lifted off the ground to a level attitude, the pilot applied full aft control column. However, the tail continued to rise until the propeller struck the ground.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/1406

ZK-DIA, Grumman American AA-5, 26 Apr 00 at 14:15, Ardmore Ad. 3 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 55 yrs, flying hours 612 total, 381 on type, 24 in last 90 days.

The aircraft landed heavily, collapsing the nosewheel.

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

CAA Occurrence Ref 00/1165

ZK-HWZ, Rotorway Exec, 25 Jun 00 at 10:40, Waimauku Area. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence CPL (Helicopter), age 47 yrs, flying hours 641 total, 17 on type, 36 in last 90 days.

In the latter stages of a practice autorotation, the student pilot overpitched, resulting in the loss of rotor rpm and subsequent settling with power. The main rotor then struck nearby trees.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/2102

ZK-FGW, Cessna 152, 9 Aug 00 at 14:44, Matakana Is. 2 POB, injuries nil, aircraft destroyed. Nature of flight, training dual. Pilot CAA licence CPL (Aeroplane), age 25 yrs, flying hours 481 total, 221 on type, 87 in last 90 days.

The instructor and student had levelled off at 800 feet after the climb and were about to commence a dual low-flying training exercise when the engine failed. Engine trouble checks were carried out to no avail and a Mayday call was made. The most suitable landing area was the beach but a closer inspection revealed logging debris and driftwood. The decision was made to ditch in the sea as close to the shore as possible. The aircraft flipped in the surf and came to rest inverted by the shoreline.

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

CAA Occurrence Ref 00/2611

ZK-CHQ, Cessna U206, 9 Aug 00 at 17:50, Mercer. 1 POB, injuries nil, damage substantial. Nature of flight, parachuting. Pilot CAA licence ATPL (Aeroplane), age 49 yrs, flying hours 22000 total, 250 on type, 225 in last 90 days.

The pilot lost sight of the runway on short final, in the glare of the setting sun. The aeroplane landed short of the strip, in soft ground, sustaining substantial damage.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/2618

ZK-HEL, Hughes 269C, 10 Aug 00 at 14:00, Kaimanawa Range. 2 POB, injuries nil, aircraft destroyed. Nature of flight, Ferry/positioning. Pilot CAA licence CPL (Helicopter), age 39 yrs, flying hours 2900 total, 525 on type, 14 in last 90 days.

The helicopter was being ferried to Taupo for maintenance. Low cloud and strong winds prevailed over the area, and the pilot was tracking via the Rangitikei River in order to get through. Crossing a saddle, the helicopter encountered severe turbulence, lost rotor rpm and collided with trees on the ridge. It fell 30-40 feet to the ground beneath, but both occupants were uninjured apart from minor scratches. After about an hour,

with worsening weather approaching, they decided to walk out to lower ground and took the ELT with them. They were later rescued by helicopter from a nearby hut.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/2628

ZK-KTB, Cessna 172P, 23 Aug 00 at 14:20, Great Mercury Is. 2 POB, injuries nil, damage minor. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Aeroplane), age 36 yrs, flying hours 1756 total, 1443 on type, 138 in last 90 days.

The aircraft carried out a normal approach to the airstrip at Great Mercury Island. The surface wind was assessed by the pilot from overhead the strip as a light crosswind. During the landing approach, however, the aircraft experienced a series of strong wind gusts causing the wind to back rapidly, which turned the light crosswind into a strong tailwind. The aircraft was committed to the landing and subsequently overran the airstrip, hitting the end fence.

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

CAA Occurrence Ref 00/2776

ZK-JAC, Piper PA-32-260, 22 Sep 00 at 21:00, Masterton. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence CPL (Aeroplane), age 34 yrs, flying hours 1839 total, 21 on type, 112 in last 90 days.

The instructor was giving the student night circuit training instruction. The approach was slightly faster and higher than normal, resulting in a touchdown that left insufficient runway in which to stop. The instructor endeavoured to use the toe brakes from the righthand seat to stop, but these were not fitted to this model of aircraft. She subsequently applied the handbrake. The aircraft went through the fence at the end of the runway, coming to rest on the road.

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

CAA Occurrence Ref 00/3123

ZK-GLZ, Glaser-Dirks DG-200/17, 23 Sep 00 at 13:44, nr Bombay. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age 51 yrs, flying hours 62 total, 13 on type, 20 in last 90 days.

The pilot elected to make an out-landing when he realised he did not have sufficient height to return to the base at Drury. During the landing roll in crosswind conditions, the left wing struck a tree stump.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/4022

ZK-HFT, Hughes 369E, 17 Oct 00 at 12:50, Upukerora. 2 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Helicopter), age 49 yrs, flying hours 12720 total, 8000 on type, 100 in last 90 days.

ZK-HFT had been chartered for an inspection of a slip on the road between The Divide and Homer Tunnel. After completing the inspection and while flying down a valley east of Te Anau, the helicopter had a sudden uncommanded power loss. The pilot entered ZK-HFT into autorotation and attempted to restore power – without success. The pilot completed an autorotational landing, during which the main rotor blades severed the tail boom. The helicopter remained upright after the landing. The pilot and passenger were not injured. The reason for the loss of engine power was not determined.

Main sources of information: Abstract from TAIC Accident Report.

CAA Occurrence Ref 00/3309

ZK-EUC, NZ Aerospace FU24-954, 8 Nov 00 at 12:15, Napier. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 53 yrs, flying hours 16052 total, 11236 on type, 123 in last 90 days.

An increased tailwind component on landing caused the aircraft to overrun the airstrip and collide with a fence post. The aircraft sustained damage to its propeller, left fuel tank, and left outer wing.

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

CAA Occurrence Ref 00/4522

ZK-FYM, Denney Kitfox, 17 Nov 00 at 15:00, Kawhia. 2 POB, injuries 2 minor, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 47 yrs, flying hours 323 total, 122 on type, 20 in last 90 days.

The pilot was looking for an airstrip to land on in the Kawhia area because of the high winds he was experiencing along the Raglan to New Plymouth leg of a cross-country flight. Due to the wind velocity he calculated that he would not have sufficient safe fuel reserves on reaching New Plymouth. He could not, however, locate the airstrip at Kawhia. As he climbed out of the area he experienced severe downdraughts and windshear, which resulted in a forced landing. The aircraft suffered damage to its undercarriage and lower fuselage area.

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

CAA Occurrence Ref 00/3634

ZK-HTY, Schweizer 269C, 24 Nov 00 at 12:25, Crow Hut. 3 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Helicopter), age 26 yrs, flying hours 527 total, 393 on type, 90 in last 90 days.

The pilot had picked up two fishermen with light packs from the Crow Hut helipad (at the junction of the Karamea and Crow Rivers). The wind was a light southerly, although the direction was locally variable at the pad. The pilot lifted to a hover twice to assess the power available, but landed again because of the wind. On the third attempt he achieved a vertical climb to treetop height before transitioning forward. The helicopter began to lose height without loss of rotor rpm, but the pilot was already committed to the takeoff path and could not turn back to the helipad. The machine touched down in the rocky riverbed at low forward speed and rolled on to one side. The ELT did not operate, as the impact forces were minimal. One of the passengers had a mountain radio, with which he was able to contact a base station and report the accident.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 00/3731

GA Defect Incidents

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

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

Key to abbreviations:

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

Cessna 207A – Steering bungee seizes, P/N 1260808-1

Two minutes after departure, the pilot requested a return due to an aircraft controllability problem. The aircraft landed safely and the pilot advised ATC that the aircraft rudder had jammed.

Inspection revealed that the nose steering arm had seized. TTIS 8632 hrs.

ATA 3250 CAA Occurrence Ref 99/2828

Fletcher FU24 – Wing fittings corroded

Exfoliation corrosion was found in wing/fuselage attachments, causing distortion to the adjacent rearward frame on the lefthand side. Both the left and righthand side fittings were subsequently replaced. The corrosion of these fittings only became apparent when the hopper was removed for rectification work on another area of the aircraft.

The maintenance organisation concerned suggests that all agricultural aircraft have their hoppers removed periodically to inspect the structure behind, which cannot normally be seen during routine inspections. It is suggested that agricultural operators amend their maintenance programmes to include the removal of the hopper (in conjunction with other scheduled maintenance) so the structure behind can be fully inspected before an unsafe condition occurs.

ATA 5300 CAA Occurrence Ref 01/3044

The offending wing/fuselage attachment prior to its replacement.

Photographs courtesy of Fieldair Engineering.

Hughes 369D – Brass splined bush loose

During scheduled maintenance, the inner brass-splined bushing P/N 369D 21800-501 on the tail rotor pitch-change fork was found to be loose.

Further investigation revealed that the retaining rivets had worn badly and allowed the bushing to become free to move. Cracking was noted around one rivet hole. It was considered that the inadequate forming of the retaining rivets during manufacture had caused the rivets to become insecure. The defective parts were replaced and the aircraft was returned to service.

ATA 6720 CAA Occurrence Ref 01/1622

Kawasaki-Hughes 369 HS – Tail rotor drive shaft coupling fails

Some of the damage to the failed 369HS tail rotor driveshaft is pictured above.

Photograph courtesy of Skytech Aviation Limited.

The helicopter was recently imported from Japan. It had suffered a tail rotor strike prior to importation and was consequently received minus its tail rotor gearbox assembly and tail rotor blades. An after-tail-rotor-strike inspection was carried out in accordance with the MD Helicopters' HMI (helicopter maintenance inspection). The drive shaft couplings are of the Kamatics type, and they were inspected as per the HMI, which does not indicate that they have to be removed. In this case, the rear drive shaft coupling was removed and inspected, but the forward one was not. It was the forward coupling that failed.

It is strongly recommended that drive shaft couplings be removed for inspection in all cases.

A recommendation will be made to MD Helicopters to amend their HMI to require the couplings to be removed for inspection and scrapped if a tail rotor strike results in the blades being unserviceable.

ATA 6500 CAA Occurrence Ref 01/2501

Robinson R22 Beta – Fuel filter bowl clamp incorrectly fitted

The fuel filter bowl was removed and refitted during routine 50-hour check. However, the next morning it was discovered that all the fuel had leaked onto the hangar floor via a loose filter bowl. This was refitted and double-checked, whereupon it was noticed that one of the clamp legs could remain dislodged from its cavity. If this situation was to remain undetected, the clamp could work itself loose after an engine start thus allowing fuel to drain over the exhaust pipes. The submitter indicates that it is very easy to fit the clamp legs in the wrong place with subsequent visual and feel checks indicating that it appears correctly located.

ATA 8500 CAA Occurrence Ref 99/3703