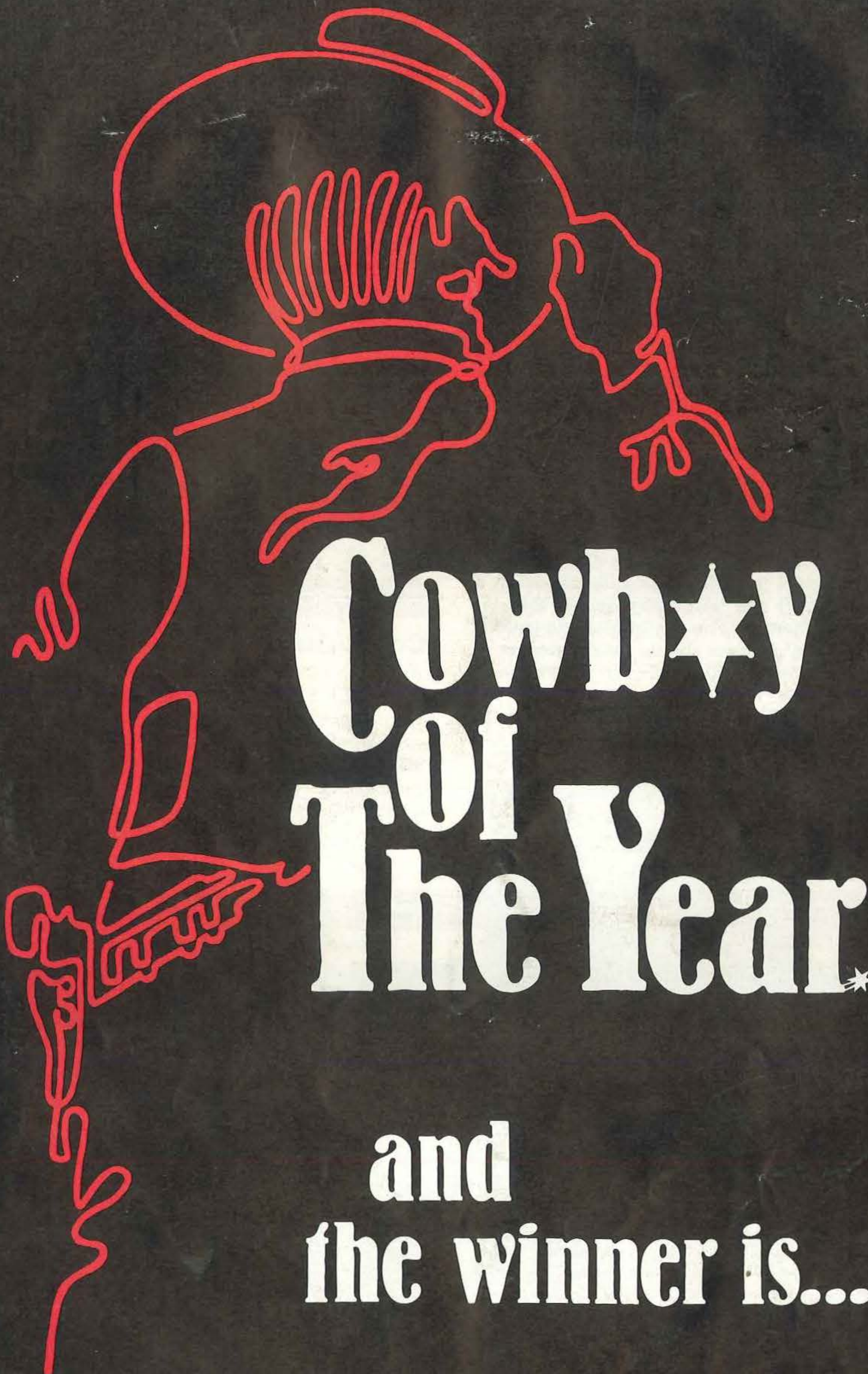

Cowb★y of The Year

and the winner is...

Lucky

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DEPARTMENT OF Aviation

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The views expressed in the Aviation Safety Digest are those of the editor or the individual contributor and are intended to stimulate discussion in the fields of aviation safety and related areas. They do not necessarily reflect the policy of the Department. The articles are intended to serve as a basis for discussion and even argument in an effort to identify and resolve problem areas and potentially hazardous situations.

Reader comments and contributions are welcome but the editor reserves the right to publish only those items which are assessed as being constructive towards flight safety.

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Editorial

MAY I TAKE this opportunity to present my credentials. I was born in 1944 in England and grew up in Melbourne. In 1960–61 I learnt to fly at Biggin-Hill, to glide at White Waltham and to parachute at Fairoaks in the U.K. I continued flying at the Royal Victorian Aero Club and parachuting at Packenham. In 1964, I joined the RAAF where I spent twenty-one years as a fighter pilot, test pilot and project manager. I served in South Vietnam as a Forward Air Controller, flying Cessna 0-2A aircraft. I completed the course at the Empire Test Pilots School in 1972 and flew many aircraft types ranging from gliders and Chipmunks to the Argosy and Lightning. My last post in the RAAF was as Resident Project Manager for the Wamira. More recently I was the Chief Ground Instructor and an active flying instructor at the Australian Aviation College at Parafield.

This issue of the *Digest* is the first that is completely produced 'under new management'. It represents an attempt to make the magazine more positive, more constructive and more readable.

Traditionally, the *Aviation Safety Digest* has been a forum for the analysis and discussion of causes of accidents. Articles were prepared so as to present the probable sequence of events which led to a particular accident or series of accidents and to forewarn the rest of us. We can and should all learn from each other's mistakes. However, a problem remained in cases where the cause was not positively identified or where there was no one correct solution or course of action. To enable discussion of such items I have taken responsibility for presenting my opinion of what might have happened, or what should happen. I do this in the knowledge that I could well be wrong but at least we can all learn from the results and subsequent discussion.

I am also encouraging individual contributions from many sources so as to bring out into the open, topics which have been misunderstood, mistaught, misapplied or simply avoided. It is therefore essential that you the readers have your say. The authors of such material will be clearly credited.

The World Gliding Championships at Benalla in Victoria have highlighted that very active type of flying and there are many facets that are applicable to powered flight. The glider pilots' sensitivity to slight changes in weather conditions, their need for constant lookout, the continuous demand for assessment and decision-making, the stress of competition and their selection and achievement of a suitable landing area, are skills that could be refined by all pilots.

Summer is upon us and with it the need for care of our own well-being and physical condition. There was an excellent article in *Digest* 122 on heat stress, which I encourage you to read again. The human factor is no less significant this year and I will continue to accentuate these topics.

The photographic competition is in full swing and your input will be welcome. I would personally like to encourage black-and-white photos as they provide a valuable contrast to colour and can be widely used throughout the *Digest*. The competition is fully described in the back of this issue.

I wish you all a safe and smooth 1987 □

David Robson

DAVID ROBSON
Editor

Covers

Front. The pleasure of general aviation is well expressed by this colourful little aircraft — Decathlon, VH-KAR — at Parafield. As the sage once said: 'Flying is like love — it can be shear pleasure if you're careful, shear misery if you're not.'
Photograph by David Robson —
NIKON F — Fujicolor 100

Back. There is still a 'cowboy' element in aviation and like the original cowboy, his days are numbered. If you know a cowboy (or cowgirl) pilot, don't just ignore it — say something, or at least warn your friends.
Poster design by Soussanith Nokham

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A bunch of boys was beating it up . . .

SINCE LILIENTHAL, pilots have regularly collided with solid objects and come off second best. In the early days the pilots had limited control of their aerial vehicles. Collisions were largely unavoidable. However, alongside the evolution of the aircraft, piloting skills were being developed. With this developing skill and confidence, pilots began to demonstrate their degree of control and degree of daring by flying as low as possible, climbing as high as possible, diving as fast as possible and recovering as late as possible. These arts were refined by the stunt pilots of the 1920s and 1930s — highly experienced showmen with highly manoeuvrable aircraft in highly rehearsed scenarios.

The image lingers. The temptation for the 'red-blooded' pilot to fly under the wires, between the trees, to make waves with the prop-wash or to leave skid-marks on the sand is almost irresistible. More pilots than would care to admit it have succumbed to the temptation, frightened themselves and returned to their home base sheepishly, grateful to be alive and slightly more reflective than when they took off. Some escaped unscathed, some had dented pride because they were foolish enough to display their inadequacies in public view, some had dented aeroplanes and some had dented heads. Many didn't make it back at all.

Personality has a lot to do with it. Some people are born 'hams'. The opportunity to perform in front of a live audience is simply irresistible. Some people cannot resist the opportunity to compete. It is a natural characteristic of the human animal to strive to do better than his or her fellow. It's part of the will to survive. Unfortunately in the aviation game, many do not survive.

Not all of the inadequacies are human. Most modern light aircraft do not have the control response, the structural strength nor the excess thrust to allow display routines that are both exciting and safe. The mark of the professional display pilot is that he or she can show the limits of the aircraft without breaking it. They take their work seriously and some of them, despite their thoroughness and care, also succumb. Display flying is a high-risk occupation. There is little margin for error.

Beat that — one

What could have been more fun than a 'fly-in' to a country property — a chance to chat about aircraft and flying and a chance to show off a new aircraft that had been lovingly built by hand over a period of nearly seven years.

Several aircraft arrived overhead the property together and while some circled the farmhouse, the remainder went on to the airstrip and landed.

One of the aircraft, a beautiful red and white Starlet, circled the house a couple of times then conducted a low flypast. During the low run the aircraft was estimated to be flying at 100 knots and at an altitude of about 20 feet.

As it approached the house, the pilot raised his right hand and threw something out. As he did so, the right wing dropped slightly and hit the top of a tree next to the house. Impact with the tree occurred 5 metres above the ground and severed the right wing at mid-span. The uncontrollable aircraft hit the ground with a 'thump' and disintegrated.

The pilot had thrown a flour bomb. He had a history of low flying which was considered dangerous to the extent that his colleagues had cautioned him several times. His club had even considered expulsion but thought they might be able to better influence his behaviour if they kept him within the group.

The pilot died on impact.

The Starlet is controlled by the right hand on the control stick and the left hand on the throttle. It might be said that changing hands to throw the flour bomb (thereby having to fly at very low altitude using the left, non-standard hand) caused the wing to drop and therefore impact the tree. However, the pilot should simply not have been there in the first place.

Many of us have flown at low altitude and perhaps below the legal and safe 500 feet or 200 feet agl that was authorised. But 20 feet, in close proximity to a house and tree, while flying with the left hand and throwing a flour bomb!

Beat that — two

At the conclusion of a training operation, the pilot was asked to ferry a Bell 47G back to an airstrip on the property. A second pilot was on board as an observer.

After takeoff, a practice autorotation was conducted over the dam and was followed by some unauthorised low flying in the vicinity.

On arrival at the strip, the helicopter performed several low runs with torque turns to change direction at each end of the strip. The second torque turn was assessed by the CFI who was watching from the ground, as being well outside the limits of the aircraft and he did not expect the pilot to recover from it. The CFI was going to a parked aircraft to use the radio to tell the pilot to stop the illegal manoeuvres but, after the second torque turn, he thought the pilot had frightened himself enough to stop any further antics voluntarily.

The helicopter then flew in a southerly direction, parallel to the airstrip. At this stage, the CFI thought the aircraft was returning to the parking area to land. However, near the southern end of the strip, just past the parking area, the aircraft entered a third torque turn from low altitude.

During this manoeuvre, the helicopter was pulled up past the vertical and reached an altitude of 80–100 feet. The nose then fell away to the left and the aircraft dived into the ground, impacting in a near-vertical attitude.

Fire broke out immediately, consuming the occupants.

How do you stop pilots killing themselves in this way? It's such a terrible waste of life. Of the total population of pilots, the vast majority will recognise their own limitations and not even consider such temptations. A small minority will eventually kill themselves no matter what their colleagues say or do. In between these two groups is a small floating population of pilots who through their inexperience or personality, may still be tempted to try such foolishness. It is still possible to influence this group. They are not beyond redemption.

This is not an advocacy against aerobatics. On the contrary, tuition in aerobatics is valuable for all pilots as are regular refresher courses for those of us who spend our normal flying hours right-side up. There are excellent aerobatic aircraft and instructors who will gladly teach Basic, Intermediate and Advanced aerobatics. From this, a pilot can go on to display flying when he or she has sufficient experience and is approved to do so.

My concerns relate to illegal low flying, beat-ups and impromptu displays. All I can ask of pilots who indulge in these practices is:

- If you must do it, then at least spare your family and friends the added grief of having to watch you die.
- If you must do it, don't do it in public.
- If you must do it, don't carry passengers.
- Or, better still, if you must do it, learn how to do it properly, i.e. in a suitable aircraft, from a qualified aerobatic instructor and within the limits that instructor will impose for your level of experience.

If you know of a pilot who is inclined to do these dangerous manoeuvres, then it is *your* responsibility to either stop them flying, stop them flying your aircraft, stop them flying in your club, tell your CFI or at the very least, tell anyone who is likely to fly with them, *not to* □

Strike one . . . you're out! (again)

The human factor in agricultural operations

The following article was written by John Freeman, Examiner of Airmen (Agricultural Operations), from the Adelaide office of DofA. John is an ag. pilot and operator of some 25 years' experience. It amplifies previous articles in the Special Ag. Issue of the Digest. John's point is that most strikes take place with previously detected wires.

FOR THE AG. PILOT to live a full, happy and productive life he must *not* have a wirestrike. Wirestrikes are usually followed by one of three things:

- The aircraft crashing out of control, killing the pilot.
- The aircraft crashing out of control, seriously injuring the pilot.
- The aircraft crashing out of control and the pilot escaping injury thanks to aircraft design for survivability.

On the odd occasion, the pilot maintains control of the aircraft and lands. He then buys a lottery ticket as quickly as possible before his *luck* deserts him.

What causes a highly trained and often highly experienced pilot to strike wires with his aircraft?

To avoid striking wires associated with a particular treatment area, the ag. pilot must do three things:

(1) *Prior to* treatment he must locate *all* wires associated with the treatment:
in the treatment area
around the treatment area
within the manoeuvring area

(2) *Prior to* treatment he must locate *all* obstacles in close proximity to, and particularly beneath, the wires.

(3) *During* treatment he must be able to recall quickly *all* of the above until the treatment, including clean-up runs, is finished.

How does he accomplish this?

(1) By using the following *indications* of wires, in order, and *then* by visually locating the wire itself:

- towns, settlements requiring power
- dwelling houses, sheds, pump sheds, etc. which *will* have power connected
- the poles that carry the wires, be they steel, concrete or wood
- the crosstrees on the poles which allow more than one wire in a run to be carried
- the insulators which join the wires to the poles.

All the foregoing *indicate* the wire position. Remember that having located the indication, the wire itself must be located. One doesn't hear of *indicator* strikes, only *wire* strikes.

One other consideration is that wires place stress on poles. If the stress is in a straight line, the poles themselves will absorb the stress, at times helped by guy-wires in line with the wire run. Any deviation in the wire run, however, will place extra stress on the pole which eventually will require extra bracing through guy-wires placed on the opposite side to the direction of stress. Guy-wires, if anticipated, are easily located. They often have a wooden protective piece tied to them which shows up clearly.

In any case, any change in a wire run, i.e. an extra crosstree, extra insulator, different insulators, pole or crosstree placed differently, pole leaning etc. *must* be treated with suspicion and fully scrutinised before treatment commences.

Wirestrikes are not just confined to within and around the treatment area. Wires can be contacted while manoeuvring due to emergency landing, downdraught activity, turbulence or undulating terrain. Therefore wherever the aircraft is likely to be 300 feet and below, the wires must be located.

(2) It's a fact of life that if you run under a wire during treatment you are likely to find a problem under it or near it, i.e. a post or iron dropper, a poorly briefed marker, a spectator, turbulence, undulations, trees, bushes, etc. To avoid this and the obvious result you must look, anticipate and properly brief personnel. If you don't, Murphy will ensure that eventually you will have to choose between an obstruction or the wire. One hell of a choice if the obstruction is a human being.

If you are faced with such a choice and it's not a human being the obstruction usually beats the pants off the wire if you have to hit something. Control is more likely to be maintained after contacting a wooden or iron post than after contacting a wire.

(3) When the wires and associated problems have been located the ag. pilot now has to remember them. Usually the treatment area is partly affected by wires, therefore the ag. pilot, while *remembering* the wire, can ignore it where it doesn't immediately affect him.

However, read on!

Seven wirestrikes in ten are on wires previously located. If the wire is so life threatening — and it is — how is it possible to forget it? The answer lies in supermarket shopping. Go shopping *without a written list*, remembering as many items as you are comfortably able to. Just prior to entering the supermarket have someone ask you to get a couple of extra items or strike up a conversation with a friend. When you come out you will find you have forgotten some of the original items and not necessarily the unimportant ones.

When treating an area the ag. pilot has to remember:

- the location of wires and other hazards
- his application rate and how far the treatment has progressed consistent with pesticide dispensed
- his fuel state
- the location of susceptible crops nearby
- the avoidance of nuisance areas
- possible areas of turbulence
- areas requiring clean-up
- encroaching rising terrain
- areas not to be sprayed during his spray-run with corresponding shut-off, open-up and clean-up required
- whether the markers are tracking correctly
- whether the wind is rising, falling, changing direction
- etc., etc.

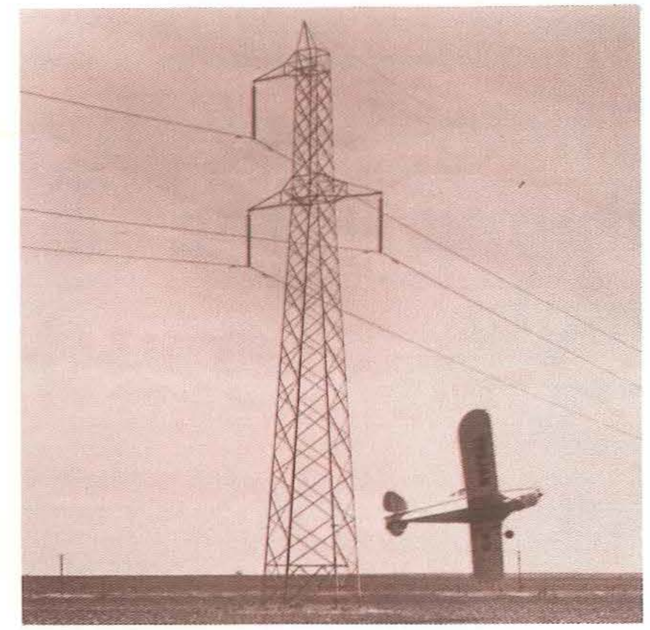
This is hard enough without cluttering his brain with items that are not important in the air, such as:

- the general progress of the job
- the day's work
- water supplies
- AVGAS supplies
- chemical supplies
- marker availability
- the effect of the weather
- aircraft and spray gear serviceability
- etc., etc.

These latter items are all *ground* items and are *not* to be taken into the air: when the ag. pilot is in the cockpit, aircraft loaded, engine running, about to close the aircraft door and somebody comes running up to say that the chemical hasn't arrived, the AVGAS isn't available, his wife rang, there's another 500 acres to spray before leaving, etc. he is now set up to strike that wire he has been working around, or which crosses his clean-up run.

To summarise: things that can only be dealt with on the ground *must* be left on the ground otherwise that distraction will kill.

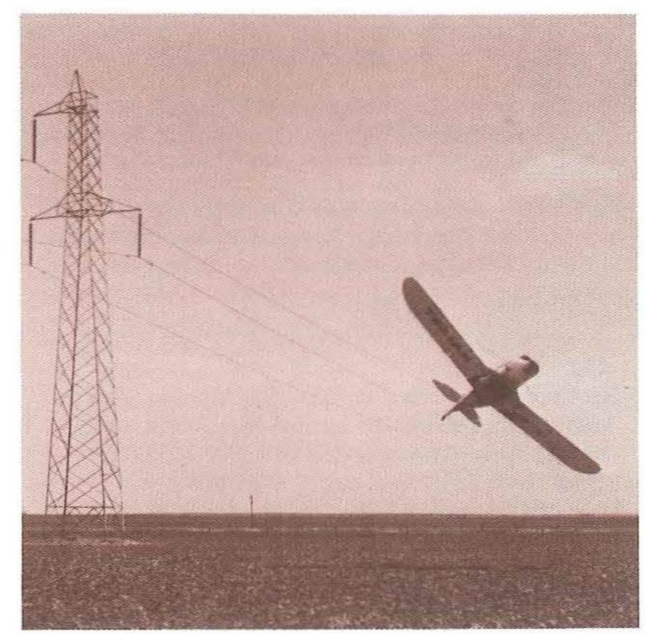
In recognising the limitations of human memory he can also take the precaution of drawing a 'mud map' which notes the location of all wires and obstacles. Even if this map can't be used in flight it can be used to jog the memory between flights and the action of drawing the map reinforces the image of the treatment area.



Accident records clearly show that the most likely candidate for a wirestrike is the ag. pilot who is also:

- an owner-driver
- in charge of the operation
- married or otherwise attached
- between 35 and 45 years old
- experienced with 4000+ hours ag. flying
- trained before 1980.

This man is the likely candidate. However, ag. pilots who don't fit this picture but who do not fully survey the treatment areas, locate the wires and then remember them by leaving the ground items on the ground, have a better than even chance of striking a wire. In this event only luck or good aircraft design will save them as they are no longer in control of their destiny. □



Things that go thump in the night

THE PILOT was conducting a Night VMC flight to maintain recency; the flight consisted of a short cross-country to Narrogin for a night landing and return to Jandakot. He had a Class 4 Instrument Rating, issued within the previous 12 months. He had flown several times at night since then but had not landed away from Jandakot since the Rating test. The test had included a night landing at Narrogin.

Approaching Narrogin, the pilot triggered the pilot-activated lighting and saw the airfield directly ahead. He descended to 2000 feet on QNH, entered the circuit and completed an ALA inspection at an estimated 80 feet agl. He noticed that there were two rows of trees on the extended centreline, about 300-600 metres from the threshold.

The pilot climbed to circuit height, completed his downwind checks and turned on to final at about 700 feet agl. When he had lined up he realised that he was a long way out and shallow. As he continued the approach he realised he had not selected the carby-heat. After attending to this he realised he was too low. He applied power and raised the nose. There didn't seem to be an immediate response. At this stage, there was a 'thump' and the nose of the Warrior pulled to the left. The pilot was able to maintain control and as he could see no damage to the left wing, assumed that it was the left undercarriage that had struck the trees. He elected to continue the approach as he did not know the extent of any damage and how the aircraft might behave in an overshoot (go-around).

The aircraft landed safely. The leading edge of the left wing was badly damaged by impact with the dead branches of a tree.

Several factors are significant:

- The obstacle-free gradient (including the tree-tops) was 3 per cent or about 1½ degrees, that is the trees were about 15 metres high and about 500 metres from the threshold. On a normal approach the aircraft should clear these by 10 metres (33 ft on a 3 degree or 5 per cent glideslope).
- The runway had a 1 per cent downslope which generally would delude the pilot into believing that he was lower than he really was, even on a normal glidepath.

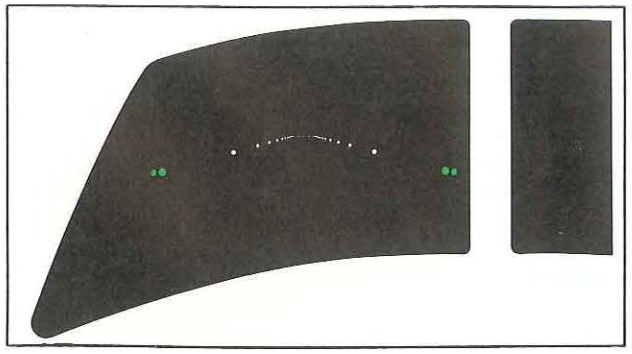


Figure 1: A shallow but constant approach.

Runway aspect constant and position in windscreen constant.

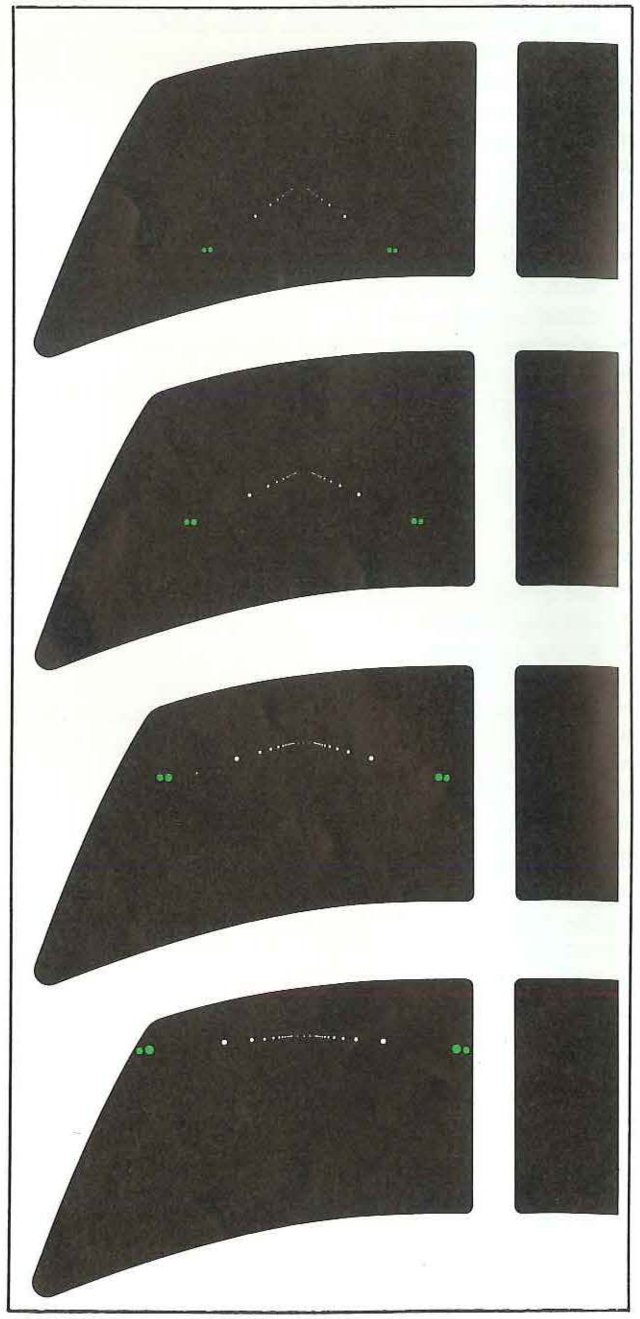


Figure 2: A shallow, undershooting approach.

Runway aspect flattening and moving up in the windscreen.

- Our pilot had developed the habit of conducting long shallow approaches because he believed it gave him better control of the landing.
- The pilot was distracted to look down into the cockpit to select the carby-heat during this most critical phase of the flight.

To hit the tree-tops the pilot must have been either on a shallow (< 1½ degree) approach path or descending towards a point short of the threshold. In the first instance, the aspect of the runway would have been grossly flattened but constant (assuming constant IAS, W/V and aircraft configuration). See Figure 1. In the latter case the runway aspect would have been flattened, getting flatter and moving up in the windscreen (same provisos). See Figure 2.

Final approach to an ALA at night offers a paucity of visual references, particularly where there are no peripheral cues such as lights or reflections in the undershoot area. In such a situation, the pilot has only the runway lights as a reference for both the approach gradient (steep or shallow) and for trends (flattening, steepening, overshooting or undershooting). Such angles and changes are subtle and require dedicated concentration. For a night approach it is even more critical that all 'housework' (checks etc.) be out of the way and all lights adjusted and set before the final approach.

The approach should be no steeper and no shallower than daytime. If like our pilot, you have lapsed into 'submarine' approaches as a means of achieving a smooth touchdown near the threshold, you are setting yourself up for some form of impact short of the threshold. It is a misconception to believe that a shallow approach gives better control of the speed and touchdown point. A short-field approach is a slower approach but not a shallower approach.

The altimeter is also a useful guide. As you roll out on final the altimeter should read about 500 feet agl (if you fly a standard circuit). When you are a good runway-length (say 1000 metres) short of the threshold you should be at about 150–200 feet agl. Don't look inside to the detriment of your visual assessment of the approach — just a quick glimpse of the altimeter as a cross-check of how you are going.

The essence of a good landing is a constant approach and this comes from self-imposed consistency, day and night. If you are not consistent you have no reference, no basis for judgment. Consequently, your appreciation of how the runway-light 'picture' should look may be wrong.

Irrespective of such considerations, if it doesn't feel right, even if you don't know why, go around and set up another approach.

Having said all this, the pilot in the example is to be commended for putting the aircraft on the ground safely and *then* analysing the problem. He did not risk a go-around in a damaged aircraft and that's a lesson for all of us □

What a drag! . . . minimum rpm for feathering

The following was prompted by and partly produced from an article in our sister publication, New Zealand Flight Safety.

THE BRITISH CAA has recently drawn attention to a design feature of most common constant-speed propellers in use on light twin-engine aircraft — for example Hartzell and McCauley propellers. The propellers incorporate a feature which prevents the blades going to the feathered position when the propeller is turning at low rpm.

The reason for this feature is to prevent the propeller from feathering when the engine is shut down. Hence it will remain in a fine-pitch position for the subsequent start.

The propellers include centrifugal latches which hold the blades at fine pitch as the rpm reduces below 700–1000 rpm. Consequently the propeller cannot be feathered below this range.

In flight the windmilling speed of the propeller on a failed engine could fall below this range and prevent feathering. This is particularly likely in the case of a seized engine due to mechanical failure or loss of oil, where the rpm decay can be rapid.

The usual procedure in the event of an engine failure is to control the aircraft, identify the failed engine (dead leg, dead engine) and then to confirm the failed engine by checking for response to throttle movement. In my case I was taught to open the throttle first and then close it. If there was no response the failed engine was confirmed. The CAA suggest that, if windmilling rpm has fallen below the latching range, opening the throttle will usually increase the rpm sufficiently to improve the probability of successful feathering.

The CAA is quoted as saying:

> The loss of performance associated with a stopped propeller in fine pitch, or more importantly with a windmilling propeller, is potentially serious. The additional drag will considerably reduce the single-engine climb performance from that available with a fully feathered propeller. Directional controllability will also be reduced, though adequate control should still be available down to minimum control speed (Vmca) as [this speed] is determined with the propeller in the condition prior to feathering action by the pilot . . . It will probably not be possible to trim the aircraft on the rudder trim at the best rate-of-climb speed, and a considerable foot-force may have to be held to maintain heading. It cannot be overemphasised that, if it is necessary to gain or conserve altitude, the best available performance is essential, and for this the best engine-out rate of climb must be maintained.

TO DO THIS THE BEST SINGLE-ENGINE RATE-OF-CLIMB *SPEED* (Vyse) MUST BE MAINTAINED □

The seat of the problem

The chain is as strong as its weakest link

IN ANY AIRCRAFT system, there is a human element. The flight control system requires a human manipulator. The engine requires a human controller. The electrical system requires a human operator. The fuel system requires a human selector. All systems require a human estimator, monitor and decision-maker.

The critical link then is between the pilot and the systems. The cockpit is the space where the human operator 'interfaces' with the aircraft and its systems. The controls and displays are there to enable the pilot to monitor, manage and operate those systems. The controls have not always been well designed, logically arranged or easy to operate. The displays have not always been reliable, easy to read or well positioned. But designers are now taking more care with ergonomics, the science of making the man-machine interface as efficient as possible.

Of course, a vital factor in this interface is the physical position of the human operator in relation to the controls and the means of keeping him or her there. The design of the pilot's seat is critically important in respect of range of adjustment, support, comfort and strength. The seat and the restraint system are designed primarily for the rapid deceleration case — the sudden stop. Often the strength of the seatback in a rearward direction is substantially less. The seatback is also vulnerable to wear, damage and fatigue as passengers and crew often lean heavily on it when entering or leaving the aircraft. Seats with adjustable rake (seatback angle) can experience weakening of the locking assembly. Similarly, the seat-track or rails and its locking assembly can wear or be damaged.

The consequences of a failure of the seatback or the fore-and-aft locking mechanism can be catastrophic. If the pilot cannot reach the controls then in some circumstances the aircraft will crash. Let's be quite clear on this — a simple failure or unlocking of the seatback can cause the loss of the aircraft and all on board. A worn or unlatched fore-and-aft lock can similarly cause loss of control. And over the years, several aircraft have been lost for precisely these reasons. Imagine on liftoff, the seat fails and the pilot falls backwards. He is holding the control column and the throttles . . .

These are not hypothetical situations. Such simple failures have caused many serious accidents in the past. Of a total of 27 accidents and incidents on the files of the Bureau of Air Safety Investigation the following are typical:

May 85 Tobago
Seat slid back during taxiing. Pilot could not operate the brakes properly, collided with another aircraft. Cause: seat not locked.

May 84 Cessna 188
The aircraft's tail rose on landing and it slowly overturned. The aircraft was substantially damaged but only minor injuries sustained. Cause: the pilot inadvertently applied harsh braking when she slipped forwards and out of her shoulder harness. Because of her small size, she was not adequately restrained by the harness.

Mar. 83 Cessna 210
During the flare for landing, the seat collapsed. Cause: fatigue of component.

Feb. 83 Aero Commander 680
The back of the pilot's seat failed during the climb. Cause: retaining bolts had sheared due to normal wear.

Feb. 83 Cessna 180
The back of the pilot's seat failed on takeoff. He lost control and the right-hand main landing gear collapsed in the subsequent ground loop. The aircraft was destroyed. Cause: fatigue crack.

Aug. 82 Merlin
As the pilot applied takeoff power, the seat slid backwards. The takeoff was aborted. Cause: incorrect installation of seat.

June 82 Cessna 185
The pilot moved his seat forwards on downwind. The seat moved backwards during landing. The pilot lost control of the aircraft which tipped onto its nose. Cause: seat not locked.

Jan. 80 Piper PA-38
Seat slid back during takeoff. Pilot managed to regain control of the aircraft and land normally. Cause: incorrect installation.

Dec. 79 Cessna 180
Seat lifted off track during taxiing. The uncontrolled aircraft collided with a mound which tore off the right-hand main landing gear. Damage was substantial. Cause: seat and harness not secured.

Nov. 79 Cessna 180
During takeoff the pilot's seat slid rearwards. The pilot was unable to reach the rudder pedals and lost directional control. The pilot closed the throttle and shut down the engine. The aircraft was substantially damaged as it swung around. Cause: seat not properly secured and maintained.

Jul. 79 Cessna 185
The pilot's seat slid off its rails during the landing roll. Cause: stops left out during servicing.

May 79 Cessna 180
During the takeoff run the pilot's seat slid to the rear. The pilot closed the throttle but was unable to maintain directional control. The right wheel dug in and the aircraft tipped over. It was substantially damaged. Cause: seat not locked.

Feb. 78 American Aviation AA5
Seat slid backwards on takeoff. Cause: seat not locked.

May 76 Cessna 172
The pilot's seat slid rearwards and the pilot could not apply the brakes. The aircraft was substantially damaged in an ensuing collision. Cause: seat not properly locked.

Feb. 76 Cessna 180
Pilot's seat slid back on takeoff. The aircraft was substantially damaged in the subsequent ground loop. Cause: seat incorrectly fitted.

Jan. 76 Mooney 20
The pilot's seat slid backwards as power was applied for takeoff. The aircraft veered off the runway. Cause: seat not locked.

*The relatively high proportion of occurrences involving tailwheel-configured Cessna aircraft is noteworthy.

For whatever reason, the failure or movement of the pilot's seat can be catastrophic. Most of the above pilots survived unscathed. The main reason for this was that the seats failed or slid during taxiing or early in the takeoff roll, when power was applied. This will not always be the point of failure although it is the most likely.

Consider again our scenario of seat failure on liftoff. It has happened at least three times that I know of. One was a first solo:

The student taxied back to the holding point. So far, it had been a reasonably consistent period of circuits although he was annoyed at his stupid mistakes — particularly forgetting the downwind call. The instructor looked across at the student and grinned reassuringly: 'Do the next one on your own.'

The student felt both excited and unsure. He knew he could fly all right, but up there, alone? He swallowed, wiped his palms on his trouser-legs and smiled back weakly.

'Don't forget to listen for instructions from the Tower and take your time. If you are not happy about the approach — go around. You're in command, good luck.' The instructor climbed out of the aircraft, secured the harness and locked the door. He stepped down off the wing, gave a 'thumbs-up' and slapped the fuselage.

The student looked at the empty seat next to him with a mixture of relief and apprehension. He double-checked the pretakeoff vital actions, changed to Tower frequency and called 'Ready'.

After the Cherokee on short final had passed, he lined up. He felt good but his palms were still sweaty. He wiped them once more, checked the Cherokee was clear, confirmed his clearance and opened the throttle wide.

The 150 accelerated smoothly and he felt the thrill of the takeoff roll. No matter how often he did it, it always had the same effect. The aircraft seemed to leap ahead and although he could have rationalised the cause as being the reduced weight, he was more interested in making a good takeoff to justify his instructor's faith in him.

He could feel the flight controls becoming effective as he maintained a presentably straight takeoff roll. He eased back on the control column and the nose came up towards the takeoff attitude that his instructor had drummed into him. This was going to be his smoothest takeoff yet.

He felt the weight of the aircraft lifting off the wheels and he was about to look along the side of the nose to maintain runway direction when his seat gave way.

It took a split second to comprehend what was happening. He was falling backwards. He still had the controls in his hands. The nose of the aircraft was rising. He could no longer see the horizon. In desperation he let go of the controls and as he fell, he grabbed the throttle.

With the throttle closed, the nose of the aircraft immediately began to pitch down, although he couldn't see this. The airspeed decayed and the aircraft touched down nosewheel first and bounced. By now much of its energy was dissipated and the second touchdown was firm but permanent. The aircraft swerved sideways and stopped in a very short distance.

There was a smell of burnt rubber. Only then did he realise the engine was still ticking over although he knew the propeller must have touched the ground during the landing. He pulled the mixture control and switched off the ignition and battery switches. He suddenly awoke to the noises and bustle around him — the siren, the voices and the spraying liquid. Somebody swore and told him to get the hell out of there. He felt a bit panicky as he undid his harness and struggled with the door. The door was almost wrenched out of his hands and a massive gloved fist reached past him and turned off the fuel cock.

When his feet touched the ground, they felt remote and his legs wavered when they first took his weight. He was overwhelmed with relief and a joy-to-be-alive. His hands shook visibly. His voice was similarly unfamiliar and uncontrolled.

The instructor reached the wreck as the fire crew were jokingly supporting the wavering and, by now, rapidly talking student. The instructor had run the length of the airfield. He looked little better than the student. The tale of the first-solo student is a true one. Thank God he let go of the control column and grabbed the throttle.

The pilot of a Cessna 180 was taking off. As he was about to lift off, the back of the seat failed. He let go of the control column as he fell backwards and his feet lifted from the rudder pedals. He managed to reduce the power to idle and he pulled the parkbrake handle full on. The aircraft ground looped and the right main landing gear was broken off. The propeller hit the ground and the right wing was bent upwards. The aircraft was damaged beyond repair.

Again the pilot had the instinctive reaction to let go of the control column and close the throttle.

A *Digest* reader described the tale of his near-miss, condensed as follows:

On entering the Cherokee 140, I adjusted the seat and thought I had locked it. Shortly after takeoff, the seat suddenly slid back. The nose immediately rose and I had to push on the control column to avoid a stall. I was pushing with all my strength and could not risk taking one hand off for long enough to try to adjust and lock the seat. I waited until the aircraft had climbed a little further and then made a grab for the trimwheel. After several attempts I managed to wind it forward enough to allow me to let go of the controls long enough to adjust and lock the seat.

Once again a potentially disastrous situation — well handled. The nose-up pitching moment was due to the high power setting. The pilot did not want to reduce power until he was safely clear of the ground. Why the takeoff trim setting did not counter the pitching moment is not clear; possibly due to an increasing airspeed. The apparently high control force was probably due to the rearward seat position and the stretch necessary to reach the forward control position. However, at least a partial power reduction would have helped. Quite a dilemma. It is significant that this pilot has unusually long arms. If he hadn't, then his only option would have been to reduce power. He now checks the seat lock on entry and during the pre-takeoff vital actions.

The seat failure accident is a preventable one. Pretakeoff vital actions include 'hatches and harnesses'. When you check the harness make it an automatic action to also check that the seat is locked fore-and-aft, that the seat rake is locked and that the seatback is sound. I check this by trying to slide my bum back and forth and by trying to push the seatback back. In the process I may be causing additional wear on the seat assembly. So be it. I would rather cause a failed seat during a ground test than have it fail at a critical stage of flight.

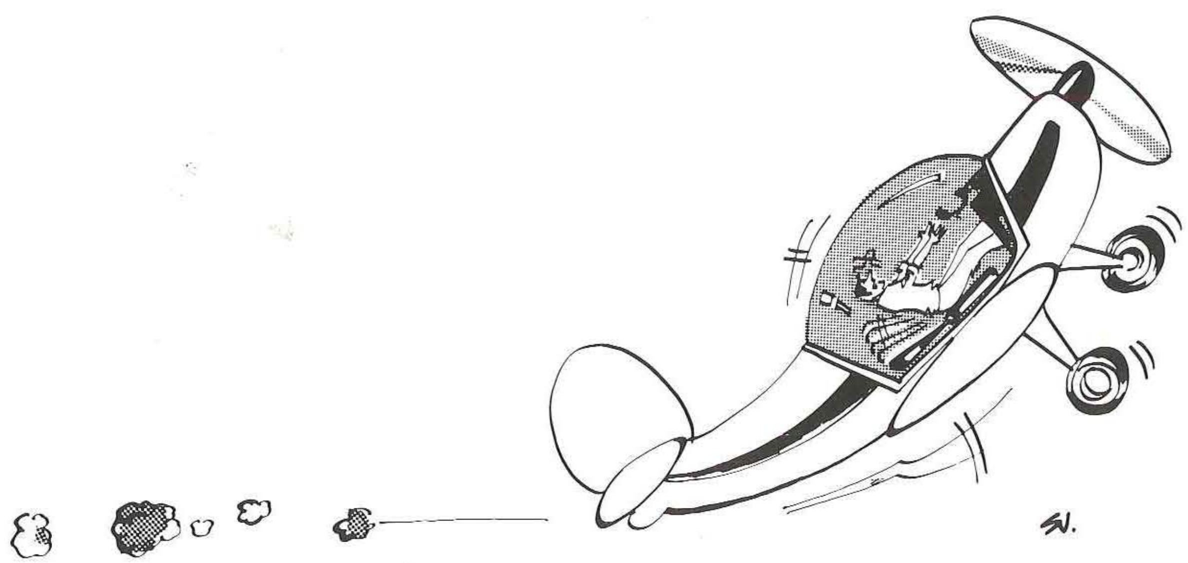
Also check the seat when you first strap-in — and always do it, even if you are only taxiing to the refuelling point.

Perhaps most importantly of all, mentally rehearse the seat-failure situations, so you know that if the occasion arises your reaction will be automatic and correct.

As far as the inflight adjustment is concerned I consider this to be decidely risky. If the seat is correctly adjusted in the first place there should be no need to adjust it in flight. If there is a need, then a second pilot should be in control during the manoeuvre.

Like most elements of the operation of an aeroplane, the care and feeding of seats is important. Thoroughly brief your passengers on how to correctly board the aircraft so as to minimise wear and tear — and include seats as a vital part of any checklist.

As the Cherokee pilot also pointed out, there have been several unexplained accidents where an aircraft pitched nose-up after takeoff, stalled and crashed. Locked controls? . . . or unlocked seat? □



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Aircraft accident reports

Third quarter 1986

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.

Preliminary data indicate aircraft type and registration, location of accident, date, category of flying, pilot licence and rating, and total hours.

Preliminary reports

The following accidents are still under investigation

Fixed Wing

Cessna 172-F, VH-DNU, Goodooga N.S.W., 04 Jul. 86, Instructional — dual.
The pilot in command was continuing a mustering endorsement which had been commenced the previous day. After flying for about 85 minutes the pilots stopped for a break of some 30 minutes. About 75 minutes after flying had recommenced, a person on the ground heard a thump and the wreckage of the aircraft was discovered shortly afterwards. It had struck the ground, in a steep nose-down attitude while spinning or turning to the left, about 270 metres to the south of the strip.

Amer Air 5-A, VH-SYX, Tangalooma Qld., 06 Jul. 86, Non-commercial — pleasure.
The first takeoff attempt towards the south was abandoned because the pilot was uncertain whether the aircraft would become airborne in the distance available. He noted that the windsock indicated calm conditions, and after completing another engine run, elected to take off towards the north. Full power was applied before the brakes were released; however, acceleration appeared to be uneven, reducing as the wheels passed through soft areas on the strip. The aircraft struck a fence shortly after liftoff and touched down in a nose-high attitude. It then bounced several times, struck a mound of sand and debris, and overturned.

Beech A-36, VH-MNS, Caloundra Downs Qld., 26 Aug. 86, Instructional — dual.
A simulated forced landing exercise was planned by the instructor as part of an endorsement onto the type. The exercise was commenced at about 2800 feet above ground level, but because of distractions relating to radio transmissions, engine power checks were not conducted during the descent. When the throttle was opened at about 500 feet, there was no response from the engine. The instructor took control but was unable to prevent the aircraft touching down about 90 metres short of the selected strip. The gear was torn off and the right wing was severed by a collision with a fence post.

Piper PA31, VH-CJB, Cairns Qld., 02 Sep. 86, Non-commercial — pleasure.
The pilot hired the aircraft privately from his employer to conduct a holiday flight during his leave. The journey commenced at Moorabbin on 25 August and the aircraft arrived at Cairns about midday, 30 August, after a stopover at Coolangatta enroute. The pilot and his passengers then spent the next three days at leisure in the Cairns area.

On the morning of the accident, the pilot attended the Cairns Briefing Office where he collected the relevant weather forecasts and submitted a flight plan. The flight plan indicated that the flight would be conducted in accordance with Instrument Flight Rules. It contained a deficiency in that no details were given for the first sector from Cairns to Biboohra. This error was not noticed when the flight plan was submitted.

When the pilot was issued with an airways clearance prior to departure, it was apparent that he did not understand the terms of the clearance, which gave the initial tracking point as Biboohra. The location of this point was explained to the pilot and he subsequently accepted the clearance.

The aircraft was issued with a takeoff clearance which instructed the pilot to turn right after takeoff. Witnesses observed that the aircraft complied with this instruction and headed in a south-westerly direction before turning to the north-west and entering cloud. The cloud base was estimated to be between 2000 and 2500 feet above mean sea level. No further communications were received from the aircraft and a search was commenced that afternoon. The search effort was hampered by the weather and the wreckage was not located until the following afternoon.

Inspection of the wreckage indicates that the aircraft struck the top of a ridge line, 250 metres south-west of Mt Williams, while flying wings level and climbing at an angle of about five degrees.

Amer Air 5-B, VH-IFS, Birdsville Qld., 05 Sep. 86, Non-commercial — pleasure.
The pilot had held a Private Pilot Licence which had expired about six months prior to the accident. He reported that after a normal touchdown, a gust of wind lifted the aircraft off the ground and that it subsequently landed heavily on the nosewheel. The nosewheel strut broke and the aircraft came to rest in a nose-down attitude.

Beech C-35, VH-AKI, Cheepie Qld., 05 Sep. 86, Non-commercial — aerial application/survey.
The aircraft was being operated at between 500 feet and

Piper PA32-300, VH-SBH, Waikerie S.A., 22 Sep. 86, Non-commercial — pleasure.
The aircraft was being flown to Waikerie for a major inspection. While the aircraft was cruising at 2500 feet enroute, the pilot smelt smoke and almost immediately noticed oil streaming over the windscreen. He closed the throttle and commenced an approach to a large paddock. The aircraft was landed without further damage. The pilot vacated the aircraft via the rear door to avoid the billowing smoke from the engine compartment and attempted to extinguish the fire with a portable fire extinguisher. On realising the attempt would be unsuccessful, he collected his luggage from the cabin of the aircraft and cleared the area. The aircraft was subsequently destroyed by fire.

Piper PA25-235, VH-JPT, Burra S.A., 26 Sep. 86, Aerial agriculture.
Shortly after the takeoff run was commenced, a large stone was thrown up by the right mainwheel and struck the spray boom. The pilot dumped the load and returned for a landing. The strip was rough and undulating and during the landing roll the right gear leg collapsed. The right wing then struck the ground and the aircraft ground looped. The pilot turned off the electrical system and vacated the aircraft, but shortly afterwards a fire broke out and consumed the aircraft.

De Havilland DH82-A, VH-ART, Kingston S.A., 27 Sep. 86, Non-commercial — pleasure.
During the takeoff run, the pilot reported that the aircraft encountered a crosswind from the left. Despite the application of left rudder and aileron the aircraft continued to move towards the right of the strip. The pilot attempted to manoeuvre the aircraft over a gable marker but one of the mainwheels struck the marker and caused the aircraft to turn further to the right. The aircraft continued and the lower right wing was torn off after it struck a fence post. The aircraft came to rest 13 metres beyond the boundary fence.

Beech 58, VH-REH, Lawlers W.A., 01 Jul. 86, Charter — passenger operations.
As the aircraft was accelerating to the normal climbing speed after takeoff, the pilot lost elevator control. The nose continued to pitch up until the pilot closed the throttles. He then discovered that he could maintain limited pitch control by the judicious use of power. A successful gear-up forced landing was made; however, during the landing slide, one wing was torn off after it struck a tree.

Beech A23-24, VH-TYY, Cunderdin W.A., 09 Jul. 86, Instructional — solo (supervised).
The pilot was conducting the second leg of his first solo cross-country exercise. He subsequently reported that during the takeoff the aircraft failed to become airborne when expected. Power was reduced in order to abandon the attempt, but the aircraft then momentarily became airborne. The pilot applied forward pressure to the control column to place the aircraft back onto the ground, but a heavy touchdown occurred. The nosegear collapsed and the aircraft slid 183 metres before coming to a stop. After vacating the aircraft, the pilot realised that he had attempted to take off with a downwind component of about 10 to 15 knots.

Cessna A188B-A1, VH-SUA, Rocky Gully, 17 Jul. 86, Aerial Agriculture.
During the course of the day's activities, the pilot had landed at the strip on 24 occasions. The surface was wet and landings had been made with a quartering tailwind. On each occasion, the pilot had stopped the aircraft about 100 metres short of a cattle yard at the end of the strip. The pilot was making his first approach after changing operations to another paddock. The aircraft touched down about 100 metres beyond the previous touchdown area, and despite heavy braking the pilot was unable to prevent the aircraft colliding with the fence of the cattle yard.

Cessna A188-A2, VH-DOD, Munglinup W.A., 31 Jul. 86, Aerial agriculture.
The pilot was engaged in the spreading of urea. During the operation he had observed that the aircraft was not performing as well as normal. He carried out a trouble check and after the completion of some rectifications and an engine run, believed he had rectified the problem. Six more sorties were completed without problem. However, shortly after takeoff on the next sortie the engine again partially lost power. The pilot decided to return and land but during the turn toward the airstrip, the aircraft stalled and impacted the ground with the left wingtip.

Cessna 150-M, VH-TDP, Mt Magnet W.A., 06 Aug. 86, Non-commercial — aerial mustering.
The pilot was attempting to take off from an eight metre wide road. Just after full power was applied, the left maingear overran a windrow on the edge of the road and the aircraft ran off the road. It mounted a one metre high dirt mound and rolled inverted.

Rotary Wing

Enstrom F28-C, VH-IYP, Carlingford N.S.W., 20 Sep. 86, Charter — passenger operations.
The pilot had been conducting a series of joy flights as part of a school fund-raising program. Refuelling equipment was positioned some 100 metres from the passenger loading area. The pilot had offered to take two boys with him as he airtaxied the aircraft prior to refuelling. After takeoff from the passenger area, the pilot decided to carry out a short local flight, but as he turned back towards the fuel dump, the engine lost power. The pilot was unable to reach a cleared area and attempted to land in a street. The helicopter collided with trees, then struck the roof of a house before coming to rest on its side in the driveway of the house.

Bell 47G-3B-1, VH-ANG, Coleman River Qld., 03 Jul. 86, Aerial mapping/photography/survey.
The helicopter was being used in a program of disease eradication in cattle. After operating for about one hour, the pilot flew to a boat anchored in the river and hovered alongside it while signalling to the crew that the aircraft would return in about two hours. Shortly afterwards as the aircraft approached the bank of the river, the pilot realised that the aircraft was not responding to control inputs. He applied more collective control in an effort to avoid flying into the water, but the rotor overpitched and the aircraft struck the water at about 40 knots.

Bell 47G-5A, VH-BHQ, Normanton, 27 Jul. 86, Non-commercial — aerial mustering.
The pilot was engaged in mustering cattle out of thick undergrowth. As he was moving the helicopter slowly forward, while checking the undergrowth for any remaining cattle, the main rotor moved under the overhanging branch of a large tree. The pilot attempted to move the helicopter down and to the right but the main rotor struck the main overhanging branch. The helicopter impacted the ground and caught fire.

Robinson R22-Alpha, VH-UXV, Camden N.S.W., 16 Jul. 86, Instructional — dual.
An exercise in emergency procedures was being carried out in the circuit area. A number of landings were completed, with the instructor simulating a jammed tail rotor pedal. On the last landing, a jammed right pedal was being simulated. After a standard approach for the circumstances, the student flared at about 45 centimetres above the ground at a speed of about 15 knots. As he then began to reduce power, the engine apparently suffered a substantial loss of power and the aircraft landed heavily. The left landing skid dug in and the helicopter somersaulted before coming to rest on its right side.

Agusta 206-B, VH-LED, Mangalore Vic., 17 Sep. 86, Aerial mapping/photography/survey.
The purpose of the flight was to film a moving train. Prior to commencing the operation, the pilot made an aerial inspection of the area and mentally noted the various obstructions. On the first filming run, the helicopter collided with power lines at a height of 33 feet above ground level. The helicopter descended and struck the ground about 50 metres beyond the point of collision. It then bounced and came to rest on its side.

Bell 47G-5A, VH-LEF, Old Delamere N.T., 11 Jul. 86, Aerial mustering.
During mustering activities, the aircraft was operating between 50 and 80 feet above the ground when the engine suddenly stopped. The wind at the time was a quartering tailwind, and during the attempted autorotation the aircraft struck the ground in a tail-low attitude. The tail boom was severed, the aircraft bounced, spun to the right, and came to rest with the landing skids collapsed.

Robinson R22, VH-UXM, Kununurra W.A., 16 Jul. 86, Aerial mustering.
The pilot had planned to operate for 120 minutes before refuelling, and the aircraft had an endurance of 150 minutes. As the aircraft was approaching the refuelling area after a total flight time of 121 minutes, the engine failed. The pilot carried out an autorotative landing, but on touchdown one landing skid became entangled in a large tuft of grass. Believing that the aircraft would roll over, the pilot applied rearward cyclic control. The main rotor severed the tail boom, but the aircraft remained in an upright attitude. Initial inspection revealed that the engine failed from fuel exhaustion, although the low-fuel warning light did not illuminate.

Robinson R22H, VH-UXQ, Kalannie W.A., 13 Sep. 86, Ferry.
As the aircraft was cruising at 2500 feet above mean sea level, the pilot noticed a vibration in the airframe. He reduced the manifold air pressure setting slightly and the vibration stopped. A short time later the aircraft lost directional control and began to spiral to the right. The pilot was unable to stop the rotation and when the helicopter landed, it rolled over.

Initial inspection of the wreckage indicates that the vertical fin, tail rotors and tail gearbox became detached in flight.

Gliders

Burkhart twin Astir, VH-IKV, Bundaberg Qld., 27 Jul. 86, Non-commercial — pleasure.
The glider was being winch launched. The launch was normal until the glider reached an altitude of about 70 feet above the strip when the winch cable went slack. The aircraft was levelled before commencing a descent and the landing flare was initiated at about 10 feet above the strip. The aircraft then stalled, landed heavily and bounced. The nosewheel collapsed during the landing roll.

Final reports

The investigation of the following accidents has been completed

Fixed Wing

Cessna 172N, VH-KZG, Archerfield Qld., 20 Jul. 86, Non-commercial — pleasure, PPL, 141 hrs.
The pilot was making a landing approach in eight knot crosswind conditions. Witnesses reported that the aircraft was flared at a greater height above the ground than normal and it subsequently landed heavily and bounced. The pilot elected to carry out a go-around, applied full power and raised the flaps. Shortly afterwards, the aircraft stalled and struck the ground in a left wing low attitude at about 90 degrees to the runway heading.

The pilot had not flown for several weeks, and had evidently misjudged the height of the aircraft when he commenced the landing flare. After he applied full power to go-around, he had retracted the flaps while the airspeed was still relatively low.

Cessna 182R, VH-PJV, Wando Vale Stn., 21 Sep. 86, Non-commercial — pleasure, PPL, 998 hrs.
The pilot stated that the strip used for landing was aligned into the morning sun. On late final approach, he noticed several kangaroos near the threshold of the strip and decided to land beyond the animals. He reported that just as the aircraft was about to touch down, he saw a small kangaroo and then heard a thump. An inspection of the aircraft revealed that the animal had been struck by the left tailplane.

This accident was not the subject of an on-site investigation.

Piper PA25-235, VH-PPA, Mandurama N.S.W., 01 Jul. 86, Aerial agriculture, CPL/Agric. Cl. 1, 14800 hrs.
The pilot left his home base and flew to the strip from which he intended to conduct top-dressing operations. Shortly after a normal takeoff with the first load of superphosphate, the engine power suddenly deteriorated. The pilot dumped the load and landed in an adjoining paddock, but the aircraft collided with a fence and subsequently ground looped.

No fault was subsequently found with the engine, which was still operating at idle power when the aircraft came to rest.

After arrival at the agriculture strip, the pilot had left the engine idling for several minutes with the carburettor heat selected to the cold position. Atmospheric conditions were suitable for the formation of carburettor icing and it was most probable that this had occurred. The pilot had been in the habit of using reduced power for takeoff, which may have aggravated any tendency for carburettor ice to form.

Beech A36, VH-MGM, St. Marys N.S.W., 10 Jul. 86, Charter — passenger operations, CPL/Cl. 4, 3200 hrs.
On arrival in the circuit area, the pilot assessed the wind to be from the south-west at 10 knots. He elected to land downwind, as ths strip sloped slightly uphill to the north-east. Touchdown occurred about halfway along the strip and the pilot was unable to bring the aircraft to a stop in the distance remaining. The aircraft collided with a fence and came to rest 60 metres beyond the end of the strip.

The strip was undulating, with the slope in the landing direction varying from 2 per cent up to 1.5 per cent down. The average upslope was in the order of 1 per cent and the pilot evidently misjudged the effect this slope would have on a landing in downwind conditions. The aircraft crossed the threshold slightly higher than the pilot desired and it floated for a considerable distance under the influence of the tailwind. After touchdown, the pilot was reluctant to carry out a go-around because of the slope.

Piper PA30, VH-CON, Bankstown N.S.W., 20 Jul. 86, Non-commercial — pleasure, PPL, 224 hrs.
On returning from a flight in the local area, the aircraft was cleared for a straight-in approach. When the gear was selected down, the in-transit light illuminated and stayed on. The gear warning horn sounded and a go-around was made from short final. Following a flypast, the Control Tower confirmed that the wheels were only partially extended. As the aircraft was climbing through about 700 feet, there was a surge of engine power and the aircraft yawed from side to side, mainly to the right. The pilot assumed that the right engine had failed, closed both throttles and made a gear-up landing on the grass alongside the runway. Initial investigation revealed that the gear motor circuit breaker had popped.

This was a known fault with the aircraft, although the pilot had not been alerted to it. Although fuel was found in the right main and both auxiliary tanks, none remained in the left main and the left engine system was devoid of fuel.

During his pre-flight inspection, the pilot had evidently overestimated the quantity of fuel in the left main tank. He had limited experience on multi-engine aircraft and had not been formally checked on asymmetric handling procedures for some four years. Under the circumstances, he elected not to attempt to maintain height on one engine and concentrated on achieving a safe forced landing.

De Havilland DH82A, VH-ASG, Bankstown N.S.W., 02 Aug. 86, Charter — passenger operations, CPL/Cl. 1, 2000 hrs.
The pilot was taxiing the aircraft along a gravel path in the direction of a run-up area for runway 36. The duty runway was 29, and the pilot's request to depart into the north was not approved. A gentle turn was made to join a marked taxiway but before the aircraft reached this taxiway the left wing struck a metal sign.

The pilot was aware of the location of the sign but had inadvertently overlooked its presence.

Maule M5-235C, VH-MEU, Wynyard Tas., 09 Jul. 86, Ferry, CPL/Cl. 1, 1310 hrs.
When the pilot arrived at the destination, the wind was swinging from south to south-west and gusting from 15 to 35 knots. Runway 23 was unserviceable and the pilot later advised that there were no suitable grass areas for an into-wind landing. An approach was made to runway 26, but during the landing roll the aircraft was affected by a strong wind gust. The pilot was unable to maintain directional control, and the aircraft ground looped, collapsing the right maingear.

The pilot was relatively inexperienced on tailwheel-type aircraft. He had elected to make a landing approach after being informed that the present wind was from 190 to 230 degrees at 18 knots. This would have resulted in a crosswind component of between nine and 15 knots, while the maximum allowable for the aircraft type was 12 knots. More favourable landing conditions existed at other aerodromes in the area. The pilot had apparently not considered the possibility of strong wind gusts as he made the approach.

This accident was not the subject of an on-site investigation.

Air Tractor AT301, VH-ODA, Edenhope Vic., 14 Jul. 86, Aerial agriculture, CPL/Agric. Cl. 1, 7900 hrs.
Towards the end of a spraying operation, the pilot manoeuvred the aircraft for a clean-up run. This required flying between two trees before diverting around another tree and pulling up over a power line. The first part of the manoeuvre was accomplished but as the pilot applied rudder to yaw around the single tree, his left foot slipped off the rudder pedal. He then tried to lift the right wing over the tree but the outer section of the wing struck a large branch. The pilot was able to maintain limited control of the aircraft, which touched down heavily in a nearby paddock.

The pilot had experienced some discomfort of his left leg, possibly due to his wearing of shoes with lower heels than those on the boots he normally wore. To alleviate the discomfort, he had placed his foot on the side of the left rudder pedal, from which it had slipped when pressure was applied to yaw the aircraft.

Cessna 150-M, VH-WWS, Coldstream Vic., 10 Aug. 86, Instructional — solo (supervised), Student, 39 hrs.
The pilot had been conducting a series of circuits with touch-and-go landings. Shortly after takeoff for another circuit, the engine lost power. The pilot pumped the throttle and the engine responded briefly, but then failed again. The pilot was committed to a forced landing in an unsuitable area. The touchdown was heavy, the nosegear was dislodged, and the aircraft overturned.

The reason for the loss of engine power was not established.

Rotary Wing

Aerospatiale AS355F-1, VH-NWA, Bankstown N.S.W., 28 Jul. 86, Ferry, CPL-H, 6800 hrs.
During the downwind leg of the circuit, the pilot heard a sharp crackling noise which was accompanied by a vibration in the airframe. He also noted that the transmission oil pressure warning light had illuminated. A precautionary landing was carried out and an initial inspection revealed that a transmission cowling had become detached in flight. The cowling had struck the main rotor disc and a piece of debris had then hit a tail rotor blade.

The design of the latches of the cowling is such that they can appear to be locked when they are actually in an unsecured position. It was possible that the pilot had not fully secured the cowling during his pre-flight inspection. However, the locks were not recovered and the precise reason for the cowling opening in flight could not be established.

A detailed examination failed to reveal any reason for the illumination of the oil pressure warning light. It was likely that the warning was spurious, probably being generated by moisture around the pressure-sensing switch wiring.

Bell 47-G2, VH-KHL, Bankstown N.S.W., 11 Aug. 86, Non-commercial — corporate/executive, CPL-H/Cl. 4 with Flt. Instr., 5180 hrs.
After landing, the pilot was taxiing the aircraft along a marked taxiway between two hangars. Several aircraft were parked in the vicinity and the pilot taxied at a slightly higher level than normal in order to reduce the effects of downwash. He suddenly noted cables just above eye level and banked steeply to the left in an effort to avoid a collision. However, the main rotor blades struck and severed the cables, which were a pair of disused Telecom lines strung between the hangars, and both blades then struck the ground.

The cables were not marked, and at the point where they crossed the taxiway they were 6.6 metres above the ground.

Final updates

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

Fixed Wing

Rockwell 685, VH-MML, Ben Lomond, 20 Jan. 84, CPL/Cl. 1, 670 hrs.
During the flight the pilot reported that he would descend to cruise at 500 feet above ground level. Witnesses saw an aircraft at low level on the expected track and others heard aircraft noise and then the sound of impact. Weather conditions were overcast with low cloud covering the hills. The wreckage was found at an elevation of about 4300 feet above mean sea level. The aircraft had apparently struck the ground while in a steep nose-down attitude and rotating to the right. A fire had broken out and engulfed the wreckage.

Investigation did not reveal any defect or malfunction of the aircraft which might have contributed to the development of the accident. Both engines were operating at high power settings and the gear and flaps were up.

The aircraft had been operating under the Instrument Flight Rules when the pilot reported his intention to descend. Conditions at the destination were suitable for visual flight, and the reason the pilot elected to proceed at a low height above the ground was not determined. It was likely that while cruising below the cloud, the pilot was suddenly confronted by localised adverse weather conditions in the vicinity of the accident site. The maintenance of control of the aircraft under these conditions should have presented little problem to the pilot, who was suitably qualified to operate in instrument conditions. In these circumstances, the precise sequence of events leading to the evident loss of control of the aircraft could not be established.

Piper PA28-140, VH-TVJ, Bankstown N.S.W., 06 Jul. 84, PPL/Cl. 4, 300 hrs.
About five 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 nine 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.

The aircraft had departed with adequate fuel to conduct the flight. The pilot had only limited experience with night operations and had not maintained a detailed navigation log. He had apparently not been aware of the critical fuel state of the aircraft until about 10 minutes before engine failure, which occurred 56 minutes after the position-uncertainty was reported.

Beech 58, VH-SWT, Collymongle Stn., 03 Dec. 85, CPL/Cl. 1, 1000 hrs.
As the aircraft was being rotated for takeoff, the pilot detected a slight loss of performance from the right engine. He looked towards the engine and saw evidence of fire around the air intake on top of the cowling. The takeoff was abandoned, both propellers were feathered and heavy braking was applied. The aircraft overran the strip and entered a very muddy field. The nosegear collapsed and the right engine was torn from its mounts before the aircraft came to rest 110 metres beyond the strip threshold. The pilot rapidly vacated the aircraft and waited for several minutes until rescuers arrived and extinguished the fire.

The subsequent investigation did not reveal any evidence of a pre-impact fire and all fire damage was found to have occurred after the aircraft had come to rest. No positive reason for the reported power loss was established; however, tests showed that the spark from the magnetos was weaker than normal. At the point where the takeoff attempt was abandoned, insufficient strip length remained in which to stop the aircraft.

Conaero LA4-200, VH-XDH, Strahan Tas., 11 Dec. 85, SCPL/Cl. 1, 4900 hrs.
The pilot had not previously landed at the particular area but had carried out a detailed inspection to ensure no debris was present in the water, which was about one metre in depth. Almost immediately after touchdown the nose yawed some 20 degrees to the left and the aircraft pitched forward and overturned. A subsequent inspection revealed considerable damage to the hull below the cabin floor.

The investigation discovered that the right-hand nosegear door had previously been damaged. The repairs carried out had not corrected weaknesses in the door resulting from this damage.

The area selected for landing on this occasion was too short for normal operations, and discolouring of the water prevented the pilot from detecting any obstructions below the surface. The aircraft adopted a nose-low attitude shortly after touchdown, but whether this was pilot induced or the result of striking a sandbank was not established. The resulting pressure of water on the nose area distorted the already weakened gear door and forced the left door sideways into about the normal open position. During the subsequent yaw and overturn, the right wing and nose of the aircraft struck the bottom of the river.

Beech 95-C55, VH-TOE, Coolangatta Qld., 07 Apr. 86, CPL/Cl. 1, 3700 hrs.
Prior to landing, the gear was selected down and a normal gear-down indication obtained. The touchdown was normal but when the airspeed was reduced to about 65 knots, a vibration similar to a wheel shimmy developed. Attempts were made to keep the aircraft straight with brake and rudder but when it was realised that the right maingear was not supporting the aircraft, the right engine was shut down. Investigation revealed that the uplock bracket spring had become detached from the uplock bracket. This along with some corrosion and stiffness in the bracket pivot bolt caused the bracket and uplock not to be withdrawn during the extension sequence. As a result, the extension rod was bent during the extension cycle and the right gear did not extend.

There is no provision made for lubrication of the bracket pivot bolt and no requirement for regular removal and servicing of this item. The pilot was unaware of the gear malfunction due to the design feature of the system which does not indicate gear-leg position but only the extent of gearbox travel.

Mooney M20-E, VH-IJN, Camden N.S.W., 07 Jan. 86, CPL, 4500 hrs.
Approaching the circuit area the pilot selected the landing gear down but the appropriate gear position light did not illuminate. The pilot then noticed that all electrical systems were inoperative. He subsequently advised that he checked the mechanically operated position indicator and was satisfied that the gear was down. Witnesses observed the aircraft making a normal approach but then saw the gear collapse shortly after touchdown. Initial investigation revealed that the aircraft battery was fully discharged.

The aircraft alternator had failed some time previously and the battery had been steadily depleted. However, this situation would not have been evident to the pilot, as the ammeter was defective and showed a steady charge at all times.

The last part of the gear extension cycle results in a very small movement of the position indicator and it is considered difficult to assess the precise position of the gear by reference to the indicator. The aircraft handbook warns that a discharged battery may prevent the gear from fully extending by electrical power. The pilot was aware of this warning but had not employed the emergency lowering procedure to ensure that the gear was locked down.

Air Tractor AT-301, VH-FRC, Walgett N.S.W., 20 Feb. 86, CPL/Ag. Cl. 1, 3280 hrs.
The pilot was making night spraying runs over a cotton crop. During the third run at about 50 feet above ground level, the engine suddenly lost all power. The pilot attempted a landing at slow speed in a flooded cotton field. Almost immediately after touchdown, the aircraft nosed over and sank into the soft muddy surface. The pilot was able to extricate himself from the partly waterfilled cockpit.

The subsequent examination of the engine revealed massive internal damage. It was likely that one connecting rod had failed and this led to similar failures in three other cylinders. The reason for the initial failure was not determined.

The pilot had selected the most suitable area available for the forced landing. When the aircraft overturned, the fibreglass roof of the cockpit failed and cut into the top of the pilot's helmet. Had the pilot not been wearing this protection it was likely he would have suffered head injuries and probably drowned.

Piper PA60-601, VH-CUO, Lismore N.S.W., 11 Mar. 86, SCPL/Cl. 1, 2500 hrs.
When the aircraft arrived in the destination area, another aircraft was also in the circuit. The pilots were in communication with each other and arranged that VH-CUO would land after the other aircraft. However, the pilot of VH-CUO apparently misjudged the relative speeds of the two aircraft. He initiated a go-around from a position on final approach to runway 15 when there was evidently insufficient separation with the preceding aircraft to allow a normal landing. The aircraft remained at a low height above the ground and the pilot broadcast a message that he intended to land in the opposite direction, on runway 33. The wind at the time was from the south-east at about 10 knots. Witnesses observed the aircraft as it tracked along the western side of

the runway. The turn onto base leg was made at an angle of bank of about 60 degrees, and about three-quarters of the way around the turn the nose of the aircraft dropped rapidly. The aircraft then dived steeply to the ground and was destroyed by the impact and subsequent fire.

The subsequent investigation did not reveal any defect or malfunction which might have affected the operation of the aircraft. The pilot was conducting an operation known as a 'bank run', and there is pressure on pilots performing such runs to adhere to the prescribed schedules. The pilot's decision to perform a low level circuit and land downwind was considered to be related to his desire to arrive at the terminal as close as possible to the scheduled time. While conducting the circuit, the aircraft stalled during a turn at a height which was too low to allow the pilot to recover control before impact with the ground.

Piper PA24-250, VH-RJY, Barraba N.S.W., 09 Jun. 86, PPL/Cl. 4, 830 hrs.
The aircraft arrived at the destination strip about 40 minutes after last light. Weather conditions in the area were good, with light winds and clear skies; however, the night was very dark and there was no visible horizon. Witnesses on the ground reported that the aircraft seemed to be at a normal height on the crosswind leg and as it turned onto downwind. However, it was then seen to enter a gradual but steady descent. About half way along the downwind leg, the lights of the aircraft were lost to sight. The aircraft impacted the ground in a straight and level attitude, bounced 118 metres, and then bounced and skidded for a further 216 metres before coming to rest.

No fault was subsequently found with the aircraft which might have contributed to the development of the accident. The pilot lacked recent experience in night operations. He had made only two night flights in the previous 32 months, the most recent being some 11 months prior to the accident. On the downwind leg of the circuit, the pilot had apparently not increased engine power after the gear was lowered. He had also been concentrating on his position relative to the flare path, and had evidently paid insufficient attention to the height of the aircraft.

Piper PA60-600, VH-WRV, Bankstown N.S.W., 10 Jun. 86, CPL/Cl. 1, 2100 hrs.
As the pilot approached his destination, he was advised that he was number three in the landing sequence. A visual, straight-in approach was made in clear, dark conditions. After receiving a landing clearance, a normal flare was made and it was not until the aircraft settled onto the runway surface that the pilot realised that the gear was retracted.

At the end of the landing slide, the pilot turned off the master electrical switch and vacated the aircraft. He had made no attempt to alert the Control Tower to the fact that the aircraft was disabled on the runway. The controller not seeing any lights indicating that the runway was obstructed, cleared a waiting Cessna 172 for takeoff. Only prompt action by the instructor in this aircraft prevented a collision with the stationary aircraft.

Beech 58, VH-NSK, Crooble N.S.W., 30 May 86, SCPL/Cl. 1, 15 000 hrs.
At the completion of one leg of the flight, the passengers disembarked and the pilot prepared to ferry the aircraft to another aerodrome in preparation for the next day's flying. The strip in use was constructed of crushed limestone laid on black soil. The pilot taxied onto the black soil at one end of the strip as he prepared to carry out a 180 degree turn to line up for takeoff. The nosegear entered a hole about 150 millimetres deep, and collapsed.

The area where the nosegear collapsed had been affected by washouts and had gradually become filled with soft silt. There was no indication to the pilot that the area was unsuitable. The owner of the property had no flying experience and was probably unware that the condition of the strip surrounds had deteriorated.

This accident was not subject to an on-site investigation.

Cessna 210, VH-BEC, Ballina N.S.W., 30 Jun. 86, PPL/Cl. 3, 950 hrs.
The aircraft crossed the threshold higher than the pilot desired and touchdown occurred well into the 730 metre strip. After initially running normally along the ground, the aircraft bounced twice before coming to rest in a nose-down attitude. Investigation revealed that the aircraft had landed on the left side of the strip, where the surface was very rough, and the aircraft had suffered a broken nosegear fork. The nosewheel had become detached and the nose strut was pulled away from the firewall.

The pilot was feeling fatigued after completing 7 hours flying for the day. He had elected not to go around when the aircraft was high on the approach, as adequate strip length remained for a safe landing. The rough area of the strip was not visible from the air and the aircraft entered this area at a higher speed than would have resulted from a touchdown at the normal aiming point.

Cessna 180-K, VH-WSN, Caramut Vic., 14 Apr. 86, PPL, 2541 hrs.
On arrival at his destination, the aircraft overflew the homestead. This was the pilot's normal practice, to indicate to persons on the ground that transport from the nearby strip was required. The aircraft was then seen apparently following a gully containing a sunflower crop in which the pilot and passenger were partners. Shortly afterwards the sounds of an impact were heard. The aircraft was found to have struck the side of the gully while in a steep nose-down attitude and probably rotating to the right.

No pre-impact defect or malfunction of the aircraft was found which might have contributed to the development of the accident. However, about 12 months previously, the pilot had applied tape over the stall warning vane, thus depriving him of aural warning of an impending stall. The wreckage distribution was consistent with that which follows a stall at low level where control of the aircraft is not regained before impact. It was likely that the aircraft stalled while the pilot was manoeuvring above the crop, but the precise reason for the stall and subsequent loss of control was not established.

Cessna A150-K, VH-RAI, Coldstream Vic., 13 May 86, Student, 28 hrs.
The pilot was conducting a series of solo circuits and landings into a wind of 10 to 20 knots, with occasional gusts to 25 knots. On the third approach, the aircraft had been flared for landing when it suddenly ballooned and a wing dropped. Full power was applied but the aircraft sank heavily to the strip and the nosegear collapsed.

The student pilot had reacted correctly when a sudden wind gust was encountered; however, he had been unable to prevent a heavy touchdown.

This accident was not the subject of an on-site investigation.

Beech C23, VH-MRC, Echuca Vic., 05 Jun. 86, RPPL, 365 hrs.
Following a dual check on circuits and landings, the pilot carried out some upper air work before returning for circuit practice. The weather conditions were fine, with light and variable winds. A normal approach was flown but the aircraft bounced slightly on the initial touchdown and this was followed by two further bounces of increasing magnitude. The pilot persevered with the landing attempt but the propeller struck the ground and the nosegear collapsed before the aircraft was brought to a halt.

This accident was not the subject of an on-site investigation.

Cessna 210-L, VH-SRJ, Ascot Vic., 09 Jun. 86, PPL, 254 hrs.
The pilot's flight plan indicated that he would reach his destination 20 minutes before last light. During the flight, this estimate was amended to seven minutes before last

light. As the enroute weather was satisfactory, the pilot proceeded as planned. However, about 10 kilometres from the aerodrome, rain showers and deteriorating visibility were encountered and the pilot did not consider it safe to continue. There was insufficient daylight remaining to reach the planned alternate aerodrome and the pilot elected to carry out a precautionary landing on a sealed stretch of road. The aircraft touched down normally, but then began to drift to the right. A go-around was initiated but the tailplane struck a fence post. The force of this impact almost tore the tail section from the aircraft. The pilot felt the impact but was unaware of the extent of the damage until after he had landed the aircraft in the adjoining paddock.

The road on which the pilot had attempted to land was narrow, and the approach had been made in crosswind conditions. The pilot had limited experience on the type and had been unable to maintain directional control under the existing conditions.

Piper PA32-RT300, VH-MSX, Fraser Island Vic., 08 Jun. 86, PPL, 80 hrs.
The pilot was approaching to land into the south. The wind at the time was from the south-west and gusting to about 30 knots. The first half of the strip was sheltered from the wind by a solid line of tall scrub and trees. The aircraft did not touch down when the pilot flared for landing and a go-around was initiated. At a height of about 10 feet and passing abeam of the end of the sheltered area, the aircraft suddenly moved violently to the left. The nose dropped sharply and the nosewheel dragged on the ground for some 10 metres before the pilot was able to continue the go-around. A diversion to a more suitable aerodrome was made, where a post-landing inspection revealed that the nosegear had been bent sideways by the previous ground contact.

Because of the turbulent conditions, the pilot had approached at about 10 knots faster than normal. The strip was relatively short and the general crosswind in gusts was probably above the maximum for the type. A post analysis of the weather conditions indicated that wind gusts in excess of 50 knots may have occurred in the area.

Rotary Wing

Bell 206B, VH-FHB, Sydney N.S.W., 05 Aug. 84, CPL-H/Cl. 4, 375 hrs.
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.

No mechanical fault or defect was found with the helicopter which might have contributed to the development of the accident. It was considered likely that the aircraft experienced the phenomenon known as 'tail rotor breakaway', which results in an uncommanded yaw to the right accompanied by a steep nose-down pitch change. The pilot was aware of the phenomenon and had read various articles on the subject. However, much of the information available at the time was of a confusing and conflicting nature and the recovery action employed by the pilot on this occasion was ineffective.

Hughes 269-C, VH-TES, Cloncurry, 02 Apr. 86, CPL-H, 1720 hrs.
During a mustering operation at 100 feet above ground level, the pilot noticed an unusual vibration in the aircraft. He decided to land in a nearby clear area to investigate the source of the vibration. As the pilot commenced the approach, the engine suddenly oversped and the pilot immediately commenced an autorotational descent. The aircraft touched down while still moving sideways and rolled over.

Inspection of the aircraft found that the short drive shaft from the engine to the transmission had failed. The failure was the result of the shaft overheating due to a lack of lubrication when the grease-retaining boot on the drive shaft adaptor fell off. The clamp that held the boot in position was not found and the reason the boot was lost could not be determined.

This accident was not the subject of an on-site investigation.

Bell 206B, VH-LAQ, Cunnamulla, 12 Jun. 86, CPL/Cl. 1, 6052 hrs.
The helicopter was engaged in an inspection of the oil pipeline between Jackson and St. George. The inspection involved landing at various points along the pipeline to allow the technicians to check the pipeline. As the aircraft took off after an inspection stop, the front passenger warned the pilot about the position of a power line. The pilot attempted to take avoiding action but the aircraft struck a power line. Control of the aircraft was lost and it struck the ground in a nose-low attitude and rolled onto its right side. A section of the helicopter's transmission was torn from the aircraft and struck the front seat passenger.

During the day the flight had been delayed by problems with the inspection schedule and aircraft fuelling. While waiting in the aircraft for the technicians to complete their task, the pilot was involved in flight-planning the next stage length to St. George to arrive there before last light. The pilot reported that he had seen the power line during the previous landing sequence but had forgotten about its presence on takeoff.

Bell 205-A1, VH-UHP, Falls Creek Vic., 09 Feb. 86, SCPL-H/Cl. 1, 6250 hrs.
A group of five firemen had finished a task in a fire-fighting area and were to be winched out from steeply sloping terrain. The helicopter hovered at about 30 feet while the first two men attached themselves to the dual winch hook. They were then raised to the aircraft, following which the next fireman was also lifted. The remaining two men then attached themselves to the hook. The operation proceeded normally until the men were close to the skids of the helicopter. At this point the winch cable broke and the men fell to the ground.

An inspection of the cable revealed that it had come off one of the pulleys of the hoist and became jammed. Fraying of the cable had occurred and it had finally failed in overload at a point some four metres from the hook. A number of kinks were found in the cable, possibly resulting from the operator's maintenance and inspection procedures. Such cable twisting would have increased the possibility of the cable riding over the edge of the pulley, particuarly when the cable was not under tension. Such a situation would occur when extra cable was paid out to assist with the attachment of the cable to a person's lifting harness. The length of frayed cable was consistent with this sequence happening on the hoist on which the accident occurred.

This accident was not subject to an on-site investigation.

Gliders

Scheibe SF25C, VH-GXM, Cunderdin W.A., 14 Jun. 86, Glider, 289 hrs.
The student pilot was being checked on the Motorfalke powered glider. At about 50 feet above ground level, the instructor shut the engine down to simulate an engine failure. The student elected to land the glider straight ahead on the remaining runway and the instructor being satisfied with the student's initial actions directed his attention to stopping the propeller in the horizontal position. The student fully opened the spoilers and a high rate of descent was set up. The instructor took control of the glider but was unable to arrest the high rate of descent and a heavy landing resulted.

Lighter than Air

Colt 240, VH-NMS, Alice Springs N.T., 15 Apr. 86, Balloon, 240 hrs.
Following a 30-minute flight, the pilot landed the balloon and the passengers waited in the basket for the retrieve vehicles

to arrive to affect a passenger changeover. During this period a strong wind blew up, caught the balloon and dragged it towards trees. The pilot advised the passengers to adopt a crouch position and operated the burner to apply heat to raise the balloon. The balloon climbed steeply, cleared the trees, then descended rapidly, bounced, and the basket began oscillating about 30 degrees either side of vertical. The pilot was thrown out of the basket and 10 of the 11 passengers received injuries, although all remained in the basket. The balloon continued to be blown along the ground and one of the passengers climbed into the pilot's section of the basket and applied heat; this took the balloon aloft. The pilot chased the balloon and after one of the retrieve vehicles located him, he was able to contact the balloon by radio and relay instructions on the use of the burner to the passenger. The balloon landed about 3.5 km from the position it had been waiting to changeover the passengers.

Corrigendum

The following is an amended version of the narrative of an accident report described in the 'Final updates' section of Aviation Safety Digest *130.*

De Havilland DH82-A, Bond Springs N.T., Jan. 86, SCPL/Cl. 4, 3600 hrs.
Analysis of a video recording, taken of the takeoff run by the occupant of the front seat, indicated that the aircraft became airborne after a ground roll of about 18 seconds. The aircraft then continued in the direction of takeoff for a further 11 seconds at what appeared to be near to takeoff speed. The aircraft did not climb away. It was not clear from the recording whether or not the aircraft was airborne throughout the 11 seconds. At the end of this time, however, the aircraft was on the ground and it then veered sharply to the right. At the time, the prevailing wind was a left quartering crosswind. The pilot was unable to regain directional control and the aircraft ran off the side of the strip and struck an embankment before coming to rest inverted.

No defect was found with the engine or flight controls and the aircraft weight and centre of gravity were within the required limits. The aircraft had been fitted with a braking system and had recorded 27 hours in service since the modification. An examination of the brake shoes revealed an excessive rate of wear to the left brake shoes, and a cable within the braking system was found to be incorrectly adjusted. However, whether these defects contributed to the development of the accident could not be established.

The reason for the loss of directional control was not determined.

In the corrigendum contained in the Accident Report section of Aviation Safety Digest *130 there was a corrected narrative regarding a glider/tug accident in Tasmania. Unfortunately, it contained a typographic error. The corrected report is as follows:*

Czech Blanik L13, Woodbury Tas., Aug. 84, Glider, 232 hrs.
The student glider pilot had carried out three previous flights during the day. Her instructor had informed her that she was at a suitable stage of training to be introduced to practice emergency procedures. After sighting her training log book, the instructor for the final flight left the glider to speak to the pilot of the tug aircraft. The instructor returned to the glider and preparations for takeoff were then continued.

Witnesses observed that the tug and glider became airborne and subsequently carried out normal turns to position the aircraft on a downwind leg at about 500 feet agl. The tug aircraft was then seen to waggle its wings sharply three times. Almost immediately this aircraft assumed a steep nose-down attitude, its tail apparently being pulled into a vertical position by the tow rope which was still attached to the glider. The glider then also assumed a steep nose-down attitude and both aircraft spun or spiralled towards the ground. The tow rope was released from both aircraft, but neither pilot regained control before impact with the ground.

The subsequent investigation did not disclose any defect or malfunction with either aircraft that might have contributed to the development of the accident.

During glider towing operations when the pilot of the tug waggles the aircraft wings, it is a signal to the glider to immediately release from the tow. This 'wave-off' signal would normally be given when the tug pilot detects some malfunction or when the glider is sufficiently far out of position behind the tug to affect the tug pilot's control of his aircraft.

On this occasion, it was considered possible that the instructor in the glider had arranged for the tug pilot to simulate an emergency by giving a wave-off signal. The wave-off signal was observed to be given in the normal position relative to the strip for such training manoeuvres to be performed. The reason for the subsequent loss of control of both aircraft could not be determined. However, it was evident that when the aircraft released the tow rope there was insufficient height remaining to permit recovery to normal flight.

Probable significant factors
There was insufficient evidence available to determine the precise cause of the accident. Nevertheless, the following were considered to be probable factors in the development of the occurrence:

1. The gliding instructor and the tug pilot arranged to give the student a practice emergency.
2. When the wave-off signal was given, the glider did not immediately release from the tow.
3. Control of both aircraft was lost at too low a height to permit recovery.

Aviation Regulatory Proposals

Aviation Regulatory Proposals (ARPs) are an important means by which the Department consults with industry about proposed changes to operational legislation and requirements. Copies of all proposals are circulated to relevant organisations, and occasionally to individuals for information and comment. The comment received provides a valuable source of advice which greatly assists the Department in the development of the completed documentation.

Each edition of the *Digest* contains a listing of those ARPs circulated since the previous edition.

Should you wish further information about any of the ARPs, please contact your industry organisation.

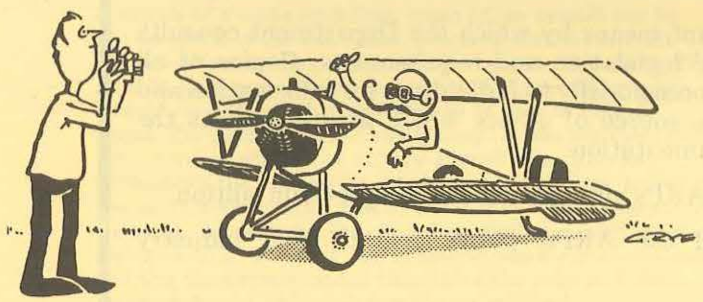
Number	Subject	Status
86/7	Aircraft Weight and Performance Limitations	Issued 27 August 1986 Comments due 15 December 1986
86/10	Authorised Landing Areas used for ab-initio flying training	Issued 30 June 1986 Comments are under consideration
86/12	Operation of Hang Gliders in Military Control Zones	Issued 26 August 1986 Comments due 1 October 1986
86/15	Fuel Requirements	Issued 20 October 1986 Comments due 14 January 1987
86/16	Life Jackets	Issued 20 October 1986 Comments due 31 March 1987
86/17	Second Pilot Instrumentation	Issued 16 October 1986 Comments due 31 January 1987

Nikon

AVIATION PHOTOGRAPHIC COMPETITION

The Digest is pleased to announce its second photographic competition for aviation enthusiasts.

The competition is designed to encourage an awareness of safety related matters in the field of civil aviation. It is also to promote a high standard of photography of aviation subjects which may be used to maintain the quality of presentation and reader participation in the Aviation Safety Digest. The competition is sponsored by Maxwell Optical Industries Pty Ltd, the Australian distributors of Nikon photographic equipment.

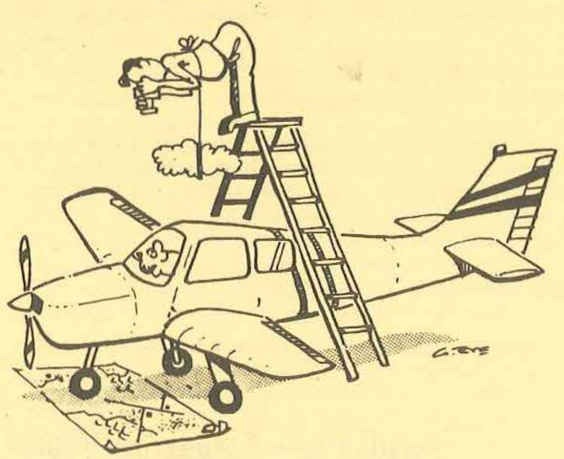


Three categories will be judged:

Category 1 — For the best print or transparency on the general subject of Australian civil aviation or Australian civil aircraft. The judges' emphasis in this field will be photographic and artistic quality.

Category 2 — For the best picture illustrating a safety aspect or an unsafe aspect of Australian civil aviation. A clue in this field is that the primary contributory factor in aviation accidents is the 'human factor'. The judges' emphasis will be the 'message' and how well the photographic design conveys that message.

Category 3 — There will be a specific prize for the best monochrome print. Black-and- white photographs in particular are a valuable contribution to the Digest. The judges will look for photographic skill and artistic composition which best exploits the unique quality of the black-and-white photograph.



Three prizes will be awarded as follows:

Category 1 — A Nikon F-301 Program/Motor-Drive Camera with a 50mm f1.8 lens.
Retail Value: A$1,035.00. This is a state-of-the-art automatic camera with manual reversion and integral film-wind.

Category 2 — A Nikon FG-20 Auto/Manual Camera with a 50mm f1.8 lens.
Retail Value: A$725.00. The FG-20 is a 35mm single-lens reflex with aperture priority exposure and manual over-ride.

Category 3 — A Nikon L35 AWAF Auto-Focus camera with built-in flash.
Retail Value: A$595. This is the rugged, waterproof, fully automatic Nikon with built-in motor-drive.

Entries close with the last mail on Friday, 26 June 1987 and should be addressed to:

Photographic Competition
Aviation Safety Digest
GPO Box 367
CANBERRA ACT 2601

CONDITIONS OF ENTRY:

Any number of entries may be submitted in any or all categories.
Prints should be gloss finished and preferably be about 13cm × 18cm although any format is acceptable. Transparencies must be mounted.

Entries must be accompanied by the entry form enclosed in the centre section of the Digest or available from the Safety Promotion Liaison Officer in any Departmental Regional Office, Pilot Briefing Room and most Photographic stores.

Entries should be clearly marked — PHOTOGRAPHIC MATERIAL — DO NOT BEND.

The competition is open to all Australian citizens with the exception of staff from the Safety Promotion Section of the Department of Aviation and employees of Maxwell Optical Industries, and their immediate families.

The Digest reserves the right to publish once, any entry received in this competition. Any further publication will be with the express permission of the photographer concerned. Winning entries become the property of the Department of Aviation. The Digest will take every care with entries but cannot accept responsibility for loss or damage. Selected entries will be temporarily retained by the Digest for a display to tour major aviation venues. If entries are to be returned, please include return postage.

The judging panel will consist of:
the editor of the Digest;
a photographic specialist from outside the Department, familiar with aviation subjects, and
a representative from the Bureau of Air Safety Investigation.

The judges decision will be final.

ENTRY FORM FOR THE DIGEST PHOTOGRAPHIC COMPETITION

TO: Photographic Competition
Aviation Safety Digest
Department of Aviation
GPO Box 367
Canberra, ACT 2601

ENTRIES CLOSE: Last Mail,
Friday,
19 June 1987

Results will be published in the Spring edition of the Digest

Dear Sir,

Enclosed is an entry for the Aviation Safety Digest Photographic Competition. Details are as follows:

Category of Entry: .... Film Size and Type: ....

Camera Type: .... Caption or Title: ....

Description of the Photograph and Theme: ....

....

Name of Entrant: ....

Address: ....

....

I do/do not wish the photograph to be returned (return postage enclosed?)

I agree to be bound by the conditions of entry as described in the advertisement

.... *(Signature)* .... *(Date)*

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AIRFLOW

Sir, I read with interest the article in *Digest* 129 titled 'Overstressed'. I noticed a mistake in the article and an omission which I feel is of great importance and should have been discussed in the article.

The mistake is where you refer to the PA28's maximum positive load factor in the utility category being 3.8 g. An aircraft must have a positive load factor of 4.4 g to be certified in the utility category. The PA28 does meet this requirement [for the utility category] or can operate in the normal category with a load factor of 3.8 g.

The omission is in not mentioning the effect of flap on the load factor. While the PA28 manual does not state flap position when it gives the maximum load factors, both the PA38 and the Cessna 152 manuals give positive load factors with flaps up and flaps down. The flaps down load factor is nearly 50 per cent less than with flaps up, i.e. with a flaps up load factor of 3.8 g the load factor with flaps down is around 2.0 g.

As the article mentions that the pilot had over half flap selected I feel that the above information is pertinent and should be mentioned in a later edition.

DONAL SMITH

You are quite correct, Donal. The Warrior has been accepted in Australia under the terms of ANO 101.22 which requires that the aircraft meets the criteria specified in the U.S. design code, CAR 3. CAR 3 lays down the structural standards for the normal category and the utility category. Under the U.S. Regulations for the certification of light aircraft, the manufacturer is required to provide a structure which can safely withstand a positive manoeuvring load factor of 3.8 g for it to be certified in the normal category and 4.4 g for it to be certified in the utility category. Further the structural design must provide a safety margin by tolerating a load 1.5 times these figures before failure.

Under the terms of CAR 3 the structural integrity of the Warrior with the flaps *fully* down must cope with a manoeuvring load factor of 2.0 g. This value also carries the '1.5 times' margin before failure.

Most manufacturers include this figure in the flight manual. For some reason Piper does not. You may assume that the Warrior has a positive load factor limit of 2.0 g, flaps down.

The Warrior in the article had only partial flap deflection and could probably withstand a load slightly greater than 2.0 g. To experience the damage that it did, it was probably subjected to a positive load factor well in excess of 2.0 g, and perhaps in excess of 3.0 g. This pilot was in a regime where the primary structure could have been close to catastrophic failure.

Of more concern to me are three other aspects:

1. Aircraft used as trainers and which are hence more exposed to unusual attitudes and misapplied recoveries, do not have a display or a record of applied load factor. The onus is on the pilot to be sensitive to load factor and to report any suspected overstresses. Our lives depend on each other's integrity in this area.

2. The load factor limits above are for symmetrical loads — any additional rolling moment, that is any aileron input can cause one wing to be overstressed even if the total load is within limits.

3. Another insidious aspect of load factor is the sensitivity of the pilot to the rate of application of the g-force. The pilot may snatch-pull a very high load factor and immediately release it — he will have felt only part of the force before it was released. The structure feels every bit of it.

A pilot in the predicament described in the *Digest* article can only do whatever is necessary to survive. In the process he risks damaging or breaking the airframe. Indeed many of the 'VFR into IFR' accidents result in the catastrophic failure of the structure before impact. A normal category aircraft has sufficient strength to accommodate the loads of normal flight plus a reserve margin. Any loss of control at the upper end of the speed range places the pilot in a grey area between safe recovery and airframe failure; and I include here the upper end of the flap speed range as being just as risky.

In the example it appears that the pilot was in this situation and did indeed apply both elevator and alieron to regain a level attitude. I would suggest that the combination of speed and control inputs exceeded the aircraft's structural limits.

Of further concern is the non-detection of the failure. I would suggest a post-flight inspection as a worthwhile habit at any time — I do it so I can detect any unserviceabilities in time to have them fixed before the next trip (it is particularly useful for detecting stone damage to the propeller or airframe; or oil, fuel or hydraulic leaks). After an incident like this a LAME inspection would have been an investment even if the pilot's check showed nothing obvious.

I thank you for raising these important aspects of the article □

Pilot workload — the final straw?

LOGICALLY, all controls in an aircraft are located so that the pilot can identify, reach and operate them with ease. Take for example the primary flight and power controls — the control column in the left seat is located so that it can be easily operated by the left hand and the power levers are located so that they can be easily operated by the right hand. Therefore, one does not interfere with the other.

Next, because of the almost continuous need to keep the left hand on the control column, other ancillary controls are usually located for operation by the right hand when it is not occupied with the power levers. Such an arrangement is logical and functional.

Problems can arise though when it is not possible to locate the less important controls in their ideal position because of space, access or routing. In some cockpits the trimwheel is on the left; in others the light switches are only easily operated by the left hand. In these instances the pilot has to change hands at least momentarily, to operate the system.

The problem is compounded in IMC and when the pilot also has to manage the 'paperwork' or use a computer or write something down. We left-handers have particular problems as we have to change hands on the controls every time we wish to write. Add to this already high workload and we are running into problems — big problems.

Consider the plight of the lone pilot conducting an instrument approach into an airport for the first time. The weather was lousy — rainshowers, turbulence and reduced visibility. The main cloudbase was 1000 feet so there was no expected problem getting in. However, she was having to work hard to fly within reasonable tolerances.

Passage over the NDB was accurate under the circumstances and the pilot entered the holding pattern to lose altitude and to carry out the approach checks. There was a marked drift in the pattern and she mentally noted the expected wind for the letdown and that the duty runway would necessitate a circling approach from the minima.

She double-checked the QNH and the station ident and left the coding on low volume. Next she organised the letdown plate and her checklist on the clip board on her lap. She noted down the ATIS and attached the piece of paper to the board. The freezing level was forecast to be at 4000 feet and she selected the pitot heat on before entering the next layer of strato-cumulus cloud. There was no lightning about but there was a good chance of rime icing. She hoped that there would be no need to hold in cloud.

She checked that the fuel was sufficient for an approach and a diversion to the nominated Alternate. She checked the trim indicator and disengaged the autopilot before descent. The lower cloud looked lumpy and she would prefer to get used to manually flying the plane before reaching the minima. Because of the need for a circling approach, she elected to lower the gear before descent to minimise her workload during the final leg.

Checks complete, she concentrated on getting a good 'overhead' before descent. Over the Aid, she confirmed her altitude, checked the carby-heat position and reduced power. Already she was having to make large corrections to stay within 5 degrees of the outbound track. The turbulence was getting worse and the rain was making a fair amount of noise on the airframe. A small leak near the VHF antenna above her head was causing an annoying drip, drip, drip of water on her forehead and this was running into her eye.

She wiped her brow with the back of her right hand and 'sweated' on the flight instruments. The ADF needle was wandering occasionally but the ident was still good.

The water dripped onto the letdown plate making a distracting little splodge right over the 'circling minima' column. She had already noted the minimum altitude. The noise of the rain was getting worse and the turbulence was continuous — shaking and bouncing the small aircraft like a toy.

As she turned inbound, the buffeting became momentarily worse and it needed large, sudden control inputs to maintain a sensible attitude. She noticed a distracting flash over her left shoulder and before she realised it was the reflection of the strobles on the large water droplets, her heart missed a few beats and her stomach tightened.

Steady inbound now, she double-checked her altitude, kept the wings level and peered through the wall of shimmering water. She could make out vague shapes of dark colour below but she could see nothing ahead. The descent was approaching the minima and this approach required an immediate overshoot if the field was not in sight at the minimum altitude. She did not fancy climbing back through it all and she anxiously searched ahead for a familiar pattern of runways and buildings — she had studied the aerodrome diagram and knew what to expect from this viewpoint.

Almost simultaneously, the turbulence reduced and the rain became broken. As she broke out ATC called a change of wind direction and asked her intentions from the minima. She picked up the 'mike' to reply as she sighted the runway off to her left. It was tight. She dropped the mike, grabbed for the flap lever and S-turned onto finals.

It is always in situations like this that the blessed aeroplane just doesn't want to slow down. She managed to get the speed within 10 knots of the planned threshold speed as she crossed the piano keys. She knew she had adequate runway available even at that higher speed.

She was gingerly testing the brakes when the Tower blithely asked if she had decided what her intentions were from the minima. She couldn't remember whether she had received clearance to land. She thought it ironic that this uncertainty now caused her more concern than any other aspect of the flight.

The microphone was still on the floor.

I would like you to imagine this same letdown with two further complications:

- The aircraft concerned is not alone in the pattern
- There are concerned passengers who interrupt occasionally in the hope of gaining some reassurance

The pilot's workload is now getting seriously high. There is an additional frequent need to communicate with ATC and with the other aircraft — each time requiring the pilot to reach down and pick up the microphone. During this time the pilot's right hand is not available to adjust the throttles, lower the wheels or trim the aeroplane. The microphone gives no feedback or side-tone and in these conditions, the pilot is not really sure what and how well he is transmitting.

In the meantime he occasionally has to shout to his passengers to ease their concerns or to tell them to shut-up, if necessary.

Add an additional requirement to write down a clearance limit, set an assigned altitude or make a frequency change and the pilot is now akin to the 'one-armed paperhanger'.

Now make the pilot left-handed so that every time he wants to write he has to change hands on the controls — he ends up with a pencil in his left hand between his fingers, and that hand is holding the controls. He picks up the microphone to transmit with his right hand. The reply has to be written and read back. The right hand, still holding the mike, grips the controls somewhat insecurely and the left is now free to write. Or after each call, he places the mike back in its holder before changing hands. It all takes time and during this procedure the aeroplane is making its own decisions about which way is up.

Now, just as he changes hands to write the information, give him an engine failure . . . (real CFI stuff this).

The point I am trying to make is that a pilot — even one as competent as our example — has a high enough workload as it is. Don't make it any harder. Our pilot had planned ahead and was organised before the descent from the initial approach fix. Even then, the workload was high enough to make her susceptible to error with only a minor increase in distraction.

She coped well. She may have had an easier time of it if she had a headset and a press-to-talk button on the control wheel — one easily reached with the thumb of the left hand while flying normally. Such a system allows communications with no additional workload. The pilot hears via the sidetone, what he has said and how clearly. It may be garbled in the transmission but it is better than having no clue at all. Similarly, a system which allows the pilot to talk to his passengers via an intercom also allows him to talk in a normal calm voice without increasing his workload. The passengers are better soothed. At the same time, passengers without an intercom can be excluded from the pilot's audio environment.

With a headset, the pilot can better hear and understand incoming calls without the interference of cockpit noises. Similarly the pilot's transmissions are easier to understand when the microphone is held in the optimum position in front of his mouth. The headset does this for you.

The argument against headsets has been that cockpit audio warnings can be lost. Maybe so. The audio warnings should be accessible via the headset. If not, I am not concerned. I'll tell you why:

- The simple stall warning system is not always a valid warning anyway, i.e. it often sounds during turbulence and perhaps during takeoff and landing so it becomes less alarming.
- There are 'natural' stall warnings.
- The undercarriage 'not down' warning operates when the throttle is closed below a certain value which is often on landing, i.e. when it's not too late to do anything about it.
- The more complex warning systems can be operated through the headset and combine audio with visual warnings.
- Even complex alarms have not eliminated the possibility of landing 'wheels up'.

As you can guess, I am strongly against hand-held microphones and I urge you all, even if you are right-handed, to use a headset and press-to-talk button. Be a two-armed paperhanger □

Circuits and bump

A DECISION made under the pressure of time has to be made, for better or worse. It can't be put off. The chances of this decision being a correct one can be dramatically improved by mentally rehearsing the possible and probable emergency situations and by imagining the possible consequences of each course of action.

If you then reinforce the selected course of action:

- by discussing it with your instructor and colleagues
- by rehearsing it in your mind
- by sitting in the aircraft and going through the physical motions in conjunction with your mental rehearsal
- by practising in a simulator

when the real emergency arises, your actions (the ones already selected as being the most correct in those circumstances) become almost automatic. This not only saves valuable time, it reduces the mental workload and allows you to be planning your landing, advising air traffic services or briefing your passengers while you are coping with the situation.

Perhaps the most critical phases of flight are takeoff and landing. However, they are made even more critical in three particular situations:

- a go-around from short final
- an aborted takeoff
- a touch-and-go.

The reason for this is the high workload — the pilot has to complete a complex series of correct actions and correct judgments in a very short space of time. There is a reduced margin for error and there are usually several distractions.

The touch-and-go is at least preplanned, but on a marginal length runway or if the sequence is interrupted it can rapidly become an uncontrolled situation.

The following is an embellished description of a real incident:

An aerosol can was one of many items found by the maintenance staff during the 100 hourly servicing. The Warrior was generally well looked after and the can contained a cleaning agent for the windscreen. It was in the baggage compartment with several rags, the tie-downs and a pitot cover. The LAME collected these items and put them in a cardboard box which he tied down in the compartment.

The aircraft flew several sorties after the servicing before the rags, tie-downs and the aerosol can were once again roaming around the baggage area. The cardboard box was discarded after it became damp from contact with a wet rag.

In the Warrior, the baggage compartment is open to the space under the rear seats, a space that is not easily visible and is not usually checked during a preflight inspection. You guessed it. The aerosol can headed this way — and also contained in this area are the exposed elevator control cables.

The can hovered inoffensively for several flights, in the area of these cables.

Our pilot was due for some practice in the circuit area and decided to combine his continuation training with a pleasure flight for three friends. His preflight was thorough but did not include the area under the rear seat. He assisted his passengers and carefully briefed them on the coming flight.

Start-up and taxi were normal. After the run-up and a final check of his passengers, he completed the pretakeoff 'vital actions' and lined up.

The ALA was of adequate length but not such that a pilot could ignore the far end when carrying out touch-and-go's. Takeoff was smooth and on downwind the lady passenger in the front seat seemed to be relaxing and enjoying the experience.

The can was still under the seat but due to the vibration of the takeoff was edging its way along the elevator control cable towards the pulley. On downwind, the can settled into a niche between the cable and the pulley.

The circuit was fairly tidy and the pilot concentrated on the final approach. He was keen to demonstrate a smooth touchdown. The passengers were enjoying the flight and an air of expectation engulfed all four persons on board as they looked down final at the runway threshold.

The can was still resting in its niche.

Threshold speed was spot-on as the pilot closed the throttle and gently raised the nose to the landing attitude. He was unconsciously holding his breath when the wheels brushed the grass surface. The pilot chuckled to himself and momentarily bathed in the admiration of his passengers. As he did so, the nosewheel touched down firmly and the aircraft shook mildly as it ran along the slightly uneven surface. The can nestled further into the crutch of the pulley.

Time was now pressing. The pilot opened the throttle to full power, lowered the flap lever to retract the flaps and restored the trim to the takeoff position. At about 60 knots he started to pull back on the control column.

There was no response from the aircraft, no change in attitude and no liftoff. The can was now firmly wedged between the cable and the pulley and prevented either from moving.

The pilot then wound back the trim; still no liftoff. At 70 knots with firm back-pressure and still no liftoff, the pilot decided to abort the takeoff. There was some 150 metres of runway remaining. He shut down the engine and applied the brakes.

The Warrior overran the runway and was headed towards a 2 metre high earth levee. The pilot tried to cushion the impact by raising the nose. Surprisingly, full-up elevator travel was now available. The can, having been squeezed by the pulley, had decided to move back towards the baggage area. The aircraft was badly damaged by the impact and the front-seat passenger received a cut to her forehead from the visor. All four POB exited the aircraft safely. There was no fire.

Now let's look at the sequence of events with the clock ticking. The touchdown occurred well before the half-way point of an 850 metre runway. On touchdown the pilot:

- applied full throttle; tick . . . tick . . . tick . . .
- retracted the flaps; and tick . . . tick . . .
- restored the trim to the takeoff position. tick . . . tick . . .

At 60 knots he applied back pressure . . . tick . . . tick . . .
and there was no response. tick . . . tick . . . tick . . .
He applied further nose-up trim. tick . . . tick . . . tick . . .
At 70 knots . . . and no takeoff,
he decided to shut down the engine. tick . . . tick . . . tick . . .

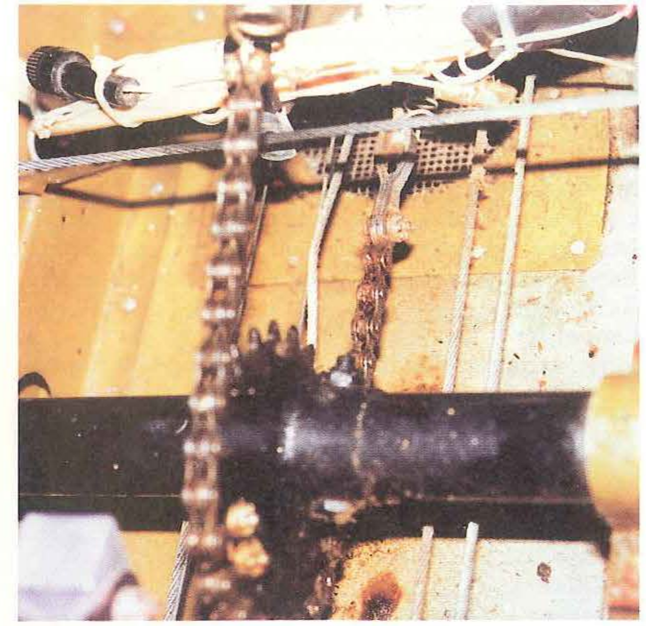
There was now only 150 metres left to run.

During the groundroll the average speed of the aircraft was in the order of 60 knots. That is, it travelled about 30 metres every second. From touchdown, say one-quarter of the way down the runway to a planned liftoff, say three-quarters of the way down, the pilot had some 14 seconds to reconfigure the aircraft, make a control input, assess the response, make a decision based on that response and takeoff or abort as appropriate.

In some aircraft the flaps can be raised instantly whereas in others it takes several seconds. In some aircraft the power is available instantly whereas in others it takes some time to obtain full power. In some aircraft the trim can be reset quickly or doesn't have to be reset, whereas in others, it can be critical and time consuming. In some aircraft you may even have to change hands to complete these actions.

Our pilot made the correct decision — the only decision under the circumstances. But to avoid the overrun, it should have been made earlier. If he had decided to abort as soon as he felt the restriction in the control circuit, perhaps he could have stopped within the remaining runway distance.

For the benefit of all of us, let us consider how such a decision could have been pre-empted.



Knowing that we intend to touch and go, we could mentally rehearse the actions that are necessary for our particular type of aircraft. These are probably familiar but note that they vary from type to type. Also consider the sequence in which they are done. Logically, the power levers should be advanced first so that the engine is accelerating while flaps and trims are being set. Carburettor heat should be set to cold. Flaps and trims should be set as laid down in the flight manual, if there is a procedure in the flight manual for a touch-and-go. (Watch out for the undercarriage selector when retracting the flaps.)

Bear in mind that failing to retract the flaps will affect acceleration. It will also affect climb angle and rate but it may well be better to do these actions in the air rather than hesitate on the ground. Some aircraft such as the C150 won't perform very well unless flap is at least partly retracted.

Failing to retrim will result in a nose-up pitching moment. That is, the nose will want to rise due to the application of power and the increasing airspeed. This trim change could also be affected by flap position or movement but in most cases, not significantly. The out-of-trim forces can be held without difficulty for the short period of time that is required to retrim the aircraft. However, ask your CFI to demonstrate these effects in your aircraft type, at a safe altitude, so that you can experience its behaviour.

Follow the procedure as described in the particular flight manual, if there is one for a touch-and-go, but *if there is any doubt or confusion or hesitation* apply full power and fly away when you have flying speed. Keep the nosewheel off the ground if you can and lift off normally. Then you can retract the flaps slowly or in stages and retrim the aeroplane as you go.

So now we have a predetermined series of actions for a touch-and-go which can be rehearsed. What else can be done to improve the margin of safety?

First, reduce the Landing Distance Required (LDR) and the Takeoff Distance Required (TODR) as these determine how much runway will be consumed during the touch-and-go. LDR is determined by threshold speed which is determined by All-Up-Weight (AUW) and factored for gusty conditions. TODR is determined by AUW. Both are affected by Wind Velocity (W/V), runway slope and surface and density altitude. So a touch-and-go is safest at minimum AUW, into wind, on a level, dry, smooth, long, runway at low density altitudes. Select a runway of sufficient length — as a rule-of-thumb, plan on using a *groundroll* at least equal to your normal TODR — and use this as the minimum runway length for a touch-and-go in your aircraft.

Next, nominate a 'decision point' at which, if you are not airborne, you will abort. This point is selected on the basis of your ability to stop in the remaining runway distance.

Spend the least possible time in the transition from landing to takeoff, having achieved the normal threshold speed. Excess speed is not acceptable on a touch-and-go.

Now we have selected the optimum conditions for the manoeuvre, what about the unexpected, the emergency? This is largely up to the individual pilot. There are an infinite number of emergency scenarios. We should consider the most probable and the most critical. For day VFR flight, it would be relevant to mentally rehearse the following:

- engine failure, particularly during takeoff, go-around or touch-and-go situations
- control failure during takeoff
- flap extension failure
- undercarriage extension or retraction failure
- pilot seat failure or unlocking .
- door opening in flight, particularly during takeoff
- navigational, medical and weather emergencies.

Our pilot, then, could have reduced the AUW by leaving the passengers behind. (It would be better not to carry pax on a 'demanding' training sortie anyway.) He was probably aware of the procedures for a touch-and-go for his aircraft. He could have rehearsed these and he may well have done. Most importantly, he could have mentally rehearsed the situation where he discovered locked or restricted controls during takeoff.

The reaction must be immediate. *Any control problems while still on the ground — ABORT ABORT ABORT — immediately.*

Postscript

This pilot and his passengers were both lucky and unlucky. The pilot made only one mistake and that was to waste time by having a second go at retrimming and lifting off instead of aborting immediately. If the aircraft had lifted off and the pilot had found the controls locked in a rearward position the results would have been disastrous. This could well have happened in this case as the controls had been fouled by the aerosol can under the rear seat and they could have jammed in any position □

It's the thing you don't check that will kill you

Y'all come back now, y'hear?

THE FOLLOWING ARTICLE was prepared by Noel Matthews, Flying Operations Section, SA/NT Region of DofA. Noel is an active glider pilot. He presents some very valuable tips for power pilots who intend visiting a glider field.

1. What to look for:

There are many small gliding clubs operating near country towns; often theirs is the only nearby airstrip and being friendly, they are only too willing to give permission for a visiting power pilot to use their airfield. In fact regular 'power' traffic can be a good reason to get the local Council to assist in maintaining the airstrips.

Now this will immediately give rise to another hazard: most Council grader-drivers automatically keep their blades at an angle suitable for draining water off roads. So your gliding strip, which is not very wide anyway, will probably have a fair camber. If you fly a taildragger — watch out.

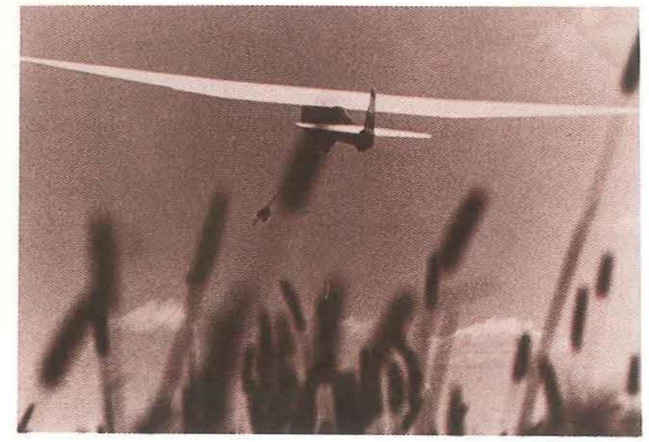
Many gliding clubs operate with winch launches and what looks like a nicely gravelled airstrip is probably really a winch 'road' over which the gliders take off. It is *not* normally used for landings. The landing areas are in fact usually adjacent to the takeoff points. When the gliding club is active these will be marked by a group of parked cars or perhaps a mobile control van.

2. Arrival:

The VFG states that an arriving aircraft should not overfly a (winch) gliding site below 1500 feet agl. In fact it is safer *not* to overfly the airstrip in use at all. In strong winds (or with a long strip) it is possible for a winch cable (breaking strain 500 kg force) to go to 3000 feet or more. Enough said!

Having arrived at the site with a *brief* radio call on 122.7 MHz (there may not be a radio in use) complete a circuit to check the windsock, then make a shallow to normal but not too long, approach. The usual approach angle of a glider on finals with good airbrakes is 10–15 degrees. By avoiding a steep approach, you should be able to easily see a glider on finals, silhouetted against the sky. You are required to give way to it.

Circuits may be in either direction — if overshooting keep straight and do not turn over the airstrip in use. It is easy to see if a glider is about to be launched — instead of being parked with a wingtip on the ground, the wings will be held level. Sometimes a large signal bat will be waved towards the winch driver.



Be careful of landing while a winch launch is in progress. If the launching cable breaks the glider will execute a *very* quick abbreviated circuit and will aim to land anywhere he can, preferably on the airfield. Gliders can safely execute a 180 degree turn and land back in the event of a cable break. The danger can come from the broken cable which if attached to a drogue parachute, will drift downwind, sometimes for a considerable distance. (I've seen them finish up downwind of the strip end.) If there is a crosswind obviously that's the way the drogue will fall.

Having landed, be careful when taxiing. If you can see a winch at the upwind end of the airfield, assume that there are cables laid. Do not taxi along the cables — if you need to cross them, do so at right angles and without delay and only if you can see that they are flat on the ground. If one has broken it is possible for coils to be some inches above the ground (especially if high-tensile wire is used, which is common). It is possible for wire to be picked up by a propeller — the next one won't be the first.

Look for guidance to park somewhere out of the way (not under the approach path).

3. Departure:

Before taxiing watch a few launches to see how the system operates and to see where the gliders, cables and the winch are heading. Arrange for some form of 'all clear' signal to be given to you before takeoff . . . and you will be welcome back □

NUT CASE

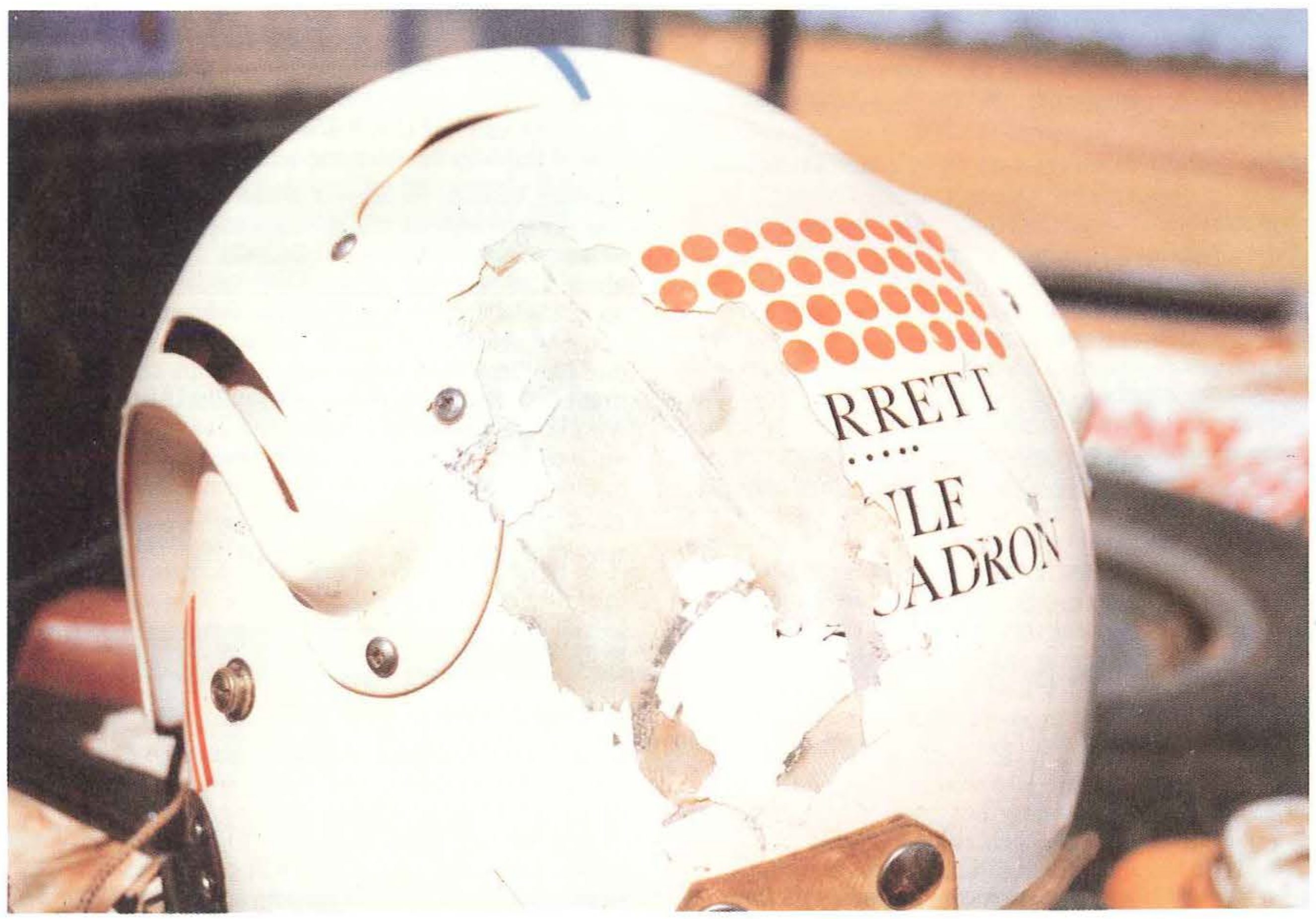
A REPORT ON an accident involving a Bell 47 stated:

While flying at a low forward speed approximately 15 feet above the trees, the helicopter suddenly yawed to the right. As the pilot was unable to correct the yaw he attempted to manoeuvre the helicopter to a clear area. The helicopter impacted the ground in a level attitude, moving rearwards and rotating.

During the impact the Bell's main rotor hit a dead tree: the rotor and mast were torn forward and across the canopy bubble. The mast smashed the bubble and tore the pilot's firmly fastened helmet from his head.

Based on the damage which the helmet sustained, it is likely that if the pilot hadn't been wearing it, he may well have suffered severe head injuries or even been killed.

'Hot, heavy and uncomfortable' are some of the adjectives used to describe safety helmets. At least one pilot describes them as 'life-savers' □

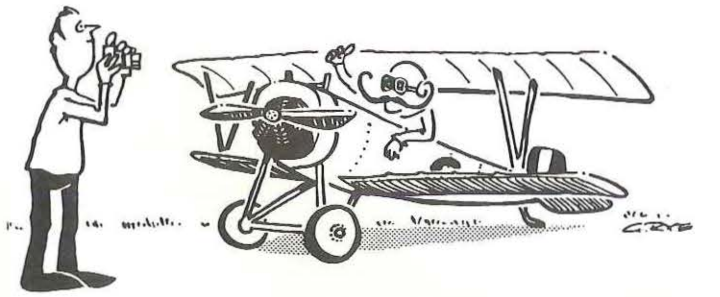


Nikon

AVIATION PHOTOGRAPHIC COMPETITION

The Digest is pleased to announce its second photographic competition for aviation enthusiasts.

The competition is designed to encourage an awareness of safety related matters in the field of civil aviation. It is also to promote a high standard of photography of aviation subjects which may be used to maintain the quality of presentation and reader participation in the Aviation Safety Digest. The competition is sponsored by Maxwell Optical Industries Pty Ltd, the Australian distributors of Nikon photographic equipment.



Three categories will be judged:

Category 1 — For the best print or transparency on the general subject of Australian civil aviation or Australian civil aircraft. The judges' emphasis in this field will be photographic and artistic quality.

Category 2 — For the best picture illustrating a safety aspect or an unsafe aspect of Australian civil aviation. A clue in this field is that the primary contributory factor in aviation accidents is the 'human factor'. The judges' emphasis will be the 'message' and how well the photographic design conveys that message.

Category 3 — There will be a specific prize for the best monochrome print. Black-and- white photographs in particular are a valuable contribution to the Digest. The judges will look for photographic skill and artistic composition which best exploits the unique quality of the black-and-white photograph.

Three prizes will be awarded as follows:

Category 1 — A Nikon F-301 Program/Motor-Drive Camera with a 50mm f1.8 lens.
Retail Value: A$1,035.00. This is a state-of-the-art automatic camera with manual reversion and integral film-wind.

Category 2 — A Nikon FG-20 Auto/Manual Camera with a 50mm f1.8 lens.
Retail Value: A$725.00.
The FG-20 is a 35mm single-lens reflex with aperture priority exposure and manual over-ride.

Category 3 — A Nikon L35 AWAF Auto-Focus camera with built-in flash.
Retail Value: A$595.
This is the rugged, waterproof, fully automatic Nikon with built-in motor-drive.

Entries close with the last mail on Friday, 26 June 1987 and should be addressed to:

Photographic Competition
Aviation Safety Digest
GPO Box 367
CANBERRA ACT 2601

CONDITIONS OF ENTRY:

Any number of entries may be submitted in any or all categories.
Prints should be gloss finished and preferably be about 13cm × 18cm although any format is acceptable. Transparencies must be mounted.

Entries must be accompanied by the entry form enclosed in the centre section of the Digest or available from the Safety Promotion Liaison Officer in any Departmental Regional Office, Pilot Briefing Room and most Photographic stores.

Entries should be clearly marked — PHOTOGRAPHIC MATERIAL — DO NOT BEND.

The competition is open to all Australian citizens with the exception of staff from the Safety Promotion Section of the Department of Aviation and employees of Maxwell Optical Industries, and their immediate families.

The Digest reserves the right to publish once, any entry received in this competition. Any further publication will be with the express permission of the photographer concerned. Winning entries become the property of the Department of Aviation. The Digest will take every care with entries but cannot accept responsibility for loss or damage. Selected entries will be temporarily retained by the Digest for a display to tour major aviation venues. If entries are to be returned, please include return postage.

The judging panel will consist of:
the editor of the Digest;
a photographic specialist from outside the Department, familiar with aviation subjects, and
a representative from the Bureau of Air Safety Investigation.

The judges decision will be final.

A glaring deficiency . . . or shades of darkness?

Doctor Adrian Zentner is an aviation medicine specialist in the central office of DofA. He has recently returned from a period of study at the Institute of Aviation Medicine at Farnborough, U.K. In this article he offers advice for pilots on the selection of sunglasses.

GLARE IS ONE of the most common problems encountered by pilots and yet it has received scant attention in aviation safety publications. Impairment of vision by glare and dazzle has been reported as the primary cause of disorientation and loss of control in a number of aircraft accidents. The wearing of suitable sunglasses for glare protection may help prevent such occurrences. *However some types of sunglasses have themselves been implicated in aircraft accidents.*

Suitable glare protection obviously improves the safety of visual flight. The problem is to find the right sunglasses for the aviation environment. There are two primary factors to be considered when choosing sunglasses — the frame and the lenses.

The frame

Any spectacle frame reduces the pilot's field of view — that is the area of the uninterrupted visual field. So narrow, slender frames are best. Avoid frames with deep side-arms as they interfere with the peripheral view and this view is vital to pilots for both collision avoidance and judgment of attitude, motion, distance and height above the ground.

Choose a comfortable frame and have the spectacles correctly fitted to your head. We all differ slightly and ill-fitting 'sunnies' can be a real 'pain' after a few hours.

The lenses

Sunglass lenses should protect the eyes from glare without adversely affecting the visual cues necessary for safe flight. Accordingly, lenses should not be too dark — ideally they should absorb about 15 per cent of the ambient light. The 'tint' should be 'neutral density' (ND) — that is a greyish tint that does not change the colour of objects as perceived by the pilot and does not adversely affect red signal detection and recognition (warning lights and cockpit displays). The optimum lens for pilots is then 'ND15'.

To ensure that sunglasses provide adequate protection from solar radiation that could damage your eyes, only those sunglasses that conform to Australian Standard AS1067-1983 should be worn. For aviation use, those sunglasses marked 'specific purpose sunglasses' are recommended, provided their frames are appropriate. The lenses of these sunglasses have been specifically designed for use in conditions in which glare is very intense, such as flight above cloud, where at higher altitudes, atmospheric absorption of ultraviolet radiation is reduced.

Sunglasses that conform to AS1067-1983 also meet acceptable standards for lens quality, frame strength and lens retention, for aeronautical use.

Polarised sunglasses should not be used while flying. The polarising filter interacts with the cockpit transparencies to produce a distorted and degraded visual field that could be a significant hazard.

For those who wear spectacles

Those pilots who already wear prescription spectacles for flying can choose from a number of options for glare protection. Prescription sunglasses with ND15 lenses can be obtained or ND15 clip-on or flip-on sunglasses may be worn over prescription spectacles.

Pilots who require correction of their near vision only and who wear 'lookovers' are advised to obtain bifocals with a 'plano' — that is uncorrected upper segment. Clip-ons or flip-ons can then be worn with them.

Another option is the graduated tint. Glasses can be made in such a way that the lower portion of the lens is only lightly tinted or not tinted at all. This provides glare protection for distant vision outside the aircraft and near vision inside the cockpit is not impeded. The use of a single tinted segment in bifocal glasses should be avoided as the visual effect of the 'false horizon' where the two segments meet, can be distracting and disturbing.

A further solution to the problem of glare which may seem ideal for wearers of prescription glasses, is the photochromic lens. These lenses react to the light level and go darker in bright conditions and bleach when the light intensity fails. Unfortunately these lenses have some disadvantages that make them unsuitable for flying.

First — their response times are relatively slow. Photochromic lenses take about five minutes to increase their density to the level of a sunglass but more importantly, the bleaching time from maximum to minimum density can be as long as 30 minutes although there is a rapid lightening of the lens in the first five minutes. This can be too long in the aviation environment when there is a sudden variation in light level due to flying in and out or under cloud or when you wish to scan from outside the aircraft to inside the cockpit.

Second — even when they are fully bleached, photochromic lenses still absorb slightly more light than untinted lenses. Since flying is so critically dependent on vision at low light levels and at night, even a small decrease in the amount of light reaching the eye can be significant.

Conclusion

As much as 80 per cent of the information required by a pilot is acquired by sight. Pilots who wear suitable sunglasses can protect their eyes from damaging solar radiation, glare, and still ensure that vital visual information is not prejudiced.

To be *safe* — choose the correct sunglasses and have them properly fitted □