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BUREAU OF AIR SAFETY INVESTIGATION

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Contents

COVER

Sunset from a Department of Aviation
Gulfstream Commander 695B (AIS photograph.)

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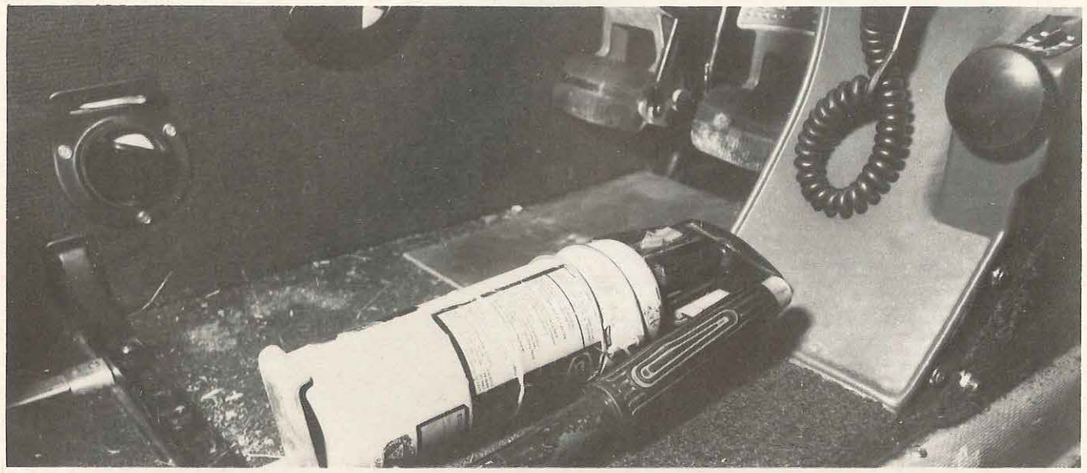
Hand portable fire extinguishers



Can you remember from the last time you flew a light aircraft:

- What kind of hand portable fire extinguisher it had (e.g. Halon, CO_2, dry powder, water based)?
- Where the extinguisher was stowed?
- How to release it quickly from its stowage area in an emergency?
- How to operate the extinguisher?
- Whether any operational restrictions applied to the type of extinguishant?

Indeed, can you remember whether your aircraft even *had* an extinguisher?

If you are unable to answer all of those questions, then your safety preparation is not as good as it should be.

Carriage of extinguishers

There are mandatory requirements for the carriage of hand portable fire extinguishers in aircraft of the following categories:

- all aeroplanes with a takeoff weight above 5700 kg
- charter and Regular Public Transport (RPT) aeroplanes with a maximum takeoff weight of 5700 kg and below
- all helicopters with a maximum weight above 2750 kg

From this it follows that it is not mandatory to carry a hand portable extinguisher in fixed-wing GA aircraft of less than 5700 kg engaged in operations other than RPT or Charter: in other words, the majority of GA flights in Australia can be conducted without an extinguisher.

It is, however, clearly in the interests of safety to have access to fire-fighting equipment, and many aircraft owners wisely take the precaution of fitting a portable extinguisher in their aeroplane, regardless of the class of operation for which it is used. The Department of Aviation strongly endorses this practice.

Fitting an extinguisher is, of course, only the first step in helping to protect life and property, as the following accident summary indicates.

> A light twin was cruising at 7500 feet when the pilot became aware of a fire behind the throttle quadrant. A descent was commenced immediately and the pilot began to run through emergency checks and procedures. The fire continued to burn. Shortly after starting the descent the pilot sighted a disused sealed strip and started an approach to land there.
>
> With the fire still burning the pilot took the portable fire extinguisher, intending to discharge it into the throttle quadrant. The extinguisher would not work. By this time the pilot had to concentrate on getting the aircraft safely onto the ground, so the extinguisher was passed to one of the passengers to try to get it to operate. In his words: 'I read the instructions on the fire extinguisher — followed the instructions but nothing happened. I then shook the extinguisher and heard what I believed to be a liquid slosh around in the canister.'
>
> In the event the aircraft was landed and the passengers safely evacuated. The fire, however, continued to burn, the eventual outcome of which can be seen in the accompanying photograph. (*overleaf*)
>
> While it cannot be said that the aircraft would not have been destroyed if a serviceable extinguisher had been available, the chances are that the prompt application of a suitable extinguishant would have arrested the fire before it became uncontrollable.

An extinguisher that does not work is just dead weight in an aircraft. It is in an attempt to circumvent the kind of occurrence detailed above that regulations exist regarding the useful life of, and time between overhauls for, extinguishers.

Service life

Unless approval has been obtained to the contrary, the maximum service life of hand portable fire extinguishers is not permitted to exceed five years taken from the date the container was filled. For extinguishers which can be overhauled, the maximum service life between overhauls again is five years. In any event, fire

This light twin was destroyed by fire after the extinguisher was found to be unserviceable.

extinguishers must be permanently retired from service in accordance with the manufacturer's ultimate life limitations.

For those operators not involved in RPT or Charter work but who take the sensible precaution of fitting an extinguisher, their safety initiative may come to naught if they do not also ensure that the extinguisher remains serviceable. Note that any overhaul on an extinguisher must be performed in accordance with the manufacturer's recommendations.

Type and installation of extinguisher

The number, type and location of extinguishers stipulated for aircraft on which their carriage is mandatory can vary. Operators whose aircraft must carry extinguishers must consult the pertinent Orders. The main purpose of this section of the article is to draw to the attention of those owners who do not have to carry extinguishers, but do, the main points to be observed on selecting and fitting same.

- An extinguisher which is intended for use in the Flight Deck Compartment must not contain a dry powder or water based extinguishant. Clearly, this regulation would affect most GA aircraft.
- Extinguishers must be positioned and installed so that they are readily accessible and their availability clearly evident to anyone who may be required to use them.
- Extinguishers must be located in an environment and mounted in an attitude which complies with the manufacturer's recommendations.
- They must not be mounted in positions which could lead to accidental discharge or restrict access to other equipment.
- The extinguisher must be mounted in a bracket from which it is readily detachable.

Comparative analysis of extinguishants

Some interesting data emerged from a comparison of aircraft fire extinguishants reported in the September 1983 issue of the U.S. magazine *Aviation Consumer.* The *Digest* wishes to acknowledge *Aviation Consumer's* kind permission to refer to that data.

Dry powder. Dry powder extinguishers have often been favoured because they are light and cheap. While they are normally effective on open blazes they do not penetrate well into deep, smouldering fires. Further, dry powders which eventually are melted by exposure to heat are dangerously corrosive to bare aluminium, electrical equipment and engines. Several years ago the (U.S.A.) National Business Aircraft Association maintenance bulletin pointed out that two aircraft engine failures had been caused by ingestion of dry chemicals during attempts to extinguish intake manifold fires because the chemical residue formed a sticky shellac-like substance on the intake valve stems, causing them to seize.

There is also an instance on record of a dry powder extinguisher being accidentally discharged in a light aircraft cabin in flight, and creating instant IFR conditions inside the cockpit. The pilots reported conditions of 'blinding clouds of white powder obscuring everything, and the aircraft slowly sliding into a spiral'.

Carbon dioxide. Carbon dioxide works as an extinguishant by smothering a fire and displacing all the oxygen. A drawback here is that, under certain circumstances, it may have the same smothering effect on the pilot. Another problem with CO_2 is that the gas exits extinguishers at a temperature of about minus 45 °C, which gives it the potential to cause a blinding condensation fog, or thermal shock damage to any hot electrical or avionics systems exposed to the sub-freezing blast.

Finally, while CO_2 works against most types of fires, it is no more effective in penetrating a smouldering, imbedded fire than is dry powder. (Incidentally, for these imbedded fires, such as one in a seat, plain ordinary water works better than anything else.)

Halon. The use of Halon hand portable fire extinguishers is recommended by the Department of Aviation. Two types of Halon are readily available and widely used: Halon 1211 (BCF) and Halon 1301. Unlike CO_2, the Halon liquefied gases do not smother a fire; instead, they inhibit the chemical flame chain reactions to terminate the combustion process.

Halon 1211 (bromochlorodifluoromethane) is highly effective and most readily available in hand-held equipment suitable for use in light aircraft. Since Halon 1211 is in a liquid state below minus 5 °C and discharges from most extinguishers at temperatures varying from minus 10 to minus 5 °C, it is discharged in the form of a fine mist of droplets (about 85 per cent liquid and 15 per cent gas) and thus has a good throw distance (i.e., 'squirting' range) of 3 to 5 metres. 1211's discharge temperature is so much higher than that of CO_2 that it is far less likely to cause any thermal shock damage to sensitive avionics and instruments in an aircraft panel.

Note that extinguishers containing Halon 1211 will satisfactorily extinguish a Class 'A' (fabric, paper, wood) fire, as combustion is prevented for as long as the gases remain around the burnt material. However, there is a danger of re-ignition when the gases dissipate because of high residual heat in the combustible material and the presence of oxygen in the atmosphere. This possibility can be overcome by following up with water after a deep seated Class 'A' fire.

Note: Never discharge Halon 1211 onto burning metal fires.

Halon 1301 (or bromotrifluoromethane) has virtually the same fire-fighting capability as Halon 1211 but it has a number of different physical characteristics that make it more suitable for built-in total flooding systems than for hand-held extinguishers.

Other advantages of both Halons are as follows:

- They are electrically non-conductive.
- Unlike dry chemical extinguishants, Halon evaporates completely and leaves no stains or residues of any kind.
- Halon is five times heavier than air, so it tends to remain concentrated in the target area; although when it is fully circulated throughout an aircraft cabin, it will remain in atmospheric suspension and not settle out to the floor.

Operating considerations. Both types of Halon begin to break down chemically when exposed to temperatures above 460 °C, and their decomposition by-products (primarily hydrogen, fluoride, chloride and bromide) are both acrid and highly toxic. Halon 1211 is about five times more toxic than Halon 1301 (which is one reason why the latter is preferred for flooding systems).

The toxicity of Halon is such that inhalation can make the heart abnormally sensitive to elevated adrenaline levels (which would certainly be present during an aircraft fire) — a phenomenon known as cardiac sensitisation. This can result in heart arrhythmia and possible death. However, these effects are rapidly and completely reversible upon removal from exposure, or a good ventilation of the aircraft cabin.

Here, it is significant to note that tests conducted by the American FAA indicate that the use of Halon in small aircraft in flight is unlikely to be dangerous; the reason being that light aircraft cabins generally are so well ventilated that the Halon discharged from a portable extinguisher can never reach high enough levels of concentration to become toxic. In a test using a Cessna 210, the FAA found that its ventilation rate prevented the Halon dosage released from reaching more than about one-quarter of the level that might be toxic.

As is the case with any extinguisher, the imperative with Halon is to extinguish any fire as rapidly as possible in order to:

- achieve the primary objective, and
- minimise toxicity.

CLASSES OF FIRE

Class A — Fires in ordinary combustible materials, such as wood, cloth, paper, rubber, and plastics for which the quenching and cooling effects of quantities of water, or of solutions containing a large percentage of water, are of prime importance.

Class B — Fires in flammable liquids, oils, greases, tars, oil base paints, lacquers, and flammable gases for which extinguishing agents having a blanket effect are essential.

Class C — Fires which involve energised electrical equipment and where the electrical nonconductivity of the extinguishing media is of importance.

Class D — Fires which involve combustible metals, such as magnesium, titanium, zirconium, sodium, lithium, and potassium and require extinguishing agents of the *dry powder* types, following special techniques and manufacturer's recommendations for use because of the possible chemical reaction between the burning metal and the extinguishing agent.

EXTINGUISHING AGENTS

The following extinguishing agents are recommended as appropriate for use on the classes of fires defined above:

Carbon dioxide — Class B or C
Water — Class A
Dry chemicals — Class A, B or C
Halogenated hydrocarbons — Class A, B or C
Specialised dry powder — Class D

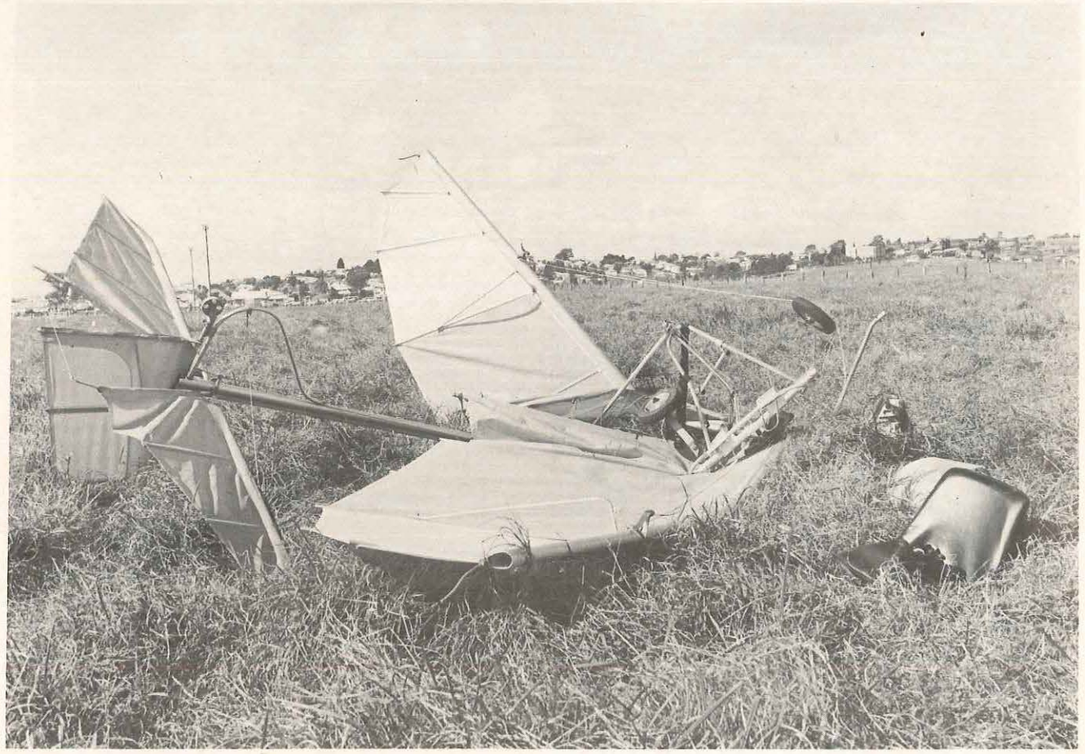
Summary

Several most important conclusions arise from this information. Aircraft fires can happen to any pilot, and *will* happen to some pilots reading this article. It will be too late if you wait until after the sudden conflagration occurs to start desperately searching for a fire extinguisher that may not work, or may not even be there. Make sure that the odds are on your side by having access to a suitable, serviceable hand portable fire extinguisher. Also, carrying a container of water will add insurance against seat fires ●

Ultra-lights aren't easy

The results of several accident investigations completed by the Bureau of Air Safety Investigation indicate that some pilots — particularly those with experience on General Aviation aircraft — believe that flying an ultra-light is relatively easy. This is a mistaken and dangerous notion. The handling characteristics of many ultra-lights are substantially different to the GA range, including the most commonly used types such as the C150, C172, PA28 and so on. Ultra-lights tend to have a narrower performance envelope, far less power to weight, and far more drag. One significant consequence of this is that their inertia is nothing like that of a GA aircraft; thus, when the throttle is closed or the engine stops, the loss of airspeed is far more rapid than is the case with a GA machine. Additionally, when you operate at speeds of around 20 knots, the effects of wind and/or terrain — even a 5 knot gust or a single tree — can produce alarming control problems for the unwary.

This is not to suggest that ultra-lights are inherently dangerous. Rather, the point is that training must be thorough; GA experience is not necessarily completely transferable, and overconfidence arising from that experience can be gravely misplaced. All of those factors — as well as other important safety lessons — were evident in a serious accident involving a Skycraft Scout Mark III.



The accident

A pilot with a private licence and about 250 hours GA experience intended purchasing a Skycraft Scout. He had not flown the type, or any other ultra-light, previously.

Before buying the aircraft the pilot arranged to complete a check flight and, at the same time, familiarise himself with the machine. The normal procedure for pilots learning to fly an ultra-light consists, among other things, of conducting a series of short 'hops' along a strip in order to become familiar with the aircraft's handling characteristics gradually and safely. The pilot was already aware of this. Further, before his check sortie, he was advised by the then-owner to limit himself initially to ground handling.

However, after only several minutes of taxiing — during which, according to one witness, the pilot did not appear to have particularly good control — he took off, climbed to about 20–30 feet, reduced power and landed immediately.

Discussing the brief flight with the owner — who had been disturbed when he saw the aircraft unexpectedly take off — the pilot commented that the engine had seemed to miss when he reduced power on reaching 20–30 feet. The owner replied that this was probably caused by the throttle being retarded too quickly. This explanation was accepted. The owner also mentioned that the aircraft should always have its engine at full power when climbing.

No further familiarisation taxiing or flying was conducted: the sale was concluded and the pilot departed with his new aircraft in its trailer.

Two days after buying the Scout the pilot carried out some routine maintenance checks. A witness later reported that several problems were evident during an engine ground run. The engine had been difficult to start, while during a full power run there reportedly had been some misfiring and excessive vibration. Apparently these problems had been resolved by replacing the spark plug and cleaning the contact breaker points.

The following day the pilot transported the Scout to his local aerodrome. He assembled the aircraft, strapped in, and started the engine, apparently without difficulty. He then taxied to the intersection of the main taxiway and grass runway, lined up, and took off towards the west.

When the aircraft had reached a height of about 100 feet, a left turn was commenced and some witnesses reported hearing a slight power reduction. The Scout appeared to be flying slowly during the turn in a nose-high attitude. After it had turned through approximately 200 degrees it appeared to stall and entered a steep dive. It hit the ground about 75 metres to the south of the grass runway, in a paddock which was heavily grassed and in which the soil had been softened by recent rain.

The aircraft was destroyed and the pilot, who was not wearing a protective helmet, sustained serious injuries.

Analysis

A technical examination of the aircraft wreckage failed to reveal evidence of any pre-existing mechanical fault or failure. In conjunction with witness reports and the on-site investigation, this finding made it clear that the aircraft had indeed stalled.

Investigation also led to the conclusion that the pilot had made no attempt to recover from the stall. This was considered likely to have stemmed from a number of factors:

- his inexperience on type
- the aircraft's close proximity to the ground
- the element of surprise

The flight was only the pilot's second on type and he had not properly acquainted himself with its low speed handling characteristics. Indeed, he had not even familiarised himself with normal operating procedures: had he done so, he would not have reduced engine power while in the climb (as reported by witnesses) at about the time he entered the left turn.

As far as stalling at a very low altitude is concerned, it is likely that when the aircraft's nose dropped rapidly, the pilot would have experienced a sensation similar to that which parachutists know as 'ground rush'. This would probably result in an instinctive reaction to pull back on the control column, which in turn would nullify any inherent longitudinal stability effects assisting recovery from the dive as speed increased. (Note that in an ultra-light, the onset of this 'ground rush' sensation is likely to be far more rapid than for a GA aircraft, given the former's particular aerodynamic and performance characteristics.)

Finally, any inadvertent stall is likely to contain an element of surprise. In these particular circumstances, anything which delayed the commencement of the correct recovery actions was going to be critical.

General safety lessons

Two other important lessons emerged from this accident. First, the pilot was not wearing a protective helmet. Depending on pilot size, there may be insufficient clearance in this particular aircraft when the pilot is seated, between the tail boom and a helmeted head. However, discussions with the Scout's manufacturer elicited the advice that this problem can be easily overcome by the pilot positioning his head either side of the tail boom by leaning to the left or right. Also, regarding safety equipment, the aircraft had only a lap seatbelt rather than a full lap/shoulder harness.

Second, the pilot was a large man. By definition, ultra-light aircraft are very small and, clearly, pilot size may significantly affect aircraft performance. As it happened, this pilot was heavier than the maximum weight recommended by the manufacturer. It was estimated that the effect of this would have been to move the position of the longitudinal centre of gravity aft, thus reducing stability.

Comment

Ultra-light flying is a growing sport in Australia, offering as it does some of the exhilaration of stick-and-rudder, open cockpit piloting at a reasonable price.

Like any sport, the odds are you will enjoy it more if you are good at it. In aviation that means being thorough and safety conscious in your attitude to all operational aspects: for pilots and LAMEs, words like 'good' and 'expert' are synonymous with 'safe'. Enthusiasm and safety awareness are not mutually exclusive; on the contrary, when they exist in conjunction they enable you to derive maximum enjoyment from your recreation ●

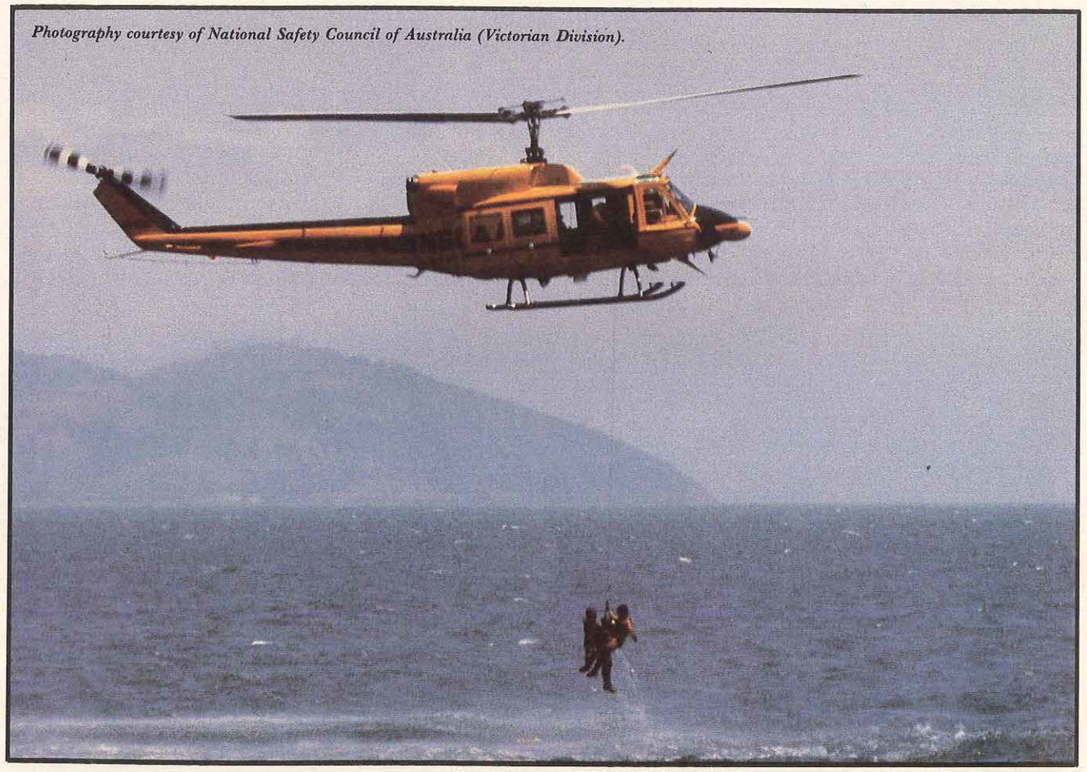
Notable quote

Seven steps to safety stagnation:

- It won't work.
- It costs too much.
- We're doing okay without it.
- We're not ready for that yet.
- We tried it once and it won't work.
- We've never done it that way before.
- That's not my responsibility.

Ostrich

Hypothermia



Photography courtesy of National Safety Council of Australia (Victorian Division).

The human body has well-defined limits for its optimum performance. In the way that an aircraft has a 'performance envelope' so too the human body has an envelope in which it operates well. Take the human body out of this envelope and it complains, usually with a sensation of pain; then if no notice is taken of the warning it begins to fail.

One of the important elements of human performance is the control of body temperature, particularly of the inner core of vital organs. The brain especially will only perform satisfactorily within a narrow band of temperatures. The control of temperature is complex but the heat produced by bodily activity (metabolism) must be balanced by heat loss from the body to maintain an equilibrium. This may be expressed in the form of a simple equation:

Heat produced (Metabolism) = Heat loss (Radiation + Convection + Conduction + Evaporation)

We should all be familiar with the processes of heat transfer from our knowledge of physics gained at school. The modes of heat transfer should therefore be well known and experienced in our everyday lives. We are familiar with heat loss in cold weather, made worse if there is a wind or our clothing is wet. We are less likely, though, to have experienced heat transfer by conduction. It is possible to transfer heat to our bodies from the environment if the air temperature is high, there is no wind and it is humid. This heat gain is not a topic for this article, but in some circumstances it may occur and create major difficulties.

The topic of this article is heat loss which leads to a reduction in the core temperature of the body — hypothermia. The term is derived from the Greek *hypo* (below or under) and *thermos* (warm). This term is used to describe the condition which occurs when the body's core temperature falls below 35 °C (95 °F), a mere 2 °C below the temperature usually regarded as 'normal'. In its early stages hypothermia can seriously affect performance, while a severe case can result in death.

There are three main situations in which pilots are likely to find themselves exposed to this dangerous condition:

- loss of aircraft pressurisation (decompression)
- exposure to extreme conditions on land
- exposure to extreme conditions and/or immersion after a ditching

In Australia serious body heat loss is most likely to be associated with immersion, so the major part of this article is directed towards the problems associated with ditching. At the same time, the dangers arising from either prolonged flight at high altitude in a very cold cockpit or exposure on land to low temperatures and/or a high wind chill factor cannot be discounted.

Decompression

If aircraft pressurisation is lost at relatively high altitudes (as a *guide* only, say above about 25 000 feet) one of the consequences will be a rapid drop in temperature. Unless the aircraft is descended to a lower, warmer temperature within a short period (about 2–5 minutes) damage to skin and hypothermia can result.

In any circumstances, prolonged operation in a cold cockpit is likely to lead to physiological and, therefore, performance problems.

On land

It is a wise precaution in much of Australia always to have available in your aircraft warm protective clothing. Should the unexpected eventuate — as it often does in aviation — such as an unplanned stopover in a remote area, or an emergency landing, what might have at first been a pleasant, mild day may soon become a fight for survival should you find yourself faced with a cold night, winds, little shelter, high terrain, and so on.

Preventing hypothermia. If you find yourself in the situation described above, the important points to note are:

- try to find some shelter;
- put on extra clothing;
- have something to eat and drink; and
- make a careful assessment of all factors before committing yourself to any course of action.

Symptoms. Someone suffering from hypothermia will:

- be cold to touch; and
- have a slow pulse accompanied by slow and shallow breathing.

Note that elderly and infirm casualties may be unconscious (the young and old are particularly susceptible to hypothermia).

The patient may have a pink face, hands and feet, which can give a visually deceptive impression of warmth.

Treatment. Treat as follows:

- Place the casualty between blankets so that the temperature can rise gradually.
- If conscious, give warm sweet drinks (body supplies of sugar are reduced with prolonged exposure to cold).
- *Do not* use hot water bottles or electric blankets as these will open up skin vessels and take blood from deeper tissues, causing collapse.

Note 1: Recovery can be swift but if it has not occurred within 15 minutes, or the patient has collapsed, he will not be able to to warm himself; you must do it for him. You must treat him on the spot — he may collapse and die if you wait too long attempting to get to shelter.

2: Alcohol has no place in preventing the onset of hypothermia. The use of alcohol before, during or after profound exposure to a cold environment cannot be deplored enough. Alcohol causes the vessels of the skin to dilate and will give rise to a considerable loss of body heat from the core, the very opposite to what is required. Similarly, the inexpert administration of drugs is likely to exacerbate a patient's condition.

Ditching

In the past decade there have been a number of well-publicised aircraft ditchings in the Australian region. It may surprise some readers to learn that the average rate of ditchings during that period has been about four a year and, while a number of those have been into inland lakes, dams and the like, many of the others have been into the generally far less hospitable oceans.

A ditching involves numerous hazards, not the least of which is that of surviving once the aircraft is safely in the water. In the seas off Australia from about the central eastern to the central western coastal extremities, perhaps the key factor for much of the year is that of retaining sufficient body heat to stay alive. In this context, it is significant to note, first, that a water temperature of about 20 °C seems to be the demarcation point between 'safe' and 'dangerous' water temperatures, and, second, that average sea temperatures off Australia's central/southern coasts are about 15–20 °C in summer and 10–15 °C in winter.

There is little doubt that in a number of Australian ditchings the touchdown itself was survivable, but the failure to carry life-saving equipment, or ignorance of life-saving procedures, subsequently contributed to death.

Thus, before addressing the subject of body temperature loss after ditching in detail, it is worthwhile emphasising — yet again — the absolute importance of thorough preflight preparation. Here, in addition to the normal requirements, special attention would have to be paid to such items as:

- flight planning — fuel, accurate reporting points and times, submission of a detailed flight plan
- survival equipment (eg, ELT, raft, life jackets, anti-exposure suits, rations, etc)
- aircraft glide performance
- diversions, equi-time points and so on
- knowledge of survival techniques

* * *

The most likely occurrence of hypothermia is during immersion in water which is below 20 °C. At water temperatures below this, heat loss outstrips any conservation of heat which the body attempts by way of compensatory mechanisms. The high thermal conductivity of water leads to rapid body cooling. In turn, the loss of heat from the skin and extremities (body shell) produces a heat gradient with the core which causes a transfer of heat to the shell and thus to the environment. Movement of water past the body will increase the heat loss convection effect, though the relative movement of water to a floating body is likely to be small. The body attempts to conserve heat by constricting blood vessels in the skin and subcutaneous fat which then become layers of insulation. In addition, the body endeavours to produce more heat by inducing shivering, which at its maximum raises heat production five-fold above the normal resting level. As the core temperature falls below 35 °C mental confusion occurs, and manual dexterity and strength wane to a level where a survivor will be unable to clutch and hold a line. A further fall in core temperature sees the shivering replaced by stiffness and consciousness reduces. Life expectancy diminishes rapidly with the onset of unconsciousness. It is imperative that persons

in the water are recovered as soon as possible, at least into a raft if not to land. Figure 1 illustrates the effects of reducing body temperature.

How long can a person survive in water? The answer to this question is surrounded by many 'ifs' and 'buts'. Variations of many factors alter the chances of survival, so it is pertinent to discuss some of these factors.

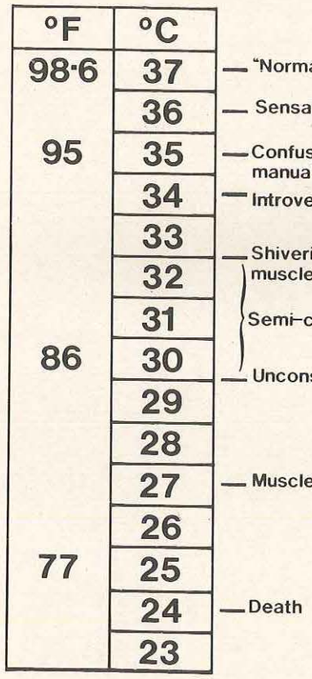


Fig. 1. Effects of drop in body temperature

Water temperature
The temperature of the water in which a person is immersed is obviously of prime importance. The lower the temperature, the greater the risk. As already suggested, 20 °C (68 °F) appears to be the borderline between 'safe' and 'dangerous' water temperature, but only if prolonged for a matter of days instead of hours.

Note again that the average sea level temperature in Bass Strait is 20 °C or less the year round, and that similar conditions will prevail over the entire Australian coast from the south-east to the south-west for significant periods of the year.

Duration of immersion
Related intimately with water temperature is the duration of exposure. A short time-exposure to very cold water may be tolerated, whereas a longer period of time in warmer water may be fatal. The relationship between duration of exposure and water temperature is well shown in Figure 2. The lines of the graph are drawn for 'average' persons without an anti-exposure suit.

Fat
Subcutaneous fat is an excellent insulator against heat loss and 'fatties' are much better able to manage cold water immersion than 'skinnies.' Survival rates may be improved by up to sixteen times for the very fat person over the very thin. Small children, because of their relatively large skin area, cool more rapidly than adults. Male adults cool more rapidly than females of similar size because of generally having thinner fat layers. The chivalrous call of 'Women and children first' should perhaps be reconsidered and replaced by 'Children and men first'! (However, the improved survival rate of 'fatties' should not be an excuse for over-indulgence in food and drink to produce a fatty layer, as there are more disadvantages to fatness than there are benefits.)

Water experience
Persons who spend a good deal of time in the water, especially the sea, and feel 'at home' in water are usually able to survive better. Experienced swimmers develop layers of fat and some level of adaptation to cold and are more likely to survive. They are also less likely to panic and thereby lose their life by drowning from inappropriate actions.

Exercise
Although exercise such as swimming will produce heat and therefore appear to be an answer to reducing core temperature, it has an unfortunate side effect. The increased activity causes the blood supply to the shell (skin) to open up and transfer heat to the surrounding water very rapidly, causing the core temperature to drop even further. Swimming should not be undertaken unless you can reach land in a very few minutes.

Clothing
Clothing loses much of its insulating properties when it is wet, though it will decrease the rate of cooling to some extent. The usual clothing of crew and passengers who may have to survive in the waters around Australia will probably not add significantly to their survival times. The only substantial improvement comes from using an anti-exposure suit.

Alcohol
Attention must be drawn again to the section above addressing the dangers inherent in administering alcohol or drugs to hypothermia victims.

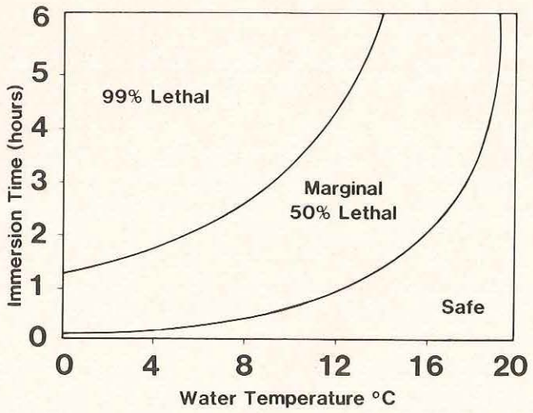


Fig. 2. Effect of water temperature on survival prospects.

Prevention of immersion-induced hypothermia

When an individual is immersed in cold water there is little that can be done to stop the core temperature dropping, but steps can be taken to slow down the heat loss.

Flotation
The use of a life jacket will enhance survival as it will not only assist in keeping the survivor on the surface and aid against drowning, but because the survivor need not tread water, he can preserve his energy reserves. The use of a flotation device therefore significantly enhances survival.

Clothing
Whilst clothing loses a lot of its insulating properties when wet, layers of clothing will assist in trapping water close to the body which will warm to provide some insulation. Quite obviously the use of an anti-exposure suit by crew and passengers on all over-water flights is not practical. There is commercially available though, a garment which will provide flotation and protection to high heat-loss areas for those persons who regularly fly light aircraft over water, and which is claimed by its manufacturers to increase survival time four-fold.

In-water techniques
It has been established that the main areas of heat loss from the body are the head, neck, axillae (armpits), sides of the chest and the groin. Any technique which prevents water conducting heat away from these areas is therefore most helpful. A solitary survivor can help himself by taking up the 'Heat Escape Lessening Posture' (HELP) as illustrated in Figure 3. Flotation gear will keep the head above water, folding the arms round the chest will protect the axillae and chest, and folding up the legs covers the groin. If a few survivors are present in the water, they can huddle together for mutual protection (Figure 4). The techniques of HELP and huddling may well increase survival times by 50 per cent, a significant improvement.

Fig. 3. Heat Escape Lessening Posture (HELP)

Fig. 4. 'Huddle'

Pre-flight planning
As is the case without exception, the key to safe operations is preflight planning. Proper maintenance and preparation of the aircraft is a prerequisite for any flight. For over-water flights, it is also essential that any survival gear such as life rafts, life jackets and signal devices are not only serviceable, but readily accessible. Life jackets should preferably be worn. Finally, if there is any possibility of flight over water, then a flight plan should be filed and reporting positions and times adhered to so that in the unfortunate event of a ditching, the search and rescue facilities may swing into action at the earliest possible moment.

Summary

- Prepare properly for your water crossing
  - — aircraft equipment maintenance
  - — aircraft flight planning
- Water survival
  - — flotation equipment
  - — life jacket
  - — life raft
  - — remain still
- Single — HELP posture
- Multiple — huddle together
- Above all DON'T PANIC — CONSERVE YOUR ENERGY ●

On remaining current

A glider pilot was returning to land after a period of general handling practice. When established on the landing glide path, he operated what he thought was the dive brake handle to extend the brakes to control his final approach. However, the glider's descent profile did not change which meant that it quickly began to overshoot the strip.

Realising that he was going to go beyond the strip, the pilot decided to complete an outlanding in an adjoining paddock which appeared both adequate in size and free from obstructions. Yet again the glider floated, to the extent that it also overshot the selected outlanding area.

By this stage the pilot had little control over where he was going to touch down. In the event the glider settled on to the down slope of a minor undulation, traversed a patch of soft wet ground and then hit rising ground. It was substantially damaged while the pilot sustained minor injury.

This pilot had in the order of 160 hours experience, 90 of which were on powered aircraft and 70 on gliders. His training had suffered from large time gaps between flights. His recent experience had been particularly sparse:

- 4 hours in the past 3 months
- 1 hour in the current month

Because of this, his gliding club had given him a pre-solo check prior to the flight during which the accident occurred. Following that check flight the pilot was told by his instructor that he needed to pay more attention to airspeed control.

During the approach on his solo flight, the pilot was conscious of this debriefing and it seems probable that he concentrated on the airspeed indicator to the detriment of other necessary actions. When he reached the stage at which it was necessary to extend the airbrakes, he inadvertently pulled the towcable release lever rather than the airbrake lever (see photograph).

Despite the fact that he overshot not only the strip but also his selected outlanding area, the pilot was unable to make the logical connection between his aircraft's excess performance and the failure of the airbrakes to extend. This was directly linked to his limited recent experience. Among the relevant factors identified as contributing to the accident were the following:

- pilot inexperienced on type
- pilot not in current flying practice

Comment

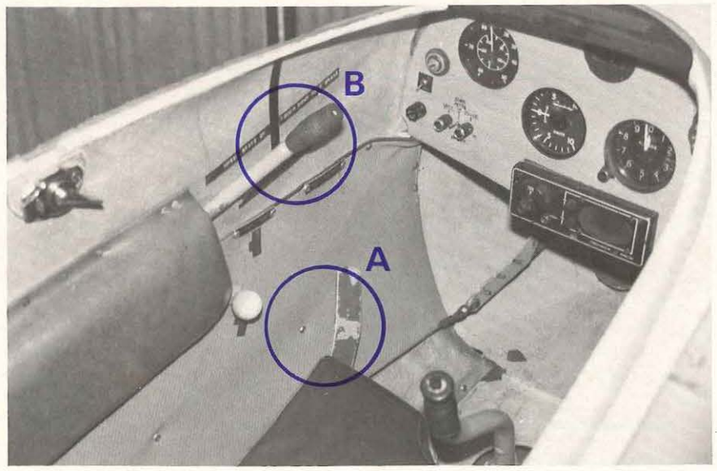
Regardless of whether one is flying a jumbo or a minimum aircraft, a certain frequency of operation is essential to retain proficiency. The ideal system is the fixed and closely supervised training regimen enjoyed by RPT aircrew. Clearly, however, such a regimen is impracticable for those who fly for recreation or, indeed, in some cases, on private business.

No amount of regulation will ever ensure pilot currency. Supervisors within such organisations as flying clubs, schools and companies bear a large responsibility for ensuring that those who use or hire their aircraft are qualified, competent and current.

As is so often the case in aviation it is, though, in the final analysis, the individual's decision whether he or she is 'up to it'. It is not just a matter of getting off the ground and getting back on again. We must be certain within ourselves that when the need arises we have the ability, both in terms of familiarity with our aircraft and overall aeronautical knowledge, to analyse and deal with unexpected events.

If you do not have that certainty, then it is time to take the initiative yourself and arrange for some consolidated dual training.

As a last thought, and appreciating that recreational flying can be an expensive business, time spent sitting in a cockpit on the ground with the Pilot's Handbook, familiarising — or refamiliarising — yourself with controls, systems and checklist sequences is rarely wasted ●



Pilot operated the tow cable release lever (A) instead of the airbrake deployment lever (B).

Aircraft accident reports

FIRST QUARTER 1985

The following information has been extracted from accident data files maintained by the Bureau of Air Safety Investigation. The intent of publishing these reports is to make available information on Australian aircraft accidents from which the reader can gain an awareness of the circumstances and conditions which led to the occurrence.

At the time of publication many of the accidents are still under investigation and the information contained in those reports must be considered as preliminary in nature and possibly subject to amendment when the investigation is finalised.

Readers should note that the information is provided to promote aviation safety — in no case is it intended to imply blame or liability.

Note 1: All dates and times are local

Note 2: Injury classification abbreviations

C = Crew P = Passengers O = Others N = Nil
F = Fatal S = Serious M = Minor

e.g. C1S, P2M means 1 crew member received serious injury and 2 passengers received minor injuries.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	*Aircraft type & registration / Location*	*Kind of flying / Departure point/Destination*	*Injuries / Record number*
04 Oct 1345	Cessna 150M VH-TDX Berwick, Vic.	Instructional—solo (supervised) Berwick, Vic./Berwick, Vic.	C1N 8431029

Earlier in the day the pilot had undergone a dual check and was authorised to conduct the same operation solo. After some time in the training area he returned for a landing in light crosswind conditions. The aircraft landed heavily nosewheel first and bounced several times before the nosegear collapsed rearwards. The aircraft slid to a halt on its nose, 101 metres from the initial touchdown point.

07 Oct 1730	Cessna 182M VH-EGZ Flinders Is, Tas	Non-commercial—pleasure Canberra, ACT/Flinders Is, Tas	C1N, P3N 8431030

The initial touchdown was in a flat attitude and the aircraft bounced. The second touchdown was on the nosewheel and the propeller struck the ground. After the aircraft bounced again the pilot carried out a go-around, during which he noticed about 75 millimetres free travel in the elevators. A safe landing was made and an inspection revealed damage to the firewall, which had moved the elevator control cable pulleys rearwards and allowed the cables to slacken.

12 Oct 1200	Piper PA25-235 VH-CCS Blayney, NSW 15 SW	Aerial agriculture Clay River Hill Stn/Clay River Hill Stn	C1N 8421053

During spraying operations the engine suffered a partial power loss. The pilot initiated dumping of the hopper load but was unable to prevent the aircraft from striking the ground heavily. The landing gear collapsed and the aircraft slid for about 50 metres before coming to rest.

12 Oct 1135	Beech E33 VH-ENU Emerald, Qld.	Non-commercial—business Emerald, Qld./Mackay, Qld.	C1N, P3N 8411044

After takeoff the pilot noticed that the airspeed indicator was fluctuating between 35 and 60 knots irrespective of the aircraft's actual speed. He elected to land again but, with his attention directed towards the faulty airspeed indicator, he forgot to lower the landing gear prior to touchdown.

13 Oct 1334	Glasflugel Mosquito VH-GKN Dalby, Qld. 35 NW	Air show/air racing/air trials Jondaryan, Qld./Jondaryan, Qld.	C1F, 01M 8411045

Several gliders were thermalling in one area during a cross-country flight. VH-IZE departed for the next thermal and the pilot, having determined that he was clear of other aircraft, began a left turn in the thermal. He then heard a loud bang and the glider pitched steeply down, however he was able to parachute to the ground. The left wing of VH-IZE had severed the fuselage of a second glider, VH-GKN, and the tail wheel area had struck the upper right wing and cockpit. The pilot of VH-GKN had been thrown from his seat but did not operate his parachute.

13 Oct 1334	Glaser-Dirk DG 202 VH-IZE Dalby, Qld. 35 NW	Air show/air racing/air trials Jondaryan, Qld./Jondaryan, Qld.	C1M, 01F 8411045

Several gliders were thermalling in one area during a cross-country flight. VH-IZE departed for the next thermal and the pilot, having determined that he was clear of other aircraft, began a left turn in the thermal. He then heard a loud bang and the glider pitched steeply down, however he was able to parachute to the ground. The left wing of VH-IZE had severed the fuselage of a second glider, VH-GKN, and the tail wheel area had struck the upper right wing and cockpit. The pilot of VH-GKN had been thrown from his seat but did not operate his parachute.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
13 Oct 1046	Piper PA36-300 VH-FET Finley, NSW 18 NE	Aerial agriculture Finley, NSW 18 NE/AG Strip	C1N 8421054

During the takeoff roll the pilot noted a loss of aircraft performance, but considered that there was insufficient strip length remaining to safely stop the aircraft. Shortly after becoming airborne the tail assembly struck the wooden top railing of a bridge. The left wing tip struck a dead tree 65 metres further on, the aircraft slewed to the left, touched down and came to rest with the engine and landing gear torn from the fuselage.

14 Oct 1530	Schemp Cirrus VH-GOM Ballan, Vic. 5S	Non-commercial—pleasure Bacchus Marsh, Vic./Bacchus Marsh, Vic.	C1N 8431031

Following the loss of thermal activity the pilot elected to land in a paddock where the 5-10 knot wind would produce a right crosswind and downwind component for landing. During the base leg, which was commenced from a low height, the pilot realised that his groundspeed was high. The turn to finals was conducted at 60 knots indicated airspeed and up to 45 degrees of bank to avoid overshooting the final path. Dive brake was applied during the turn to increase the glider's descent angle but the glider entered a spin. A recovery was made but the glider collided with trees.

19 Oct 1600	Piper PA28-140 VH-PXU Speed, Vic. 4 SE	Non-commercial—pleasure Turriff, Vic./Turriff, Vic.	C1N 8431033

The pilot intended landing in a paddock to inspect the results of recent spraying. He was aware of a power line well beyond the intended landing area. Sheep obstructed all of the paddock but the pilot hesitated in going round. Having temporarily forgotten about the power line, he then saw it too late to climb over and the top of the fin was severed as the aircraft was flown under the wire. The impact jammed the rudder, however, the pilot was able to carry out a safe landing in the adjoining paddock.

20 Oct 1652	Piper PA28-181 VH-SVQ Glen Innes 6 NE	Non-commercial—pleasure Gympie, NSW/Glen Innes, NSW	C1N, P1N 8421055

The aircraft departed with a planned fuel endurance of 170 minutes, and an expected flight time of 116 minutes. About 110 minutes after take-off the engine lost power and the pilot was forced to land on unsuitable terrain. The aircraft sustained damage to the wings, landing gear and rear fuselage as it ran through two fences and came to rest after striking several trees. Initial inspection revealed that the spring loaded fuel drain cock for the right tank was in the open position.

23 Oct 0900	Bell 47G5A VH-BHQ Miranda Downs, Qld.	Aerial mustering Miranda Downs, Qld./Miranda Downs, Qld.	C1M, P1M 8411046

The helicopter was hovering at about 100 feet AGL when the engine stopped. A heavy landing followed. The pilot reported that he knew the aircraft normally had an endurance of 220 minutes. On this flight he had been operating for 210 minutes, the task was almost completed and the refuelling point was a short distance away. He continued for a short time with the fuel gauges indicating empty in order to complete the task.

23 Oct 1834	Piper PA34-200T VH-SVM Moorabbin, Vic.	Instructional-check Moorabbin, Vic./Moorabbin, Vic.	C2N 8431032

Touchdown on a simulated asymmetric landing was reported as firm and with a slight bounce. During the ground roll the right wing settled to the runway and the aircraft came to a halt off the side of the runway. The right hand main landing gear leg was found to have fractured below its pivot point.

25 Oct 1206	Beech 65-A80MK2 VH-TGC Trinidad Stn, Qld.	Charter—passenger operations Charleville, Qld./Trinidad, Qld.	C1F, P4S, P3M 8411047

Just before touchdown passengers attempted to advise the pilot that the landing gear was up. Simultaneously the propellers made contact with the ground, the pilot rotated the aircraft and applied full power. Before the aircraft was clear of the strip the left engine had stopped, and its propeller windmilled during the subsequent flight. After a steep climb to about 150 feet AGL the aircraft began to yaw and roll left until ground impact, which was mainly on the nose and the left engine.

27 Oct 0213	Bell 206-B VH-AKY Trinidad Stn, Qld.	Non-commercial—aerial ambulance Wilton, NSW/RNS Hospital, NSW	C1S, P2F, P1S 8421056

The helicopter was being used to transport a critically injured road accident victim to a hospital with the necessary specialist facilities. Weather conditions in the Sydney Control Zone were unsuitable for night VMC operations and the pilot declared a mercy flight. Shortly after the pilot reported that he would hold in the area because of cloud, the helicopter crashed into a tidal embankment.

28 Oct 1806	Piper PA32-300 VH-ISB Darwin, NT	Non-commercial—pleasure Kununurra, WA/Darwin, NT	C1N, P5N 8441024

The approach was made with full flap extended at an indicated airspeed of between 75 and 80 knots. As the pilot closed the throttle in preparation for landing, the handle of the throttle lever came off in her hand. The aircraft struck the runway heavily and bounced several times, collapsing the nose gear leg.

30 Oct 1015	Beech 58 VH-DTU McIntyre's Field	Charter—passenger operations Archerfield, Qld./McIntyre's Field	C1N, P3N 8421058

After a normal circuit the aircraft crossed the threshold at 85 knots. The pilot advised that the wheels locked as soon as braking was applied. Intermittent brake application had little effect in slowing the aircraft and as the pilot considered that insufficient strip remained to permit a go-around he attempted to ground loop the aircraft. It slid off the side of the strip and collided with a fence before coming to rest.

04 Nov 1130	Bellanca 8KCAB VH-UOO Wallacia, NSW	Non-commercial—pleasure Wallacia, NSW/Wallacia, NSW	C1N, P1N 8421060

After a normal approach in calm wind conditions the aircraft bounced following the initial touchdown. A number of bounces then occurred before the pilot was able to regain control of the aircraft. At this time he assessed that there was insufficient strip remaining to stop the aircraft or to safely go around. A ground loop was attempted, during which the right landing gear collapsed.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
05 Nov 1345	Cessna T303 VH-OBH Perron Place, WA	Non-commercial—business Jurien Bay, WA/Perron Place, WA	C1N, P3N 8451031

A normal full flap approach was made into a 25 to 30 knot south-westerly wind. The pilot stated that when he attempted to flare the aircraft he was unable to reduce the rate of descent and the aircraft landed heavily.

09 Nov 1630	Cessna A188B-A1 VH-IEQ Arubial Lagoon	Activities associated with aerial agriculture Arubial Lagoon/Dalby, Qld.	C1N, 01S, 01M 8411050

The pilot commenced the take-off run while a vehicle was being driven along the left side of the strip. He stated that just after becoming airborne, he had been distracted by some movement to his left. As he looked to the front again, the left main wheel of the aircraft struck a drum on the vehicle and then the vehicle cabin. The aircraft was subsequently landed at the pilot's base strip.

10 Nov 1630	Beech 77 VH-HBJ Archerfield, Qld.	Instructional—solo (supervised) Archerfield, Qld./Archerfield, Qld.	C1N 8411051

After completing a dual instruction period of crosswind takeoffs and landings the pilot prepared for solo exercises in the training area. At about 45 knots during the takeoff roll the aircraft unexpectedly became airborne. The pilot had been correcting for the left crosswind and when the aircraft touched down again its heading altered sharply to the left. Attempts to regain control were unsuccessful and the pilot abandoned the takeoff. Damage to the nosegear was sustained when the aircraft entered a ditch before coming to rest off the side of the strip.

10 Nov 0930	De Hav C2 VH-IDH Barham Stn, NSW 20N	Aerial agriculture Barham, NSW 20N/Barham, NSW 20N	C1M 8421062

At a height of approximately 50 feet after takeoff the engine suddenly lost all power. The pilot was able to glide the aircraft over several drainage banks, two fences and an irrigation canal but a high rate of descent developed and the aircraft landed heavily and overturned. Fire broke out and the central section of the fuselage was burnt out.

11 Nov 1156	Cessna U206-F VH-EKJ Kudgee Stn, NSW	Non-commercial—business Essendon, Vic./Broken Hill, NSW	C1N, P1N 8441025

The pilot noticed a low oil pressure reading and decided to land at a strip he had just overflown. As he turned the aircraft toward the strip the engine began to vibrate and backfire and it was shut down. The aircraft touched down 150 metres short of the strip boundary fence. After running through this fence the aircraft continued for a further 280 metres before coming to rest on the strip. Initial inspection revealed that the engine crankcase had been punctured by a connecting rod.

12 Nov 1700	Hughes 269-C VH-PSU North Star, NSW	Non-commercial—pleasure North Star, NSW/Rocky Springs, NSW	C1N, P1N 8421063

At a height of about 20 feet after take-off the engine suddenly lost all power. The pilot attempted to land straight ahead in a sorghum field, but on touchdown the helicopter yawed and rolled onto its right side.

14 Nov 1445	Transav PL12 VH-IVH Andamooka, SA 16E	Non-commercial—business Leigh Creek, SA/Coober Pedy, SA	C1N 8441026

The aircraft was being flown in company with a helicopter. While enroute the pilots had been requested to check the surface of Lake Torrens for suitability for future operations. The helicopter was landed on a section of the lake which was assessed as suitable for the fixed wing aircraft. The pilot of that aircraft also assessed the area as suitable and a landing was made at a touchdown speed of 40 knots. Shortly after the nose wheel contacted the surface it began to sink in the soft ground and the aircraft overturned.

15 Nov 0805	Rockwell S2R VH-WBW Moree, NSW 63 NE	Aerial agriculture Croppa Creek, NSW/Croppa Creek, NSW	C1N 8421064

During spraying operations the engine began to run very roughly and lost a considerable amount of power. The pilot considered that insufficient power remained to permit him to divert to a suitable landing area and he attempted to land straight ahead. Towards the end of the landing roll the aircraft struck a contour bank and the right landing gear collapsed.

17 Nov 1025	De Hav DH 84 VH-AQU Beachport, SA 10E	Ferry Strathalbyn, SA/Portland, Vic.	C1N, P1M, P1N 8441027

After refuelling, the pilot found one of the tanks contaminated with water. The fuel was drained from the tank and clean fuel added. No contamination was found in the subsequent check of the fuel in the tank. The aircraft was then washed using a high pressure water hose. During the following flight, the engine began to run roughly and the pilot decided to carry out a landing in a paddock. The surface of the paddock was rough and the aircraft bounced heavily and groundlooped, collapsing the right gear.

18 Nov 1500	Piper PA25-236 VH-KKQ Spring Creek, Qld.	Non-commercial—business Spring Creek, Qld./Atherton, Qld.	C1N, P2N 8411052

During taxi for takeoff the left main gear struck an anthill and broke at its attachment point.

20 Nov 1430	De Hav 82-A VH-PFL Bankstown, NSW	Non-commercial—practice Bankstown, NSW/Bankstown, NSW	C1N, P1N 8421065

The aircraft is fitted with a tail skid and was being taxied on the grass beside the taxiway. The pilot reported that he was looking over the right side of the aircraft when the left wing struck a sign.

20 Nov 1100	Cessna 150L VH-DIV Muttaburra 74N	Non-commercial-aerial application/survey Hardington, Qld./Hardington, Qld.	C1N, P1N 8411053

The pilot reported that the flight was commenced with full fuel tanks. An endurance of over 210 minutes was anticipated with the planned fuel flow. The engine failed after three hours and the aircraft sustained damage to the nose gear and right wing during the ensuing forced landing. The pilot advised that when he subsequently dipped the fuel tanks there was no fuel remaining.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
23 Nov 2210	Cessna 210L VH-EDE Parkes, NSW	Non-commercial—practice Parkes, NSW/Parkes, NSW	C1N 8421066

Prior to departure for a nearby aerodrome the pilot decided to carry out some practice night circuits. He subsequently advised that all necessary checks were completed for the first landing, however the aircraft landed with the gear retracted. When the aircraft came to rest the pilot noted that the gear hydraulic pump motor was still operating. It was determined that the aircraft had touched down on the gear doors, which were open at the time.

25 Nov 1250	Britnor 2-A21 VH-ISI Wilton, NSW	Sport and parachuting (not associated with an airshow) Wilton, NSW/Wilton, NSW	C1M, P4M, P8N 8421067

At a height of about 200 feet after takeoff the right engine lost power. The pilot feathered the propeller and commenced a gentle left turn in order to return to the strip. He later advised that the aircraft began to sink towards some large trees and he was forced to increase the angle of bank in an effort to avoid them. Shortly afterwards the aircraft struck the ground heavily in an adjacent paddock about 1 kilometre from the strip.

27 Nov 0755	Beech 58 VH-ETV West Maitland, NSW	Charter—cargo operations Sydney, NSW/West Maitland, NSW	C1N 8421068

The pilot advised that when he selected the landing gear down, aerodynamic noises were normal and the main gear green light illuminated. When he closed the throttles the warning horn did not sound, however during the landing roll the left gear collapsed and the aircraft came to rest on the grass adjacent to the landing runway.

30 Nov 1330	Hiller UH12E VH-FBH Mackay, Qld. 174 SW	Ferry Wyena Station, Qld./Broadmeadow, Qld.	C1N, P1N 8411054

The pilot reported that shortly after commencing to cruise at about 750 feet AGL the helicopter encountered a willy willy and was thrown almost upside down. During the recovery actions, right pedal was applied rapidly and the operating cable broke. An auto-rotational landing was initiated but, just prior to touchdown, another willy willy struck the helicopter and it landed while spinning under the influence of this disturbance.

01 Dec 1030	Victa 100 VH-BNV Chillingham 20N	Non-commercial—pleasure Surfers Gardens, Qld./Casino, NSW	C1N 8421070

The pilot had recently purchased the aircraft and intended taking it to his local aerodrome. About 20 minutes after departure the engine suddenly lost all power and the pilot was committed to a landing on suitable terrain. When inspecting the aircraft after it had come to rest, the pilot discovered a loose connection in one of the fuel lines.

01 Dec 0854	Amer Air 5A VH-SZV Coolangatta 50 WSW	Non-commercial—pleasure Archerfield, Qld./Taree, NSW	C1M, P2M 8411055

As he approached the Macpherson Range the pilot was forced to fly around some hills in order to stay below the cloud base. After crossing a ridge line where the gap beneath the cloud was about 300 feet, the pilot was confronted by a higher ridge. He subsequently advised that the aircraft could not out-climb the terrain and he carried out a controlled entry into the jungle canopy about 200 feet below the top of the ridge. Both wings were torn off; however, the cabin area came to rest intact.

01 Dec 1120	Aerocdr 500A VH-AGA Goulburn, NSW	Non-commercial—pleasure Canberra, ACT/Goulburn, NSW	C1S, P2S 8421069

The aircraft was being used to transport equipment for members of an Aero Club, who were to carry out training at Goulburn. As the pilot was undergoing formation flying training, it was decided that he would lead a formation of two aircraft for the flight. A briefing on the procedures to be followed was carried out. During the flight the pilot of the second aircraft began to suspect the accuracy of his aircraft's airspeed indicator and requested that it be checked against that of the lead aircraft as the aircraft joined the circuit. The pilot of the lead aircraft extended the landing gear and flew the initial leg of the circuit at an indicated airspeed of 96 knots. At the end of this leg the pilot turned the aircraft steeply to the left, the nose dropped slightly and the aircraft flicked into a steep right turn. The aircraft then assumed a steep nose down attitude; however, the pilot was able to level the wings and raise the nose to the level attitude before impact. The impact occurred at a very high rate of sink.

02 Dec 0859	Pitts S1 VH-IGZ Emkaytee, NT	Non-commercial—pleasure Darwin, NT/Emkaytee, NT	C1N 8441028

At the conclusion of an aerobatic display the pilot performed an inverted circuit, rolling upright as the strip was sighted on final. On short final the aircraft descended below the desired flight path and the pilot applied power. The aircraft responded but the right gear leg caught on a power line 5 metres AGL and 330 metres from the threshold. The aircraft struck the ground in a steep nose down attitude and came to rest inverted.

02 Dec 1510	Piper PA28-140 VH-RVL Longwarry, Vic.	Non-commercial—pleasure Longwarry, Vic./Longwarry, Vic.	C1N, P1N 8431036

The pilot was to conduct two spot landings from practise forced landing approaches commenced at 2000 feet. On the first approach an undershoot developed and power was used to complete the landing. The second approach was high and touchdown was made about half way down the 730 metre strip. A go-around was initiated but the engine failed to develop significant power. The takeoff was then abandoned and the aircraft struck a dirt bank and drain beyond the end of the strip.

02 Dec 0305	Ayers S2R VH-JBN Mungindi, NSW 2S	Aerial agriculture "Iolanthe", NSW/Mungindi, NSW	C1F 8421071

At the conclusion of night spraying operations the pilot departed for Mungindi. Witnesses at the town saw the aircraft overflying at a low height and heading towards the aerodrome, which is about 7 kilometres from the town. Engine noise was then heard to cease and sounds of impact followed. The aircraft had struck the ground 5 kilometres from the aerodrome, and a post-impact fire had engulfed the wreckage.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
04 Dec 1919	Burkhart ASTIR CS VH-KYN Whitwarta, SA	Instructional—dual Whitwarta, SA/Whitwarta, SA	C1M, C1N 8441030

After travelling 15 metres during a winch-launch the left wing-tip contacted the ground. The instructor immediately assumed control of the glider and applied right rudder and aileron but the left wing entered an oat crop on the edge of the strip. The tip then dug into soft soil, causing the glider to cartwheel and impact heavily on its nose 120 metres from the take-off position and 35 metres to the left of the centreline.

09 Dec 1400	Czech Blanik VH-GIK Monarto, SA	Instructional—solo (supervised) Monarto, SA/Monarto, SA	C1N 8441031

It was reported that the flight proceeded normally until during the flare. The glider was lined up with the strip, but during the hold-off it drifted to the right and touched down on the edge of the marked, 50 metre wide strip. The landing roll continued off the runway and the starboard wing struck a tree 20 metres from the edge of the strip.

14 Dec 1020	Airparts 24-950 VH-MXD Forester, Tas 5NE	Aerial agriculture Trig Hill Airstrip/Trig Hill Airstrip	C1N 8431037

While enroute to the treatment area the pilot noted a loss of engine power. After the load of superphosphate was dumped, he realised he would be unable to return to the departure strip and selected a track as the most suitable landing area. During the landing roll the aircraft ran over a hump which caused it to slew off the track into the surrounding bush.

14 Dec 1620	Cessna A188B-A1 VH-FZD Kingaroy, Qld. 4SE	Instructional—check Kingaroy, Qld./Kingaroy, Qld.	C1M 8411056

During the single-seat test phase of the rating test the aircraft was observed to carry out an inspection of the treatment area and commence spray runs, with the first run into wind. At the end of the second run a procedure turn right was commenced. Shortly after reversing the turn the nose dropped and the aircraft struck the ground in a near vertical attitude.

16 Dec 1445	Glasflugel Kestrel VH-GSY Pipers Field, NSW	Non-commercial—pleasure Pipers Field, NSW/Pipers Field, NSW	C1M 8421072

The pilot was approaching to land at the conclusion of his second flight on the type. The approach was normal, however the glider floated the length of the strip at a height of about 25 feet. At the end of the strip a turn was commenced but after completing about 90 degrees an incipient spin developed and the glider struck the ground. The pilot subsequently advised that he activated the cruise flap lever instead of the air brake. The two levers are located side by side in the cockpit.

17 Dec 1511	Cessna 182-A VH-KLJ Interview River	Non-commercial—business Sandy Cape, Tas/Interview River	C2N 8431039

The pilot decided to land at the strip to check on the welfare of the two mining company employees working in the area. During the latter stages of the landing roll the nosewheel entered a soft area and dug in, causing the aircraft to overturn.

17 Dec 1625	Piper PA19 VH-ECN Lismore, NSW	Non-commercial—pleasure Acherfield, Qld./Lismore, NSW	C1N, P1M 8421073

The pilot was making a landing approach in 10 knot crosswind conditions. After the first touchdown he experienced difficulty in maintaining directional control and elected to carry out a go-around. On the subsequent approach the aircraft touched down prematurely and bounced. A go-around was initiated but the aircraft drifted off the side of the strip and struck a fence.

18 Dec 1511	Beech 77 VH-HBI Archerfield, Qld.	Instructional—dual Archerfield, Qld./Archerfield, Qld.	C2N 8411058

The aircraft was being taxied from the runway towards a parallel taxiway. Approaching the edge of the flight strip, the instructor noticed a 20 centimetre deep spoon drain in the path of the aircraft. He took control and attempted to avoid the drain but the nosewheel entered the drain and broke off. The presence of the drain was indicated on a diagram of hazardous taxying areas available to pilots but the area was not marked by cones.

21 Dec 1715	Conaero LA4-200 VH-AOW Hook Island, Qld.	Charter—passenger operations Lindeman Island, Qld./Hook Reef, Qld.	C1F 8411059

Throughout the afternoon the pilot had flown the aircraft on a number of sorties in the area. During the subject flight the pilot reported abeam a point on Hook Island, enroute to pick up some divers he had dropped off earlier. No further communications were received from the aircraft.

22 Dec 1951	Piper PA25-235 VH-SPE Dooen, Vic.	Non-commercial—pleasure Horsham, Vic./Dooen, Vic.	C1M 8431040

Prior to the flight the pilot was given details of the paddock in which the glider was located, by the glider pilot. This information included reference to power lines on the western side. An inspection run into the west was performed at 300 feet AGL and as a run at a low height towards the east was commenced, the landing gear struck a power line suspended 9 metres above the ground. The aircraft struck the ground in a vertical nose down attitude and came to rest inverted.

22 Dec 1300	Reims 172H VH-EDZ Quilpie, Qld. 3W	Non-commercial Quilpie, Qld./Unknown	C1N 8411060

The aircraft was parked, with controls locked and doors unlocked, by the owner who retained the ignition key. Later, another person entered the aircraft and operated a number of controls before experimenting with a car key in the ignition switch. The engine started and the aircraft took off from the position at which it was parked. The occupant attempted a landing but this was unsuccessful as full power was still selected. Some time later the engine stopped due to fuel exhaustion and the aircraft glided into scrub near the town. The occupant was later apprehended by local police.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
23 Dec 1117	Cessna 210M VH-MDI Koolan Is, WA	Charter—passenger operations Koolan Is, WA/Derby, WA	C1F, P5F 8451033

After loading the five passengers and their luggage, the pilot taxied the aircraft for take-off from runway 23. The aircraft became airborne approximately 54 metres before the end of the runway. It was observed to descend into a small ravine off the end of the runway, then climb steeply, strike wires and somersault before impacting the ground in a near vertical nose down attitude. Following the impact, the aircraft cartwheeled once and burst into flames.

24 Dec 1900	Schleicher ASW-19 VH-GWL Waikerie, SA 7E	Non-commercial—pleasure Waikerie, SA 7E/Waikerie, SA	C1N 8441032

Following an outlanding the pilot arranged an aerotow. The takeoff was commenced into wind and up a rise. The glider became airborne but on breasting the rise, the tug pilot aborted the takeoff as trees and a fence appeared closer than expected. The tug aircraft which had just become airborne turned left and the left wingtip struck the ground before the aircraft came to rest. The glider pilot released the tow but the glider's right wingtip contacted the ground then the fence before the glider impacted the ground beyond the fence.

24 Dec 1900	Piper PA25-235 VH-WGC Waikerie, SA 7E	Glider towing Waikerie, SA 7E/Waikerie, SA	C1N 8441032

Following an outlanding the pilot arranged an aerotow. The takeoff was commenced into wind and up a rise. The glider became airborne but on breasting the rise, the tug pilot aborted the takeoff as trees and a fence appeared closer than expected . The tug aircraft which had just become airborne turned left and the left wingtip struck the ground before the aircraft came to rest. The glider pilot released the tow but the glider's right wingtip contacted the ground then the fence before the glider impacted the ground beyond the fence.

26 Dec 1335	Piper PA28-151 VH-PZC Glenaubyn Stn, Qld.	Non-commercial—pleasure Glenaubyn Stn, Qld./Capella, Qld.	C1N, P3N 8411060

The pilot reported that, after commencing the takeoff with flaps up, he selected 10 degrees of flap and rotated at 60 knots. Although the aircraft became airborne it did not climb normally. The aircraft struck a telephone line near the end of the strip and then landed in a paddock before passing under a power line. With full power still applied, the pilot attempted to clear a fence but the wing leading edges struck fence posts. The aircraft landed heavily and came to rest 478 metres from the strip end.

26 Dec 1245	Glas-Flugel 210B VH-GGY Narrikup, WA	Non-commercial—pleasure Narrikup, WA/Narrikup, WA	C1N 8451034

The glider was launched by being towed behind a motor vehicle. After the glider became airborne, the pilot signalled to the vehicle driver to slow down. The vehicle driver slowed the vehicle too quickly, the tow rope slackened and the rope drogue deployed. The tow rope then released from the glider. Because of the position of the tow rope, below the glider, the pilot did not immediately lower the nose, the glider stalled at about 15 feet AGL and landed heavily.

27 Dec 1323	Cessna 310R VH-FFA Moruya, NSW	Charter—passenger operations Sydney, NSW/Moruya, NSW	C1N, P3N 8421074

Following a normal circuit, the aircraft touched down with the landing gears doors open and the gear partly extended. The gear collapsed as the aircraft slid to a halt on its under-surface.

28 Dec 0610	Piper PA34-2001 VH-STN Adelaide, SA	Ferry Parafield, SA/Adelaide, SA	C1N 8441033

The pilot reported that as the aircraft descended through 300 ft on final approach, windshear and an increase in the rate of descent was experienced. He applied power to arrest the rate of descent then reduced the power setting to idle. The aircraft landed heavily and bounced, the pilot attempted to take corrective action but the aircraft again landed heavily. The aircraft was taxied to the parking area where the damage was noted.

30 Dec 1545	Cessna 182L VH-EFN Willaura, Vic.	Non-commercial—pleasure Willaura, Vic./Willaura, Vic.	C1M, P1M 8431041

After flying in the local area for a time, the pilot entered a long straight-in final approach for the easterly strip he had used for take-off. From a distance he observed that the wind was a light southerly. Following a slight bounce on touchdown, braking was initiated but the aircraft seemed to be travelling faster than normal. The pilot, believing that he had landed with a tail-wind, turned the aircraft to the north-east to increase the landing roll available. The aircraft overran the area into a fence and firebreak.

FINAL REPORTS (The investigation of the following accidents has been completed)

Date / Time / Pilot licence	Aircraft type & registration / Location	Age	Kind of flying / Departure/Destination / Hours Total	Hours on Type Rating	Injuries / Record number
04 Oct 1515 Commercial	Cessna A188B VH-TDJ Robinvale, Vic. 16E	38	Aerial agriculture Meilman Property, NSW/Meilman Property, NSW 5000	3000	C1M 8421052 Agricultural class 1

The pilot had been spraying a wheat crop for about 30 minutes. He advised that difficulties were encountered with the stabilisation of the spray pressure. While attempting to adjust the pressure control he temporarily forgot the proximity of three high voltage power lines which crossed the crop. The aircraft collided with these lines and pitched down steeply to the ground. Fire broke out on impact and engulfed the wreckage.

05 Oct 1456 Commercial	Beech 58 VH-WGS Mount Bonnie, NT	28	Charter—passenger operations Darwin, NT/Mount Bonnie, NT 1712	78	C1N, P2N 8441023 Instrument rating 1st class or class 1

The aircraft touched down about 300 metres after the threshold of the 1200 metre long strip, which sloped uphill. When the pilot realised that the aircraft would not stop before the end of the strip, heavy braking was applied. The aircraft overran the strip and the nose gear strut collapsed in the rough terrain.

The pilot subsequently advised that had he initiated braking earlier the aircraft would have stopped in the remaining length. He had believed that there was more strip length available than was actually the case and it was considered probable that he had been deceived by the slope of the strip.

22 Oct 1615 Student	Piper PA28-140 VH-AJW Moree, NSW	29	Instructional—solo (supervised) Moree, NSW/Moree, NSW 36	12	C1N 8421061 None

After completing exercises in the local training area the pilot returned to the circuit. There was other traffic in the circuit and the pilot resolved to clear the runway as soon as practicable after landing. The touchdown was normal but shortly after the pilot leaned forward to grasp the handbrake the aircraft swung sharply to the left. The right wing tip and the propeller struck the ground before the aircraft came to rest.

The landing had been made in crosswind conditions. The handbrake is the only braking system fitted to the aircraft and as the pilot reached for the lever she inadvertently relaxed the back pressure on the elevator control, apparently with the nose wheel uncentred.

27 Oct 1220 Senior Commercial	Cessna 421B VH-ADK Kidson Field, WA	26	Non-commercial—aerial ambulance Kidson Field, WA/Well 33, WA 3240	650	C1N, P2N 8451029 Instrument rating 1st class or class 1

Just after the pilot applied full power at the commencement of the takeoff run, the nose wheel struck an anthill. The nose gear leg collapsed and the aircraft slid a further 15 metres before coming to a stop.

Although a strip inspection was carried out by the pilot both before landing and again whilst taxiing, the anthill was not noticed because of its colour and composition.

28 Oct 1130 Commercial	Piper PA36-300 VH-FEQ Deniliquin, NSW 25E	39	Aerial agriculture Elliston AG Strip/Elliston AG Strip 1200	2000	C1N 8421057 Agricultural class 1

The aircraft was being flown at about 180 feet AGL enroute to a rice paddy. The pilot reported that as he overflew an irrigated paddock strong sink was encountered. Full power was applied and dumping of the hopper load was commenced, but the aircraft touched down briefly. With full power still applied the aircraft became airborne again, however another touchdown occurred some 250 metres further on and the pilot closed the throttle. The left wing struck a fence post before the aircraft came to rest.

28 Oct 1420 Private	De Hav 82A VH-FAS Jandakot, WA	28	Non-commercial—pleasure Jandakot, WA/Jandakot, WA 240	20	C1N, P1N 8451030 None

The aircraft joined the circuit for a landing on the duty runway, 06. On short final the pilot was advised that there was a 3 knot tailwind. She continued with the landing and as the tail was lowered to the runway, after touchdown, the aircraft began to accelerate and yaw to the left. Corrective action was taken and the yaw stopped. However, as the pilot applied the hand-operated brake, the aircraft again yawed quickly to the left and ground-looped before coming to rest on the right wing tip and nose. During the landing the wind had changed from a light north easterly to an 18 knot south westerly.

03 Nov 1320 Private	Cessna 182-N VH-LMG Capertee, NSW	56	Non-commercial—pleasure Mudgee, NSW/Capertee, NSW 200	80	C1N, P2N 8421059 None

The aircraft was turned onto the base leg of the circuit earlier than normal because of cloud in the area. The pilot selected an approach speed 5 knots higher than usual as the aircraft was being operated at a greater than normal weight and because of the turbulence. The aircraft touched down on all three wheels simultaneously and bounced. The second touchdown, 100 metres further along the strip, was on the nosewheel, which collapsed.

The aircraft was not correctly flared before the touchdown, nor was the correct action taken after the bounced landing. After the second touchdown the nose wheel dug into a soft patch on the strip.

04 Nov 1130 Student	Cessna 172H VH-RLT Charleville, Qld.	18	Instructional—solo (supervised) Charleville, Qld./Charleville, Qld. 19	8	C1N 8411048 None

The aircraft was proceeding along a taxiway which had a truck parked at its edge. The pilot had written some details on a knee-pad while checking the aircraft taxy direction and he was observing wind-sock indications to his right when the left wingtip struck the side of the truck. The aircraft veered left and the wing struck a fork-lift parked in front of the truck.

FINAL REPORTS (The investigation of the following accidents has been completed)

Date / *Time* / *Pilot licence*	*Aircraft type & registration* / *Location*	*Age*	*Kind of flying* / *Departure/Destination* / *Hours Total*	*Hours on Type Rating*		*Injuries* / *Record number*
04 Nov	Cessna 172-N VH-KZG		Non-commercial—pleasure			C1N, P1N
1355	Surfers Gardens		Archerfield, Qld./Surfers Gardens			8411049
Private		27	134	19	None	

The pilot was aware than an area of the strip was prone to being soft. On his arrival he saw four cone markers across the strip, about half way along its length, and assumed that they designated the soft area. During the ground roll the aircraft began to slide sideways, the nose wheel entered soft ground and the aircraft overturned 230 metres before the cone markers which were 367 metres from the threshold.

The pilot did not ascertain the condition of the strip before departure. The cones across the centre of the strip were meant to delineate the serviceable and unserviceable sections of the strip. However, the unserviceable section was not appropriately marked and the aircraft was landed on that section.

17 Nov	Cessna 210L VH-FYR		Non-commercial—aerial application/survey			C1N
0700	Lady Barron Is		Devonport, Tas/Lady Barron Is			8431034
Private		71	7000	1100	None	

The landing approach was made over a power line which was adjacent to the threshold, and touchdown was made halfway along the 585 metre strip. Braking was commenced but was ineffective. Attempts to ground loop the aircraft failed and the pilot steered the aircraft towards a gate into another paddock. The nose gear was broken off in a ditch short of the gate. After vacating the aircraft the pilot noticed that there was heavy dew on the strip surface.

The wind at the time was light and a longer strip had not been used because the pilot wanted to get used to landing over the power line. Although the presence of dew on the strip could not be confirmed, insufficient strip length remained after touchdown to effect a safe landing on a dry strip.

18 Nov	Cessna 150M VH-WWU		Aerial mustering			C1N
1130	Nyang Stn, WA 19E		Nyang Stn, WA 19E/Nyang Station, WA			8451032
Commercial		32	479	350	Instrument rating class 4	

Whilst sheep spotting the passenger became visibly agitated and the pilot elected to land. During the landing roll the aircraft entered scrub but was not damaged. After the passenger disembarked the pilot attempted a flapless takeoff using a clearing approximately 140 metres in length. The aircraft failed to become airborne and hit several trees before coming to a halt in soft sand.

Prior to the attempted takeoff the pilot did not measure the available length or refer to the flight manual 'p' charts. He subsequently indicated that his judgement was affected by perceived commercial pressure to continue the sheep spotting operation without undue delay.

28 Nov	Piper PA28-235 VH-PDB		Non-commercial—business			C1N, P3N
1950	Tooradin, Vic.		Cowra, NSW/Tooradin, Vic.			8431035
Private		43	460	15	None	

The pilot arranged for one of his passengers to check on the condition of the strip. This was done through a third person with the wife of the owner of the strip. The landing was made into the late afternoon sun and on touchdown a passenger advised the pilot that there were sheep on the strip. Almost immediately the aircraft struck a number of the sheep and the nose gear was torn off.

The strip was surrounded by tall grass which reduced the effective width to 12 metres and hid the grazing sheep. The strip owner was aware of the impending arrival of the aircraft; however, the pilot was not advised of the location of the sheep.

01 Dec	Stits SA6B VH-ULB		Non-commercial—pleasure			C1N, P1N
1845	Aldinga, SA		Aldinga, SA/Aldinga, SA			8441029
Private		43	900	50	None	

After installing his passenger in the aircraft, the pilot hand swung the propeller, the normal means of starting the engine. When the engine fired it ran up to high power and the aircraft jumped the chocks. The pilot attempted to stop the aircraft but it continued forward and collided with the side of a hangar. The nose gear collapsed and the wooden propeller shattered as the aircraft came to rest on its nose.

During the pre-start checks the pilot believes he set the throttle almost fully open by mistake. The aircraft handbrake was unservicable.

15 Dec	Glasflugel Libelle VH-GGQ		Non-commercial—pleasure			C1N
1419	Woodbury, Tas		Woodbury, Tas/Woodbury, Tas			8431038
Glider		60	219	58	Glider	

The pilot reported that an aerotow to 2700 feet AGL seemed to be accomplished quickly. When the glider had descended to 1400 feet the pilot rejoined the circuit but then considered that the altimeter was defective. She believed that sufficient height remained to permit a landing at the strip and carried out a low, tight circuit. However, as the turn onto final was completed an immediate landing flare was required. A heavy touchdown occurred and the aircraft came to rest 175 metres after the strip.

Faulty alignment of the 'thousands' needle in the altimeter had led to the pilot mis-setting the height of the strip prior to takeoff. The indications she read from the instrument were therefore 1000 feet in error.

FINAL UPDATES (The investigation of the following accidents has been completed. The information is additional to or replaces that previously printed in the preliminary report)

Date / *Time*	*Aircraft type & registration* / *Location*	*Age*	*Hours Total*	*Pilot Licence* / *Hours on Type Rating*		*Record number*
11 Aug 83	Cessna 150M VH-RZA			Private		8341026
1130	Amburla HS 11SSW	25	600	75	None	

The aircraft was flown back and forth above a quarantine paddock in order to ensure that no cattle remained. The search pattern was flown at about 200 feet AGL. Ground marks and broken trees indicate that the aircraft struck the ground in a spin to the right. The pilot does not recall the sequence of events immediately prior to the accident.

The available evidence indicates that the pilot lost control of the aircraft while manoeuvring at low level. The reason for this loss of control could not be determined.

02 Mar 84	Cessna A188B-A1 VH-SHK			Commercial		8421009
1000	Boggabri, NSW 20N	29	2152	1155	Agricultural class 1	

Just after liftoff for spraying operations the aircraft sank back to the ground and drifted to the left. The pilot dumped the load but the aircraft became entangled in a fence running along the left side of the strip.

The pilot stated that at a height of about 20 feet the aircraft appeared to encounter a wind gust from the right rear quarter. The aircraft was heavily laden and the pilot had been unable to regain full control before the collision with the fence.

07 Apr 84	Cessna 180J VH-SHX			Private		8451009
1610	Mt Barnett HS 6SW	33	764	400	None	

After a flight time of 70 minutes, with a planned fuel endurance of 140 minutes, the engine failed and the pilot was committed to a forced landing on rock covered terrain. Evidence of a faulty fuel cap and fuel leakage past the cap was found.

The engine failed due to fuel exhaustion. The pilot had been aware of the faulty fuel filler cap before undertaking the flight and had not monitored the fuel contents gauges adequately during the flight.

27 Apr 84	Piper PA32-301 VH-JGH			Commercial		8421020
1630	Bingara, NSW 9SW	23	960	350	Instrument rating 1st class or class 1	

The strip had been recently graded by heavy earth-moving equipment which the passengers were to inspect. Before landing, the pilot carried out a strip inspection from 50 feet. After touchdown the pilot was allowing the aircraft to decelerate without the use of brakes when a soft, graded area containing numerous hidden boulders was encountered. The right main gear leg became detached from the wing and the aircraft came to a halt resting on the right wingtip.

05 May 84	Piper PA28-180 VH-DWV			Private		8421028
1230	Coonabarabran, NSW	37	300	Unknown	None	

The weather conditions were deteriorating as the pilot approached to land. On final approach the aircraft was too high and a go-around was conducted. During the subsequent circuit the pilot inadvertently entered cloud and shortly afterwards control of the aircraft was lost. The pilot ultimately recovered control; however, both wings were later found to be bent upwards as a result of applied aerodynamic loads.

The aircraft had been flown some 27 hours since the occurrence by a number of pilots and despite numerous pre-flight inspections the airframe damage was not noticed until subsequent periodic servicing.

31 May 84	Piper PA24-400 VH-BOO			Commercial		8441017
1945	Adelaide, SA	60	864	682	Instrument rating 1st class or class 1	

Due to weather conditions at the planned destination, the aircraft was diverted to Adelaide. About 135 kilometres from Adelaide the engine began to run roughly, but cruising altitude could be maintained. The aircraft was positioned over Adelaide airport at 2500 feet and a right circuit commenced. During the approach the aircraft began to undershoot and when the pilot applied power the engine did not respond. The wing was torn off by impact with a power pole and the aircraft struck the ground inverted near the airport boundary.

Because of an autopilot malfunction, the pilot had hand flown the aircraft through frontal weather and turbulence for two hours and was probably fatigued. The engine rough running was caused by malfunctioning valve lifters on No. 5 cylinder which in turn, damaged their valve pushrods. As the pilot had commenced his descent too late for a straight-in approach, he overflew the aerodrome to reposition for a right downwind. During this descending turn to the right, the engine failed completely, probably due to the low fuel quantity in the left tank, which was selected at the time. Approximately 150 litres of fuel was drained from the other tanks after the accident.

07 Jun 84	Pilatus B4 VH-UIP			Glider		8421027
1320	Central Mangrove	64	136	34	Glider	

The pilot was carrying out his third flight for the day when heavy sink was encountered near a small bushfire and an outlanding became necessary. During the approach the pilot flew below a set of power lines and then attempted to climb over trees at the edge of the selected paddock. After passing over the trees the aircraft was seen to descend steeply and strike the ground, crumpling the fuselage and damaging the wing attachment structure.

The paddock selected by the pilot was the only suitable area in the vicinity. The pilot later advised that when he had cleared the trees bordering the paddock the aircraft was on the point of stalling. He had lowered the nose in an effort to regain airspeed but had been unable to arrest the high rate of sink before impact with the ground.

22 Jun 84	A188B-A1 VH-MXH			Commercial		8451015
1400	Wongan Hills 16E	35	6000	4500	Agricultural class 1	

Prior to commencing spraying operations for the day the pilot had taken samples from three of the five fuel drain points fitted to the aircraft. Water was detected at each point and further samples were taken until no trace of water remained. Further samples of clean fuel were obtained after two subsequent refuellings. On takeoff after the second refuelling the aircraft failed to accelerate normally and collided with a fence after overrunning the strip. Water was later found in the fuel system.

The loss of performance during the takeoff was due to a loss of engine power, that probably resulted from water contamination of the fuel. The pilot was unaware of the position of all the drain points fitted to the fuel system. He assumed that the performance loss was due to the weight of the aircraft, although the two previous takeoffs had been made at a similar weight. When the takeoff was abandoned, the pilot did not select the best available overrun area.

FINAL UPDATES (The investigation of the following accidents has been completed. The information is additional to or replaces that previously printed in the preliminary report)

Date / *Time*	*Aircraft type & registration* / *Location*	*Age*	*Hours Total*	*Pilot Licence* / *Hours on Type Rating*		*Record number*
24 Jun 84	Cessna 210M VH-PKR			Private		8431017
1515	Birchip, Vic 24NW	19	170	42	None	

The aircraft touched down about 160 metres past the threshold of the 650 metre strip and bounced. The pilot applied power to go around and progressively raised the flap, but the aircraft then began to sink and he was unable to prevent the left wing striking the ground. The aircraft cartwheeled and rapidly came to a halt.

During the bounce the aircraft had drifted towards a tree on the right side of the strip. The pilot had commenced the left turn to avoid the tree and had not straightened the flight path for the go-around. Flap retraction had been too rapid, considering the speed and attitude during the turn and the aircraft was probably in a stalled condition when contact with the ground occurred.

24 Jun 84	Mooney M20F VH-ERY			Private		8451016
1600	Mundabullangana	39	550	5	None	

A go-around was made from the first approach as the aircraft was overshooting the pilot's aiming point. On the second approach the aircraft began to porpoise after touchdown. Braking was commenced with 200 metres of the 750 metre strip remaining. After a further 100 metres the pilot attempted to go-around. The aircraft came to rest some distance beyond the strip end after colliding with a number of mounds of earth.

The pilot was inexperienced on the type. Indicated airspeed on final was 12 knots above that recommended in the aircraft flight manual and a tailwind component of 5 to 8 knots existed during the landing.

04 Jul 84	Piper PA28-R201 VH-RQN			Private		8411031
1340	Gympie, Qld.	25	115	10	Instrument rating class 4	

The pilot was landing in gusting wind conditions with a cross-wind from the left. After the left wheel had touched down and before the right wheel had been grounded a gust of wind lifted the left wing, causing the aircraft to drift to the right. Attempts by the pilot to re-land were unsuccessful and a go-around was initiated. The aircraft subsequently collided with a fence post and came to rest about 180 metres off the side of the runway.

The aircraft encountered a very strong wind gust at the time of touchdown. The pilot delayed action in initiating a go-around and when power was applied the aircraft was unable to out-climb the rising terrain while flying downwind.

27 Jul 84	Smith 600 VH-PWL			Commercial		8421035
1100	Deniliquin, NSW	47	12500	600	Instrument rating 1st class or class 1	

The pilot was carrying out a practice single engine landing. The gear was lowered and three greens obtained, but as the nose wheel contacted the runway the nose gear retracted. Inspection revealed that the drag link trunnion block had failed allowing the drag brace to slip over the centre and the nosegear to retract.

The trunnion attachment bolts were found to be a loose fit, and movement between the trunnion block and adjustment structure had resulted in abnormal wear.

29 Jul 84	Beech D55 VH-FED			Private		8451018
1700	Prescott Lake 16NE	38	1000	500	Instrument rating class 4	

The strip had been prepared by grading an area amongst sand dunes and the pilot had landed the aircraft there on three previous occasions. During the landing roll the right main wheel broke through the surface crust of the strip. As the pilot attempted to correct the ensuing swing the left main wheel also broke through the surface and the nose wheel collapsed as it was dragged sideways through the sand.

Although the pilot had previously tested the suitability of the strip surface using the method outlined in the Visual Flight Guide, the nature of the surface and subsequent usage had caused a soft spot to develop.

10 Aug 84	Hiller UH12E VH-FBX			Commercial-helicopter		8421038
0945	Black Springs 13SW	34	807	286	Agricultural class 2	

The pilot was conducting spraying operations over a lightly timbererd paddock, flying at about 10 feet AGL and 50 knots airspeed. During the seventh swath run the helicoper main rotor struck a branch of a tree. The rotor tip weight and fairing were detached and severe vibration developed. The pilot attempted to land straight ahead but the tail rotor struck the ground, the helicopter pitched forward and came to rest on its right side.

The pilot was relatively inexperienced in helicopter agricultural operations. While concentrating on maintaining the correct height for the spraying he had misjudged the distance from the rotor disc to the tree.

22 Aug 84	Piper PA32-300 VH-RPB			Private		8431023
1130	Skipton, Vic 3SSE	35	555	47	None	

While the aircraft was cruising at 3000 feet the engine RPM suddenly increased, coinciding with the loss of oil pressure. The pilot commenced a precautionary landing sequence but after completing a satisfactory approach the aircraft made a heavy landing in a cleared paddock.

The oil pressure loss was caused by the failure of teeth in the oil pump. Before the engine was shut down, a connecting rod failed and induced severe vibration in the aircraft. The aircraft was flown about 8 knots below the recommended approach speed on late finals and probably encountered a wind gust, inducing a high sink rate close to the ground.

FINAL UPDATES (The investigation of the following accidents has been completed. The information is additional to or replaces that previously printed in the preliminary report)

Date / *Time*	*Aircraft type & registration* / *Location*	*Age*	*Hours Total*	*Pilot Licence* / *Hours on Type Rating*		*Record number*
24 Aug 84	Piper PA28-161 VH-PZQ			Student		8421041
1300	Cessnock, NSW	18	78	78	None	

Maintenance vehicles were parked on the grass area adjacent to the taxiway. The pilot was concentrating on keeping the aircraft moving down the taxiway centre-line when the left wing struck a tractor. The aircraft slewed to the left and collided with a utility which was parked behind the tractor.

The pilot's planned departure time had been delayed because the instructor designated to authorise the flight was not in attendance, and the assigned aircraft was late returning from a previous exercise. By the time the pilot had refuelled the aircraft and obtained authorisation from an instructor, there remained litle extra time to complete the flight before last light. The pre-flight briefing given was inadequate, no mention being made of the presence of maintenance vehicles adjacent to the taxiway. While hurriedly taxying for departure the pilot misjudged the clearance from the wingtip to the vehicles, which were not displaying hazard lights.

31 Aug 84	Piper PA32-300 VH-CST			Commercial		8431024
0830	Leaghur, Vic	30	322	6	Instrument rating class 4 with flight instructor	

During cruising flight, fumes were detected in the cabin and the engine began to run roughly. An explosion then occurred in the engine compartment, deforming the right side of the engine cowl. The pilot made an emergency landing in a paddock; however, the aircraft touched down heavily, collapsing the right main gear. The aircraft slid through a sink hole and the nose gear also collapsed. The centre right cylinder was subsequently observed to have detached from the engine block.

Fatigue failure of two crankcase through-bolts resulted in separation of No. 3 cylinder. The forced landing area subsequently selected contained shallow sink holes which were difficult to see from the air. During the landing flare, the pilot failed to compensate for reduced elevator effectiveness caused by lack of propeller slipstream.

01 Sep 84	Hiller UH12E VH-CCU			Commercial—helicopter		8421044
0815	Boorowa, NSW 9SW	34	843	323	Agricultural class 1	

While manoeuvring to commence a clean-up spray run parallel to a power line, the helicopter collided with a spur line. A broken section of the cable struck and severed the tail boom, control was lost and the aircraft struck the ground 150 metres beyond the spur line.

The pilot was aware of the presence of the spur line and had crossed it on a number of occasions during the operation. He elected to carry out a previously unplanned clean-up run to dispense the remaining chemical and temporarily overlooked the proximity of the wire. There was some evidence to indicate that the pilot was suffering from fatigue at the time of the accident.

09 Sep 84	Robinson R22 VH-IPC			Private—helicopter		8451024
1630	Gidgegannup, WA	42	1075	21	None	

The pilot was operating in a control zone but was unable to communicate with the controlling agency while the helicopter was on the ground. He carried out a takeoff and again, while hovering at 200 feet AGL, attempted to communicate with the control agency. Still unable to make contact, the pilot let go of the collective pitch lever, on which the friction was not applied, to change radio frequencies. The helicopter entered a descending turn and the pilot was unable to regain control before it struck the ground.

The pilot was inexperienced in helicopter operations and while attempting to change radio frequencies and hover in conditions conducive to the formation of turbulence, he failed to notice decreasing engine noise and rotor rpm.

12 Sept 84	Reims R172E VH-REV			Private		8421048
0750	Goodwood Stn 9NNW	31	250	200	None	

The pilot was conducting an inspection of bore tanks. The fuel selector was in the 'BOTH' position when the engine suddenly failed. The pilot was forced to land on unsuitable terrain and the aircraft suffered damage to the main landing gear support area.

Inspection of the aircraft found that the right fuel tank was empty; however, approximately nine litres of useable fuel remained in the left tank. No contributory fault could be found with the engine or the fuel system with the exception of an inaccurate left fuel gauge. The cause of the apparent fuel starvation of the engine could not be determined.

15 Sep 84	Cessna 150E VH-KMJ			Private restricted		8431027
1152	Reekara, Tas	48	65	3	None	

The pilot had decided to carry out some cross-wind circuit practice after the other pilot on board had carried out circuits on the into-wind strip. On the first circuit, touchdown was made 357 metres into the strip on the nose wheel and left main wheel together, followed by the right wheel. The nose gear sustained damage and when the aircraft touched down again after a short bounce the propeller struck the ground.

The pilot had not conducted cross-wind landing practice for about a year. He was inexperienced on the aircraft type and the cross-wind component at the time was close to the aircraft limit.

22 Sep 84	Rolladen LS4 VH-GXP			Glider		8411040
1620	Kingaroy, Qld. 20SW	40	320	75	Glider	

Towards the end of the flight an outlanding became unavoidable. A paddock with a number of trees and a power line at its edge was selected. During the final approach, after clearing those obstacles, the glider contacted another wire running diagonally across the paddock. The wire hooked under the wing and the glider slid sideways along the wire for some distance before the right wing struck a tree and the aircraft fell to the ground.

A short time earlier the pilot had selected a different paddock for the outlanding. He had then encountered a weak thermal which had been utilised. When the thermal dissipated the pilot had drifted away from the selected paddock and had only a short time to select an alternative paddock.

FINAL UPDATES (The investigation of the following accidents has been completed. The information is additional to or replaces that previously printed in the preliminary report)

Date *Time*	*Aircraft type & registration* *Location*	*Age*	*Hours Total*	*Pilot Licence* *Hours on Type Rating*	*Record number*
26 Sep 84 1120	Hiller UH12-E VH-ECK Galong, NSW 4NE	33	7730	Commercial—helicopter 600 Agricultural class 2 with flight instructor	8421051

Towards the end of a spraying run the pilot noticed that the aircraft was drifting towards a power line running roughly parallel to the aircraft track. He attempted to counter the drift but the aircraft moved underneath the wire. The main rotor struck the line as the pilot attempted to manoeuvre clear and also avoid trees at the end of the spraying run. After striking the wire the helicopter swung through 180 degrees and the tail boom collided with a tree.

Although the pilot had gained considerable experience on helicopters, most of this had been obtained cattle mustering. He evidently did not realise that a hazardous situation was developing in time to take safe avoiding action.

30 Sep 84 1355	Pitts S2A VH-SZA Berwick, Vic.	40	470	Private 13 Instrument rating 1st class or class 1	8431028

The pilot reported that he commenced the takeoff with the control stick fully back and some right rudder applied. As the aircraft rolled it veered left until the left wheel encountered long grass on the side of the gravel strip. The aircraft tail, which was in the air when the grass was encountered, continued to rise until the propeller struck the ground and the aircraft came to rest inverted.

Although the 7.5 metre centre gravel section was firm, the remainder of the strip was soft and wet and could not support the aircraft's weight. The pilot was aware of the natural tendency of the aircraft type to swing to the left during takeoff but he had not been able to maintain directional control on the narrow serviceable portion of the strip.

Faulty fuel management

Cast your mind back to the last aircraft you flew and see if you can recall the following operational information:

- total usable fuel capacity
- inflight mixture leaning technique for the recommended lean mixture setting
- average fuel consumption at representative cruising altitudes and power settings
- whether or not the aircraft kit contained a calibrated fuel dipstick

Each of those factors must be noted when fuel management is considered, not only during a flight but also at the preflight planning stage.

In the accident review which follows, a number of important fuel management lessons emerge.

The accident

An uneventful afternoon flight had been made in a Cessna 182Q to a country town. At the start of that flight the pilot had confirmed that the aircraft was fully fuelled which, he later stated, amounted to 65.5 usable imperial gallons. For that flight he planned on a consumption rate of 10 gallons per hour (gph), and the duration of the trip was about 3 hours 10 minutes.

After an overnight stop at the town the aircraft was prepared the next morning for the return flight. It was refuelled from drums, and an estimated 18 gallons (all fuel amounts given in this article now are in imperial gallons) were added: the assessment here was made by the refueller. The pilot checked the fuel gauges before and after refuelling. Each tank showed half full at the commencement and three-quarters full at the completion. The contents were also assessed visually and had obviously risen. Both of these checks confirmed in the pilot's mind that about 9 gallons had been added to each tank. As the fuel contents had been about half full on arrival he estimated that the remaining half would be sufficient for the return flight, leaving the additional 18 gallons as reserve.

Precise calculations made by the pilot were as follows: 47 gallons of fuel on board which, at 10 gph, he assessed as about 300 minutes endurance. Planned flight time was 182 minutes, so with 45 minutes fixed reserve required, he had a margin of 73 minutes.

Three passengers were embarked and takeoff was made just after two o'clock local time. When established in the cruise at 9000 feet the pilot set the power at full throttle (20″ MP) and 2350 RPM. Mixture was leaned until the engine ran roughly and then enriched until the EGT dropped three divisions (75 °F).

After about two hours it became necessary to descend to remain below controlled airspace. During this descent the pilot gradually enriched the mixture until, passing 3000 feet on the way down to the final cruise altitude of 2000 feet, full rich was selected. This setting was then maintained.

En route the pilot had run the engine from the right tank until it was effectively dry: this had been done deliberately so that he would know 'that all remaining fuel was in the left tank'. Thus, when cruising at 2000 feet, the fuel selector was on the left tank. (Note: the fuel selector positions available were LEFT, BOTH, RIGHT and OFF.)

About 25 minutes from the destination, the Cessna's engine began to run roughly. At this stage the left tank was indicating one-quarter full. The pilot changed the fuel selector to the BOTH position, which seemed to cure the problem. He kept the selector on BOTH for about 2 minutes and then changed back to LEFT because he thought that, with the right tank empty and the selector on BOTH, the engine might 'suck' air. (While this had no effect on the eventual accident, it should be pointed out that this belief was wrong. As long as there is a sufficient head of fuel in either or both of the fuel tanks then, with the selector in BOTH, ample fuel will be delivered to the engine.)

Shortly after the selector was returned to LEFT, and with the left fuel gauge reading about two needle widths less than one-quarter, the engine again started to run roughly. A PAN call was transmitted and the pilot started to look for suitable landing areas.

After the PAN call had been made the engine alternately ran normally and roughly. The pilot positioned the aircraft for a landing on a golf course, while continuing to adjust the throttle and fuel selector in his attempts to restore normal power continuously.

In fact, on the landing approach the engine was delivering power. Unfortunately the approach was misjudged and a go-around was necessary. This was safely completed, but on downwind for the second approach the engine stopped completely. In the ensuing forced landing onto the golf course the Cessna struck a television antenna, a tree and a chain wire boundary fence, and was substantially damaged. The engine failure was caused by fuel exhaustion.

Analysis

One relevant factor to emerge from the investigation was that the fuel quantity calibration card was incorrect. The card indicated that with full fuel the left tank would contain 35 gallons and the right tank 37 gallons, yet the C182Q Pilot's Operating Handbook and the Department of Aviation Approved Flight Manual both specified a total fuel capacity of 66.6 gallons and a usable capacity of 62.4 gallons. The accuracy of the calibration card throughout the complete range between empty and full was therefore open to doubt.

Nevertheless, in itself this should not have been sufficient cause for eventual fuel exhaustion; and here, other factors emerged. These were related to systems knowledge and operational technique.

The incorrectly calibrated fuel contents card notwithstanding, the pilot believed that the total fuel available was 65.5 gallons, whereas it was in fact 62.4. Thus, in this case it seems possible that the fuel load the pilot assessed he was starting with was, in terms of flight time, deficient some 15-20 minutes. Again, this should not have been a serious problem — had the tanks been dipped with a calibrated C182Q dipstick. Because they were not, and despite the other checks the

pilot carried out, he could not confidently and precisely have known the amount of fuel in his aircraft.

Assessment of fuel consumption

The pilot stated that he had based his calculations for flight planning on a consumption rate of 10 gph. However, examination of the performance data from the C182Q Pilot's Operating Handbook shows that, for the power settings the pilot used during the flight, the theoretical average consumption rate would have been about 11.2 gph using the recommended lean mixture. The Handbook also states that 'some indeterminate variables such as mixture leaning technique, fuel metering characteristics, engine and propeller condition, and air turbulence may account for variations of 10 per cent or more in range and endurance'.

Mixture leaning technique

The technique used by the pilot to adjust the air/fuel mixture was not in accordance with the recommended operating procedures.

First, during the climb the pilot left the mixture control in full rich, although the Handbook recommends leaning the mixture in the climb above 5000 feet. Second, when established at 9000 feet, he leaned the mixture to 75 °F below peak on the rich side of the EGT curve: the Handbook recommends a setting 50 °F below peak. Finally, the low altitude section of the flight was conducted with the mixture in full rich instead of at the recommended lean mixture.

In combination, those three factors would have resulted in fuel consumption significantly in excess of that allowed for by the pilot.

The figures quoted for leaning the mixture with the EGT, and the flight regimes for which leaning is permitted mentioned here, apply, of course, only to the C182Q: the Pilot's Operating Handbook and Approved Flight Manual must be consulted to determine exact recommended procedures for each aircraft type. However, the lessons which emerged from this accident are applicable to all pilots and all aircraft types ●

LEANING WITH A CESSNA ECONOMY MIXTURE INDICATOR (EGT)

Exhaust gas temperature (EGT) as shown on the optional Cessna Economy Mixture Indicator may be used as an aid for mixture leaning in cruising flight at 75 per cent power or less. To adjust the mixture, using this indicator, lean to establish the peak EGT as a reference point and then enrich the mixture by a desired increment based on figures in the table below.

Continuous operation at peak EGT is authorised only at 65 per cent power or less. This best economy mixture setting results in approximately 5 per cent greater range than shown in this handbook accompanied by approximately 3 knot decrease in speed.

NOTE

Operation on the lean side of peak EGT is not approved

When leaning the mixture under some conditions, engine roughness may occur before peak EGT is reached. In this case, use the EGT corresponding to the onset of roughness as the reference point instead of peak EGT.

MIXTURE DESCRIPTION	*EXHAUST GAS TEMPERATURE*
RECOMMENDED LEAN (Pilots Operating Handbook and Power Computer)	50 °F Rich of Peak EGT
BEST ECONOMY (65% Power or Less)	Peak EGT

		20 °C BELOW STANDARD TEMP – 9 °C			*STANDARD TEMPERATURE 11 °C*			*20 °C ABOVE STANDARD TEMP 31 °C*		
RPM	*MP*	*% BHP*	*KTAS*	*GPH*	*% BHP*	*KTAS*	*GPH*	*% BHP*	*KTAS*	*GPH*
2400	22	77	134	13.1	74	135	12.6	71	136	12.2
	21	72	131	12.3	69	132	11.8	67	133	11.4
	20	67	128	11.5	65	128	11.1	63	129	10.7
	19	62	124	10.7	60	124	10.3	58	125	10.0
2300	23	78	135	13.3	75	136	12.8	72	137	12.4
	22	73	132	12.5	70	133	12.0	68	133	11.6
	21	68	128	11.7	66	129	11.3	64	130	10.9
	20	64	125	10.9	62	125	10.5	60	126	10.2
2200	23	73	132	12.5	70	133	12.0	68	133	11.6
	22	69	129	11.7	66	129	11.3	64	130	10.9
	21	64	125	11.0	62	126	10.6	60	126	10.2
	20	60	121	10.2	58	122	9.9	56	122	9.6
2100	23	68	128	11.6	66	129	11.2	64	130	10.8
	22	64	125	10.9	62	126	10.5	60	126	10.2
	21	60	121	10.2	58	122	9.9	56	122	9.6
	20	56	118	9.6	54	118	9.3	52	118	9.0
	19	52	113	9.0	50	114	8.7	48	113	8.5
	18	47	109	8.4	46	109	8.1	44	108	7.9

CRUISE PERFORMANCE

PRESSURE ALTITUDE 2000 FEET

CONDITIONS:
2950 Pounds
Recommended Lean Mixture
Cowl Flaps Closed

NOTE
For best fuel economy at 65 per cent power or less, operate at the leanest mixture that results in smooth engine operation or at peak EGT if an EGT indicator is installed.

		20 °C BELOW STANDARD TEMP – 25 °C			*STANDARD TEMPERATURE – 5 °C*			*20 °C ABOVE STANDARD TEMP 15 °C*		
RPM	*MP*	*% BHP*	*KTAS*	*GPH*	*% BHP*	*KTAS*	*GPH*	*% BHP*	*KTAS*	*GPH*
2400	20	74	142	12.7	71	143	12.2	69	144	11.8
	19	69	138	11.8	67	139	11.4	64	140	11.0
	18	65	134	11.0	62	135	10.6	60	135	10.2
	17	60	129	10.2	57	130	9.8	55	130	9.5
2300	20	71	140	12.1	68	140	11.6	66	141	11.2
	19	66	136	11.3	64	136	10.9	61	136	10.5
	18	61	131	10.5	59	131	10.1	57	132	9.8
	17	57	126	9.7	55	126	9.4	53	126	9.1
2200	20	67	136	11.4	64	137	11.0	62	137	10.6
	19	62	132	10.6	60	132	10.2	58	133	9.9
	18	58	128	9.9	56	128	9.6	54	128	9.3
	17	53	123	9.2	51	123	8.9	50	122	8.7
2100	20	63	132	10.7	60	133	10.3	58	133	9.9
	19	58	128	10.0	56	128	9.6	54	128	9.4
	18	54	123	9.3	52	123	9.0	50	123	8.8
	17	50	118	8.7	48	118	8.4	46	116	8.2
	16	46	112	8.1	44	111	7.8	42	109	7.6

CRUISE PERFORMANCE

PRESSURE ALTITUDE 10 000 FEET

Human factors

(1) Frustration

A group of friends had hired two aircraft to fly to a resort for a camping holiday over a long weekend. Six of them left early in one machine, leaving one other pilot and a non-pilot passenger to follow. These two were to travel in a Cessna 206 and were to take most of the camping equipment, sleeping bags and food.

When the C206 pilot arrived at the airport he found that his aircraft had been double-booked and was no longer available. An alternative aircraft which was flying at the time was arranged: the pilot was advised that it should be ready for him at about mid-day. Unfortunately it did not return until about 1830 hours local, which was too late for a departure that day. This was frustrating and upsetting for the pilot, who was concerned that his six friends had only two sleeping bags between them and little camping gear and food. He arranged to leave as early as possible next morning.

On arrival at 0630 the following day the pilot was further frustrated to find that his aircraft had not been refuelled. He did the job himself, then carried out a normal engine start, taxied to a position alongside the equipment and stores, and shut down while he loaded the Cessna. Ready at last to depart, he and his passenger got into the aircraft — and found that the engine would not start.

Diagnosing the fault as some kind of electrical malfunction, the pilot decided to attempt a hand start.

At this juncture he made a series of mistakes, his judgment perhaps having become clouded by the number of aggravations he had experienced.

The regulations addressing hand starting are quite specific. They permit the pilot-in-command of an aircraft which requires an operating crew of only one pilot to 'manipulate the propeller of the aircraft for the purposes of starting the aircraft' under the following circumstances:

- when there is no assistance available;
- when adequate provision is made to prevent the aircraft moving forward; and
- when no person is on board the aircraft.
  (Note that an appropriately licensed pilot or other approved person should occupy the control seat if available: this final requirement relates to the circumstances of 'one pilot' and 'no assistance available'.)

In this case, however, the pilot did not seek proper assistance, nor did he make adequate provision to stop the aircraft from moving forward.

Instead, he set the park brake and briefed his passenger on the operation of the throttle and the toe brakes. In particular he instructed the passenger that, if the engine started but then looked like it was going to stop, the throttle should be opened slightly.

The pilot swung the propeller and the engine started immediately. As the pilot began to board the aircraft through the left door, 'considerable power was applied and the aircraft began to move'. In fact it seems that the passenger had inadvertently opened the throttle right up and applied full power.

The sudden airstream blast blew the door shut and prevented the pilot from getting in the Cessna. At about the same time, the left main wheel ran over his right foot.

Veering left and gathering speed, the 206 headed for the side of a hangar, which it then struck at a speed of about 25–30 knots. Running to the aircraft, the pilot found the passenger on the ground just outside the right door. He then got in the aircraft and turned off the magnetos and master switch.

Minor injuries were sustained by the pilot and passenger, considerable damage was done to the hangar, 5 metres of a chain fence were broken, a hole was punctured in the side of another aircraft, and the C206 was destroyed. *(See photograph opposite.)*

Comment

Frustration is a fact of life — it happens to all of us. Usually we know when we, or someone we are working with, are frustrated; and often we recognise symptoms, e.g. cutting corners, omitting checks. The problem seems to be more one of not understanding the effects frustration can have, rather than actually recognising the condition.

Frustration causes stress, and stress when it builds up can have dangerous effects on a pilot's performance. The major problem arises when the pilot is not aware of those effects. Most significantly, it is an individual's decision-making ability and judgment, rather than hands-on flying performance, which are particularly affected. If the stress of frustration is combined with other stresses — fatigue, personal problems, time pressures and so on — then the situation can become especially dangerous.

The key point we need to appreciate from all this is that frustration increases the chances that we will make an error without being aware of it.

Appreciating this, what can be done?

The best action is to stop and take stock of the situation, and consider the risks inherent in letting frustration get the better of you. Take yourself out of the situation for a time, both physically and mentally: take a break, a walk, go for a cup of coffee — whatever, relax!

Think about the circumstances that led to the situation. Try to understand what the consequences are and why you have become frustrated. This understanding can help you to gain control of the frustration and enable you to approach your flight in a calm and considered manner.

Remember, a high level of frustration leads to a high level of stress even if it is only temporary. If an emergency should arise, in this frustrated condition your chances of dealing with it may be diminished ●

A C206 destroyed as the result of a series of mistakes following the frustration of a delayed departure (article on opposite page).

(2) Impulsive action

An experienced pilot was en route to a large country centre in a single-engine trainer to complete a routine stint of instruction for his company. It was one of those perfect days that can make pilots euphoric — clear skies, warm sun and smooth early morning air.

Understandably, the pilot felt on top of the world.

It was in this frame of mind that he noticed he was approaching a lake. At this stage he unfortunately allowed his euphoria to override his good judgment. He put his aircraft into a descent so that he could make a low pass over the smooth waters of the lake.

At the conclusion of the low pass the pilot pulled up to clear the dam wall. Unhappily, he had failed to see a power line in the same area. Luck was on his side: although the wire passed over the nose of the aircraft, through the propeller and smashed the windscreen, he was able to fly away, and damage to the aircraft was subsequently assessed as minor.

The pilot summed up this incident succinctly himself in his report:

> Obviously I am lucky to be alive and even luckier to have escaped without injury. Not being experienced at low flying I foolishly assumed that it was safe to fly low as long as a good lookout was maintained. I realise now that this could not be further from the truth. Despite the fact that I maintained constant lookout for such things I did not see the wire until I was only feet away from it.
> I hope that my experience may be used to warn others so they can avoid the possibility of this *by not putting themselves in the position in the first place.*

* * *

The world would be a dreary sort of place if none of us ever gave in to the urge for impulsive action. However, there is a time and a place for everything: clearly, impulsive actions and aviation do not mix.

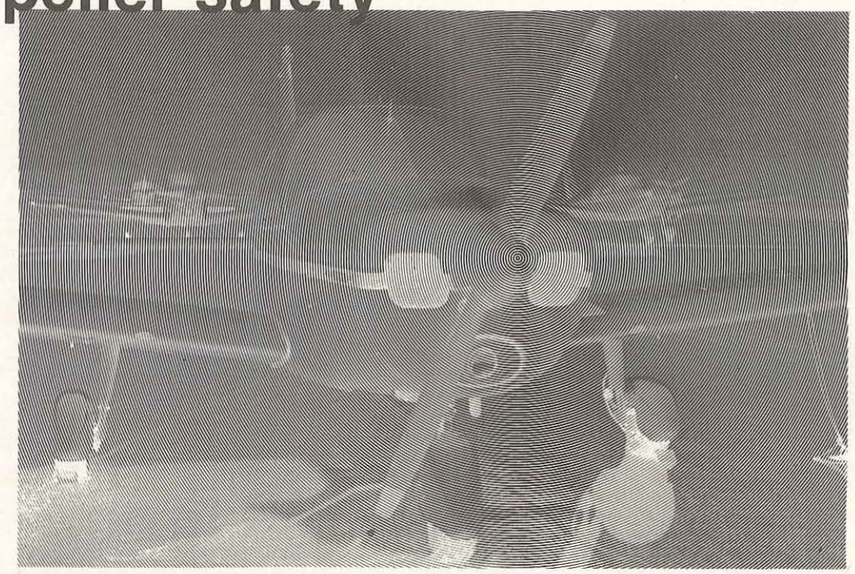
One of the definitions of impulsive behaviour is the sudden tendency to act without reflection, and therein lies the problem. When flying an aircraft, action without reflection is like playing Russian Roulette — if you are lucky you might survive.

The real problem in trying to combat the tendency to act on impulse is that impulsive behaviour always seems like such a good idea at the time, but as the pilot mentioned in this article found out, it does not always work out that way.

Impulsive behaviour involves taking action without first thinking about the consequences of that action, while responsible safety-minded behaviour involves taking action only *after* the possible consequences of the action have been considered.

Remember, think first, act second ●

Propeller safety



Although concerned primarily with 'human factors', the article on page 16 of this issue of the *Digest* draws attention to some of the possible dangers a propeller can present. The intention here is to elaborate on those dangers and to outline the general propeller safety procedures pilots should observe in relation both to passengers and hand starting engines.

Boarding or approaching aircraft

Few aviation mishaps are more distressing than those in which an individual approaching an aircraft walks into a rotating propeller. It is incumbent upon the pilot in command to take all measures to ensure that this does not happen. Essentially, this entails giving a thorough briefing to passengers before the flight, and maintaining vigilance at all times once the engine has been started.

Briefing. You must ensure your passengers understand the dangers of propellers by stressing the following points:

- Clearly stipulate the approach path to the aircraft for them to use.
- Point out the position of entry doors and the way in which to get into the aircraft.
- Let them know whether the engine will be running. (Preferably it should not be started until everyone is on board.)
- Emphasise that they should approach the aircraft from the side and never walk from the rear to the front of a wing.
- Instruct them always to treat a propeller as live: even if it is not running, they should never stand in or pass through the propeller arc.

For disembarkation, if possible the engine should be shut down, but if operational necessity precludes this, these additional points must be made:

- In most cases, passengers should walk away directly behind the main wing and towards the wingtip.
- Direction should not be changed until they are well clear of the aircraft.
- Again, they should never walk from the rear to the front of a wing.

If it is necessary to load an aircraft with its engine(s) running, the loaders/despatchers must be fully briefed to use only standard procedures and hand signals.

Finally, the importance of the pilot exercising thorough vigilance cannot be over-emphasised. Bear in mind that noise and excitement may well distract an inexperienced passenger; and that part of the danger of a rotating propeller is its invisibility. If you see someone coming towards your aircraft in a direction that may put them at risk, then do not hesitate to shut the engine down. Restarting takes little time or effort, and is infinitely preferable to having someone exposed to the danger of a propeller. Always remember — propellers can be lethal.

Hand starting

Accidents caused by hand started aircraft running away continue to occur periodically. For some aircraft types hand starting is a regular practice; consequently, their pilots are well versed in the technique and seldom experience problems. Difficulties primarily arise when those who are unfamiliar with the procedure decide for some reason — e.g. a flat battery, faulty starter motor — to hand start an engine, and are either unaware of, or choose to ignore, the recommended technique.

The following summary of procedures and considerations covers the major points in the normal hand starting sequence. While not exhaustive, the list provides for most light aircraft engine installations. Like any operational procedure, hand starting should first be practised under the supervision of an experienced pilot or, in this case, a suitably endorsed LAME.

Preparation

- Firmly apply the parking brake.
- Chock the wheels.
- If a qualified pilot or an approved person is available, have them occupy the pilot's seat (note that this is mandatory for all aircraft requiring a crew of two pilots).
- The propeller swinger should not wear any loose clothing — scarf, necktie, headgear, open jacket etc. — which might become entangled in the propeller or hinder movement. Footwear should also be suitable, e.g. no thongs or sandals.
- Establish clear communications with the person at the controls.

Practising the hand start

- Face the aircraft into wind, preferably towards open ground.
- Ensure that the ground immediately in front of the propeller is level and firm: slippery grass, mud, oil or loose gravel could lead to a fall into the propeller.
- Set the engine with magnetos off, fuel off, mixture idle cut-off and throttle closed.
- Face the plane of the propeller.
- Stand close enough to the propeller to be able to step away at an angle of about 45 degrees to the propeller as it is pulled down. (Stepping away is a safeguard should the brakes fail.) Do not stand in a position that makes you lean towards the propeller to reach it, as this may place you off balance and cause you to fall into the propeller when the engine starts.
- Place one or both hands on the trailing edge of one of the blades.
- Position the propeller blade for a comfortable swing against compression. (Note: cold engines should always be 'pulled through' at least two revolutions before starting to free moving parts and to check whether a hydraulic lock has formed.) Determine the most favourable starting position of the propeller for your hand swing and for the particular installation.
- Make a smooth stroke through compression, pulling the hands down and away as the movement is completed, simultaneously stepping back from the propeller arc with the rearward foot first.
- Practise the technique until you are certain of your competence and safeness.

Starting the engine

- Fuel on.
- Battery master on.
- Prime the cylinders — throttle, mixture and auxiliary fuel pump as required.
- Throttle closed, then open for a normal start — take care it is not opened excessively.
- Tighten throttle friction.
- Magnetos as recommended for hand starting.
- Swing the propeller using the technique practised.
- After the engine has started, take particular care to avoid the propeller while removing the chocks and moving to the entrance door.

The point about always treating the propeller as being live bears repetition. It must also be remembered that with an impulse magneto even the slowest movement can cause a primed cylinder to fire. Therefore, even when turning the propeller slowly for correct positioning, the techniques adopted when actually attempting a start must be used.

Engine fails to start

- DO NOT OPEN THE THROTTLE further than the normal start position and try to start again.
- Magnetos off, throttle fully open, mixture idle cut-off.
- 'Blow out' the engine by swinging the propeller backwards against normal rotation four full revolutions.
- Do not reprime.
- Repeat start procedure.

Single pilot

In addition to the instructions detailed above, pilots of aircraft approved for single pilot operations and who need to attempt a hand start without anyone at the controls should observe the following considerations:

- Passengers must not be in the aeroplane.
- Align the aircraft so it cannot become airborne — it is preferable for it to be stopped by a ditch than to take off unmanned (as has happened).
- Consider attaching ropes to the chocks so that they can be pulled clear of the wheels from inside the cockpit.
- Remember that the throttle need be only partially open to give sufficient power for the aircraft to jump the chocks.
- Consider tethering the aircraft to some heavy or fixed object using the rear tie-down point — but do not forget to undo it!

* * *

One last comment

Accidents with propellers often arise because of last-minute changes or problems — finding yourself cramped for taxiing room and calling someone to check the space available, investigating a minor maintenance hitch after startup, a late or unexpected passenger and so on. Each of those events involves someone approaching your aircraft at short notice, perhaps from an unexpected and irregular direction, and possibly with his mind on something else. It is up to you, the pilot, to ensure that in these circumstances safety standards are not compromised ●

Reader contribution

No-radio near-miss

Several months ago a Restricted area was activated around my local aerodrome by a Class 1 NOTAM. The area of restricted airspace was out to a radius of five nautical miles and up to an altitude of 7000 feet. It became active at 1155 hours local time and lasted until 1235 hours; its purpose was for a display by five military jets.

The five jets arrived over the airfield at 1210 in close formation and at a low altitude, trailing smoke.

At exactly the same time a low-wing, retractable undercarriage, single-engine light aircraft, registration unknown, and tracking from the north-east to the south-west, passed directly over the aerodrome at an altitude of about 2500–3500 feet.

After the jets passed over the airfield and under the intruder, they pulled up into a loop. At the top of this manoeuvre they were about 1500 feet above the intruder and 300 metres behind him. From my viewpoint, the GA aircraft effectively flew through the centre of the loop. Near the end of the loop the jets turned towards the east to commence their next manoeuvre. Had they turned towards the west and climbed they would have again been in close proximity to the light aircraft.

The intruder failed to acknowledge radio calls made to him by both the area Flight Service Unit (FSU) and a military transport aircraft (which was supporting the jets).

The lesson to be learned: when approaching to land or overflying non-controlled aerodromes and Broadcast ALAs below 5000 feet, ALWAYS listen out and broadcast a 20 miles inbound call. The pilot concerned should also think about the extra security he would enjoy generally by submitting a flight plan and checking relevant operational information (NOTAMs, weather and so on) before flight.

Editor's comment

Thanks to the reader who submitted this important contribution.

Presumably the pilot of the GA aircraft was making a NOSAR NO DETAILS flight and either did not have a radio in his aircraft (which seems unlikely given that it was a retractable undercarriage machine) or had decided not to turn it on.

No-radio flights are permitted in certain areas and under certain conditions in Australia because they are, *under those specific circumstances,* considered practical, and acceptable in terms of flight safety.

However, the Visual Flight Guide (VFG) clearly stipulates important requirements which all pilots contemplating this category of flight must observe.

First, a NOSAR NO DETAILS aircraft must not (among other restrictions listed at VFG 44-2) enter, depart or transit an AFIZ, a designated remote area, or a Restricted area.

Second, ANY pilot — regardless of flight category — who intends to operate below 5000 feet within 20 miles of a non-controlled government or licensed aerodrome or Broadcast ALA, outside an AFIZ or MBZ, MUST maintain a listening watch on the area VHF frequency and broadcast his position, level and intentions at approximately 20 nm from the aerodrome. From this it follows that no-radio flights are not permitted under the circumstances detailed in this and the preceding paragraph.

Finally, the intruder in this occurrence apparently had not checked the operational information applicable to his flight. Again to turn to the VFG, 'Even if you are making a flight for which you are not required to notify your movements . . . you are still required to make sure you are familiar with the operational and weather conditions for your flight'. Had this pilot followed that procedure, the dangerous conflict with the jets would never have happened. Either a radio call when airborne to an FSU or ATC centre or, better still, a telephone call before departure — and reverse charge at that — was all that was needed ●

In brief

A home-built minimum aircraft crashed and the pilot sustained serious injuries during test flying. The pilot later said that he believed the lateral control was incorrectly rigged, which created difficulties when he applied bank. It also seemed probable that the aircraft stalled prior to the crash. It was not fitted with an airspeed indicator: the pilot was attempting to judge airspeed by 'assessing' airflow.

* * *

A pilot undergoing a check flight executed an autorotational landing. A run-on landing was made but the skids dug into the ground and the helicopter nosed over. The main rotor blades severed the tail boom as the helicopter came to rest inverted.

Although high and low level aerial inspections of the proposed area had been carried out, neither pilot had walked over the surface — the only certain way of assessing its suitability. In the event, the surface proved to be soft and skid penetration caused the helicopter to nose over.

* * *

An uneventful VFR flight had been completed in a Beech Bonanza. A normal circuit and landing was flown, without any unusual circumstances which might have distracted the pilot.

The pilot made a particularly good landing and, as the aircraft slowed, he went to retract the flaps, as was his habit. In doing so, he mistakenly moved the landing gear selector to the UP position. He immediately realised what he had done and reselected DOWN, but the retract cycle had already begun, and the wheels continued to retract. Damage to the aircraft was substantial.

* * *

Before takeoff a passenger in a C210 placed a cassette player on the instrument coaming. It was not noticed by the pilot — nor was the fact that the cassette caused the compass to misread by 20 degrees. When the pilot then used the compass to fly his departure headings, the error caused him to transgress his departure clearance ●

Clarification

Aviation Safety Digest 118/1983 included an article entitled 'Incorrect Glider Launch'.

It has been suggested that this article did not accurately reflect the published findings of the relevant accident investigation and was therefore unfair to persons associated with the particular accident.

The article stated, among other things, that

— the main factor which emerged during the investigation into this fatal accident was that the glider was configured for aero-tow launching with the towhook on the forward attachment point, and the hook was not repositioned to the rear attachment point for the winch operations

— because they did not check the flight manual, the pilot involved and his companions were not aware of this requirement

— they were also not aware that the flight manual stated that porpoising could occur if winch launches were made using the forward attachment point.

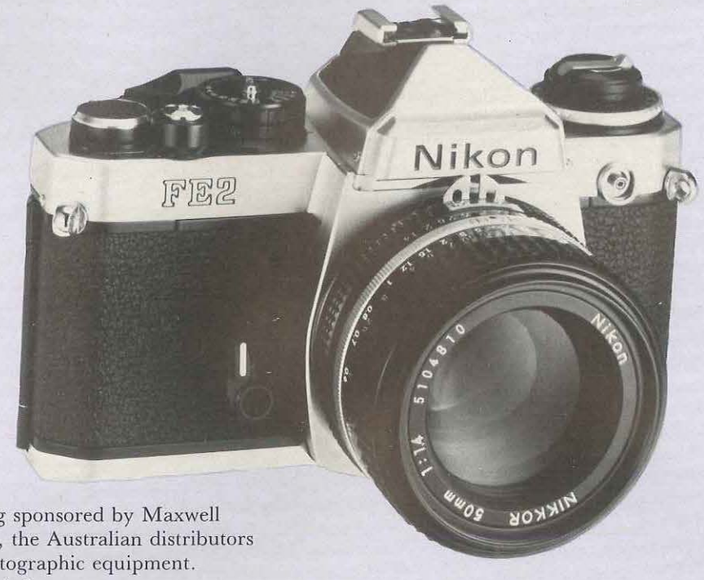
With regard to the first matter, the relevant Aircraft Accident Investigation Summary Report did not explicitly identify any 'main factor' as having caused the accident. The Summary Report did identify the position of the towhook as a 'contributory' cause of the accident.

In relation to the other two matters, whether or not the pilot and his companions had checked the flight manual and were familiar with its contents was not among the matters which the accident investigation directly looked into. Hence the statements in question were not established fact, but were logically based conclusions reached in the accident investigation. It is acknowledged that different conclusions from those stated could have been reached from the available evidence.

The fundamental objective of the investigation of an aircraft accident is the prevention of accidents. Similarly, the sole purpose in publishing details of an accident investigation is safety education. The article 'Incorrect Glider Launch' sought to reflect those objectives ●

Photographic competition

The *Aviation Safety Digest* is pleased to advise readers that it is conducting a photographic competition for all Australian aviation enthusiasts.



The competition is being sponsored by Maxwell Optical Industries Pty Ltd, the Australian distributors of Nikon cameras and photographic equipment.

Two prizes will be awarded:

- one for the best picture having as its theme Australian civil aviation;
- the other for the best picture having an Australian civil aviation safety theme.

The prize for the best civil aviation picture is a Nikon FE2 valued at $650 and the prize for the safety theme picture is a Nikon FG-20 valued at $360. Both prizes have been supplied by Maxwell Optical industries.

The FE2 is a 'state of the art' 35 mm single lens reflex (SLR) camera and was judged the 1983 SLR Camera of the Year by Australian Camera Craft Magazine. The FG-20 is a fully automatic 35 mm SLR aperture-priority auto exposure camera which also provides a facility for manual over-ride. Both cameras will be equipped with a 50 mm 1.8 Nikon E lens and an ever-ready case.

Any number of pictures can be entered by individuals as either colour or black-and-white 13 cm × 18 cm prints, or colour transparencies. Entrants should include name and address, telephone number, make of camera, details of film, aperture, shutter speed and a short description of the picture on a separate sheet securely fixed to each entry.

Entries will be accepted up until the last mail on 24 May 1985 and should be addressed to:

Aviation Safety Digest Photographic Competition
Bureau of Air Safety Investigation
GPO Box 367
CANBERRA CITY, ACT 2601

Photographers will retain copyright to their pictures, except for the two winning entries. In addition, the Bureau may wish to publish a number of other entries along with the winning pictures in *Aviation Safety Digest* 125 in July 1985 and mount a display.

The competition is open to all photographers with an interest in civil aviation, with the exception of the staff of the Bureau and Maxwell Optical Industries and their immediate families. Pictures can cover any aspect of civil aviation — aircraft in flight or on the ground, airways operations, maintenance or runway facilities, passenger servicing etc.

The Bureau will take all reasonable care of entries submitted but cannot accept responsibility for non-receipt, loss or damage. The judging panel will consist of the Editor of the *Digest*, another member of BASI, and a photographic specialist from outside BASI. Their decisions will, of course, be final ●