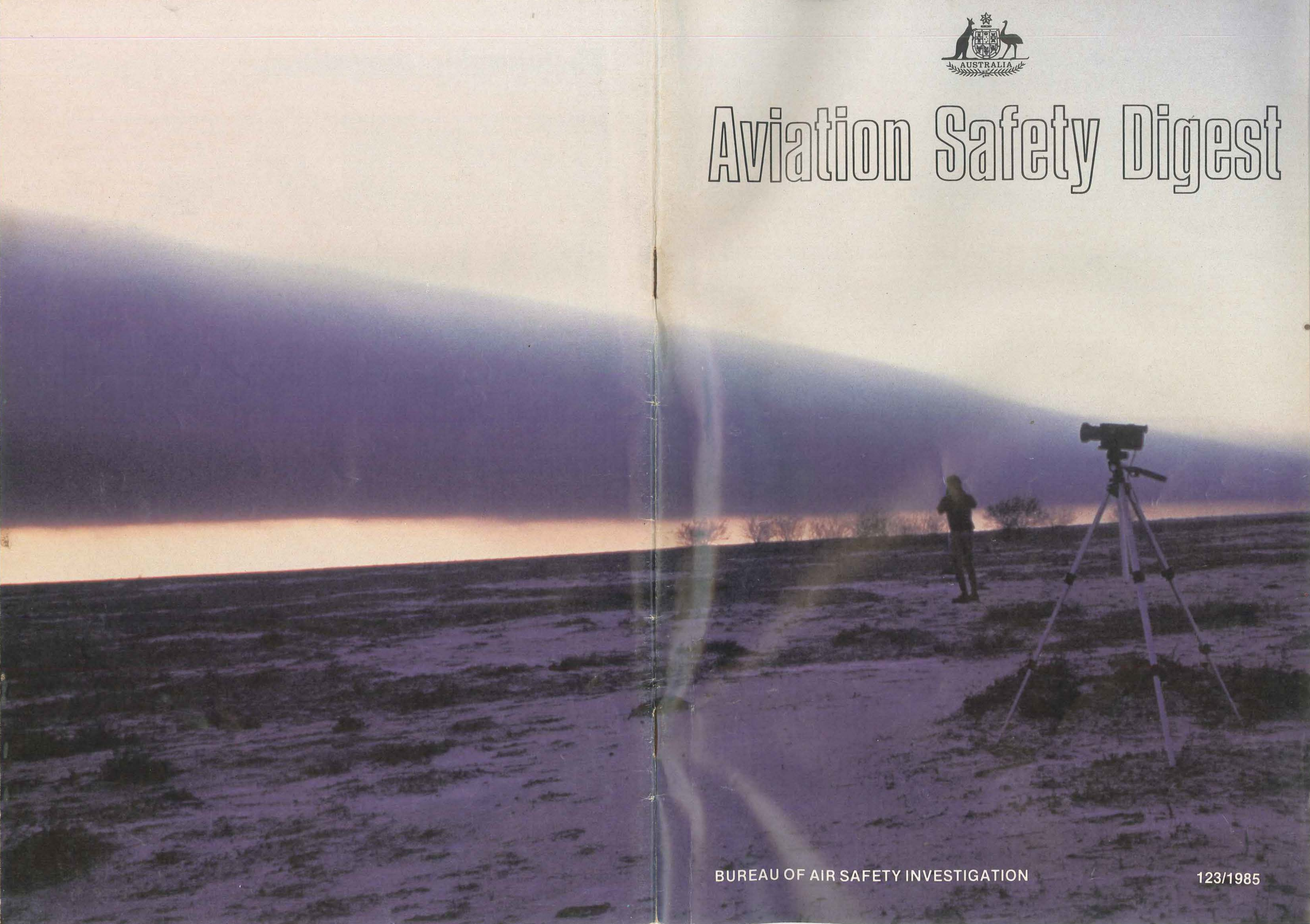
AUSTRALIA

# Aviation Safety Digest



BUREAU OF AIR SAFETY INVESTIGATION

123/1985

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*ISSN 0045-1207*
*R84/151 Cat. No. 84 1558*

*Printed by Ambassador Press Pty. Ltd.*
*51 Good Street, Granville, N.S.W. 2142.*


## Cover

Approaching Morning Glory roll cloud formation produced by a solitary wave propagating in a maritime inversion towards the southwest over saline coastal flats near Burketown, Queensland, shortly after sunrise on 1 October 1981. The base of this roll cloud is estimated to be about 0.3 km and the top lies at about 1.5 km. Note that the position of the cloud marks a complex localised region of strong horizontal and vertical wind shear near the surface.



# Solitary waves and low-altitude wind shear in Australia


*D. R. Christie and K. J. Muirhead, Research School of Earth Sciences, Australian National University, Canberra.*


It is widely recognised that on rare occasions aircraft encounter unexpected and dangerously intense wind shears during final approach or on takeoff. In most cases, the pilot is able to undertake corrective procedures and the aircraft continues for a normal takeoff or landing. There have, however, been a significant number of major aircraft accidents in recent years which have been attributed directly to a sudden encounter with severe low-altitude wind shear in the airport environment. The principal conclusion from the recent review[1] of the aviation wind shear problem by the National Academy of Sciences and the Federal Aviation Administration in the United States is that 'low-altitude wind variability (or wind shear) presents an infrequent but highly significant hazard to aircraft landing or taking off'.

Aviation wind shear may be defined as any change in wind speed or wind direction over a short distance, including up- and down-draughts, which leads to a deviation of an aircraft from its intended flight path. It is generally agreed that the most hazardous forms of wind shear are those which result in a sudden loss of lift either immediately after takeoff or during the critical final approach stage where safety margins are minimal. Large jet-powered aircraft, with their relatively slow response, appear to be particularly susceptible to an encounter with severe low-level wind shear. Unexpected wind shear in the airport terminal area can, however, present a serious hazard to all types of aircraft.

A number of articles on wind shear related aircraft accidents, both in Australia and overseas, have appeared in the *Aviation Safety Digest* in recent years. In the United States alone, low-altitude wind shear in the terminal area has been identified as the most important causal factor in at least 24 major commercial airline accidents. It must be expected that low-altitude wind shear has also been a major contributing factor in a significant number of general aviation accidents. Anderson and Clark (*Aviation Safety Digest* 106) have recently carried out a thorough survey investigation which shows that wind shear is a significant operational problem in Australia.

### Meteorological conditions for low-altitude wind shear

Hazardous low-altitude wind shear can be associated with a wide variety of meteorological phenomena, including mountain lee waves and eddies, nocturnal boundary-layer jet streams, sea-breeze and cold frontal systems, thunderstorms and other precipitating convective storm systems, and large amplitude solitary wave disturbances. With the exception of solitary waves, these meteorological wind shear sources are easily recognised and can often be predicted well in advance in the airport terminal area. Pilots and Air Traffic Controllers are generally well aware of the potentially severe hazards associated with thunderstorm downbursts and with thunderstorm outflow gust fronts. The microburst — a particularly intense localised convective downburst — has received a great deal of attention since the wind shear-induced crash of Eastern Airlines Flight 66 at New York City's Kennedy Airport

1 *Low-Altitude Wind Shear and Its Hazard to Aviation.* 1983. National Academy Press, Washington, D.C., 128 pp.

in 1975 and the severe hazards produced by these short-lived treacherous disturbances are now widely appreciated in the aviation community. In contrast, large amplitude solitary waves have only recently been identified as a significant source of intense transient low-altitude wind shear. These propagating boundary-layer waves, which are commonly found in many areas of Australia, are a particularly insidious form of dynamic wind shear, since they usually occur without warning as a sudden unexpected clear-air disturbance.

In many wind shear accidents it has been possible to associate the hazardous shear with one of the well-known meteorological wind shear conditions. In some instances, however, the identity of the low-altitude wind shear source has been uncertain. In this regard, it is of interest to note that of the 93 meteorologically related wind shear incidents in Australia compiled in the survey by Anderson and Clark, only 15 could be attributed to frontal and thunderstorm activity. The remaining incidents were categorised as vertical shear of horizontal wind (31 incidents) and down-draught (47 incidents). Large amplitude solitary waves produce horizontal and vertical wind shears, including significant localised up- and down-draughts, which are comparable with other known forms of hazardous low-altitude wind shear. In view of the ubiquitous nature of these commonly occurring waves, it is likely that some of the incidents noted in this survey, and quite possibly other hitherto unexplained aircraft accidents, both in Australia and elsewhere, can be accounted for by solitary wave activity in the atmospheric boundary layer. The primary purpose of this article is to draw attention to the hazard associated with large amplitude solitary waves and to describe recent progress in the identification, detection and prediction of this important type of low-altitude wind shear disturbance.

## Solitary waves

Solitary waves in the lower atmosphere take the form of remarkably large amplitude, single-crested waves of elevation which propagate predominantly as clear-air disturbances in boundary-layer inversion wave guides. The first definitive observations of these essentially non-linear travelling wave disturbances were made in 1976 at the Australian National University's Warramunga Infrasonic Array near Tennant Creek in the arid interior of the Northern Territory. A number of detailed investigations have been carried out in recent years to determine the basic meteorological factors which govern the evolution of these commonly occurring disturbances as they propagate over the Northern Territory and north Queensland. Although extensive well-documented records are as yet lacking for many areas in Australia, sufficient evidence is now available to show that solitary wave-dominated disturbances occur frequently and are particularly well-developed over much of the Australian region. This regional factor can be attributed largely to the featureless, semi-desert terrain which distinguishes much of the Australian continent.

Solitary waves are by no means unique to Australia. Waves of this type are now known to occur on occasion over southern England, northern Germany, the central Mediterranean region and North Africa. In addition, a number of detailed observations of these disturbances have recently been reported from the Great Plains area in the central United States. Non-linear wave disturbances of this type are a commonly occurring feature in the lower atmosphere and will generally be found wherever suitable boundary-layer conditions exist.

Solitary waves arise quite naturally as the long-lived component in the decay of a wide variety of atmospheric disturbances. Waves of this type are exceptionally stable and, under ideal conditions, may propagate as coherent entities for many hundreds of kilometres. A noteworthy feature of the structure of large amplitude solitary waves is a region of recirculating fluid which is carried with the disturbance. Larger amplitude waves of this type take the form of a propagating horizontal vortex which may produce particularly severe low-level wind shear conditions.

Solitary waves are observed to occur either as single isolated waves of elevation or, more commonly, as groups of spatially separated, well-developed, amplitude-ordered solitary waves, and, in an early stage of formation, as partially resolved waves associated with the actively evolving leading edge of a disintegrating long-wave, or internal bore-wave, disturbance. The typical scale and structure of a three-component boundary-layer solitary wave disturbance is illustrated in Figure 1. Individual solitary waves are most commonly observed with amplitudes between 300 and 1000 metres and with effective horizontal scales from 0.5 to 6 kilometres. They usually propagate with speeds between 6 and 16 metres/second (m/s) but on occasions they have been observed to propagate with speeds exceeding 20 m/s (approximately 40 knots).

The passage of a solitary wave disturbance over the airport terminal area is marked by a complex low-altitude wind shear disturbance with a typical lifetime of about 4 minutes. This transient shear disturbance is characterised by rapidly varying horizontal winds near the surface compounded by strong up- and down-draughts associated with the leading and trailing edges of the wave. The vertical wind component in these disturbances is typically about 5 m/s but may on occasion exceed 8 m/s. Maximum horizontal winds are found at the centre of the disturbance near the surface and are usually in the range from 10 to 15 m/s; significantly higher winds may occur in individual solitary waves which contain a region of recirculating fluid.

Since any disturbance in the lower atmosphere can be expected to generate solitary waves on an existing inversion, the origin of these waves can be attributed to a wide variety of meteorological phenomena ranging from mid-latitude cold frontal systems to intense thunderstorms. One recent result, which is clearly an important factor in the prediction problem for transient shear disturbances of this type, is the observation that seemingly benign long internal bore-wave disturbances in the lower atmosphere can evolve over a period of less than one hour into a series of well-developed solitary wave wind shear disturbances. Low-level wind shears in the residual disturbance behind the primary solitary wave components tend to be small and are of little significance to the subject of air safety.

One of the best-documented accounts of an accident apparently attributable to intense and unexpected low-altitude wind shear was that involving an F27 at Bathurst, NSW, in May 1974.

When the aircraft's crew called Bathurst for a weather check about 6 minutes before the subsequent accident, conditions seemed generally fine, with the surface wind from the north-east at 5 knots. An approach was commenced but, because the F27 did not become properly aligned with the runway, a go-around was initiated — as it turned out, 24 seconds before ground impact. Investigators later determined that, when the go-around was commenced, the aircraft was experiencing a headwind component in the order of 30 knots; this headwind component became variable some 16–10 seconds before impact, and the aircraft experienced a tailwind in the order of 30 knots during the final seconds of flight.

The Accident Investigation Report concluded that the cause of the accident was that during the go-around the climb performance of the aircraft was adversely affected by an unpredictable encounter with a large change in the horizontal wind component, and an associated downdraught, at a height too low to effect recovery.



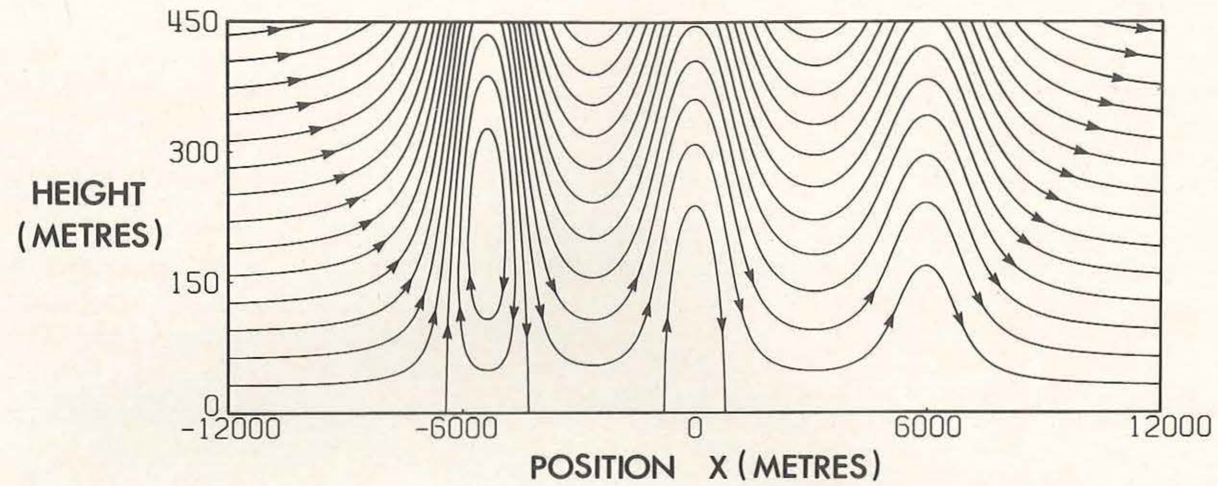



**Figure 1.** *Model calculation of the relative streamline pattern corresponding to a typical well-resolved family of solitary waves propagating in a boundary layer inversion.*

## Observations of solitary waves in Australia

Solitary waves can be expected to occur wherever conditions of low-level atmospheric stability prevail. Waves of this type may occur at any time of the day in coastal regions of Australia which are subject to a persistent marine inversion and in most inland areas during the night-time and early morning daylight hours. These waves are progressively destroyed over land by convection and are seldom observed in inland areas during the afternoon. Solitary waves are unstable in mountainous areas and are therefore less likely to be found over the highlands of southeast Australia. Some examples of the occurrence of solitary wave disturbances in Australia are as follows:

### Clear-air disturbances in central and northern Australia

Over 1000 large amplitude solitary-wave-dominated disturbances have been recorded over a 9 year period on a high-sensitivity microbarometer array at Warramunga near Tennant Creek. These waves have been observed from all directions and at all times of the year. Solitary waves of larger amplitude occur most frequently between August and November and originate predominantly to the north and north-east in the direction of the Gulf of Carpentaria. On many occasions, two or more independent large-amplitude non-linear wave disturbances have been observed to propagate over the Tennant Creek area from different directions within an 8 hour period. Detailed field studies have shown that these complex boundary-layer disturbances often have wavefronts which extend for hundreds of kilometres and they often propagate for distances in excess of 500 kilometres. One important conclusion from these extensive observations is that waves of this type almost invariably occur without warning in the arid interior of Australia as sudden unexpected clear-air disturbances. Since solitary waves in inland areas usually propagate on the nocturnal

**Figure 2.** *The above photograph depicts a unique example of a roll cloud over Spencer Gulf, South Australia. The picture was taken at 1.15 pm, 27 November 1977 by the co-pilot of an Airlines of South Australia aircraft while on approach to land. He estimated the length of the cloud to be 5 kilometres. The camera was pointing west and a further faint roll is just visible to the west of the main one.*

*The ship near the centre of the picture was the Danny F, which was 230 metres long. This puts the thickness of the roll and the height of its base around that figure.*

*A north-easterly airstream had resulted in humid sultry conditions over most of South Australia, with isolated thunderstorms a day or so before the event. An interaction of this air mass with a cooler south-easterly anti-cyclonic flow towards the South Australian coast undoubtedly contributed to the formation of this well-defined roll.*

inversion, large amplitude waves of this type will normally present an operational problem for aviation only during the night-time and early morning hours prior to the break-up of the radiation inversion layer.

### Visible solitary waves over the Gulf of Carpentaria

Solitary waves in coastal areas are sometimes accompanied by a low-level propagating roll cloud formation. The Morning Glory (cover photograph) is a spectacular visible manifestation of a solitary wave propagating on a maritime inversion. These remarkable roll cloud formations, which frequent the southern margin of the Gulf of Carpentaria during the spring, are accompanied by strong wind squalls which may present a hazard to aviation. Similar propagating roll cloud formations are seen on rare occasions in other maritime areas of Australia. Figure 2 shows a relatively small amplitude, but exceptionally well-formed, solitary wave roll cloud over Spencer Gulf in South Australia. It should be emphasised that very few solitary wave disturbances are accompanied by roll cloud formations. Even under the tropical humid conditions which prevail along the southern coast of the Gulf of Carpentaria, large amplitude solitary wave disturbances occur more often than not without warning as clear-air disturbances.

### The southerly buster

The southerly buster, an intense southerly wind squall which frequents the coast of New South Wales, is a familiar feature of the weather in the Sydney area during the spring and summer months. This disturbance is often accompanied by severe convective storms; it also frequently occurs as a sudden unexpected clear-air disturbance with low-altitude winds in excess of 15 m/s which may present a wind shear hazard to aviation along the New South Wales coast. The phenomenon seems to be invariably associated with the passage of a cold frontal system across south-east Australia. On occasions, the southerly buster is accompanied by a spectacular propagating roll cloud, or a series of roll clouds, aligned perpendicular to the coast. In a number of cases the southerly buster can be identified as a coastally trapped density current; on many occasions, however, the observational evidence indicates that the southerly buster is a vivid manifestation of particularly large amplitude solitary waves with closed circulation propagating on a maritime inversion.

### Pre-frontal solitary wave disturbances over southern Australia

Sea-breeze and cold frontal systems are a significant source of solitary wave activity over southern and south-eastern Australia. Large amplitude solitary-wave-dominated disturbances, similar to the non-linear wave disturbances seen over northern Australia, have been reported from both coastal and inland areas of South Australia and Victoria, and from the interior of New South Wales. These propagating wind shear disturbances appear to originate predominantly in frontal systems and occur most frequently during the spring and summer months. Pre-frontal wind squalls of this type exhibit a high degree of variability in their properties; they can occur up to several hours in advance of the main frontal air mass and may, on occasions, present a difficult short-term forecasting problem for aviation, especially when they occur without cloud.

## Solitary wave wind shear and aircraft performance

The complex, rapidly varying wind shears produced by large amplitude boundary layer solitary wave disturbances can affect the performance of aircraft in a variety of ways. Perhaps the most serious situation occurs when an aircraft unexpectedly encounters a solitary wave disturbance from the front during the critical final approach stage (see Figure 3). In this case the aircraft is initially displaced above the glide path under the positive influence of increasing head winds coupled with the up-draught along the leading edge of the disturbance. This brief period of positive lift is followed by a sudden loss of lift as the aircraft penetrates the region of rapidly decreasing head winds and down-draught along the trailing edge of the wave. In most circumstances, the normal reaction of a pilot to the initial increase in lift during final approach would be to decrease air speed in an attempt to return the aircraft to the standard glide path; this action, coupled with the sudden loss of performance along the trailing edge of the wave, could leave the aircraft dangerously close to the ground in a potentially disastrous runway undershoot situation. This particular behaviour pattern — a temporary period of positive performance followed by a sudden loss of lift — is characteristic of many low-altitude wind shear accidents. In a similar manner, an encounter with a solitary wave from the opposite direction during the approach stage could lead to runway overshoot conditions.

Most wind shear accidents occur during the final approach to the runway. While the degree of hazard is usually less severe during takeoff, an encounter with a large amplitude solitary wave immediately after takeoff would certainly be a cause for concern and could in some cases lead to difficulties in clearing obstacles along the flight path and, perhaps, to stall conditions. Solitary waves may also be encountered during landing and takeoff at oblique angles to the wavefront. Under these conditions aircraft will be subject to both varying lift characteristics and rapidly changing crosswinds which will increase the pilot's workload and thus increase the risk of an accident.

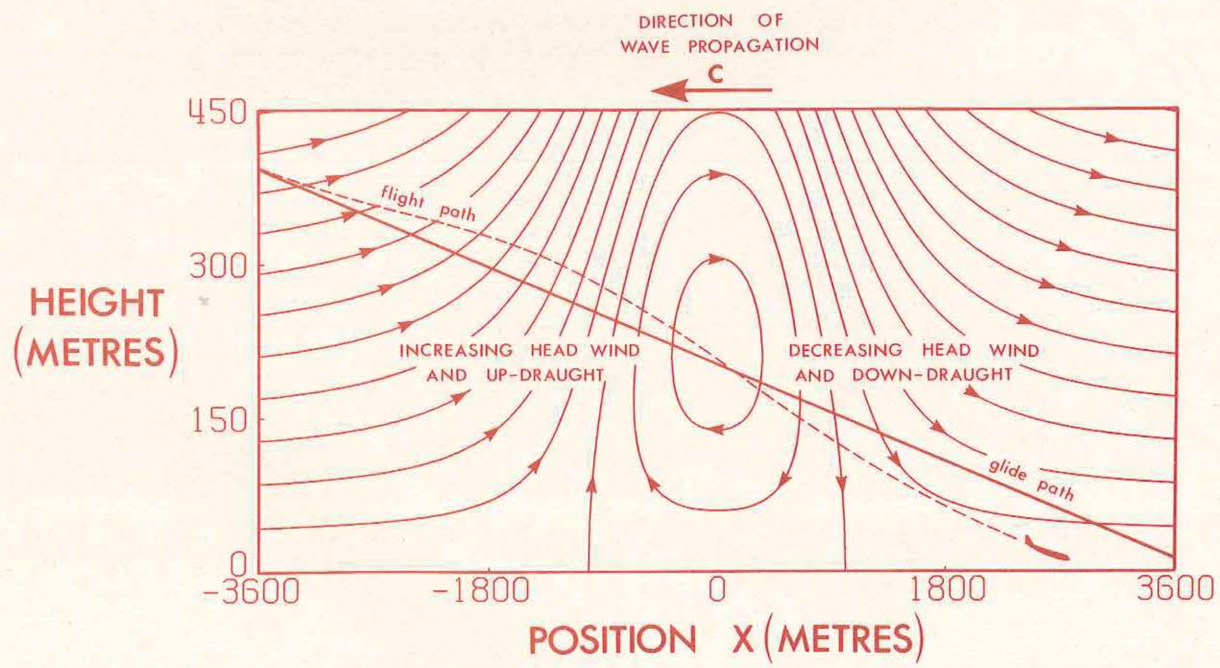



**Figure 3.** *Illustration of the possible behaviour of an aircraft leading to runway undershoot during a head-on encounter with a large amplitude solitary wave on final approach. Maximum horizontal winds occur at the centre of the disturbance near the surface.*

## Solitary waves, convective microbursts and thunderstorm gust fronts

Large amplitude solitary waves, convective microbursts and thunderstorm outflow gust fronts appear to be the most serious forms of low-altitude wind shear hazard to aviation. The effective horizontal scales of all of these transient wind shear disturbances are in the order of a few kilometres and they therefore have a strong influence on the behaviour of aircraft over the terminal area. The relative importance of each of these wind shear disturbances to air safety may be assessed from the compilation of their properties given in Table 1. Pilots will often be forewarned of the possibility of convective microbursts and thunderstorm gust fronts over the airport area. In contast, solitary wave disturbances are much more difficult to predict, since they usually occur as clear-air disturbances and are often found at great distances from their source. It is worth noting that the performance of an aircraft during a head-on encounter with a large amplitude solitary wave (Figure 3) is remarkably similar to the behaviour of an aircraft during an encounter with a convective microburst. In the latter case, an aircraft may first encounter a brief period of positive performance (increased lift) due to the sudden onset of outflow headwinds followed by a potentially serious loss of performance as the aircraft penetrates the downflow region coupled with the onset of outflow tailwinds. Down-draughts and rapidly varying horizontal wind components distinguish the solitary wave wind field from the more benign wind shear pattern associated with thunderstorm outflow gust fronts. Since solitary waves most often occur in amplitude-ordered wave packets (Figure 1) formed in the decay of long internal bore waves, the winds in these disturbances are generally much more complex than those found in simple thunderstorm outflow systems.

## Wind shear detection and prediction at airports

An effective wind shear detection and warning system for operational use at airports should provide an accurate short-term forecast of the severity and nature of all types of low-altitude wind shear in a form which can be easily interpreted and rapidly communicated to incoming and outgoing flights. Some types of wind shears, such as those associated with sea-breeze and cold frontal systems, mountain lee waves and nocturnal boundary-layer jet streams, can often be predicted, sometimes hours in advance, over the airport area. Solitary waves, convective microbursts and thunderstorm gust fronts can be detected *in situ* by measurement of either the surface wind or micropressure or by a variety of remote sensing techniques. Surface wind records are often complex and difficult to interpret and do not always provide a reliable measure of wind shear conditions aloft. Since solitary waves and thunderstorm outflow gust fronts are easily and reliably detected by sensitive microbarometers, an array of these relatively inexpensive instruments in the neighbourhood of an airport can be used to accurately monitor the progress of coherent disturbances of this type over the terminal area. Data from a suitable array of this type supplemented by surface wind observations can be analysed in real time to determine the nature of the disturbance and to provide an effective warning for Air Traffic Controllers of the onset and intensity of propagating wind shear disturbances over the runway area. The application of Doppler microwave radar to quantitative wind measurements is the most promising recent development for the accurate detection and prediction of low-altitude wind shear conditions. A high sensitivity dual Doppler microwave radar installation in the neighbourhood of an airport can provide a timely warning of the approach of propagating disturbances, including clear-air disturbances, and appears to be particularly well suited to the detection of the highly localised wind shears in convective microbursts. Another system which is being developed for remote wind sensing is the airborne or surface-based pulsed Doppler radar. This system shows considerable potential, particularly for the detection of clear-air disturbances, and may prove to be a valuable component in an integrated low-altitude wind shear monitoring system.

**Table 1. Properties of solitary waves, convective microbursts and thunderstorm outflow gust fronts**

| *Parameter* | *Solitary wave* | *Convective microburst* | *Thunderstorm outflow gust front* |
|---|---|---|---|
| Propagation speed | Usually between 6 and 16 m/s; may exceed 20 m/s* | | Typically 10–20 m/s |
| Effective horizontal scale of wind shear disturbance | Typically between 0.5–6 km; may exceed 10 km | Diameter typically 1–4 km | Gust front transition zone typically 2–5 km |
| Effective vertical scale | Typically 1–2 km; may exceed 3 km | Horizontal vortex circulation typically 1–2 km | Average outflow depth 0.4–0.6 km |
| Horizontal winds near surface | Usually between 5 and 12 m/s; may exceed 15 m/s | Initial diverging outflow typically 5–20 m/s; may exceed 30 m/s | Typically 10 m/s; may exceed 15 m/s |
| Down-draught | Typically 5 m/s; may exceed 8 m/s | Typically 10 m/s; may exceed 20 m/s | |
| Effective time scale over terminal area | Usually between 2 and 7 min. for individual solitary waves | 2–20 min. | Typically 2–10 min. (gust front transition zone) |
| Remarks | Long-lived disturbance; propagates over great distances; usually occurs as clear-air disturbance | Ubiquitous feature of convective storms; short-lived, localised disturbance | Usually active within 30 km of thunderstorm source |

*10 m/s is approximately 20 knots



# Division of responsibility

An article in *Aviation Safety Digest* 119 drew attention to the need to establish before flight a clear division of responsibilities when two pilots fly an aircraft which is normally operated single-pilot. As that article pointed out, 'Preferably the pilot-in-command should operate a single-pilot aircraft as its manufacturer intended: by himself'. That advice holds good. At the same time, it is advice based on the premise that the two pilots have decided who actually is the pilot-in-command. The failure to resolve this question was the basis of an incident involving two pilots with a total combined flight time of 20 000 hours.

The flight notification for the trip in a light twin indicated that Pilot A, who was undergoing an instrument rating renewal test, was pilot-in-command. However, the testing officer, Pilot B, believed that he was pilot-in-command. No discussion was held prior to the flight concerning respective responsibilities.

Consequently a degree of ambivalence about who was doing what characterised the pre-flight inspection, which was subsequently described as being 'shared and unco-ordinated'. As often seems to happen in this type of occurrence, the attention of both pilots also was diverted during the preflight. The upshot of all this was that the inspection was incomplete and the pitot tube cover was not removed.

Because it was raining the pitot heater was switched on before takeoff. This was perhaps fortuitous, as it caused the plastic cover to melt and the airspeed indicator worked normally. However, the red streamer attached to the cover alerted the crew to the fact that something was wrong when, shortly after lift-off, it started flapping against the aircraft skin. Air Traffic Control was advised that the aircraft was returning because of a flapping noise associated with the airframe, and an Alert SAR Phase was initiated. The landing was completed without incident.

### Discussion

Operating an aircraft without an absolute understanding of who is responsible for what offers the potential for disaster. This incident also proved — yet again — that aviation can be a real leveller and is no respecter of experience or status if the basics are not observed ●

## Conclusions

Large amplitude solitary waves in the atmospheric boundary layer are a significant source of hazardous low-altitude wind shear. These waves are a commonly occurring feature in many areas of Australia and may be encountered by aircraft as sudden unexpected clear-air wind shear disturbances. While the probability of such an encounter is small, it is not insignificant.

Pilots and Air Traffic Controllers should become familiar with the influence of solitary waves and other low-altitude wind shear disturbances on the performance of aircraft, particularly during landing and takeoff.

Hazardous low-altitude wind shear conditions can develop rapidly over the airport terminal area. Pilot reports of wind shear difficulties can therefore be vitally important and should be relayed as rapidly as possible to other incoming and outgoing flights. Air Traffic Controllers should be aware that the detection of one solitary wave disturbance may well be an indication of the onset of several identical wind squalls separated in time by some 10–20 minutes.

Further work needs to be undertaken to establish a climatology for low-level wind shear in Australia and to develop a completely reliable wind shear detection and warning system for operational use at airports.

## Acknowledgments

This research was supported by the Air Force Office of Scientific Research under Contract AFOSR-83-0045.

Further information on solitary wave wind shear may be found in the following articles:

Christie, D. R. and Muirhead, K. J., 1983: Solitary Waves: A Hazard to Aircraft Operating at Low Altitudes. Aust. Met. Mag., *31*, 97-109.

Christie, D. R. and Muirhead, K. J., 1983: Solitary Waves: A Low-Level Wind Shear Hazard to Aviation. International J. Aviation Safety, *1*, 169-190.

Reprints of these papers are available upon request from the authors, R.S.E.S., A.N.U., G.P.O. Box 4, Canberra, A.C.T. 2600 ●

# Engine failure on takeoff

Pilots of multi-engine aircraft practise engine failures as a matter of routine. Because the circumstances of such practice are usually predictable — rating tests, endorsements and so on — pilots generally are prepared and handle the situations easily. Experience has shown, however, that when a genuine — and therefore unexpected — engine failure occurs the pressures associated with the 'real thing' can cloud a pilot's judgment. This is particularly so if the failure occurs during a critical phase of flight.

* * *

During the takeoff roll, all engine indications on the light twin were as advertised, with 43 inches of manifold pressure and 2575 RPM each side and all temperatures and pressures normal. Takeoff weight was 28 kg under the maximum. Acceleration was good and the aircraft was rotated at 90 knots. The pilot held the aircraft level until 104 knots (best two-engine rate-of-climb speed) was reached and retracted the undercarriage. Then, while accelerating to best single-engine rate-of-climb speed (109 knots), the pilot felt his aircraft yaw slightly to the right.

As the aircraft yawed the pilot noticed the right-hand manifold pressure drop from 43 inches to about 30 inches. RPM, fuel flow, temperatures and pressures all appeared normal. Initially, however, because they were so close to the ground, the pilot was almost fully occupied with flying the aeroplane.

When he was able to complete a trouble check, the pilot confirmed with the 'dead-leg dead-engine' technique that it was the right engine that had sustained a power loss. He noted that there did not seem to be much yaw and the force he had to apply to the rudder seemed slight, while the engine note had not changed and there was no audible propeller desynchronisation. The pilot also confirmed that the throttle was fully open and that the undercarriage and flaps were retracted.

At about this stage the occupant of the right-hand seat, who was a qualified pilot and was on this flight as an observer, suggested to the pilot that the right engine had sustained a turbo-charger failure. Of his own initiative the observer also checked that the auxiliary fuel pumps were on and the fuel selections were correct.

The aircraft was now flying over water and was so low that the pilot was reluctant to either try to turn or to change the configuration, lest any disturbance should cause the aeroplane to impact the surface. He asked the observer to check the engine gauges again and also raised the possibility of feathering the right propeller. The observer replied that he thought the engine was still developing some power and that in his opinion they should not feather. This diagnosis was accepted by the pilot.

It is significant to note that at about this time the pilot asked the observer to help him hold the rudder force countering the yaw towards the right engine, even though he had initially considered that force to be slight.

A turn-back to the runway was not possible: it seems that it was only because of ground effect that the light twin stayed airborne, for each time a climb or slight turn was attempted airspeed would start to decrease and the stall warning horn would blow.

This dire situation was resolved when the pilot sighted a beach which he was able to reach without much manoeuvring and on which he effected a safe landing.

Before discussing the loss of engine power and the pilot's actions it is worth mentioning the general emergency procedures taken.

Although a ditching could have been carried out, the pilot wanted to avoid it if possible, as none of those on board had lifejackets. He did, however, advise the passengers of the predicament and got the observer to brief them on ditching procedures over the PA system. He also managed to declare an emergency over the radio, get the transponder selected to code 7700 and keep Air Traffic Control advised of his actions.

## Incident analysis

Technical investigation showed that the right-hand engine had in fact lost all power shortly after takeoff because of magneto drive failure. Although the ignition system was fitted with dual magnetos, those magnetos shared a common drive system; thus, when it failed, all ignition was lost. There was nothing wrong with the turbo-charger.

There were two pilots on the aircraft, albeit one was an observer. Both had twin-engine experience yet neither recognised that the right engine had failed; consequently the appropriate engine failure drill was not carried out. Thus, the propeller was not feathered but rather was left windmilling (in the mistaken impression that it was under power), in which condition the drag it created seriously degraded the aircraft's single-engine performance. Indeed, it was determined that the aircraft stabilised at a height of about 10 feet: had it not been over water where it was possible to fully utilise ground effect, a hazardous crash landing would probably have eventuated.

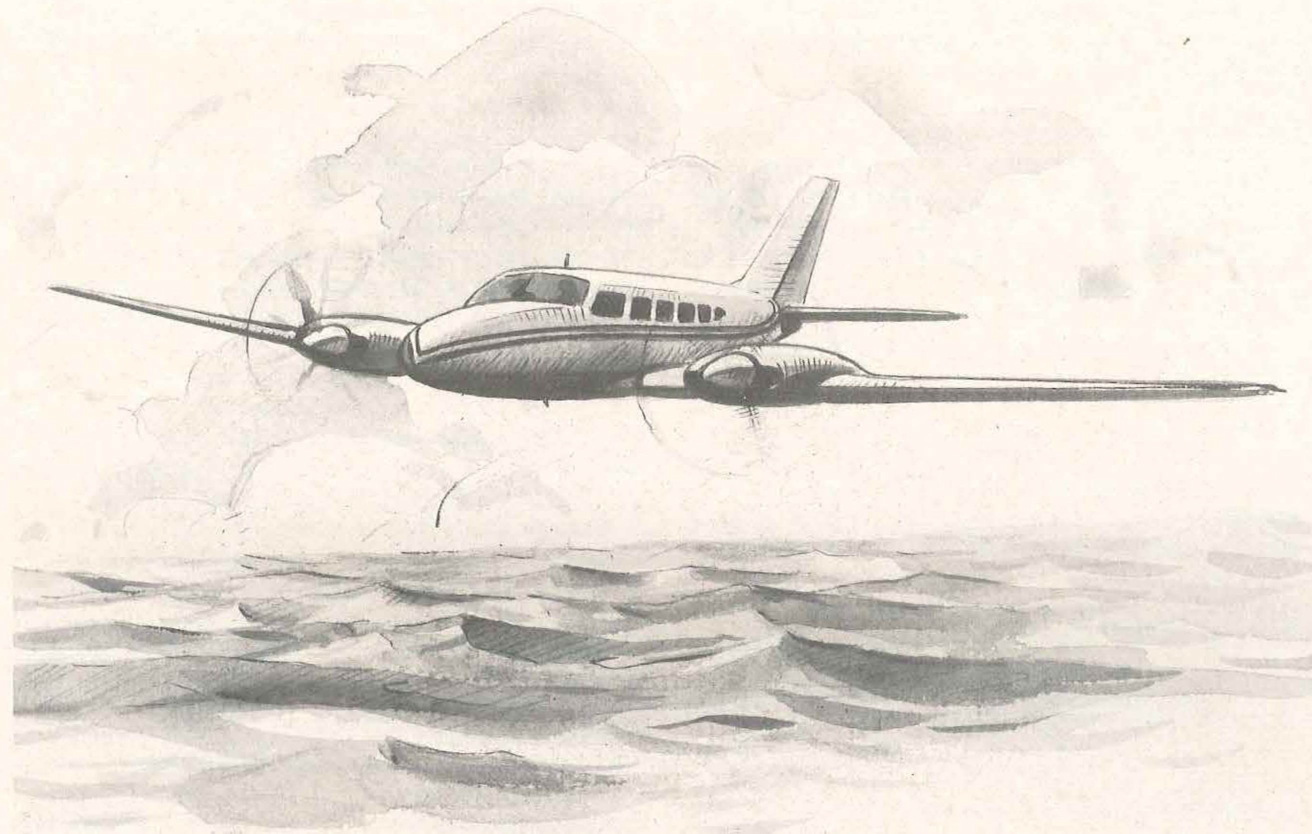
There are three aspects of the 'trouble checks' that are worth examining in this incident, relating to:

- turbo-charging
- control forces
- engine instruments

The pilot's reliance on the observer's assessment of the problem also requires comment.

**Turbo-charging.** The purpose of a turbo-charger or supercharger is to increase the mass airflow into an internal combustion engine, thereby increasing its power output. For example, in this case manifold pressure at takeoff was 43 inches, whereas with a normally aspirated engine (i.e. without turbo-charging), manifold pressure would have been close to ambient pressure (about 27–30 inches).

The point here is that the failure of a turbo-charger on a twin-engine aircraft should not, on its own, affect the performance such that the aircraft will lose height. In general terms, even if its turbo-charger was inoperative, the engine of this aircraft should still have



developed about 70 per cent of its rated sea-level takeoff power. Given the aircraft's loss of performance, this clearly was not the case.

**Control forces.** As every twin-engine pilot knows, an aircraft will yaw towards a failed engine. To counter this yaw opposite rudder must be applied: hence the 'dead-leg dead-engine' technique of identifying which engine has failed. The pilot used this technique but commented that the left rudder force he had to apply to counter the yaw seemed slight, which he took as an indication that the right engine was still developing power. However, as was mentioned above in the narrative of the incident, he shortly afterwards asked the observer to help him hold the rudder forces. As was the case with the aircraft's loss of performance, this should have alerted the pilot to the fact that the right engine had failed completely.

Exactly why the pilot initially considered the rudder forces to be light cannot be determined, but perhaps with his adrenalin pumping he did not fully appreciate the effort he was making.

**Engine instruments.** One of the fundamentals of piloting is the cross-check. For a suspected engine failure this means, after completing the 'dead-leg dead-engine' identification, cross-referral to the engine instruments to confirm that identification. This is very important, for in the heat of the moment it is easy to become confused. In this instance, with the throttle fully open, the manifold pressure gauge would not have been much use as it could have indicated ambient pressure (about 27–30 inches) for either a turbo-charger failure or a complete loss of power. RPM, too, initially would have remained normal, although a decay should have subsequently occurred as airspeed decreased.

The key engine instrument here was the cylinder head temperature gauge (CHT) which was not observed by either pilot after their initial checks. If the engine had been developing power, the CHT would have given a normal operating range reading. However, in a failed engine which has not been shut down, the CHT will drop rapidly, for, instead of burning, the fuel and air being pumped into the cylinders will act as a coolant. Oil temperature also will drop noticeably, although not as quickly.

## Pilot responsibility

The pilot had over 400 hours on type, including 25 in the last 90 days. The observer, on the other hand, had 45 hours on type; while this flight was only his second on type for over 2 years and his second on any type for 6 months. Given these circumstances, the pilot's acceptance of the observer's analysis of the problem can only be questioned. It does not seem unfair to suggest that had the pilot had a thorough knowledge of his aircraft's systems and performance he would have had the confidence to analyse the symptoms himself and feather the right engine, thereby improving the aircraft's single-engine performance.

It also seems possible that under the stressful circumstances the pilot's attention became channelised on one aspect of the emergency which thus excluded other important information (engine instrument indications) from his attention. Frequent and thorough training provides the best counter to this problem ●

# Fatigue leads to confusion

At the end of a day's mustering activities a Hughes 269C helicopter and a Cessna 172 landed at a waterbore so that the pilot and stockman/spotter from the helicopter could board the Cessna to return to their homestead: the helicopter was to be left at the bore overnight. Last light was only 15 minutes away, so the engine of the Cessna was left running. After getting into the Cessna, the helicopter pilot and spotter remembered that they had left their water flasks near the helicopter and hastily left the Cessna through the right cabin door to retrieve them. The helicopter was parked to the left of the C172 (see diagram). The helicopter pilot exited around the tail of the Cessna but the stockman ducked under the strut and went forward towards the propeller. At the last moment he saw the sun reflecting off the propeller disc but it was too late. Although he sidestepped he could not avoid the rotating blade and sustained serious injuries, including a badly slashed left arm and severed artery.

The C172 pilot parked the brakes and ran to the injured man. The helicopter pilot grabbed the first-aid kit from the Hughes and put a tourniquet around the spotter's upper arm. The spotter was then assisted back to the C172 and they departed for the homestead, arriving at last light. There was insufficient fuel left in the Cessna for a mercy flight to the nearest hospital, so the Royal Flying Doctor Service was called out to pick up the injured man. First-aid information was relayed over the radio.

## Discussion

The spotter was used to working with fixed-wing aircraft and knew that he should not go around the nose of the Cessna because of the propeller. However, for two days he had been entering and exiting the helicopter from the front in order to avoid the tail rotor and so that the pilot could see him. It seems that this practice had become ingrained. He was also very tired, having started work at 5.30 a.m. each day for over a week.

The pilot of the Cessna did not caution the helicopter pilot and spotter that the engine was running when they got out of the Cessna to retrieve their water flasks. However, he knew that they were both familiar with fixed-wing aircraft operations, while he too was very tired, having been engaged in cattle mustering for 10 days.

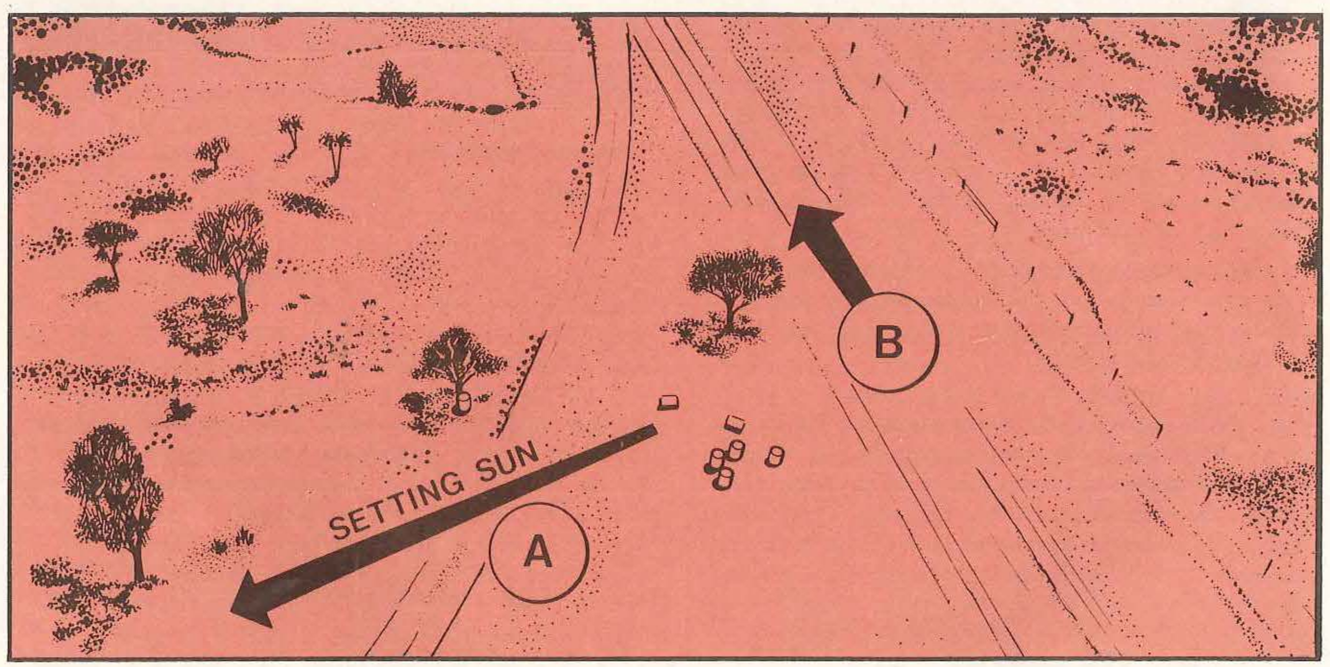
## Comment

It is well recognised that it can be dangerous to work with moving machinery when one is tired and 'switched off'. Here, the Cessna pilot and the spotter were fatigued. In this state, the spotter reverted to his automatic action of the past two days and exited the Cessna by the front, as he had been doing consistently with the helicopter.

The subject of fatigue and recognising its symptoms has been given considerable exposure in recent editions of the *Aviation Safety Digest.* Clearly it would be unrealistic to suggest that aircrew or LAMEs should stop work the instant their performance drops below the optimum. By the same token, to allow oneself to become fatigued to the stage where safety standards are compromised can be tantamount to dicing with death. In this context, it is important to remember that the onset of fatigue, with all its attendant dangers, is often insidious.

* * *

A secondary lesson to be learnt from this accident is the value of first-aid training. The availability of a good first-aid kit and the helicopter pilot's ability to use it were instrumental in saving the spotter's life ●




*Helicopter was parked at A, C172 at B, heading 350 as indicated by arrow.*



# Aircraft accident reports

## THIRD QUARTER 1984

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, F = Fatal, P = Passengers, S = Serious, O = Others, 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* |
|---|---|---|---|
| **04 Jul** 1421 | Piper 32-R300 VH-SBK / Charleville, Qld. | Charter—cargo operations / Roma, Qld./Windorah, Qld. | C1N / 8411032 |

During cruise, the pilot noticed that the electrical system was malfunctioning. The ammeter was reading zero, the system was switched off and a diversion for landing carried out. The pilot reported that, on arrival in the circuit area, the landing gear could not be lowered by the emergency system. A wheels-up landing was made.

| *Date / Time* | *Aircraft type & registration / Location* | *Kind of flying / Departure point/Destination* | *Injuries / Record number* |
|---|---|---|---|
| **04 Jul** 1340 | Piper 28-R201 VH-RQN / Gympie, Qld. | Non-commercial—pleasure / Maroochydore, Qld./Gympie, Qld. | C1N, P1N / 8411031 |

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

| *Date / Time* | *Aircraft type & registration / Location* | *Kind of flying / Departure point/Destination* | *Injuries / Record number* |
|---|---|---|---|
| **04 Jul** 1220 | Robinson R22 VH-UXM / Mildura, Vic. 11 ESE | Ferry / Swan Hill, Vic./Mildura, Vic. | C1M, P1S / 8431019 |

The aircraft departed Camden on the previous afternoon for a ferry flight to the Kununurra area with an overnight stop near Eildon, Victoria. About 35 kilometres from Mildura the pilot reported that he was landing due to a vibration. After inspecting the aircraft he continued with the flight but later made a brief Mayday call. Witnesses reported that the engine was running intermittently before the helicopter landed heavily, tail-down, in a vineyard. Initial investigations have indicated that the incorrect grade of fuel was being used and that the fuel system contained a contaminant.

| *Date / Time* | *Aircraft type & registration / Location* | *Kind of flying / Departure point/Destination* | *Injuries / Record number* |
|---|---|---|---|
| **06 Jul** 0258 | Piper 28-140 VH-TVJ / Bankstown, NSW 4N | Non-commercial—business / Coffs Harbour, NSW/Bankstown, NSW | C1N / 8421030 |

About 5 minutes after his estimated arrival time the pilot reported that he was uncertain of his position. Attempts to locate the aircraft were unsuccessful until the pilot climbed to 6000 feet, and 22 minutes after the initial call the aircraft was radar identified 78 kilometres north of Sydney. The aircraft was vectored towards Bankstown but about 9 kilometres from the aerodrome the pilot advised that the aircraft was out of fuel. A forced landing was carried out onto a suburban street, during which power lines and a power pole were struck.

| *Date / Time* | *Aircraft type & registration / Location* | *Kind of flying / Departure point/Destination* | *Injuries / Record number* |
|---|---|---|---|
| **09 Jul** 1553 | Cessna R182 VH-UCN / Borroloola, NT | Non-commercial—pleasure / Borroloola, NT/Doomadgee, Qld. | C1M, P1M / 8441020 |

As the aircraft was climbing through 8000 feet the engine suffered a complete loss of power. After unsuccessfully attempting to restore engine power, the pilot selected a small clearing in which to land. During the landing attempt, the aircraft floated the 160 metre length of the clearing before colliding with trees.

| *Date / Time* | *Aircraft type & registration / Location* | *Kind of flying / Departure point/Destination* | *Injuries / Record number* |
|---|---|---|---|
| **12 Jul** 1545 | Transav PL12 VH-BPR / Tumbarumba, NSW 20 NW | Aerial agriculture / Lower Bargo, NSW/Lower Bargo, NSW | C1N / 8421034 |

Superphosphate spreading operations had been carried out throughout the day. During the subject takeoff attempt the aircraft began to pull to the left shortly after full power was applied. The pilot abandoned the takeoff and as he did so the left main gear collapsed. The aircraft groundlooped and came to rest 70 metres from the start of the takeoff roll. Investigation revealed that the left main gear pivoting lugs had fractured.

## 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 Jul** 1705 | Mooney M20F VH-CGJ<br>Narrabri, NSW | Instructional—check<br>Narrabri, NSW/Narrabri, NSW | C2N<br>8421032 |

The pilot was receiving a check flight as part of a biennial flight review. He was appropriately endorsed for retractable gear and constant speed propeller aircraft, but had not previously flown the Mooney type. After touchdown on the third of a series of touch-and-go landings the pilot inadvertently raised the landing gear instead of the flap. The aircraft slid to a halt on the runway.

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| **27 Jul** 1100 | Smith 600 VH-PWL<br>Deniliquin, NSW | Instructional—check<br>Deniliquin, NSW/Deniliquin, NSW | C2N<br>8421035 |

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

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| **01 Aug** 1100 | Robinson R22 VH-UXD<br>Brooklyn Station | Non-commercial—pleasure<br>Brooklyn Station/Brooklyn Station | C1N<br>8411033 |

The pilot landed the helicopter to allow his passenger to alight. The engine was left running, the cyclic frictioned and collective held fully down. The pilot then felt a low frequency vibration begin and almost immediately the left side of the helicopter lifted and the tail swung to the right. Control inputs by the pilot had no effect and the helicopter rolled onto its side.

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| **05 Aug** 1008 | Bell 206-B VH-FHB<br>Sydney, NSW 9NE | Aerial mapping/photography/survey<br>Nth Ryde (Channel 10)/Nth Ryde (Channel 10) | C1S, P3S<br>8421036 |

The pilot brought the helicopter to a hover at 1000 feet agl, pointing approximately into wind. The aircraft began to yaw to the right and the pilot was unable to stop the resulting rotation. The helicopter descended in a steep nose down attitude and struck the ground heavily while still rotating to the right. The landing skids were torn off and the helicopter came to rest on its left side.

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| **05 Aug** 1543 | Piper 25-235-A1 VH-BSB<br>Woodbury, Tas. | Glider towing<br>Woodbury, Tas./Woodbury, Tas. | C1F, O2F<br>8431021 |

At about 500 feet after a normal takeoff and turns to position the two aircraft on a downwind leg direction, the tug aircraft gave a signal requesting the glider to release from the tow. The tug aircraft then assumed a steep nose-down attitude, its tail being held up by the glider. The glider then also adopted a steep nose-down attitude and both aircraft spiralled to the ground. Both pilots had initiated release from the tow cable but evidently at too late a stage to allow recovery to normal flight.

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| **05 Aug** 1543 | Czech Blanik VH-GGF<br>Woodbury, Tas. | Instructional—dual<br>Woodbury, Tas./Woodbury, Tas. | C2F, O1F<br>8431021 |

At about 500 feet after a normal takeoff and turns to position the two aircraft on a downwind leg direction, the tug aircraft gave a signal requesting the glider to release from the tow. The tug aircraft then assumed a steep nose-down attitude, its tail being held up by the glider. The glider then also adopted a steep nose-down attitude and both aircraft spiralled to the gound. Both pilots had initiated release from the tow cable but evidently at too late a stage to allow recovery to normal flight.

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| **07 Aug** 1548 | Cessna 210L VH-EJC<br>Bankstown, NSW | Non-commercial—business<br>Coolangatta, Qld./Sydney, NSW | C1N, P2N<br>8421037 |

On arrival in the destination circuit area the pilot was unable to obtain a safe 'down and locked' indication for the landing gear. A diversion to a more suitable aerodrome was carried out and after all efforts to lock the left main gear down were unsuccessful, a safe landing was made with all wheels retracted. Damage was confined to the propeller blades and the under skin of the fuselage.

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| **10 Aug** 0945 | Hiller UH12E VH-FBX<br>Black Springs, NSW 13SW | Aerial agriculture<br>Black Springs, NSW/Black Springs, NSW | C1N<br>8421038 |

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

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| **12 Aug** 1528 | Robinson R22 VH-UXL<br>Castle Hill, NSW | Instructional—dual<br>Castle Hill, NSW/Castle Hill, NSW | C2N<br>8421039 |

At the conclusion of an exercise in the training area the instructor positioned the helicopter in a hover at about 3 feet agl and allowed the student to use the controls. The aircraft was headed into the 15 knot gusty wind when sudden sink was experienced. The student instinctively applied full aft cyclic control and the heel of the right skid dug into the ground as the helicopter moved backwards. The aircraft rolled onto its right side, destroying the main rotor blades and distorting the cabin area.

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| **18 Aug** 1005 | Robinson R22 VH-IXM<br>Archerfield, Qld. | Instructional—dual<br>Archerfield, Qld./Archerfield, Qld. | C2N<br>8411036 |

As the helicopter was being hovered the pilots heard a muffled bang. The instructor immediately assumed control and landed the helicopter. An inspection of the transmission area revealed that the rear drive belt was missing. The instructor reboarded the helicopter and commenced to hover taxi back to the hangar. Another bang and other noises were heard emanating from the rear of the helicopter, which was again landed and the engine shut down. Substantial damage had been caused to the transmission area.

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| **20 Aug** 1645 | Airtract AT301 VH-IXL<br>Ingham, Qld. 1S | Aerial agriculture<br>Ingham, Qld./Ingham, Qld. | C1N<br>8411037 |

As the pilot was manoeuvring the aircraft to commence another baiting run, the engine lost all power. The aircraft was landed in a paddock of young sugar cane. After a ground roll of 90 metres the main wheels dug into the furrows across the paddock and the aircraft nosed over. A fire broke out and engulfed the wreckage.





| *Date / Time* | *Aircraft type & registration / Location* | *Kind of flying / Departure point/Destination* | *Injuries / Record number* |
|---|---|---|---|
| **22 Aug** 1130 | Piper 32-300 VH-RPB<br>Skipton, Vic. 3S | Non-commercial—pleasure<br>Melbourne, Vic./Naracoorte, SA | C1N, P1S, P1M, P1N<br>8431023 |

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

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| **23 Aug** 1834 | Beech H18 VH-PDI<br>Bankstown, NSW | Charter—cargo operations<br>Bankstown, NSW/Canberra, ACT | C1N, P1N<br>8421040 |

The aircraft returned to its departure aerodrome after suffering a complete electrical failure. Emergency extension of the gear was completed, but during the landing roll the nose leg retracted, which resulted in the nose and propellers striking the runway.

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| **23 Aug** 1600 | Cessna 172N VH-TEF<br>Dooley Downs Stn., WA 4SW | Non-commercial—pleasure<br>Dooley Downs Stn., WA/Mt Augustus Stn., WA | C1N, P1M<br>8451020 |

At about 600 feet agl after takeoff the engine stopped and attempts to restart were unsuccessful. The pilot was then forced to attempt a landing on unsuitable terrain and during the landing roll the nose wheel and right main wheel were torn off.

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| **23 Aug** 1400 | Cessna A188B-A1 VH-EVV<br>Spicers Creek, NSW | Aerial agriculture<br>Spicers Creek, NSW/Spicers Creek, NSW | C1N<br>8421049 |

During a spray run which involved flight beneath a power line, the pilot lost sight of the supporting poles and assumed he had passed the cable. A pull up was initiated but the fin and rudder struck the cable, which tore about 15 cm from both surfaces. The aircraft remained controllable and a safe landing was subsequently carried out.

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| **24 Aug** 1300 | Piper 28-161 VH-PZQ<br>Cessnock, NSW | Instructional—solo (supervised)<br>Cessnock, NSW/Bankstown, NSW | C1N<br>8421041 |

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

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| **24 Aug** 1905 | Cessa 182Q VH-CKJ<br>Cooma, NSW 5S | Non-commercial—pleasure<br>Bankstown, NSW/Cooma, NSW | C1F<br>8421042 |

After completing an instrument flight at night, the pilot reported his arrival in the circuit area of the destination aerodrome. The aircraft did not land and a search was commenced. The burnt out wreckage was located the following morning.

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| **26 Aug** 1330 | Schneider ESKA6 VH-GQK<br>Cunderdin, WA | Non-commercial—pleasure<br>Cunderdin, WA/Cunderdin, WA | C1F, O1S<br>8451021 |

While being towed to the planned launch height, the glider under tow and another glider in the circuit area collided. The collision caused the tow rope to break and the pilot of the glider, although injured, was able to land his aircraft. The tailplane of the other glider separated in the collision and the aircraft descended uncontrolled into the ground. The tug aircraft was undamaged and landed safely.

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| **26 Aug** 1333 | De Hav C1 A1 VH-RJK<br>Cunderdin, WA | Non-commercial—pleasure<br>Cunderdin, WA/Cunderdin, WA | C1N, O1F, O1S<br>8451021 |

While being towed to the planned launch height, the glider under tow and another glider in the circuit area collided. The collision caused the tow rope to break and the pilot of the glider, although injured, was able to land his aircraft. The tailplane of the other glider separated in the collision and the aircraft descended uncontrolled into the ground. The tug aircraft was undamaged and landed safely.

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| **26 Aug** 1333 | Czech Blanik VH-WUT<br>Cunderdin, WA | Non-commercial—pleasure<br>Cunderdin, WA/Cunderdin, WA | C1S, O1F<br>8451021 |

While being towed to the planned launch height, the glider under tow and another glider in the circuit area collided. The collision caused the tow rope to break and the pilot of the glider, although injured, was able to land his aircraft. The tailplane of the other glider separated in the collision and the aircraft descended uncontrolled into the ground. The tug aircraft was undamaged and landed safely.

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| **31 Aug** 0830 | Piper 32-300 VH-CST<br>Leaghur, Vic. | Non-commercial—pleasure<br>Essendon, Vic./Broken Hill, NSW | C1N, P5N<br>8431024 |

While cruising at 3000 feet, fumes were noticed in the cabin and the engine began running rough. An explosion then occurred in the engine compartment, deforming the right side of the engine cowl. The pilot made an emergency landing in a paddock; however, the aircraft touched down heavily, collapsing the right main gear, and after sliding for some distance the nose gear also collapsed. The centre right cylinder was observed to have detached from the engine block.

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| **01 Sep** 1320 | Beech 76 VH-MFS<br>Bendigo, Vic. 12SSE | Instructional—dual<br>Melbourne, Vic./Moorabbin, Vic. | C2N<br>8431025 |

During cruise the right engine began to surge and vibrate. Normal actions to restore engine performance were unsuccessful and the engine was shut down. About four minutes later the left engine lost power in a similar manner to the right. The pilot carried out a forced landing and the nose wheel was torn off when it struck a ditch.

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| **01 Sep** 0815 | Hiller UH12E VH-CCU<br>Boorowa, NSW 9SW | Aerial agriculture<br>Corcoran Plains, NSW/Corcoran Plains, NSW | C1M<br>8421044 |

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

## PRELIMINARY REPORTS (The following accidents are still under investigation)

| Date<br>Time | Aircraft type & registration<br>Location | Kind of flying<br>Departure point/Destination | Injuries<br>Record number |
|---|---|---|---|
| **01 Sep**<br>1533 | Piper 25-235A1 VH-MYE<br>Leongatha, Vic. 2N | Glider towing<br>Korumburra, Vic./Korumburra, Vic. | C1F, P1F<br>8431026 |

The aircraft was returning to the strip following release of a glider. On right downwind, at about 1500 feet agl, the aircraft banked steeply, then entered a spin. At about 800 feet agl spin recovery appeared to be effected but the aircraft then entered a spin in the opposite direction and subsequently struck the ground.

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| **04 Sep**<br>1037 | Piper PA38-112 VH-HAV<br>Bankstown, NSW | Instructional—solo (supervised)<br>Bankstown, NSW/Bankstown, NSW | C1N<br>8421045 |

Following a period of dual instruction the pilot was authorised to carry out her second solo circuit and landing. During the landing flare the aircraft ballooned and subsequently touched down on the nose wheel. The aircraft bounced and on the next touchdown the nose wheel broke off, the nose gear leg was displaced and the aircraft slid to a halt on the runway.

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| **05 Sep**<br>1300 | Cessna 210N VH-FOK<br>Go Go Station, WA | Non-commercial—business<br>Go Go Station, WA/Go Go Station, WA | C1N, P2N<br>8451022 |

The pilot selected a 340 metre long taxiway as the takeoff path. After a ground roll of about 250 metres, at an indicated airspeed of approximately 55 knots, the pilot rotated the aircraft but it did not become airborne. He then closed the throttle and the aircraft ran off the end of the taxiway and collided with several trees.

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| **06 Sep**<br>1515 | Cessna A188B-A1 VH-UJR<br>Illabo, NSW 5E | Aerial agriculture<br>Illabo, NSW 3NE/Illabo, NSW 3NE | C1N<br>8421046 |

The particular spraying run crossed a group of trees at the top of a rise. As the pilot pulled up to overfly the trees, the right wing of the aircraft struck some branches. The pilot noticed fluid escaping from the tears in the wing and elected to carry out an immediate landing on the downslope beyond the trees. Shortly after touchdown the aircraft yawed, the left wheel dug in and the aircraft rolled over twice before coming to rest inverted.

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| **07 Sep**<br>1800 | Robinson R22 VH-UXK<br>Mt Farquhar, WA 12NNW | Commercial—aerial mustering<br>Mt Farquhar, WA/Mt Farquhar, WA | C1S<br>8451023 |

The pilot was flying the helicopter along a ridge line, checking a gully for cattle, when the engine suffered a substantial loss of power. The pilot initiated an autorotational descent as the engine failed completely. The helicopter landed heavily in the base of the gully.

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| **09 Sep**<br>1630 | Robinson R22 VH-IPC<br>Gidgegannup, WA | Non-commercial—pleasure<br>Gidgegannup, WA/Jandakot, WA | C1N, P1N<br>8451024 |

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

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| **12 Sep**<br>0750 | Reims R172E VH-REV<br>Goodwood Stn., NSW 9NW | Non-commercial—business<br>Polpah Stn., NSW/Goodwood Stn., NSW | C1N<br>8421048 |

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

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| **12 Sep**<br>1536 | Cessna 172N VH-POS<br>Gove, NT | Non-commercial—pleasure<br>Gove, NT/Gove, NT | C1N, P4N<br>8441021 |

The pilot commenced an approach to land after a preceding Fokker F28 had cleared the runway. During the landing flare, severe buffeting was encountered and the aircraft subsequently landed heavily, with resultant damage to both wings, the forward fuselage, landing gear and the propeller. The wind at the time of the occurrence was gusting from 5 to 14 kt with a cross-wind component of up to 7 kt.

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| **12 Sep**<br>1650 | Bell 47-J2A VH-THH<br>Mataranka Homestead, NT | Charter—passenger operations<br>Mataranka HS., NT/Mataranka HS., NT | C1M, P1M, P2N<br>8441022 |

A ten minute flight in the local area had been completed without incident. After departure for a second flight, the helicopter was climbed to 150 feet agl to allow the passengers to view the campsite and a herd of animals. The pilot and passengers then heard a loud bang which was followed by a severe airframe vibration. The noise and vibration continued and the pilot elected to carry out an autorotational descent and land in a small clearing. The clearing was overshot and the helicopter struck several trees.

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| **15 Sep**<br>1157 | Cessna 150E VH-KMJ<br>Reekara, Tas. | Non-commercial—pleasure<br>Reekara, Tas./Reekara, Tas. | C1N, P1N<br>8431027 |

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

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| **16 Sep**<br>0725 | Cessna U206F VH-WTJ<br>Bungle Bungle, WA | Charter—passenger operations<br>Kununurra, WA/Kununurra, WA | C1N, P3M, P2N<br>8451025 |

When the pilot applied climb power a loud bang was heard, followed by severe vibration and a loss of power. The pilot selected the most suitable area of the rough terrain to attempt a landing. During the landing the aircraft struck several trees, the nose wheel was torn off and the aircraft nosed over. Inspection of the aircraft revealed that one of the propeller blades had separated in flight.



## PRELIMINARY REPORTS (The following accidents are still under investigation)

| Date<br>Time | Aircraft type & registration<br>Location | Kind of flying<br>Departure point/Destination | Injuries<br>Record number |
|---|---|---|---|
| **18 Sep**<br>1010 | Piper 25-235 VH-KLZ<br>Goondiwindi, Qld. 50NE | Activities associated with aerial agriculture<br>Warwick, Qld./Wyagra Ag. Strip, Qld. | C1N<br>8411039 |

After conducting a routine strip inspection, the pilot was concerned about the height of the wheat on each side and commenced another inspection from about ten feet agl. During the inspection the aircraft descended almost to ground level, with its right wing low, as a result of the strong, gusting wind. The right spray boom contacted the wheat and the aircraft yawed right. As ground contact was inevitable the pilot closed the throttle and attempted to correct the yaw but the main wheels and left wing contacted the ground causing the aircraft to slew through 180 degrees before coming to rest.

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| **20 Sep**<br>1743 | Cessna 210M VH-MGI<br>Tocumwal, NSW | Instructional—dual<br>Tocumwal, NSW/Tocumwal, NSW | C2N<br>8421050 |

On downwind after the first takeoff following a scheduled servicing, the pilots were unable to fully extend the landing gear. After all efforts to lower the gear by normal and emergency methods were unsuccessful, the pilot in command carried out a safe landing with the gear retracted.

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| **22 Sep**<br>1620 | Rolladen LS4 VH-GXP<br>Kingaroy, Qld. 20SW | Non-commercial—pleasure<br>Kingaroy, Qld./Kingaroy, Qld. | C1M<br>8411040 |

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

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| **24 Sep**<br>1610 | Cessna 172M VH-WYK<br>Burleigh Station | Commercial—aerial mustering<br>Burleigh Station/Burleigh Station | C1F<br>8411041 |

The pilot was conducting mustering operations, operating between 50 and 300 ft agl. All turns and climbs were being conducted at normal angles. A witness to the accident saw the aircraft suddenly execute a steep pull-up, appear to stop in the air, then dive steeply towards some trees. The aircraft struck the ground in a steep nose-down attitude, bounced and slid for 23 metres before the left wing struck a large tree.

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| **24 Sep**<br>1040 | Wittman W8 VH-MGO<br>Munglinup, WA 7E | Non-commercial—pleasure<br>Northam, WA/Munglinup, WA 7E | C1N, P1N<br>8451026 |

The aircraft touched down in a three-point attitude and after a short roll became airborne over a small rise. The second touchdown was in a left wing low attitude and the propeller struck the ground. The aircraft swung to the right, then the left wing struck the ground turning the aircraft to the left. It slid a short distance before coming to rest with the left gear leg collapsed.

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| **26 Sep**<br>1120 | Hiller UH12E VH-ECK<br>Galong, NSW 4NE | Aerial agriculture<br>Bobbara Stn., NSW/Bobbara Stn., NSW | C1N<br>8421051 |

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

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| **28 Sep**<br>0922 | Cessna 182A VH-CJC<br>Dalby, Qld. 40S | Sport p'chuting (not associated with airshow)<br>Nangwee, Qld./Nangwee, Qld. | C1M<br>8411042 |

After releasing a group of parachutists from 10 000 feet the pilot commenced descent. Carburettor heat was applied until the aircraft was positioned on a long left downwind for the selected strip. Shortly after engine power was further reduced and carburettor heat was selected to off, the pilot realised that the engine had failed. He turned onto a right base leg and manoeuvred the aircraft in order to land downwind on the strip. The aircraft stalled just prior to touchdown and came to rest inverted.

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| **29 Sep**<br>1620 | Cessna 210N VH-ADI<br>Beverley, WA 3W | Air show/air racing/air trials<br>Narrogin, WA/Jandakot, WA | C1N, P5N<br>8451027 |

Prior to the first flight on the day, the pilot inspected the fuel tanks of the aircraft and estimated they contained 200 litres of fuel. On that basis he planned a flight of 155 minutes duration. Approaching the second last turning point of the flight the engine stopped. The pilot selected the other fuel tank, power was restored and a diversion made to the nearest suitable airfield. On final approach to that airfield the engine stopped again. The aircraft was landed heavily in a paddock and the nose gear leg torn off.

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| **29 Sep**<br>1045 | Cessna A188B-A1 VH-EVU<br>Coreen, Qld. | Aerial agriculture<br>Coreen, Qld./Coreen, Qld. | C1N<br>8411043 |

The strip being used was aligned south-east and the wind of 15 kt was swinging from south-east to south-west. On the second takeoff for the day acceleration was sluggish and the pilot kept the main wheels in contact with the strip surface for longer than normal before allowing the aircraft to become airborne. Shortly after liftoff the aircraft mushed and the wheels contacted the ground. The pilot abandoned the takeoff attempt and the aircraft came to rest 240 metres beyond the end of the strip after sustaining damage to the left wing and landing gear.

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| **30 Sep**<br>1355 | Pitts S2-A VH-SZA<br>Berwick, Vic. | Non-commercial—pleasure<br>Berwick, Vic./Berwick, Vic. | C1N<br>8431028 |

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

## 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 |
|---|---|---|---|---|---|---|

**03 Jul** DH-82A VH-WAP — Charter—passenger operations — C1N, P1N
1240 Surfers Gardens — Surfers Gardens/Surfers Gardens — 8411030
Commercial — 56 — 3363 — 2536 — Instrument rating class 4

As the pilot approached the circuit area he noticed a squall line approaching the strip. While the aircraft was taxiing along the flight strip after landing the wind suddenly swung at right angles to the strip and gusted to 30 kt. The pilot attempted to turn into wind but before he could effect this the left wing lifted. The aircraft was then swung downwind and overturned.

**17 Jul** Cessna 401A VH-RZY — Charter—passenger operations — C1N, P4N
1132 Bankstown, NSW — Orange, NSW/West Wyalong, NSW — 8421031
Commercial — 33 — 3610 — 2000 — Instrument rating 1st class or class 1

On arrival at the planned destination, the pilot was unable to obtain a down and locked indication for the nose landing gear. A diversion was carried out to a more suitable aerodrome and during the landing roll the nose gear collapsed.

Investigation revealed that the nose torque tube mounting bracket assembly and support bracket had failed because of fatigue cracking. This had resulted in ineffective cranking action by the nose gear operating system.

**24 Jul** Britnor 2-A20 VH-IGT — Sport p'chuting (not associated with airshow) — C3N, O1F
0955 Wilton, NSW — Wilton, NSW/Wilton, NSW — 8421033
Commercial — 25 — 490 — 200 — None

The aerodrome caretaker had been requested to inflate a tyre on one of the operator's aircraft. The engines of VH-IGT were operating when the pilot observed the caretaker approaching, carrying a battery which powered an air pump. The caretaker walked around the tail of the aircraft, placed the battery near the right wheel, moved to the wingtip, and proceeded towards another aircraft. He then realised he had taken the battery to the wrong aircraft and returned, walking directly towards the right engine. The pilot attempted to shutdown the engines but the caretaker continued forward and was struck by the rotating propeller.

**29 Jul** Beech D55 VH-FEO — Non-commercial—business — C1N, P2N
1700 Prescott Lake, WA 16NE — Derby, WA/Prescott Lake, WA — 8451018
Private — 38 — 1000 — 500 — Instrument rating class 4

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

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

**04 Aug** Cessna 150G VH-RXL — Instructional—solo (supervised) — C1N
1020 Berwick, Vic. — Berwick, Vic./Berwick, Vic. — 8431020
Student — 56 — 14 — 14 — None

The student had completed five dual circuits and was then authorised to carry out two solo circuits and landings. During the second approach some turbulence was encountered and a hard landing was made. The aircraft ballooned to 5 metres and groundlooped on the subsequent touchdown. After the aircraft had turned through 180 degrees its left wingtip scraped the ground and it nosed over.

After the heavy touchdown the student had held excessive back pressure to keep the nose wheel off the ground. A wind gust caused the aircraft to become airborne and the pilot was unable to effect timely recovery action.

**09 Aug** Cessna 172M VH-WXX — Commercial—aerial mustering — C1N
0815 Fairfield H'stead, WA 19NE — Fairfield H'stead, WA/Fairfield H'stead, WA — 8451019
Commercial — 45 — 8360 — 8360 — None

While conducting aerial mustering in a small valley the aircraft struck a tree. The pilot conducted a control check which revealed no abnormal operation. He then elected to return to Fairfield airstrip where he landed safely. A ground inspection revealed damage to the right tailplane.

**09 Aug** Beech 95-C55 VH-WSW — Charter—passenger operations — C1N
0646 Shepparton, Vic. — Shepparton, Vic./Tocumwal, NSW — 8431022
Commercial — 26 — 2100 — 230 — Instrument rating 1st class or class 1 with instrument rating

The aircraft was taxied in the early dawn light with an overcast sky and drizzle. The aerodrome pilot-activated lights were not on nor were the aircraft landing and taxi lights. The aircraft was inadvertently taxied off the taxiway. During attempts to return to the taxiway the nose wheel of the aircraft entered soft ground and was broken off.

**11 Aug** Piper 32-300 VH-BMH — Non-commercial—pleasure — C1N, P5N
1052 Mornington Island — Mt Isa, Qld./Mornington Island — 8411034
Private — 50 — 167 — 4 — None

The pilot was landing into a gusting 30 knot headwind. During the ground roll a strong crosswind component suddenly developed and the aircraft slewed at right angles to the runway. The pilot was unable to fully regain directional control. The aircraft ran off the runway and encountered a drain, causing the nose gear to collapse and the propeller to strike the ground.



## 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 |
|---|---|---|---|---|---|---|

**15 Aug** Hiller UH12-E VH-FFE — Commercial—aerial mustering — C1N, P1N
1530 Bowen Downs, Qld. — Bowen Downs, Qld./Bowen Downs, Qld. — 8411035
Commercial — helicopter — 33 — 1250 — 1250 — None

While in a low hover the pilot noticed several beasts moving towards the rear of the helicopter. He moved the helicopter rearwards and when he realised the tail rotor was close to the ground, he applied power in an attempt to gain height. The tail rotor struck the ground and the helicopter spun through 270 degrees before landing heavily.

The operation was being conducted over flat, grassed terrain. The pilot had only recently recommenced flying after a nine month absence and he therefore had no recent experience in low level operations.

**21 Aug** Cessna 180K VH-SAA — Instructional—solo (supervised) — C1N
1110 Clermont, Qld. — Rockhampton, Qld./Clermont, Qld. — 8411038
Private restricted — 38 — 86 — 24 — None

The pilot was on a solo navex which included a landing away from his training aerodrome. After a normal approach and touchdown the aircraft groundlooped to the right when the tailwheel contacted the runway. The left gear collapsed and the propeller, tailplane and left wingtip struck the ground. The aircraft was fitted with a lockable tailwheel but the pilot had not been instructed in its use for landing or takeoff.

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

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **20 Jan 83** 1556 | Jastreb Cirrus VTC 75 VH-CQQ<br>Tocumwal, NSW | 60 | 74 | Glider<br>Unknown | Glider | 8321010 |

The pilot was carrying out his first flight in the type of glider. The aircraft was observed to enter a spin, at a low height, at the start of the downwind leg. The aircraft struck the ground while turning to the right.

The pilot had probably applied excessive control movements when encountering an unexpected thermal. His spin recovery technique was not in accordance with that recommended and would have resulted in a substantial loss of height before recovery could have been effected. The aircraft had partially recovered to a spiral dive at the time of ground impact.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **29 Jul 83** 1550 | Bell 206-B VH-CEC<br>Wickham Heliport | 39 | 9800 | Commercial — helicopter<br>2500 | Instrument rating class 4 | 8321059 |

The helicopter had been parked adjacent to a refuelling platform 60 mm high. As the pilot was bringing the aircraft to the hover prior to takeoff, the right skid contacted the platform. The pilot attempted to correct with cyclic but the helicopter rolled to the right and came to rest on its right side near the platform.

The contact between the right skid and the edge of the platform had induced dynamic rollover. The pilot evidently had not identified the problem in time to take the appropriate corrective action of lowering the collective control in order to place both skids on the ground.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **17 Dec 83** 1310 | Burkhart Astir CS VH-WVI<br>Richmond, NSW | 39 | 1800 | Glider<br>600 | Glider | 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.

Recovery from the high rate of descent was not initiated at a sufficient height to permit a proper flare for the landing.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **12 Jan 84** 1630 | Robinson R22 VH-UXK<br>Curbur Station, WA 45NW | 27 | 2100 | Private — helicopter<br>2050 | None | 8451001 |

During hover taxi to a refuelling point the collective lever jammed. As the pilot attempted to free the lever, he allowed the helicopter to rotate and the tail rotor struck a tree. A normal landing was made when the collective lever was freed.

The collective control had jammed because the spherical bearing around which the swashplate tilts had become misaligned. While the cause of the misalignment could not be positively determined, it is likely that a build-up of aluminium oxide grease on the spherical bearing caused a change in the bearing preload. This may have in turn allowed the spherical bearing to become misaligned.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **20 Jan 84** 1740 | Beech A36 VH-FEL<br>Bunbury, WA | 49 | 13900 | Commercial<br>1290 | Instrument rating class 4 | 8451003 |

After about 80 metres of ground roll following a normal touchdown the nose began to drop, followed by the right and left wings, and the aircraft slid to a halt with the gear retracted.

No mechanical fault or defect was subsequently found with the aircraft. The weight of available evidence indicated that the pilot had probably inadvertently selected the gear up shortly after touchdown.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **04 Feb 84** 1450 | Schneider ES60 VH-GQH<br>Latrobe Valley 1ENE | 57 | 60 | Glider<br>Unknown | None | 8431003 |

After release from an aerotow launch at 2000 ft, the pilot detected significant sink. Attempts to find lift were unsuccessful and judging he would be unable to return to the strip the pilot elected to make an outlanding. The aircraft collided with a tree during the approach into the selected area and subsequently struck the ground heavily. Witnesses reported that the airbrakes were extended from the time of release from the aerotow.

The pilot had little experience in the aircraft type. He had inadvertently deployed the airbrakes when attempting to adjust the trim after tow release. Control positions and operating feel were different from the controls of other glider types the pilot had flown recently.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **05 Feb 84** 1305 | Burkhart Astir CS VH-GDS<br>Maryvale, Qld. 7E | 27 | 521 | Glider<br>40 | Glider | 8411004 |

The pilot elected to do an outlanding and selected a paddock which had a power line running east-west on its southern side. An approach was made into the paddock on a westerly heading but the glider struck another power line running at a right angle to the one noticed by the pilot.

The pilot had not seen the power line running across the approach path when he selected the paddock for an outlanding. The sighting of the line was made difficult by a background of high terrain and the power poles being obscured by trees.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **08 Feb 84** 0810 | Piper 28-140 VH-CNS<br>Cessnock, NSW | 37 | 25 | Student<br>25 | None | 8421006 |

Having completed his first solo the previous day, the pilot was given a dual check and authorised to carry out five solo circuits. The first landing was reported as normal; however, on the second the pilot carried out a go-around after the aircraft bounced to about 30 ft. After a slight bounce on the next landing a go-around was carried out and the aircraft adopted a nose-up attitude and turned left. The left wing struck a fence before the aircraft was landed in a field.



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

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **18 Feb 84** 1651 | Cessna 150M VH-BFA<br>Parafield, SA 2NE | 30 | 601 | Private<br>10 | Instrument rating 1st class or class 1 | 8441004 |

The pilot departed Toowoomba early on the same day to ferry the aircraft via refuelling stops at Walgett and Griffith. The flight evidently proceeded normally until the aircraft was on approach to land at Parafield. At this time the pilot advised that the engine was failing and shortly afterwards he reported that he was experiencing fuel problems and would attempt a forced landing. Control of the aircraft was subsequently lost and it crashed inverted into a suburban property.

Inspection of the wreckage revealed that the engine had failed through fuel exhaustion. Fuel usage on the previous legs of the flight should have indicated to the pilot that the aircraft could not reach the destination with the mandatory fuel reserves. The pilot was known to be in a hurry to make an onward transport connection from Adelaide and he possibly allowed this to influence his decision to attempt the flight non-stop from Griffith.

When the engine failed the aircraft was about 800 feet agl and there were no suitable forced landing areas within gliding distance. Control of the aircraft was then lost at too low a height to enable recovery before impact with the ground.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **21 Feb 84** 2005 | Piper 32-300 VH-MVT<br>Aldinga, SA | 37 | 57 | Private restricted<br>11 | None | 8441005 |

After returning from a flight in the local training area, the pilot went around from an approach which was too high. On the second approach, touchdown occurred about half-way along the 820 m strip. The aircraft started to skid under heavy braking and the pilot considered that the aircraft might overrun the strip into a gully. Power was applied and although the aircraft became airborne at the strip end it then descended and collided with the far bank of the gully.

The pilot had limited experience on type and had encountered turbulence on final approach. The aircraft probably touched down at a higher than recommended speed. It became airborne at the end of the strip at a low airspeed and subsequently stalled.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **26 Feb 84** 1600 | Beech V35 VH-CFK<br>Binjour, Qld. | 29 | 170 | Private<br>120 | None | 8411008 |

The pilot had not flown for some time and was practising circuits with her husband who was also a pilot. On downwind, her pre-landing checks were interrupted by a radio call. The aircraft was subsequently landed with the gear retracted. The gear warning horn was not serviceable prior to the flight.

After the aircraft was established on final, the pilot's husband commenced to stow the headsets and other loose items which were in the cockpit. He did not monitor the approach and therefore did not notice that the pilot had omitted to lower the landing gear.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **11 Mar 84** 1345 | Hiller UH12E VH-FBO<br>Casino, NSW 15S | 43 | 6700 | Commercial — helicopter<br>3000 | Agricultural class 1 | 8421010 |

The helicopter was climbing through a height of about 30 ft when the pilot heard a loud snapping noise. This was followed by temporary loss of control and severe vibration. The pilot retained sufficient control of the aircraft to carry out a forced landing at about 10 kt ground speed.

The main rotor tension/torsion pin had failed through the eye end due to fatigue which had originated from corrosion pitting. The pin had evidently not been inspected at the intervals required by the approved maintenance schedules.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **13 Mar 84** 0845 | Cessna 182Q VH-EIL<br>Taggerty, Vic. 5SSW | 20 | 320 | Commercial<br>80 | I.R. class 4 with flight instructor | 8431006 |

The pilot carried out a straight-in approach to the 760 metre long grass strip. Rain was falling at the time. The aircraft touched down about 200 metres beyond the threshold and the pilot reported that the brakes seemed ineffective. After overrunning the strip the aircraft overturned when it entered a ditch.

No fault was subsequently found with the braking system. It was possible that the aircraft was subjected to a tailwind gust at the time of touchdown. Although he was concerned at the lack of braking effectiveness, the pilot considered that the aircraft would stop in the remaining distance and he elected not to carry out a go-around.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **14 Mar 84** 0945 | Mooney M20J VH-MIY<br>Great Keppel Island | 67 | 627 | Private<br>245 | Instrument rating class 4 | 8411013 |

Shortly after takeoff, the pilot heard a loud noise and noticed that the luggage locker door was open. A 180 degree turn was carried out for an approach to the departure runway. As the aircraft approached the end of the runway the right wing struck the ground and the aircraft slid sideways along the runway. All the landing gear legs collapsed before the aircraft came to rest.

On short final, mechanical turbulence had been encountered and a high rate of descent had developed. Although some action to correct this rate of descent was taken, the pilot was unable to avoid a hard landing. No fault could subsequently be found with the luggage door securing mechanism.

| Date / Time | Aircraft type & registration / Location | Age | Hours Total | Pilot Licence / Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **22 Mar 84** 2019 | Beech 35-C33 VH-CEA<br>Essendon, Vic. | 28 | 460 | Private<br>50 | Instrument rating class 4 | 8431007 |

On the downwind leg of the circuit, the pilot selected the landing gear down and observed the gear down light illuminate. During the landing roll the left wing began to lower and the left aileron and flap contacted the ground. The aircraft veered off the runway before coming to rest. The left main gear leg was found to be still in the up position.

Excessive wear in the gear pivot points had resulted in jamming of the left main uplock. When the gear was selected down, the actuating rod sheared allowing the gear motor to complete its down cycle and give a normal gear down indication.

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

| Date<br>Time | Aircraft type & registration<br>Location | Age | Hours Total | Pilot Licence<br>Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **24 Mar 84**<br>0957 | DH Sea Fury-308 VH-HFG<br>Leyburn, Qld. 17S | 43 | 2700 | Private<br>18 | Instrument rating class 4 | 8411015 |

During the climb and initial cruise the pilot noticed that the oil temperature was rising. Shortly afterwards the engine began to run roughly and the pilot elected to make a precautionary wheels-up landing in the only cleared paddock in the vicinity. The landing was successfully completed within the confines of the 400 metre long paddock and resulted in the minimum damage that could be expected.

The high oil temperature had been caused by the failure of the associated temperature sensor, which resulted in the oil cooler shutters remaining in the closed position. These shutters cannot be controlled manually. Seizure of the number 7 piston had caused the rough running.

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| **29 Mar 84**<br>0945 | Cessna 172 G VH-DJE<br>Cann River, Vic. | 33 | 1740 | Commercial<br>700 | None | 8431011 |

On arrival at his destination, the pilot made a low inspection pass over the strip at about 20 feet agl in a flapless configuration at 80-90 knots. As he neared the end of the strip he pulled up steeply to about 150-200 feet. At the top of the climb the aircraft banked to the left, descended rapidly while turning through some 135 degrees and struck the ground in a left wing down attitude.

Investigation revealed that the aircraft had been serviceable, but it was probably being operated at a low power setting throughout the manoeuvres. The aircraft had stalled and the pilot had been unable to effect recovery in the height available.

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| **29 Mar 84**<br>1735 | Piper 30 VH-TON<br>Kalumburu, WA | 37 | 980 | Private<br>825 | Instrument rating class 4 | 8451008 |

The landing gear had been selected down during descent to the destination. On arrival overhead the strip, the pilot noticed some cattle on the strip. He became concerned with the onset of darkness and selected the gear up to make a quick pass to clear the cattle from the strip. The gear was selected down on downwind and the selection was again checked on final approach, but the aircraft landed without the gear being down and locked.

Inspection of the aircraft revealed that the landing gear actuator motor drew excessive current due to the armature windings being badly burnt. This resulted in the landing gear circuit breaker being tripped during the retraction sequence and the gear stopping just before the fully retracted position. When the pilot selected the gear before landing, the gear remained in its previous position. With the gear in this position, neither gear position indicator light was illuminated.

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| **29 Mar 84**<br>1107 | Bell 206-L1 VH-BJX<br>Leigh Creek 85SSE | 49 | 6660 | Commercial — helicopter<br>1236 | None | 8441011 |

As part of a communications propagation test, personnel were to be positioned in the Oraparinna National Park by helicopter. One person was being lowered by winch when, at about 3 metres below the helicopter and 4 metres above the ground, his harness became detached from the winch hook and he fell to the ground.

The reason for the harness becoming detached from the winch hook could not be determined.

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| **05 Apr 84**<br>1000 | Beech A36 VH-WHH<br>"Cobham" Homestead, NSW | 37 | 297 | Private<br>78 | Instrument rating class 4 | 8421016 |

The pilot was aware that a rough area existed adjacent to the threshold of the strip. He elected to land long and clear of the rough section as sufficient strip length remained for a safe landing. He stated that he was concentrating on achieving a precise point of touchdown and did not realise until after landing that he had omitted to extend the landing gear.

The landing gear warning horn was subsequently found to be unserviceable.

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|---|---|---|---|---|---|---|
| **09 May 84**<br>1645 | Bell 47-G3B1 VH-CSE<br>Mable Downs 12N | 34 | 5900 | Commercial — helicopter<br>5700 | None | 8451011 |

The fuel gauge was unserviceable and a dip stick was not available. The pilot estimated that there was two hours fuel remaining by inspection of the contents of the left hand tank only. Seventy minutes after takeoff the engine stopped and an autorotational landing was attempted. The terrain was very rough and during the landing the tail rotor struck a tree and the main rotor blades cut off the tail boom.

The pilot had delayed his departure because of personal business commitments. The delay was such that the pilot had insufficient time to carry out refuelling and then reach his destination before last light. When the engine failed from fuel exhaustion the aircraft was being flown over rough terrain which was less than three kilometres from a road which ran parallel to the desired track. No mechanical fault or defect was found which would have caused premature fuel expiry.

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|---|---|---|---|---|---|---|
| **10 May 84**<br>1400 | Cessna T188C VH-HAM<br>Walgett, NSW 25S | 32 | 2200 | Commercial<br>400 | Agricultural class 2 | 8421021 |

The pilot was landing at the conclusion of the second spraying operation for the day. She aimed to touch down about half way along the 700 metre strip to allow a following aircraft to land behind her. During the latter stages of the landing roll the tail rose and the aircraft overturned.

As the brakes were applied the pilot slid forward in her seat and her shoulders were released from the seat harness. This resulted in increasingly heavy braking being inadvertently applied, together with forward movement of the control column.

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|---|---|---|---|---|---|---|
| **13 May 84**<br>1326 | Cessna 337G VH-KUX<br>Gove, NT | 24 | 899 | Commercial<br>440 | I.R. 1st class or class 1 with I.R. | 8441014 |

Prior to commencing a 60 minute flight the pilot estimated that the aircraft had fuel for 120 minutes. The front engine failed when the aircraft was 25 km from its desination. The rear engine subsequently failed and a glide approach from 9 km and 3000 feet was commenced. A 15 knot headwind was present and the aircraft landed 7 metres short of the aerodrome boundary fence. The right main gear was torn off in a ditch during the 135 metre ground roll.

When the aircraft was last refuelled, it was not filled to capacity and the pilot probably inaccurately estimated the amount of fuel on board. Fuel usage rates did not vary significantly from those used by the pilot for flight planning. The fuel gauges were found to overread in the lower quantity range.



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

| Date<br>Time | Aircraft type & registration<br>Location | Age | Hours Total | Pilot Licence<br>Hours on Type | Rating | Record number |
|---|---|---|---|---|---|---|
| **16 May 84**<br>0919 | Cessna 172M VH-DYM<br>Corkwood Bore, NT | 55 | 1748 | Private<br>950 | Instrument rating class 4 | 8441015 |

As no one had arrived to meet the aircraft at the planned destination the pilot flew to a strip on another property. The strip appeared suitable to the pilot but during the landing roll the right wing struck mulga trees on the side of the strip. The width of the strip was subsequently determined to be 16 metres and the trees on the side of the strip were up to 5 metres in height.

| | | | | | | |
|---|---|---|---|---|---|---|
| **16 May 84**<br>1500 | Partavia P68-B VH-FAD<br>Horn Island, Qld. | 23 | 1714 | Commercial<br>231 | I.R. 1st class or class 1 with I.R. | 8411024 |

Severe turbulence had been encountered on final approach but smooth air was entered on short final. After flaring to land, the aircraft rolled left rapidly and the landing was made on the left main wheel, followed by the right and the nose wheels. The pilot subsequently inspected the aircraft but did not detect any damage. After two further flights the pilot noticed that the left wing appeared to be low. Distortion of the left main gear support frame was found.

| | | | | | | |
|---|---|---|---|---|---|---|
| **21 May 84**<br>Unknown | Cessna 182G VH-DJN<br>Townsville, Qld. | Unknown | Unknown | Unknown/not reported<br>Unknown | Unknown or not reported | 8411027 |

During a routine 100 hourly servicing both wings were found to be bent upwards slightly. On further inspection both rear spars were found buckled just inboard of the inboard aileron hinges. None of the pilots who had flown the aircraft since the last periodic inspection could recall any unusual stresses being placed on the aircraft by turbulence or manoeuvring.

The cause of the airframe overstress could not be established.

| | | | | | | |
|---|---|---|---|---|---|---|
| **22 May 84**<br>0852 | Cessna 182Q VH-WMF<br>Trentham, Vic. 5NE | 50 | 919 | Private<br>800 | Instrument rating class 4 | 8431016 |

During the flight the pilot encountered gradually deteriorating weather conditions, forcing him to reduce his cruising altitude from 5500 feet initially to below 3500 feet. Cloud covered the tops of the adjacent ranges and there were showers and associated low cloud in the accident area. The aircraft struck the ground at 2140 feet amsl, while flying level, banked 20 degrees right, under control, and on a heading 55 degrees to the right of the flight planned track.

| | | | | | | |
|---|---|---|---|---|---|---|
| **22 May 84**<br>1640 | Cessna 182Q VH-FRV<br>Vergemont Station | 56 | 1045 | Private<br>946 | None | 8411026 |

The pilot reported that his approach to land towards the north-west was good; however, the aircraft floated for some distance before touching down. As the aircraft landed the sun appeared from behind a cloud and the pilot lost all forward vision. Braking was applied but as the pilot considered that the aircraft was not slowing down and he was aware that the strip end was near, he applied power to go-around. The aircraft failed to become airborne and collided with a bush and a fence beyond the end of the strip.

The investigation did not reveal any fault with the aircraft that could have contributed to the accident.

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|---|---|---|---|---|---|---|
| **23 May 84**<br>1340 | Cessna 150L VH-DNE<br>Pinnacles Station, 8NW | 35 | 1566 | Private<br>1260 | None | 8451012 |

The aircraft was being used for sheep spotting. Three hours had been flown since the last refuelling and the pilot noted that the fuel gauge was indicating close to empty. He considered that enough fuel remained for a further 40 minutes; however, 5 minutes later the engine stopped. During the ensuing forced landing two trees were struck and the aircraft sustained substantial damage to both wings and the tail section. Less than 3 litres of fuel was subsequently drained from the fuel system.

The pilot made only mental estimations of the expected fuel endurance of the aircraft and confirmed these by reference to the uncalibrated fuel gauge. As the aircraft was being flown at 200 feet agl when the engine suffered fuel starvation, insufficient time was available to the pilot to select a more suitable landing area.

| | | | | | | |
|---|---|---|---|---|---|---|
| **26 May 84**<br>1515 | Piper 28-140 VH-MTU<br>Hoxton Park, NSW | 19 | 46 | Private<br>6 | None | 8421023 |

The aircraft bounced after the initial touchdown and subsequently porpoised a number of times before the pilot was able to regain control of the landing. He later inspected the aircraft but did not notice any damage which might have occurred during the landing. On the subsequent takeoff, pitch attitude control difficulties were encountered and the pilot carried out a low level circuit and landing. Damage to the rear bulkhead and stabilator trim support brace was discovered.

The damage had been sustained during the initial touchdown, which had been on the mainwheels and the tail skid, and had probably accounted for the pilot's difficulty in controlling the subsequent porpoises along the runway.

| | | | | | | |
|---|---|---|---|---|---|---|
| **27 May 84**<br>1600 | Quickie Q2 Not reg.<br>Warnervale, NSW | 54 | 476 | Private<br>Unknown | None | 8421026 |

The pilot had finished construction of the aircraft and was conducting ground handling trials. He reported that on the final taxiing test the aircraft suddenly became airborne. There was insufficient strip length remaining to safely land again and the pilot climbed the aircraft to 2000 feet and carried out handling manoeuvres before returning to land. The aircraft landed heavily and the right canard was fractured.

| | | | | | | |
|---|---|---|---|---|---|---|
| **31 May 84**<br>2152 | Cessna U206G VH-AZC<br>Goulburn, NSW | 39 | 3275 | Commercial<br>106 | I.R. class 4 with flight instructor | 8421025 |

The pilot under instruction was training for the issue of a Night VMC rating. At about 250 feet agl on approach considerable sink was experienced and the aircraft descended below the desired approach path. Power was applied and the nose was raised but the sink continued. The instructor took control and initiated a go-around; however, the left main gear wheel collided with a fence and was dislodged. Control was maintained and a safe landing was subsequently carried out on return to Bankstown.

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

| *Date* / *Time* | *Aircraft type & registration* / *Location* | *Age* | *Hours Total* | *Pilot Licence* / *Hours on Type* | *Rating* | *Record number* |
|---|---|---|---|---|---|---|
| **10 Jun 84** / 1145 | Burkhart Astir CS VH-WUK / Kimba, SA 30S | 24 | 104 | Glider / 53 | Glider | 8441019 |

While ridge soaring at a low height and 50 knots, the pilot noticed a dead tree a short distance ahead. The glider mushed during the attempted pull-up; the left wing hit another tree and the glider turned through 90 degrees before colliding with the upward sloping ground.

| *Date* / *Time* | *Aircraft type & registration* / *Location* | *Age* | *Hours Total* | *Pilot Licence* / *Hours on Type* | *Rating* | *Record number* |
|---|---|---|---|---|---|---|
| **18 Jun 84** / 0705 | Hughes 269C VH-SMT / Moola Bulla Station | 34 | 882 | Commercial — helicopter / 785 | None | 8451014 |

The pilot had planned to carry out a cattle muster in conjunction with another aircraft. He had been late in departing his base, but when he found the other aircraft had not yet arrived at the rendezvous point he decided to make a quick comfort stop. The helicopter was landed on a spinifex-covered area and the pilot disembarked leaving the engine running. Shortly afterwards he noticed a fire underneath the helicopter and reboarded, in an attempt to fly it away from the fire. The engine did not respond. The pilot disembarked and attempted unsuccessfully to extinguish the fire. He received burns to his hands and legs while unloading equipment and the helicopter was destroyed.

| *Date* / *Time* | *Aircraft type & registration* / *Location* | *Age* | *Hours Total* | *Pilot Licence* / *Hours on Type* | *Rating* | *Record number* |
|---|---|---|---|---|---|---|
| **29 Jun 84** / 0930 | Piper 25-235A1 VH-MYE / Leongatha, Vic. 8SE | 32 | 6000 | Commercial / 2000 | Agricultural class 1 | 8431018 |

A spray run was being flown along the boundary of a paddock. One tree infringed the run and the trainee elected to apply rudder to direct the aircraft past the tree. Incorrect rudder was applied and the instructor took over but the left wing struck the tree. The instructor was able to maintain control although one metre of wing and the aileron had been torn off. He landed the aircraft in the adjoining paddock without further damage.


*". . . on your next visit, Miriam, smuggle in a 260-hp Lycoming . . ."*



# An untrained mustering pilot

There are many factors which contribute to the making of a good pilot. A few of these, which will be present to different degrees in different individuals, are common sense, aircraft systems knowledge, personal reliability, knowledge of associated subjects, natural ability and a mature appreciation of one's own limitations.

One factor which must always be present is good training, both in relation to basic piloting skills and specialised flying tasks. Any pilot who attempts to complete a task for which he has not been correctly and thoroughly trained always runs the risk — for which the stakes are the ultimate — that sooner or later that lack of training will find him out. Such was the unfortunate case with a young, inexperienced pilot who accepted employment mustering cattle without having undergone proper training.

* * *

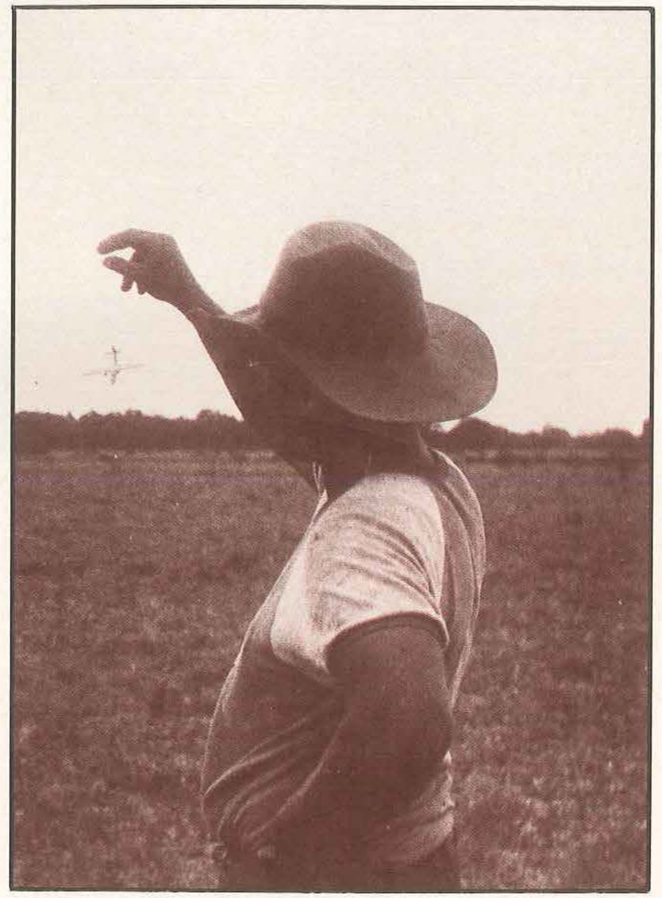
After gaining his commercial licence the pilot managed to fly only four times in the following eight months. Eventually, he secured employment at a cattle station and, realising that he would be required to carry out cattle mustering flights, arranged a brief period of low flying training with an experienced agricultural pilot. As the check pilot had no experience at cattle mustering, training was limited to general manoeuvring at a height of 200 feet. The improperly and inadequately trained pilot then began flying for the station.

The station manager had employed pilots who were not trained or approved for cattle mustering on a number of occasions. He would then instruct them as to the manner he wished the aircraft to be manoeuvred during mustering flights. Although he had never held a pilot licence, the manager was familiar with aerial mustering as he normally flew in the aircraft, directing operations and maintaining communications with stockmen on the ground by means of a portable radio. To move cattle from beneath trees, he would instruct the pilot to dive the aircraft steeply to tree-top level, then pull up into a steep climb and carry out a wing-over turn into the next dive. The new pilot complied with his employer's instructions, although he was reported to have subsequently stated that, on a number of occasions, he had almost stalled the aircraft during the wing-over turns.

Weather conditions at the station on the morning of the accident — one week after the pilot had started mustering — were good: the surface wind was a light south-easterly, there was a broken cloud cover at an altitude of about 3500 feet and visibility was unrestricted, except in isolated rainshowers. The aircraft — a Cessna 172 — was working in conjunction with a number of stockmen on horses and motorcycles to muster cattle some 20 km north-west of the station homestead.

After about an hour's flight the aircraft was observed making a number of steep dives to tree-top level, apparently to move cattle adjacent to a creek. Following one dive the Cessna was seen to pull up steeply to an estimated height of 400 feet, then stall and dive into the ground. It impacted at an angle of about 73 degrees and broke apart. The main wreckage bounced 28 metres before coming to rest against some trees. Both the pilot and the station manager, who was flying as spotter, were killed.

An investigation found no evidence of pre-existing aircraft mechanical defect or malfunction; nor was there any evidence of pilot incapacitation.



*Using an aircraft model, a witness demonstrates for air safety investigators the aircraft's attitude and position immediately prior to impact.*

* * *

There is no need for any comment on this accident other than to repeat the accident's relevant factors, determined by the Bureau of Air Safety Investigation:

- The manager employed a pilot for cattle mustering who was neither trained nor qualified for the operation.
- The pilot accepted the employment.
- The manager instructed the pilot to muster cattle in a manner which required maximum aircraft manoeuvring performance and high pilot skill, and which, at the low height involved, left no margin of safety.
- The pilot complied with the manager's instruction, thereby abrogating his command responsibility for the safe operation of the aircraft.
- The pilot lost control of the aircraft at a height too low to permit recovery ●

# Landing area standards

Landing is the phase of flight during which most General Aviation accidents occur. In one annual survey of accidents prepared by the Bureau of Air Safety Investigation, 50.7 per cent of GA accidents were found to be associated with this phase. The precise breakdown was as follows:

- Approach 6.9 per cent
- Level-off/touchdown 21.5 per cent
- Roll 16.7 per cent
- Go-around 3.0 per cent
- Other 2.6 per cent

Given that data, it is apparent that pilots should try to ensure that as many factors as possible are working in their favour during landings.

One of those factors is the state of the landing area, where items such as surface condition, gradient, dimensions, elevation and approach path are all important. The hazards attendant in ignoring those items are apparent in the following two summaries of landing accidents.

* * *

An agricultural aircraft had completed a spraying run and was returning to land on a strip located in an oatfield. The strip's width was 15 metres while the aircraft's wingspan was 12.7 metres.

At the edge of the strip the average height of the crop was 1 metre. After the aircraft had made a normal touchdown, the right wingtip contacted a patch of oats growing on a slight mound, and which stood about half a metre higher than the rest of the crop. This caused the aircraft to swing rapidly to the right, in the course of which the fuselage was severely buckled, and the left wingtip and left horizontal stabiliser were substantially damaged (see Figure 1).

In the second occurrence an aircraft was approaching to land after an aerotow sortie. As was common practice, the pilot was planning to land on the grass strip immediately adjacent to the sealed runway.

When he was on short final approach at about 50 feet, the pilot noticed that a glider had been pushed onto the grass strip and was infringing his intended landing path. Instead of initiating a go-around he decided to land on the area alongside the grass strip. This apparently was not unusual: from subsequent discussions with a number of people it emerged that it was customary to use most of the aerodrome as an all-over field.

However, in this instance the practice came unstuck.

After touchdown, the aircraft became entangled in tall weeds, tipped onto its right wing and then overturned, sustaining considerable damage. The 'grass' area which had looked acceptable to the pilot from a height of 50 feet consisted of Patterson's Curse and other weeds ranging from heights of about half a metre at the beginning of the landing run to about 1.5 metres where the aircraft came to rest, inverted (Figure 2).

## Comment

The specifications for Authorised Landing Areas (ALAs) are detailed in the *Visual Flight Guide* (VFG). Those standards are considered to be the minimum to ensure safe operations over an extended period. As these two expensive accidents showed, persistent disregard of those standards is likely, in the long run, to catch up with those who choose to ignore them.

It cannot be overemphasised that operations into landing strips will only provide the necessary margin of safety if the strip:

- meets the specifications for ALAs set out in the VFG, and
- has been carefully surveyed from ground level ●

## In brief

While a Lockheed Tri-Star was cruising at 35 000 feet en route from Cyprus to London, smoke was observed in the cabin at passenger seat 39F. No flames were visible but the seat material was smouldering.

A BCF fire extinguisher was used, followed by a water extinguisher to prevent re-ignition. Smoke evacuation procedures were completed and the flight continued to London without further incident.

The burning was found to have been caused by a cigarette which had dropped between the armrest and the seat cushion. It was concluded that the fire retardant properties of the seat cushion material satisfactorily retarded combustion.

* * *

Manoeuvring his Cessna 210 into a limited parking space, the pilot was aware that his vision in the direction he wished to turn was partly obscured by his passenger and the aircraft's nose. Nevertheless, believing his path was clear he continued taxiing. He stopped when he heard the Cessna's propeller striking something. The 'something' turned out to be a metal 'No Standing' sign, which bent the outer 100 mm of all three blades about 90 degrees backwards.

While airport staff do their best to ensure parking areas are clear, it remains the pilot's responsibility to ensure his aircraft is clear of all obstructions when taxiing. Taxiing accidents are usually inexcusable: if there is any doubt about whether your intended path is clear, stop, and get someone to have a look before you proceed; or shut the aircraft down and have it towed ●



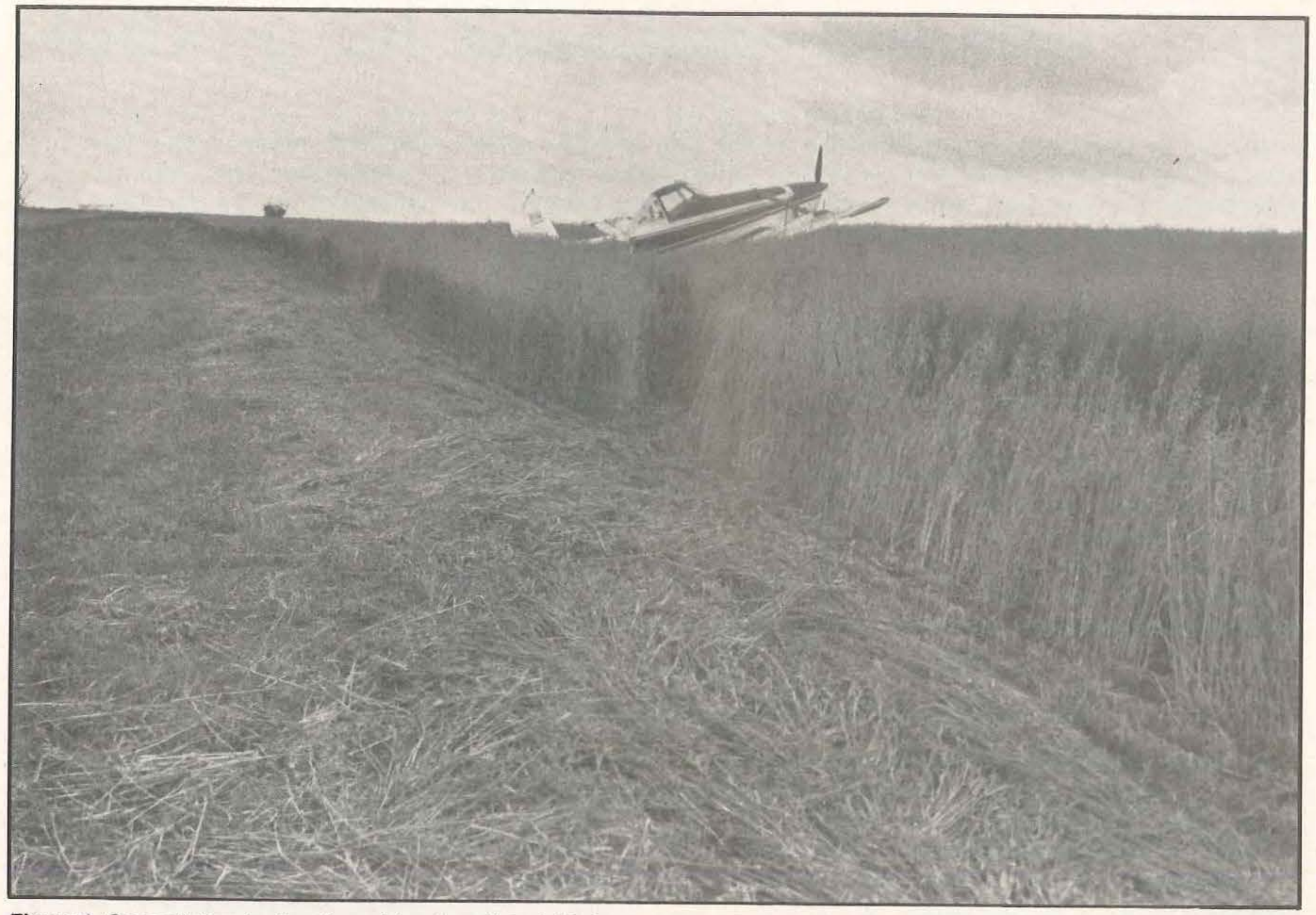


**Figure 1.** *General view in direction of landing. Note initial entry point of aircraft into crop.*

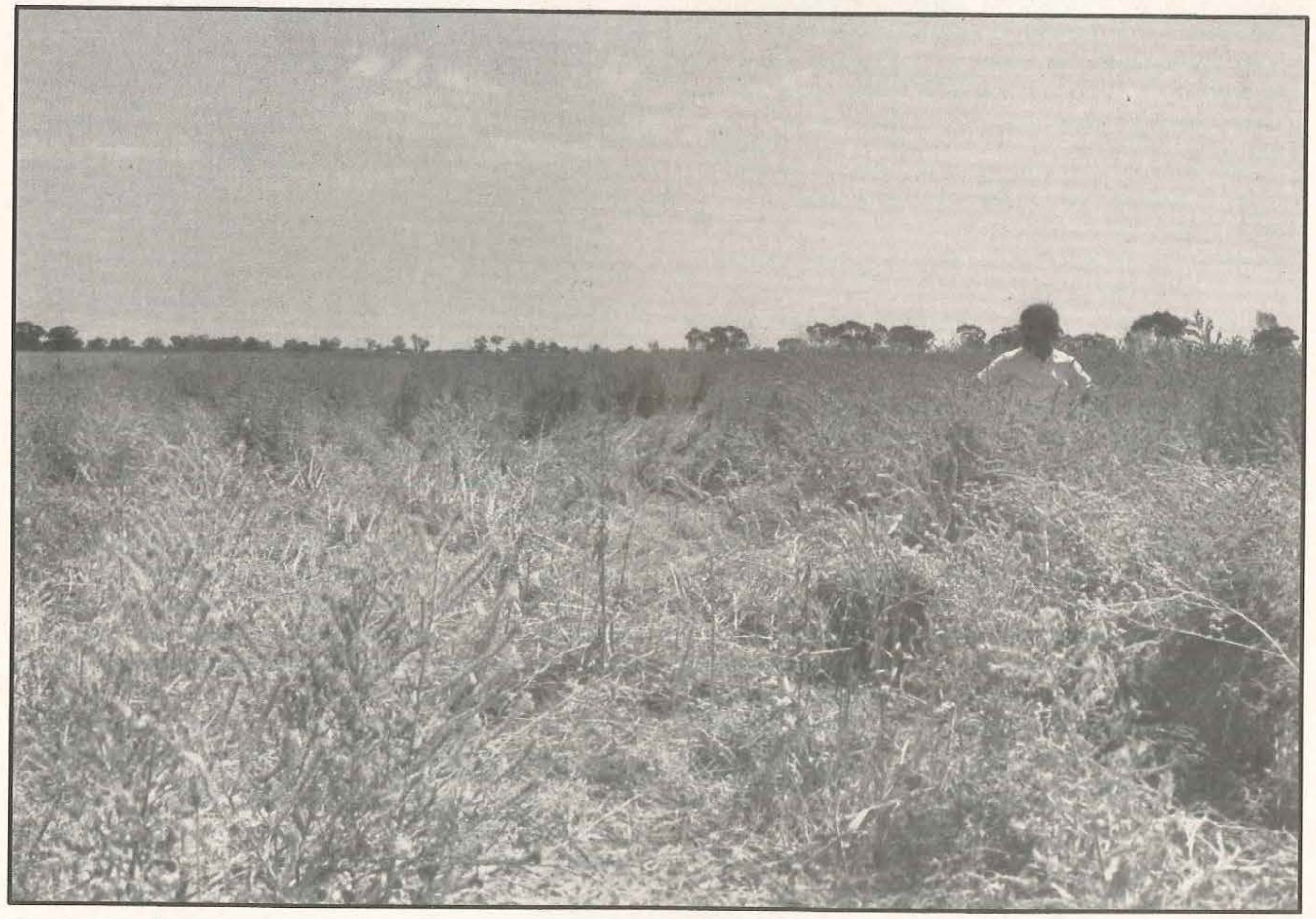


**Figure 2.** *View back along aircraft's touchdown path, taken from accident site. Person standing amongst the 'grass' is 183 cms tall.*

# Declare your emergency

**There seems to be a curious reluctance on the part of some pilots to declare an emergency. By failing to do so they needlessly, and often irresponsibly, expose their passengers, their aircraft and themselves to additional, unnecessary risk by possibly delaying the call-out of rescue services. The following accident is a case in point.**

Shortly after takeoff the top engine cowl from the right engine of a commuter aircraft separated from its mounting and struck the right horizontal stabiliser about midway along its span. The aircraft was travelling at 140 KIAS at a height of 300 feet.

The cowling wrapped itself around the horizontal stabiliser with about one-third of its area over the upper surface. Severe buffeting was experienced; the pilot later reported that the aircraft lost about 60 per cent of controllability in pitch. A turn on to a cross-runway was commenced and power reduced to maintain 140 knots.

The aircraft was landed safely with the engine cowl still firmly embedded in the horizontal stabiliser. A Mayday call had not been transmitted.

When the critical situation arose, the pilot did not employ the Distress and Urgency Message procedures detailed in the En Route Supplement. Instead, he attempted to communicate the serious nature of his predicament to Air Traffic Control by a hurried description of the technical problem.

This message was not fully understood but the sense of urgency in the pilot's voice indicated to the Tower Controllers that a potentially hazardous situation existed. Fortunately, air traffic at the time was quiet. Had there been numerous movements, creating the complex, high workload that often prevails in ATC, the controllers would have been faced with a most difficult problem. They were expected by the pilot to interpret the seriousness of his circumstances — a most unreasonable presumption.

In the event the controllers, of their own initiative, activated the crash alarm.

A similar pattern of events unfolded when the pilot of a light piston engine twin had to close down one engine while cruising at FL150.

After securing the engine, the pilot advised ATC of his intention to divert to a nearby airport but did not declare an emergency. Again, ATC took the initiative and implemented an Alert Phase and Aerodrome Alert Procedures. It is noteworthy that the diversion airport was some distance from the town it served and, as all emergency services had to come from that town, a delay in calling them could have been critical.

Having landed safely, the pilot commented that he felt the aircraft's situation had been hazardous from the time the engine was shut down. In particular he stated that, given the icing conditions which prevailed for the descent, the extensive cloud cover and low cloud base at the diversion airport, and the marginal single-engine performance of his machine, the emergency services in attendance for his landing 'were very much appreciated'.

That being the case, it is hard to understand why he had not declared an emergency himself as soon as his problem became apparent.

**DISTRESS AND URGENCY MESSAGES**

| DISTRESS MESSAGE (IMMEDIATE ASSISTANCE REQUIRED) | URGENCY MESSAGE (IMMEDIATE ASSISTANCE NOT REQUIRED) |
|---|---|
| —USE WHEN AIRCRAFT IN GRAVE AND IMMINENT DANGER | —USE WHEN AIRCRAFT EXPERIENCING DIFFICULTIES IN NAVIGATION, AIRCRAFT PERFORMANCE, ETC; OR SAFETY OF SOME PERSON ON BOARD OR WITHIN SIGHT IS INVOLVED |
| —TRANSMIT<br>• MAYDAY MAYDAY MAYDAY<br>• NAME OF UNIT ADDRESSED<br>• AIRCRAFT IDENTIFICATION<br>• NATURE OF DISTRESS CONDITION<br>• INTENTION OF PERSON IN COMMAND<br>• PRESENT POSITION, FLIGHT LEVEL OR ALTITUDE, HEADING, AIRSPEED AND ENDURANCE<br>• NUMBER OF PERSONS ON BOARD | —TRANSMIT<br>• PAN PAN PAN<br>• NAME OF UNIT ADDRESSED<br>• AIRCRAFT IDENTIFICATION<br>• NATURE OF URGENCY CONDITION<br>• INTENTION OF PERSON IN COMMAND<br>• PRESENT POSITION, FLIGHT LEVEL OR ALTITUDE AND HEADING<br>• ANY OTHER USEFUL INFORMATION |
| —TURN ON AUTOMATIC EMERGENCY EQUIPMENT IF PROVIDED | |
| —SQUAWK SSR CODE 7700 | —SQUAWK SSR CODE 7700 |

IF COMMUNICATION CANNOT BE MADE ON PRESCRIBED ROUTE FREQUENCIES, OTHER FREQUENCIES MAY BE OF SOME ASSISTANCE. THESE ARE —

| | |
|---|---|
| VHF—121.5 MHz | Being the allocated distress frequency for transmission of ELB(A) signals. It is monitored from time to time by domestic aircraft and continuously by most international aircraft. Ground monitoring is not available. |
| UHF—243 MHz | As for 121.5 except that it is monitored by all RAAF aircraft in flight and by ground stations indicated in ERS/COM section. |

## Comment

It is occasionally suggested that pilots are reluctant to declare an emergency because this might somehow reflect on the 'macho' image sometimes associated with flying. Such attitudes can only be described as misguided in the extreme. If you overhear 'bar talk' to that effect, the speaker's operational judgment and appreciation of pilot responsibility must be regarded as highly suspect.

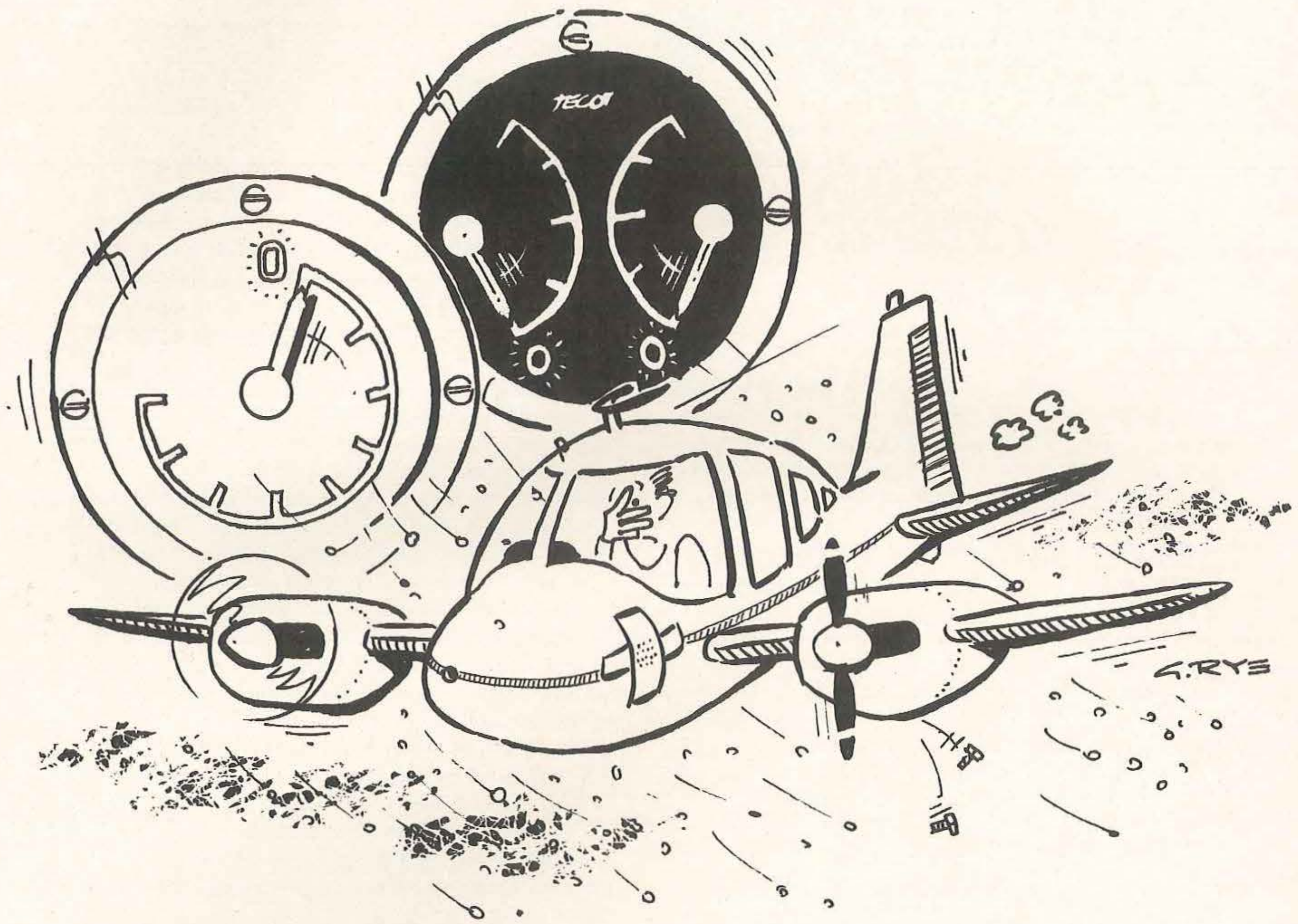
Australian Air Traffic and Flight Service Officers are highly trained and motivated individuals who can be of great assistance to pilots experiencing difficulties. They understand the pressures flying can create and want to help. It is up to you to ensure that a request for help is not left too late.

Pilots with an emergency should also appreciate that if they are operating into an airport where the landing priority system is in force, and depending on their class of operation (e.g. RPT, Charter, Private), they may not necessarily be given priority to land unless that emergency is formally declared.

The message is clear. Declare your emergency, preferably in the format advised in the En Route Supplement ●



# Nothing on the clock but the maker's name — literally



The 'there I was . . .' and 'nothing on the clock . . .' stories are well known (some may say too well known) in every clubhouse around the world where aviators meet, especially during social occasions. The following occurrence is a classic of the genre — especially as it is guaranteed authentic! It was first reported in the U.K. magazine, *Flight Safety Bulletin*.

A Beagle 206 twin took off from Oxford for a Certificate of Airworthiness renewal air test. Forecast weather included isolated snow showers and 6–8 oktas of cloud, base 300–2000 feet and tops 7000 feet.

Following a single-engine climb to above 8 oktas at 6000 feet, on restarting the other engine the gyro compass froze. So the pilot began a recovery to Oxford with the help of Cotswold radar. It then became apparent that radio transmission had failed although reception was still available. So the transponder was switched to 7600 and a rapid descent begun in a relatively clear patch. The aircraft's anti-icing system was not working, then the left hand fuel gauge contents indication fell to zero, the DME stopped indicating, the No. 1 VOR failed, there was no response on the ADF, and No. 2 VOR gave only a weak response to Honily. When visual contact with the ground had been made between snow showers, the pilot tried to work out where he was and eventually Tewksbury was recognised and course set to fly along the motorway to Staverton. By this time the artificial horizon had failed and the heater would no longer work. Staverton was overflown at 250 feet but visibility in the falling snow was such that it was not possible to manoeuvre for a landing. After circling for about five minutes in clear air by the River Severn, course was again set from a known landmark for Staverton where the pilot was fortunate enough to arrive lined up with runway 09. The engineer-observer lowered the undercarriage using the emergency system and, although no greens were indicated, the aircraft landed safely.

There was no mention of whether or not the Certificate of Airworthiness was renewed! ●

# *Reader contribution*

# Complacency and aircraft knowledge

We departed Archerfield and after obtaining airways clearance climbed direct to 6500 feet. Altitude was reached about Samford and Brisbane approach asked us to squawk code 3000 and ident. There seemed to be some difficulty with the transponder and apparently it did not register on the radar. There was some small discussion between myself and 'the man' but after confirming that 'operations were normal' I assumed that the problem had been rectified and we were well on the way.

Abeam Gayndah — 65 minutes into the journey — as part of my position reports and normal in-flight checks, I switched the fuel cock to the right tank having flown off the left tank since departure from Archerfield, noticing at the same time that the left tank now indicated quarter full, which was normal for that duration of flight at the 60 per cent power setting of 2100 RPM and 20.6 MP, at 5000 feet and 2 points under EGT.

Some time just before reaching Rockhampton I remarked to my companion in the right hand seat that 'the right fuel tank indicator seemed to be taking a long time to register', i.e. come down below the 'full' mark, and since we had been flying for about an hour on the tank, I switched on the electric pumps which transfer fuel from the outboard auxiliary tanks to the main inboard tanks, as was normal procedure.

Approximately 2 miles north of Glen Prarie Station, the engine cut out, surged again and then died. Immediately, I switched on the fuel booster and selected rich mixture. The engine gave a couple more surges, so I decided to make a forced landing at Glen Prarie Homestead where there is an excellent grass airstrip.

The aircraft was set up in the glide, all switches checked and I advised Rockhampton Flight Service of my problem and intentions. My passenger was fully briefed for a forced landing and during the descent I did a complete, though fruitless, check of all instruments and switches to try to find the problem.

On turning base, I realised that I still had power and used it to make a normal approach and landing at Glen Prarie.

After a successful landing we exited the aircraft and I proceeded to do other, though equally fruitless, external checks to see what had happened, and after climbing back into the cabin, started the engine and ran it at full power for several minutes, and all seemed to be in perfect working order.

I must admit that during the descent I had not tried the left tank because it was inconceivable that I had run out of fuel on the right tank after only 90 minutes of flight and knowing that the tanks were full when I left Archerfield and that the tank caps were on tight, and that I had been transferring fuel for some time. The right tank was still indicating well over quarter full which was also normal for that tank after 60 minutes or so of flight.

Arrangements were made to bring a LAME out from Rockhampton and together we set about solving the mystery.

The cowls were removed and all checks such as fuel to the carburettor, auxiliary fuel tank pumps, electrical equipment etc. were carried out with no further indication of the cause of the trouble. The engine was again run up for several minutes and from all indications everything was operating normally. We came to the conclusion that whatever happened the problem had now rectified itself and we should be safe to get airborne again.

However, before doing so I decided to recheck my flight plan, and determined that I had in fact flown 108 minutes on the right inboard tank. By itself this would have been enough to run it dry, but because the fuel transfer pump had been on to transfer fuel from the right auxiliary tank, there should have been at least another 40 minutes of fuel left in the main tank.

The LAME climbed up on to the wing and confirmed that the right main tank was almost 'bone dry'. This raised suspicions about the right hand fuel transfer pump, as there was still ample fuel in the right auxiliary tank.

Further investigation revealed that the venting tube on that auxiliary tank was partially blocked in some way and could not be cleared on site. This accounted for the surging of the engine while airborne as the fuel was not being transferred at the normal 15 gallons per hour to make up for the engine usage of 11 gallons per hour.

After the problem was discovered, all fuel available was transferred to the inside tanks and in due course we departed Glen Prarie and arrived in Mackay where the necessary work to clear the blocked vent was completed.

On the flight immediately preceding this one, the aircraft had developed a complete electrical failure in flight which resulted in an uncertainty phase being declared on the aircraft, and a landing at Archerfield with no radio, although I did code 7600 on the transponder.

The trouble in this case had been traced to a faulty alternator, which was replaced, as well as the battery.

Because of the length of time spent in this aircraft recently, I have become completely familiar with all phases of its operation and know what the fuel gauges 'should look like' after various periods of time in the air. The erratic nature of the right hand main fuel gauge I blamed on the electrical system; indeed, it made me wonder whether in fact I was developing another electrical failure in flight, particularly as I had transponder trouble during the flight as previously stated. The combination of 'knowing' how much fuel I had in the right hand tanks and sheer fright at the time created a mental situation that caused me to overlook the option of changing to the left tank. For the reasons described below, this may have been fortuitous.

While the incident can be put down to 'experience', particularly as nobody was injured, there were a number of extremely lucky features that in retrospect, without such luck, could have resulted in injury and/or death.

They were:

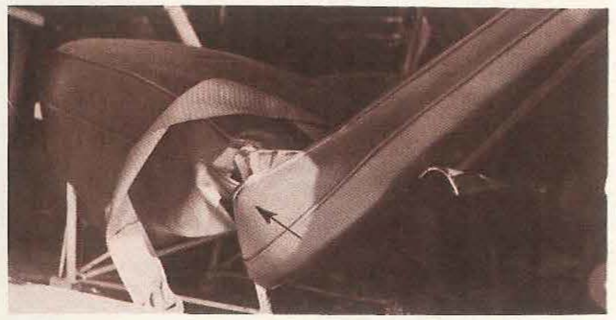
1. Lucky that Glen Prarie Station had an airstrip and although I had seen it before on other trips and was aware of its existence, I had only just pointed it out to my companion and we both saw a 'twin' stationary at one end of it, which helped in locating it.
2. Lucky that the auxiliary pump was transferring some fuel during the descent from 5000 feet which enabled a powered landing at Glen Prarie.
3. Lucky that we found the partially blocked vent in the outer tank on the ground. In all probability I would have taken off again still on the right tank, which would most certainly have resulted in an engine failure on takeoff with potentially disastrous results.
4. Lucky that I did not switch to the left tank in the glide because I would probably have carried on to Mackay or returned to Rockhampton and the whole incident put down to fuel starvation and incompetency on my part. The partially blocked fuel tank vent would almost certainly not have been discovered and the incident may have been repeated over much less hospitable country with potentially tragic results.
5. Lucky I know an excellent drycleaner.

### Morals

1. Don't become so complacent that you think you know your aircraft so well that you can predict all its habits — particularly with regard to fuel gauges.
2. When the bells ring — listen! e.g. 'That fuel gauge is taking a long time to register — I wonder if we are developing another electrical problem'.
3. If a forced/precautionary landing is made, never attempt to take off again until you have made absolutely sure that the problem has been found and rectified ●

# Seat collapse on takeoff

A normal takeoff was being carried out in a Cessna 180. Weather conditions were good and the bitumen runway dry. As the indicated airspeed reached 50-55 knots, and with the tail wheel clear of the ground, the pilot was just about to rotate when the back of his seat collapsed. He let go of the control column as he fell backwards and his feet lifted from the rudder pedals, but he retained his grip on the throttle long enough to reduce the power to idle. He was also able to reach forward far enough to pull the park brake handle full on.



The Cessna groundlooped to the left and ran onto a taxiway about 180 metres from the threshold. At this point the right main landing gear was broken from the fuselage. The engine stopped as the propeller struck the bitumen surface and the right outer mainplane was bent upwards on contact with the ground. Damage was such that the aircraft was not economically repairable.

It was determined that the left-hand support tube of the seat back failed initially and the right-hand support tube then failed because of overload. Progressive overload failures of other minor seat-support structures followed.

Examination showed that the left-hand support tube had a pre-existing fatigue crack over one-quarter of its circumference and it was from this that the total failure originated. The cause of this pre-existing crack should be of interest to all pilots, LAMEs and aircraft passengers.

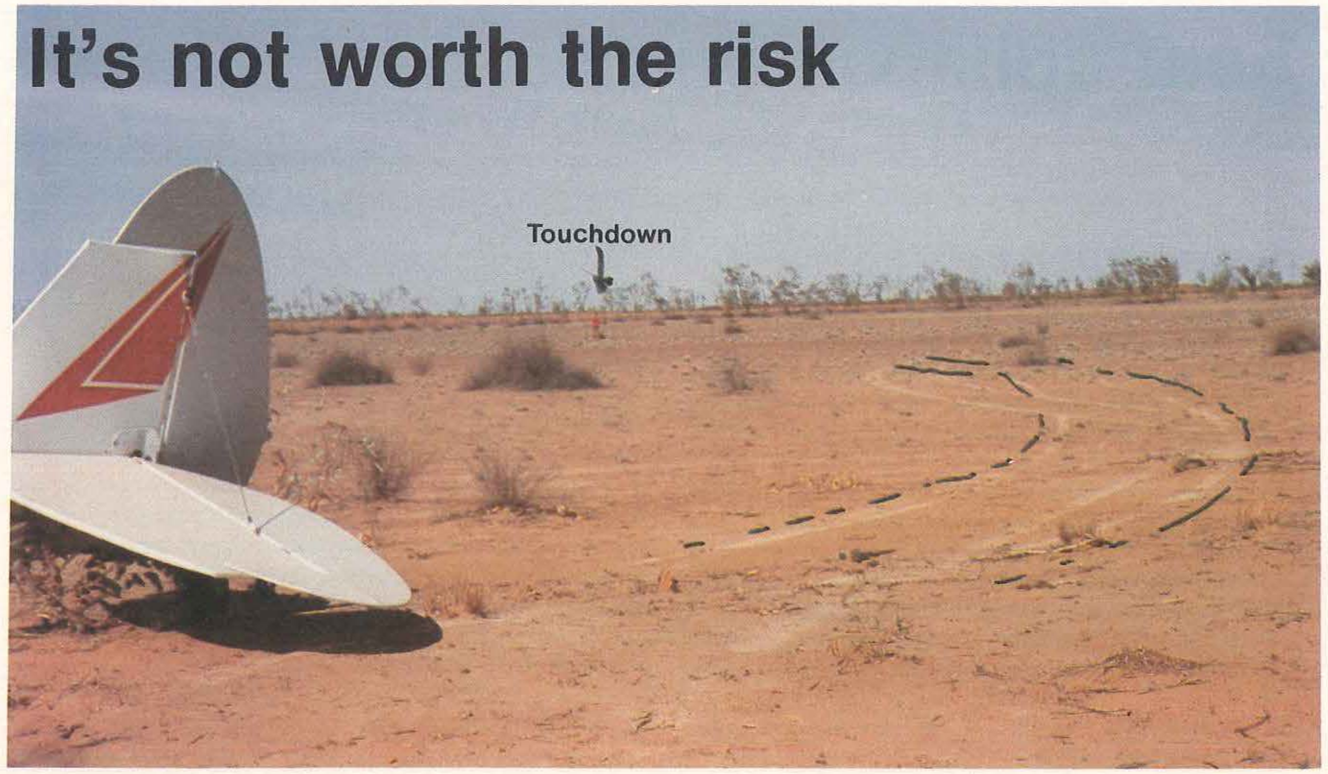
The left-hand side of the seat back, together with a 'grab' handle on the forward door post, is generally used by people to haul themselves into the aircraft. Further, the front seat backs are hinged to allow access to rear seat passengers who also tend to lean on those seat backs during entry to the cabin. It seems probable that this extra loading on the pilot's seat back, over a long period, caused the initial fatigue cracking of the support tube.

### Comment

It is only possible to thoroughly inspect this particular support tube in the Cessna 180 by partially removing the seat's upholstery. This may seem to be a nuisance at the time — yet consider the effort involved against the cost of an aircraft. The cost may well have been greater too had the seat collapsed shortly after takeoff.

This accident serves as a timely reminder that all components of an aircraft's structure — ranging from seats to spars — must be treated with respect. Often, components may have extreme strength in one direction but very little in another (the landing gear is a prime example of this). Whenever we are doing things like getting in and out of an aeroplane or climbing onto a wing to complete an inspection, we should ensure that no component is subjected to a stress for which it was not intended ●

# It's not worth the risk




After finding the mob of cattle for which he had been looking, the pilot of a Piper PA18 decided to land on a claypan to pass on the information to the ground party. He had already landed there once earlier in the day.

Weather conditions were clear and there was a headwind of 10–15 knots. Landing distance available was about 120 metres.

The pilot later stated that he always chooses a go-around point for short landings; if the aircraft has not touched down by that point, he abandons the approach. On this occasion he misjudged the approach and, having passed his 'landing point', decided to go around. According to the pilot, when he opened the throttle the engine did not respond and thus he was forced to continue with the landing.

At this stage he still felt that he would be able to stop the aircraft safely. However, to add to his troubles, the wheel brakes did not operate as efficiently as he expected and it became apparent that the Cub was going to overrun the landing area. To avoid this the pilot decided to groundloop the aircraft. In doing so, the aircraft's left wing struck a sapling while the left main landing gear was torn away. Overall damage was assessed as substantial.

Flight safety aspects arising from this accident involve the engine, the pilot's attitude towards the use of P-charts and the condition of the wheel brakes.

### The engine

The technical report prepared on the engine following strip-down showed no irregularities which would have caused an unexpected power loss. General engine condition was, however, poor:

- Externally, the engine was very dirty.
- The carburettor venturi and butterfly were coated in red dust, indicating poor air filter maintenance. On further dismantling of the carburettor this dust was found packed in behind the venturi.
- The cylinder bores were badly worn, as were the exhaust valve stems and guides.
- The spark plugs were fouled by lead, although not sufficiently to prevent them working (the pilot stated that he had been having trouble for some time with oiled plugs).

### P-charts

*Aviation Safety Digests* 118 and 120 included detailed articles on the importance of using the landing weight charts and takeoff weight charts — generally referred to as P-charts — which are contained in each aircraft's Department of Aviation-issued Flight Manual. These charts are the only authorised source of takeoff and landing data for Australian operations.

In this instance, reference to the P-charts for the PA18 showed that the landing distance required was about 250 metres. As it was there were only 120 metres available and the aircraft floated for 60 of those before touching down.

Notwithstanding his earlier successful landing on this area, the fact was that the pilot was operating without any safety margin.

P-charts are factored to cater for such variables as pilot handling techniques and abilities and aircraft age and condition.

Those who have become uncertain on the use of P-charts are urged to refer to *Digests* 118 and 120.

### The wheel brakes

Both brake master cylinders were found to be leaking because of the deterioration of rubber seals. This was attributed to the use of automotive brake fluid, which is vegetable based, instead of the approved synthetic-based aircraft fluid.

### Comment

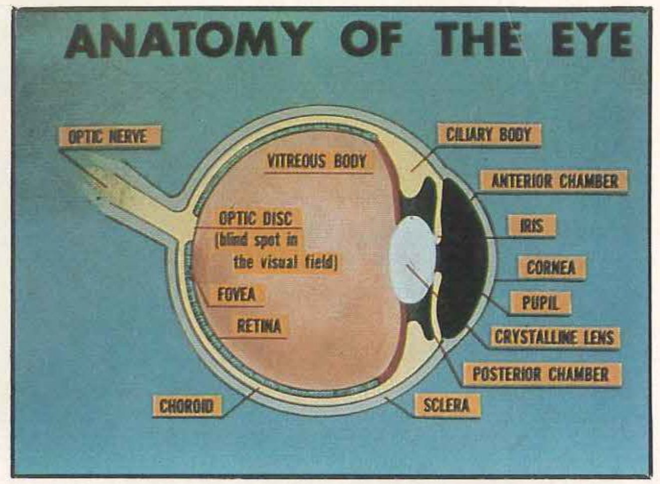
This pilot got away once with a poorly maintained aircraft and ignoring the P-charts, but not twice. His aircraft was badly damaged, and it could have been worse. Is it really worth the risk? ●



# *Why didn't I see that wire until too late?*

The human eyeball Mark I is a very versatile apparatus that serves us well. It has, however, even with 'perfect' sight, physical limitations in its performance. One such limitation is its power of resolution — that is, the minimal size of an object that can be registered — due to the construction of the sensor, the retina. In some respects the retina resembles the grain of black-and-white photographic film. The grain is the finite size of the sense organs, the cones. (The periphery of the retina is coarse grained and picks up movement but not detail, while the central part is fine grained and registers detail.) As anyone who has enlarged black-and-white film knows, the grain itself limits the detail that can be obtained.

The usual country power line or telephone wire when viewed from a safe (in flying terms) distance makes too small a visual angle for it to register on the cones. How then do we ever see it? Under specific conditions, that is against a plain contrasting background such as the sky, the eye has a compensating mechanism that relies on this contrast. In effect, we perceive the break in continuity of the background rather than 'seeing' the wire itself. Our mobile computer, the brain, happily translates this into seeing. However, reduce the contrast and break up the background and we are thrown back on to the basic visual mechanism limited by the grain (cone) size. The wire literally disappears. It is not 'camouflaged' it is beyond the limits of the eye to see it and no matter how hard we stare, squint or move our heads we will never be able to see it. We are wasting our time looking.




These physiological facts have obvious and important implications for pilots in country areas, particularly agricultural pilots and those who must have a 'closer look'. Where it is necessary to fly low in the course of a job, up-to-date charts of line obstructions must be obtained and supplemented by a ground survey. The extra power line to a shed has frequently appeared since the last time the area was flown. For those who must look closer, an adequate safety height must be maintained and prudence observed wherever pylons can be seen.

Do not, repeat do not, expect to spot wires from the air; your visual apparatus is not sufficiently sensitive, and if you do see them it will be 'too late' ●

## In brief

While the Fokker F27 was in the cruise a smell that was thought to be gas was detected coming from the forward locker. On landing it was found that the fuel tank of a chainsaw in the cargo was three-quarters full and some of the mixture had leaked out, creating the potential for a violent inflight explosion. The consignees had failed to observe the requirements relating to the air transport of such items, while the airline employee who accepted the chainsaw failed to inspect its fuel tank prior to loading it.

* * *

A foreign RPT aircraft was cruising at Flight Level 310 and asked for FL240 because of moderate turbulence. ATC advised that the clearance could be expected in 20 miles. Just then a Flight Attendant came into the cockpit to discuss a minor inflight problem with the Captain and the Flight Engineer. While the Captain and the Attendant were talking the First Officer read back an ATC instruction which included a vector onto a heading of 280 degrees. Returning his attention to flying after his discussion with the Attendant, the Captain heard this as a descent clearance to FL280, set the altitude reminder to that, and began a gradual descent. The First Officer, meanwhile, was preoccupied with getting out approach plates, and it was not until he looked up that the discrepancy was noticed. An immediate climb back to FL310 was made. The crew later commented that they believed the mistake was attributable to the double distraction ●

# Keep flying your aeroplane

Immediately after a Bonanza became airborne the forward cabin door opened. Apparently alarmed and confused, the pilot turned left on to downwind instead of entering the designated right-hand circuit pattern. Witness assessments of the aircraft's height on downwind varied, but it seems that it descended fairly quickly. It was then seen to bank steeply to the left and strike the tops of trees and two heavy posts before crashing nose-down into a vineyard.

The pilot and front seat passenger sustained facial and other injuries. Although both had fastened the lap section of their seat belts, neither had bothered to use the shoulder restraints. Another passenger who was in the right centre seat, and who had been attempting to close the door, was thrown forward out of the door (which opened fully on impact) and hit the ground ahead of the aircraft. The injuries to all three occupants were serious.

### Analysis

Subsequently the pilot was unable to recall any aspects of the accident. There was, however, no evidence to suggest that the door or its locking mechanism were unserviceable; on the contrary, the aircraft had flown the previous day without any problem of this nature being reported. It therefore seems probable that for this flight the door was not closed correctly.

Because of the pilot's memory loss it was not possible to determine positively the cause of the accident. However, when the door popped open unexpectedly in flight the pilot would have been subject to a very loud and sudden airstream noise. Given the witness descriptions of the erratic attempted circuit, and the fact that the aircraft's nose dropped rapidly immediately before impact with the ground, it seems highly likely that the pilot allowed herself to be distracted to the extent that she paid insufficient attention to her primary responsibility of flying the aircraft safely, and allowed it to stall.

### Comment

The Pilot's Operating Handbook for the Bonanza gives the following advice for an unlatched door in flight:

*If the cabin door is not locked it may unlatch in flight. This may occur during or just after takeoff. The door will trail open approximately three inches but the flight characteristics of the airplane will not be affected, except that the rate of climb will be reduced. Return to the field in a normal manner. If practicable, during the landing flare-out have a passenger hold the door to prevent it swinging open.*

Accidents and incidents continue to happen because pilots allow themselves to be distracted by relatively harmless occurrences. For example, in addition to doors opening in flight, several pilots of late have taken precipitate action because they were alarmed by the knocking noise made by seat belts trailing outside closed doors.

To take the issue a step further, there have been cases of twin-engine aircraft stalling and crashing following an engine failure during a critical phase of flight: the pilots involved apparently became preoccupied with attending to the malfunctioning engine and in doing so failed to maintain sufficient airspeed for safe flight. While the example here clearly involves a more serious problem, the principle remains the same.

Whether he is in a 747 or a Cessna 150 a pilot's prime responsibility is that of flying his aeroplane. Emergencies and less-dangerous inflight occurrences must assuredly be dealt with, but never at the expense of maintaining control of the aeroplane ●

*Locking the door: While the door of this aircraft may seem locked (the latch at the top centre is in the CLOSED position) it is not. The application of gentle pressure at the top right corner has opened the door slightly, indicating that it was not properly shut when the latch was closed. For many GA aircraft applying a gentle pressure to the door as illustrated is a useful way of checking that it is secure.*

## Watch your headset storage

VFR pilots who store unused headsets on the coaming above the instrument panel may be letting themselves in for a big headache. Tests conducted in the U.S.A. have shown that electronic disturbances from a 'live' headset can create severe compass error — in some tests up to 50 degrees. In an actual air safety incident, a pilot strayed into a heavily trafficked control zone because of a 30-degree error induced in this manner ●



# Photographic competition

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


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

Two prizes will be awarded:

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

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


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

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

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

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

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

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

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