SOME THINGS WERE NEVER MEANT TO FLY.

Ask first. For safety's sake.

AUSTRALIA

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BUREAU OF AIR SAFETY INVESTIGATION

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Contents

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Dangerous cargo

Some things were never meant to fly

The Australian Government fears there could be a disastrous aviation accident in this country unless people become more aware about the restrictions and precautions needed before taking or sending dangerous goods on to aircraft.

Every day thousands of dangerous goods are sent around the world by air. When packed and handled correctly, they are perfectly safe. However, when exposed to the environment of air transport they can, if not properly packed and handled, become as dangerous as a hijacker's bomb.

SOME THINGS WERE NEVER MEANT TO FLY — that's the message the Department of Aviation is giving to people wanting to take or send potentially dangerous goods on board an aircraft.

They are being urged to ASK FIRST — FOR SAFETY'S SAKE if they are not sure about what they can or can't take on an aircraft.

Accidents and incidents

Listed below are some dangerous cargo occurrences reported in Australia and overseas in recent years.

From the U.K.

- A suitcase filled with toilet articles (hair sprays, deodorants, fingernail polish remover and medicinal alcohol) and loose book matches exploded when dropped by a baggage handler.
- A smoking suitcase with a broken gallon glass jug of nitric acid was pulled off an aircraft just before the baggage caught fire.
- The cork came off a bottle of acid in a repair kit checked as passenger baggage, and caused considerable damage to the aircraft.
- A passenger insisted on holding his briefcase in his lap. When the flight attendant tried to stow the bag under the seat, the passenger resisted. It transpired that the case contained six quart-bottles of sulphuric acid.
- A baggage handler was cut by flying fragments and one of his eardrums was injured when 10 practice hand grenades, five firecrackers and a smoke bomb packed in a coffee can in a passenger's bag exploded.
- While luggage was being loaded into an aircraft, ground personnel noted a fuse-type powder smell and smoke coming from one of the bags. Two of 91 books of matches had ignited.

In Australia

- A baggage handler who was loading passenger luggage into the cargo compartment of a Boeing 727 at Darwin noticed smoke coming from a briefcase. The case was removed from the aircraft, and examination revealed that a book of matches had ignited and burnt some adjacent papers.
- Aboard a Fokker F27 en route from Townsville to Hughenden a passenger was carrying a bottle of ammonia in her hand luggage. The ammonia spilt in the passenger cabin. Because of the fumes, the crew went on to oxygen and the aircraft returned to Townsville.
- During turnaround of a Douglas DC9 at Townsville Airport, a pungent smell was noticed in the rear cargo locker. Subsequent unloading revealed a damaged can of methyl ethyl ketone. In addition, a Ramset container was found holding 700 rounds of explosive charges. Two tradesmen on the aircraft had spoken to the operator about the carriage of the Ramset gun but had not mentioned the charges.
- Before boarding a Fokker F27, a passenger checked-in five pieces of luggage, including two cardboard cartons. He did not indicate that the cartons contained hydrochloric acid. As the cartons were travelling along the baggage conveyor belt, one tumbled down the 45-degree slope. It was removed from the belt and placed on a trolley. Because of the odour coming from the carton and the violent reaction of some spilled fluid on the trolley, ground staff investigated further and found that the carton contained acid.

Papua New Guinea

- A box marked as containing laboratory equipment burst into flames during transhipment at Port Moresby airport and could not be extinguished. It had arrived aboard a passenger aircraft. A subsequent investigation revealed that the box contained a variety of chemicals, including nitric acid.

U.S.A.

- Perhaps the worst aircraft accident attributed to dangerous cargo was in 1973 when the three-man crew of a Pan American Boeing 707 freighter was killed when the aircraft crashed near Boston while trying to make an emergency landing. Investigators found that the crew had been overcome by fumes from a cargo of incorrectly packed nitric acid, which had leaked and reacted with the sawdust in which it was packed.

The possibility always exists that worse accidents, for which it was not possible to determine a reason, may have been caused by dangerous cargo.

Dangerous goods

Below are some things FORBIDDEN in hand luggage or luggage destined for the hold of an aircraft.

- EXPLOSIVES: fireworks, flares, toy gun caps.
- COMPRESSED GASES: gas cylinders, and aerosols other than limited quantities of medicinal and toiletry articles which are necessary for the journey.
- FLAMMABLE LIQUIDS AND SOLIDS: lighter fuel, matches, paints, thinners, fire lighters, cigarette

lighters containing unabsorbed lighter fuel.

- OXIDISERS: some bleaching powders and certain acids.
- ORGANIC PEROXIDES: such as hair or textile dyes, disinfectants, fibreglass repair kits and certain adhesives.
- POISONS: arsenic, cyanide, weedkillers.
- IRRITATING MATERIALS: tear gas devices.
- INFECTIOUS SUBSTANCES: live virus materials, pathological samples.
- RADIOACTIVE MATERIALS: medical or research samples which contain radioactive sources.
- CORROSIVES: acids, alkalis, wet cell-type car batteries, caustic soda, mercury.
- MAGNETISED MATERIALS: magnetrons, instruments containing magnets.
- OTHER DANGEROUS GOODS: dry ice, oil-impregnated rags.

All of these goods can be shipped as *cargo* if properly packed and declared. People are advised to contact their airline for more information.

Below is a list of items passengers CAN take on an aircraft:

- alcoholic beverages, perfumes and colognes
- limited quantities of medicinal or toiletry products such as hair sprays for personal use
- with the approval of the airline: small oxygen cylinders for medical use and small carbon dioxide gas cylinders worn to power mechanical limbs
- safety matches and certain lighters carried on the person: they *must not* be packed in luggage.

Why some goods are dangerous

GAS CIGARETTE LIGHTERS. Lighters containing liquefied gas under pressure may be hazardous when operated under the reduced atmospheric pressures experienced in an aircraft cabin during flight. The popular plastic disposable lighters are not fitted with a means of protecting the gas release valve against

inadvertent operation. Such operation of a disposable lighter in baggage could release the entire contents into an aircraft baggage compartment. These lighters contain sufficient gas to cause a powerful explosion.

LIGHTER FLUID is a highly volatile and flammable liquid which can produce an explosive concentration of vapour in an enclosed space. Cigarette lighters containing unabsorbed liquid fuel may leak under the conditions of air transport, producing explosive vapour in aircraft baggage compartments and cabins.

BOOK MATCHES can easily have the protective flap dislodged when moved about in luggage. There have been several incidents where the flap has been dislodged and a fire started when match heads rubbed against the striking surface of another book of matches.

AMMUNITION. This includes all kinds of bombs, grenades, rockets, projectiles or other devices containing incendiary, smoke, tear-producing or toxic agents. These contain either an explosive-igniting device, a burster, an expelling charge or a propellent charge. Ammunition presents a risk of a fire and/or an explosion as well as the possibility of tear-producing gases, poisonous gases, smoke or a projection hazard.

For these reasons, most types of ammunition are forbidden on passenger and cargo aircraft. The Ramset-type charges used in the building industry are classified as an explosive. However, when packed in accordance with regulations, these goods are considered safe and limited amounts may be transported by air.

SOLVENTS AND ADHESIVES. Adhesives often contain solvents such as acetone, methanol, methyl ethyl ketone (MEK) and acrylonitrile, which are very flammable and in some cases, such as methanol and acrylonitrile, toxic. Acrylonitrile when heated emits highly toxic cyanide fumes. Therefore, if a spillage or a leakage of adhesive or solvents occurs, there is a risk of a fire hazard and, depending on the type of solvent or adhesive, there may also be a toxicity hazard.

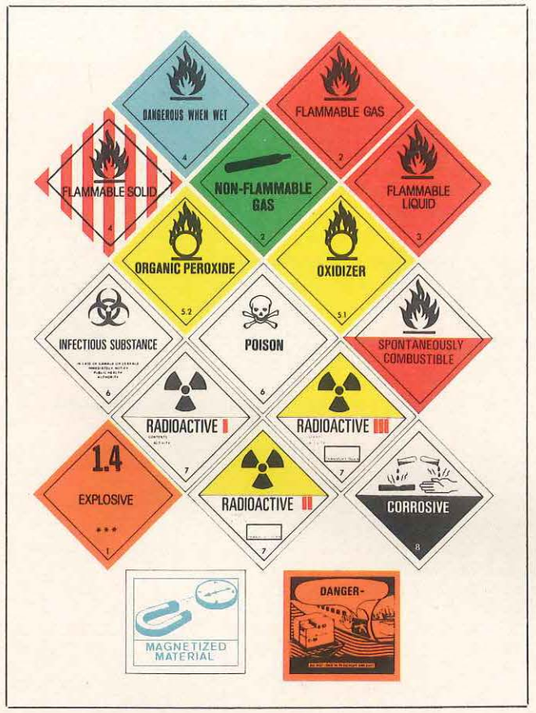
EASILY VAPORISED LIQUIDS. These liquids are mainly solvents, such as methylated spirits, petrol, naphtha, ether, etc., which are highly flammable. They are also very volatile, emitting flammable fumes.

A risk of a fire or explosion will result if a leakage occurs. Therefore, the packaging used for such volatile liquids must be capable of withstanding the internal pressures encountered when these liquids are transported by air.

WET CELL BATTERIES. These consist of metal plates immersed in an electrolyte liquid, either a dilute sulphuric acid or potassium hydroxide. Both of these electrolytes are corrosive liquids. These batteries could cause damage either through spillage or accidental short-circuiting of the terminals, which could result in a fire.

There have been many occurrences where battery acid has leaked, causing damage to both the aircraft structure and adjacent baggage.

MERCURY is a metal which remains in liquid form at temperatures as low as −38 °C. It gives off toxic fumes at high temperatures and low pressures. Liquid mercury will very quickly penetrate aluminium and cause it to become brittle and weak. As most aircraft parts are produced from aluminium, it can cause severe structural damage if spilt in an aircraft, especially as it is difficult to trace and remove.



PAINTS. Classified as paints are enamels, lacquers, stains, shellac, varnish, polish, filters and thinners. These all contain solvents which are highly flammable.

Unless the container is tightly and effectively sealed and packed, the reduced air pressure in an aircraft hold could cause the tin to pop open and the contents to spill. There have been numerous incidents where cans of paint have opened and spilt, not only damaging other goods and the aircraft but also, in some cases, producing explosive vapour in the aircraft hold.

PETROL is a highly flammable liquid which increases in volatility at low pressures and/or high temperatures. It must therefore be stored or packed in approved containers and should have sufficient room for expansion to ensure that no leakage or distortion occurs to the container. A hazardous situation will occur if the seal leaks, allowing fumes to escape and produce an explosive mixture.

HOUSEHOLD CLEANERS. Cleaners such as detergents, stain removers, bleaches, etc., can contain either chlorides or ammonias. Many bleaching powders contain strong oxidisers, which react with other materials producing fumes, smoke and fire. Some detergents and stain removers contain ammonia, which is very corrosive and reacts with oxidising materials. Ammonia also produces toxic fumes. There have been instances where aircraft have had to return to an airport due to ammonia fumes affecting the pilot and passengers.

ACIDS present a number of hazards depending on the particular type. In general they are corrosive and will attack most types of metal alloys and materials used in aircraft. They can also cause very severe burns when in contact with the skin. Some acids such as nitric and perchloric are strong oxidisers. If spilt, they could combine with other substances and create a fire or an explosion. When heated, the majority of acids will produce very toxic fumes. Unless properly packed and very carefully handled, they are a source of potential danger.

AEROSOL CANS. In aircraft, decreased cabin pressure may result either in leaks if the can is not properly sealed or in the contents being expelled at a much greater rate than normal when used. They are also very susceptible to heat, and there have been incidents where cans have exploded as a result of becoming overheated in an aircraft cabin.

Legislation and penalties

Carriage of dangerous goods by air is governed by the Air Navigation Regulations (ANRs). ANR 120 states that dangerous goods shall not be consigned or carried except with permission of the Secretary of the Department and in accordance with conditions set out in that permission. The conditions are set out in Part 33 of the Air Navigation Orders (ANOs). Part 33 is being revised to conform with the requirements set down by the International Civil Aviation Organisation (ICAO).

In Australia, monetary penalties for breaches of the Air Navigation Regulations, including improperly consigning or taking dangerous goods on to an aircraft or falsely declaring them, were increased recently to a maximum of $5000. A gaol sentence of up to two years may be imposed on individuals as an alternative or additional penalty.

Section 18 of the Crimes (Aircraft) Act deals with taking or sending dangerous goods on an aircraft. The penalty which exists for individuals breaching this Act is a gaol sentence of seven years. Until recently there was no provision for a monetary penalty for either individuals or for bodies corporate illegally consigning such goods. The Act has been amended to correct this deficiency and monetary penalties of up to $20 000 for individuals and $100 000 for bodies corporate are now available.

Airlines are stepping up their security checks on passengers' hand luggage and widespread publicity is planned when people are prosecuted.

The airlines have highly trained cargo acceptance staff to assist people who need advice and information on shipping dangerous goods. Staff are also required by law to reject any item incorrectly prepared or consigned. In some cases, they are also required to report these occurrences to the Department of Aviation.

If the investigation into such an occurrence reveals a deliberate attempt to circumvent the regulations and procedures, the Department will prosecute the offending person or company. Successful prosecutions have been made in the past and it is expected that the recent penalty increases will help to deter the few 'rogues' in the cargo business.

Conclusion

The hazards of incorrectly packing or consigning dangerous goods are so extreme and obvious that it is difficult to believe that any individual associated with the aviation industry would do so deliberately. Anyone who has any doubts regarding the safety of air cargo should always check to ensure that all safety regulations have been met before that cargo is despatched or accepted for carriage ●

More on P-charts

The importance of using the performance charts contained in each GA aircraft's Approved Flight Manual was emphasised in a feature article in *Aviation Safety Digest* 118/1983. That article stressed the point that P-charts are the only authorised source of takeoff and landing data, and that they must be consulted on any occasion the slightest doubt exists about an aircraft's capability of operating into or from any strip.

The accident described below is unfortunately typical of many in GA operations, in that the strip the pilot tried to use simply was not long enough.

The accident

A property owner wanting to conduct an aerial inspection of his land arranged for a friend who was a pilot to do the job in a Cessna 172. Before flying out to the property, the pilot told the owner that he would need an airstrip about 700 metres long and a means of determining the wind velocity. The owner said he would attend to those requirements and on arrival the Cessna landed uneventfully in the designated area.

Before taking off for the inspection, the pilot was driven along the strip by the owner and, using the car's speedometer, measured its length as 400 metres. By 'eyeballing' the strip, the pilot estimated that this distance was about the same as his home field and therefore decided that a takeoff with himself and three passengers would not present any performance problems. This belief was reinforced by the fact that he had used only half of the strip for landing.

The passengers were embarked and, on completion of an engine runup, the aircraft was taxied to the takeoff threshold. After lining up, full power was applied while the aircraft was held on the brakes. Ten degrees of flap were selected.

Subsequently the pilot recalled that, during the takeoff roll, acceleration to 50 knots seemed normal but then became very slow. He therefore lifted the aircraft off the ground at 50 knots as he felt the strip might be a bit soft. His intention was to accelerate close to the ground and, when the airspeed had increased sufficiently, pull up to clear two trees at the end of the strip. The technique of holding the aircraft close to the ground was consistent with the Flight Manual which states that 'the aircraft is held on or close to the ground until takeoff safety speed is achieved' (which in this case was 62 knots).

Just after the pilot pulled up and passed the trees the aircraft's right wing suddenly dropped about 15 degrees. The pilot later commented that he was able to pick up the wing with aileron but could not prevent the Cessna from 'flying into the ground' and striking a dam revetment.

Investigation

The Cessna's acceleration during the takeoff roll had in fact been normal and it soon became apparent that the faulty component was human, not mechanical: the accident occurred because the pilot had failed to maintain flying speed during his efforts to get airborne from a short strip.

It was established that the pilot had received more than adequate instruction on ALA operations and the use of performance charts during his basic training and subsequent licence testing. However, since then he had, for no good reason, become reluctant to use P-charts. Thus, even though he had taken the trouble to measure this strip, he effectively discounted that measurement by making an 'eyeball' assessment that the strip was the same length as one he used frequently, and therefore would be suitable.

Had the pilot been in the habit of referring to his P-charts, he would have known — even without making a precise calculation — that 400 metres was totally inadequate.

In this particular instance, the Takeoff Distance Available (TODA) of the strip was further reduced from 400 metres to 315 metres because of the climb-out gradient requirements to clear the two trees. Prevailing conditions were as follows:

- temperature ..... 29 °C
- strip pressure height ..... 600 feet AMSL
- strip surface ..... short dry grass
- strip slope ..... up 1 per cent
- aircraft weight ..... 1043 kg
- wind velocity ..... 5 knots headwind

Entering the Cessna 172 Takeoff Weight Chart (opposite) with those figures, the takeoff distance required can be seen to be just under 800 metres.

It should be noted that the Takeoff Weight Chart for the 172 is based on a flap setting of 0 degrees: there is no P-chart for 10 degrees. This is not, however, a problem. In the manufacturer's Pilot's Operating Handbook, pilots are advised that, while normal and obstacle clearance takeoffs are performed with the wing flaps up, the use of 10 degrees of flap can be helpful on short, soft or rough strips as it will shorten the *ground run* by about 10 per cent. The Handbook goes on to point out that the use of 10 degrees of flap will, however, result in a degraded climb performance for clearing a 50-foot obstacle.

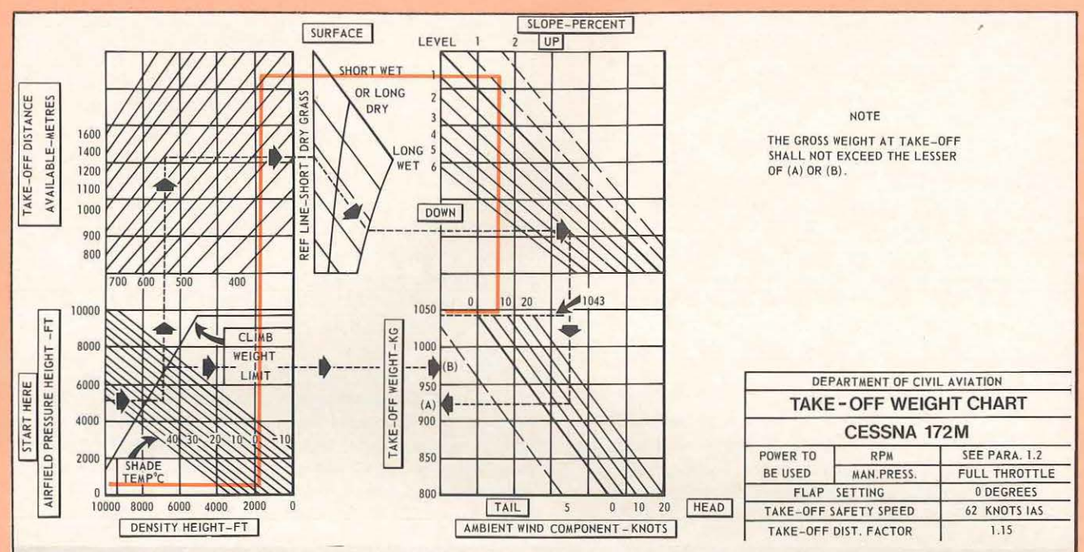
In this case the trees the pilot wanted to clear were only 15 feet high, so his decision to select 10 degrees of flap was reasonable. The important point, though, is that even when the 10 per cent reduction of aircraft ground run is applied, he still needed a total takeoff distance in excess of 700 metres — more than twice that which was available.

As a secondary point, the accident also illustrated the danger of assessing or comparing strip lengths by 'eyeballing' them.

Comment

If this pilot had used his P-charts and heeded their information, he would not have jeopardised the lives of himself and his passengers; nor would he have caused substantial damage to a valuable aircraft.

Contrary to the beliefs of a minority of pilots, P-charts are neither complicated nor difficult to use. In this example, the information required is the distance



the aircraft needs to takeoff. To find the distance, it is simply a matter of entering one side of the charts with airfield pressure height and the other side with takeoff weight, and following the self-explanatory graphs through the other variables shown as sloped lines (temperature, wind, slope and surface) until the two lines intersect. Most calculations are even simpler than that, as strip length is usually known, in which case the graphs are entered at the airfield pressure height and followed through to find the maximum permissible takeoff weight for the given conditions of temperature, strip length, strip surface, strip slope and wind component.

Too many avoidable accidents — many of which cause fatal or serious injuries — continue to be attributable to pilots' failure to use P-charts. The remedy is simple and within the control of every pilot ●

Unauthorised Night VMC flight

A pilot holding a private licence without any class of instrument rating was asked to fly three people on a fishing trip from Swan Hill in Victoria to the Northern Territory. The passengers planned to stop at Alice Springs on the northbound flight to attend the Henley-on-Todd Regatta. A Piper PA32-260 was hired for the trip.

The pilot lived in Melbourne and on the day of departure arrived at Moorabbin Briefing Office at about 0830 Eastern Standard Time (EST). Weather conditions to the north were unsuitable for Visual Meteorological Conditions (VMC) flight so he took the Cherokee on a brief local sortie. By 1100 hours the weather to the west of Moorabbin had improved so the pilot decided to depart in that direction and circumnavigate the poor conditions which still existed on the direct track to Swan Hill. He prepared and submitted a flight plan covering all stages of the journey to Alice Springs, operating under the Visual Flight Rules (VFR). Although forecasts of en route winds were available, the pilot chose to plan for nil wind conditions.

When the flight plan was submitted, it was noted by the Briefing Officer that the estimated flight time was 9 hours 42 minutes and the journey would therefore extend beyond the end of daylight. When this was pointed out to the pilot, he stated that the final part of the journey would be completed under Night VMC procedures. The Briefing Officer reminded the pilot that he would need to check the latest weather forecasts at Leigh Creek to ensure that conditions were suitable for this type of operation.

The Cherokee departed Moorabbin at 1134 hours EST and arrived at Swan Hill at 1411. After refuelling and embarking the three passengers and their baggage, it departed at 1447 hours and arrived uneventfully at Leigh Creek at 1819 hours (1749 hours Central Standard Time). The aircraft was again refuelled and the pilot attended the Flight Service Unit (FSU) where he was given copies of the latest weather forecasts. He was observed making a number of calculations, but he did not notify the FSU of any amendments to his original flight plan.

The forecasts provided to the pilot indicated that the wind at the planned cruising altitude of 8500 feet was from the west at 15 to 20 knots. No cloud was predicted for the part of the route south of Oodnadatta but increasing altocumulus and altostratus, base 12 000 feet, was forecast for the latter part of the journey.

Departure from Leigh Creek was made at 1824 hours (NB: all times are now given in CST), which was about the same time as the end of daylight. The planned route and estimated time intervals were: Lake Eyre North 53 minutes, Oodnadatta 59 minutes, Finke 60 minutes and Alice Springs 54 minutes.

In accordance with this schedule, the pilot reported to Leigh Creek that he had reached Lake Eyre North at 1917 hours, was cruising at 8500 feet and was estimating Oodnadatta at 2016 hours. Subsequently, when in radio contact with Alice Springs, he amended his estimate for Oodnadatta first to 2020 hours and later to 2024 hours. At 2023 the pilot reported his position as Oodnadatta at 2024, cruising at 8500 feet and estimating Finke at 2124 hours. At 2059 he advised that he was now cruising at 7500 feet. Then, at 2124 hours, he reported he was at Finke at 2126, cruising 7500 feet and estimating Alice Springs at 2220 hours.

Five minutes later the pilot called Alice Springs and asked for radar guidance. He was informed that Alice Springs was not equipped with radar and, when asked if he required navigational assistance, replied 'affirmative'. The Uncertainty Phase of Search and Rescue procedures was implemented by air traffic control.

Radio communications with the Cherokee were intermittent and messages were being relayed through other traffic. The pilot was asked to climb to 10 000 feet in an attempt to improve R/T and navaid reception from Alice Springs. Communications did improve, and Alice Springs ascertained from the pilot that:

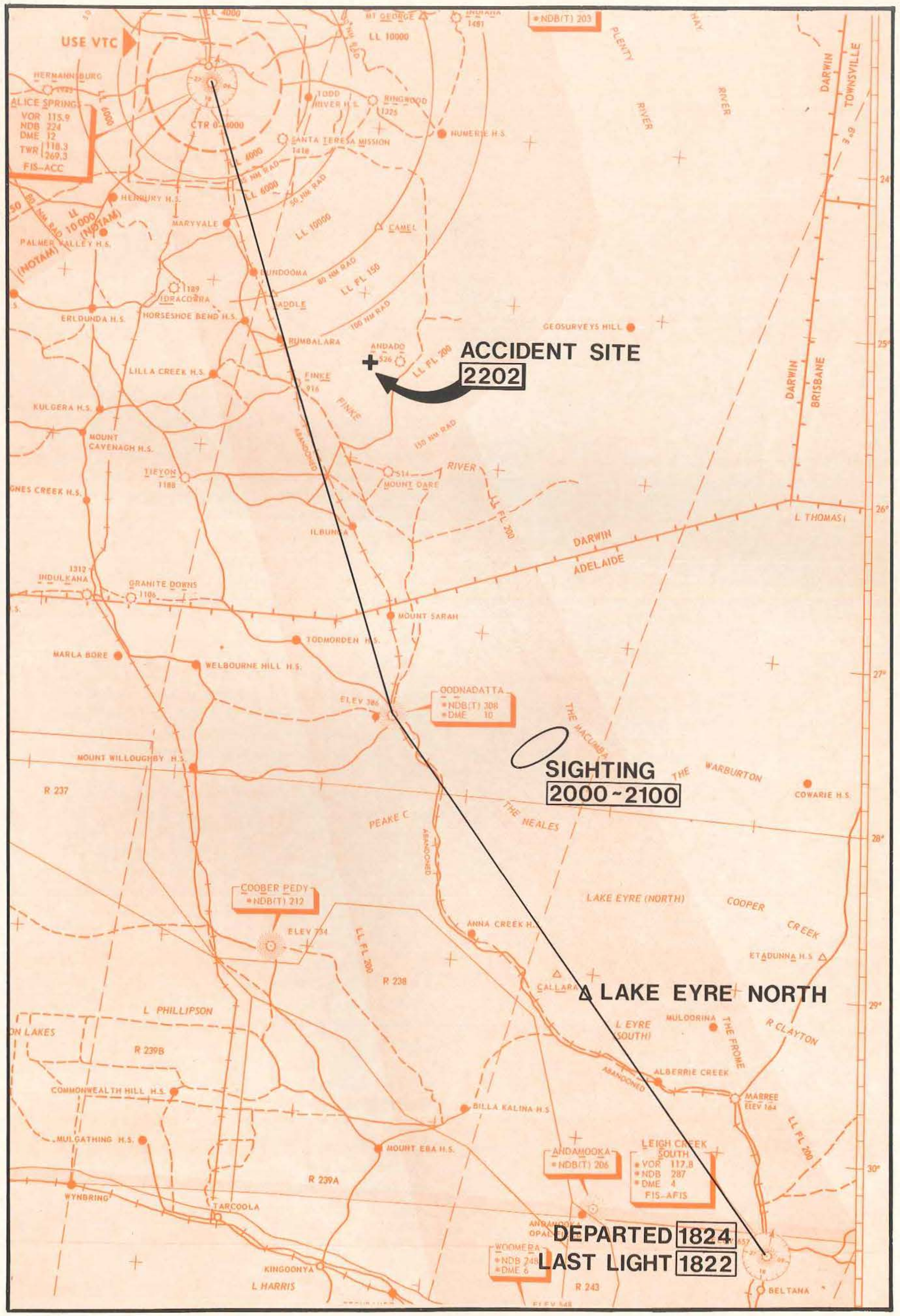
- his last positive visual fix had been at Oodnadatta;
- he had maintained a heading of 335 degrees magnetic since that position; and
- his true airspeed was 120 knots.

As the aircraft was equipped with VOR and ADF the pilot was asked if he was receiving the Alice Springs facilities. He advised that he was not receiving the VOR but that he could hear the Alice Springs automatic terminal information service on the ADF. At 2145 hours the pilot stated that his remaining fuel endurance was 90 minutes.

From the information provided by the pilot and the forecast winds, it was calculated that the Cherokee was east of track. The pilot was therefore instructed to steer a heading of 320 degrees magnetic. At 2150 hours he reported that the ADF was indicating 030 degrees, but he could not see any lights or ground features. At 2157 hours the pilot was instructed to steer a heading of 300 degrees magnetic, in the hope that he would come within range of the Alice Springs VOR station. Three minutes later he advised that his VOR equipment was receiving Alice Springs and he was on the 320 radial. As this indicated that the aircraft was northwest of Alice Springs, the pilot was asked to confirm that his equipment indicated 320 'to' and not 320 'from' the station. No reply was received to either this or subsequent repeated calls.

SAR procedures were upgraded to the Distress Phase and an extensive air and ground search initiated. The Cherokee was not equipped with an emergency locator beacon and it took about 36 hours to locate the wreckage, which was 29 nm east of the planned and reported position. There were no survivors.

Parts of the aircraft were spread over a considerable area. A trajectory analysis of the various components revealed that the aircraft had broken apart while heading 050 degrees magnetic, in a steep dive of at least 46 degrees, and within the altitude range of 2750-3850 feet. Examination of the wreckage found no evidence of pre-existing defects. The left wing, both left and right stabilators, and the rudder and fin had



separated from the aircraft as a result of overload forces in excess of the design strength of the aircraft. Permanent torsional deformation of both stabilators indicated the aircraft speed was in excess of 204 knots prior to break-up. There was evidence that the engine had been operating and the aircraft's electrical system had been powered at the time the fuselage struck the ground.

Analysis

Although the flight from Leigh Creek was conducted at night, the pilot did not hold a Night VMC or any other class of instrument rating. His logbook recorded only 1.5 hours of night flying experience, gained five years previously during training for his private pilot licence. However, documents recovered from the wreckage showed that he had made travel flights at night on other occasions, the most recent being one month before the fatal accident.

By applying 'hindcast' winds (i.e. winds based on aircraft reports and recorded meteorological data for the particular area and time) and the Cherokee's true airspeed to the most probable flight path from Leigh Creek to the accident site, investigators determined that it was highly improbable that the aircraft had been at Lake Eyre North, Oodnadatta and Finke at the reported times. However, even allowing for these calculations, the investigators initially found that there were about 15 minutes of flight for which they could not account. It was here that a witness report came to the fore. A stockman camped in the Mt Robinson/ Youltangunna Hill area reported having heard the engine noise, and seen the lights, of what appeared to be a light aircraft, circling in the area for about 15 minutes between 2000 and 2100 hours. This was consistent with the flight path reconstructed by investigators and explained the 'missing' 15 minutes.

Given the known and postulated flight data, it seems probable that, notwithstanding his position reports for Lake Eyre North, Oodnadatta and Finke, the pilot started experiencing navigational difficulties soon after his departure from Leigh Creek. By the time he reached the Mt Robinson/Youltangunna Hill area, he was so concerned that he spent a considerable time circling, searching for an identifiable landmark. His final position report at Finke — which was followed only five minutes later by a request for radar assistance — was obviously little more than a guess, and not a very well informed guess at that.

Comment

The cause of the accident was found to be that, following a loss of control, the aircraft was subjected to aerodynamic loads in excess of its design limit. While the reason for the loss of control could not be determined with complete certainty, several probable factors were apparent.

First, by the time of the accident, the pilot had been on duty for about 14 hours, and out of bed for considerably longer; thus, he would have been fatigued to some extent. Second, the final stages of the flight were conducted under a complete overcast, beneath which it was very dark with no visible horizon. The fatigue and absence of an horizon would have increased the pilot's susceptibility to spatial disorientation.

Finally, and most significantly, there is the matter of a pilot without a Class Four rating attempting a Night VMC flight.

The aeronautical experience and flight proficiency requisites for a Class Four rating are exhaustive and demanding. For example, included among the many requirements Class Four aspirants must satisfy are those of completing 10 hours of night flying, of which at least five must be visual navigation; and a demonstration of proficiency in recovering from unusual attitudes solely by reference to instruments (full details of all requirements are listed in ANOs). It is axiomatic that all of the sequences a pilot must complete for the rating are essential, and are designed to equip an individual to deal with the considerable and varied situations and pressures which can arise during Night VMC flight.

Apparently the pilot involved here had flown at night previously without undertaking any formal Class Four training. Regrettably, it needs to be said that he was foolhardy in the extreme to do so. On this flight, when pressures started to build up on him, he simply did not have the training, knowledge or relevant experience to cope.

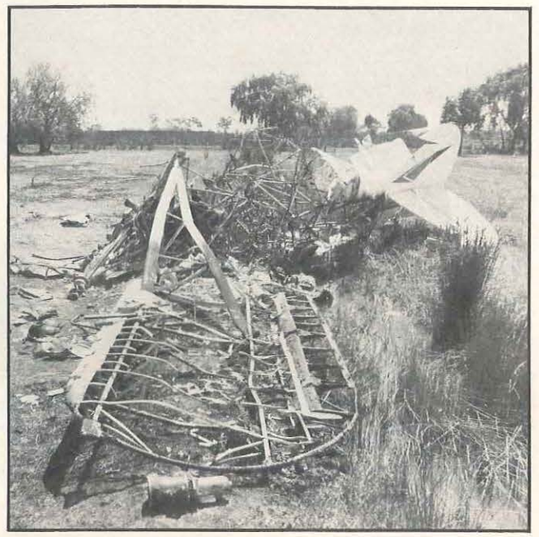
The investigation report concluded that the reason for the loss of control could not be determined. However, the report went on to state that, together with fatigue and the prolonged stress arising from navigational difficulties, the pilot's lack of training and experience at maintaining control in the absence of external visual references was probably a contributory factor ●

In brief

Shortly after liftoff the left engine on an American DC-9 lost power and there were twelve to thirteen rapid compressor stalls. Though the computed engine pressure ratio (EPR) settings for takeoff were 1.94, the crew noted that EPR had dropped to 1.22 at this point. The aircraft sank back on to the ground, with the tail striking the dirt adjacent to the edge of the runway because of directional control difficulties.

To initiate this takeoff, the crew had taken the aircraft back behind a displaced threshold to make use of all available runway. They were cleared for takeoff just as a heavy L-1011 exited the runway after an autoland. In reconstructing the incident, it was determined that the DC-9's rotation and liftoff occurred at a point on the runway just prior to the heavy jet's touchdown point, leading to the conclusion that wake vortices probably caused the repeated compressor stalls, power loss and temporary loss of directional control ●

Unnecessary low level transit = disaster



Aerial application flying is recognised as a high-risk operation. It was because of this that *Aviation Safety Digest* 114 featured a special article titled 'Wire strikes: the threat and the defence' which addressed dangers faced by agricultural pilots.

Among the matters discussed in the article was that of transit heights while flying en route to or from an application area. It was pointed out that wire strikes are common on transit flights, and that pilots should avoid exposing themselves to this totally unnecessary risk by cruising at a comfortable height as 'hedgehopping back to the strip achieves negligible time saving and markedly increases fatigue and exposure to wire strikes'.

The risks inherent in needless low level cruises are not restricted to wire strikes. Should an aircraft sustain a malfunction precipitating a forced landing, then obviously the aircraft's height AGL is going to be a crucial factor in the execution of that landing. As an old saying goes, 'Altitude above you is like runway behind you'. It is a maxim which has relevance to all pilots, but especially those of single-engine aircraft; and it was unhappily illustrated in the following fatal accident.

* * *

An agricultural aircraft took off in the late afternoon to carry out some sowing on a property about 17 kilometres from the airstrip. After turning on to heading the pilot settled into the cruise at a height of about 100 feet AGL, although there was no operational necessity to maintain such a low level. At a position about three kilometres north of the airstrip the noise of the engine suddenly ceased. The aircraft descended and banked steeply to the right. While still turning, the right wing collided with a large willow tree. The right wing tip then struck the ground and the aircraft cartwheeled before coming to rest 58 metres further on. An intense fire consumed much of the wreckage and killed the pilot.

* * *

Because of the fire damage, it was not possible to determine the cause of the apparent engine failure. It was found that the aircraft was illegally fitted with both liquid-spraying and solid-spreading equipment (only one should be fitted at any time) which would have significantly affected glide performance.

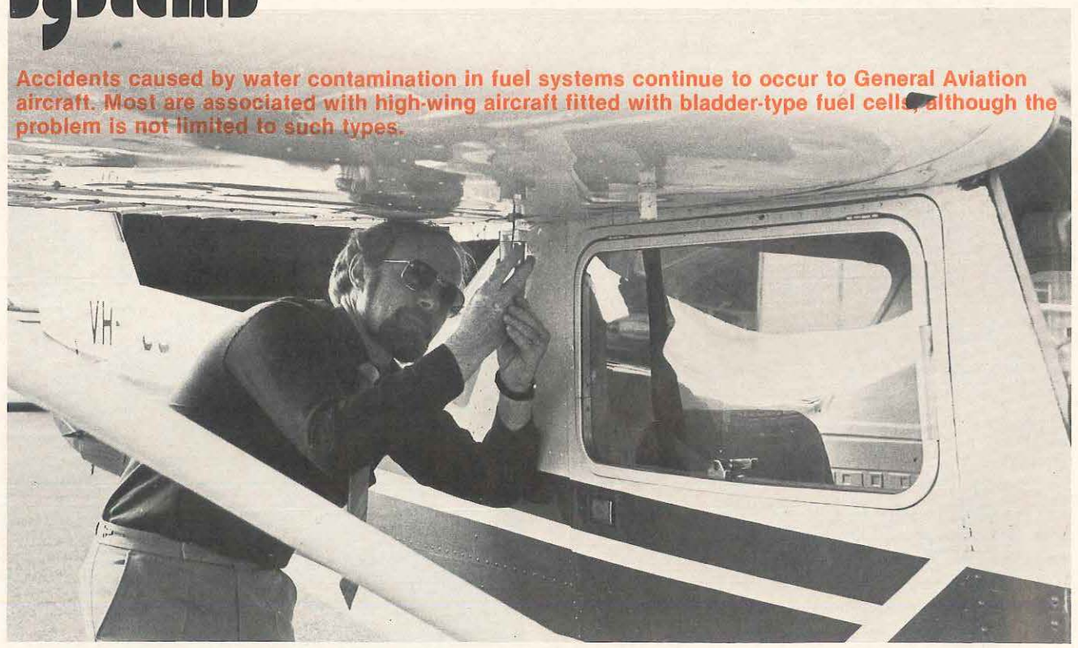
However, notwithstanding the loss of engine power and the illegal equipment configuration, the low cruise height was identified as being a crucial factor in the catastrophic outcome of this accident. Based on the position, heading and height of the aircraft at the time of the apparent engine failure, the most suitable forced landing area was located ahead and to the right. It seems probable that the pilot was attempting to reach this area when the collision with the tree occurred. The collision was a consequence of the pilot not having time for any course of action other than that which immediately presented itself: unless he happened to be virtually on top of a clear area, he simply did not have sufficient height to effect a safe forced landing.

Comment

The extent to which light aircraft are damaged during forced landings varies considerably. It is, however, a fact that the great majority of pilots and passengers involved in such accidents survive them, often with little, if any, injury.

One of the key factors is that of having sufficient time — which clearly is related to sufficient altitude — to assess the situation and exercise as much control as possible over the forced landing. If you can pick the place, the landing direction, control the airspeed, complete safety checks, etc., then the odds are very much in your favour. On the other hand, needlessly cruising at a low altitude stacks the odds against you to the extent where lives may be placed at risk ●

Water contamination of fuel systems



Accidents caused by water contamination in fuel systems continue to occur to General Aviation aircraft. Most are associated with high-wing aircraft fitted with bladder-type fuel cells, although the problem is not limited to such types.

Water in an aircraft's fuel system will gravitate to the lowest point of the system. Fuel tank drain points are provided at the low point of the tanks, though in high-wing aircraft in particular, the low point of the system is usually in the plumbing between tanks and engines. Frequently, additional drain points are installed during manufacture to cater for this problem. In some other cases — for example, certain models of the Cessna 182 — remedial action in the form of an Airworthiness Directive has been taken, necessitating modification of the fuel system. Similarly, Cessna Service Letter SE 812-24 details a retrofit kit to install fuel line drain valves on Cessna 150/152 models.

Investigation of one accident revealed that the pilot of a Cessna 182P was unaware of the provision of an additional fuel drain point on the aircraft. Using the fuel tank drain points indicated in the aircraft handbook, the pilot had detected water contamination and had been careful to continue draining fuel until clear samples were obtained. However, the aircraft had been modified in accordance with Cessna Airworthiness Directive 180/63, which required the installation of an additional drain valve at the fuel selector, to ensure proper drainage in the event of water contamination. Because the pilot did not drain that valve, water remained in the system and eventually caused an engine failure.

* * *

Apart from highlighting the absolute importance of thoroughly completing fuel water drain checks, this occurrence raises two other important points, one relating to keeping water out of fuel systems and the other to systems knowledge.

Prevention

On the basis that prevention is better than cure, all steps should be taken to stop water entering the fuel system. Water can enter a fuel system in three ways:

- it may be pumped in from contaminated stock;
- it may condense from humid air; or
- it may leak in through faulty fuel caps or improperly fitted inspection plates.

The first two possibilities can be prevented by careful filtering of suspect stock and by keeping fuel tanks as full as possible.

The main problem arises from faulty fuel caps, which not only allow water to enter the cells but also can cause bladder-type cells to collapse and syphon fuel overboard in flight. It is extremely important for fuel caps and adapters to be regularly inspected for proper sealing. Whenever leakage is suspected a leak test, in accordance with the manufacturer's instructions, should be completed.

Systems knowledge

While this article has dealt specifically with aircraft fuel systems, the principle involved extends beyond a particular system or aircraft type. It is a requirement that a pilot whose licence includes a group endorsement shall not act as pilot-in-command unless he is familiar with his aircraft's systems. The aircraft owner is responsible to ensure that the pilot complies with this requirement. When a system has been modified, the owner must be particularly careful to draw the pilot's attention to the modification and its implications ●

Aircraft accident reports

FOURTH QUARTER 1983

Prepared by the Bureau of Air Safety Investigation

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
F = Fatal S = Serious M = Minor N = Nil

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*
02 Oct 1630	Cessna 172 M VH-UGP Green Head, WA	Non-commercial—practice Green Head, WA/Green Head, WA	C1N, P1N 8351024

While conducting a series of practice circuits, the pilot noted that a crosswind from the right was evident down to 50 ft on the approach but the wind at ground level was blowing down the strip in use. On the last circuit a normal approach was made, however, shortly after touchdown the aircraft began to drift, despite the application of corrective rudder. A go-around was made but the drift to the right continued. Flap was raised but control was then lost and the aircraft struck trees.

04 Oct 1500	Victa 115 VH-MUA Singleton, NSW	Instructional—solo—supervised Singleton, NSW/Singleton, NSW	C1M, P1N 8321077

The student pilot was briefed to conduct a period of solo consolidation training. After several circuits and landings had been completed the pilot flew the aircraft to a strip at a nearby military installation. A passenger boarded the aircraft and the pilot then conducted a takeoff, with the intention of making a local flight. A partial loss of engine power occurred and the aircraft subsequently struck the ground at a high rate of descent and came to rest inverted.

08 Oct 1559	De Hav 82 A VH-KLH Bankstown, NSW	Non-commercial—pleasure Bankstown, NSW/Bankstown, NSW	C1N, P1N 8321079

After a one-hour flight in the local training area the pilot entered the circuit for a full-stop landing. The ATIS broadcast indicated that a 10 kt crosswind could be expected. The initial touchdown was heavy and the aircraft bounced. The pilot then attempted to land the aircraft in a 3-point attitude, but the touchdown was again heavy and the main gear partially collapsed.

08 Oct 0941	Cessna 177 RG VH-IRO Kingston, SA 70NW	Non-commercial—pleasure Parafield, SA/Robe, SA	C1N, P1N 8341031

During cruise at about 1000 ft agl the engine began to run roughly and the pilot observed falling oil pressure indications. A severe engine vibration then developed and the pilot, after selecting a suitable forced landing area, shut down the engine. He delayed lowering the landing gear until he was satisfied that the selected area had a firm surface. The gear was selected down on very late final, but only the nosegear had time to become partially extended before touchdown.

09 Oct 1700	Pitts S1 VH-IWC Stawell, Vic 15NE	Non-commercial—pleasure Stawell, Vic 15NE/Stawell, Vic 15NE	C1S 8331029

The aircraft was one of many which had flown into a barbecue at a private airfield. The pilot was asked if he would provide an aerobatic display, and during the day carried out three. After completing the third display, the aircraft flew past the gathering, at about 500 feet above the ground, pulled up steeply and turned through 180 degrees to land straight ahead. It then descended steeply at low forward speed and struck the ground heavily in a nose-down attitude.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
11 Oct 0630	Hiller UH12-E VH-FFC Longton Property, Qld	Commercial—mapping/photo/survey Longton Property, Qld/Longton Property, Qld	C1F, P1F 8311066

The pilot, with his wife as passenger, was conducting a bore inspection. A search was instigated when the helicopter did not return by nightfall. The wreckage was found the next morning. The helicopter had struck the ground in an inverted attitude amongst trees in a dry swamp.

13 Oct 0730	Piper 25 235/A1 VH-FOO Cowra, NSW 8W	Commercial—aerial agriculture/baiting Cowra, NSW/Cowra, NSW	C1M 8321080

The pilot carried out an aerial survey of the area to be treated and commenced spraying. The initial run was made below power lines crossing the centre of the crop, and the third run was in the same direction. As the aircraft approached the power lines the pilot's attention was distracted and the windscreen and canopy struck the lower two cables. The aircraft turned to the right and crashed into an adjoining field.

16 Oct 1030	Piper 25 235 VH-CDU Tintinara, SA 25SW	Commercial—aerial agriculture/baiting Tintinara, SA 25SW/Tintinara, SA 25SW	C1F 8341029

The pilot was engaged in spraying a crop of lupins. The aircraft was observed to fly from one paddock to another on the property. A short time later a tree in that paddock was observed to be on fire. The wreckage of the aircraft was later found in the paddock. The aircraft had struck the ground in an inverted attitude and was completely burnt out by the ensuing fire.

18 Oct 1330	Piper 25 235/A1 VH-FAW Drysdale, Vic 2SW	Commercial—aerial agriculture/baiting Drysdale, Vic 2SW/Drysdale, Vic 2SW	C1N 8331030

On arrival at the agricultural strip, from which he had operated many times before, the pilot observed that the grass on both sides was thick and long. During the ensuing takeoff which was made in the opposite direction to the landing, the left spray boom entered the grass. The aircraft, which was just airborne, swung sharply to the left. The right wing struck the ground and the sideways movement brought the aircraft to a stop with the propeller still turning.

23 Oct 1040	Cessna A188 A1 VH-KVK Canowindra, NSW 6E	Commercial—aerial agriculture/baiting Oatleigh Station, NSW/Oatleigh Station, NSW	C1N 8321082

The aircraft completed a spraying run and landed on a strip located in an oatfield in which the surrounding crop averaged one metre in height. A section of this crop which was growing on a low earth mound was half a metre higher. After touchdown, the right wingtip entered this section of oats, the aircraft swung rapidly to the right and the left wingtip and tailplane struck the ground.

24 Oct 1108	Cessna 310 L VH-DTJ Clermont, Qld 27NE	Non-commercial—business Rockhampton, Qld/Kenlogan, Qld	C1F, P3F 8311069

The aircraft was flown to the airstrip after the pilot had been unable to locate his destination. Witnesses saw the aircraft make three circuits of the strip and reported that the landing gear was extended for the third circuit. The aircraft was lost to sight behind a hill on part of the final downwind leg. Witnesses then sighted a cloud of black smoke and found the wreckage 800 m short of the strip threshold. Intense fire prevented rescue attempts.

24 Oct 0945	Bell 47 G5A VH-BHR Wando Vale 29NNE	Commercial—aerial mustering Wando Vale, Qld/Wando Vale, Qld	C1N, P1N 8311070

The pilot elected to conduct a practice autorotation. His initial intention was to reapply power and discontinue the exercise before reaching the ground, but during the descent he changed his mind and decided to continue to the ground. As the pilot flared the helicopter the tail skid contacted the ground and the main rotors struck the tail boom and tail rotor shaft.

26 Oct 1700	Piper 25 235 VH-FUM Beaufort, Vic 13SW	Commercial—aerial agriculture/baiting Beaufort, Vic 16WSW/Beaufort, Vic 16WSW	C1N 8331031

After the pilot had levelled the aircraft, loaded spray and carried out a fuel drain check, he commenced spraying a nearby wheat crop. Part way through a procedure turn at the end of a spray run, the engine lost all power. The pilot levelled the wings and, after avoiding a farmhouse ahead, dumped the spray load. The aircraft struck a power line, trees and the ground and fire broke out immediately. The pilot escaped from the wreckage.

27 Oct 1055	Piper 23 250 VH-WAB Moorooduc, Vic	Commercial—mapping/photo/survey Moorooduc, Vic/Moorooduc, Vic	C1N, P1N 8331032

The aircraft was being used for scenes in a TV film production. For a particular sequence, the film crew positioned a remotely controlled camera about 400 metres along the runway from where the takeoff roll was to commence. The pilot applied full power before releasing the brakes, but as the aircraft became airborne the right wheel struck the camera, breaking part of the landing gear retraction mechanism. The aircraft was flown to Moorabbin and a wheels-up landing was made.

01 Nov 1438	Mooney M20 F VH-CIV Biloela, Qld 2.5N	Non-commercial—business Shauna Downs, Qld/Biloela, Qld 2.5N	C1F 8311072

The pilot was making an approach to land at his private strip. The landing gear struck a fence at the end of the strip and the aircraft touched down on the nose wheel, right main wheel and the right wingtip after slewing about 45 degrees to the intended landing direction. Witnesses then heard the sound of a substantial power increase and the aircraft was seen to climb steeply to about 100 ft before descending and striking the ground in an inverted attitude.

01 Nov 1545	Piper 28 R180 VH-PFB Warnervale, NSW	Non-commercial—pleasure Cessnock, NSW/Warnervale, NSW	C1N 8321083

There was a low cloud base in the circuit area and the pilot concentrated on remaining clear of cloud. He stated that he flew a tight circuit and carried out downwind checks but omitted to lower the gear. The gear override selector was in the inoperative position and the aircraft was landed with the gear retracted.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
02 Nov 1500	Amer Air 5 A VH-IFY Koorawatha, NSW 2E	Non-commercial—pleasure Bankstown, NSW/Cowra, NSW	C1N, P2N 8321084

On completion of several orbits at about 600 ft agl, the pilot applied full power to climb to his intended cruising altitude. A rapid knocking noise was heard from the engine and the pilot discovered that the frequency of the noise was related to the throttle setting. He elected to conduct a precautionary landing on a nearby agricultural strip. The aircraft touched down normally, but during the landing roll it collided with a temporary fence erected across the strip.

03 Nov 1602	Piper 25 235 VH-PPP Tamworth, NSW	Commercial—assoc. agriculture/baiting Tamworth, NSW/Gunnedah, NSW	C1N 8321085

Shortly after becoming airborne, the pilot observed that the temporary fabric covering on the left wing was ballooning, and advised the Tower that he was returning. The aircraft turned left until lined up with strip 18 and the pilot advised that he would recheck the condition of the left wing and might land downwind. He stated that the nose and left wing dropped suddenly and that despite corrective flight control action, he was unable to prevent the aircraft striking the ground.

04 Nov 1807	Piper 28 R201 VH-PRF Bankstown, NSW	Non-commercial—pleasure Dubbo, NSW/Bankstown, NSW	C1N, P2N 8321086

The pilot believed that he had selected gear down as the aircraft turned on to the base leg, but it touched down with the gear retracted.

06 Nov 1530	Piper 28 140 VH-CTF Bunyip, Vic	Non-commercial—pleasure Bunyip, Vic/Tooradin, Vic	C1N, P2N 8331033

The aircraft had landed in a paddock with 10 cm long grass. While taxiing for the subsequent takeoff the pilot conducted a satisfactory acceleration check. On takeoff the aircraft lifted off at 60 kt, cleared the boundary fence but then sank and struck another fence. The impact tore out the right gear leg. The pilot was not aware of the full extent of the damage but elected to divert to Moorabbin and made a successful emergency landing.

06 Nov 1730	Piper 25 235 VH-WNY Derrinallum, Vic	Commercial—aerial agriculture/baiting Derrinallum, Vic/Derrinallum, Vic	C1N 8331034

The pilot made one takeoff under a power line which crossed the strip 150 metres from the northern boundary. He then completed a number of spraying runs before landing. He uplifted the same quantity of spray and commenced the second takeoff in the same direction. The aircraft passed under the power line, but the undercarriage and left wing struck the boundary fence. The pilot dumped the load and returned to land.

06 Nov 1200	Piper 25 235/A1 VH-FAL Narromine, NSW	Towing gliders Narromine, NSW/Narromine, NSW	C1N 8321088

Because the runway was occupied by a glider, the pilot of the tug aircraft elected to land on the flight strip. On late final approach another glider was pushed onto the flight strip, obstructing the intended landing path. The pilot elected to continue the approach and aimed to touch down just outside the confines of the strip. Shortly after touchdown the landing gear became entangled in long weeds and the aircraft overturned.

06 Nov 1000	Piper 28 161 VH-MHR Wellington, NSW	Noncommercial—pleasure Wellington, NSW/Bankstown, NSW	C1N, P3N 8321087

The pilot was conducting a takeoff from a strip with a 2 per cent up-slope. He reported that the takeoff was normal until the aircraft had reached a height of about 20 ft, at which point the rate of climb decreased to zero. The stall warning sounded and the pilot lowered the nose and flew the aircraft back onto the ground. It collided with the boundary fence and the pilot then abandoned the takeoff. The aircraft came to rest about 300 m beyond the end of the strip.

07 Nov 1510	Cessna 172 N VH-CSG Crookwell, NSW 6N	Non-commercial—pleasure Crookwell, NSW 6N/Canberra, ACT	C1N 8321089

The pilot conducted an examination of the strip and estimated the length as 400 m. He subsequently stated that the aircraft appeared to accelerate normally during the initial takeoff roll, but the rate of acceleration then slowed. The aircraft was rotated prematurely in an effort to clear the boundary fence, but the landing gear struck the top of the fence and the aircraft landed in an adjoining paddock.

08 Nov 1230	Transavia PL12 VH-EVH Caldwell, NSW	Commercial—assoc. agriculture/baiting Caldwell, NSW/Barham Base Camp	C1N, P1N 8321091

At about 300 feet agl on climb out, the pilot heard a loud bang and saw that the propeller had separated from the aircraft. He lowered the nose to regain airspeed but the aircraft descended steeply and landed heavily in a rice paddy.

08 Nov 1130	Auster 3 F VH-MBA Cootamundra, NSW	Non-commercial—pleasure Cootamundra, NSW/Cootamundra, NSW	C1N, P1N 8321090

During the course of a local flight, strong gusting winds were encountered and the pilot decided to return for a landing. He stated that as the aircraft was about to touch down, it was affected by a sudden strong tailwind, and the nose struck the runway. The wooden propeller was shattered, both wingtips came into contact with the runway and the tailwheel was torn off before the aircraft came to rest.

09 Nov 1605	Cessna 152 VH-MRP Pennant Hills, NSW	Instructional—dual Bankstown, NSW/Bankstown, NSW	C1M, P1N 8321092

The pilot reported that after the aircraft struck a bird the engine began to overheat. It then started to run roughly and the pilot decided to land the aircraft on a golf course. After touching down on a fairway heavy braking was applied and the nose wheel and propeller dug into the soft ground.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
11 Nov 1400	Bell 47-G5 VH-JGF Darwin, NT 93SE	Commercial—aerial mustering Mt Bundey Homestead/Mt Bundey Homestead	C1N 8341032

The pilot was engaged in mustering a group of buffaloes towards a gate between two paddocks. As he began to transition from the hover to forward flight, the pilot reported that the aircraft shook violently and the engine then lost all power. The aircraft yawed to the right, descended steeply and struck the ground.

13 Nov 1355	Schneider ES-49 VH-GFO Blanchetown, SA	Instructional—dual Blanchetown, SA/Blanchetown, SA	C2N 8341033

The glider was aligned on final approach above the desired glide path. The instructor decided to demonstrate sideslipping as a method of losing excess height. At about 200 ft agl the demonstration was discontinued but a high rate of sink persisted. The glider landed 70 m short of the threshold and the pilot was unable to avoid obstacles during the ground run.

15 Nov 0712	Mitsubishi MU2B 30 VH-CJP Cairns, Qld	Charter—cargo Townsville, Qld/Cairns, Qld	C1N, P1N 8311073

The aircraft was established on final by the pilot under check. A 5 kt downwind component prevailed. The flare was commenced higher than normal and the airspeed decreased below the optimum. The pilot did not react to prompting by the check pilot and retarded the throttles. The aircraft struck the runway heavily in a left wing low attitude and the left main and nose gears were torn off.

18 Nov 0130	Piper 24 400 VH-FOE Hamilton, Vic	Non-commercial—pleasure Hamilton, Vic/Unknown	C1F, P1F 8331035

At about 0200 hours, the pilot and passenger boarded the aircraft for a local flight. A resident heard it take off and saw the aircraft lights in the circuit area. He also noted that the runway lights were illuminated. A go-around was made on the first approach and the aircraft was landed after another circuit. A takeoff was carried out in the opposite direction and shortly after becoming airborne the aircraft struck the ground. Fire broke out and engulfed the wreckage.

19 Nov 1815	Cessna 210 L VH-PZO Swifts Creek 10SW	Non-commercial—pleasure Swifts Creek 10SW/Lilydale, Vic	C1N, P5N 8331036

As the strip at the planned destination was unsuitable the pilot elected to use a nearby agricultural strip. After landing, he found that the grass was longer than he had anticipated and he arranged to drive a vehicle over the strip several times to flatten the grass. On the subsequent takeoff roll the aircraft ran off the side of the flattened area and the rate of acceleration slowed. The aircraft became airborne but struck a fence and came to rest in an adjoining paddock.

20 Nov 1235	Piper 28 140 VH-SVG Moorabbin, Vic	Instructional—solo—supervised Moorabbin, Vic/Moorabbin, Vic	C1N 8331037

On the landing roll during a solo training exercise, the aircraft drifted to the left side of the runway. The student pilot over-corrected and the aircraft ran off the runway. The nose gear folded back and the propeller struck the ground.

22 Nov 1800	Cessna 172 M VH-IMY Echuca, Vic	Instructional—solo—supervised Echuca, Vic/Echuca, Vic	C1N 8331038

After a period of dual training, the pilot was sent on his first solo flight. The landing approach was made at 75 knots to the flare point, and the touchdown was in 3-point attitude. The aircraft bounced, the nose dropped and the second touchdown collapsed the nose gear. The aircraft skidded off the runway and overturned.

24 Nov 2215	Cessna 210 L VH-FOC Mildura, Vic	Non-commercial—pleasure Orange, NSW/Mildura, Vic	C1N, P1N 8331039

On final approach the pilot opened the throttle to adjust the glide path but the engine failed to respond. The aircraft landed in a paddock, about 150 m short of the aerodrome boundary and ran through a fence and a ditch before coming to rest with the nose gear assembly dislodged.

27 Nov 1415	Piper 28 140 VH-CHR Zeehan, Tas	Non-commercial—pleasure Devonport, Tas/Zeehan, Tas	C1N, P1M 8331040

The pilot had previously checked the strip dimensions, and on arrival over the top, made a thorough appraisal of the area. He noted that there was a crosswind from the right gusting to 15 knots. He stated that on short final approach at a low height, the aircraft dropped suddenly, and despite the application of power, struck the lip of a ditch. The gear legs were detached, and the aircraft slid to a stop 13 metres short of the threshold.

30 Nov 1605	Beech 200 VH-AAZ Lord Howe Island	Scheduled passenger service—commuter Sydney, NSW/Lord Howe Island	C2N, P5N 8321093

The aircraft floated for some distance after the landing flare, and touched down firmly, right wheel first. As the pilot selected reverse thrust, the aircraft settled slowly to the right. The check pilot observed an unsafe gear indication for the right main gear, and shut down the engines. The aircraft stopped on the runway after sliding for approximately 400 metres.

02 Dec 1120	Piper 28 140 VH-RUA O'Connell, NSW 3SE	Non-commercial—pleasure Gunning, NSW/O'Connell, NSW 3SE	C1N, P1N 8321094

The pilot had not landed at the strip before, and made four inspection runs prior to approaching to land uphill. There was a gusting crosswind from the left. He stated that as he flared to land, the aircraft suddenly veered to the right, and he applied full power to go around. The aircraft could not outclimb the rising terrain, and touched down in an adjacent field. It ran through a fence and struck an earth bank. The nosegear was torn off and the aircraft overturned.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
03 Dec 1900	Czech Blanik L13 VH-GAP Cranbrook, WA	Instructional—dual Cranbrook, WA/Cranbrook, WA	C2N 8351028

At about 50 feet after liftoff on a winch launch, a winch power failure occurred. The instructor disconnected the tow cable and landed straight ahead. In the resulting heavy landing the main wheel was pushed upwards through the cockpit floor.

04 Dec 1037	Piper 30 VH-DIC Bankstown, NSW	Instructional—dual Bankstown, NSW/Bankstown, NSW	C2N 8321095

The pilot was undergoing initial twin-engine endorsement training. On the third touch-and-go landing, the instructor retracted the flaps, advised the pilot that he had done so and instructed him to proceed with the takeoff. The pilot inadvertently retracted the gear and the aircraft settled to the runway.

04 Dec 1125	Cessna 210 VH-AEC Midge Point, Qld	Non-commercial—pleasure Glenden, Qld/Midge Point, Qld	C1N, P2M, P1N 8311076

After a normal approach in gusty crosswind conditions the aircraft touched down near the threshold of the strip. It bounced slightly before settling onto the ground with about 650 m of strip remaining. The pilot subsequently reported that the brakes failed to have any retarding effect and he was unable to prevent the aircraft from over-running the strip. After crossing a road the aircraft entered a gully and overturned.

05 Dec 1016	Cessna 501 VH-BNK Kalgoorlie, WA 11E	Non-commercial—corporate/executive Adelaide, SA/Kalgoorlie, WA	C1N, P5N 8351029

The flight was planned to cruise at FL 370 with a 50 kt headwind component. At an intermediate stopover the pilot checked the forecast wind and amended the cruising level to FL 290. While on descent in cloud, the low fuel warning light illuminated and shortly after the right engine flamed out. Relight attempts were unsuccessful. Descent was continued until clear of cloud at 1000 ft agl, when the left engine flamed out. A gear-up landing was made on a firebreak.

07 Dec 1100	Pitts S1-S VH-KKT Dalby, Qld	Non-commercial—pleasure Roma, Qld/Toowoomba, Qld	C1N 8311080

At the end of the landing roll, the pilot unlocked the tailwheel and commenced to taxi back along the landing path. While travelling at about 20 kts with the wind from the right rear quarter the aircraft began to veer to the right. The pilot attempted to correct the situation but the aircraft groundlooped to the right and the lower left wing struck the runway.

07 Dec 1130	Hiller UH12 E VH-FBF Mackay, Qld 148S	Commercial—aerial mustering Mackay, Qld 148S/Mackay, Qld 148S	C1N 8311077

While cruising at 150 ft agl and 40 kts the engine failed. During the subsequent attempted autorotational landing the pilot tried to turn the helicopter into wind but a heavy landing resulted while the helicopter was still drifting to the right. The landing skid attachments collapsed and the main rotor and tail rotor struck the ground as the helicopter bounced and tilted to the right.

08 Dec 1045	Hiller UH12-E VH-PYH Killarney, Qld 6S	Commercial—aerial agriculture/baiting Killarney, Qld 6S/Killarney, Qld 6S	C1N 8311078

On the initial spray run the helicopter struck a low-slung power line. After the wire strike the helicopter began to vibrate. The pilot carried out an immediate landing without further damage being incurred.

08 Dec 1030	Cessna A188B A1 VH-IBQ Leeton, NSW 9SW	Commercial—aerial agriculture/baiting Brobenah Strip, NSW/Brobenah Strip, NSW	C1N 8321096

During rice-spraying operations the aircraft was flown under a power line. On one swathe run the top of the fin and rudder struck the line. The pilot was able to retain control of the aircraft which was subsequently landed without further damage.

08 Dec 1515	Cessna 210 N VH-BKD Longreach 148S	Non-commercial—pleasure Longreach, Qld/Broken Hill, NSW	C1N, P4N 8311079

During cruise the pilot noticed an indication of a high battery discharge rate and that the alternator and gear pump circuit-breakers had tripped. Attempts to reset the circuit-breakers were unsuccessful. Smoke was then observed in the centre console area and the pilot decided to land on a short disused strip. During the landing roll the aircraft overran the strip and to avoid running through a gully the pilot stopped the aircraft by steering into a tree.

10 Dec 1423	Cessna 182 Q VH-TLD Coolangatta, Qld	Test Coolangatta, Qld/Coolangatta, Qld	C1M, P2N 8311081

The aircraft had not been flown for about two months. During that time it had been washed regularly and had been parked in the open. The pilot conducted a water check before ground running the engine and he then elected to fly the aircraft. Further water checks were conducted before the aircraft was positioned for takeoff. At about 200 ft agl the engine failed completely and the aircraft overturned during the subsequent forced landing.

14 Dec 1530	Cessna P210 N VH-SWM Launceston, Tas 23S	Non-commercial—pleasure Launceston, Tas 23S/Launceston 23S	C1N 8331042

After touching down on a mown area of a paddock, the aircraft became airborne over a slight hump. Following the second touchdown, the pilot applied the brakes but was unable to prevent the aircraft hitting a gate. It then ran across a road and struck an earth bank, collapsing the gear.

17 Dec 1150	Hiller UH12-E VH-FFV Gympie, Qld 15SE	Commercial—aerial agriculture/baiting Gympie, Qld 15SE/Gympie, Qld 15SE	C1N 8311082

As the pilot was positioning the helicopter to commence a spray run, the engine lost power. An autorotational descent was carried out but the aircraft landed heavily on sloping terrain.

PRELIMINARY REPORTS (The following accidents are still under investigation)

Date / Time	Aircraft type & registration / Location	Kind of flying / Departure point/Destination	Injuries / Record number
17 Dec 1310	Burkhart Astir CS VH-WVI Richmond, NSW	Non-commercial—pleasure Richmond, NSW/Richmond, NSW	C1S 8321097

The pilot stated that the glider became high on final approach after encountering lift. He extended the air brakes and side-slipped steeply, then levelled the wings. The glider continued to descend and struck the ground 150 metres short of the normal touchdown area.

18 Dec 1203	Volmer VJ21 VH-TUB Latrobe Valley, Vic	Non-commercial—pleasure Latrobe Valley, Vic/Yarra Glen, Vic	C1M 8331043

At about 400 ft agl on climb after takeoff, the pilot reported hearing a loud bang. Engine power was reduced but the source of the noise could not be located. As power was reapplied the engine ran roughly and the pilot decided to land the aircraft in a paddock. During the approach, the pilot realised the aircraft was overshooting and forced it onto the ground to avoid a fence. The left wing struck the ground and the aircraft turned through 180 degrees before coming to rest.

21 Dec 0450	Cessna T188C VH-KZI Wee Waa, NSW 28W	Commercial—aerial agriculture/baiting Redlands (Wee Waa 5E)/Redlands (Wee Waa 5E)	C1M 8321098

As the aircraft was climbing away at the completion of the first run of a night spraying operation, the main gear legs struck a power cable. The cable broke away from the power pole insulators and remained attached to the aircraft, which struck the ground 200 metres beyond the line of the poles.

24 Dec 1627	Czech L40 VH-DUE Geelong, Vic 25W	Non-commercial—pleasure Skipton, Vic/Tyabb, Vic	C1N 8331044

During the cruise the engine began to misfire and lose power. The pilot carried out a precautionary landing on a road, but during the landing roll the left wing struck a road signpost. The force of this collision caused the aircraft to swing to the left and it ran through a fence before coming to rest in an adjacent paddock.

25 Dec 1744	Piper 32 R300 VH-UAM Brampton Island	Non-commercial—pleasure Charters Towers, Qld/Brampton Island, Qld	C1N, P5N 8311083

The pilot misjudged the height of the aircraft above the ground when he initiated the landing flare. Touchdown occurred at a high rate of descent and the left gear collapsed.

30 Dec 1645	Cessna 172 N VH-UNR Streaky Bay, SA 2N	Non-commercial—business Streaky Bay, SA 2N/Streaky Bay, SA 2N	C1N, P3N 8341034

The pilot reported that, as the aircraft was being manoeuvred for landing with a right crosswind, a gust from the left lifted the left wing and caused the aircraft to touch down to the right of the strip on a heading about 30 degrees from the runway direction. During the landing roll the aircraft was turned towards the runway but the right wing and landing gear collided with a parked car.

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
05 Oct 1800 Private	Cessna 150 B VH-RWM Wellstead, WA	50	Non-commercial—pleasure Gnowangerup, WA/Wellstead, WA 1477	1400 None	C1N 8351025

At the conclusion of an approach to a private strip the pilot held the aircraft off the ground for longer than normal. The resulting nose high attitude caused him to lose sight of the strip. The aircraft drifted under the influence of a crosswind and shortly after touchdown the left wing struck two trees at the side of the strip. The nosewheel was detached after striking a mound of earth and the aircraft came to rest inverted.

The trees on the side of the strip reduced the effective width to below the minimum standard for ALA operations. During the extended hold-off prior to touchdown the pilot had not made adequate compensation for the wind conditions existing at the time.

06 Oct 1220 Commercial	Piper 25 235/A1 VH-FAU Tocumwal, NSW 16NE	35	Commercial—aerial agriculture/baiting Agstrip on property/Agstrip on property 6800	4000 Agricultural Class 1	C1N 8321078

The pilot had completed three hours of crop spraying, and clean-up runs were required to finish the operation. Towards the end of the first of these runs, the pilot altered heading to fly below power lines traversing the crop. During the turn, the right wingtip entered the wet wheat and the aircraft was dragged into it. The right wing struck the ground, the aircraft cartwheeled horizontally through the wheat and hit the boundary fence.

The pilot experienced difficulty in judging his height above the crop because the light wind conditions did not produce any significant swaying of the crop. The turn to the right was initiated while the spray run was in progress and the pilot began concentrating on the manoeuvre required at the end of the run in order to position for the following run. The crop was wet and dense and control of the aircraft could not be maintained after the wingtip had entered the crop.

13 Oct 1130 Private	Cessna 182 E VH-AKM Woodstock STN20SW	53	Non-commercial—pleasure Esmeralda Stn, Qld/Gladevale Stn, Qld 4600	4550 None	C1N 8311067

At the start of operations for the day the aircraft carried about 225 litres of fuel. After approximately four hours cattle mustering in the aircraft the pilot commenced a flight to his home property. Twenty minutes later the engine failed and during the subsequent landing on unsuitable terrain the aircraft collided with trees.

Fuel had been lost through venting because the right tank fillercap had not been properly secured after the last refuelling. The bag-type fuel tank had collapsed and caused a false fuel contents indication. The engine failed due to fuel exhaustion.

17 Oct 1333 Commercial	Cessna 310 K VH-PSB Parafield, SA	39	Test Parafield, SA/Parafield, SA 1214	150 None	C1N 8341030

During takeoff on a check flight a loud bang was heard from the area of the nose gear after the gear was selected up. The nose gear did not retract fully, nor could it be extended. On landing the nose gear retracted and the aircraft slid to a halt on its main wheels and nose.

The nose oleo had deflated during taxi and takeoff. When the gear was selected up, the nose wheel mudguard came in contact with a door bracket and the operating linkage failed, permitting the nose strut to swing free. The oleo had deflated because a seal in the strut had hardened, due to age, and allowed the air pressure to bleed off.

19 Oct 0745 Commercial Helicopter	Hughes 269 C VH-THN Kondoparinga Stn, Qld	30	Commercial—aerial mustering Kondoparinga Stn, Qld/Kondoparinga Stn, Qld 2400	2150 None	C1N, P1N 8311068

After positioning for a mustering task the pilot shut down the aircraft for about an hour. The pilot then took off for his task and landed at a cattle yard enroute without shutting down. During the subsequent takeoff when at a height of about 40 ft agl and an airspeed of 20 kt, the engine backfired and lost power. While attempting to land the helicopter in a small clearing both main rotor blades struck a dead tree.

The cause of the engine malfunction was not determined.

28 Oct 0700 Private	Cessna 182 A VH-PUH Dingo, Qld 28NE	25	Non-commercial—business Woongarra, Qld/Mourindilla, Qld 162	17 Instrument Rating Class 4	C1N, P1N 8311071

The strip being used was of adequate length and 90 m wide. The threshold of the north-west strip was marked by two posts 90 m apart and two drums between these posts. The drums were hidden in long grass and the pilot was unaware that the posts defined the threshold. On landing, the pilot touched down 19 m short of the threshold and the nosewheel struck a drum. The nose leg oleo collapsed and after a short ground run the left wingtip struck the ground.

29 oct 1000 Commercial	Cessna 172N VH-BXG Perth, WA 78S	38	Non-commercial—pleasure Beacham, WA/Beacham, WA 622	59 None	C1M, P2M, P2N 8351027

The pilot intended taking some friends for a local flight. The takeoff was commenced from the threshold of the 750 m gravel strip, with 30 degrees of flap set. The pilot reported that the aircraft was not performing normally and when the stall warning sounded he elected to land in a paddock. During the landing attempt the left wing struck the ground.

The pilot had only limited recent flying experience. He was concerned about the position of obstacles at the end of the strip and used a non-standard takeoff technique, which degraded aircraft performance. No contributing fault was found with the engine or other aircraft systems.

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*
30 Nov	Hiller UH12-E VH-FFT		Instructional—Check			C2N
1530	Gatton, Qld 3W		Backmann Property/Backmann Property			8311075
Commercial Helicopter		32	6850	3500	Agricultural Class 1 and Flight Instructor and Instrument Ratings	

During a check flight the pilot was executing 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 were carried out, neither pilot was aware of the surface condition before commencing the practice autorotational landings. The selected area proved to be soft and skid penetration caused the helicopter to nose over.

17 Dec	Pilatus B-4 VH-GJQ		Non-commercial—pleasure			C1N
1230	Bunyan, NSW		Bunyan, NSW/Bunyan, NSW			8321099
Glider		35	80		Glider Rating	

The pilot was making his first flight in this type of glider. There was a 5 to 10 kt wind from the left and during the takeoff run the aircraft began to veer to the left. The pilot attempted to correct the yaw with right rudder and raised the tail. The aircraft continued to veer left, the pilot released the tow rope but the nose and left wingtip struck the ground.

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

Date / *Pilot licence*	*Record number* / *Age*	*Hours total*	*Hours on type*	*Rating*
22 Feb	8321023			
Commercial	24	481	400	Flight Instructor Grade 3 and Instrument Rating

Investigation revealed that due to excessive wear, the carburettor heat control cable had failed at the attach point with the actuating bellcrank. The air hose between the muffler and the carburettor hot air box had collapsed internally. The combination of the carburettor heat control failure in the "hot" position and the obstruction at the alternate air source led to the loss of engine power during takeoff. Shortly afterwards the aircraft stalled over flat open country.

06 Mar	8311016			
Commercial	22	850	50	Agricultural Class 2

The landing distance available was 120 m. The landing distance required was 247 m. Although the pilot had previously made an uneventful landing on the same area, he touched down with only 60 m remaining. No engine faults were detected which could explain a lack of engine response. The gear collapsed due to overload failure during the attempted ground loop. The brakes were found to be defective due to excessive wear and leaks caused by using incorrect brake fluid.

10 Mar	8351009			
Commercial	29	2300	350	Agricultural Class 1

The engine lost power after the fuel was exhausted from the selected fuel tank. There was sufficient fuel in the other main tank to complete the flight.

12 Mar	8311019			
Glider	40	77	29	Glider Rating

Although there was sufficient landing distance available to permit a straight landing roll, the pilot selected an area which required a curved path to be followed. During the approach and subsequent landing roll the pilot was unable to maintain adequate directional control.

08 Apr	8311021			
Private	45	700	150	Instrument Rating Class 4

Investigation revealed an accumulation of dirt on the nosegear assembly which prevented its geometry from achieving an over-centre lock. In addition it was found that the nose wheel microswitch had been adjusted to show a down and locked indication in this position. Vibration on the landing roll unlocked the nose gear leg and initiated the retraction.

11 Apr	8321037			
Commercial	36	1561	687	Instrument Rating 1st or Class 1

No reason for the reported loss of performance during the takeoff could be found. After the takeoff was abandoned the aircraft hydroplaned on the wet runway.

10 May	8391001			
Private	39	500	Unknown	Instrument Rating 1st or Class 1

The investigation did not reveal any evidence of pre-accident mechanical or structural failure. The pilot had had no previous flying experience in PNG. At the time of the accident there was extensive cloud developing over the Owen Stanley Range which includes terrain over 14 000 ft high.

05 Jun	8311032			
Commercial Helicopter	47	3534	2650	None

The source of the screeching noise reported by the pilot was not determined. The pilot had made an approach to land downwind into the selected area and had overshot. The tail rotor had struck a tree on the edge of the clearing, which was the most suitable area available for an attempted forced landing.

09 Jun	8351018			
Commercial	27	250	5	Agricultural Class 1

No fault could be found in the airspeed-indicating system. The pilot's decision to attempt fault finding was unnecessary and any actions should have been attempted at a safe height. During the descent the pilot failed to maintain an adequate lookout. The right-hand tail plane was bent during the first collision, thus locking the elevators and causing the aircraft to pitch up.

11 Jun	9311035			
Private	54	413	350	None

The pilot did not comply with the pre-flight briefing to return to the last turning point in the event of becoming unsure of position. Prior to landing the pilot did not carry out an adequate inspection of the intended landing area.

18 Jun	8321049			
Senior Commercial	22	2950	300	Instrument Rating 1st or Class 1 and Flight Instructor Rating

The student pilot's previous experience had been confined to aircraft types in which the flap selector was positioned at approximately the same location as the gear selector lever on the Bonanza.

29 June	8341022			
Commercial	Unknown	Unknown	Unknown	Instrument Rating 1st or Class 1

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

Date / *Pilot licence*	*Record number* / *Age*	*Hours total*	*Hours on type*	*Rating*
02 Jul	8311041			
Private	36	497	175	None

The loss of control occurred during a turn at low level. It is probable that the aircraft stalled as a result of poor airspeed control and/or turbulence. Recovery was not effected before the aircraft had landed heavily on the mainwheels. Loss of directional control occurred in a crosswind on the soft surface. No reason could be found for the reported lack of engine response but it is considered that the pilot may have used the pitch lever by mistake.

03 Jul	8321054			
Private	55	1646	408	None

The hard landing occurred because the pilot stretched the glide approach in an attempt to achieve a landing on the aiming point.

04 Jul	8311042			
Private	51	2315	150	Instrument Rating Class 4
06 Jul	8311043			
Commercial	27	1800	75	Instrument Rating 1st or Class 1

The aircraft was loaded beyond the aft C of G limit and the elevator trim was set with excessive nose-up trim due to a faulty trim indicator. The aircraft was rotated prematurely and flying speed was not maintained. The ensuing loss of control led the pilot to suspect an engine malfunction. Inappropriate emergency drills by the pilot delayed the takeoff abort. No fault was found with either of the engines.

20 Jul	8331019			
Private	73	500	200	None

The rough running of the engine probably occurred because of the fouling of several spark plugs by oil. The oil contamination resulted from the newly fitted piston rings not being "bedded-in" before the flight. The pilot misjudged the approach and the touchdown was made 600 m beyond the threshold.

20 Jul	8351020			
Private	48	3415	3368	None
24 Jul	8321056			
Private	37	1100	520	Instrument Rating 1st or Class 1

The area from which the aircraft was departing was relatively dark, with illumination provided by floodlights. As the person who was struck approached the aircraft he was looking towards the floodlights and would have had difficulty seeing the rotating propeller disc.

27 Jul	8311045			
Commercial	23	251	30	Instrument Rating 1st or Class 1

The pilot continued with the circuit in unsuitable weather conditions. Insufficient attention was given to the maintenance of altitude in the circuit and the missed approach was commenced at an altitude that was below the elevation of the airfield.

05 Aug	8331021			
Commercial	25	731	91	Agricultural Class 1

The pilot had minimal experience in spreading operations over hilly terrain. The positioning turn had been made towards rising ground. A weight and performance penalty was incurred because spraying equipment had not been removed from the aircraft prior to the spreading operations. This equipment also inhibited the rate at which a load could be dumped in an emergency situation.

08 Aug	8341025			
Private	42	5021	4708	None

Sufficient airspeed had not been maintained while manoeuvring at low level, and a stall had developed which the pilot had been unable to correct in the limited height available.

10 Aug	8311050			
Senior Commercial	27	2500	1	Instrument Rating 1st or Class 1

The pilot had not flown a tailwheel aircraft for three years. The flight was initiated in wind conditions which at times exceeded the crosswind limitations on both runways available. At the time of the accident a crosswind gust of 24 kt was encountered and the pilot was unable to maintain control of the aircraft.

16 Aug	8311051			
Private	58	600	20	None

The weather forecast received by the pilot predicted the presence of low cloud along the route to be flown. During the attempt to return to his destination the pilot had overflown a licensed aerodrome but had not considered landing to await an improvement in the weather.

26 Aug	8321064			
Commercial	44	2145	20	Instrument Rating 1st or Class 1

The landing was made in fluctuating wind conditions with a downwind component. The pilot had underestimated the length of the strip, which was inadequate given the prevailing conditions.

26 Aug	8311052			
Commercial Helicopter	46	9650	60	Instrument Rating 1st or Class 1

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

Date / *Pilot licence*	*Record number* / *Age*	*Hours total*	*Hours on type*	*Rating*
28 Aug	8331022			
Private	19	140	132	None

The pilot had flown a flapless approach at the circuit spacing for an approach with flaps extended. This resulted in the aircraft being high on final approach, however, the pilot elected to continue the approach and land. The grass strip surface was wet and braking efficiency was reduced.

01 Sep	8311054			
Commercial Helicopter	31	2700	420	Instrument Rating Class 4

The helicopter suffered a loss of translational lift probably due to fluctuations in the prevailing wind. In an attempt to recover the lost lift the pilot applied excessive collective control and overpitched the main rotors. The helicopter landed on sloping ground and rolled over.

01 Sep	8311055			
Commercial Helicopter	48	17020	1020	Agricultural Class 1

The pilot was distracted by the person acting as a marker, who was slow to re-position for the next swathe run. As the pilot turned the aircraft to avoid the marker the rotor blades struck the cable. The pilot considered that he may have been further distracted by the need to monitor the spray pressure gauge, as he was expecting the chemical supply to become exhausted.

10 Sep	8321070			
Private Restricted	34	95	3	None

The pilot had only limited experience on the aircraft type. Some turbulence had been experienced during the final approach and the aircraft touched down heavily before the pilot was able to adopt the correct attitude for the landing flare. Go-around power was not applied until after the aircraft touched down following the second bounce, but the nose gear strut had already failed. The propeller struck the ground with full power still applied.

14 Sep	8311057			
Private	21	903	830	None

The victim was familiar with fixed-wing aircraft and helicopters but had been flying continually in helicopters for several days and was briefed to go ahead of the aircraft to avoid the tail rotor. He was tired and in a hurry so as not to delay the aircraft, which had little time to spare for the return flight before last light.

16 Sep	8311059			
Commercial	38	11874	11600	Agricultural Class 1

The pilot reported that he was not attempting to hand start the engine and was only trying to free the starter drive. When he left the cockpit to turn the propeller he had left the magneto switches on and the throttle in the full open position. The park brake had been applied but was not sufficiently strong to restrain the aircraft under full engine power.

16 Sep	8321072			
Student	41	23	23	None

During the approach the pilot concentrated on keeping the aircraft aligned with the runway centreline and did not initiate a landing flare. He had limited experience in crosswind landing techniques.

20 Sep	8341028			
Commercial Helicopter	38	3050	2600	None
21 Sep	8351023			
Commercial	54	3237	2000	Instrument Rating Class 4

The aircraft was fitted with standard size tyres and wheel spats. During the manoeuvring on the clay pan, mud accumulated in the spats and prevented the wheels from rotating freely.

24 Sep	8331028			
Student	51	27	27	None
25 Sep	8311062			
Glider	35	300	150	Glider Rating

The pilot misjudged the speed and height of the glider at the commencement of the low-level fly past. He then attempted to turn and land in the opposite direction, but did not maintain sufficient airspeed for this manoeuvre.

27 Sep	8311063			
Student	23	25	25	None

The instructor authorised an inexperienced student to carry out solo touch and go circuits in a 5 kt crosswind. On approach the student set the elevator trim nose down. During the subsequent attempted takeoff attention was diverted from the operation of the aircraft when takeoff flap was selected and directional control of the aircraft lost as it turned into wind and left the strip.

ACCIDENTS TO AUSTRALIAN CIVIL AIRCRAFT 1983

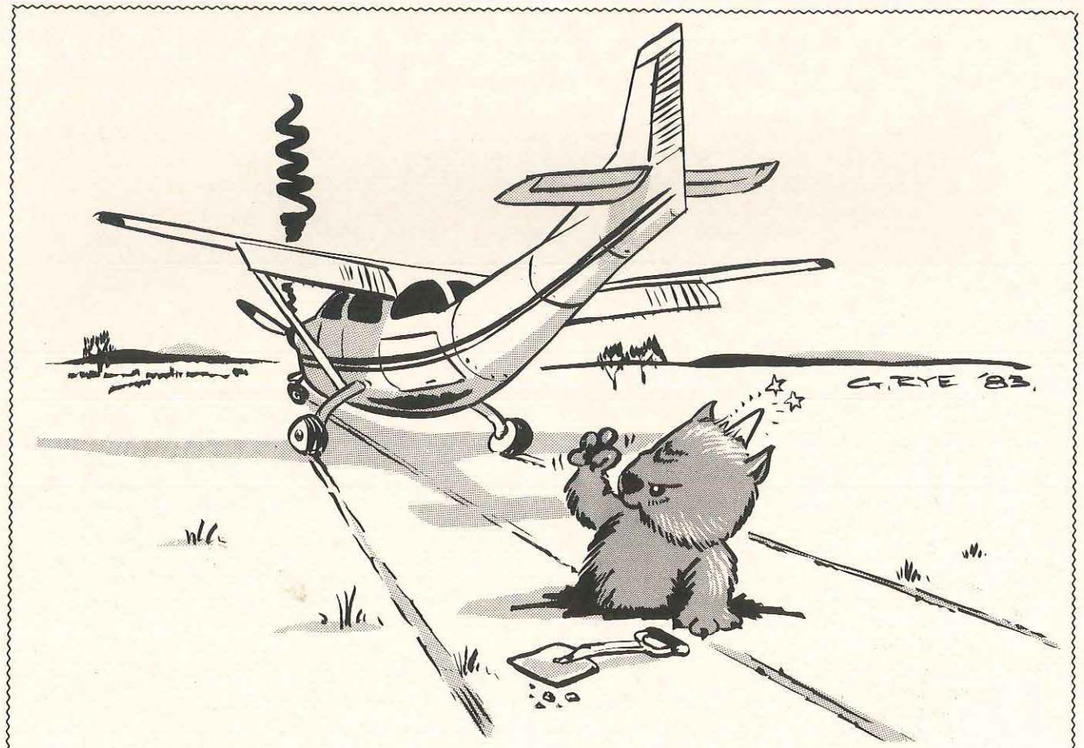
The table below details accident statistics for the period 1-01-1983 to 31-12-1983. A comparison with average rates for the previous three years is also provided.

Note 1: Data for 1983 is preliminary information only and may be subject to revision.

Note 2: Abbreviations used are: tot = total, ftl = fatal, ACC = accidents.

	QLD		NSW		V-TAS		SA-NT		W. AUS		O/SEAS		TOTAL	FATAL
	tot	ftl	tot	ftl	tot	ftl	tot	ftl	tot	ftl	tot	ftl	ACC.	ACC.
AIRLINE	—	—	—	—	—	—	1	—	—	—	—	—	1	—
COMMUTER	1	—	1	—	1	—	—	—	—	—	—	—	3	—
CHARTER	7	2	4	1	1	—	3	1	2	—	—	—	17	4
AGRICULTURE	11	1	16	1	7	—	2	1	4	—	—	—	40	3
TRAINING	5	—	14*	—	4	—	2	—	1	—	—	—	26	—
OTH. AER. WK	18	3	5*	—	6	1	9	—	6*	1	—	—	44	5
PRIVATE/BUS.	34	2	49*	4	23	3	13	—	13	2	2	1	134	12
GLIDING	4	—	11*	—	—	—	3	—	3*	—	—	—	21	—
TOTAL	80	8	100	6	42	4	33	2	29	3	2	1	286	24
Average over previous 3 years	71		71		39		38		41		1		261	26
	(Average rounded to nearest whole number)													
ROTARY Included in dissection above	21	2	5	1	1	—	3	—	1	—	—	—	31	3

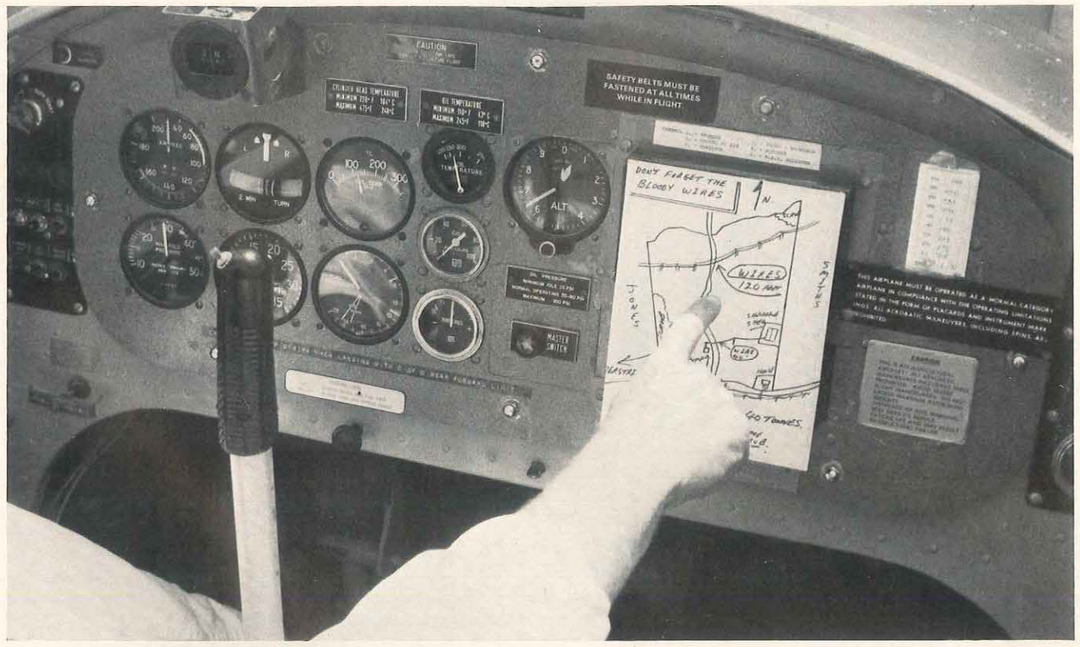
*Denotes number of aircraft involved in accidents. Includes collisions between two aircraft on three occasions in NSW and one occasion in WA.



07 Mar *Cessna 182 K VH-KRI* *Non-commercial—pleasure* *C1N, P1N*
0900 *Couta Rocks, Tas.* *Smithton, Tas./Couta Rocks, Tas.* *310063*

After landing the pilot taxied the aircraft along a track leading to a parking area. Nearing the parking area the nosewheel entered a wombat hole, pushing back the nose strut and buckling the firewall.

The dangers of distraction



A feature article in *Aviation Safety Digest* 114 addressed the topic of wire strikes by cropdusting aircraft. One of the many points stressed was that of the need for continuous vigilance and concentration on the part of the pilot during aerial application operations. Quite simply, because of the environment in which they work, agricultural pilots cannot afford the slightest lapse of concentration. This truism is yet again illustrated in the two brief but instructive accident summaries related below. The pilot in the first accident had over 18 000 hours flight time, and the second over 9000 hours.

* * *

A cotton field was being sprayed under conditions which the pilot found relatively easy. The only noteworthy obstruction was a single-strand power line which was on a perimeter of the paddock, suspended from poles about 200 metres apart, and which hung down to about 20 feet above ground level at mid-span. To facilitate his task, the pilot settled into a routine of flying under this wire at the completion of every second run.

Conditions were calm and cool, and the pilot had sprayed this paddock on numerous occasions previously. In his own words, it all added up to 'a dead easy job'. Because of this he allowed his mind to wander on to the next job he would be undertaking, and also on to details relating to a personal business venture on which he intended to embark later that day.

Consequently he omitted to descend the aircraft on the penultimate run and saw the power line only when he was almost on it. He dived in an attempt to avoid the wire but struck it with the tail fin. The complete tail assembly was torn from the aircraft and all control was lost. As the aircraft struck the ground the engine was wrenched from its mountings. The airframe continued to cartwheel for 23 metres. The unconscious pilot was extricated from the wreckage by the loader driver and marker.

* * *

While he was spraying a sorghum crop the pilot of an Agwagon noticed that a component of the spraying equipment was malfunctioning. He climbed a little while he rectified the fault and then resumed his job. Shortly afterwards the component failed again, so he repeated his actions and was again successful.

However, when he descended to recommence spraying, having been distracted by his problems, he forgot about a single-strand power line which was across his path until he had almost collided with it. His attempt to evade the wire failed and it snagged the rudder horn leading edge, tearing off the horn and the rudder section above the top hinge. Fortunately, aircraft controllability was retained and the pilot was able to fly his damaged aircraft to the nearest suitable aerodrome and land safely.

Summary

It is well understood that aerial application is an extremely demanding exercise. As the article in *Digest* 114 concluded, continued safe operations largely boil down to 'establishing a personal set of safety rules *and disciplining oneself to adhere to them at all times'*. That many agricultural pilots have flown for many years and thousands of hours without having a wire strike shows that it can be done, and emphasizes the efficacy of the simple but fundamental dictum quoted above ●

Stress, fatigue and piloting

Medical studies have established that emotional stress created during the day-to-day lives of people can lead to ulcers, heart disease, family difficulties, loss of productivity and possible early death. It follows that stress as a health factor must be of concern to pilots. Associated with the general question of stress is the more familiar problem of pilot fatigue. There is evidence to suggest that individual operators and flying supervisors do not always focus sufficiently on these two problem areas. Yet there are often clear indications or symptoms that an individual is, or is likely to be, exposed to risks arising from stress and/or fatigue.

Stress

Some of the more obvious stress-inducing events (stressors) have already been mentioned above. Research analysts have produced a 'life event scale' which shows the relative score values of each stressor (see Figure 1). By being aware of the relative impact of these events, we should be able to guard against loading up ourselves or our workmates when stresses from 'life events' already exist.

Social readjustment rating scale (incomplete)

Life event	*Value*
Death of spouse	100
Divorce	73
Marital separation	65
Jail term	63
Personal injury or illness	53
Marriage	50
Retirement	45
Change to different line of work	36
Trouble with in-laws	29
Trouble with boss	23
Change in work conditions	20
Change in sleeping habits	16
Change in eating habits	15

Figure 1

Apart from the life events, there are other fairly readily identifiable symptoms of stress which we should be able to recognise in ourselves and others:

- general irritability or depression
- low morale — loss of enthusiasm
- poor work habits associated with a decline in the quality of work
- trembling, nervous twitches or tics
- insomnia, sweating, headaches
- compulsive eating or drinking
- drug and alcohol abuse
- illness, such as ulcers, high blood pressure.

It is important to note the crucial role management can play in creating or alleviating stress. There is considerable evidence from physicians and clinical psychologists that psychologically unhealthy relationships between subordinates and their authority figures can lead to emotional disability.

One of the best ways to alleviate stress in the working environment therefore is to adopt a management style that engenders an open, trusting and participative climate. Good communication and an open, honest approach will do a lot to assuage stress through common clear understanding of tasks, purpose and goals. The way supervisors handle evaluations, internal job changes, tasking and counselling can be either devastating or morale boosting. Admittedly there are times when tight deadlines and operational requirements induce stress, but such stress is to be expected and can be managed by careful assignment of tasks according to ability and equitability of the workload. The question of managing stress is succinctly addressed in the following quotation:

> The secret of success is not to avoid stress and thereby endure an uneventful boring life, for then our wealth would do us no good, but to learn to use our capital wisely, to get maximal satisfaction at the lowest price.

Fatigue

Perhaps a more widely recognised enemy of pilots is aircrew fatigue. Flying tasks can require a high degree of skill, alertness and co-ordination, sometimes under adverse conditions. Often it is necessary to complete the most important and demanding part of a task at the end of a long and difficult day.

The fatigue factor, simply put, results in an inability to perform effectively. Also, it is insidious in that an individual may not be aware that judgment has been impaired. The symptoms, however, are apparent to the rested observer and include the following:

- a low frustration level
- degraded co-ordination
- slowness in response
- failure to recognise errors
- carelessness
- acceptance of low standards of accuracy.

How many of us have committed, or heard of, errors such as wrongly set altimeters, missed altitude calls, incorrect headings, and poor approaches followed by dicey landings after a long and difficult day? Fortunately, such errors are usually countered by our ability to draw on reserve energy to 'psyche up' and handle stressful situations.

It is necessary to be aware of circadian rhythms, which explain the way in which the human body functions on a 24-hour-cycle biological clock. Any disruption of this cycle will cause fatigue and stress. Such primary body functions as temperature, blood pressure, blood sugar level and haemoglobin level can be adversely affected. Studies show that our poorest performance occurs at the low point in our circadian rhythm or the time we would normally be sleeping. Hence, our worst period is from about 0300 to 0600 local time (Figure 2 depicts the problem graphically). If you are trying to land during the 0300-0600 period after a long period of duty, then don't expect your judgment and skills to be at their best. Such matters as previously inadequate crew rest and crossing time zones will lower performance even more.

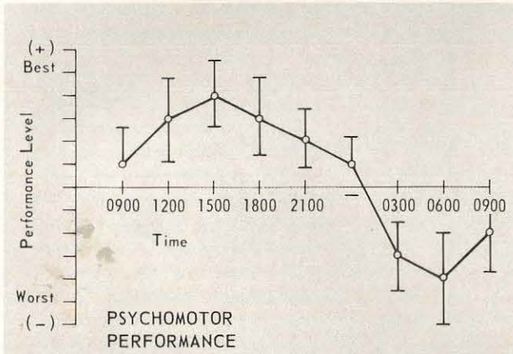


Figure 2

Pilots should also be aware of the phenomenon of 'sleep deficit'. The amount of sleep required by an individual varies, but in intensive flying operations sleep disturbance occurs frequently, to the point that insufficient sleep or 'sleep deficit' occurs. If less than 8 hours of quality sleep is obtained in any 24-hour period, then an accumulation of sleep loss begins. The nature of flying operations is such that rest periods can become fragmented, with sleep often being scheduled for unusual hours. In these circumstances, it is likely that a pilot's sleep deficit will accumulate to a point where task risk increases. Once an individual is into a sleep deficit situation, considerable time off is required to restore the body to its normal state. Studies have shown that, following duty times of 12–20 hours, fatigue may exist for more than one or two days.

There are a multitude of other factors which cause aircrew fatigue in addition to those mentioned. Some of these are age, experience level, cockpit temperature, humidity, cabin altitude and physical fitness, including the effects of caffeine, self-medication, alcohol and smoking. There are a few irrefutable facts worth keeping in mind when considering pushing the fitness and hygiene factors and bending such rules as 'bottle to throttle'. Included in these are the following:

- Mental alertness and stamina are increased when an individual is physically fit.
- If pilots do not eat properly before and during flights, then a low blood sugar supply may result in anxiety, disorientation, amnesia and headaches.
- Studies and reports show that smokers are more susceptible to fatigue and suffer from a definite reduction in altitude tolerance.
- Alcohol causes significant changes in the body system that seriously impair the performance of flying skills. These changes appear to remain longer after drinking stops than was previously realised. Alcohol itself and its residual effects can remain for up to 18 hours after drinking.
- The over-use (4–5 cups per day) of coffee after flight might impair adequate rest and contribute to unnecessary fatigue on the next day's flight.

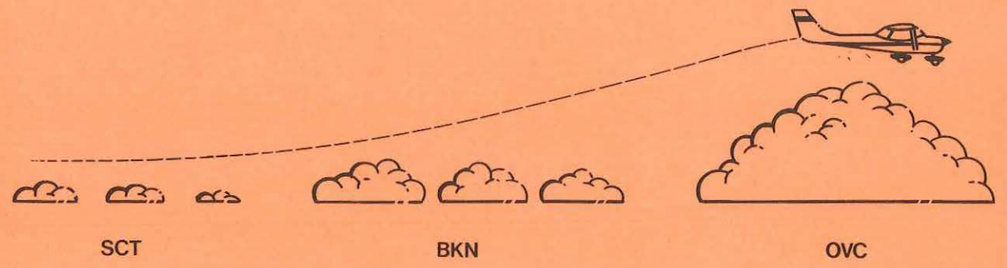
Of course, many of these fatigue and stress factors can be present simultaneously.

Comment

The subject of pilot stress and fatigue is complex and often it is a struggle to maintain control over events which may pose a threat to safe operations. Nevertheless, pilots and operations managers must continue to focus on these human factors if their operations are to remain effective and safe. The idea is not to eliminate stress and be overly lenient, but more to alleviate *unnecessary* stress and fatigue. Those individuals associated with flight operations, either actively or administratively, must educate themselves on the many aspects of stress and fatigue that heretofore have not been sufficiently emphasized. The best counter to the issue is to be able to recognise stress and fatigue-inducing factors, and their associated symptoms, early, and to take remedial action before distress becomes a problem ●

(*Adapted from* Flight Comment)

Trapped on top



FORECAST CLOUD ABBREVIATIONS

SKC (sky clear) – nil
SCT (scattered) – 1 to 4 OKTAS
BKN (broken) – 5 to 7 OKTAS
OVC (overcast) – 8 OKTAS

The amount of cloud predicted in a meteorological forecast is an important item for consideration in preflight planning. While it is a factor which must be assessed carefully by all pilots, it is particularly relevant to those who plan to file VFR flight plans.

As the Visual Flight Guide (VFG) points out, navigation by reference to the ground is impracticable if an aircraft is flying over more than 4 oktas of cloud. The VFG also details the procedure to be followed when radio navigation equipment, rather than visual fixing, is used for navigation during a VMC flight. Used sensibly, this procedure obviously is relevant to VFR flight above cloud. It is, however, a procedure which needs to be used with care and common sense, as the following account of an air safety incident illustrates.

A pilot departed an aerodrome on the east coast planning to fly to a destination about 100 miles inland. The forecast seemed suitable; although scattered to broken cloud was predicted it was supposed to be clearing from the west.

Once airborne the pilot found that there was more cloud than expected and that it had not yet started to clear. In order to maintain the required heading and remain VMC the pilot had to keep climbing over a steadily increasing cloud buildup. Given the conditions there is little doubt that he would have been better advised to have reversed his heading and returned to his departure point. Eventually he found himself at 8000 feet on top of overcast conditions. When he finally decided it was time to turn back he found that cloud buildups towards the coast were now blocking his way: his decision to divert had been left too late.

At this stage the pilot started to become uncertain of his position; while in order to remain VMC he had to climb further, initially to 10 000 feet and then shortly afterwards to 12 000 feet. With the situation threatening to get dangerously out of hand, the pilot very sensibly contacted Air Traffic Control and requested assistance. His aircraft was quickly identified on radar and he was given his position and a course to fly to reach a clear area.

The pilot deserves credit for calling for help before matters got even worse. Hopefully, when he was safely back on the ground, he derived the full value from this experience by reflecting on what might have happened had he not been within range of ATC radar when he trapped himself on top of the overcast conditions.

This particular incident highlights only one of the problems — namely, that of getting lost — which a pilot without an instrument rating who attempts to fly VFR on top of broken or overcast cloud may encounter. Other problems can arise. For example, a pilot who successfully navigates from A to B might have done only half the job: he still has to be able to descend safely to land at B when he arrives. Consider the following incident.

A Cessna 182 pilot was flying to a destination sited at the foot of a range of hills. En route navigation posed few difficulties, although cloud beneath the aircraft steadily increased and the forecast for the destination indicated that conditions were marginal for VFR operations. The pilot began to feel slightly uneasy about the deteriorating weather but he pressed on, remaining VMC on top. He arrived overhead his destination on time but, because of the cloud, was unable to descend. The cloud cover had become so extensive that no alternative airstrips in the immediate vicinity were open.

Unsure of how to tackle the difficult — and potentially dangerous — predicament in which he had placed himself, the pilot wisely asked Flight Service for help. With assistance from the FSU and inflight guidance from the instrument-rated pilot of another Cessna 182, the non-rated pilot was, after some fairly tense moments, directed to the nearest suitable diversion aerodrome, where he was able to descend clear of cloud and land safely. It is significant that this aerodrome was 200 kilometres away from the original destination. As was the case with the other incident, it seems probable that this pilot would have been in serious trouble if help had not been readily available.

* * *

Several points need to be raised concerning VFR flight on top of cloud. The first is that there is nothing inherently wrong with the practice. Indeed, it may well be good airmanship to fly above scattered cloud rather than beneath it in order to take advantage of smoother air, improved visibility or more favourable winds. Certain basic precautions must, however, be observed. It is incumbent upon the pilot to ensure that:

- the stipulated separation from cloud for VFR flight is maintained;
- weather conditions are stable or improving; and
- he remains alert for any changes and takes timely action if the clouds start to increase and the 'sucker holes' start to shrink.

The biggest mistake a pilot can make when flying VFR on top is to wait too long before descending or making a 180-degree turn (one of aviation's oldest safety devices) when deteriorating conditions demand action.

The second point addresses that most crucial aspect of safe piloting, preflight planning. If VFR flight above scattered cloud is being considered, the following procedures must be observed during planning:

- Obtain a meteorological forecast and briefing for all phases of your flight, and make a thorough assessment of that information.
- Do not plan for or attempt VFR flight when weather conditions are close to VFR minima. Remember that, given the right ingredients, those conditions can deteriorate quickly.
- Select a cruise altitude which will be compatible with terrain and cloud separation requirements.
- Consider the weather in relation to such factors as the route and your aircraft's capabilities and then allow a margin of safety commensurate with your experience level.
- While en route, monitor the weather not only visually, but also through such sources as FSUs, aerodrome weather reports, aircraft weather reports and VOLMET.

Finally, the question arises, what should you do if, as a pilot authorised only for VMC flight, you find yourself trapped on top of an overcast?

The primary requirement is to make every effort to remain VMC and to let someone know of your problem as soon as possible. Air traffic controllers and flight service officers are trained in assisting pilots in distress, so give them a chance to help you before it is too late. If you experience difficulties in making radio contact, climbing will both increase VHF range and improve the chances of ground radar detection. It may also be prudent to conserve fuel by using an economical or maximum endurance engine power setting.

* * *

As is usual in matters of flying safety, prevention is a much better approach to this problem than the cure: if you are a pilot rated only for VMC operations, then avoid flying on top of overcast conditions ●

In brief

After a short thermalling flight the pilot of a Blanik L13 glider returned for landing. Because there were several other pilots waiting for flights, he deliberately aimed to land short to reduce the retrieve time. The approach unhappily turned out to be too short. At about 150 metres from a fence delineating the airfield boundary, airspeed started to decrease quickly. As he was intending to land short, the pilot was by that stage relatively low and did not have speed to trade for height. He tried to utilise ground effect to stretch the glide, but only succeeded in hitting the fence, causing substantial damage to the glider's tailplane.

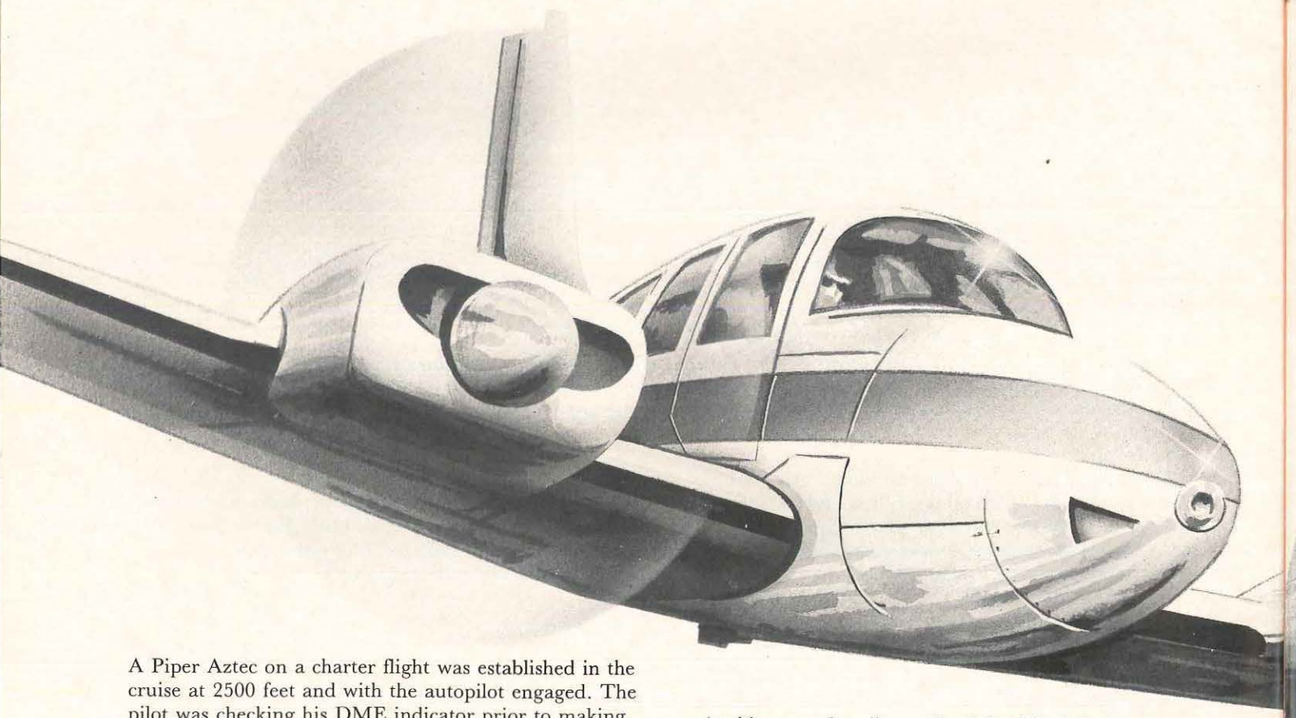
While the prime cause of the accident was the poor judgment of the pilot in attempting to land short, the fact that there was an upslope on the approach to the runway probably was a contributory factor, causing the pilot to fly lower on final approach than he should have. (See *Aviation Safety Digest* 111 for an article on visual illusions caused by sloping approach terrain.)

* * *

While climbing through 600 feet a helicopter pilot experienced loss of directional control. Suspecting tail rotor failure or separation, the pilot put the aircraft into an autorotation. The helicopter was damaged when it struck the ground at a high rate of descent. The initial investigation showed that a strap normally used to secure cargo had flown out of the cabin area through an open door and become entangled with the tail rotor ●

BIRDSTRIKES
Reducing the risk

Birdstrikes are a potential hazard facing all pilots. Strikes involving large birds and light aircraft can be particularly dangerous and costly, as the following three accounts of accidents show.



A Piper Aztec on a charter flight was established in the cruise at 2500 feet and with the autopilot engaged. The pilot was checking his DME indicator prior to making an inbound call at 20 miles, which necessitated looking down and to the right towards the centre of the panel. His right hand was across his face scratching his left temple.

Suddenly there was a loud explosion. The pilot found himself lying across the right-hand seat, bleeding profusely from the head. His right hand was also severely lacerated although he did not realise this at the time. He pulled himself up and noticed that the windscreen was missing and that a large bird was wedged in the top left-hand corner of the windscreen frame.

After checking that the aircraft was still straight and level at 2500 feet (approximately 1500 feet AGL), he attempted a Mayday call to an aircraft from the same company which he knew was about 15 miles behind. The headset had been knocked from his head into the rear of the cabin and was retrieved by pulling on the cord. Another Mayday call was transmitted.

At this stage the pilot realised that his right hand was almost unusable. Fortunately his destination was in sight.

He heard what he thought was an acknowledgement to his Mayday and set himself up for a straight-in approach. He was finding it difficult to see out of his left eye, but accomplished a normal landing after carrying out the primary functions with his left hand.

Although the pilot had continued to transmit his intentions throughout, neither the Mayday nor other transmissions were heard by other aircraft due to his microphone being full of blood.

The remains of the bird, a Wedge-tailed Eagle, weighed about 5 kg. The cost of repairs and loss of income resulting from this strike totalled approximately $14 500.

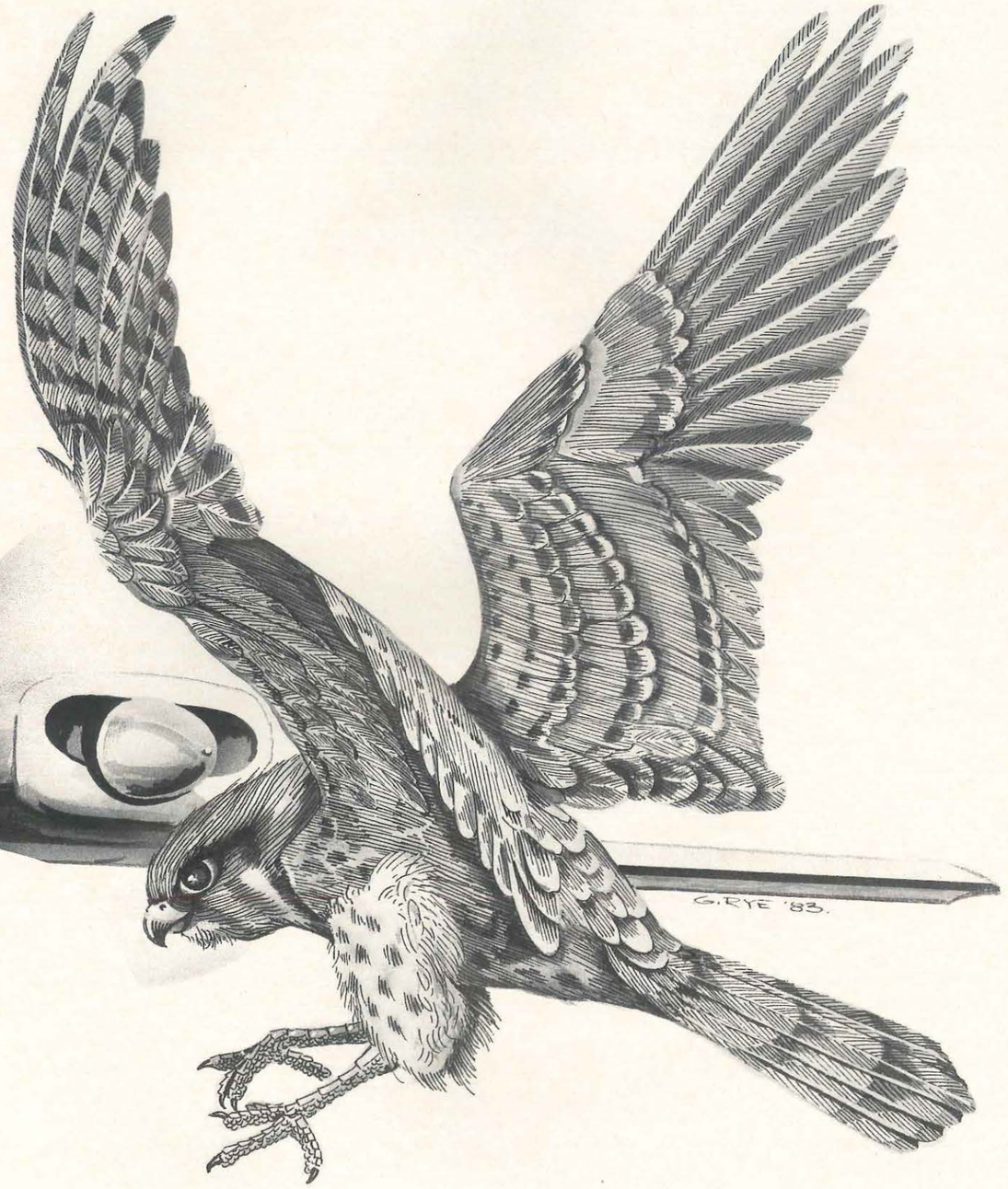
* * *

The pilot of an A9A Callair was conducting glider-towing operations. After completing normal safety release checks with the tow rope, a Blanik L13 glider was hooked on and takeoff commenced. A flock of hawks had previously been noticed near the runway, but the birds had vacated the immediate area when full engine power had been applied.

However, at between 150–200 feet AGL several birds flew into the aircraft's flight path and contact was unavoidable. The pilot noticed one hawk had lodged in the 'V' formed by the leading edge of the port wing and wing strut. The glider was immediately released and it landed safely straight ahead.

The Callair started to turn to the left by itself, and when the pilot tried to correct this he found that the ailerons were ineffective. He was able to keep the wings level by applying right rudder but he could not prevent the aircraft from tracking to the left.

By this stage the aircraft happened to be positioned on downwind. A quick glance at the ASI showed 100



BIRDSTRIKES
Reducing the risk

knots. The pilot attempted to turn base by allowing the left wing to drop about 15 degrees and reducing power, but found he then had insufficient control over his machine. Full power was applied but this only increased the angle of bank, tightening the turn.

The pilot realised a crash into the trees below was inevitable. He held the aircraft in a 15 degree port wing down attitude with no power and full right rudder until striking the ground. He completed most emergency checks but did not have time to turn off the fuel.

On impact, flames shot up into the cabin from beneath the rudder pedals. The pilot freed himself from the aircraft after which both fuel tanks, which were approximately two-thirds full of 100/130 avgas, exploded.

The pilot escaped with only a few minor injuries. The aircraft, which was valued at $18 500, was destroyed.

* * *

The pilot of a Cessna 310 was engaged in prawn spotting operations. He had been cruising as low as 600 feet ASL and was commencing a climb when he went through a flock of birds. As he approached 700 feet ASL one of the birds passed through the starboard side of the windscreen and struck the observer in the chest. The bird was identified as a Lesser Frigatebird.

The pilot reported that the return flight to home base was noisy and uncomfortable with 'blood and guts over everything'. Fortunately there were no control difficulties.

The observer suffered a cut hand and a bruised chest. There were no other injuries.

The total cost of repairs and loss of income due to the period of unserviceability of the aircraft was estimated to be in excess of $10 000.

* * *

Each of the pilots involved in these accidents was fortunate to escape serious injury. Indeed, the pilot who had his hand across his face immediately before impact may have been saved by that action. It was possible that his aircraft, which had full tanks of fuel, would have continued on autopilot into the Simpson Desert had he lost consciousness.

Because birds are more common close to the ground, most birdstrikes are likely to occur in the vicinity of airports. Over 80 per cent of strikes occur during the takeoff, climb, final approach and landing phases of flight. Approximately 22 per cent of reported strikes are windshield strikes. On average, 10 per cent of reported strikes result in damage to the aircraft.

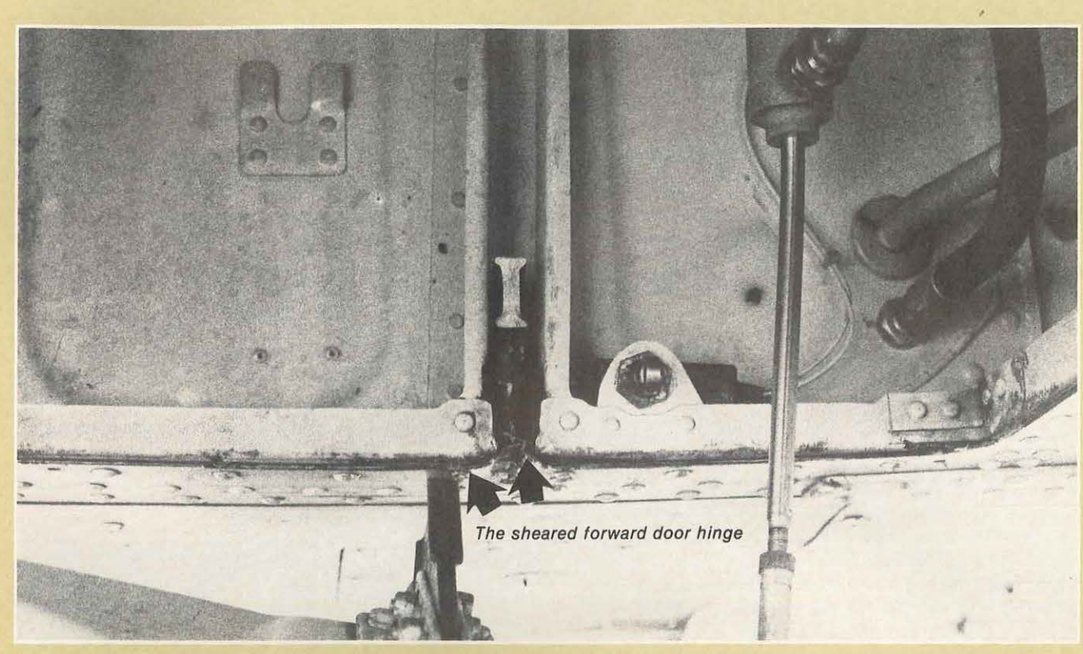
Birdstrikes to aircraft while cruising are much less frequent. However, the likelihood of sustaining serious damage and injury from the impact of such a strike is greater due to the higher speeds involved.

When a 2 kg bird strikes an aircraft travelling at 135 knots it exerts a 3.8 tonne (37.28 kilonewtons) force on a saucer-sized area of the aircraft's frame or engine. If the aircraft is travelling at 170 knots the force is equivalent to 15 tonnes (147.15 kilonewtons) and at 540 knots, 60 tonnes (588.6 kilonewtons). Even though light aircraft are unable to travel at this latter speed, they are, nevertheless, susceptible to severe damage from the impact forces of a birdstrike which can result in windshield breakage, control jamming, airframe distortion and control surface breakage.

Whereas action is taken on and around aerodromes to reduce the likelihood of encountering birds, little can be done to assist aircraft while cruising. This responsibility must, therefore, rest with the pilot. The following points, which may help to reduce the possibility or severity of a birdstrike, should be kept in mind:

- Maintain a good lookout, particularly when flying at low level.
- Be aware that many birds that feed and roost in flocks such as ibis, galahs and starlings may fly between their roosting areas and feeding areas during the early morning and evening.
- Watch for indications of thermals and updrafts and if possible avoid areas where they may occur. Birds of prey and large water birds tend to soar on rising currents of air and can be encountered at heights up to 20 000 feet AGL.
- Avoid flying below 1500 feet AGL in the vicinity of abattoirs, swamps, wooded hilly areas, garbage dumps or any place that is likely to be attractive to birds.
- It is preferable not to try to avoid a bird by flying under it. It is usually the bird's natural inclination to avoid a collision by diving or sideslipping to lose altitude.
- Should a strike appear imminent, try to maintain straight and level flight rather than risk control difficulties due to the distortion of the airframe by a birdstrike or over-stressing of the aircraft during last minute evasive action. Also, you should try to duck below the line of the instrument panel if there is a possibility that the bird may strike the windscreen.
- Advise ATC, Flight Service or 'all stations', as appropriate, if you are aware of bird activity on or around an aerodrome so that other aircraft may be alerted, especially if Regular Public Transport operations are involved. This is particularly important at large airports where the control tower may be remote from runway approach and departure paths which might make it difficult for controllers to visually detect smaller flocks of birds.
- Avoid, wherever possible, attempting to take off or land when there are birds on or around the runway.
- Finally, report all birdstrikes. Apart from being a statutory requirement, accurate birdstrike reporting enables the intensity and nature of bird hazards at a particular location to be assessed so that action can be taken to control those hazards. One of the accidents described above occurred near Batchelor in the Northern Territory. It was the second birdstrike to have been reported there in 12 years. The third reported strike occurred one week later and resulted in the shattering of a helicopter canopy. If all the other strikes which have doubtless been sustained at Batchelor over the years had been reported, action could have been taken to prevent the loss of an aircraft and danger to life ●

Inadequate periodic inspections



The sheared forward door hinge

On downwind for a night landing, the pilot of a Piper PA31 Navajo selected the landing gear down. The nose wheel and port main wheel green lights illuminated but the starboard main wheel red 'gear unlocked' light remained on. Climbing to 2000 feet to clear the circuit area, the pilot attempted to rectify the problem by recycling the gear several times, but to no avail. He then tried to lower the gear using the emergency system but this too was unsuccessful.

An airborne inspection by another aircraft, which was able to illuminate the underside of the Navajo with its landing light, confirmed that the port main wheel and nose wheel were both down, and that the starboard main wheel was partially down and appeared jammed. The Navajo pilot then attempted to dislodge the jammed wheel through the application of g forces to the aircraft, but had no success.

Accepting that he was committed to a gear-up landing, the pilot retracted the gear and, with the full assistance of the emergency services and Air Traffic Control, carefully planned his landing. This was effected calmly and competently and, while the aircraft sustained a fair amount of damage, both occupants were uninjured.

Analysis

The aircraft was hoisted by crane the following morning and put on jacks for examination. Inspection of the starboard undercarriage wheel bay area revealed that the forward hinge on the inner gear door had broken near the centre of the arm (see photograph). This had prevented the door from operating correctly, so that when the pilot selected the undercarriage down the wheel and the door had become jammed. Retraction tests revealed no other fault with the system.

The possibility of cracking occurring in the PA31's main landing gear inboard door hinges had been recognised by the Piper Aircraft Corporation following field reports. Accordingly the Corporation had issued a Service Bulletin on the subject which detailed the inspection procedure. This procedure had been endorsed by the Department of Aviation.

It was apparent from an inspection of the Navajo's door hinges that this particular inspection had not been completed properly. The Service Bulletin stipulated that the hinges had to be inspected for cracking using the Dye Penetrant Method, before which all paint had to be removed from the inspection area. The broken hinge removed from the starboard main landing gear of the Navajo still had the original zinc chromate primer on it — in other words, the paint had not been removed. Thus, any Dye Penetrant Inspection, if in fact conducted, would have been invalid.

This inspection was to be carried out every 100 hours time in service unless the hinge had been replaced by an acceptable replacement part. Although several periodic inspections had been certified as having been completed on this aircraft since the issue of the Service Bulletin and the applicable Departmental Airworthiness Directive, the condition of the door hinge did not support those certifications.

Comment

Readers should not need any conclusions to be drawn by *Aviation Safety Digest* on this matter. The importance to flight safety of thorough and reliable maintenance is self-evident. In this accident the pilot and his passenger were lucky ●

Reader contribution

The importance of preflights

My son and I both hold unrestricted PPLs with about 300 and 400 hours respectively. We own a Cessna 172 which is sometimes parked in the open at a country airport. At the time of the occurrence described below it had flown about 20 hours following a major inspection three months previously.

I had always considered that my preflight inspections were careful and I had also spent as much time as possible on owner maintenance. However, a recent incident has given me a new perspective on preflight inspections.

* * *

We flew to another country aerodrome after doing a 'complete' preflight check, including weight and balance calculations. Landing weights were: two pilots 294 lb, two rear seat passengers 276 lb, rear luggage 30 lb, fuel 112 lb. All well within safety limits.

On what appeared a normal approach with full flap into a steady wind we felt the tail area touch the runway. The aircraft had a high nose up attitude and the stall warning just began to sound at touchdown. Examination showed slight scratching on the tail tie-down ring, no other damage. We could not come up with an explanation as it had never happened before.

Not being satisfied with an unusual experience which we could not explain, I made a complete check of the aircraft. I removed inspection plates and the panel from the luggage area to inspect the rear inside fuselage. I found that there was about 40 mm of water trapped between the rear bulkheads at the rear of the fuselage. The drain holes had been blocked with dirt and paint overspray. Clearing the drains allowed a considerable amount of water to flow out.

Whether this weight of water caused an out-of-balance centre of gravity I am not able to say. However, one can imagine how much worse this would have been if we had been operating at closer to gross weight limits. The aircraft is perfectly normal and subsequent landings in the same configuration have all been normal.

My preflight inspections will be even more careful in future.

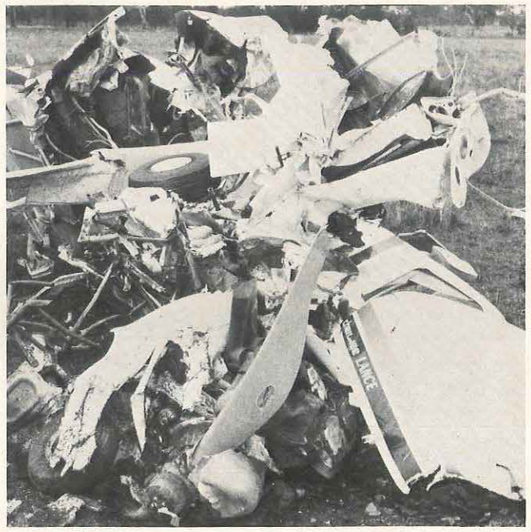
* * *

Comment

When carrying out preflights, pilots should remember that special circumstances may require special inspections. For example, if your aircraft is parked outside for long periods and used infrequently, then, in addition to checking *all* the items listed in the pilot's handbook, extra attention will need to be paid to such items as corrosion, water and other types of contamination, bird and insect nesting, and so on.

It is difficult to over-emphasise the importance of preflight inspections. Countless potential accidents have been averted by the discovery of faults during preflights. Unhappily the reverse is also true. One of the most graphic examples of this was a fatal accident involving a PA32, which was the subject of a Summary Report issued by the Bureau of Air Safety Investigation.

It was apparent from wreckage distribution and witness statements that the Cherokee had broken up in flight. Investigation resulted in the discovery of fatigue cracking in the stabilator. It seems probable that this cracking eventually affected the skin panel to the extent that the skin disrupted airflow over the right stabilator. This then led to a loss of control, and eventually the inflight breakup of the aircraft. The following photograph shows the catastrophic consequences.



In detailing the factors relevant to the accident, the BASI report made reference to the fatigue crack as follows: *'Although the crack was not located in an easily visible position it should have been detectable in previous routine maintenance and preflight inspections'.* The failure to detect the crack cost the pilot and his passenger their lives.

As a final thought on preflights generally, pilots must always resist any pressures to 'abbreviate' this crucial check. The temptation to rush through a preflight inspection or to take a short-cut is experienced sooner or later by all pilots: when we're running late the preflight seems a natural 'target' for saving time. But to do so is never worth the risk. It is better to spend a few minutes extra on the ground than to realise — at the possible expense of your life — in the air that a vital preflight check has been omitted ●

The pilot of this Cessna 182 was lucky to escape with only minor aircraft damage after striking a Wedge-tailed Eagle. Birds of this species average 3.5 kg in weight and may reach almost 6 kg.