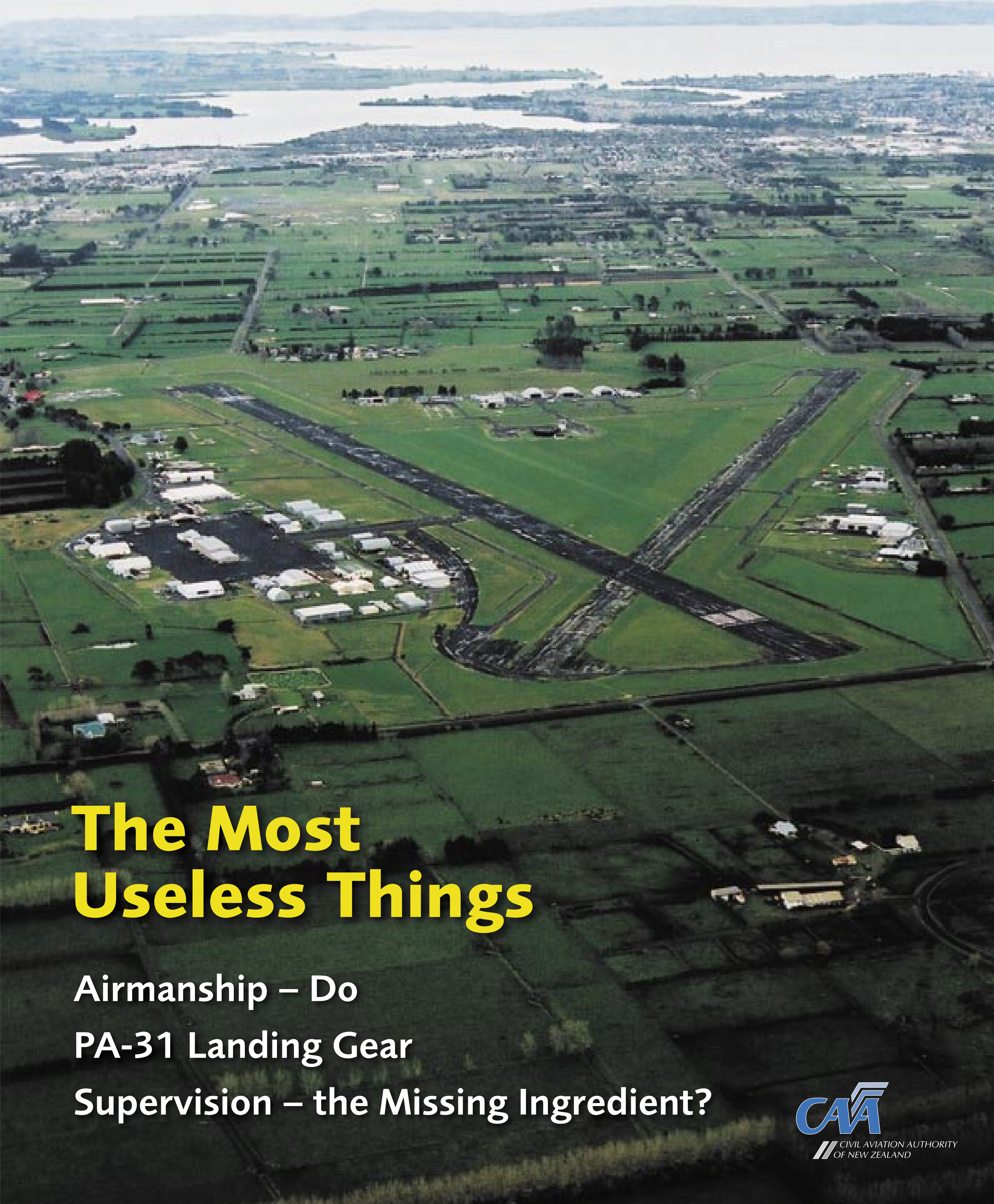
September / October 2003

VECTOR

Pointing to Safer Aviation



The Most Useless Things

Airmanship – Do

PA-31 Landing Gear

Supervision – the Missing Ingredient?

CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND

VECTOR

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What are your chances of survival following a ditching? Are you prepared and would you know what to do? This article looks at some basic preventive measures that can be taken prior to flight to maximise you and your passengers' survival chances.

The final in the series on Airmanship considers the last aspect of the 'Detect' model, Do – the pilot's ability to convert his or her skills, knowledge and decisions into actions.

Bad habits can jeopardise flight safety and may develop over time when a pilot does not receive adequate supervision. They have been responsible for many accidents over the years. Ways to address the most common problem areas are discussed.

The failure of a Piper Navajo landing gear leg to extend has highlighted a possible systems problem when the aircraft is flown with a flat oleo strut. The analysis and recommendations from the recent TAIC accident report are discussed.

ALSO FEATURING

Publications Purchase

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

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: An aerial view of Ardmore aerodrome taken during a recent research visit for a proposed GAP booklet on Auckland airspace.

The Most Useless Things

– Keep Emergency Equipment Accessible –

Recent Ditching Accidents

The pilot of the Piper PA-28 reported an engine failure and advised that he was about to ditch. The aircraft was beyond gliding distance from land at the time. Search and Rescue located the bodies of the occupants the following day. They were found to have drowned after safely vacating the aircraft into rough seas. The aircraft ditched three miles off shore, near the Waipara River mouth.

The planned flight was such that it was not a legal requirement to carry lifejackets and needless to say, none were carried, even though they were made available by the training organisation hiring the aircraft.

The pilot of a Cessna 402C carried out a successful ditching approximately 12 nautical miles south of Invercargill. All the occupants escaped from the aircraft, but four of them were not wearing lifejackets. The pilot re-entered the cabin in order to locate more lifejackets before the aircraft sank. He was unsuccessful. Rescuers reached the scene about an hour after the ditching, only to find that all those without lifejackets had perished, as had a young boy who was wearing one.

The two accidents highlighted above happened relatively recently in New Zealand and in both cases, all of the occupants survived the ditching, only to succumb to drowning while awaiting rescue. Had the victims all been wearing lifejackets, their chances of survival would have been greatly enhanced.

What Are Your Chances of Survival?

Statistics have shown that, overall, the general aviation ditching survival rate is high. In a major US study it was as high as 90 percent, and fatalities were quite rare. Since New Zealand is an island nation, with the Tasman Sea to the west, the Pacific Ocean to the east and the cold waters of the Southern Ocean to the south – not to mention expanses of inland waters – it would seem both good airmanship and common sense to do more than just think about the possibility of having to ditch. Any time we fly over water, beyond gliding distance from land, there is a risk.

Our ability to survive in a hostile environment, whether it is in water or on land is determined before the flight commences. Knowledge and preparation breeds confidence and dispels fear. In order to help increase your knowledge, the CAA has produced a video on marine survival. (A summary of the video is on page 6.) This video can be borrowed from the CAA library or purchased directly from Dove Video. See the video list in this issue for contact details or visit our website (**www.caa.govt.nz**) and look under "**Safety Information – Videos**".

In addition to drawing your attention to the video, this article highlights the need to carry appropriate survival equipment such as liferafts, lifejackets and personal locator beacons, and their stowage in a location and manner that enables easy and rapid deployment when an emergency arises.

Rule 91.525 *Flight over water* spells out the equipment required for over-water flights. When did you last read it, and does your aircraft conform?

Lifejackets

Make sure your aircraft has enough lifejackets for all on board. Always wear your lifejacket when flying over water. There are various types on the market. Perhaps the best are those designed for regular wear, or a quick-donning style. Some constant-wear marine jackets are acceptable – refer to Part 91, Appendix A *Instrument and equipment specifications*, A14 (b).

Attempting to don a lifejacket in the confines of a light aircraft is, at best, an awkward endeavour.

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If the ditching preparations begin at a low altitude, the chances of your passengers being able to get into a conventional airline style life vest in time are almost nil.

Always brief your passengers on the location and use of the lifejackets **before** the flight as part of the standard passenger safety briefing. Never inflate the lifejacket until completely clear of the aircraft. Make sure your passengers know this, because a lifejacket inflated inside the cabin can block egress and may prevent others from escaping.

If possible, attend a marine survival course so that you can better help your passengers, as well as yourself, by becoming familiar with the equipment and its use.

Brief your passengers on the location and use of the lifejackets before the flight – as part of the standard passenger safety briefing.

Liferafts

CAA Rule Requirements

Rule 91.525 tells us that, for single-engine aircraft, or multi-engine aircraft unable to maintain a height of at least 1000 feet amsl with one engine inoperative, on flights of more than 100 NM from shore, there shall be carried:

- sufficient liferafts with buoyancy and rated capacity to accommodate each occupant of the aircraft; and
- a survival locator light on each liferaft; and
- a survival kit, appropriately equipped for the route to be flown, attached to each liferaft; and
- at least one pyrotechnic signalling device on each liferaft; and
- one ELT(S) or one EPIRB.

The liferaft must be secured, and yet be easily accessible.

A pouch-type lifejacket, which can be worn around the waist.

Liferaft Stowage and Operation

If you are contemplating such a flight, then it would pay to become familiar with the aircraft liferaft(s), contents, and use. For example, there is a 90 percent chance that, because of the way it is packed, it will inflate the right way up. But what if you strike one of the 10 percent that don't?

Although a liferaft takes approximately 10 seconds to inflate, you can start getting aboard after just three seconds. Getting wet is the quickest way to cool the human body. The less time you spend in the water, the greater your chances of survival. Also, a liferaft is a much larger target for Search and Rescue to locate. But just getting into a liferaft can use up a lot of energy. Trying it out on a training course can only be of benefit.

If you are carrying a liferaft, it needs to be as accessible as possible. It must be secured, yet be easy to get at. If it goes in the rear baggage compartment, make sure it is on top of the baggage and secured with quick-release tie-downs. All on board should be familiar with how to deploy the liferaft.

Some Inadvertent Inflation Incidents

There have been cases where liferafts have been accidentally inflated in the aircraft. Recently, in the UK, there were two cases where this happened on the ground.

While taxiing, the liferaft inflated, pinning both front seat occupants to the control panel. In the other, inflation occurred when a pilot was doing the 'walk around' and leaned inside the rear compartment, setting off the liferaft. He was pinned to the floor, with just his feet sticking out of the aircraft.

In both cases, the pressure of the liferaft prevented those involved being able to release themselves, and they had to wait for assistance.

In the US, a liferaft was inflated prior to ditching and had to be deflated with a knife, rendering the liferaft useless in the subsequent ditching. Beware of the possibilities of inadvertent liferaft inflation.

Servicing of Emergency Equipment

To be effective, flotation devices should be regularly serviced. Civil Aviation Advisory Circular 43–6 *Emergency equipment* states that, unless otherwise detailed in the manufacturer's procedures, all flotation equipment should be tested as follows:

- Inflation tests should be performed at intervals not exceeding 12 months.
- Flotation equipment should be checked for general condition of the material and seams.

- All items fitted to the equipment, such as strobes, whistles, inflation valves, CO_2 cylinders, etc, should be assessed for their serviceability.
- The packaging of the equipment should be checked to ensure that it provides the equipment with adequate protection against in-service damage.

More Survival Tips

Some right-thinking pilots carry their own survival kit, the contents of which reflect the terrain over which they intend to fly. There are, of course, items generic to any survival situation that should be included, for example, a torch, food, survival blanket, and a first aid kit.

The clothing you wear on the flight can also have a significant effect on your chances of survival. Assuming you have a lifejacket or liferaft to support you, then the more clothing the better. Even wet clothes provide some insulation from the cold. Wet wool retains 50 percent of its insulating properties, wet cotton 10 percent.

If you cross water often, a PLB could be a good investment. A cellphone may be of some value, but unless you have a waterproof cover for it, and are close to a cellphone site, chances are it will not function correctly.

Conclusion

If you do have the misfortune of having to ditch, history has shown that you will have a very good chance of surviving the initial impact. It is most important, therefore, that your pre-flight planning includes making sure that appropriate emergency survival equipment is on board. The equipment should be serviceable and stowed so that it is readily accessible. Before the flight, the passengers must be properly briefed, on where the equipment is stowed and how to deploy it.

When you are adrift in the water, you are on your own, and it's better to have too much survival gear than little or none at all. You can never be too prepared, and you never know when it might happen to you! ■

Abbreviations

ELT(S)	Emergency Locator Transmitter (Survival)
EPIRB	Emergency Position Indicating Radio Beacon
PLB	Personal Locator Beacon

Safety Videos

Here is a list of safety videos made available by CAA. See our web site (**www.caa.govt.nz**) for a synopsis of each title by clicking on "**Safety Information – Videos**". Note the instructions on how to borrow or purchase.

Civil Aviation Authority of New Zealand

Safety Video Series

Title	*Length*	*Year released*
Airframe Icing	26 min	2003
Airspace & the VFR Pilot	45 min	1992
Apron Safety	15 min	1992
Collision Avoidance	21 min	1993
Decisions, Decisions	30 min	1996
Drugs and Flying	14 min	1995
ELBA	15 min	1987
Fatal Impressions	5 min	1995
Fit to Fly?	23 min	1995
Fuel Management	38 min	2002
It's Alright if You Know What You Are Doing – Mountain Flying	32 min	1997
Light Twins	23 min	2001
Marine Survival	42 min	2003
Mark 1 Eyeball	24 min	1993
Mind that Prop/Rotor!	11 min	1994
Momentum and Drag	21 min	1998
Mountain Survival	24 min	2000
On the Ground	21 min	1994
Passenger Briefing	20 min	1992
Radar and the Pilot	20 min	1990
Rotary Tales	10 min	1999
Situational Awareness	15 min	2002
Survival	19 min	2000
Survival – First Aid	26 min	2001
The Final Filter	16 min	1998
To the Rescue	24 min	1996
We're Only Human	21 min	1998
Weight and Balance – Getting it Right	28 min	2000
Wirestrike	15 min	1987
You're On Your Own	15 min	1999

Other titles

All of Us (security awareness)	22 min	2003
Working With Helicopters	8 min	1996*

*re-release date

Civil Aviation Safety Authority, Australia

The Gentle Touch (Making a safe approach and landing)	27 min
Keep it Going (Airworthiness and maintenance)	24 min
Going Too Far (VFR weather decisions)	26 min
Going Ag – Grow (Agricultural operations)	19 min
Going Down (Handling emergencies)	30 min

Outside Productions

These may be borrowed, but not purchased, from CAA.

Mountain Flying (produced by High Country Productions, R D 2, Darfield) 66 min 2000

The CAANZ programmes have been produced over a period of years using three formats, Low-band, SVHS and Betacam. Programmes are being progressively replaced and it is the intention to eventually offer all programmes in Betacam. While the technical quality of some of the earlier videos may not be up to the standard of commercial programmes, the value lies in the safety messages.

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

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

New Videos

Aviation Security

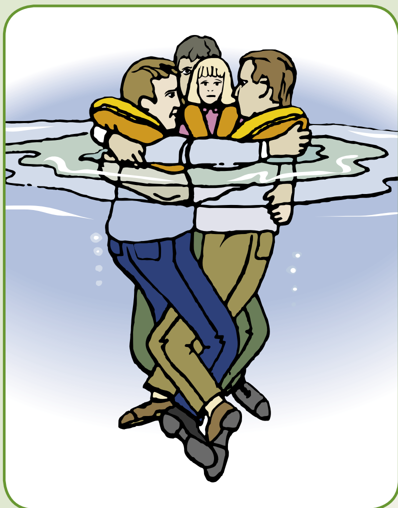
A joint initiative involving five New Zealand airlines, Aviation Security Service, and the Civil Aviation Authority has resulted in the production of an aviation security video entitled *All of Us*. This 22-minute video aims to raise the security awareness of people working in the aviation industry. It promotes the concept that everyone can enhance security by following some basic rules and by developing a security-awareness culture.

The video emphasises the fact that we are not immune from acts of unlawful interference against civil aviation in this part of the world. The harm caused by a major security event in New Zealand (or close to our borders) could have dire consequences for our aviation and tourism industries – and thus the national economy. As an industry, we can not afford to be complacent about security in these uncertain times of international terrorism.

The importance of individual responsibility as well as collective responsibility, in order to minimise the risk of a security event occurring, is stressed.

From airlines to flight training organisations; pilots to cleaners; private owners; aerodrome operators – whatever your business or role, this video contains valuable advice and information that will be relevant to your situation. Ideal for staff induction and refresher training courses, we suggest that you obtain a copy. See the video listings on page 5 for information on borrowing or purchasing this or any other CAA safety video titles.

Marine Survival



The latest title in our safety video series has just been released. As New Zealand is surrounded by sea and has a significant amount of inland water with lakes and rivers, the possibility of having to ditch in the event of an engine failure is not necessarily a remote one. This 42-minute programme, *Marine Survival* encourages you to think about this possibility – prior consideration, knowledge, planning and training are the key to survival in any emergency situation.

The video begins with the planning aspects, looks at emergency equipment such as lifejackets, rafts and suitable clothing, and addresses some myths about ditching. All aspects of the actual ditching are then covered – initial preparation, MAYDAY actions, preparing the cabin, assessing the water conditions, planning the approach (including recommended aircraft configurations and landing direction), and what to expect on touchdown (or splashdown!), followed by tips on vacating the aircraft.

Having achieved all that, one still has to survive in our cold coastal waters – the dangers of hypothermia are discussed, with advice on how to minimise the risk. Mental attitude is also an important factor for survival.

With proper preparation, proper execution and the right survival equipment, ditching can be a relatively safe procedure. Check out this video to improve your chances of success should it ever happen to you.

This video complements previous titles *Survival*, *Mountain Survival* and *Survival – First Aid*.

See the video listings on page 5 for information on borrowing or purchasing any of the safety videos.

A Piel Emeraude, Irish Sea 1991. Photo courtesy of CAA (UK).

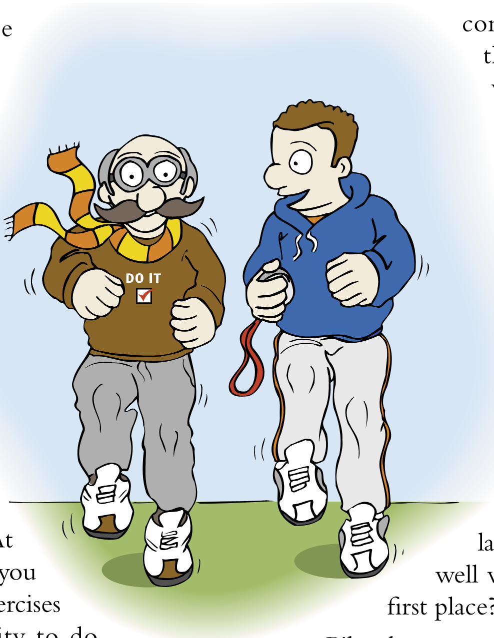
Airmanship – Do

Previous articles in this series have discussed a model of airmanship that can be described by using the catch-phrase 'Detect – Determine – Decide – Discipline – Do'. This article considers the last aspect of the model, Do.

The Ability to Do Things

The model of airmanship we are using has as its ultimate step the ability of the pilot to put into practice the actions deemed necessary as a result of the decision-making process – in short to **do** things. An example we have used before is that of the pilot who notes that the oil pressure has dropped to below normal (good situational awareness, SA) and has decided that a forced landing would be a prudent precaution (good decision making). Unfortunately, the pilot hasn't practised a forced landing since his or her last BFR, nearly two years ago. The aircraft gets too high on approach for the chosen paddock, and just as the pilot starts the go-around the engine finally quits.

This example shows that the rest of the decision-making process can be up to speed, but at the end of the day the safe outcome of the flight often relies on the pilot's ability to put decisions into practice.



Capability and Proficiency

In discussing the ability to do things, we can use the terms capability and proficiency. Capability refers to things that you know how to do, while proficiency is how well you can do them. In the early stages of your flying career you learn how to do basic things, like how to turn, takeoff or land. At the more advanced level, one of the things you learn is how to navigate. As extension exercises you might have developed the capability to do aerobatics or even formation flying. All of these represent different capabilities the pilot can develop.

How well the pilot does these things at any given point in time is measured by proficiency. Proficiency is influenced by three factors:

- How well you were trained to do something in the first place.
- How often you have done it.
- How long since the last time you did it.

These factors are closely interrelated. If you were not well taught, then you will quickly forget how to do something. This is particularly acute if you were taught **how** to do something by rote or mechanically, without understanding **why** you were doing it. If you understand the reason why you need to do something a particular way, then research shows you are much more likely to remember what to do and how to do it.

If you have only done something a few times, then you will quickly lose proficiency. If, however, you have done the same thing many times, then you can have a longer break from doing it before proficiency drops to the same degree. For example, if you are an experienced driver, you can go for months or even years without getting behind the wheel, but still be able to drive reasonably competently. If you are a new driver who has driven only a few times, you would much more quickly lose the ability to drive.

Maintaining Proficiency

What does all this mean for the pilot? During the various "Measuring Up" Av-Kiwi seminars on which these articles are based, a frequent comment from participants – particularly recreational GA pilots – was that they did not consider themselves to be as proficient as they should be. In a typical group, few would feel comfortable about going out and doing a 'no-notice' BFR straight away. How would you feel about doing one tomorrow? If you need to think twice about it, then the chances are that your proficiency is not what it should be.

The things that tend to catch pilots out are the ones they don't get to practise regularly unless they make the effort to do so. A survey of instructors shows the two pure flying elements most likely to be poorly performed on a BFR are forced landings and crosswind landings. When was the last time you practised either of these? How well were you taught how to do them in the first place?

Pilots have a responsibility to ensure that they can perform all the normal and emergency flight manoeuvres to a reasonable standard any time they take to the air. This requires a regular programme of refresher or continuation flying, and a deliberate policy of practising a variety of exercises as often as is required to maintain proficiency.

Flying is not cheap. A number of pilots have commented at seminars that they simply can't afford to fly as often as they would need to maintain a reasonable degree of proficiency. That is an unfortunate fact of life for many aspiring pilots. There is no easy solution to this problem. One thing you can do is ensure that whatever flying you can afford is used as efficiently as possible. Don't waste those precious hours just boring holes in the sky. Look for opportunities to practise your flying skills. For example when landing at your airfield, traffic permitting, why not join via a practice forced landing rather than a standard rejoin. You have to land anyway, they take about the same time to complete, and you get the bonus of a practice forced landing, which one day might save your life. (**Note:** If you are going to conduct a practice forced landing at **any** airfield, **any** time, then please be

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very sure of the local traffic and ensure there is **no** potential for conflict. It would be ironic if your attempts to improve safety by practicing forced landings actually caused an accident or incident because of a traffic conflict.)

If you know you are not as proficient as you should be, then you should either limit the type of flying you do to what you are comfortable with, or get some dual time up to get back to the required level of proficiency. As a worst case scenario, if you really can't afford to fly often enough to maintain a safe standard, then you might have to limit yourself to dual flying only.

You can still have fun going out with an instructor, and, after all, for most of us the reason we fly is for the fun and challenge of it. As the Nike logo says – "**Do It**" – but do it safely and with confidence in your abilities. ■

Supervision – the Missing Ingredient?

Accidents and incidents are seldom due to a single cause. Rather, they are the result of a chain of events. Many years of aircraft accident investigations, and the application of lessons learned from these, have reduced the number of accidents quite dramatically. There is one root cause, however, that has defied all efforts to eliminate it – that cause is human error.

Human error comes in many guises and is as varied as human nature itself. It is probably impossible to eliminate human error, but we can attack various aspects of it, thus reducing the overall size of the problem.

In this article, we will discuss how bad habits can develop over time when pilots do not have adequate supervision.

A Recent Accident

A very recent landing accident, involving a Boeing 757, was caused by the captain having developed the habit of applying full nose-down elevator after main-wheel touchdown, in the belief that this technique would improve control effectiveness and braking action in wet or slippery conditions. The UK Air Accidents Investigation Branch noted "an intrinsic feature of such a habit is the possibility of execution without conscious monitoring." The pilot concerned had over 11,000 hours, with 5,000 hours on type.

Airline pilots have to spend long hours in simulators and have regular flight checks to assess their ability in the air. In spite of this, accidents such as the above continue to happen from time to time. However, because of regular checks and close supervision of airline pilots, accidents are relatively rare at this level.

Without regular and constant supervision, everyone will develop bad habits and lose the sharp edge of their ability.

Quality Supervision

A lack of skilled supervision may be responsible for many of the accidents and incidents suffered by recreational and private pilots.

Supervision is readily available to student pilots during their *ab initio* flight training. The quality of this supervision depends on their flight instructors, and on the standards set by their training organisation.

After student pilots have attained their private pilot licences, they are free to go about their flying without any further supervision – until the next BFR (biennial flight review) and, as we have already said, there is not a pilot in the world who will not develop bad habits as time goes by.

Can We Learn Something from the Military?

While the military still have accidents and incidents, the occurrence rate is far less than in the civil environment.

Perhaps we can benefit by taking a look at how things are done in the military. It is acknowledged, of course, that military pilots undergo a rigorous selection process, and that a great deal of public money is invested in their training. These pilots do benefit, however, from constant and highly skilled supervision of all aspects of their flying.

Somebody makes sure they have been adequately trained before they are required to perform any task. **Somebody** provides them with the best available kit for comfort and survival. **Somebody** closely supervises the many highly trained and skilled men and women, whose job is to make sure that the aircraft are meticulously prepared for each flight. **Somebody** makes sure they are in good health, and fit to fly – by carrying out regular medical checks and by training in aviation medicine. There is even **somebody** whose task is to make sure that pilots are properly fed with a correct diet.

A private pilot, in the civil aviation environment, has to take personal responsibility for all of the above, and many other tasks, if safety is to be assured. Yet the only selection process, if one decides to become a private pilot, is the ability to sign valid cheques for large sums of money. The medical standards are not above normal fitness levels, and there are no educational standards other than the ability to pass some examinations during training.

Complacency

Without regular supervision, all pilots will become complacent about certain aspects of their flying. Let us examine the following thought processes:

- Perhaps the aircraft is your own and nobody else flies it. It was perfectly airworthy when you last flew it, and nothing can have changed while it has been sitting on the ground – so you don't need to do a thorough pre-flight check. **Wrong!!!**
- You have flown out of this strip dozens of times – so you don't need a performance calculation. **Wrong!!!**
- You know the route like the back of your hand – so you don't need a flight plan. **Wrong!!!**
- The weather has been settled for days – so you don't need a forecast. **Wrong!!!**
- Just throw that extra bag in the back – it doesn't look very heavy. **Wrong!!!**
- It'll only take an hour or so to get there – so there's plenty of fuel on board. **Wrong!!!**
- But you'd never do any of those silly things, and this article doesn't apply to you. **Wrong!!!**

All of the above are examples of how pilots can become complacent and neglect, or forget, the basic checks and procedures necessary to assure the safe outcome of each and every flight. If you are totally honest with yourself, you have probably been guilty of at least one of the above transgressions, or something very similar.

So, you ask, why do pilots do these things? Not because they want to kill themselves and their passengers, but probably because they got away with it once and think that it doesn't matter any more.

How long is it since you had a real check flight with an instructor? Not with a mate, but with someone who will demand reasonable standards and tell you so before and after the flight.

Conclusion

Pilots, being human, gradually develop bad habits because they are not being supervised and are not sufficiently disciplining themselves. Nobody can maintain a constantly high standard of piloting ability over a long period of time without being supervised and regularly examined by an instructor, or testing officer.

How about arranging to spend a few hours with a ground instructor revising your aircraft's systems and performance data? Do some practice flight plans and some performance calculations – under supervision. Why not go the whole hog, and have an hour in the air with an instructor, to revise whatever aspects of your flying most need attention? There are two kinds of pilots who require supervised revision of their skills – those who fly irregularly – and those who fly regularly.

Supervision will improve your flying, sharpen your piloting skills, and remind you to maintain your standards. ■

This article was contributed by John Stewart-Smith. John was the editor of the United Kingdom General Aviation Safety Council's publication *The Flight Safety Bulletin*. He trained as a pilot with the RAF, graduating as a qualified flying instructor and a test pilot. John also completed his UK ATPL examinations. Retiring with 12,000 hours flying experience on about 150 aircraft types, John still maintains an active interest in aviation. He sits on the board of General Aviation CHIRP (Confidential Human Factors Incident Reporting Programme) covering all United Kingdom aircrew, air traffic controllers and aircraft engineers.

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

Planning an Aviation Event?

Do you have a significant event or airshow coming up soon? If so, you need to have the details published in an AIP *Supplement* rather than relying on a NOTAM. (Refer to AC 91–1 *Aviation Events* for operational requirements.) The information must be promulgated in a timely manner, and should be submitted to the CAA with adequate notice. Please send the relevant details to the CAA (ATS Approvals Officer or AIS Coordinator) at least one week before the appropriate cut-off date indicated below.

Supplement Cycle	*Supplement* Cut-off Date (with graphic)	*Supplement* Cut-off Date (text only)	*Supplement* Effective Date
03/12	25 Sep 03	2 Oct 03	27 Nov 03
03/13	23 Oct 03	30 Oct 03	25 Dec 03
04/01	13 Nov 03	20 Nov 03	22 Jan 04

Check Those Changes

As a result of the nation-wide airspace review in 2002, a large number of new Mandatory Broadcast Zones (MBZs) and Special Procedure Areas (SPAs) were established. This was largely due to the disestablishment of all Approach Conditional Areas (ACAs) and Aerodrome Traffic Zones (ATZs). These changes came into effect on 20 March this year and were timed to coincide with the release of the new Visual Navigation Charts (VNCs). The changes were promulgated in the March 2003 edition of the AIP *Supplement*.

Unfortunately, a number of pilots are still unaware of the changes and have been transiting through MBZs and SPAs without transmitting their intentions to local traffic. This is usually because they do not realise that the new airspace exists, that the dimensions of the old airspace have been altered, or that there has been a radio frequency change. Note that several aerodrome and MBZ frequencies have recently changed – see the accompanying table for details.

The Kaikoura MBZ has been a particular problem, with aircraft transiting through the busy whale-watch area completely unannounced – most often because the pilot was on the wrong frequency. This particular area involves both rotary and fixed-wing aircraft carrying out scenic operations orbiting overhead whales. The last thing local operators want is for an itinerant aircraft to turn up unannounced and pose a collision hazard.

A further problem area has been that of enroute traffic transiting through unattended aerodrome circuits, or coming uncomfortably close to them, completely unannounced – the dangers of which need no further elaboration. The pilots of these aircraft were either on the wrong radio frequency at the time, or were unaware of the aerodrome's existence. It is only a matter of time before a serious mid-air incident occurs if this practice continues.

Maintaining an awareness of where unattended aerodromes along the route lie, and making the appropriate position reports on the promulgated frequency, is good airmanship. All of this information is clearly marked on the area VNC.

This general lack of awareness can be attributed to pilots not having the appropriate up-to-date VNCs and AIP *Supplements*, and to inadequate pre-flight planning. Obtaining, and carefully studying, all this information prior to flight is always going to be the key to avoiding an embarrassing or potentially dangerous incident.

Details of the changes can be viewed by visiting the NZ Air Navigation Register on CAA web site, **www.caa.govt.nz**, and looking under "**Airspace – Permanent Airspace**". The accompanying table summarises the most significant aspects of these changes and has been provided as a quick reference.

Note that, when operating within an MBZ, it is a CAA rule requirement to monitor the promulgated frequency, make regular position reports on that frequency (normally every five minutes), and to activate landing or anti-collision lights. These requirements are not mandatory when within an SPA, but pilots are strongly advised to abide by them in the interests of safety. ■

Summary of New MBZs and SPAs

Disestablished	Established
NZC111, Kaitaia ACA	NZC115, Kaitaia MBZ, (119.1 MHz, 5 min)
NZC112 & NZC113, Kerikeri ACAs	NZC116, Kerikeri MBZ (119.4* MHz, 5 min)
NZC114, Whangarei MBZ	NZC117, Whangarei MBZ (118.6 MHz, 5 min)
	Rodney VFR SPA (118.0 MHz)
NZZ172, North Shore ATZ	North Shore VFR SPA (118.0 MHz)
NZC118, Auckland City MBZ	NZC110, Auckland City MBZ (120.4 MHz, 10 min)
	Hauraki Gulf VFR SPA (120.4* MHz)
	NZC119, Great Barrier MBZ (124.4 MHz, 10 min)
NZC213, Whakatane ACA	NZC216, Whakatane MBZ (118.6 MHz, 5 min)
NZC410, Tarawera MBZ	NZC411, Tarawera MBZ (120.9 MHz, 15 min)
NZC414, Wairoa ACA	NZC415, Wairoa MBZ (119.1 MHz, 5 min)
NZZ376, Feilding ATZ	Feilding VFR SPA (119.1 MHz)
NZZ377, Fox Pine ATZ	Fox Pine VFR SPA (119.1 MHz)
	Marlborough VFR SPA (123.0 MHz)
NZC811, Kaikoura MBZ (119.1 MHz)	NZC811, Kaikoura MBZ (124.9* MHz, 10 min)
NZZ875, West Melton ATZ	NZC812, West Melton MBZ (119.2 MHz, 5 min)
NZC910, Timaru ACA	NZC911, Temuka MBZ (119.5 MHz, 5 min)
NZC710 & NZC711, Westport ACAs	NZC715, Westport MBZ (119.1 MHz, 5 min)
NZC713 & NZC714, Hokitika ACAs	NZC716, Hokitika MBZ (119.1 MHz, 5 min)
	NZC718 Ryans Creek MBZ (130.2 MHz, 5 min)
	Stewart Island VFR SPA (118.5 MHz)

* Frequency Change

PA-31 Landing Gear

Photographs courtesy of TAIC.

The Incident

The pilot of a Piper PA-31-310 Navajo conducting an early-morning freight flight from Palmerston North had to make an emergency landing at Napier, because the righthand landing gear leg was unable to be extended.

Nothing abnormal was found during the pre-flight inspection of the aircraft, and it had been fuelled the previous night for an endurance of four hours.

After a normal takeoff, the aircraft was flown to Napier at 8000 feet. The pilot reported appreciable turbulence while crossing the Ruahine mountain range. On arrival over Napier at about 05:30 NZST, the pilot elected to make a visual approach for Runway 34. Napier airport was not attended by air traffic control or rescue fire service at that time. When gear DOWN was selected, the gear position indicator illuminated two green lights only (instead of the normal three), with the red 'gear unsafe' light remaining on.

The pilot continued the approach to the runway, where he made a touch-and-go to check the landing gear in contact with the tarmac. He discovered that his righthand wing dropped further than normal, so he climbed the aircraft away. The pilot then contacted a second company pilot by radio and asked him to inspect the landing gear from the ground while the aircraft was flown low over the runway. The second pilot reported that the righthand landing gear door was down, but the gear itself was not extended. The inspection was repeated shortly afterwards with better ground illumination, when the Napier Airport Fire Service came on watch, and this confirmed the previous report.

The pilot held the aircraft out to the east of Napier for 90 minutes awaiting daylight, and during this time he completed the "abnormal landing gear procedures" from the aircraft Flight Manual, but without success. He also contacted his maintenance engineer, who consulted the Piper Navajo Service Manual in order to advise how to rectify the problem. The engineer concluded that the up-lock mechanism would be holding the landing gear up, and suggested trying to lower the gear during a negative-G manoeuvre. This was tried, again without success.

After daylight, and with Napier Tower now on watch, the pilot landed into wind on the grass along the southern side of sealed Runway 25. He landed the aircraft with the left main and nose landing gear extended. The aircraft was kept straight, with the wing held up until late in the landing roll. When the righthand wing dropped, the aircraft slewed through almost 180 degrees before stopping.

"When gear DOWN was selected, the gear position indicator illuminated two green lights only..."

Aircraft Information

A review of the aircraft's records indicated that all routine and normal maintenance had been completed in accordance with the Operator's Maintenance Manual.

The PA-31 has a retractable tricycle landing gear, which incorporates normal oleo (air/oil) suspension struts. Retraction and extension is achieved by a hydraulic system, which is pressurised by engine-driven pumps. The main gear legs retract inboard into each wing, where they are enclosed by doors. When the legs are retracted, they are suspended in a horizontal position by mechanical up-

Continued over ...

Landing gear retracted showing the up-lock hook holding the gear leg up.

... continued from previous page

lock hooks. When gear DOWN is selected, hydraulic pressure is first applied to the inboard doors to open them, and then pressure is applied to the landing gear actuators. The first movement of the actuator rotates the up-lock hook back to release the leg, which is then free to extend. Full actuator travel completes the extension and locks the leg in the DOWN position.

Aircraft Examination

When the aircraft was jacked up, the righthand wheel assembly could be easily lifted, indicating that no pressure remained in the oleo strut. No fluid leaks were evident, except for the inboard door ram, which had a broken hydraulic fitting consistent with the damage incurred by the door on landing.

Detailed examination of the righthand landing gear components revealed two frames within the wing wheel bay had fresh marks and minor damage. Matching witness marks were found on the upper scissor-link (connecting the upper and lower leg parts to allow the strut suspension movement while preventing rotation) and on the lower leg casting.

While the righthand gear leg was retracted and suspended on the up-lock hook, the oleo strut was compressed by hand to the extent allowed by the movement of the hook against its spring. This strut compression was easily accomplished, and it brought the matching witness marks together within the wheel bay. With the strut so compressed, gear DOWN was selected to no avail. The lefthand and nose legs extended normally, but the righthand leg could not be released by the up-lock hook, since all the hook travel had already been taken up by the compressed strut. When the oleo strut was decompressed by hand to its normal position, the righthand leg could then be extended.

The right gear leg was then removed for examination. It was first re-pressurised, and was found to hold pressure normally. Internal examination of the oleo strut generally showed components to be in good condition, but the O-ring seal in the lower bearing had rolled over within its groove, and was probably the cause of the loss of pressure in the strut. A quantity of oil (0.82 litres) was drained from the strut, whereas subsequent refilling on return to service, took 1.6 litres of oil.

Landing gear extended – oleo strut inflated.

Landing gear extended – flat oleo strut. NB scissor link circled.

Other Information

A search was made of accident and incident databases in the USA, the UK and New Zealand, for similar occurrences involving PA-31 landing gear extension failures. Although a number of such events had been reported with a variety of causes attributed to them, none had previously identified a flat oleo strut as a causal factor.

The PA-31 type first flew in 1962, and several thousand aircraft, including later variants, have been in service worldwide, mostly in commuter airline or charter operations. Additionally, the PA-31T and PA-42 types use a similar landing gear design.

The flat oleo strut scenario was not analysed or tested during the original certification of the landing gear retraction system.

Analysis

The Transport Accident Investigation Commission (TAIC) report said that the initial action taken by the pilot, in establishing that the righthand landing gear leg had not extended, by doing a touch-and-go after getting a 'gear unsafe' indication, was "probably not the best practice in the circumstances." This action, combined with reduced visual cues at night, could have led to an unintended ground contact and loss of control.

The pilot's subsequent actions, however, were reasonable. He called for ground assistance to visually confirm the problem, and he sought advice from his maintenance engineer. His decision to land the aircraft into wind (enabling a landing at minimum groundspeed), and his election to land on the lefthand main and nose gear, rather than on the aircraft's belly, probably minimised the damage incurred by the aircraft on this occasion. We at *Vector* believe that, in circumstances such as these, landing on a sealed runway with the landing gear fully retracted could be a safer option.

During subsequent examination of the aircraft, the tests which replicated the compressed strut condition showed that this occurrence defeated the ability of the up-lock hook to release the leg during the landing gear extension cycle, unless the strut could be returned to its normal full length.

Several possibilities could have contributed to the strut becoming compressed while it was suspended horizontally by the hook:

- The turbulence reported on the flight might have produced an outboard force on the wheel and lower leg, tending to compress the strut.
- The action of the up-lock hook, at the start of the extension cycle, is to move back in the direction of compressing the strut. The strut pressure normally reacts against this movement, allowing the hook to release the leg. Without internal pressure, the strut might have become compressed instead.
- Tests showed that the strut had resealed, and it was able to hold pressure normally afterwards. If the strut had lost pressure during the flight at 8000 feet to equalise with the outside air pressure at that altitude, and had then resealed before or during the descent – perhaps as a result of internal fluid movement – it could have developed a small negative pressure at low altitude, which would have tended to compress it.

Conclusion

It appears that this occurrence is the first time a flat oleo strut has been identified as a major factor in a landing gear failure-to-extend event involving a PA-31 aircraft. It is possible, in view of the findings of the TAIC report on this accident, that some of the earlier mishaps could have been misidentified as being caused by some other mechanical defect.

Internal examination of the oleo strut involved showed that the probable cause of the pressure loss was the O-ring seal in the lower bearing rolling over within its groove. It is possible that the low oil level contributed to the O-ring rollover, by allowing it to become dry.

Recommendations

- Any PA-31 pilot facing a similar landing gear hang-up problem could try climbing the aircraft back to cruise altitude or higher (where any negative internal pressure in the oleo strut would be cancelled) before again attempting to lower the gear.
- Should it be necessary to ferry a PA-31 aircraft to a maintenance base with a known flat oleo strut, then retracting the landing gear should be avoided.
- It is recommended that operators of PA-31 aircraft, and their maintenance personnel, give consideration to whether additional routine servicing might be warranted, to guard against the possible effects on landing gear extension of low oleo strut oil levels. ■

Flight Plan Overdues Update

We give further feedback on the campaign to reduce the number of flight plans going overdue.

VFR Overdues Statistics

Total plans filed and percentage overdue

2003	March	April	May	Jun	Jul	Aug
Number filed	2021	2175	1665	1468	1872	1661
Number overdue	209	219	156	119	163	133
Percentage overdue	10.3%	10.1%	9.4%	8.1%	8.7%	8%

The slight improvement in the number of flight plans going overdue in recent months is being sustained, but there is plenty of scope for further improvement.

Statistics from the National Briefing Office show that from a steady 10 percent from February to April, there was a reduction to nine percent in May, eight percent in June, a slight rise to almost nine percent in July, and back to eight percent in August.

Please keep up the good work, and make a conscious sustained effort to **update your SARTIME** as required and to **terminate your flight plan** at the end of the flight.

To help you remember, your local CAA Field Safety Adviser or flight training organisation has available stickers and posters spelling out the message "Amend SARTIME or Terminate Flight Plan".

A large sticker (148 x 105 mm) is a memory jogger for locations that pilots are likely to frequent after a flight, eg, toilet, kitchen, reception area or hangar. A smaller sticker (74 x 53 mm) contains the same information but can be placed on items like the AIP, flight-log clipboard, aircraft dashboard or door. Both stickers are of the non-permanent variety so will not damage the surface underneath.

Let us try to drop at least another percent in the next two months. Safe flying! ■

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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.

Overdue Flight Plans

Vector (Jul/Aug page13) raises the important point of the need to terminate and amend flight plans. Notably, the greatest number of 'transgressors' is in the "Other" category although "Clubs" and "Private Operators" are not too flash either! "Flying Schools" do the best. The message is that flying schools have a system. The CAA/Airways initiative of posters and things will help. **But we all need a system.** What's yours?

In passing, I would have thought the **first** thing the Flight Information Service (FIS) would do for an 'overdue' is phone the operator. Certainly not launch an Orion! Fines for miscreants might have a salutary effect too – and defray costs incurred.

However, before we get the cart too much in front of the horse on this issue, what concerns me as much as not terminating is what is going to happen if I have another sort of 'termination' – a prang! I am not enthralled with the prospects.

First, nobody is going to do much at all until my SARTIME. So I could be freezing 'down' in the bush, mountains or water for **hours** before anything happens.

Second, because the folk in the FIS are working like proverbial one arm paper hangers they are not that keen/able to receive position reports (which rather sensibly we used to have to make every 30 minutes) and probably don't 'log' them anyway.

Third, because the FIS frequencies are so clogged (often with irrelevancies) my chances of getting out a MAYDAY are zip.

So none of those systems is going to do much for my 'salvation'.

Which leaves ELTs. A topical topic. They don't always work. Many don't work in water. They have to be located. And if they are the 'bottom line' (no pun intended) why bother about flight plans at all?

There are operators in NZ that have excellent flight-following systems. It seems bit odd to me that CAA/Airways doesn't.

How does *Vector'* see it?

John Clements
North Shore Helicopter Training
July 2003

Vector Comment

Thank you for your letter on what is an important area of flight safety.

We referred it to John McKenzie, Manager of the National Briefing Office (NBO), for comment:

> I can assure the correspondent that contacting the operator is definitely one of the checks that are carried out by NBO staff before alerting the NRCC.
>
> I am also not sure why a pilot needs to have SARTIME set hours in advance. These days the SARTIME can be changed as often as is required for no extra cost.
>
> FIS staff are busy at times and we are all frustrated by RTF congestion, but their job is to record position reports and **every** single one is recorded for future reference should search and rescue action be required.
>
> I have no doubt at all that a MAYDAY call will 'get through' even when the frequencies are busy, or even if it is on relay from another aircraft.
>
> Flight plans are voluntary and some operators do have their own flight following systems, but I can assure you that if you file a flight plan with the NBO you will receive the services you are due and they will contribute to your 'salvation'.

We at *Vector* believe that while the current VFR flight plan system will never be as comprehensive as the old proactive one, it is nevertheless a safe and efficient service when used correctly.

The format of the VFR flight plan allows the user to enter a great deal of supplementary information (eg, all flight-planned route waypoints, survival equipment carried, cellphone number, aircraft markings, etc) that will be useful in a search and rescue (SAR) situation. Clearly, the SARTIME can be set ahead to a time which affords a SAR response time that the pilot is comfortable with.

With regard to your comments on the usefulness of ELTs in SAR situations, it is agreed that over-reliance on ELTs as the first indication of a possible emergency should be avoided for the reasons that you give. Filing a flight plan should **always** be the primary means by which SAR action will be initiated – hoping that the ELT will activate and that the signal will be located is not good enough.

The correct use of the flight plan and SARTIME procedures, supplemented by sensible use of the radio for position reporting, should ensure that any emergency service alerting and response is timely, appropriate and effective.

The ELT represents the ambulance at the bottom of the cliff. There are many sensible things that can be done to ensure that the fence at the top of the cliff is in good condition and likely to keep you out of harm's way. The correct use of flight plans and SARTIME are two such things.

PNR Calculations

Your article on PNR calculation in the July/August 2003 issue of *Vector* is very good and worthy of clipping and keeping handy to the flight planning folder. It is worthy of adding to my flight planning log.

However, from a mathematical viewpoint there are a couple of inaccuracies that I would like to point out, and I also offer a better alternative for your consideration:

The first line of the formula as published is: $X=POH/O+H$

This should be: $X=POH/(O+H)$

The error is also repeated further down the article where the values are substituted. While multiplication symbols are implied between the symbols **P, O** and **H**, they are not included, and this seems to be an error of omission.

The first bulleted note at the bottom of the left hand column is good, but irrespective of what velocity units are used (and it seems to be inconceivable that kph or mph would be used in aviation) the time needs to always be expressed in decimal format – not just when the velocity is in knots – as the note implies.

Suggested Improvement

Velocities are best represented in mathematics and in aviation using the symbol "**V**", eg, $\mathbf{V_{NE}}$, etc.

Within aviation I have become more used to the terms outbound for the outward leg and inbound for the inward leg, rather than homeward leg.

Can I therefore suggest an amendment to the formula as below:

$$X_{PNR} = \frac{\text{Endurance} \times V_O \times V_I}{(V_O + V_I)}$$

While this may be slightly harder to format in an article, it seems to add value to have it both mathematically correct, and to use symbols that are more relevant to aviation and that are easier to remember.

This formula can be used without any need to define at length the symbols as they are pretty much self explanatory.

Graeme Culling
Christchurch
August 2003

Vector Comment

Thank you for your letter regarding the PNR article. You are quite right – the formula as written is not correct. In the original draft of the article it was written as:

$$X_{PNR} = \frac{POH}{O+H}$$

The process of editing the article for print resulted in it being changed – for the numbers to make sense, the denominator had to be **(O+H)**. Our mistake – well spotted! Some readers may have picked up the error by working through the examples given in the article.

The point about using endurance in decimals was for the benefit of pilots who might be more used to calculating endurances in minutes – some do. The formula still works, but the speeds then have to be in miles per minute, rather than miles per hour.

A number of texts were referred to in preparing the article. In these the terms 'outbound' and 'inbound' were not used, but rather 'outwards' or 'homewards'. It may be that the latter terms are historical ones used by navigators of old, which have continued in use today. It is also possible that the terms have been deliberately retained to avoid potential confusion with the specific meanings that outbound and inbound have during instrument approach procedures.

The omission of the multiplication signs is fairly common in algebraic calculations so should not have caused aviators any confusion. The most common example would be the formula $\mathbf{L = C_L \frac{1}{2} \rho V^2 S}$, which is universally written without any multiplication signs.

Having said all that, *Vector* would encourage pilots to calculate PNR in whichever way suits them. The way you have suggested is certainly less likely to be confused and some readers may prefer it.

Thanks for your letter, and our apologies to any readers who may have been confused by the article.

Pitot-Static Systems

The July/August 2003 issue of *Vector* provided some good technical explanations about the effects of blocked static sources. It has been my observation that many GA aircraft have their static port plates painted over because they have not been masked off properly prior to the aircraft being painted. Paint can enter the static port and cause a restriction, which can disrupt the airflow and cause possible irregularities in the static pressure to the flight instruments.

The static port plates are supposed to remain unpainted, polished and clean to provide an undisturbed airflow to the static port.

It is worthwhile taking the extra time to fit static port and/or pitot head covers to prevent dust, dirt and even insects from entering the system and causing blockages – especially if the aircraft is normally parked in a dusty environment. (Note that static port plugs are normally used only on larger aircraft.) These covers and plugs should have red flags attached to attract attention, and pilots should be trained to remove them during the pre-flight walk around.

Having said all this, if you are unfortunate enough to inadvertently get airborne with the pitot head cover still fitted (which I have seen done), then it is useful to get another aircraft to formate on you and provide airspeed readings over the radio during the landing approach.

Peter Kirker
Wellington
August 2003

Vector Comment

Thank you Peter for your comments.

There are a few additional points that we would like to make, however, with regard to getting airborne with the pitot head cover fitted or a pitot-static blockage. Although such a scenario is reasonably unlikely, (one *Vector* editor, however, has had the experience of landing with an unserviceable ASI after flying through heavy rain) it pays to think about how it should best be handled.

- There is no excuse for getting airborne with the pitot head cover on. Airspeed should **always** be checked early on during the takeoff roll and the takeoff aborted if an erroneous reading is observed.
- If you have got airborne with the cover on, then a slightly-lower-than-normal nose attitude should be maintained during the climb out. An increased awareness of the symptoms of the stall is also important.
- Getting an aircraft to formate on you can be a dangerous option if both pilots do not have formation experience. All pilots should have reasonable judgement of nose attitude vs power and flap setting to maintain a particular airspeed on approach – sometimes they just don't realise it! Remember your instructor emphasising setting the power and the correct nose attitude, and **then** check the airspeed indicator and make adjustments as necessary? With an unserviceable ASI, use a slightly lower nose attitude than normal to add a safety margin, but remember that a longer landing distance will be required at a higher-than-normal airspeed.

Being able to fly an aircraft at appropriate airspeeds using nose attitude and power setting is a skill that requires regular practice. When was the last time that you flew a circuit without reference to instruments?

If it has been a while, we suggest that you incorporate a couple of non-instrument circuits into your next BFR (or, if you belong to an aero club, enter the next non-instrument flying competition.) ■

OCCURRENCE BRIEFS

Lessons for Safer Aviation

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

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

Accidents

The pilot-in-command of an aircraft involved in an accident is required by the Civil Aviation Act to notify the Civil Aviation Authority "as soon as practicable", unless prevented by injury, in which case responsibility falls on the aircraft operator. The CAA has a dedicated telephone number 0508 ACCIDENT (0508 222 433) for this purpose. Follow-up details of accidents should normally be submitted on Form CAA 005 to the CAA Safety Investigation Unit.

Some accidents are investigated by the Transport Accident Investigation Commission, and it is the CAA's responsibility to notify TAIC of all accidents. The reports which follow are the results of either CAA or TAIC investigations. Full TAIC accident reports are available on the TAIC web site **www.taic.org.nz**.

ZK-MAT, NZ Aerospace FU24-950, 23 Dec 01 at 14:30, Hukerenui. 1 POB, injuries 1 fatal, aircraft destroyed. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 39 yrs, flying hours 1516 total, 1262 on type, 161 in last 90 days.

The aircraft took off with a load of lime and entered the sowing area, which was a valley system in hilly terrain. It is likely that the pilot experienced a 'hung load' as the lime was moisture-contaminated, so he elected to dump the load as he was in a cul-de-sac valley system. The load, however, would not jettison, and he tried bunting manoeuvres to release it without success. The aircraft struck a tree before impacting the ground and catching fire.

A full report is available on the CAA web site.

Main sources of information: CAA field investigation.

CAA Occurrence Ref 01/4194

ZK-HRV, Hughes 369D, 30 Apr 02 at 16:30, Mt Tarawera/Rotorua. 4 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Helicopter), age 34 yrs, flying hours 164 total, 27 on type, 52 in last 90 days.

On Tuesday 30 April 2002, at about 1630, New Zealand Helicopters Hughes 369D helicopter ZK-HRV was being flown on a scenic passenger flight from Mount Tarawera to the company base near Rotorua when engine trouble arose. Before the pilot could land the helicopter, the engine failed and he was forced to make an autorotational landing on difficult terrain, where the helicopter rolled over. None of the four occupants were injured in the accident.

The engine failed from oil starvation, following a fracture of a fitting in the oil line to the torque gauge.

A safety issue identified was the need for pilots and operators to better understand the torque gauge oil line system on this helicopter type.

Main sources of information: Abstract from TAIC report 02-005.

CAA Occurrence Ref 02/1314

ZK-IAD, Bell 206B, 21 Jul 02 at 16:10, Kaipara Flats. 1 POB, injuries 1 minor, damage substantial. Nature of flight, training solo. Pilot CAA licence nil, age 52 yrs, flying hours 60 total, 41 on type, 41 in last 90 days.

The pilot was a director of the company that owned the helicopter, and had been learning to fly it under the auspices of a helicopter-training organisation. When the helicopter was to be used on company business, the pilot would fly with an instructor and gain experience. Interspersed with these flights were normal lessons, with the pilot working towards his PPL(H).

On the day of the accident, the pilot and his instructor flew the helicopter to Kaipara Flats Aerodrome, where some hover and circuit work was performed. The instructor assessed the pilot as ready for his first solo flight, and having briefed him on the required exercises (informally) and the fact there would be a significant weight difference, vacated the aircraft.

The pilot accelerated the rotor to its normal rpm, and began applying collective pitch to bring the machine to a hover. Before the helicopter left the ground, it rolled abruptly to the right, and the main rotor struck the ground and was destroyed. The pilot was assisted from the cabin by the instructor, and found that he had received a cut to the head in the accident sequence.

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

CAA Occurrence Ref 02/2193

ZK-KLB, Cessna 337A, 18 Aug 02 at 19:00, Whenuapai. 4 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence ATPL (Aeroplane), age 41 yrs, flying hours 13705 total, 9 on type, 180 in last 90 days.

The aircraft was engaged in a circuit training exercise when the landing gear failed to extend. The aircraft was flown to a more suitable aerodrome, where a wheels-up emergency landing was successfully completed.

Engineering inspection found that taper pins in the landing gear torque tube drive assembly had failed.

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

CAA Occurrence Ref 02/2470

ZK-GCY, Slingsby T.50 Skylark 4, 21 Dec 02 at 13:45, Inglewood. 1 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 36 yrs, flying hours unknown.

The glider clipped a fence post while on final approach to land, shearing 25 centimetres off one of its wingtips.

Main sources of information: Accident details submitted by NRCC.

CAA Occurrence Ref 02/3724

ZK-DXI, Cessna 172M, 21 Jan 03 at 10:00, Brynderwyn Hills. 1 POB, injuries nil, damage substantial. Nature of flight, private other.
Pilot CAA licence PPL (Aeroplane), age 37 yrs, flying hours 551 total, 164 on type, 1 in last 90 days.

The aircraft was on a solo cross-country flight from Whangarei to North Shore aerodrome when the pilot experienced an engine failure approaching the Brynderwyn hills.

The pilot chose a hillside site to forced land on. During touchdown, the aircraft bounced off a hump in the paddock and then impacted a second hump, which caused it to flip over onto its back.

The cause of the engine failure could not be determined. The possibility of carburettor icing could not be ruled out.

Main sources of information: CAA field investigation plus accident details submitted by pilot and operator.

CAA Occurrence Ref 03/130

ZK-HRX, Schweizer 269C, 4 Feb 03 at 10:30, Kaimanawa Ranges. 3 POB, injuries 2 serious, 1 minor, aircraft destroyed. Nature of flight, private other. Pilot CAA licence CPL (Helicopter), age 40 yrs, flying hours 850 total, 850 on type, 20 in last 90 days.

The pilot was carrying out a demonstration flight for a potential client and intended to land on a peak in the Kaimanawa Ranges. The pilot reported that on approach he misjudged the wind direction, and the helicopter struck the ground prematurely with sufficient forward speed to cause it to nose over.

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

CAA Occurrence Ref 03/258

ZK-JFN, Zenair Zodiac 601 UL, 11 Feb 03 at 12:30, Mesopotamia Station. 1 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence nil, age 71 yrs, flying hours 817 total, 525 on type, 26 in last 90 days.

The pilot was caught out by a sudden turbulent gust while landing, which caused the aircraft to drift sideways and bend its landing gear. Despite this, the pilot still managed to steer the aircraft clear of a fence. Damage was limited to the landing gear, the propeller, and minor skin damage to the wing.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 03/353

ZK-CMW, Cessna 185B, 15 Mar 03 at 15:45, Whakatane. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 52 yrs, flying hours 426 total, 152 on type, 21 in last 90 days.

After carrying out a standard overhead join, the pilot made an approach to sealed Runway 27, touching down close to the threshold. After a landing roll of approximately 450 metres, the pilot applied the brakes, at which point the aircraft veered to the left. Additional pressure was applied to the right brake in an attempt to keep the aircraft straight. The pilot reported that because of the extra braking the aircraft decelerated more quickly than expected, and as it was coming to a halt, it slowly tipped forward and finished up on its back in the middle of the runway.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 03/737

ZK-HSB, Sikorsky S-55B, 26 Mar 03 at 07:30, nr L Waikaremoana. 1 POB, injuries nil, damage minor. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 67 yrs, flying hours 13000 total, 600 on type, 20 in last 90 days.

As the pilot was approaching the landing area, the engine appeared to lose power, resulting in an undershoot and a landing on sloping ground. The left front undercarriage assembly suffered some damage.

No definitive cause for the power loss was established, although the operator suspects carburettor icing.

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

CAA Occurrence Ref 03/866

ZK-LJA, Maule M-5-235C, 27 Apr 03 at 11:05, Taieri Ad. 1 POB, injuries nil, damage minor. Nature of flight, training solo. Pilot CAA licence PPL (Aeroplane), age 21 yrs, flying hours 122 total, 2 on type, 8 in last 90 days.

The pilot was carrying out some solo circuit training following a dual session in light crosswind conditions. On the second landing, the aeroplane touched down normally, windward wheel first, but as the second (right) wheel touched, the aircraft began to yaw to the right. The pilot reported that he was unable to arrest the yaw with full opposite rudder, and despite his holding the stick hard back, the aeroplane nosed over, damaging the propeller and striking one wingtip.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 03/1269

GA Defect Incidents

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

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

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

Aerospatiale AS350B

Tailrotor pitch-change pushrod not connected

The aircraft suffered a total loss of yaw control shortly after takeoff on a test flight. The pilot managed to successfully carry out an emergency landing.

Reconnection of the tailrotor control input rod attachment to the tailrotor servo in the tailboom had been overlooked during previous maintenance.

An inadequate duplicate inspection of the system was carried out, with no functional check, and the aircraft released to test flight without actually being airworthy.

ATA 6400 CAA Occurrence Ref 01/1992

Cessna A185F

Mechanical fuel pump coupling shears, P/N 646212-1A5

The engine stopped unexpectedly during a ground run.

Investigation revealed that the mechanical fuel pump drive coupling had sheared off. The pump had done only 200 hours since manufacture. A stripdown report revealed an overload failure, possibly caused by an engine backfire.

ATA 7300 CAA Occurrence Ref 01/2018

Eurocopter AS350B

Transmission cowling detaches

During the flight a noticeable yaw to the right developed. The helicopter remained controllable, and the pilot was able to proceed to the pre-determined landing point.

Once on the ground, the pilot checked the helicopter and noticed that the righthand transmission cowling was missing. A cowl latch failure was determined to have allowed the cowl to move into the airflow and depart the aircraft. Manufacturer's Service Letter 1391-53-99 was issued in 1999 to highlight the failure of the latch's titanium hook, and it recommended that particular attention be given to the post-flight inspections of these components.

ATA 5350 CAA Occurrence Ref 03/943

NZ Aerospace FU24-950

Lycoming IO-720-AIB exhaust valve seat fails

The engine was removed from service due to metal found in the oil filter. This was the result of an exhaust valve seat dropping into the No 5 cylinder.

It was suspected that vibration, detonation, and excessive heat had caused the valve seat to fail. The source of the vibration, which may have ultimately initiated the engine failure, could have been a crack found in the outer blade bearing of the propeller. Once cracking occurs, aerodynamic loading would force the blade to track away from the other blades, causing a severe out-of-balance situation.

It was also reported that the lefthand magneto had moved from its correct timing position, which probably caused engine detonation.

TTIS 5637 hrs; TSO 568 hrs.

ATA 8530 CAA Occurrence Ref 01/2020

NZ Aerospace FU24-954

Lycoming IO-720-AIB main bearings defective, P/N LW 13683

The engine was removed from service due to metal in the oil filter. A stripdown inspection found that the main bearing, camshaft, and tappet bodies had failed prematurely, which had caused other engine damage.

At the time of the incident, Lycoming acknowledged that they had had problems with the manufacture of main bearings (P/N LW 13683) and that in future only bearings with the part number 14830 should be used.

TTIS 4743 hrs; TSO 484 hrs.

ATA 8520 CAA Occurrence Ref 01/2019

PA31-310

Cylinder bolts work loose

The engine failed in flight because five of eight cylinder base studs on the No 3 cylinder had come loose. The resulting movement of the cylinder in relation to the crankcase also caused the fuel injector line to that cylinder to fracture.

All the studs, and the fuel injector line, were replaced, and the other cylinders checked for tightness.

ATA 8530 CAA Occurrence Ref 02/3268

PA34-200T

Cracks found in both undercarriage legs

While undergoing repairs on the left main undercarriage, fatigue cracks were found in both main undercarriage legs, originating from the brake torque plate bolt holes. The cracks were in an area where there is minimal thickness provided around the bolt hole recess.

ATA 3210 CAA Occurrence Ref 02/654

PAC 08-600 Cresco

P3 air hose found deteriorated, P/N 3026687

The engine would not accelerate from Ground Idle due to a deterioration of the Teflon P3 air hose between the PC filter and fuel control unit.

ATA 7310 CAA Occurrence Ref 03/780

International Occurrences

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

United Kingdom

Occurrences

The following occurrences come from the Autumn 2000 edition of *Flight Safety Bulletin,* which is published by the General Aviation Safety Council, United Kingdom.

Skylark 3G
Pilot fails to roundout adequately

After a late field selection in an area of undulating terrain the experienced, but out of practice, pilot approached the upward-sloping field with full airbrake. On finals the airbrake lever slipped out of his hand and, while attempting to close the brakes, he failed to roundout properly on the up-slope. The heavy landing destroyed the glider.

Pilot aged 43 with 256 hrs P1.

RF3
Blocked panel vents cause pressure differential

The motorglider was climbed to 10,000 feet where there was a loud bang and the aircraft shook. A handling check showed no problems but, after a safe landing, an inspection showed that a panel had been lost from the top of the right tailplane. Vent holes had been covered during re-fabricing and painting. Differential pressure blew it out.

Pilot aged 60 with 346 hrs P1.

Enstrom 280FX
Loose collective/throttle correlation contributes to accident

The pilot was on his first flight in the helicopter since completing his type conversion. During the training the instructor had noted that the throttle was stiff and the collective/throttle correlation was incorrectly set. The EGT was also rather high. After rectification, the pilot found the throttle to be very much freer. He was advised that the mixture was slightly lean but provided he kept the EGT below 165 degrees Fahrenheit it would not be harmful.

The pilot departed to the north east. The EGT was high during the climb so he decided to abandon the flight and return to the aerodrome where the surface wind was 200/10 kts. He was cleared to approach to Helicopter Training Area (HTA) Whiskey. Another helicopter was approaching HTA November to the north of Whiskey so the pilot of the Enstrom routed to the west for separation. He was high when he approached Whisky and came to a hover at about 12 feet, close to the western edge of Runway 21. ATC asked him to hold for departing traffic off Runway 21.

The pilot considered he was too close to the runway and initiated a spot turn to the left to hover taxi sideways to the west. He then lost control and realised the helicopter was descending slowly. He raised the collective but this did not stop the descent. He decided the rate of descent onto the rough grass was acceptable but was not aware of a deep ditch hidden in the grass. The aircraft descended gently into the ditch, suffering damage to the main rotor blades.

The pilot said he inadvertently reduced power when making collective movements due to the much freer throttle and the increased workload. It is probable that in making the spot turn he positioned the helicopter downwind, compounding the situation.

PPL(H) with 1200 hrs total, 9 hrs on type with 15 hrs in the last 90 days and 7 hrs in the last 28 days.

Australia

Occurrences

The following are a selection of occurrences that come from the ATSB's (Australian Transport Safety Bureau) *Aviation Accident/Incident Database* contained on their web site.

Piper Chieftain PA31-350
Night circling approach goes wrong

The aircraft crashed while on a night landing approach to Launceston Airport, Tasmania.

It was being operated by one pilot and carried nine passengers. Six passengers received fatal injuries. The pilot and three passengers sustained serious injuries.

The accident occurred while the pilot was making a visual circling approach to land on runway 32 at Launceston. Some low cloud was present and the aircraft passed through patches of cloud on the approach. Late on a left base leg the aircraft entered a steep left bank. Shortly after, at a height of about 200 feet, the aircraft developed a rapid rate of descent. This descent culminated in collision with the ground.

Significant factors in this occurrence included minimal endorsement training and pilot experience on type, inadequate operator supervision, and pilot decision-making adversely influenced by the carriage of noisy, alcohol-affected passengers. Organisational factors included an absence of standards prescribed by the CAA for aircraft type endorsement. The investigation found indications of significant confusion over the interpretation of AIP DAP instructions on visual circling approaches, particularly at night.

Piper PA31-350 Chieftain
Aircraft descends below MDA without visual reference

The aircraft, while on a right base leg for a landing approach to runway 01 in conditions of low cloud and darkness, struck trees at a height of 275 feet above the elevation of the aerodrome at Young, New South Wales, and crashed. The Chieftain, which was being operated as a regular public transport service from Sydney to Young, was destroyed by impact forces and post-crash fire. All seven occupants, including the two pilots, suffered fatal injuries.

The investigation found that the circumstances of the accident were consistent with controlled flight into terrain. Descent below the minimum circling altitude without adequate visual reference was the culminating factor in a combination of local contributing factors and organisational failures. The local contributing factors included poor weather conditions, equipment deficiencies, inadequate procedures, inaccurate visual perception, and possible skill fatigue. Organisational failures were identified relating to the management of the airline by the company, and the regulation and licensing of its operations by the Civil Aviation Authority.