May / June 2004

VECTOR

Pointing to Safer Aviation

Multi-Engine Turboprop EFATO Training

Pitot Static Malfunction

Improved Radar Services

Down But Not Out

CAA
CIVIL AVIATION AUTHORITY OF NEW ZEALAND

VECTOR CAA NEWS

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

Manager Communications: Bill Sommer.

Editor: Peter Singleton.

Publishing team: Gareth Clare, Pam Collings, Cliff Jenks, Peter MacDonald, Jim Rankin, Rose Wood.

Design: Gusto Design & Print Ltd.

Publication Content

Unless expressly stated as CAA policy, the views expressed in *Vector/CAA News* do not necessarily reflect the policy of the Civil Aviation Authority. Articles are intended to stimulate discussion and nothing in *Vector/CAA News* is to be taken as overriding any New Zealand Civil Aviation legislation, or any statements issued by the Director of Civil Aviation or the Civil Aviation Authority of New Zealand.

Reader comments and contributions are welcome and may be published, but the Editor reserves the right to edit or abridge them, and not to publish those that are judged not to contribute constructively towards safer aviation. Reader contributions and correspondence regarding the content of Vector/CAA News should be addressed to: publications@caa.govt.nz, or *Vector/CAA News* Editor, P O Box 31–441, Lower Hutt.

Free Distribution

Vector/CAA News is distributed automatically to all New Zealand flight crew, air traffic controllers, aircraft maintenance engineer licence holders, aircraft owners, most organisations holding an aviation document, and to certain other persons and organisations interested in promoting safer aviation. In the case of flight crew and air traffic controllers, a current aviation medical certificate must be held, and a current New Zealand address given, to ensure magazine entitlement. *Vector/CAA News* also appears on the CAA's web site: www.caa.govt.nz.

Change of Address

Readers receiving *Vector/CAA News* free of charge should notify publications@caa.govt.nz of any change of address, quoting your CAA Client Number. Paying subscribers should notify The Colour Guy.

Paid Subscriptions

Vector/CAA News is available on subscription only from The Colour Guy, P O Box 30-464, Lower Hutt, Freephone 0800–438 785.

ISSN 1173-9614

May / June 2004

CONTENTS

If engine-failure-after-take-off training is not done properly, it can be more dangerous than the real thing. This article highlights the importance of developing appropriate engine failure drills and training practices for individual types of multi-engine turbine aircraft.

The incident described illustrates how a potentially serious situation can arise when erroneous indications occur, and it highlights the importance of understanding the pitot-static system in your aircraft.

This article examines how Emergency Locator Transmitters (ELTs) operate and the importance of checking for inadvertent activation before and after flying.

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 New Zealand* Volumes 1 to 4 and all charts.

www.aip.net.nz, AIP Online – *AIP New Zealand* is available free on the internet.

Cover Photo: Air New Zealand Link Saab SF 340A arriving at 'Warbirds Over Wanaka 2004'.

Even Worse than the Real Thing

If it's not done properly, engine-failure-after-takeoff training can be more dangerous than the real thing

An article taken from ***Flight Safety Australia****, March-April 2002.*

Introduction

Few pilots will ever face a higher-risk situation than a loss of engine power immediately after takeoff in a twin-engine aircraft.

This type of emergency occurs at low altitude, low airspeed, and close to the maximum available power on the operating engine. To make matters worse, other workload elements competing for the attention of the pilot include asymmetric control issues; after-takeoff actions and checks, and, in most cases, the requirement to observe standard instrument departure procedures.

For those reasons, it has long been accepted as essential that pilots be exposed to simulated engine failures after takeoff.

However, simulated engine failures are not without their own problems. Two recent Australian incidents underscore the risk.

On 13 February 2000, a Beech 1900D Airliner took off from Williamtown, NSW on a local training flight. The pilot-in-command simulated a failure of the left engine shortly after takeoff by retarding the left power lever to the flight-idle position. The handling pilot applied full right rudder and right aileron to counter the resultant yaw to the left, but the yaw continued for 21 seconds until power was restored to the left engine to regain directional control. In the period following takeoff, the aircraft did not climb higher than 160 feet above ground level and at one stage had descended to 108 feet.

The aircraft then climbed to a height of 2000 feet, where the pilot-in-command simulated another failure of the left engine by retarding its power lever to the flight-idle power setting. The aircraft again lost controllability. Power was restored to the left engine, and the aircraft landed without further incident.

The pilots of a Fairchild Metro III, practising engine failures after takeoff in 1995, were not so fortunate.

The trainee first officer and the training captain failed to recover the aircraft from a simulated engine failure during a night takeoff at Tamworth airport.

The flight was under the command of a check-and-training pilot, who was conducting a type-conversion training flight for the co-pilot. Four seconds after the aircraft became airborne, the check-and-training pilot retarded the left engine power lever to flight-idle. The landing gear was selected up 11 seconds later. After a further 20 seconds, the aircraft struck the crown of a tree and then the ground about 350 metres beyond the end of the runway and 250 metres left of the extended centreline. It caught fire and was destroyed. The co-pilot and another trainee on board were killed, while the check-and-training pilot received serious injuries.

> *"Things can go wrong very quickly in EFATO training, and it is essential that the check pilot is able to intervene well before a breakdown in safety occurs."*

Risk Management

More engine failure after takeoff (EFATO) accidents occur as a result of simulated EFATO events than are caused by genuine engine failures. This has been used to support an argument that a better safety outcome would be achieved if the practice of simulating engine failure at airspeeds close to V_1 was abandoned in favour of some form of general but undemonstrated instruction.

It would, however, be poor risk management to abandon a necessary aspect of training for the reason that it has caused accidents. Although it's statistically likely that very few pilots will ever encounter a real engine failure at or just after reaching V_1, the purpose of all emergency procedures training is to prepare pilots for situations that can and do happen.

A more intelligent approach would be to identify the risks involved in EFATO training and manage them by establishing appropriate defences.

Although the term 'risk management' sounds like rocket science to some, it is something most pilots practise dozens of times per flight without even thinking about it. It is simply the process of identifying the risks associated with a task, and developing defences that eliminate or minimise them according to their potential threat to safety.

Continued over ...

... continued from previous page

Zero Thrust or Flight-idle?

In both the Beech 1900D and Metro III events, flight-idle power settings were used to simulate engine failure.

When simulating an engine failure in a piston-engine aircraft, it is appropriate to retard the throttle to idle and move it forward to a zero thrust position when the trainee calls for the prop to be feathered. This simulates an actual failure in a piston-engine aircraft where the propeller windmills, creating extra drag, until the propeller is feathered.

However, in turboprop aircraft equipped with auto-feathering – or other drag-reducing systems like negative torque sensing – the propeller does not windmill following an actual failure. Therefore, reducing power to flight-idle does not simulate a real failure. In fact, it produces a flight condition that is more difficult to manage than a real engine failure.

The Australian Transport Safety Bureau (ATSB) found that the use of flight-idle in both the Williamstown and Tamworth incidents resulted in a reduction of performance that led to a decay in airspeed and an inability to maintain directional control and satisfactory obstacle clearance.

The manufacturers of the Embraer EMB-110 Bandeirante, Beech C90 King Air, Beech 1900D Airliner and Saab SF340 give specific guidance for the simulation of one-engine-inoperative performance using flight-idle.

The data for other types, including the Metro III and Dash 8, are less clear, and the training and checking departments of most operators have refined the manufacturer's information into specific procedures and engine/propeller settings in their own training manuals.

In 1999, the UK Civil Aviation Authority published an Aeronautical Information Circular (AIC 52/1999) on the subject of simulated engine failures, and it noted that where specific information was not available from engine or airframe manufacturers, the throttle should be retarded smoothly towards a pre-determined torque setting appropriate to zero thrust.

In its investigation of the 1995 Metro III crash, the then Bureau of Air Safety Investigation (BASI) sought assistance from a qualified test pilot to examine the effects of simulating an engine failure by retarding the power lever to flight-idle. The test pilot concluded:

"Simulating engine failure by retarding a power lever to flight-idle is ... unrepresentative of any practical emergency. Moreover, the consequences in terms of further degraded performance and the potential for larger control displacement to counter the greater asymmetry are serious. The practice is unwarranted and should be discouraged."

Vector Comment

New Zealand Civil Aviation Authority airline inspectors do not entirely agree with this test pilot's comments. Auto-feather systems may fail to operate, and a windmilling propeller is the result. Consequently, there is a requirement to check the integrity of the auto-feather/auto-coarse system before the first flight of the day. There is also a need to check pilots on their ability to handle such an emergency should it occur. To accomplish this, the flight examiner/instructor must retard the power lever to the flight-idle position.

Two scenarios are possible and the drills are different:

- If the propeller auto feathers (in the absence of a fire or major mechanical failure), no action is required, except to fly the aircraft to a safe altitude and then carry out the appropriate drills.
- If the auto system fails, the pilots need to manually feather as soon as is safely possible (usually before level acceleration altitude, which is often 400 feet.)

Training

In determining the types of defences that might mitigate training risks, an examination of the following areas is valuable:

- Qualifications and training of trainee pilots.
- Qualifications and training of check-and-training pilots.
- Adequacy of pre-activity briefing.
- Policy related to asymmetric training, particularly critical manoeuvres such as V_1 cuts.
- The benefits of flight simulators.

Trainee Pilots

Significantly, the Metro III co-pilot and the pilot observer undergoing endorsement training were experiencing their first flight as crew members in the type.

The ATSB report noted that a number of pilots in the airline had expressed the view that "conversion training placed too much emphasis on emergency procedures at the expense of learning how to operate the aircraft normally."

The report went on to say that it would have been appropriate to have demonstrated and practised asymmetric handling and V_1 cut techniques at a safe altitude before attempting the manoeuvre at low level.

According to the chief pilot of a large regional airline, the background and experience of the trainee must be carefully evaluated before training.

"If it's a first turbine conversion, we pay particular attention to confirming the pilot's understanding and management of aircraft systems," he said. "This includes engine handling, negative torque sensing, emergency checklists, feathering procedures and related emergency procedures, before training for critical procedures like a V_1 cut."

"It would have been appropriate to demonstrate and practise asymmetric handling and V_1 cut techniques at a safe altitude before attempting the manoeuvre at low level."

"It is a prime responsibility of the person doing the checking or training, to ensure the person under check responds properly to an event. The less experience the trainee has, the more preparatory training will be needed before training in critical manoeuvres is attempted. Adequate ground school training is a key part of that preparation."

It is also acknowledged by regulators and human factors experts worldwide that mature, well-functioning training and checking organisations have a 'closed loop' feedback system that offers the trainee opportunity to document his or her opinions of the training. This tool assists the organisation with the development of future training procedures.

Not all 'trainees' to type are novices. Feedback from crew's experience can provide the trigger to revise or implement procedures to reduce the risk in training.

Check-and-Training Pilots

Things can go wrong very quickly in EFATO training, and it is essential that the check pilot is able to intervene well before a breakdown in safety occurs.

While experience and training have a large influence on this competency, it is critical that the check-and-training pilot is aware of, and adheres to, specified safe ranges of speed, rate of climb, obstacle clearance, heading and angle-of-bank.

The trainee pilot and check pilot should discuss these tolerances prior to takeoff, and both should be clear that power must be restored to the 'failed' engine if one or more of these tolerances is exceeded.

The chief pilot of a charter operator, which operates an all-turboprop fleet, adds that an equally important issue is the training and development of check-and-training pilots:

"We don't usually start them off as check pilots, but as training pilots first; so a pilot's initial supervisory position in our company would be as a line training pilot," he said.

"That means we train them to handle an emergency from the righthand seat, but we don't teach them to simulate emergencies. They then go off and do line training. They act as first officer in a two-pilot aircraft, or if it's a single-pilot operation they just sit and observe the flight. However, they have the ability if anything goes wrong, to take command and control of the aircraft, because they're trained to do that by our check captains.

"The next supervisory position is as a check captain for endorsement training only, so they are then instructed by our check captains to simulate asymmetric situations. We have a comprehensive programme in our training and checking manual, which sets out how to train a check captain. Once they are competent to do that, we arrange for CASA to come and check on them, and to give them the approval subject to that assessment.

"The third and final process is getting them a delegation to conduct instrument rating renewals. First we get them to sit in on two or three instrument ratings with a check captain in the jump seat, and in the final phase they then do two or three instrument ratings themselves, either in the command or first-officer seat depending on the aircraft, under the supervision of a check captain, who would issue the instrument rating renewal. Once that's done and we're happy with the assessment, we arrange for CASA to fly with them. If that's satisfactory, they get the delegation. The whole process usually takes about six months."

In that company's training programme (for a Metro 23) a pilot undergoes a well-structured seven-day ground school before

Continued over ...

... continued from previous page

commencing flight training, which is also phased in a way that helps the pilot become progressively more familiar with the aircraft, its systems and its handling characteristics, at safe altitudes and initially in visual flight conditions.

Among other criteria, human factors experts and regulators identify well-structured training and checking organisations by their documented 'stepping stone' approach to the development of their staff. Each stage affords the pilot graduated training and exposure to the role, reducing the risk of conducting procedures beyond his or her experience.

Pre-exercise Briefings

All EFATO training exercises should be preceded by a comprehensive briefing covering: critical airspeeds like V_{MCA}; what to expect when the engine 'fails'; the method of simulating the engine failure; immediate actions following engine failure including aircraft handling to establish and maintain target speeds; the method of identifying and confirming the failed engine; and follow-up actions.

It is also important that the trainer and trainee share a clear understanding of their roles in the event of a real engine failure.

Standard Operating Procedures

The Metro and Beech 1900 events highlight the need for training manuals to include:

- A comprehensive syllabus of theoretical and practical training specific to the aircraft type. (The syllabus should be phased so that a trainee becomes proficient at managing engine shutdowns at altitude before being exposed to engine failures after takeoff.)
- The qualifications, experience and recent experience requirements of check-and-training pilots. This should include guidelines for monitoring the competencies of check-and-training pilots.
- The conditions under which an EFATO exercise may be carried out. (This should include crosswind limitations, and minimum visibility requirements.)
- The minimum safe altitude and speed required to perform a simulated V_1 cut.
- Specific criteria for aborting the procedure. (Speed, obstacle clearance, heading and angle-of-bank.)
- The method of simulating engine failure, paying close attention to the difference between zero thrust and flight-idle.

Zero Thrust and Your Aircraft

Following is a list of common turboprop aircraft and a summary of the manufacturers' recommendations with regard to zero thrust. In cases where the manufacturer has not provided detailed information we have sought information from local operators. (The information in this article does not supersede regulatory requirements, manufacturers' advice or company standard operating procedures):

Beech C90 King Air: The flight manual recommends a power setting of 100ft-lbs of torque with the propeller set to 1800 rpm to simulate single-engine zero thrust and notes that "this setting will approximate zero thrust at low altitudes, using recommended single-engine climb speeds."

Beech 1900D Airliner: The flight manual specifies that simulated one-engine-inoperative flight is achieved by retarding one engine power lever to the zero thrust setting of 200ft-lbs of torque, at or above the V_{YSE} speed of 105KIAS.

Boeing Canada, de Havilland Division DHC-8 (Dash 8): The manufacturer's flight and operating data manuals do not contain information on one-engine-inoperative training or zero-thrust settings. One operator provides specific instructions in its Dash 8 Training Manual for the simulation of one-engine- inoperative. These state:

"When conducting simulated asymmetric operations in the aircraft, the power on the failed engine will be set to achieve zero thrust. This corresponds to 15 per cent torque and will result in the power lever being slightly advanced."

Another Dash 8 operator provided similar information. Its one-engine-inoperative training procedures specified that simulation of one-engine-inoperative be accomplished by reducing power on the 'failed' engine to 15 per cent torque.

De Havilland Canada DHC-6 Twin Otter Series 300: The manufacturer's flight and operating data manuals do not specify zero thrust settings. *Flight Safety Australia* contacted an Australian airline that has been operating Twin Otters for 25 years. The airline uses a zero thrust setting of 5 psi and only conducts engine-failure training at altitudes above 200 feet, in daylight VMC, and when there is negligible crosswind.

Embraer EMB-110 Bandeirante: The recommended power setting for simulating one-engine- inoperative is to retard the power lever on the 'failed' engine to 150 lb-ft of torque, with the propeller set to 2200 rpm.

Fairchild Metro III: The Fairchild Metro III flight manual does not rule out the use of flight-idle during one-engine-inoperative training. However, in its investigation of the 1995 Metro III crash, the then Bureau of Air Safety Investigation (BASI) sought assistance from a qualified test pilot to examine the effects of simulating an engine failure by retarding the power lever to 'flight idle'. The test pilot concluded:

"Simulating engine failure by retarding a power lever to flight-idle is … unrepresentative of any practical emergency. Moreover, the consequences in terms of further degraded performance and the potential for larger control displacement to counter the greater asymmetry are serious. The practice is unwarranted and should be discouraged."

Fairchild has advised that zero thrust is equivalent to 10 – 12 percent of indicated torque.

Saab SF340: The aircraft operations manual advises that engine failures should be simulated by retarding the power lever to 10 – 20 percent torque. Below 120 KIAS, the drag obtained will be approximately comparable to a coarsened or feathered propeller. Retarding the power lever to flight idle gives a drag which is higher than a wind-milling propeller.

Based on the ATSB report "One-engine-inoperative training – failure to achieve predicted performance", section 1.18.2.

However, standard operating procedures do not, in themselves, guarantee safe operating practices. Interestingly, the operator of the Beech 1900 specified in its training and checking manual that zero thrust, not flight-idle, was to be used in EFATO training.

According to the ATSB report, however, the use of flight-idle to simulate engine failure was widespread in the company.

In its investigation of the Williamtown incident the ATSB found: "The operator's training and checking organisation and its check pilots were aware that the likely consequences of simulating an engine failure by retarding its power to less than the recommended zero thrust setting were reduced aircraft climb performance and increased V_{MCA}. They were also aware that risk increased when in-flight training exercises involved the simulation of multiple failures. The routine use of a non-compliant procedure to simulate one engine inoperative by the operator's check pilots was therefore unwarranted.

"The prescribed procedures were necessary defences to minimise those risks. The routine disregard of those defences significantly increased the risks associated with the operator's training and checking procedures, and was therefore a safety-significant concern."

This illustrates how easy it is for non-standardised practices to become the norm.

Useful defences to counter the latent and active failures detailed above include regular standards meetings with supervisory, training and checking staff; and effective management of a non-punitive safety reporting system.

Flight Simulation

The only way to eliminate training risk is to conduct all checking and training in flight simulators. There are other compelling arguments for flight simulators. One reason why simulators are better in V_1 cut situations is that they simulate what would happen if an engine actually failed.

For example, when a real engine failure occurs in a Dash 8, the system senses a loss of power and automatically "up-trims" the operating engine to provide a 10 percent increase in available power. Autofeather is triggered about three seconds later. It would be difficult for a check pilot to simulate that process in the air.

Simulators are now available in Australia for Saab 340 (A/B models with GE CT7 engines); Fairchild Metro III (with TPE331 engine simulation); and Bombardier Dash 8-100, which is a common type rating with the Dash 8-200 and 300 aircraft. Beech 1900 simulation is available in Wichita Kansas and Toronto Canada, and it is used for initial endorsement and command upgrade training, while recurrency check-and-training is conducted in the aircraft.

Conclusion

Risk **can** be identified, managed, and minimised. Well-constructed training policies and practices will either make a procedure safe, or eliminate it. ■

Article refers to BASI aviation safety report BO/200000492 (B1900) and ATSB report 9503057 (Metro III).

Definitions

V_1: Takeoff decision speed. The indicated airspeed defining the decision point on the takeoff roll after which, if an engine fails the pilot should continue the takeoff.

V_{YSE}: Single-engine best rate of climb speed.

V_1 cut: The simulated failure of an engine during takeoff or initial climb at any stage between V_1 and V_{YSE} speed.

V_{MCA}: Minimum control speed. The minimum speed at which it is possible to maintain directional control of the aircraft with the critical engine inoperative. The specification of V_{MCA} assumes the takeoff configuration (gear up) and allows up to five degrees of bank toward the live engine. For aircraft with automatic feathering devices V_{MCA} is calculated assuming a feathered propeller.

Zero thrust: A power setting calculated to simulate the power/drag output of a feathered propeller. Zero thrust is always greater than flight idle.

Photograph courtesy of Ian Berridge

Congratulations

A number of the articles you read in *Vector* are written as a result of something going wrong somewhere. We write about it in the hope that next time someone else may not suffer the same consequences. This can get a bit depressing after a while. It is therefore a real pleasure for the staff of *Vector* to report on something that appears to have gone right. In this case it was the lack of any obvious problems associated with the Warbirds Over Wanaka airshow last month. The Director of Civil Aviation, John Jones said:

"After my plea and a cover-page article on the subject of the airshow in the latest issue of *Vector*, I was delighted to be told that of the 20-odd search and rescue incidents handled by the duty Search and Rescue Mission Coordinator over the weekend, not one involved Wanaka or failure to terminate a flight plan. It's great to know the message is getting through, I hope it signals a safety culture change in the general aviation business.

"I'm told the Warbirds airshow was a great success. According to John Lanham (General Manager of General Aviation and a Wanaka display pilot), from a pilot's point of view it was pretty well perfect; the airmanship displayed by participants was excellent, the weather was much better than last year, and that led to a much better attendance by the public on all three days of the show."

Airways Corporation reported that the number of aircraft arriving at Wanaka was slightly down on previous years. There were few problems with arrivals or departures. It does appear that a number of pilots chose to fly down one or two days earlier than normal. This may have been due to the forecast poor weather, particularly for the Friday and Saturday of the show. It also appears that a number of pilots chose to stop at enroute airfields, and drive the rest of the way to Wanaka. This may have been due to a desire to avoid the potentially bad weather in the hills. In both cases pilots were thinking ahead and making safe decisions.

As so often happens in the mountains, the weather went around the Wanaka basin, and the airshow was conducted in generally fine if windy conditions.

From the team at *Vector*, congratulations to all the pilots that made this an incident-free Easter. Let's try for the same result again next Easter at the Classic Fighters Over Marlborough airshow. ■

Cook Strait Crossing Follow-Up

As a follow-up to our article in the January/February 2004 issue of *Vector*, it has been suggested that we highlight the Advisory Route for VFR traffic wishing to cross Cook Strait.

The VFR Advisory Route, between Ohau Point in the North Island and Arapawa Island is shown on the VNC as two parallel broken blue lines – one for South-Island-bound traffic and the other for North-Island-bound traffic. A note beside these lines says: "Cook Strait transit – pilots must request ATC clearance for altitudes above 2500 ft. ATC clearances will only be withheld for traffic reasons."

Aircraft using the VFR Advisory Route are more likely to be granted a higher altitude, on request, than those using alternative routes.

When filing a flight plan for a Cook Strait crossing, it is worthwhile making a telephone call to the ATC Supervisor in Christchurch 0–3–358 1694 if you expect to request higher than 2500 feet. Special arrangements can then be made to assist both ATC and the pilot – ensuring smooth passage for the flight.

Image current at time of publication.

Improved Radar Services

The Skyline System

In 2000, Airways New Zealand purchased the Skyline radar system from Lockheed Martin. The old Aircat system was getting close to its capacity in terms of the number of airborne aircraft that it could cope with, and available technology was now more advanced. The new equipment has larger colour screens and many more features.

Skyline was already operating in Argentina and Korea as an enroute radar system, with components also in use in Scotland and Germany. A team of air traffic controllers and Airways New Zealand software engineers spent two years enhancing the product to New Zealand requirements and training staff to use the system.

The New Zealand Skyline system uses existing radar 'heads' and therefore has the same radar coverage as the previous Aircat radar system.

Enhanced Tower Capabilities

A major change from the old system is that all control towers (but not the Milford Flight Service facility) now have the ability to display radar-derived information. The picture seen on these displays is the same as a controller would see at a radar centre, but it is adjusted to display the particular tower's local area. Traffic displayed depends on radar coverage in the area.

The introduction of Skyline radar into control towers is another aid to assist a tower controller to manage aerodrome and local traffic. The prime responsibility of a tower controller, however, has not changed and is to look out of the window and keep a watch on aerodrome traffic. Pilots are often under the impression that because they have been identified on radar they are receiving a radar service – this is **not always** the case. For example, a tower may identify an aircraft to confirm it is clear of other traffic, and once this is confirmed the controller might not look at the radar again.

Tower controllers may or may not identify aircraft, so do not assume that because you are in known radar coverage you are being monitored on radar. Generally, tower controllers will only identify traffic if they have a need to. The main reasons are to reduce the number of RTF calls and to obtain accurate position information.

Additional Information

Tower controllers are now able to provide pilots with additional information to help with navigation and maintaining separation from other traffic. Controllers can provide the following information to pilots on request:

- Current position, including latitude and longitude.
- Track or distance to a nominated position on the radar display.
- Groundspeed.
- Relative position and level of other traffic.

Note that the provision of the above information is subject to controller workload and priorities. Towers will **not** provide radar vectors.

Assisting Traffic Flows

Pilots can assist tower controllers and the flow of traffic in the following ways:

- Pass an accurate position report and level on first contact with a tower.
- Turn your transponder to ALT when airborne, even if below radar coverage, as this assists TCAS-equipped aircraft to 'see' you.
- If your aircraft has an assigned squawk code, advise the tower of this along with your level on first contact.
- During an emergency, set the appropriate emergency squawk code (ie, 7500, 7600 or 7700).
- Ensure your transponder is turned to STANDBY or OFF while taxiing.

If you require assistance let the controller know, that's what he/she is there for – especially since he/she now has Skyline to help.

If you would like to look at the Skyline radar system, and what can be seen in your local area, contact your local Chief Controller to arrange a visit. ■

Pitot-Static Malfunction

*In the July/August 2003 issue of **Vector**, we ran an article on pitot-static systems. This recent incident in a pressurised turboprop aircraft illustrates how a potentially serious situation can arise when erroneous indications occur, and it highlights the importance of understanding the pitot-static system in your aircraft.*

The Incident

On the flight southbound, from Auckland to Christchurch, the aircraft was unable to be pressurised. The crew levelled off at Flight Level (FL) 130 and used oxygen.

At Christchurch the aircraft was met by an engineer. A small access panel in the lower forward section of the fuselage was found to have become dislodged, and this was the source of the pressurisation problem. The panel was refitted, and the return flight to Auckland was commenced.

While carrying out pre-takeoff checks at Christchurch, the crew noted that the Captain's static reading of the airspeed indicator was three to four knots lower than normal. It had also been lower than normal during the pre-takeoff checks at Auckland. Close observation of the 80-knot ASI cross-check on takeoff was made. Both 80-knot cross-checks were good.

The First Officer was Pilot Flying and was first to note that, after takeoff, the aircraft performance seemed unusually poor. The aircraft entered instrument meteorological conditions at 900 feet and remained IMC throughout the climb to FL130. Indications were 160 knots, 600 to 800 feet per minute rate of climb, with the airspeed tending to reduce. At their current all-up weight, the crew expected 170 knots and 1500 to 2000 feet per minute rate of climb. A check was made of the power settings and the flap and gear positions, which were all found to be normal.

Passing 3000 feet the crew noted a discrepancy developing between lefthand and righthand pitot-static instruments. Air Traffic Control was asked for a reading of the aircraft's transponder Mode C altitude. Instrument indications were:

- righthand altimeter reading 300 feet higher than Mode C,
- lefthand altimeter reading 800 feet higher than the righthand, and
- the lefthand ASI reading 20 knots higher than the righthand.

The crew consulted the Emergency Action Checklist (EAC) procedure for pitot-static discrepancy and determined to control the aircraft by attitude, and not pursue performance indications given by the pitot-static instruments.

The crew advised ATC of the discrepancy in their pitot-static instruments and requested additional Mode C checks and additional vigilance in monitoring Mode C.

The crew considered returning to Christchurch but determined it would be unwise to carry out an instrument approach in IMC with such a discrepancy in the instrument indications. They considered the best option was to continue to Auckland, where there was a good chance of a visual approach.

Both ASIs continued to decrease during the climb, and by 10,000 feet both read zero.

The lefthand instruments were thought to be most in error, because the indication of the righthand altimeter was closer to the Mode C indication. The crew thought that the transponder may have had an independent static source. The alternate static source was selected on the lefthand side. On doing this the lefthand altimeter rose a further 4000 feet, now making it 5000 feet higher than the righthand altimeter, and the fourth different indication of aircraft altitude – the present lefthand indication, the previous lefthand indication, the righthand indication and Mode C indications.

Because the alternate static source is considered unreliable on this aircraft type, and because the altitude indication was more extreme, the crew considered the indication from the alternate static to be less reliable and chose not to select alternate static on the righthand side.

Although not in the EAC procedure, the crew decided to depressurise the aircraft. The aircraft was depressurised in stages. After each step ATC reported a rise in the Mode C altitude. The indicated altitude on the righthand altimeter also rose, and the ASI indications increased. When completely depressurised the lefthand altimeter (still on alternate static) now agreed with the righthand altimeter, and also with Mode C. The ASIs indicated the approximate performance expected. Without further incident, the flight continued to Auckland, where a visual approach was made.

The Cause of the Problem

In the subsequent investigation two screw-on caps, one for each static system, were found to be loose. This allowed pressurised cabin air to leak into each system. These caps are used to tee into the static systems for testing purposes. The discrepancy between the lefthand and righthand pitot instruments was caused by the different rates of leakage past each cap. The instruments were reading somewhere between their true indications and the actual pressure altitude of the pressurised cabin. The apparent lack of performance during climb was due to the increased static pressure causing the ASIs to under-read, and their indications to reduce to zero as the climb continued. The VSIs also under-read, tending to indicate the rate of climb of the cabin air, which is about half the rate of climb of the aircraft.

The two transponders on this aircraft use the main static systems for their static source. The number two transponder was being used on this flight, and this transponder takes its static source from the righthand static system. This explains why the righthand altitude indication was closer to the Mode C indication.

Depressurising the aircraft caused the rate of pressurised air leaking into the static systems to decrease, which in turn decreased the instrument error. The righthand altimeter, righthand ASI and Mode C indications rose as the aircraft was depressurised.

ATC's indication of the aircraft's altitude was also in error. When fully depressurised, the lefthand altimeter (still in alternate static), righthand altimeter and Mode C were in agreement – therefore the true altitude of the aircraft had, for this flight, been about five thousand feet above the Mode C indication. ATC would not, therefore, have been aware of a possible conflict should another aircraft have been at this level!

If the crew had had faith in their alternate static source, they would have been able to extract themselves from their predicament earlier. They would still have needed to convince ATC, however, that their Mode C altitude was 5000 feet in error.

Summary

- Be alert to abnormal instrument indications on the ground, even if they are small. In this incident, the small amount of pressurisation entering the static system while on the ground caused the captains ASI to be three to four knots lower than is usual during pre-takeoff checks.
- If you become aware of a pitot-static problem during flight, maintain control of the aircraft using known attitudes and power settings. Do not chase the performance instrument indications. Avoid flying over high terrain, or positioning the aircraft where instrument accuracy is required (for example, an instrument approach). In this incident the altimeters under-read. If they had over-read, terrain clearance could have been an issue.
- Inform ATC if you have instrument indication problems. Request a greater vertical separation and declare an emergency if necessary.
- Make sure you fully understand the pitot-static systems on your aircraft. In this aircraft the cabin pressure differential indicator has a cabin pressure altimeter and an aircraft altitude altimeter. Some aircraft may have an independent static source for transponders and for cabin pressure differential indicators. In the aircraft involved in this incident, both systems were connected to the main static sources.
- If GPS is available, GPS derived height could be used as an aid in determining altitude. ■

Airstrips, Heliports and Part 157

Civil Aviation Rules, Part 157 *Notice of Construction, Alteration, Activation, and Deactivation of Aerodromes* is a short, but important and often-neglected rule.

If you are contemplating establishing an aerodrome or heliport, altering an existing one, or deactivating one, you must contact the Aeronautical Services Unit of the CAA and complete a Notice of Intent.

The Rule does not apply if the aerodrome or heliport is used (or intended to be used) on less than seven days in any 30-consecutive-day period for VFR operations only. There is also an exception for agricultural operations under certain conditions.

Many operators (helicopter operators in particular due to a 'heliport' being easier to establish) commence development action or flying operations without taking this requirement into account.

The purpose of the notification requirement is to enable an aeronautical study to be carried out. An aeronautical study considers the effects that the proposed activity would have. The study includes consideration of neighbouring aerodrome traffic circuits, existing and projected airspace uses, the safety of persons and property on the ground, and the effect that existing or proposed man-made objects and natural objects within the affected area may have on the proposed activity. Following an aeronautical study, an aerodrome determination is then issued.

Development of an aerodrome or heliport, and the associated flying activity involved, normally requires local authority consent, and this process may be made easier if an aeronautical study by the Civil Aviation Authority can be offered as supporting information. Some of the time involved in the CAA study will be charged to the client, but this will be money well spent if it makes the RMA application process smoother, especially with respect to the considered effects on the local community.

This Rule requirement can also protect your interests in the future if, as an established aerodrome or heliport operator, a new aviation activity is contemplated in your vicinity.

Share Your Experience

Down But Not Out

ELT – Your Life May Depend on It!

Installation of Emergency Locator Transmitters (ELTs) in the general aviation fleet was made mandatory in New Zealand in 1986 to assist in locating missing aircraft. ELTs were originally designed to be detected and located by overflying aircraft, but space-borne instruments are now the primary sensors.

SAR System

The United States space-borne system is known as the Search and Rescue Satellite-Aided Tracking (SARSAT) system. The SARSAT instrument is carried aboard the US National Oceanic and Atmospheric Administration TIROS satellites. It provides the ability to locate aircraft fitted with old-technology 121.5/243 MHz ELTs, but it is primarily designed for the new-technology 406 MHz units.

SARSAT serves as part of an international search and rescue system known as COSPAS-SARSAT. This includes Russian satellite instruments that operate in the same manner as the SARSAT system – except that the COSPAS satellites do not process 243 MHz signals.

When an ELT is activated, COSPAS-SARSAT receives the radio signal and transmits it to the Rescue Coordination Centres (RCC), which operate the Local User Terminals, or Earth Stations.

Beacon Characteristics

The standards and specifications for ELT equipment and aircraft installations are promulgated in New Zealand Civil Aviation Rules, Part 91, Appendix A.15. These require that the equipment comply with the United States FAA Technical Standard Order (TSO) C91A for an ELT transmitting on 121.5 MHz, or TSO C126 for an ELT transmitting on 406 MHz.

To meet the FAA standard, the ELT and mounting have to be designed to survive a shock impulse of 100 G and remain operative. This is based on aircraft impact velocities in the order of 165 knots. Crash accelerations of 2 G rearward and parallel to the aircraft longitudinal axis should trigger ELT transmissions. The ELT must also be able to operate over a wide range of environmental conditions.

New 406 MHz ELTs

Once activated, the 406 MHz ELT transmits a 50 millisecond signal burst. The satellite re-transmits the information from the burst to ground stations located around the world. These stations process the information, which enables the owner of the beacon to be identified. Data received from a second satellite pass enables the location of the crashed aircraft to be determined. The location, along with the ELT's identification code, is then sent through a communication network to the nearest RCC for a response.

The 406 MHz signal burst contains a unique digital identification code that identifies the beacon and its country of registration. Search and Rescue authorities worldwide maintain National Distress Beacon Registers, which contain information on beacons, owners, and contact details. This enables a quick response by telephone to confirm if the beacon transmission is associated with a genuine emergency or an inadvertent activation. Advantages of 406 MHz ELTs include:

- Better positioning accuracy.
- A much lower false alert rate.
- The ability to incorporate a GPS module or interface with on-board navigation systems to provide highly accurate position data.
- The option of a self-contained GPS, which, after initialisation, will transmit the beacon location.

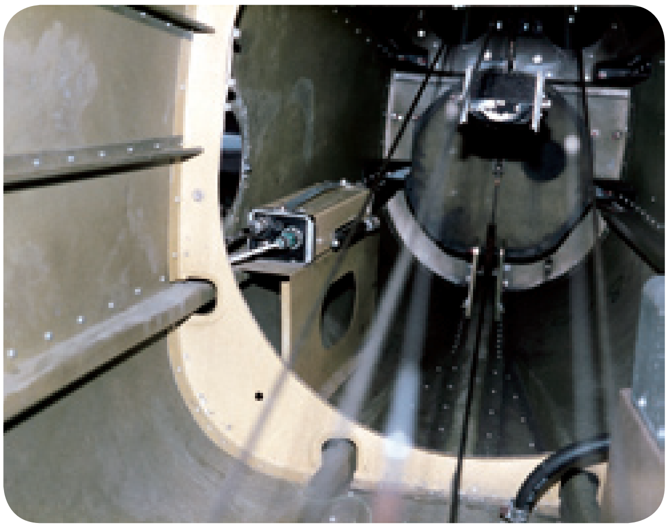
Engineering Matters

Installation

The ELT is intended to be rigidly attached to the aircraft. Some models are designed to be removable after a crash so that they can be manually operated by survivors.

The ELT should be located in a position that will minimise the potential for destruction in an accident by impact or fire. The location should be chosen so as to minimise the risk of inadvertent activation by contact with passengers or baggage. The device should be mounted on primary aircraft load-carrying structures such as trusses, bulkheads, longerons, spars, floor beams, etc, and not on the aircraft skin.

The antenna should be installed in accordance with the manufacturer's instructions. Generally this will be as close to the ELT as possible. Care should be taken that the proximity of the ELT antenna to any radio communication or navaid antenna does not create interference with the radiation patterns of either. A Certificate of Approval from the CAA Airworthiness Unit is required before installing both the ELT and the antenna.



Maintenance

The ELT must be checked routinely in accordance with CAA airworthiness requirements relating to installation and maintenance of aircraft radio stations.

A 500-hour or six-monthly inspection includes checking the operation of the ELT in accordance with the manufacturer's instructions, and checking the battery condition.

At the 24-monthly check, the ELT is removed for a performance check in which the frequency tolerance of the transmitter channels is assessed.

When the ELT has been re-installed in the aircraft after maintenance, turn it on and check for normal performance by selecting 121.5 MHz on the aircraft radio and listening out. (Tip – no batteries, no signal!) Performance tests should be no longer than three audio sweeps, and to avoid SAR alerts should be conducted only within the first five minutes after the hour. If tests have to be made outside of this time, they must be coordinated with the nearest ATS unit. Testing of the 406 MHz beacon is normally achieved by the operator positioning the OFF/ON/TEST for less than 50 seconds and observing the behaviour of the test lamp to indicate normal or abnormal beacon operation.

Pilot Checks

A pre-flight check by the pilot should (if possible) include examination of:

- the installation for security;
- the battery for condition and expiry date;
- the antenna for security; and
- the coaxial cable for security, and absence of corrosion and slack.

Activation

Inadvertent

Pilots should develop the habit of checking for inadvertent activation **before** and **after** every flight.

406 MHz Dates

Provision is being made for the phasing out of 121.5/243 MHz ELTs in New Zealand. A draft Notice of Proposed Rule Making is expected to be available for consultation with industry by late 2004. It is proposed to phase out 121.5/243 MHz ELT early models by March 2005, and later models by March 2008. From that date on, all ELTs will be of the 406 MHz type. The COSPAS-SARSAT system will no longer receive and process 121.5/243 MHz alerts from February 2009.

- **Before start up**, or as soon as the radio is switched on, listen out on 121.5 MHz. If the beacon is operating, switch it off or remove the battery, then advise your nearest ATS unit, or call the Police by dialling 111.
- **Before shutdown,** switch over to 121.5 MHz and listen out. If the beacon is operating, switch it off, then advise ATS or call the Police by dialling 111; call the aircraft operator.

Note that 406 MHz ELTs transmit on the UHF band, and you will not be able to hear this on your normal communications radio. *Vector* understands, however, that most 406 MHz ELTs also incorporate a low-powered transmitter operating on 121.5 MHz (for homing by search aircraft after a crash).

The New Zealand RCC **really appreciates** being informed of an inadvertent activation – **however short**. Information on inadvertent activations **can prevent SAR action** being initiated**.**

Failure to Activate

Failure of an ELT to activate in an emergency situation is not uncommon. There are many reasons for failures, but most can be prevented by ensuring adequate installation, maintenance, and testing of the equipment.

There are documented cases where ELTs have been rendered inoperative by flying debris in the aircraft – switches, and /or antenna connectors have broken off, or the ELT has been separated from its mounting brackets.

Failure to activate has also occurred when operational ELTs have been attached to the aircraft in such a manner that prevented the acceleration sensor from sensing the crash forces.

Corrosion can render circuits inoperative and can be caused by leaking batteries. If water gets into the ELT, a short in the system could prevent operation or cause an inadvertent activation.

Survival Situation

The position of the ELT in the aircraft should be well marked. A sign should be painted on the outside of the fuselage, and the ELT itself should have operating instructions printed on it. It is prudent, considering the possibility of pilot incapacitation after a crash, that you brief your passengers beforehand on the operation of the ELT.

The ELT should transmit automatically on impact, and in most cases the transmission will be picked up within four hours, depending on the configuration and location of the various satellites, and the terrain in which the accident has occurred. To assist searching aircraft or ground parties, make sure the crash site is conspicuous.

Continued over ...

... continued from previous page

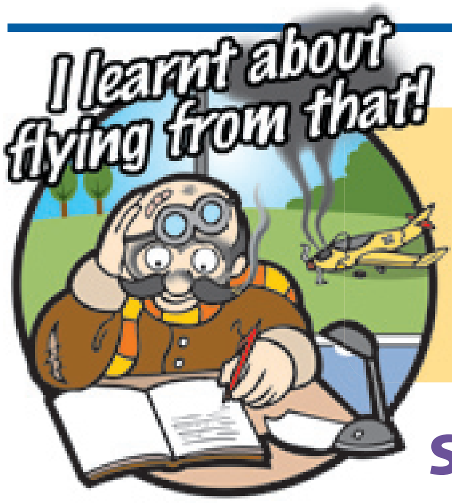
After an accident, if you consider you are in a distress situation, ensure the beacon is operating. You can check by touching the coaxial cable with a moistened fingertip; a slight tingle indicates that the beacon is working. If the antenna is broken off, practically any metal rod – even a ball point pen tip jammed up against the cable – will give you some range.

Once the beacon is operating, **never** switch it off unless you are satisfied you are no longer in grave and imminent danger, or a SAR person or other authority has directed you to switch it off. You have no way of knowing when the search aircraft will be looking for you, and the search will be protracted if erratic or inconsistent signals are received. Stay in or near the aircraft if possible, as it is the focal point of the search. If it is necessary to seek aid on foot, leave a note. The ELT should **not be taken away from the crash site unless** circumstances require that **all survivors leave**.

Conclusion

The ELT is one of those items in the aircraft that you hope you will never have to use, but when you need it your life may depend on it. Even though the ELT is designed to activate automatically when an aircraft crashes, it is still important that you, and your passengers, are familiar with its location in the aircraft and how to operate it manually.

A well-designed, well-installed, and properly functioning ELT can be a very effective tool in mounting a successful search and rescue effort. ■



Readers are encouraged to share their aviation experiences in order to alert others to the potential pitfalls. Please send your experiences to Peter Singleton, Editor, *Vector/CAA News*, Civil Aviation Authority, P O Box 31–441, Lower Hutt, or email publications@caa.govt.nz.

Thanks for the excellent response to this new series. Please keep sending in your contributions.

Small Fracture Nearly Cracks NUT

The Giles G202 is a magnificent aircraft. It is purpose built for unlimited aerobatics – carbon fibre, full-span ailerons, high power-to-weight ratio, symmetrical aerofoils, and quite unstable. It is delightful to fly, being very light and direct on the controls, rolling at 500 degrees/second, and in addition it looks beautiful – something to drool over. ZK-NUT is the only example in New Zealand, and the weekend of 7 February was building up to be a great weekend to fly it. MetVUW.com was indicating that the weather was going to be perfect, and so it turned out to be.

On the Saturday I flew in the Tauranga Airshow, and that seemed to go well, even though the landing was somewhat less than perfect. The crowd reception was good as I taxied back, and afterwards a rather attractive young lady asked for my autograph. I flew home feeling on top of the world and looking forward to Sunday.

At about midday on the Sunday I set out from Ardmore for what was to be the first of two or three practice flights in which I hoped to finalise my routine for the upcoming Aerobatic Championships. The weather was near perfect, and I was still feeling pretty bouncy. On the five-minute flight to my usual practice area at Mercer, I noticed a very slight vibration. This was unusual, as NUT is normally very smooth in flight. I checked the engine (mags, etc), but that didn't show anything unusual. The vibration was only very slight. I went on. After all, it was a beautiful day, and I was feeling great – what could go wrong?

After about 10 minutes of practice, I went to try my planned opening manoeuvre again. It was a pull up to vertical from about 190 knots, three half rolls, a push over the top to a vertical down line, with three more half rolls and a pull out.

Just as I was starting to 'push over', the whole world instantly changed. The aircraft went into an extreme and violent vibration. I naturally pulled back the power and levelled off. My immediate thought was that something had come off the propeller, probably one of the stainless steel leading edge strips, or maybe even a blade tip.

This was not a comforting thought, as I had heard of an aircraft in Japan where a similar failure had torn the engine loose, and I had recently seen a film of a Pitts S2B which lost its whole propeller. I rather carefully headed back to Ardmore with the thought that there is a nice long farm strip about half way home if I needed it. The engine seemed normal, and by playing with the settings I got what seemed an optimum of low power and 2100 rpm, and at that I could maintain about 3000 feet and a little over 100 knots.

The vibration and shaking was intense, and I could easily understand an engine or prop departing. In preparation for that I rehearsed my bail-out procedure (I was wearing a parachute) and undid the lower harness catch so that I had only one catch lever to pull and I would be free. Because I always wear a chute in NUT, I had thought through the possible conditions under which I would jump, and structural failure such as losing a prop blade or engine was definitely one of them.

The aeroplane was stable as I passed over the farm strip heading for left base on Runway 21 at Ardmore. I asked the UNICOM to organise the traffic for me and then commenced descent from about 3000 feet and quite close in. I had expected the vibration to reduce when I lowered the power for descent. Wrong assumption – it got much worse, to the extent that I couldn't see properly. Everything I looked at was blurred. As I was descending I was also getting too low to jump, and this added to my concern.

On final, from about 500 feet I would guess, I recall checking that the runway was clear and asking UNICOM for the wind, but other than that it's a bit vague. It's possibly one of those times when the mind starts blanking out peripheral information. Anyway, with some relief I got safely onto the ground and with a significantly better landing than the previous day at the airshow. A little bit of concentration obviously helps in these things.

On initial inspection everything looked fine, the prop was still all there, and that was a surprise. On a closer look and a shake, the problem became obvious. One of the three propeller blades was free to rotate from the fine stop to the coarse stop, about 30 degrees. And with the blade counterweight that aerobatic propellers commonly have, that blade would immediately have swung to full coarse in flight. This also explained why the problem got worse on descent. In level flight the two good blades would have been at some intermediate pitch setting, but on a steep descent they would have gone to full fine making for a bigger out-of-balance situation.

On reflecting on the event, there were several items of good fortune which aided a successful outcome.

- The failure happened at the top of a long vertical up line. The aircraft was thus slow and at about 3000 feet. A few seconds later and I would have been pulling out of the subsequent vertical dive, with high G loading and at close to 200 knots and nearing 1000 feet. What the vibration would have done to the aeroplane in those conditions one can only guess at. Also, being at 1000 feet, with the Hunua Ranges to cross and no ability to jump if necessary, would have made the trip back much more scary.
- I had done over 800 hours in that aircraft and was very comfortable and confident in it. If I had done only a few hours and was not current, the situation would have been a little different. Currency gave the confidence and familiarity required to much more rapidly assess the situation, and my awareness and understanding of the way the aircraft behaves enabled me to do what was logical to cope with the problem. Also, because I keep my left hand on the throttle when doing aerobatics I was able to get the power back very promptly.
- I was wearing a parachute. Not that I have any desire at all to use it, but it does give the confidence of having another option if necessary. The pilot of the Pitts that lost its propeller carried out a successful forced landing. Because he had a 12-year-old girl in the front he said that jumping was not an option, although if he had been by himself he would definitely have jumped.
- The aircraft was designed for unlimited aerobatics and is very rugged. The engine has a heavy-duty aerobatic crankshaft and the engine mounts are designed to be certified at 12 G. A lesser structure may have failed. As it was, four of the eight rubber engine-mount bushes needed to be replaced, and these were of a special heavy-duty design (and cost over $350 each).
- I was close to Ardmore, over familiar territory and in good weather conditions. Being some distance from anywhere, over tiger country, in an unfamiliar environment, and in adverse weather conditions would have made the whole event much more of a test.

The New Zealand agents for the propeller, Aeromotive Ltd of Hamilton, quickly found the problem. A small plastic spacer in the hub had fractured, due, they believe, to a lack of grease. The problem of grease escaping from those hubs was well known. The manufacturer, MT Propeller of Germany, had previously issued two engineering changes to alleviate the problem, with little success. They have now requested that the hub be sent back to their factory in order to make their third change. I really hope that it works this time. The initial minor vibration I felt after takeoff was probably due to the first piece of the spacer coming free and altering the balance.

While this incident happened to a high-performance, highly stressed aircraft, such problems aren't unknown in normal light aircraft. Three years ago an instructor from the Auckland Aero Club did an excellent job of getting a Piper Archer onto the ground when a blade tip broke off on a cross-country flight.

Looking back, a valid question to ask is why I didn't turn back when I was heading out and detected the first minor vibrations. The answer is that at the time they didn't seem too important. Looking at the likely cause, I probably would not have found any problem and would have gone out again anyway. But then again I may have found the problem.

I think that in the future it would be wise to turn back, and I think that I'll also practise forced landings and rehearse my bail-out procedure a little more often. You just never know when fate will tap you on the shoulder. ■

Thanks to Doug Brooker for contributing this experience. Doug is the current New Zealand Unlimited Aerobatic Champion. He has been flying for 27 years and has amassed 2900 hours, about 1200 hours of which have been aerobatics. He has a PPL licence with multi-IR endorsement.

Note: We will publish an article only if it contains a valid aviation safety message. We do not accept anonymous contributions, but your name and any identifying references will not be published if you prefer it that way. If required, we can help you write the article.

New GAP booklet – *In, Out and Around Auckland*

A new title in the "Good Aviation Practice" series has been published, called *In, Out and Around Auckland*.

Auckland is home to the busiest and most complex airspace in New Zealand. Not only does it accommodate the largest number of aircraft movements per annum, but also it facilitates operations of numerous aircraft types with vastly different performance requirements – from microlights to large jets and warbirds. With nine aerodromes, two CTRs (Control Zones), several MBZs (Mandatory Broadcast Zones), SPAs (Special Procedure Areas), VFR Transit Lanes and GAAs (General Aviation Areas) all located within a 25-NM radius of Auckland airport, the potential for an incident or airspace violation is very real. Because of this, it is crucial that pilots are thoroughly familiar with the airspace structure and local aerodrome procedures before undertaking a flight in the area – especially if they are new to the region.

In, Out and Around Auckland provides a comprehensive overview of Auckland's airspace, its aerodromes and their associated arrival/departure procedures, along with other local information. It is well illustrated, with 3-D diagrams of the airspace structure, and with aerial photographs of many of the visual reporting points. This booklet will be a useful reference, whether you are a first time visitor to the area, a regular visitor, or a local operator.

This GAP booklet is available free from most aero clubs and training schools, or from Field Safety Advisers (FSA contact details are usually printed in each issue of Vector.) It can also be viewed on the CAA web site (www.caa.govt.nz) by clicking on "Safety information – Publications – Good Aviation Practice booklets – In, Out and Around Auckland".

Aviation Safety Coordinator Training Courses

Attention all aviation organisations

Further Aviation Safety Coordinator training courses are in the planning stage. They will be held in late winter. Tentative venues for these two-day courses are Rotorua, Palmerston North and a South Island venue, probably on the West Coast. Early indications of interest would be welcome.

An Aviation Safety Coordinator runs the safety programme in an organisation. Your organisation should have a properly administered and active safety programme.

If you are involved in commuter services, general aviation scenic operations, flight training, or sport aviation, this course is relevant for your organisation. Apart from the course content, you will receive a comprehensive manual, which you could adapt to suit your operation.

You may have had an ASC trained in the past who is now due for a refresher, or personnel changes may mean a new person should be trained.

There is no course fee. The cost of meals (except lunch), accommodation and transport is your responsibility.

Keep an eye on the CAA web site (www.caa.govt.nz) for further details as planning progresses. Course details and an enrolment form will be posted there. Alternatively, contact Rose Wood, Tel: 0–4–560 9487, Fax: 0–4–569 2024, Email: woodr@caa.govt.nz.

Accident Notification

24-hour 7-day toll-free telephone

0508 ACCIDENT
(0508 222 433)

CA Act requires notification "as soon as practicable".

Aviation Safety Concerns

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

0508 4 SAFETY
(0508 472 338)

For all aviation-related safety concerns

Field Safety Advisers

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

Ross St George
(North Island, south of line New Plymouth–Taupo–East Cape)
Tel: 0–6–353 7443
Fax: 0–6–353 3374
Mobile: 027–485 2097
e-mail: stgeorger@caa.govt.nz

Murray Fowler
(South Island)
Tel: 0–3–349 8687
Fax: 0–3–349 5851
Mobile: 027–485 2098
e-mail: fowlerm@caa.govt.nz

Owen Walker
(Maintenance, North Island)
Tel: 0–7–866–0236
Fax: 0–7–866–0235
Mobile: 027–244 1425
e-mail: walkero@caa.govt.nz

Bob Jelley
(Maintenance, South Island)
Tel: 0–3–322 6388
Fax: 0–3–322 6379
Mobile: 027–285 2022
e-mail: jelleyb@caa.govt.nz

OCCURRENCE BRIEFS

Lessons for Safer Aviation

The content of *Occurrence Briefs* normally 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-HDS, Schweizer 269C, 16 Sep 02 at 10:30, Morvin Hills, Lindis. 1 POB, injuries 1 serious, damage substantial. Nature of flight, mustering. Pilot CAA licence PPL (Helicopter), age 43 yrs, flying hours not known.

The helicopter was being used to muster sheep when the pilot reported a sudden increase in engine rpm and a loss of control. It landed in some bush and rolled down a hill. He received serious injuries but was able to extract himself and walk away. The pilot determined that the accident was due to a failure of the external splines on the splined adaptor of the tail rotor drive.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 02/2711

ZK-FMW, Piper PA-34-200T, 12 Nov 02 at 23:38, Ardmore Ad. 4 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Aeroplane), age 34 yrs, flying hours 2167 total, 614 on type, 95 in last 90 days.

The aircraft was returning to Ardmore with the pilot and three passengers on board. While landing on the lighted runway, the aircraft's undercarriage began to collapse. The aircraft scraped along the runway for a short distance before veering off the runway and on to grass. The occupants were unhurt and vacated the aircraft unassisted. The aircraft was substantially damaged.

The cause of the undercarriage collapse was not conclusively determined, but might have been because either a transient electrical fault or play in the undercarriage assembly allowed the nose leg to move and release the downlock.

The manufacturer was aware of only one other similar incident where there was unexplained collapse of the undercarriage.

Main sources of information: From TAIC investigation Report 02-213.

CAA Occurrence Ref 02/3216

ZK-TML, Pacific Aerospace Cresco 08-600, 14 Nov 02 at 07:35, Aria. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 56 yrs, flying hours not known.

The Cresco was taking off when an undercarriage leg collapsed, causing the aircraft to veer off the strip and down a bank, where it suffered major damage. The pilot was not hurt. The weather was fine and airstrip condition good. The leg fracture was traced to a manufacturing defect.

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

CAA Occurrence Ref 02/3231

ZK-HFG, Eurocopter EC 120 B, 15 Apr 03 at 13:00, Donne Glacier. 0 POB, injuries nil, damage substantial. Nature of flight, transport passenger A to A. Pilot CAA licence CPL (Helicopter), age 42 yrs, flying hours 7950 total, 12 on type, 122 in last 90 days.

The pilot and two passengers were on a "Milford Experience" flight, which included a lunch stop, glacier landing, beach landing and a landing at Milford. The normal glacier landing site was on the Tutuko Plateau, but because of cloud and wind conditions, an alternate site on the Donne Glacier was used.

The helicopter was landed on a rock outcrop on the south side of the glacier; power was reduced to ground idle, and cyclic and collective locks were applied. The pilot disembarked the passengers and was escorting them to the left front when the machine yawed to the right in a nose-high attitude before toppling over the side of the outcrop.

The pilot reported that it had been parked into the 10 to 15 knot wind, with the left skid firmly on the ground, and the rear only of the right skid likewise.

The pilot and passengers walked down to a sheltered area after retrieving the on-board survival equipment; the pilot activated the ELT, and rescue was effected a short time later by another helicopter operator.

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

CAA Occurrence Ref 03/1084

ZK-VAD, Cessna 402C, 2 May 03 at 10:00, Greymouth. 6 POB, injuries nil, damage minor. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Aeroplane), age 41 yrs, flying hours 1224 total, 400 on type, 140 in last 90 days.

While the aircraft was landing in wet crosswind conditions, a combination of aquaplaning and excessive braking caused a tyre burst, which resulted in the aircraft veering off the runway. Damage was limited to tyres and a wheel assembly. There were no injuries.

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

CAA Occurrence Ref 03/1282

ZK-HMQ, Schweizer 269C, 8 May 03 at 10:00, near Karori Rock. 1 POB, injuries nil, damage substantial. Nature of flight, training solo. Pilot CAA licence PPL (Aeroplane), age 45 yrs, flying hours 208 total, 18 on type, 21 in last 90 days.

The pilot, on his second solo helicopter flight, raised the collective abruptly, resulting in a right yaw. The helicopter then began rotating to the left, completing about six turns before the right skid touched the ground, and the machine rolled on to its right side.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 03/1324

ZK-HOU, Elisport Helicopters CH-7 Angel, 25 Jul 03 at 16:45, Ardmore Ad. 1 POB, injuries nil, damage not known. Nature of flight, private other. Pilot CAA licence CPL (Helicopter), age 37 yrs, flying hours not known.

The two-stroke engine failed during hover taxi, and the helicopter rolled during the landing. Damage was done to one skid assembly and the rotor blades.

Main sources of information: Accident details as reported by RCC.

CAA Occurrence Ref 03/2172

ZK-RJI, Zlin Z-37T, 6 Aug 03 at 14:00, Hamilton Airport. 1 POB, injuries nil, damage minor. Nature of flight, experimentation. Pilot CAA licence CPL (Aeroplane), age 56 yrs, flying hours 14121 total, 0 on type, 78 in last 90 days.

The pilot was completing his initial type rating training in a single-seat agricultural aircraft.

After completing a touch-and-go, the pilot took his hand off the power lever to raise the flap and the power reduced. The aircraft was slow, and the pilot instinctively applied power; he then needed to retrim the aircraft, and on removing his hand from the power lever the power reduced again. The pilot thought that the engine was surging so decided to land straight ahead. The aircraft failed to clear the airport perimeter fence, resulting in substantial damage to the aircraft. There were no injuries.

The pilot believed that a combination of lack of throttle friction and his misreading of the engine power instruments contributed to the accident.

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

CAA Occurrence Ref 03/2283

ZK-DUQ, Piper PA-28-180, 14 Aug 03 at 07:50, Kaikoura Ad. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 48 yrs, flying hours 391 total, 65 on type, 0 in last 90 days.

Because of the sun just breaking the horizon, causing reduced visibility, the pilot considered it preferable to taxi in the direction of poor visibility and take off with sun behind the aircraft. The pilot failed to see a windsock pole in time to prevent the aircraft's right wing from striking it. Ground frost in that part of the airfield resulted in loss of braking effect.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 03/2472

ZK-DZM, NZ Aerospace FU24-950, 28 Aug 03 at 12:01, Rewarewa. 1 POB, injuries nil, damage minor. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 55 yrs, flying hours 18470 total, 14900 on type, 52 in last 90 days.

The aircraft was carrying out topdressing operations from an elevated strip and had just taken off when reduced engine power and erratic running were experienced. The load was sown in a descending pattern and the aircraft landed on the lower part of the spreading area. Unfortunately, the aircraft hit a sheep during the landing roll, damaging the lefthand outer panel.

Prior to taking off, the aircraft had been parked on an angle and left idling for approximately 10 minutes while the pilot assisted the loader driver with a defective hydraulic hose on the loader. This had allowed the fuel in one tank to transfer to the opposite-side tank. After takeoff, the engine began to lose power and run erratically due to a possible lack of fuel available to the engine.

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

CAA Occurrence Ref 03/2482

ZK-EMX, NZ Aerospace FU24A-954, 30 Sep 03 at 07:19, Ngakuru. 1 POB, injuries nil, damage minor. Nature of flight, agricultural. Pilot CAA licence PPL (Aeroplane), age 28 yrs, flying hours 718 total, 410 on type, 177 in last 90 days.

The aircraft was landing when a crosswind gust from the left caused the aircraft to weathercock. The pilot applied full right rudder and brake, but the aircraft continued to slide diagonally to the left side of the airstrip. The underside of the left wing scraped over four fence posts, causing some minor damage to the aircraft.

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

CAA Occurrence Ref 03/2852

ZK-MGB, Cessna 182H, 8 Oct 03 at 11:15, Paraparaumu Ad. 1 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 57 yrs, flying hours 156 total, 64 on type, 12 in last 90 days.

After joining overhead and descending non-traffic side for Runway 34 (paved), the aircraft made a normal approach circuit from 1000 feet, turning left base for Runway 34. On final approach the aircraft was a little high, but the pilot continued the approach with full flaps. The aircraft touched down on the main wheels and bounced. The second bounce occurred on the nosewheel before the pilot applied full power for a go-around. The next landing was normal. After the aircraft was parked the pilot noticed that the propeller appeared to have struck the ground.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 03/2996

ZK-BPS, Cessna 172A, 12 Oct 03 at 17:02, nr Ashburton. 2 POB, injuries nil, damage minor. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 47 yrs, flying hours 212 total, 53 on type, 8 in last 90 days.

The pilot was returning to his home strip at Ladbrooks (near Lincoln) from Invercargill. He encountered good weather through North Otago but found the cloudbase lowering to 1500 feet in the Timaru area. Around Rangitata, he struck rain and descended to 500 feet to remain clear of cloud. The rain became heavier, and, unable by this time to turn back, he made a precautionary landing in a farm field.

With the wet surface affording only poor braking action, the aircraft struck a fence during the landing roll.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 03/2888

ZK-JLU, NZ Aerospace FU24-950, 27 Oct 03 at 08:15, Bideford nr Masterton Ad. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 55 yrs, flying hours 18521 total, 14951 on type, 83 in last 90 days.

The aircraft took off normally, but a short time after passing over the end of the airstrip encountered sink. This resulted in the righthand main undercarriage leg contacting an elevated spot of ground and breaking off. The underside mirror showed the leg and wheel had been removed cleanly with no trailing parts or aircraft damage. The load was spread and the aircraft landed back at Masterton without further incident.

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

CAA Occurrence Ref 03/3040

ZK-GKO, Schleicher ASW 17, 16 Nov 03 at 15:31, Kiwitahi. 1 POB, injuries 1 minor, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age 51 yrs, flying hours 188 total, 80 on type, 47 in last 90 days.

The glider aircraft was attempting an out-landing into a ploughed paddock, after becoming too low. The pilot, however, allowed the glider's airspeed to get too low. The glider stalled on short final at around 200 feet and impacted on two fence posts on the starboard side, one behind the wing, and one forward of the tailplane. This caused the tail to separate from the glider. The pilot suffered minor injuries.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 03/3334

ZK-EIP, Piper PA-28-181, 20 Nov 03 at 12:05, West Melton. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 38 yrs, flying hours 82 total, 7 on type, 3 in last 90 days.

The aircraft landed heavily, snapping the lefthand oleo, and losing the left wheel and strut. A further circuit was carried out, and the aircraft slewed off the runway on touchdown.

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

CAA Occurrence Ref 03/3753

ZK-HWI, Bell 206B, 26 Nov 03 at 11:00, Beaumont Station. 1 POB, injuries nil, damage minor. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 49 yrs, flying hours 10000 total, 3000 on type, 300 in last 90 days.

The pilot reported that, during agricultural spraying operations, the aircraft suffered a momentary engine power loss, followed by a total power loss and subsequent heavy landing.

Engineers found that the fuel cell had moved forward from the rear wall, interfering with the upper fuel sender unit, and causing erroneous indications. The fuel cell was a type applicable to helicopters S/N 3567 and subsequent, and it was of a more rigid construction, replacing the use of lacing to retain the tank shape. It is recommended that the operators of Bell 206 helicopters S/N 3567 and subsequent take steps to ensure the integrity of the fuel cell installation.

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

CAA Occurrence Ref 03/3369

ZK-EZI, Piper PA-38-112, 29 Nov 03 at 13:42, Wellington Ad. 1 POB, injuries nil, damage substantial. Nature of flight, training solo. Pilot CAA licence nil, age 23 yrs, flying hours 125 total, 125 on type, 13 in last 90 days.

The student had just completed a check flight and was approved to continue solo in the circuit. However, the wind picked up, and the pilot was caught by a gust and failed to control a bounce, which led to a heavy landing.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 03/3452

ZK-GVF, PZL-Swidnik PW-5 "Smyk", 20 Dec 03 at 15:10, Whenuapai. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence not known, age not known, flying hours 30 total, 8 on type, 5 in last 90 days.

The pilot appeared to become overloaded during the landing phase and possibly did not recognise a changing wind gradient, which reduced the glider's airspeed. He took action very late, and this resulted in the aircraft landing very heavily on its nose. There was substantial damage to the nosewheel fuselage area.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 03/3739