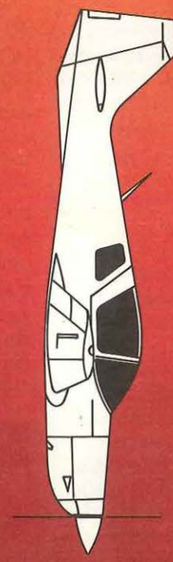
# Aviation Safety Digest


ASD 132

AUTUMN 1987

DEPARTMENT OF Aviation

## Don't leave yourself in the dark



## PLAN AHEAD

Time and tide wait for no man. You can't make time but you can make an allowance.
Plan for a reserve of time just as you plan a reserve of fuel. Then the inevitable
delays will not trap you and false urgency will not stress you into taking
risky decisions. If you are feeling pressured by time,
land and stay the night.

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# Contents



# Editorial

AUTUMN IS here and with it the shorter days, earlier sunsets, moist, cool air, strong, gusty winds, rain showers and lumpy clouds.

To the aviator, autumn is a beautiful time but it brings its challenges. Traps for the unwary include:

- carburettor icing
- wet runways and soft surfaces
- crosswinds and windshear
- running out of daylight
- water in the fuel.

I have tried to highlight topics in this issue which may assist pilots to mentally prepare for these problems — they aren't problems if you are prepared and practised for them. This anticipation and mental rehearsal is what professionalism in flying is all about.

I recently had the opportunity to fly in an Ansett Boeing 767 flown by Captain Henry Landsberg, First Officer Andrew Townley and Flight Engineer Peter Nash. There were many aspects worthy of comment but I would like to make two observations here:

- after takeoff from Adelaide, the First Officer, who was flying the aircraft, visually cleared the flight path before turning and asked his Captain to confirm that it was clear,
- during the approach into Melbourne, Captain Landsberg set his assigned altitude and asked both his First Officer and his Flight Engineer to read back what he had set and to confirm its correctness.

This is a state-of-the-art aircraft with a complex computer-based and digitally displayed flight data system and these 'humans' were double checking everything they did — that's professionalism. My thanks to Henry and his crew.

On a very different tack, I had the pleasure to follow the Southern Cross Air Race and Mapping Competition in conditions that were close to the autumn weather I have highlighted above. I found the standard of piloting and judgment among the competitors to be impressive. Many turned back. Many found a way through in marginal conditions. Many abandoned the race tasks so that they could safely cope with the flying conditions and associated workload. All pilots had to contend with reduced visibility, strong gusty crosswinds and wet surfaces. The race was completed without incident due to the judgment and skill of the pilots. Congratulations.

In terms of flight safety objectives, I have been told that it isn't possible to make much impact on the accident statistics. I can't accept that. I believe we can nominate specific objectives and have a significant effect — for example I think it is possible to have an autumn period without a single carburettor icing incident — it doesn't take any great organising — it simply requires each of us to make sure it doesn't happen to us. That's the basis of safe flight — each of us, making sure.

DAVID ROBSON
Editor

## Covers

*Front. Perhaps the most demanding and the most satisfying form of flying is close formation. It brings together the skills of piloting and the skills of leadership in a way that is intolerant of error. As a result, I think it makes us more considerate of the other aircraft, more aware of the environmental factors, and more critical of our own flying.*
Photograph by David Robson
Nikon F — Kodacolor Gold
from a Robin 2160 flown by Chris Thorne. Wingpersons Jake Jansen and John Woods. Canberra Aero Club 1986.

*Back. Approaching darkness is one of those situations where a pilot can be left with no escape route — no way out. Be generous with your planned reserves of time. Plan a 'HOWGOZIT' point — an intermediate landing point beyond which you will not proceed unless you have a confirmed margin between the ETA for your destination and last light.*
Poster design by John Eglitis.

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*Cartoons: P 12, 13* *Soussanith Nokham*
*Aphorism: P 21* *John Freeman*

# Staggering statistics

PERFORMANCE-WISE, the takeoff is the most critical phase of flight. Apparently insignificant factors can add up to the point where it is simply not possible to become airborne in the available distance or even worse, where the pilot is tempted to 'press-on regardless' and forces the aircraft into the air at less than safe flying speed and 'on the back-end of the drag curve'. The subsequent lack of acceleration, lack of climb and probable impact with trees or rising ground, is often catastrophic.

I said apparently insignificant factors — some are, but in some cases the pilot actually causes the situation where the chance of a safe takeoff is slim.

## Stagger one

The pilot departed his home base and flew to a strip from which he intended to conduct top-dressing operations. Shortly after liftoff, the engine lost power. The load was dumped and the aircraft was landed in a paddock where it collided with a fence and ground looped.

No fault could be found with the engine which was still idling as the aircraft came to rest.

When he had first arrived at the strip, the pilot had left the engine idling for several minutes while the aircraft was loaded with super-phosphate and with the carburettor heat on cold. The conditions at the time were conducive to carby icing. The problem was compounded by this pilot's technique of using only partial power for takeoff. More on this later.



## Stagger two

The pilot had intended to carry-out a scenic flight including some aerial photography. En route, one of his passengers became unwell and the pilot landed on a grass strip near the property to let the passenger out.

During the subsequent takeoff the acceleration was slower than normal. The aircraft was pulled into the air at the end of the strip but it then descended, ran through two fences and collided with some farm machinery. It came to rest in a nearby river bed.

Before takeoff, the pilot had looked at the performance charts but:

- the strip was 100 metres shorter than estimated
- the weight of the aircraft was incorrectly estimated
- the strip was covered in grass some 20 centimetres long

In fact the strip was only half the length required under the circumstances and the long grass became 'the final straw' which precluded a successful takeoff.

## Stagger three

It was hot and there was a gusty wind blowing across the strip. The aircraft appeared not to climb away normally. It passed over a boundary fence and remained at tree-top height for about a kilometre. It was then seen to turn sharply and it disappeared from view. It was later discovered to have struck the ground in a steep nose-down attitude and was completely destroyed by the post-impact fire. Three of the four occupants died.

No evidence was found of any defect or malfunction with the aircraft. The takeoff had been attempted with the aircraft's weight approximately 20 per cent above the maximum allowable and although it became airborne, the combination of excess weight and the hot, windy conditions denied the aircraft any climb performance or acceleration.

## Factors

There were several obvious factors in our examples:

- carburettor icing
- part throttle takeoffs
- misjudged strip length
- misjudged or excessive gross weight
- insufficient allowance for environmental factors — long grass, high temperature and high humidity.

Let's take them one at a time.

## Carby icing

There is nothing new about carby icing. If the air is moist and cool, the temperature drop in the throat of the carby can be sufficient to form ice — and this obstruction has a direct effect of the power output of the engine — a negative effect.

If the conditions are such that it is foggy or feels damp, humid or muggy or the engine does not produce full static rpm or if you have to idle for a long period, *always* do a full power check and run the engine for a time with the carby heat ON to compare rpm — *before you attempt to takeoff.*

Similarly, if you are airborne in these conditions, run the engine with the carby heat ON *at cruise power* before you reduce rpm for landing — you may need full power for a go-around.

## Part-throttle takeoffs

*Don't do it.* There is a false premise that reduced power on takeoff will extend the life of the engine. Similarly some pilots reduce to climb power just after liftoff, 'to save the engine'. These are false assumptions because:

- at this low airspeed, the reduced airflow means reduced cooling of the cylinders and the higher CHT causes additional stresses in the engine
- the reduced power also means reduced carby heat to the extent that it could delay clearing the ice
- part-throttle takeoffs increase the temperature drop across the carby throat thus increasing the possibility of induction icing.

Also, all the performance estimates are invalidated if you don't use the recommended settings — there is no way of predicting what the performance will be, and if you discover that you haven't used enough power, then what? (You've probably heard the saying about altitude above you and runway behind you — 'power you didn't use' is in the same category.)

## Misjudged strip length

The only way to estimate the length of the strip is to pace it out yourself. You may feel instinctively that a strip is marginal — don't risk it. *Pace it out.*

## Misjudged gross weight

This is a kind way of saying overloaded aircraft. Once again the only way to tell is to measure everything you put into the aircraft. You can estimate by equating payload to fuel, e.g. one pax equals about 110 litres of fuel. I know the problem is compounded by the mix of metric and U.S. units but that is something that we, as pilots, have to accommodate. Don't forget that this rough estimate does not take into account the centre-of-gravity. *If the tanks are near full, if the seats are near full or if the baggage compartment is near full* — always do a proper weight and balance calculation — and then calculate your takeoff performance unless you are *certain* the strip is more than adequate.

## Environmental factors

The 'P' charts take into account the ambient temperature and pressure altitude and hence DA — density altitude. In a GA aircraft flight manual there is no allowance for surface conditions. The charts show the performance of the aircraft as tested — from a level, dry, paved surface with the engine at optimum power output and flown by an experienced pilot using what the manufacturer's test pilot deduced as the optimum configuration and technique. The Australian flight manual for the aircraft then factors this performance by an extra 15 per cent to allow a margin for less than optimum conditions.

Under most circumstances this is a conservative guide to your aircraft's runway requirements. But if you have less than full power, carby icing, uphill slopes, high humidity, soft surface or long or wet grass, then things are not so rosy.

As a guide, the effect of an uphill slope of only 2 per cent is to add about 14 per cent to the takeoff run — there goes our 15 per cent margin! The effect of wet grass or long dry grass is to add about 6 per cent to the takeoff run — the effect of both the uphill slope and the long grass is to add nearly 25 per cent to the distance!

As pilot-in-command of the aircraft it is our ultimate responsibility to make these allowances — and we can only do that if we start with an accurate weight, strip length, temperature, slope and wind velocity and if we use the power setting, configuration and technique recommended by the manufacturer.

Further, a trick used by old hands is to nominate a 'HOWGOZIT' point — a reference by which they can judge how it's going. By observing the performance of your aircraft at different weights and temperature conditions against a feature say 200 metres along the strip, you will get to recognise the range of speeds that you should expect as you pass this point. If you're appreciably below the usual speed, then abort the takeoff while there is still plenty of room to stop.

And watch out for carby icing □

## Carburettor icing — probability chart

### To use the chart

— Plot the wet and dry bulb temperatures or one temperature against the Relative Humidity

— The intersected point will show the probability and icing from the shading legend

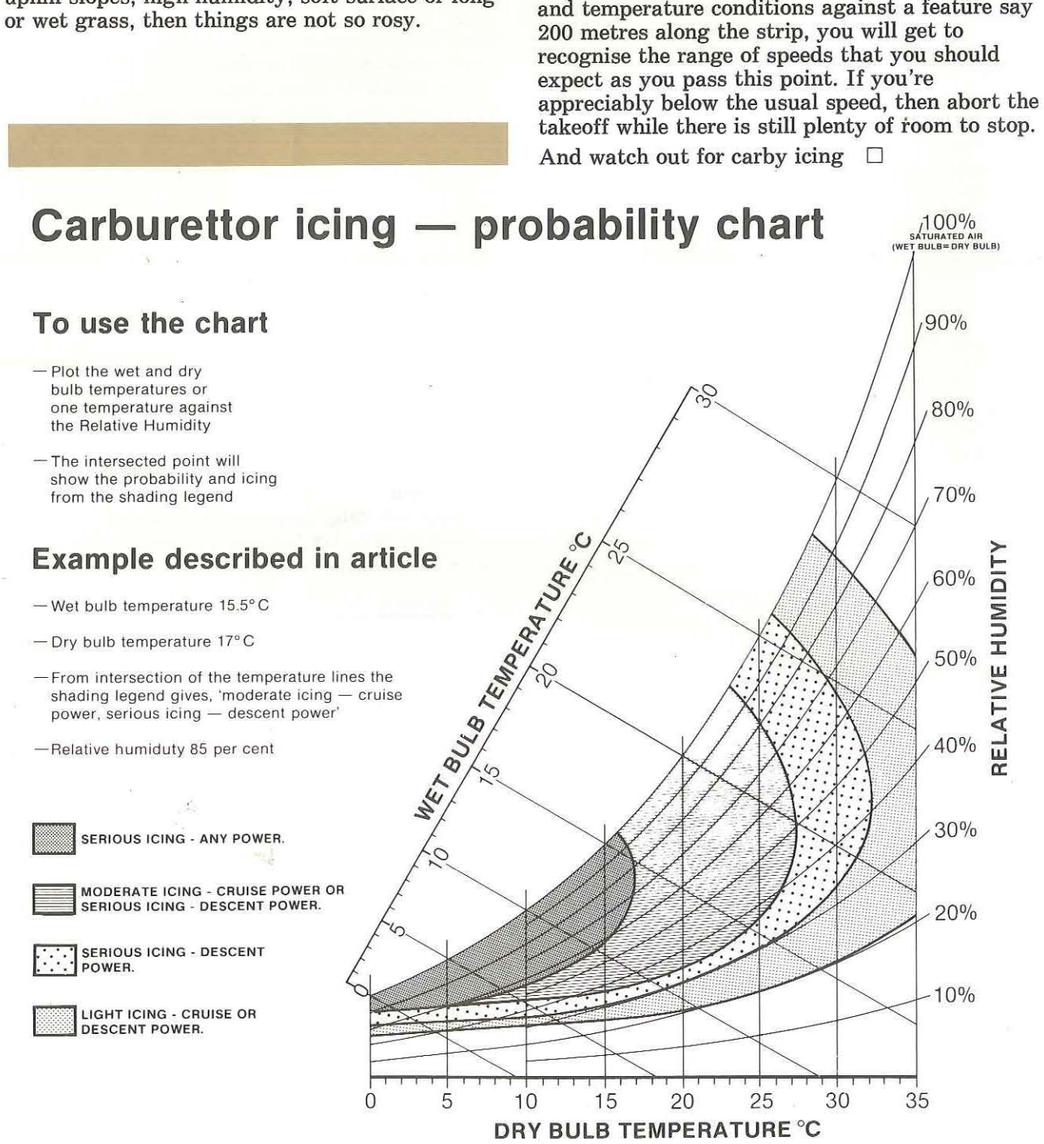
### Example described in article

— Wet bulb temperature 15.5° C

— Dry bulb temperature 17° C

— From intersection of the temperature lines the shading legend gives, 'moderate icing — cruise power, serious icing — descent power'

— Relative humiduty 85 per cent






# The foggy, foggy dew

THE BELL 47 was enroute from Sydney Harbour to Parramatta when the pilot noticed the carburettor air temperature needle creeping towards the yellow arc of the dial. He applied carby heat momentarily until the needle returned to the green sector.

About three minutes later, the engine ran roughly and then stopped altogether. There was no time to apply carby heat or to complete trouble checks.

The pilot was familiar with the area and could see two football fields about one kilometer distant which he knew were free of power lines and obstructions.

He chose the larger of the two fields and carried out a rather good autorotative landing without the benefit of the hydraulic assist to the flight controls.

He touched down with little forward speed and there was nil damage to the pilot, aircraft, passengers or property on the ground.

Conditions were:

Visibility ..... 25 km
Wind velocity ..... SW/2 kt
Cloud ..... 1 octa 2500 ft
Temperature ..... dry bulb 17 °C
wet bulb 15.5 °C
Relative Humidity (plotted from the wet and dry bulb temperatures) ..... 85%

When these environmental conditions were plotted on the Carburettor Icing — Probability Chart the conditions were just outside the 'serious icing — any power' range but in the 'moderate icing — cruise power' or 'serious icing — descent power' range.

The Bell 47 is susceptible to carby icing and under the circumstances, the short application of carby heat was insufficient to prevent the build-up recurring.

The pilot then carried out a copy-book forced landing under difficult circumstances.

The technique I was taught was to:

- start the engine with the carby heat off;
- check the carby heat on run-up — with the engine at run-up rpm select carby heat on. There should be a slight drop in rpm. If there is an increase in rpm or an increase following an initial drop, leave the rpm set and the carby heat on for a good few seconds and then select carby heat off for takeoff. (If the takeoff is then delayed run the engine at run-up rpm with the carby heat on before you roll and reselect carby heat off for the takeoff.);
- watch for any drop in rpm, manifold pressure or EGT or any power loss in flight and if you suspect carby icing, select full hot and leave it set until the power or rpm is restored;
- if you have a carby throat temperature gauge, then use carby heat to keep the needle in the green and keep an eye on it, particularly if you are approaching cloud, fog or rain;
- use carby heat for some time before reducing power for a descent if you suspect the conditions are suitable for icing — and leave it on for the descent. If you have a low power setting warm the engine every 1000 feet of descent altitude — both for CHT and carby icing considerations;
- if conditions in the circuit are suspect, select carby heat on for a while on downwind and leave it on for base and final — being prepared to select it off for a go round.

### HOW DO YOU KNOW IF THE CONDITIONS ARE FAVOURABLE FOR CARBY ICING?

There isn't a display of Relative Humidity in the cockpit but many aircraft do have a carby air temperature gauge. You can ask the Met man or the Tower can give you wet and dry bulb temperatures. If the wet bulb is close to the dry bulb it means there is little evaporation — hence high humidity.

With temperatures or relative humidity, you can use the chart to very accurately predict the probability of carby icing.

In the absence of these details (and in most cases you can't obtain this information for your location and operating altitudes), you have to rely on your senses — if it feels damp or humid or there is visible moisture such as fog or mist, drizzle or rain, then the relative humidity is high enough for carby icing. If the temperature is low or dropping then watch out. Be alert for rough running, MAP or rpm drop and check the system thoroughly before takeoff.

Particularly, be aware of the correct procedures for your aircraft type — some engine installations are far more vulnerable to carby icing than others. If in doubt use full carby heat at any time that you think icing may be present and then select it off if you need full power — e.g. for takeoff or go-around □

# Flappery will get you everywhere


## Too much?

AT THE COMPLETION of a local pleasure flight, the pilot decided to carry out three practice circuits. The first two landings were without incident but on the third landing, the aircraft touched down on the right mainwheel, bounced and rolled to the right. The pilot applied power and left aileron but on noticing the skid-ball, also applied right rudder. By this time the bank angle had increased to the extent that the right wing touched the ground. The aircraft cartwheeled and came to rest inverted. The occupants scrambled clear.

The landing was attempted in gusty crosswind conditions and the pilot had used full flap. Cessna recommends minimum flap be used in these circumstances.

In this case the problem was compounded by the pilot's use of rudder during the bounce but nevertheless, the situation may not have deteriorated to the same extent if flap was limited. In the C150, full flap also seriously affects the performance in an attempted go-around.

## Too much — too late?

During the takeoff roll, the pilot noticed a loss of performance but judged that there was insufficient strip remaining to stop the aircraft. He continued the takeoff and shortly after liftoff the aircraft's tail assembly struck the top wooden railing of a bridge.

Under the circumstances the pilot could not take any avoiding action and the left wingtip struck a dead tree. The aircraft slewed to the left, touched down and came to rest with the engine and landing gear torn from the fuselage.

No fault could be found with the aircraft or systems which would account for the loss of performance. The takeoff, from a one-way strip, was done with a slight tailwind component and the estimated takeoff weight slightly exceeded the published climb weight limit.



The aircraft had taken off previously with a similar load but on this occasion it had also been refuelled and there was a tailwind. The available strip length was not enough for the aircraft at this weight, with any tailwind at all. The pilot's technique was to progressively select full flap during the takeoff roll from the point when the tail wanted to lift. After liftoff, he then reduced the flap setting progressively to allow the aircraft to accelerate.

On this occasion the combination of factors was sufficient to degrade the aircraft's performance and to cause it to hit the bridge.

Comments heard in the Bar:

'Don't use flaps in a strong cross-wind.'

'Retract the flaps immediately after touchdown.'

'Lower the flaps at liftoff speed.'

'Don't go around with flaps down.'

'Retract the flaps before liftoff on a touch-and-go.'

'Don't use more than takeoff flap if it's gusty.'

'Don't use flaps on takeoff at all.'

Where do we start to determine the correct way to employ flaps? It is like every fundamental of flying — there is no right and wrong way that applies equally to all types of aircraft and all circumstances.

For a start, 'flaps ain't flaps'. There are many types of flap, each with its own advantages and disadvantages. Let's consider a few common ones and their typical characteristics:

*Simple Flaps.* The simple flap is a trailing-edge section of the wing which hinges downwards, e.g. the Chipmunk. The first 20 degrees or so of travel is primarily lift-increasing with little drag penalty and little attitude change. There may be some, usually slight, trim change with this movement. Further travel gives a further increase in lift but a greater increase in drag. The attitude change is more pronounced, as is the trim change.

*Split Flaps.* The split flap is one whereby only the lower segment of the trailing-edge section lowers. That is, the upper wing skin remains undisturbed, e.g. the Dakota. The lift change is not as marked as the simple flap but the drag at high deflection angles is significant. The attitude change is only marked in a glide but the required power increase is noticeable. Trim change is usually slight.

*Slotted Flaps.* The slotted flap is a simple flap which encourages the passage of air through the slot between the main-plane and the flap. It is more efficient in terms of high values of lift at high angles of attack. The change in stalling speed is greater than with simple or split flaps. The attitude change is more marked also. Trim change can be pronounced.

*Fowler Flaps.* The Fowler flap uses a displaced hinge or screw-jack to extend the flap rearwards as well as deflecting it downwards. The result is an increase in wing area as well as an increase in camber. The consequent lift increase is considerable and the drag is high at high deflection angles.

*Complex Flaps.* Complex flaps are a combination of the previously described flaps, the most common being the double or triple slotted flap and the combined slotted and Fowler flap. The modern airliner generally has double slotted Fowler flaps. The increase in lift co-efficient is in the order of 120 per cent. They are usually combined with leading-edge Kruger flaps. By combining the leading and trailing-edge devices the resultant trim and attitude change is usually small.

What is the flap primarily for?

Increased lift?
Increased drag?
Increased forward view?
Increased margin over the stall?
Increased descent angle?
Increased thrust required?
All of the above?

In the context of normal operations the flaps have several purposes. For takeoff their primary contribution is increased lift for the least possible increase in drag. Increased lift allows lower liftoff speed and shorter ground-roll. Increased lift means greater margin over the stall. Flaps allow an increased lift at a lower pitch attitude and so the forward view is improved and the deck angle is less dramatic (leading-edge devices have the converse effect). However, the benefits in terms of takeoff distance have to be offset by any increase in drag and hence reduction in excess thrust.

For the approach, flaps allow a lower nose attitude and hence improved view (compared to a flapless approach). Any drag increase results in a steeper glide-path and hence improved obstacle clearance. Increased lift provides a lower approach speed and a greater margin above the stall. The increased drag requires that a higher thrust be maintained on finals. (This is beneficial for turbo-jets in particular as it provides better engine response and hence quicker acceleration.) On landing the extra lift is unfavourable as it reduces the weight on the wheels and hence braking efficiency and at any given speed, the aircraft is more sensitive to gusts. Any drag is favourable in reducing the landing roll.

In summary:

- for takeoff the flaps should provide the most lift increase for the least drag increase;
- for the approach the flaps should provide both increased lift and increased drag; and
- for the landing-roll the flaps should provide a maximum of drag and preferably a reduction in lift.

The arguments

*Takeoff.* The first stage of flap gives an increase in lift for little drag. The lift/drag ratio, however, is reduced slightly. So theoretically the drag increase is penalising and offsets the advantage offered by the lower liftoff speed. The margin above the stall is improved if we still climb at the no-flap speed (1.2×Vs) and the lower nose attitude allows a better view. For a short-field takeoff where the lowest possible liftoff speed and lowest possible stall speed is required, the flap benefits outweigh the disadvantages. The reason some manufacturers recommend the use of nil flap for takeoff is usually because, in their particular case, the advantages are slight and the limitations, perhaps due to the trim change on retraction or the risk of exceeding the flap-limiting speed or the risk of stone damage to the flaps, are more significant. In the case of twins, there are also considerations regarding the single-engine climb performance.

*Approach.* During the approach, lift and drag increases are both favourable. Most flap should be deployed up to the point where the drag increase significantly exceeds the lift increase. In gusty or strong crosswinds high flap deflections are favourable up to the point where they may prejudice lateral control response. Leading-edge devices are favourable in this context.

*Landing.* After landing the maximum drag is required and the least lift. If the aircraft has high flap deflection angles available then full flap is best — again provided there is no adverse lateral control effect. If only small angles are available then it is a compromise as to whether the lift reduction and improved braking (more weight on the wheels) outweighs the reduced drag. At very low speed it certainly would.

## Conclusions

There is no universal guide to the optimum use of flaps. The only tested and proven configuration and technique for each aircraft is described in the flight manual. Use the recommended setting for takeoff and retract them with caution. For approach, use an intermediate setting until committed to land and then select full flap — unless the conditions are unsuitable for the use of full flap in the particular aircraft. (As a general rule I try to use full flap for all landings.) If there is a chance that you may have to go around or if the conditions are such that the lateral control of your aircraft may be affected, delay or don't use full flap. If the landing distance available is such that you require full flap in conditions that cause handling problems, then delay your landing or go somewhere else.

Once you are safely on the ground leave the flap setting as is, until you come to a virtual stop — and double-check that it is the *flap* lever you are about to select UP! The retraction of flap during landing roll is fraught with peril, although I know that in some aircraft it is necessary for touch-and-go's — but that's another story □

# NVMC — Currency

THE AIRCRAFT arrived overhead 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. The lights of the nearby town, the flare-path and nearby farms were clearly visible. Witnesses on the ground reported that the aircraft seemed to be at normal height on the cross-wind leg and at the start of the downwind leg.

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 and bounced and skidded for 350 metres. Injuries varied from minor to serious.

From the statements made, no-one was aware of anything untoward before impact. Nothing was found wrong with the aircraft or systems.

The pilot had not flown at night for some 11 months and only twice in the previous 32 months. On each of those occasions he only made one landing.

It appears that having reduced power and lowered the undercarriage, the pilot was concentrating so much on the flare path that he did not re-introduce power nor did he properly scan the instruments. The aircraft simply 'settled' onto the ground.

A pilot who flies without recent experience is taking a risk. The longer the period, the greater is the risk. A pilot who carries passengers under these circumstances is irresponsible. The NVMC currency requirements were framed to keep the risks within bounds — please observe them □



# The best-laid plans . . .

*Richard Sherer is a journalist in the Public Relations Branch of the Department and is an active GA pilot.*

THINGS GENERALLY quieten down at Sydney Airport briefing office as the night wears on and large RPT jets are safely curfewed. The briefing officer has time to carefully go through the relevant NOTAMS, particularly those affecting runway lengths due to nocturnal works-in-progress.

The forecaster had been very helpful, allaying my fears that the coastal cloud I had squeezed under on the way into Sydney may prevent a night-VMC return to Canberra. Both Sydney and my destination were forecast and I was told were actually CAVOK.

It was a great night for flying and I was soon radar-vectored to intercept my planned outbound track. It was just after midnight and while I wasn't particularly tired, I was looking forward to getting home after a long day.

I could see the lights of Canberra from a good 30 miles out and the aerodrome beacon quickly pin-pointed my destination.

It was then that I noticed the first warning signs; there appeared to be a slight haze diffusing the lights of some of the small settlements near my track. I wasn't concerned as the Canberra controller had previously mentioned the likelihood of smoke haze in the area. I heard Approach talking to another aicraft closer in, who was apparently having some trouble locating the field. Shortly after, the controller reported the possibility of some fog patches in the area but that they should dissipate quickly. After all, it was late October and the surface temperature was plus 9 degrees Celsius.

But things rapidly deteriorated. The other aircraft managed to land with some difficulty, after being radar-vectored onto an ILS approach. There were fog patches along both runways and the pilot commented that the Airport would probably soon have to close.

The controller advised that the fog was persisting and that I would have to divert. I decided to try Goulburn because it was the closest airfield and because it had looked clear when I had passed 20 minutes previously.

By this time, the length of the day was beginning to take its toll. I reluctantly turned away from Canberra and tracked in a northerly direction. I was maintaining a safe altitude and I started drifting eastwards. The controller suggested a heading correction.

I found Goulburn by its NDB and I triggered the PAL lighting. It confirmed what I was already beginning to fear — there was fog there too.

I reported this to Flight Service who asked for my endurance and undertook to locate a suitable, fog-free landing place. It was getting rather late at night to be doing mental arithmetic, and while continuing to head north past Goulburn I calculated that I had about 80 minutes of fuel remaining.

The FS officer came back a few minutes later and said what I hoped he wouldn't — that I should return to Sydney. He asked for an ETA. My mental calculations were getting worse and I gave a time interval of 75 minutes — fortunately he questioned this figure and asked me to turn on the transponder. Sure enough, by now I was only 75 miles from Sydney with an ETI of 45 minutes.

The FSO kindly phoned my wife to explain what had been happening. I was happy to see the lights of Sydney and even happier to see the lights of runway 34 jutting out into Botany Bay.

I landed and taxied in without incident although Murphy made sure the landing light was U/S.

It was now 2.30 am local.

I had some sleep in the aircraft and some more in the nearby commuter lounge, conscious that I would have to depart early to return the aircraft to Canberra in time for its next booking. No such luck — the fog was there to stay and wasn't expected to lift until after 11.00 am local.

I refuelled the aircraft and only then did it dawn on me how close I had come. A PA28-151 takes 180 litres of fuel. The refueller had put in 158 litres. I was less than half an hour (or a stiff headwind) from fuel exhaustion and yet I had taken off with all the required reserves including 30 minutes holding and I had a further 20 minutes spare.

I was on my way again about two hours later and my second flight was notable only for the eternity which it seemed to take. I had made two complete return trips in the space of nine hours.

## Conclusions

Time may fly when you're having fun but flying when you're tired isn't fun. I wasn't really aware of fatigue until, with a mixture of resignation and mild annoyance, I was turned away from my destination.

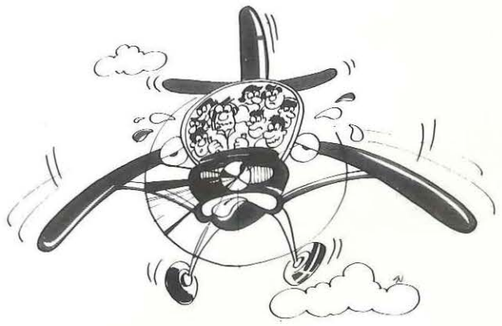
From that point, I was in a mood and condition to do only the minimum necessary to get safely onto the ground somewhere — anywhere. I was flying almost automatically, even to the extent of relying on Flight Service and ATC to sort out problems such as the endurance of both the aircraft and myself and to point me in the right direction.

Thankfully they did just that □

# Passengers rights

As s PASSENGER you ARE entitled to ask your pilot:

- have you checked the weight and balance of the aircraft?
- have you checked the takeoff and landing performance charts for the aircraft at this weight and for the airfields concerned?
- have you obtained a weather forecast?
- have you submitted a flight plan?
- are you correctly licensed, rated and current for this flight? e.g. are you qualified to fly in cloud?
- is the aircraft fully serviceable?
- are *you* fully serviceable and within duty time limits?
- are you carrying a Locator Beacon and survival equipment?
- should I make alternative transportation arrangements or delay commitments to allow for weather problems?



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- to take off or land at an airstrip which is less than the length required by the aircraft at that weight
- to fly below the legal minimum altitude
- to fly beyond his or her licence, rating or currency limitations, particularly with respect to weather
- to fly beyond the pilot's duty time limits
- to take unreasonable risks by continuing a flight for the sake of meeting your prior commitments.

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Yours sincerely, .....

Name: .....

Address: .....

*Details to be published?* ☐ *No name* ☐ *Initials okay* ☐ *Full name okay*



# Aircraft accident reports

## *Fourth 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, location of accident, month and year, category of flying, pilot licence and rating, and total hours.

## Preliminary reports

*The following accidents are still under investigation*

### Fixed Wing

**Piper PA24-260, VH-MCW, Toowoomba Qld., 22 Nov. 86, Non-commercial — pleasure.**
While taxiing before takeoff, the pilot established two-way communications with Brisbane Flight Service Unit. After takeoff, the pilot attempted unsuccessfully to pass his departure message and checks revealed that the aircraft had suffered an electrical failure. The pilot elected to return to Toowoomba and en route noticed that the radio operated intermittently. He selected the gear down and stated that he observed the 'Gear down and locked' indicator light illuminate momentarily and believes he heard the gear motor run. The aircraft was subsequently landed gear up.

Inspection of the aircraft revealed that the connector for the earth battery strap was broken.

**Cessna 172-N, VH-MJJ, Toowoomba Qld., 07 Dec. 86, Non-commercial — pleasure.**
The pilot had taken part in a flour bombing and balloon bursting competition and was returning to land. The front seat passenger was a flying instructor and was acting as a safety pilot and judge for the competition. The approach to land was high but the pilot decided to continue and the aircraft touched down about 600 metres beyond the runway threshold, and bounced. The pilot applied some power and continued with the landing attempt, but the stall warning sounded. The front seat passenger instructed the pilot to apply full power and to lower the nose of the aircraft. He then placed his hands on the controls to monitor the pilot's control inputs. The aircraft flew along the strip about a metre above the ground before striking the airfield boundary fence and coming to rest 160 metres beyond the fence.

**Piper PA25-235, VH-SEG, Ingham Qld., 15 Dec. 86, Aerial agriculture.**
The pilot was engaged in the spraying of sugar cane. During one of the swath runs, as he turned the aircraft to follow the line of the cane, the right wing struck the cane. The aircraft impacted the ground and bounced several times before coming to rest.

**Cessna 172-M, VH-WTL, Boulia Qld., 16 Dec. 86, Non-commercial — pleasure.**
The pilot landed the aircraft on a nine-metre wide gravel road to check on one of his staff working nearby. Following the check, the pilot commenced a takeoff towards the west in 10-15 knot northern wind. At an indicated airspeed of about 40 knots, the aircraft drifted to the left, off the side of the road. The pilot continued with the takeoff attempt but the aircraft continued to turn to the left, downwind, and travelled about 600 metres before the nosewheel entered a ditch and the aircraft overturned.

**Cessna 182-F, VH-DIJ, Charters Tower, 14 Dec. 86, Non-commercial — pleasure.**
The pilot reported that while he was conducting a landing at his property strip, a calf and cow ran onto and along the strip. To avoid the animals, he decided to delay any further descent until the aircraft had passed the animals. However, when the aircraft was about 15 feet above the strip, the nose dropped and the nosewheel struck the ground, resulting in damage to the firewall, engine mounts and the cabin floor.

**Cessna 182-F, VH-TWM, Gibberland Mine, 22 Dec. 86, Non-commercial — pleasure.**
Shortly after takeoff, the pilot heard a noise and noticed two holes appear in the engine cowl. The airspeed began to decrease and the aircraft landed, bouncing twice before nosing over and coming to rest 50 metres beyond the end of the strip. Both propeller blades had been dislodged from the aircraft. One was located 80 metres to the left of the strip and the other, with hub and constant speed unit attached, was located 40 metres to the right of the strip.

**Piper PA18-125/A1, VH-HCM, Redcliffe Qld., 22 Dec. 86, Instructional — dual.**
The student had completed about seven hours training and was undergoing her second session of circuit training. The instructor stated that the student had previously had difficulty with the directional control of the aircraft. On this takeoff he allowed the student to manipulate only the rudder, so that she could concentrate on the directional control aspect, while he manipulated all the other controls. As the power was increased the aircraft gradually swung to the left. Approaching the left side of the strip the swing increased and the instructor applied right rudder at the same time as the student. The aircraft swung to the right and as it left the right side of the strip, the left wheel dug into the ground and the aircraft tipped onto the left wing.

**Piper PA34-220T, VH-FYU, Coolangatta Qld., 29 Dec. 86, Non-commercial — pleasure.**
When the pilot selected the landing gear up after takeoff, the gear unsafe light remained on. Recycling the gear had no effect. The pilot continued to his planned destination, with the aircraft performing at about 10 knots below the expected speed. On arrival, a visual inspection confirmed that the right maingear was trailing. The pilot then carried out a successful emergency landing, during which the right flap and propeller sustained damage as the gear collapsed.

**Piper PA24-250, VH-GED, Moree N.S.W., 11 Oct. 86, Non-commercial — pleasure.**
The aircraft normally used by the pilot was unserviceable and he had obtained the use of the PA24, a type he had not flown for about three years. The initial leg of the flight was uneventful but the departure for the return journey had been delayed and the aircraft arrived at the destination at about last light. When the gear was selected down, a complete electrical failure occurred. The pilot was unable to read the instructions for manual lowering of the gear, which were printed on a cover on the cockpit floor, because there was not a torch available. He therefore decided to land as soon as possible as the grass strip selected was not lit. The landing was made about 10 minutes after last light and the aircraft slid for about 60 metres before coming to rest on the strip.

**Bellanca 7-ECA, VH-SLO, Bankstown N.S.W., 12 Oct. 86, Non-commercial — pleasure.**
The pilot reported that gusty and turbulent conditions existed as he made his landing approach. During the flare the aircraft ballooned to about 10 feet, and after the subsequent touchdown the aircraft veered to the left before coming to rest on its nose and left wingtip.

**Cessna 172-N, VH-BEM, Goulburn N.S.W., 25 Oct. 86, Instructional — solo (supervised).**
The pilot was conducting a solo navigation exercise which involved an en route landing. Turbulence was encountered during the latter stages of the landing approach and a heavy touchdown occurred. The aircraft bounced and again touched down heavily before the pilot was able to regain control of the landing. After taxiing to the parking area, the pilot discovered damage to the nosegear leg and adjacent structure.

**Cessna 172-N, VH-IXK, Nymagee N.S.W., 08 Nov. 86, Non-commercial — pleasure.**
The surface of the particular ALA was covered with long grass and areas of low scrub and bushes. The pilot taxied along one of the strips until he came to an area of thicker scrub and saw markers which he believed defined the end of the strip. During the takeoff roll, the aircraft had reached a speed of about 50 knots when the pilot realised that he was approaching the upwind end of the strip. He abandoned the takeoff and attempted to steer the aircraft through a gate in the boundary fence. However, the left wing and mainwheel struck the gate post, the aircraft slewed rapidly and the nosegear collapsed. The pilot later advised that he had begun the takeoff from the intersection of the two flight stips and had confused markers on the other strip for those at the end of the strip selected. As a result, the length available had been only 400 metres, compared with the full-strip length of 680 metres.

**Air Tractor AT-301, VH-FRP, Collymongle N.S.W., 19 Nov. 86, Aerial agriculture.**
The pilot was performing a takeoff in crosswind conditions of about 15 knots. When the aircraft had reached a speed of about 40 knots, it suddenly veered to the left and, despite corrective action, the pilot was unable to maintain directional control. With full power still applied, the aircraft ran off the side of the strip. It then passed over an embankment and travelled a further 200 metres before colliding with trees which were some 60 metres from the edge of the strip.

**Beech B58, VH-PGQ, Canberra A.C.T., 29 Nov. 86, Non-commercial — pleasure.**
On arrival at the destination, the pilot selected the landing gear down. Almost immediately afterwards, the radio frequency indicators faded and a strong burning smell became evident. The pilot carried out a go-around, during which radio communications were lost and the burning smell became stronger. The pilot attempted to lower the gear with the emergency system but found he was unable to move the manual extension handle. Under the circumstances, he elected to land as soon as possible. The aircraft touched down on the runway, with the gear partially extended, and slid for about 200 metres before coming to rest.

**Cessna 207, VH-UBX, Wilton N.S.W., 21 Dec. 86, Sport parachuting (not associated with an airshow).**
A student parachutist was exiting the aircraft for a static line jump when portion of the main canopy became entangled around the right horizontal stabiliser. Approximately half the right elevator was torn away, together with portion of the trim tab, while the outer section of the stabiliser was bent downwards through 45 degrees. The parachutist landed safely and the jump instructor then made a normal descent. The pilot was able to retain control of the aircraft and elected to divert to a more suitable aerodrome, where an uneventful landing was subsequently carried out.

**De Havilland C2, VH-AAY, Walcha N.S.W., 22 Dec. 86, Aerial agriculture.**
Superphosphate spreading was being carried out, with the aircraft uplifting one-tonne loads about each six minutes. Fuel endurance with both tanks full was approximately two hours. The pilot was conducting his 25th takeoff for the day, about one hour after refuelling. Witnesses observed that the aircraft did not become airborne at the usual point, two-thirds of the way along the 675-metre strip. Liftoff finally occurred at the end of the strip, but almost immediately afterwards the aircraft clipped a fence. It was seen to sink slightly, before climbing at a steeper-than-normal angle, until some 250 metres beyond the fence. At this point, the nose dropped suddenly and the aircraft dived into rising ground in a steep nosedown attitude. Fire broke out on impact and consumed much of the wreckage. Preliminary investigation revealed that the fuel selector was in the 'off' position.

**Pitts S1, VH-WIZ, Leongatha Vic., 12 Oct. 86, Air Show/air racing/air trials.**
The pilot was flying one of three similar aircraft in practice for a forthcoming aerobatic display. The three aircraft carried out a stream landing, with the pilot of the subject aircraft intending to land to the left of the centre of the strip. Shortly after a normal touchdown, the aircraft encountered a soft area of the strip and subsequently overturned, coming to rest 85 metres from the initial point of touchdown. The display team had had no prior indication of any soft areas on the strip surface.

**Piper PA28-161, VH-BZA, Lilydale Vic., 26 Oct. 86, Non-commercial — pleasure.**
The surface of the 795-metre strip was covered in long grass. The pilot noted that acceleration for takeoff was less than normal, and the aircraft took about 400 metres to achieve a speed of 45 knots. At this point, the pilot considered that he was committed to takeoff, and towards the end of the strip he attempted to force the aircraft into the air. The aircraft struck an embankment at the end of the strip, crossed a road, and collided with a fence before coming to rest about 200 metres further on.

**Cessna 172-N, VH-WSI, Harewood Vic., 30 Oct. 86, Instructional — solo (supervised).**
The pilot had been conducting a series of solo circuits and landings. On the seventh circuit, a normal approach was flown but the aircraft ballooned slightly as the flare was commenced. The aircraft was then seen to climb abruptly to a height of about 20 feet, and shortly afterwards the left wing dropped. Full power was applied but the descent continued and the left wingtip struck the ground. The aircraft slewed rapidly to the left and the nose struck the side of a ditch.

**Piper PA32-260, VH-FIC, Moorabbin Vic., 31 Oct. 86, Instructional — dual.**
The student had been practising circuits with touch-and-go landings for about 75 minutes. An approach was then made for a full-stop landing. The aircraft was flared too high and it subsequently touched down heavily and bounced. The instructor took control and landed the aircraft, but the left wing lowered until it touched the ground. After vacating the aircraft, the crew discovered that the left maingear torque bolt had failed, allowing the wheel and oleo assembly to fall clear of the strut during the bounce.

**Piper PA25-235/A1, VH-FAU, Hopetoun Vic., 06 Nov. 86, Aerial agriculture.**
The pilot was conducting spraying operations on a pea crop. Swatch runs were being made at right angles to a power line and low trees which were located just beyond the end of the crop. On the final run, the aircraft was flown beneath the power line, but the right wing then struck the top branches of a dead tree. The aircraft was seen to climb to about 200 feet before descending steeply and striking the ground some 370 metres beyond the point of collision with the tree. A fierce fire broke out on impact and engulfed the wreckage.

**Transavia PL12, VH-MYH, Mirboo Nth. Vic., 07 Nov. 86, Aerial agriculture.**
Before departing from his home base for his first operation from the particular agricultural strip, the pilot had been briefed not to land down the slope unless there was a strong headwind component favouring that direction. A normal landing was made and the pilot was then given details of the task to be performed. He departed for an aerial inspection of the area and on return noted that there appeared to be a headwind of about 25 knots for landing down the slope. However, on late final approach to land in this direction, the pilot realised that the wind strength had decreased to about 10 knots. He continued with the landing but was unable to avoid overrunning the end of the strip. A groundloop was initiated during which the left gear assembly collapsed.

**Grumman G159-B, VH-LTM, Mangalore Vic., 20 Nov. 86, Non-commercial — practice.**
The crew was conducting a series of circuits and landings. The check-pilot was sitting in the right-hand control seat and was holding the checklist. During the circuit in question, the check-pilot spent a considerable amount of time discussing various aspects of the aircraft operation. There was further cockpit talk during the final approach and neither pilot realised that the landing gear had not been lowered. The aircraft slid on its belly for some 360 metres after touchdown.

**Piper PA25-235, VH-SKJ, Horsham Vic., 29 Nov. 86, Aerial agriculture.**
The pilot was conducting spraying operations over an irregularly shaped paddock. Power lines were located along two sides of the paddock. At the end of a clean-up run conducted parallel to one set of the lines, the aircraft struck and severed two wires which crossed its path. It then yawed sharply and collided with the other wires before impacting the ground in a steep nosedown attitude. During the ensuing short ground slide, both the engine and the rubber fuel tank were torn out. The pilot advised that he had been aware of the power lines but had temporarily overlooked their presence.

**Cessna A188-A1, VH-DGO, Boort Vic., 29 Nov. 86, Aerial agriculture.**
The pilot was spraying a crop with liquid fungicide. As he pulled up to clear trees during the third swath run, the fungicide evidently surged in the hopper and a quantity escaped past the hopper-lid seal. It then splashed over the windscreen, severly restricting the pilot's forward vision. He elected to return to the strip to clean the screen and check the hopper seal. The strip length was about 1000 metres and the pilot did not consider it necessary to dump the remainder of the load. During the landing, which was made in light downwind conditions, the pilot experienced difficulty in seeing the strip. During the latter stages of the ground roll, the aircraft began to veer to the right. Corrective action failed to redress the situation and the right wing struck the fence bordering the strip. The aircraft came to rest after sliding sideways into a ditch alongside the fence, some 315 metres from the point of touchdown.

**Auster J-1, VH-AMK, Three Hummock Island, 07 Dec. 86, Non-commercial — pleasure.**
The pilot was attempting to take off on a wet strip which sloped markedly down from the centre towards each end. To minimise the effect of a slight tailwind, and to avoid an obstruction at the end of the strip, the pilot planned to angle the ground run. Takeoff was commenced from the left side of the strip but when the aircraft had reached the top of the hump in the strip, the pilot realised that he had angled the run excessively and was now outside the markers on the right side. The aircraft subsequently collided with scrub and overturned.

**Piper PA28-161, VH-BZB, Lilydale Vic., 08 Dec. 86, Ferry.**
After conducting a thorough preflight inspection, the pilot prepared to ferry the aircraft to a maintenance organisation which was to perform a scheduled inspection. The aircraft performed normally until it reached a height of about 200 feet after takeoff. At this point, the engine lost a substantial amount of power and the pilot was committed to a forced landing. During the landing roll, the aircraft collided with a fence and came to rest in the adjacent paddock. Initial inspection revealed that there was a serious leakage of fuel past the fuel filter bowl seal and it was likely that the defective seal had allowed air to enter the fuel system.

**Piper PA32-300, VH-CLF, Melbourne Vic., 09 Dec. 86, Non-commercial — pleasure.**
Prior to departure, the pilot had been made aware of a Notam advising pilots to disregard temporary displaced threshold markings for runway 27 at the destination. During the subsequent approach, the pilot noticed red and white lighting and associated this with the displaced threshold. It was his intention to land beyond these lights, which were in fact the runway approach lights. Very late in the approach the pilot realised he was too low, but before power could be applied the aircraft struck the lights, 120 metres short of the runway. The maingear legs were torn off and the nosegear collapsed before the aircraft slid to a halt on the side of the runway.

**Piper PA25-235/A1, VH-FAN, Horsham Vic., 28 Nov. 86, Aerial agriculture.**
Spraying runs were being conducted over a paddock which had power lines along one boundary. The pilot had been passing beneath the lines during each run; however, after completing about two-thirds of the task, the wire deflector on the aircraft snagged and broke the powerline. The pilot carried out a precautionary landing and discovered that the rudder of the aircraft had been substantially damaged by the wire strike.

**Bushby M1, VH-JBR, Koo-wee-rup, 28 Dec. 86, Non-commercial — pleasure.**
The pilot was making a takeoff in 15 knot crosswind conditions. Initial acceleration appeared to be normal and the aircraft lifted off at 60 knots. However, about 30 metres further

The pilot was probably concerned because two other aircraft were approaching to use the same runway, and she perceived a need to vacate the area at the first taxiway. Witnesses reported that the aircraft did not flare for touchdown and that it appeared that the pilot had tried to force it onto the ground.

**Beech C23, VH-UML, Maryborough Qld., 07 Nov. 86, Instructional — solo (supervised), student, 21 hrs.**
The student had been briefed to carry out a series of solo circuits and landings. The instructor observed the first circuit, and reported that it appeared to be normal. On touchdown, the aircraft bounced, then pitched nose down. The subsequent touchdown was heavy and the nosegear was torn off.

The student had accumulated 1.5 hours of solo operations on four previous flights and had received a dual check on her last flight, which was eight days prior to the accident. When the aircraft bounced, she had evidently been unable to take suitable corrective action to prevent the subsequent heavy touchdown.

**Cessna 150-E, VH-KML, Tundulya N.S.W., 25 Nov. 86, Non-commercial — pleasure, PPL, 300 hrs.**
The pilot had been carrying out a number of flights to strips in the general area. After completing repairs to a bore pump, the pilot and passenger prepared to return to the property homestead, some 20 kilometres to the north. Shortly after the takeoff roll commenced, the aircraft began to veer to the right. Full left rudder was progressively applied but directional control could not be maintained. The right wing collided with a number of bushes and saplings alongside the strip. The aircraft then slewed rapidly to the right and the nosegear collapsed.

Investigation revealed that the aircraft had rolled for 104 metres before the right wing struck and broke a small sapling. This coincided with the initial veer to the right, as reported by the pilot. As the aircraft diverged from the centre of the strip, it entered an area of soft loam, which increased the drag on the right wheel. The scrub struck by the aircraft had encroached onto the strip, reducing the width in places to about 15 metres. The pilot had been aware that the strip had not been cleared of undergrowth for some 21 months.

## Gliders

**Glasflugel Libelle, VH-GCP, Wyreema Qld., 10 Oct. 86, Non-commercial — pleasure, Glider, 450 hrs.**
Because of deteriorating lift conditions, the pilot elected to make an outlanding. The paddock selected had been recently ploughed and the surface was soft. Almost immediately after touchdown, the glider yawed, then groundlooped through 90 degrees, resulting in a compression fracture of the fuselage.

It was likely that the glider had been affected by a sudden wind gust shortly after touchdown and the pilot had been unable to maintain directional control.

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

**Schleicher KA-6, VH-GTW, Tumbarumba N.S.W., 06 Dec. 86, Non-commercial — pleasure, Glider, 205 hrs.**
Following a winch launch, the pilot spent 12 to 15 minutes gliding before returning for a landing. On the downwind leg he noted that the aircraft appeared to be lower than the height indicated on the altimeter. At about the base leg position the aircraft was very low and witnesses expected the glider to land in one of several suitable paddocks. However, the pilot continued towards the strip and the glider touched down during the turn onto final approach. The tail section was broken off when it contacted the long grass.

The pilot had accumulated most of his gliding experience at the particular strip and was familiar with the area. The flight in question was to be the first made by the aircraft since returning from another aerodrome. During the preflight inspection the pilot had forgotten to re-set the altimeter to read zero feet. As a result, the altimeter was over-reading by some 500 feet. The pilot had concentrated on the indicated height and had not visually assessed the approach profile. He was unable to explain why he had persisted with the approach when he became aware that the aircraft was abnormally low and there were suitable outlanding areas available.

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

# 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

**Quickie Q200, VH-FMV, Bankstown N.S.W., 10 Oct. 85, PPL, 21,000 hrs.**
The aircraft was being flown for the first time. The pilot stated that after takeoff the aircraft felt very nose heavy and that he had difficulty in maintaining a nose-up attitude after liftoff. When he attempted to reset the elevator trim, the friction nut broke. The back pressure that he was required to hold with the control column reduced as the airspeed increased. During the subsequent approach, the pilot found he had insufficient elevator control available to flare the aircraft. On touchdown, the aircraft bounced and a go-around was carried out. The pilot made several other landing attempts but on each occasion the aircraft bounced. On the final attempt, the aircraft bounced a number of times before the right canard collapsed and the aircraft ran off the runway.

The aircraft had been correctly loaded, with the centre of gravity 14 per cent aft of the forward limit. The angles of incidence on the wing and the canard were found to be about 0.3 degrees outside the design specifications. It was apparent that there was a critical relationship between these angles, the centre of gravity position and the amount of pitch control available. The aircraft manufacturer subsequently recommended a modification to the control system.

**Amer Air 5-B, VH-IFS, Birdsville Qld., 05 Sep. 86, None, 200 hrs.**
The pilot had held a Private Pilot Licence which had expired about six months prior to the accident. A witness reported that after the aircraft touched down it bounced about three times before landing in a nose-down attitude, which resulted in the nosegear strut failing in overload.

The landing was attempted in a 10 knot crosswind and the pilot reported that the aircraft was affected by a wind gust during the landing sequence. The pilot was not in recent flying practice and had not flown for about five months prior to this trip.

**Cessna 182-R, VH-PJV, Wando Vale Station, 21 Sep. 86, 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.



**Rockwell S2R, VH-LGG, Griffith N.S.W., 24 Jan. 86, CPL/Ag. Cl. 1, 9000 hrs.**
Shortly after an apparently normal takeoff, engine power was lost and the pilot was committed to a landing straight ahead. Initial touchdown was in a flooded rice paddy and the aircraft then struck a levy bank and ran through a fence, coming to rest inverted in an adjoining dry paddock. Investigation revealed that one cylinder head had become detached from the engine and had removed a section of the inlet manifold.

The cylinder head had failed as a result of fatigue cracking which had commenced at the edge of an exhaust valve insert.

**Piper PA28-140, VH-WKE, Lennox Head N.S.W., 02 Feb. 86, PPL, 251 hrs.**
While the aircraft was cruising at 2000 feet above mean sea level the engine commenced to run roughly. Trouble checks failed to determine the source of rough running and the pilot elected to land at an en route aerodrome. However, before reaching this strip, the engine lost power completely and the pilot was committed to a forced landing. Because of crowds at an adjacent beach, the pilot attempted to land on a road. Touchdown was further along the road than expected because of a strong tailwind component, and the aircraft collided with a kerb before coming to rest. Initial investigation disclosed a number of mounting stud failures on one cylider, together with an exhaust valve failure in the same cylinder.

Investigation revealed that nuts on the various bolts and studs securing the number three cylinder to the crankcase had evidently not been correctly tightened. Five of the eight mounting studs/bolts had failed from fatigue during normal operations, finally allowing the cylinder to become loose. The engine had completed 83 hours time in service since an overhaul. There was no logbook record to show whether the particular cylinder had been removed or replaced since that overhaul.

**Beech 95-B55, VH-APL, Ballina N.S.W., 30 Jun. 86, PPL, 2500 hrs.**
During the takeoff roll, the aircraft had reached a speed of about 85 knots when the left engine suddenly lost power. The pilot immediately closed both throttles and applied braking but was unable to prevent the aircraft overrunning the 730-metre strip. The landing gear was torn out before the aircraft came to rest. Initial investigation revealed that the takeoff attempt had been made with the fuel tanks selected to the auxiliary positions, and these tanks were about one-quarter full. It is probable that the fuel ports became uncovered as a result of the takeoff accleration, allowing the ingestion of air to the fuel system.

The pilot normally followed a written checklist but had omitted to use it on this occasion. After checking the fuel system during the before-takeoff vital actions, he had inadvertently left the fuel selectors on the auxiliary positions.

**Cessna U206-G, VH-UFG, Molong N.S.W., 10 Sep. 86, PPL/Cl. 4, 2398 hrs.**
The pilot was making an approach in light wind conditions to a 600-metre long strip. Undulations on the surface were such that the slope in the landing direction varied from about 7 per cent up to 4 per cent down. The pilot was using a short-field landing technique. Touchdown occurred just prior to the threshold and the aircraft bounced. Full power was applied but the aircraft then touched down heavily 100 metres in from the threshold. The noseleg broke at the fork, the propeller struck the ground several times, and the aircraft came to rest at the edge of the strip.

The strip did not meet the published requirements for an ALA suitable for Private category operations. The premature touchdown short of the threshold may have resulted from visual illusions associated with the strip slope. The aircraft had stalled during the attempted recovery from the bounce after initial touchdown.

**Piper PA28-151, VH-IBU, Bankstown N.S.W., 12 Sep. 86, Student, 14 hrs.**
The student was undertaking his fourth solo flight and had been instructed to practise circuits with touch-and-go landings. After acknowledging a landing clearance, the pilot inadvertently dropped the microphone. He learnt down to retrieve it and shortly afterwards the aircraft touched down heavily about 200 metres short of the threshold. The aircraft bounced, the pilot applied forward elevator control, and a further heavy touchdown took place on the nosewheel and propeller. The nosegear folded back and the aircraft groundlooped to a halt on the flight strip.

The student had become distracted from controlling the aircraft while attempting to retrieve the microphone. When he looked up again, he realised that the aircraft had deviated from the desired flight path, but he had persevered with the approach.

**Piper PA31, VH-UCK, Benalla Vic., 16 Jul. 86, CPL/Cl. 1, 895 hrs.**
At the time of the attempted takeoff, the night was dark with overcast cloud conditions and light rain falling. Wind conditions were light and variable. The pilot reported that initial acceleration was normal and the aircraft became airborne at about 95 knots. A positive rate of climb was established and the landing gear was selected up. The pilot subsequently advised that the speed then decayed to 90 knots. At this time there was nothing unusual in the engine noise and the controls felt normal. Shortly afterwards the propellers struck the ground 116 metres beyond the end of the runway. The aircraft then struck an embankment and passed through a fence before coming to rest 247 metres from the initial ground strike.

Although wind conditions were light and variable when the engines were started, shortly after the accident the wind was moderate from the west/south-west. A detailed analysis conducted by the Bureau of Meteorology indicated that while the pilot was preparing for takeoff, a cold front with winds in excess of 20 knots had probably passed over the aerodrome. As the pilot had conducted the takeoff on runway 08, there was probably a substantial tailwind component. Conditions were also assessed as suitable for the development of microbursts but the lack of recording instruments in the area prevented confirmation that this type of phenomenon had in fact occurred.

The pilot had been deprived of the opportunity to observe changing wind conditions at the aerodrome. The wind direction indicator adjacent to the threshold of runway 08 was not lit and the illuminated wind direction indicator was not visibile from the point where the aircraft was lined up for takeoff.

**Cessna 150-M, VH-WWS, Coldstream Vic., 10 Aug. 86, 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.

## *Corrigendum*

*In the 'Final updates' section of* Aviation Safety Digest 131, *an incorrect registration was given in the preliminary information for a Beech C23 accident at Echuca on 05 Jan. 86. The correct registration was VH-MRG, not VH-MRC as stated.*

# 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 |
|---|---|---|
| 85/16 (Issue 2) | Helicopter Winching ANO 29.7 | Issued 02 December 1986 Comments due 28 February 1987 |

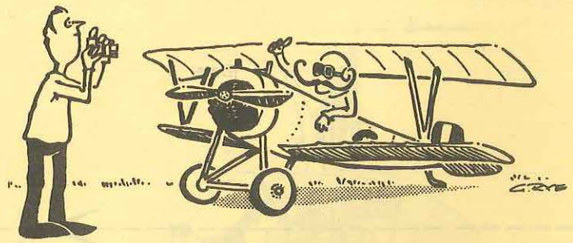


# Nikon

# 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.

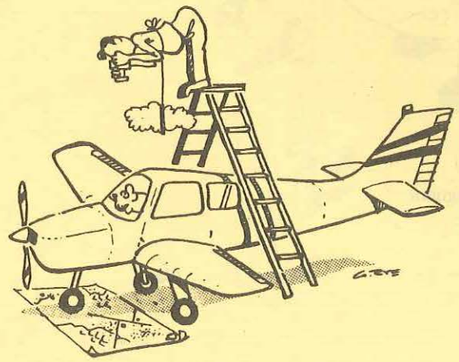


Three categories will be judged:

**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.

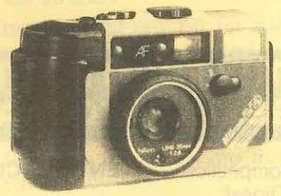
**Category 3** — There will be a specific prize for the best monochrome print. Black-and- white photographs in particular are a valuable contribution to the Digest. The judges will look for photographic skill and artistic composition which best exploits the unique quality of the black-and-white photograph.



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

..... .....

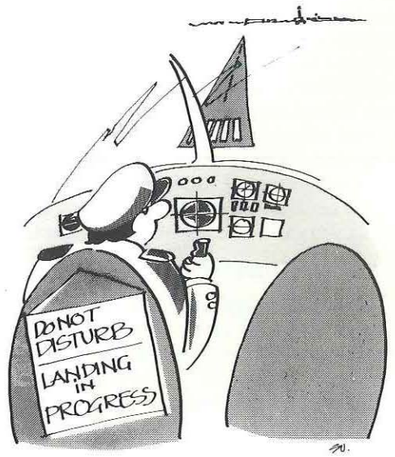
*(Signature)* *(Date)*


# Pilots rights


As PILOT-IN-COMMAND of an aircraft you HAVE NO RIGHT
. . . to endanger the lives of your passengers by:

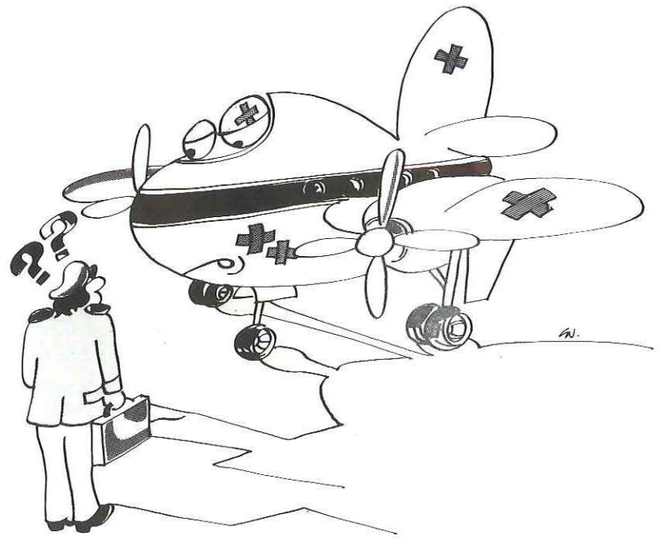
- loading the aircraft beyond its weight and balance limits
- omitting any flight planning or preflight steps
- carrying insufficient fuel
- not completing all systems checks and vital actions
- flying beyond the limitations of your licence, rating or currency
- accepting an aircraft that is less than fully serviceable
- exceeding your duty time limits
- flying when *you* are not completely serviceable

*. . . even if your passenger asks you to.*




As PILOT-IN-COMMAND of an aircraft you HAVE EVERY RIGHT to expect your passengers to:

- comply with your directions as to loading of the aircraft
- respect your request for silence during takeoff and the approach to land
- accept without complaint the nature of VFR flight and the possibility of delays or overnight stops en route
- follow your instructions in the event of an emergency □



# Wiggly amps

*Aircraft electrical systems*

*Frank Grimshaw is an electrical engineer in the Airworthiness Branch of the Department of Aviation.*

AIRCRAFT electrical systems work well and last a long time. Of course they do, but like all things, sooner or later there is bound to be a system failure. Whether or not the failure turns out to be a problem depends on many things: the nature of the failure, the type of operation in which the aircraft is involved, the pilot, or more specifically, the pilot's knowledge of the electrical system, and last but not least, the adequacy or otherwise of aircraft maintenance.

The purpose of this article is not to provide specific guidance on what pilots should do to minimise the effects of an electrical system failure — everyone knows the immediate requirement is to reduce electrical system loading. Nor is this article going to attempt to tell aircraft maintenance engineers how to perform maintenance — they have all been thoroughly trained and maintenance manuals contain the necessary detailed information. Perhaps that doesn't leave much scope for an *Aviation Safety Digest* article. But let's have a closer look at each of the factors mentioned in the opening paragraph and see if we really appreciate their significance.

(At this point I should add that the following comments are really directed at single engine aircraft. Some of the comments may be equally applicable to light twins and larger, but each reader should make due allowance for the differences.)

## Electrical System Failures

Naturally there are many components in any aircraft electrical system whose failure could result in loss of generated power. In single engine aircraft the failure of only one item can have that effect. Some twin engine aircraft, despite their having two generating systems, are in the same position. Typically, electrical generating system failures result from such mundane causes as a broken V belt, loose or broken wire to the generator/alternator or voltage regulator, voltage regulator failure and even bearing failures in alternators/generators.

Note that while one failure may cause a loss of generated electrical power, that does not imply a total loss of electrical power. All being well, there remains a battery with a capacity to supply some power for some period of time. Despite this redundancy, the Department receives, on average, 50 reports of loss of electrical power in single-engined aircraft each year.

The designer has rules which require that the likelihood of total electrical failures shall be remote. The rules are applicable at the time of certification of the aircraft, one of the certification tasks being to review the aircraft electrical system to ensure that the loss of all electrical power is unlikely. In addition, the rules apply to aircraft modifications, again to ensure that nothing is done to the aircraft electrical system which would reduce the level of safety originally established. These rules apply to the aircraft hardware, and where necessary, to the methods of operating the electrical system by instructions and procedures contained in the aircraft's flight manual.

## Type of aircraft operation

There would be little argument that loss of electrical power at night, in IMC, is the most critical situation. However, before addressing that situation in more detail, let's not neglect apparently less dramatic situations. Perhaps the least severe operation as far as the consequence of loss of electrical power is concerned would be day VFR. Provided the aircraft had no critical systems requiring electrical power, and at this time in Australia none do, there is no reason why the aircraft could not at least be safely landed albeit perhaps not where originally intended. Before writing-off this situation as 'not a problem', give some thought to your typical operations or those of your students. What systems would you have left — flaps, undercarriage extension, comms? What compensating actions would be required and how would you ensure you were not going to be a hazard to someone else? Perhaps while addressing those questions it would be wise to consider how much monitoring of your aircraft electrical system you perform when flying in these relatively ideal conditions.

How about night VMC? In this type of operation there is likely to be significantly more reliance on the aircraft electrical system — for instrument lighting, if nothing else. Again though, the rules applicable to this type of operation require the carriage of a torch, so even if all electrical power is lost there is no good reason why a safe landing should not be possible. Don't dismiss this situation too lightly though. Ever tried landing at night with only a torch (stuck in your mouth or right hand or wherever) for instrument lighting? No landing lights either, perhaps no flaps and possibly with the undercarriage having to be extended manually (was it 50 turns of the handle?), but hopefully landing at your intended destination and hopefully with runway lights (if you can turn them on)!

Now to IFR operation — loss of electrical power leaves you with a torch for illumination and a standby compass for navigation. Good luck! Yes, but I always have the aircraft battery as an emergency back-up, you say. True. But for how long following a generating system failure? And while I am at it, how are you going to know when the generating system fails? How long is it going to take you to reduce the electrical loads on the battery to a minimum? How do you reduce the electrical loads to a minimum without switching off the system(s) you need? Just what are the minimum loads you should retain? What compensating actions are necessary when loads are reduced to your minimum — is the undercarriage driven by an electrically-operated hydraulic pump? Will you have flaps? Is the electrical fuel pump really necessary?

Obviously the answers to all these questions spring to mind while the autopilot is controlling the aircraft for you. Another load on the battery! Of course if the answers don't spring to mind there is always the flight manual which you have to carry in the aircraft. That must have the answers. Checked it lately? OK, the pilot's operating handbook — maybe, but do you have it, and have you got time to read either of them anyway?

Like most things in life, the answers to these questions are neither simple nor easy. It all depends. *But, one thing is sure, you do not have any time to spare after the generating system fails if you are going to successfully manage the situation.*

## Aircraft system knowledge

It should be obvious by now that a detailed knowledge of the aircraft electrical system is an essential requirement for all who fly IFR. This is not to suggest that a detailed knowledge of all aircraft systems is not necessary for all operations. However, in IFR the electrical system does assume considerable importance.

Knowing that non-essential electrical loads should be shed as soon as possible after a generating system failure is not sufficient knowledge. Knowing how and what loads to shed is essential — and perhaps in what order. Having some idea of the likely time available before battery power is depleted is desirable since it provides the key to the urgency of your actions. Of course it makes sense that whatever battery power is left after a generating system failure should be conserved for essential systems.

But there is a peculiarity in battery characteristics that makes the time element critical. The peculiarity being that the amount of energy that can be extracted from a battery is dependent on the rate at which the energy is extracted. The higher the rate the lower the total energy that can be extracted. For example, a 15 Ampere Hour battery may be able to supply a current of three amps for five hours. However, the same battery will only provide about eight amp hours at 15 amps discharge rate (*32 minutes*), six amp hours at 30 amps (*12 minutes*) and 5.25 amp hours at 40 amps (*eight minutes*).

To illustrate the point mentioned above, and perhaps some others, it is useful to consider a scenario for the operation of an aircraft. Let's take a common single-engine IFR approved type and make some assumptions (if you don't think they are reasonable check out your aircraft), and let's look at the state of the battery (related to emergency time available) at various times. Let's assume:

1. The aircraft has a generating system failure warning light that gives immediate warning of a failure.
2. A generating system failure occurs soon after takeoff at night, in IMC.
3. It takes you two minutes to shed all non-essential loads.
4. The aircraft has a serviceable 15.5 amp hour lead acid battery which is fully charged before engine start.
5. You spend five minutes on the ground after starting for taxiing and run up, pretakeoff checks etc.
6. The aircraft has an emergency load of 11 amps and a normal load (at night) of 40 amps excluding landing lights.

We start off with a serviceable battery, that is, one having at least 80 per cent of original capacity and which is fully charged. Battery capacity is 12.4 amp hours. Assume two 10-second attempts at engine start. Because of the high current drain, the battery capacity will typically be reduced by 3.3 amp hours. We now have 9.1 amp hours remaining.

After engine start we apply the normal load of 40 amps by switching on such things as radios, nav lights, taxi light and landing light, anticollision beacon etc. The alternator now provides some power; however, we are at idle rpm and even alternators don't provide full output at idle. Let's assume the alternator provides 50 per cent of its output at 1000 rpm (a not unusual case) and is a 50 amp alternator. The alternator therefore provides 25 amps and the battery must supply the remainder of the 40 amp load, i.e. 15 amps, for the five-minute taxi etc. At this rate of discharge, the battery will typically lose a further 2.25 amp hours capacity. Remaining battery capacity is 9.1 − 2.25 = 6.85 amp hours.

Very soon after takeoff the generating system fails. We know immediately because of the failure-warning light. We now have a 40 amp load for two minutes while we collect our thoughts, control the aircraft in IMC and reduce the load to the emergency figure of 11 amps. During this two minutes we will have consumed around 3.4 amp hours of the battery's capacity. We now have 6.85 − 3.4 = 3.45 amp hours left. With the emergency load of 11 amps, the battery will typically only provide 0.7 of its capacity. We therefore have:

0.7 × 3.45 amp hours remaining = 2.15 amp hours

2.15 × 60 = 129 amp minutes

129 amp minutes = 11.7 minutes of battery power at 11 amps

That's right — about 12 minutes!

Remember the assumptions. A fully charged serviceable battery, a warning light that alerted us immediately to the generating system failure and last, but not least, sufficient knowledge of the systems in the aircraft to be able to shed non-essential loads in only two minutes. What would have happened if we had taken just a couple of minutes longer to react and shed the non-essential loads? Well, with the 40 amp load we would have had only a total of about four or five minutes of battery power and by the time we had shed the loads, would have had little or no electrical power left!

## Aircraft maintenance

So much for knowledge of the electrical system. What about the maintenance factor that was mentioned earlier? Let's look at a significant assumption in the foregoing example — a serviceable, fully-charged battery. Is it? Does it ever get a capacity check? When is it replaced? How many times have you had to do a jump start with an external power source? How many times has the engine on your aircraft been obstinate at starting and how much power would have been left in the battery after it finally started? Finally, how many times have you written-up the maintenance release for problems you may have had with an obviously less-than-serviceable battery? Maintenance staff are not going to fix a problem they are not aware of.

## Summary

Obviously this article has asked a lot of questions. Not too many answers have been provided though. Why? Well, that wasn't the purpose of this article. Perhaps it is sufficient to pose the questions and leave the answers for another time — it's probably more value for each of us to consider these situations in our particular aircraft and to refer to our own flight manual. In the meantime, if we all give a little more thought to the humble old electrical system, the article will have achieved its aim □

PS: Winter is approaching and batteries don't like cold weather.

# Parting gestures

THE FIRST effect of any significant imbalance in a rapidly rotating mass is vibration. The severity of such vibration, when a propeller loses part of its blade, is surprising in its violence.

The following examples illustrate the dramatic consequences.

The Cessna 206 had taken off from Longreach and the pilot reduced power to 25 inches and 2550 rpm at about 300 feet agl. At 500 feet, the pilot turned left to intercept the 222° omni radial.

At 1200 feet abeam the field he gave the departure report and continued the climb. By 3500 feet the throttle was fully forward to maintain 25 inches MAP. About 30 seconds later there was a loud bang and violent vibration.

'Immediate action was throttle closed — no change (suspected broken prop). Mixture to "idle-cut-off" — no change. Mags off — no change. Climbed rapidly to reduce speed. Engine [propeller] stopped at 75 knots. Turned back towards Longreach — glide established — doubtful whether we could reach the field — selected two other sites. Fuel off — MAYDAY calls — 3 VHF, 1 HF — no replies. One more on VHF was replied to. Decided safest alternative was to land on bitumen road south of the airfield. Commenced approach. Two cars on road in the way but managed to manoeuvre to land behind them. Landed successfully.'

Damage was:

- 1 prop blade broken off about 6 inches from the hub
- 2 rear engine mounts broken
- structural damage around left mount
- front cowling broken
- left cowling buckled
- chafing to baffles and plumbing.

In the next case the pilot was flying a home-built aircraft. He was cruising home towards Camden after a general flying sortie, flying level about 130 knots and at about 1300 feet agl.

Suddenly the aircraft shook so violently that the pilot was flung against the side of the cockpit.



The aircraft started vibrating severely. He closed the throttle, shut off the fuel and ignition and slowed to 80 knots. The vibration was still violent.

The area below consisted of small paddocks with large gum trees and power lines. He made an approach between two trees to land in a reasonably sized paddock, although he knew it wasn't long enough. The aircraft continued vibrating severely.

In the latter stages of the approach towards the paddock the right wing struck a tree. The aircraft dived into the ground and was destroyed. The pilot was seriously injured.

More than half of one of the propeller blades had separated in flight. The subsequent vibration was so severe that the pilot's vision was affected and he could not accurately judge his approach between the trees.

In such circumstances it is obviously insufficient merely to close the throttle. Even shutting down the engine by selecting the mixture control to the cut-off position may not stop it. The rotating mass has to stop rotating for the vibration to cease. This means that the pilot has to reduce the airspeed to a minimum until the propeller stops — and these actions have to be done quickly to prevent further damage. It is possible for the vibration to be so violent that it will cause the engine to be shaken out of its mounts.

Then there is the forced landing. Our pilots coped exceptionally well with the problem.

Like most things, prevention is better than cure — watch out for nicks, although in some cases the fatigue damage may not be evident during a walk-around. If in doubt have a LAME check it out.

To be safe:

- have any sharp nicks contoured out — particularly those in the leading edge area of the outer half of the blade
- Check the rear face of the blade as well as the front face
- Avoid run-ups over loose stones
- If you *have* to man-handle the aircraft without a tow bar, pull or push only the part of the blade immediately next to the hub — where there is plenty of 'meat'.

If you experience any severe vibration in flight, immediately:

- close the throttle and try to identify the source of the vibration
- if the vibration continues, reduce airspeed and again try to locate the source — it may be an unlocked door or hatch
- if the vibration continues, shut down the engine.

I haven't experienced a propeller failure of this nature, but from the description given by these pilots, there seemed little doubt as to the source of the vibration □

# AIRFLOW

*(Everything you always wanted to know about flying but were afraid to ask, or everything you always knew about flying but were reluctant to tell.)*

*AIRFLOW is a column through which you are encouraged to communicate with the aviation community on topics which are related to flight safety.*

*Your ideas, thoughts, questions and suggestions are welcome in this forum, irrespective of your experience level or your status within the aviation community. Queries from student pilots and advice from instructors will be particularly welcome.*

*Anonymity will be respected if requested. 'Immunity' applies with respect to any self-confessed infringements that are highlighted for the benefit of others.*

Dear Sir,

This little incident could well be titled 'Make Sure'.

In October of 1982, as a new UPPL with only 70 hours or so in the book, I took a Cessna 206 from Archerfield to Bathurst for the Hardie-Ferodo races.

The trip down was uneventful and a great weekend was had by all.

Come Monday and time to go home — the weather had deteriorated below VMC — back to town for lunch — the weather then lifted somewhat, marginal VMC — back to the airport!

The aircraft was fuelled and preflighted and I asked a passenger who was a student pilot to put two litres of oil in the engine while I joined the queue to phone-in a plan.

On my return, the passenger assured me that the oil was now OK so we all strapped in, completed the run up and took off for Archerfield.

At about 500 feet and a mile or so out, I suddenly discovered that clouds are not the only way to go 'inadvertent VMC'. A thick coating of black oil covered the windscreen.

I immediately made a slightly unusual radio call to 'All Stations Bathurst' and rejoined the circuit. The landing was safe but bumpy. It's hard to judge a flare from the side window. A few minutes were spent cleaning up the mess, topping off the oil, and making bloody sure the cap was on properly this time. By the time we arrived at Archerfield, the windscreen once again had a liberal coating of oil blown from the nooks and crannies under the cowl and, together with the afternoon sun, made for another interesting landing.

It wasn't too bad, I suppose. It didn't cause any damage, but it was a bit disconcerting to a 70 hour pilot. These days, no matter who is in the right-hand seat, I do my own preflight. Little things, if unexpected, can kill too.

ANDREW J. KERANS
DARWIN, N.T.

*As you point out, Andrew, it's the little things that catch us out. It's strange when you think about it, but if you rely on someone else to check these things for you — you are trusting them with your life. There aren't many people, perhaps two or three, that I trust* that *much, and then only because I have known them for a long time and they have earned that trust. That might be a good philosophy for aviation too.*

Dear Sir,

I believe your editorial in *ASD130* highlighted two very important attitudes in the aviation community:

- first — all sections of the aviation community are indeed interested in initiatives to improve aviation safety
- second — there is some sensitivity to the 'human factor' aspects of seeking assistance from ATC.

Pilots are reluctant to ask for help or declare a problem in case they risk some form of subsequent disciplinary action. May I suggest a change in the system which I believe would humanise this delicate situation.

In general, a pilot is not informed when ATC or Flight Service submits a routine incident report, however minor the occurrence. This causes two major problems:

- the incident report that is submitted may not be completely accurate, or at best may not include a picture of the events from both points of view
- the pilot, not knowing a report has been submitted, may have dismissed the occurrence from his or her mind in the belief that the matter was over and done with.

There is obvious concern when some time later, the pilot is asked to explain — not by ATC or FS but by a BASI officer who is investigating the occurrence and who is not personally aware of the circumstances. There is a feeling of confusion and resentment at being placed in a position of having to defend oneself without all the facts and having to rely on a vague memory of what had happened. Hence the claim, 'They are ganging-up on me!'.



AIRFLOW

Surely it's common courtesy to inform all the parties involved by phone or by mail:

- that a report has been submitted, and
- details contained in the report.

The pilot involved may then submit his or her own report while the events are still fresh to mind.

Yours faithfully,

MARY O'BRIEN
SCPL

*Mary, I think your idea is both fair and worthwhile. I have asked BASI to formally examine your proposal and I will publish the details in this column as soon as I have a response. Thanks.*

Dear Sir,

*Southern Cross Air Race '86*

Out of the blue, I received a phone call from my mate's boss, Gary Armstrong, asking if I would like to be a member of his crew in the Southern Cross Air Race. Having gained my restricted PPL in April '86, I jumped at the chance.

He explained to me some of his experiences in previous races, both good and bad, the camaraderie among competitors and, of course, the 'dinner and drinks'.

Having heard of these events, my wife became rather apprehensive about having me flying around the skies of Vic., N.S.W. and S.A. for four days, but nothing was going to stop me.

*Friday October 17*

We met at Moorabbin — myself, the pilot and two other crew members. Our flight plan was to track over Eildon then direct to Albury to pick up one more crew member. After a successful VMC departure from Moorabbin we headed for Healesville.

Noticing the cloud cover above the Ranges, we circled Healesville while Gary obtained a clearance to climb to 5000 feet. After obtaining his clearance, he was still apprehensive about the cloud.

The point I am trying to bring to your attention is that Gary had previously informed me that we would be flying over Eildon and of the terrific views and photographic possibilities.

Instilled in my mind was this route over Eildon and I personally would have carried on being all geared-up for this (and a terrific weekend to follow) not thinking of safety or even an alternative route. Having little or no experience in navigation or flying in such conditions, I was fortunate to have Gary explain to me how easily pilots are 'misled' and find themselves in serious trouble.

Electing not to track over Eildon we amended our flight plan and tracked Kilmore — Mangalore — Albury, picked up our crew member and finally on to Bathurst without mishap.

The race began Saturday morning from Bathurst, with the weather looking poor.

About halfway along the first leg, we had to put down for two hours at Temora due to bad weather. We eventually got away and managed to complete that day's race route in poor conditions and by gaining weather reports constantly from the leading competitors.

I found the attention directed to the safety of crew and aircraft by our pilot and all other competitors, was second to none.

After completing day one of the competition, ourselves and two other crew elected not to complete the air race and we opted for Sunday in Swan Hill.

WARNING: Seafood eaten in Echuca plays havoc with the digestive system (or was it something we drank?). Steve drank a bottle of Mylanta (thickener) from Echuca to Swan Hill!

After a pleasant day in Swan Hill we set off for Albury, with the weather to the south looking poor. On touchdown at Albury, the thought of staying overnight was already dawning on us. After reading the met forecast and making numerous calls to Melbourne, our pilot elected to stay overnight in Albury. This was not an easy decision to make as three of the crew had rather important appointments in Melbourne on Monday.

From discussions I overheard, there was a chance that we could have got through to Melbourne but it would have been very touch-and-go. Thirty minutes after this decision was made, the storm activity around Albury, Kilmore and Melbourne had increased significantly and I felt great to be in Albury.

As Gary said numerous times during the weekend — 'It is better to be on the ground wishing you were in the air than in the air wishing you were on the ground.'

All in all it was a terrific weekend. The comradeship of all the competitors, attitude towards safety and the hospitality at the Aero Clubs was great.

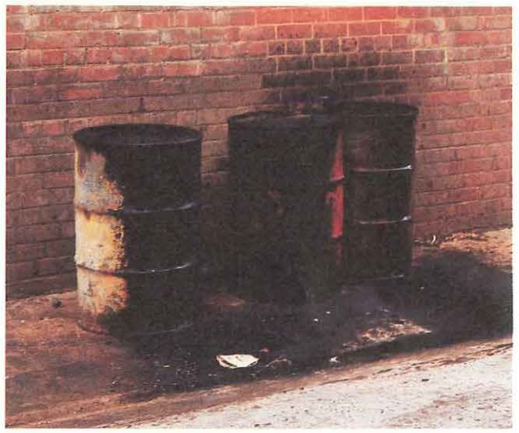
Next step, 'unrestricted'.

KIM BRITTER
VICTORIA

*Thanks for the comment, Kim. I too found the pilots in the race to be most professional. I would like to see Gary's philosophy emblazoned across the sky in large letters* — IT IS BETTER TO BE ON THE GROUND WISHING YOU WERE IN THE AIR THAN IN THE AIR WISHING YOU WERE ON THE GROUND — *wise words indeed.*


# Digest Photographic Competition

**Above — Example of a potential entry for the general category — Category 1.**



**Right — Examples of potential entries for the 'unsafety' category — Category 2.**

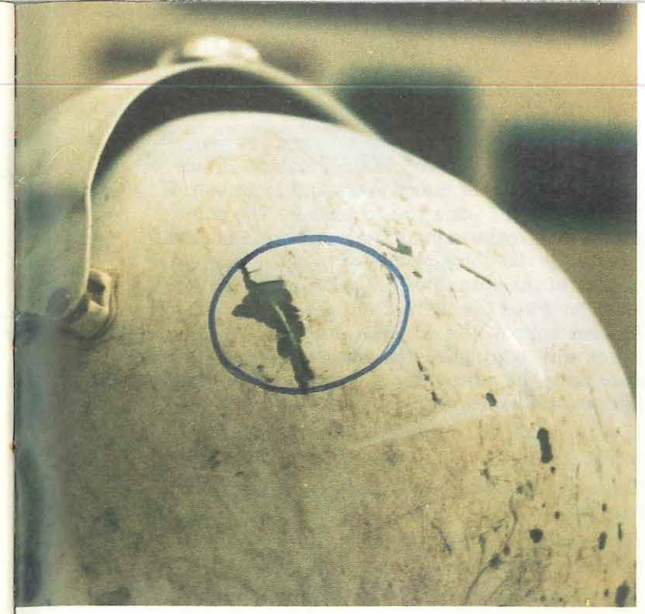
If you see such potential hazards please report them before they lead to damage to a valuable aircraft or pilot — and of course take a picture for the competition.

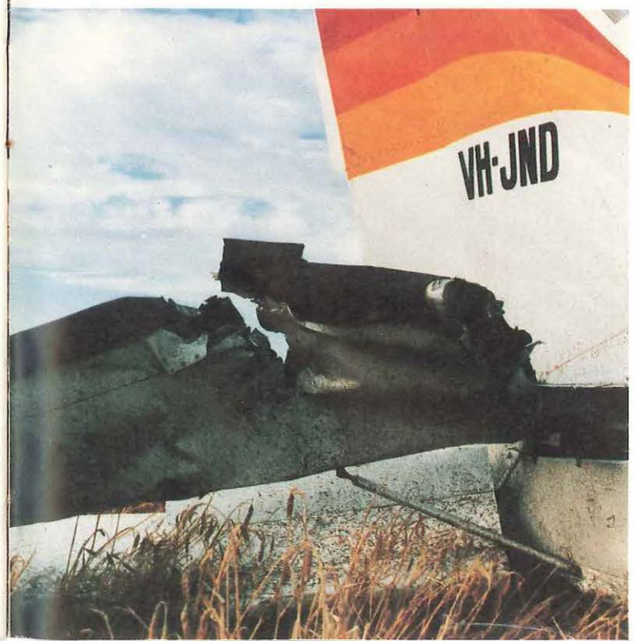
*Unsafe — one*

*These drums of discarded oil are awaiting collection for recycling. Behind that wall is a hangar full of valuable aeroplanes and valuable maintenance staff.*

*Unsafe — two*

*A not so obvious potential accident is this Cessna. It was tied down but because there was no tie-down at the tail, it has moved in the wind. Where aircraft are parked close together this movement may be sufficient to allow a collision. Also the now slackened tie-down on the far side will allow that wing to lift should the wind change. On this occasion the wind had dropped and there was no significant risk of further movement but it does illustrate the importance of that third tie-down.*




# I wouldn't be seen dead without my bone-dome

*Protective helmets for Agricultural pilots*

I READ FREQUENTLY of lives of Ag pilots saved by the fact that they were wearing a protective helmet. This of course implies a properly designed and fitted helmet — but more of that in a minute.

Remember the Pawnee Brave that crashed near Griffith, N.S.W. late last year?

*The pilot was carrying out the first spray run in the particular paddock. Towards the end of the run he was distracted when a large flock of birds flew up in front of the aicraft. The pilot descended to fly under the flock and momentarily forgot about a power line that was in the vicinity. As he pulled up at the end of the run, the main undercarriage leg snagged the wire. The wire cutters fitted to the gear did not sever the wire and the aircraft impacted the ground some 82 metres later.*

*The inertia reel which was selected to the auto position failed to lock, and during the crash the pilot was thrown forward. (The reel should lock the harness on sensing the deceleration.) The pilot's head impacted the padded instrument coaming, and despite this padding he would have probably suffered serious injuries if he hadn't been wearing a helmet.*

The pilot in this accident, Gavin Thomson, kindly agreed to recount his view of the events.

'When I started my Ag flying training in 1979, the company I worked for supplied me with a new Gentex DH118 safety helmet. The training pilot with our company insisted that it be worn at all times while working. Although it was a good quality helmet, I initially found it too heavy, hot and generally irritating. However, after persevering for a few months, I became used to it and even felt uncomfortable without it on.

'Six and a half years later I was still using the same helmet when I caught the two wires around the undercarriage of the Pawnee Brave. The wires did not break until the aircraft struck the ground in a nose-down attitude. The front of the helmet was undamaged even though the crash-pad, dash and instruments were badly damaged by it. At some stage of the accident sequence the port wing folded back and a broken spray boom passed through the side window, badly cracking my helmet above the left ear. I am sure that wearing a good quality helmet saved my life twice in the one accident.'

Gavin goes on to say — 'Any pilot buying a helmet should consider spending a few extra dollars on an adjustable strap, suspended type, which gives much better comfort and cooling and probably gives better impact protection.

'One of the problems for a young pilot who has just spent a lot of money on a Commercial and an Ag rating is the very high cost of purchasing a good helmet. I think Australian companies should consider supplying helmets — as New Zealand companies do.

'I would also like to add that some of the very experienced Ag pilots, who often only work with lap belts and ear muffs, should consider the example they are setting for new and inexperienced pilots, even if they have little regard for their own safety.'

There is much in what Gavin has said. First, I would like to shake the hand of the Ag instructor who insisted his trainees wear a helmet. Obviously, the wearing of a helmet will increase the chance of surviving a crash — and in Ag operations the crash is often as a result of a wire strike and the aircraft is not under control.

Let's look though at the design of the helmet.

Pilots are reluctant to wear a helmet that is heavy, hot and especially if it restricts the field-of-view. It is the age-old problem of weighing up the disadvantages against the odds of an accident where the helmet may save your life. It's the same with a parachute. Many pilots initially refused to wear one because of the discomfort and the probability of successfully force-landing the aircraft. As speeds got higher and the chance of walking away from a landing became less, the parachute was accepted. Similarly, the fighter pilot should wear an immersion suit if he has to eject, and if he is to survive long enough in our winter seas to be rescued. However, the suit is hot, uncomfortable and restricts movement.

Obviously it is a compromise. The odds of an Ag pilot needing a helmet are high enough in my estimation to warrant wearing one all the time. What we must do is ensure that the helmet is the lightest, most comfortable and least restrictive that current technology can produce and pilots or operators can afford.

The Gentex that was mentioned is a civilian version of the U.S. military SPH-4 helmet. It has been in service for many years and is proven. If you have one, I urge you to wear it. The point that Gavin makes about the suspension is significant as is the damage caused by the sideways impact of the spray boom. The Australian Forces have reviewed the SPH-4 and are now acquiring another helmet, the ALPHA, for both the Air Force and Army pilots who fly low and slow. It does have the adjustable suspension and is the lightest available.

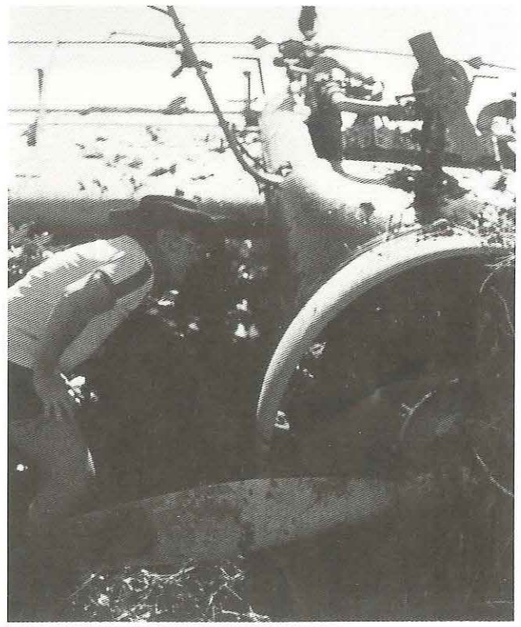
If you are about to buy a helmet it would be worth trying both before you decide.

Of great importance in either case is correct fitment.

If you still have doubts about the need for a helmet, consider the following:

*The pilot was making a night spraying run over a cotton crop. During the third run at about 50 feet agl, the engine suddenly lost all power. The pilot attempted a landing in a flooded paddock. Immediately after touchdown, the aircraft nosed over and sank into the soft muddy surface. The pilot was able to extricate himself from the partly flooded cockpit.*

*The pilot had selected the most suitable area available in the circumstances. 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 that he would have suffered head injuries and, as a result of this incapacitation, probably would have drowned* □





# Doped-up?

*Heady advice on the use of prescription drugs by anyone involved in aviation.*

*Doctor Harry Rance is a specialist in Aviation Medicine in the Department's Central Office.*

THE WORD 'drug' has many connotations. In general terms we are concerned with those chemical compounds which may be taken to cure specific symptoms or to stimulate exceptional behaviour. For example a drug could be a cure for hay fever, or an antidepressant. It could be a sleeping pill or a counter to sleep. It could be a relaxant or it could be a 'pep pill'. These are all drugs and all have effects which can be significant to our ability to act as pilot-in-command.

Let's examine a few more common drugs:

*Anti-histamines* — a very commonly prescribed drug for allergies such as hay-fever and contained in many 'cold' cures. Anti-histamines can cause drowsiness.

*Amphetamines* — sometimes prescribed with diets as they reduce hunger. Amphetamines are stimulants relieving feelings of tiredness and depression and giving temporary feelings of vitality and energy. In larger doses they can cause elation, aggressiveness and excitability.

*Antibiotics* — drugs used to combat illness or disease. The pilot being treated will probably not be fit to fly because of the illness but some antibiotics produce side-effects such as headaches, upset stomach, slight depression or even act as a sedative. Some people may be allergic to penicillin, a common antibiotic.

*Analgesics* — 'headache' powders and tablets can be taken without immediate side-effects but some of the stronger medications can cause possible side-effects.

*Barbiturates* — sleep-producing drugs. Used as sedatives or as sleeping pills, barbiturates can upset thought processes and impair judgment and co-ordination. They can induce sleep at inappropriate times and although described as 'short acting' may leave a measurable effect for some time.

*Tranquillisers* — are used to treat stress, anxiety and emotional distress. All are likely to cause drowsiness and slower reactions. Nearly all of them intensify the effects of alcohol or sedative drugs. They have been associated with some aircraft accidents.

*Drugs to reduce blood-pressure* — can also cause side-effects such as headaches, drowsiness and dizziness.

Other dangers associated with pill-popping and flying include:

*Allergies* — An allergic reaction can occur without warning and can be incapacitating.

*Side-effects* — Different people react in different ways. Some pilots may be subject to nausea or vertigo (disorientation) from drugs which are innocuous to most of us.

*Change of effect* — High-altitude or high 'g' forces have been seen to modify the effect of some medications.

*Combinations* — Drugs in combination can cancel each other, aggravate each other or produce a completely new reaction. Similarly the mixture of the social drug, alcohol, with medication can produce unexpected results.

Flying is a demanding art and skill. It requires our best ability and that comes with a sickness-free and drug-free body. Any medication carries a potential for reduced performance and the use of drugs to extend performance in the short term carries longer term penalties.

Social drugs are out. Non-prescribed drugs are out. Borrowing a colleague's cure is out. Medication should be prescribed in the knowledge of the side-effects and its influence on your ability to fly an aircraft. Off-the-shelf medication must be in moderation and treated with caution.

The safest way to take drugs is to first identify the cause of the problem and have it fixed before you fly.

Don't be tempted to use drugs to offset the symptoms and then end up in the situation where you have both the problem and the side-effects of the cure while you are trying to fly an aeroplane □