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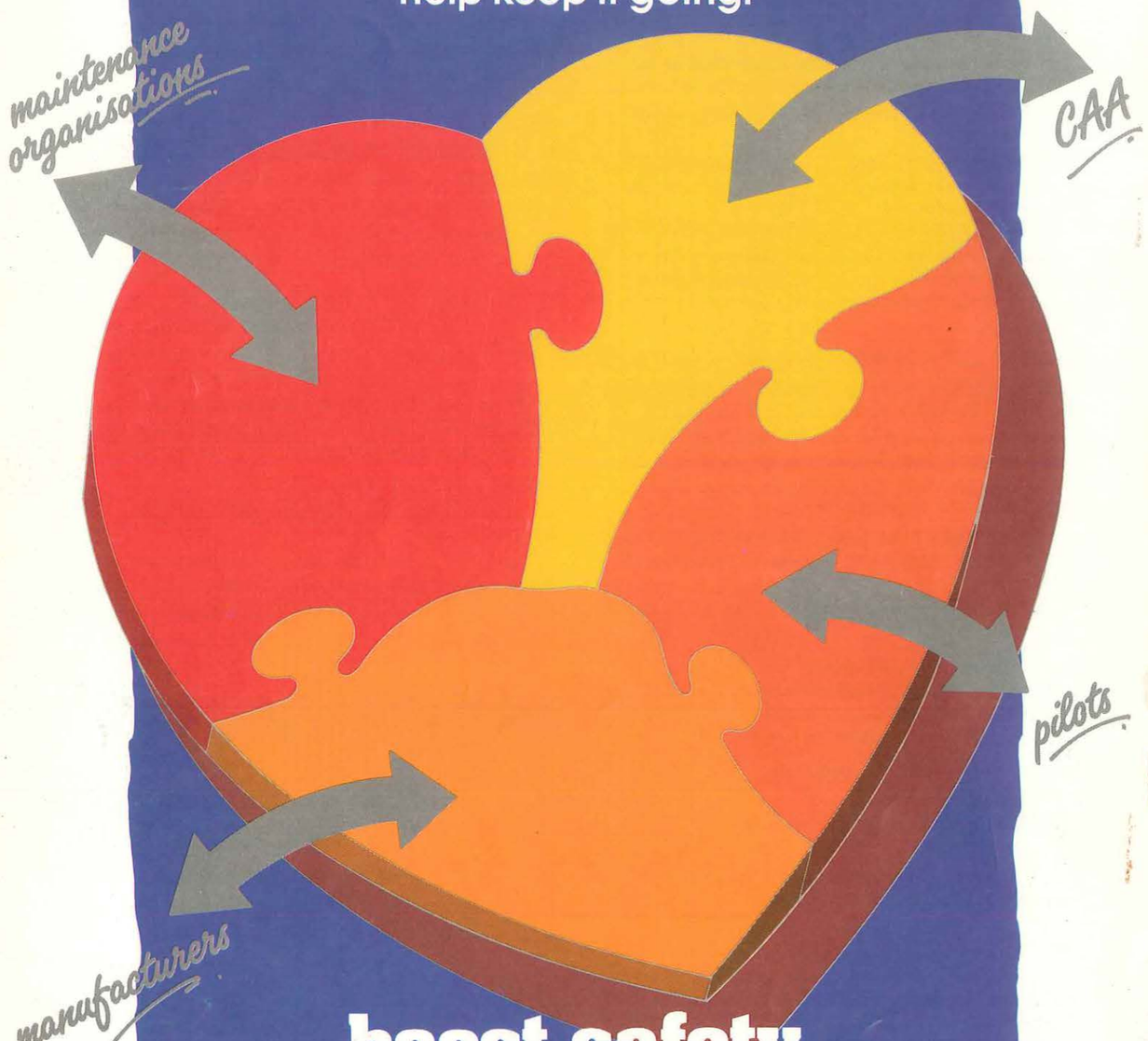

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Aviation Safety Digest

ASD 140

AUTUMN 1989

CAA
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Contents

Statement by Mr Alan Woods, Chairman of the Board

Last year saw major initiatives by the Government in aviation administration in Australia. The Federal Airports Corporation took control of most of Australia's larger airports on 1 January and the Civil Aviation Authority assumed responsibility for safety regulation and the air traffic services system on 1 July. A further element of the Government's strategy, economic de-regulation of domestic trunk route services, is to take effect in October 1990.

These changes are timely in meeting the challenges which lie ahead. The next ten to fifteen years will see significant changes in the areas of new technology aircraft, satellite-based communications, navigation and surveillance systems and runway precision approach systems.

Economic de-regulation, when it comes in 1990, will bring a more diverse and changing commercial aviation environment than we have faced in the past. This will call for adaptability and innovation on the part of the CAA as well as the aviation industry.

The Authority is moving to equip itself adequately to meet the demands which a de-regulated environment may bring.

The purpose of the CAA could be summarised as being to enable more people to benefit from safe aviation. The Authority plans to pursue this through a focus on Safety, Efficiency and Service. Our prime objective, in accordance with the Government's intention and the CAA's legislative obligations, is to promote aviation safety. It is recognised though that safety is not without cost to industry, and ultimately cost to the travelling public. There is a need to maintain proper balance between the two, as a contribution towards keeping flying from being priced beyond the means of the majority of the public.

Australia's excellent safety record in aviation has not come about by chance. It results from ongoing commitment to safety on the part of both operators and Safety regulators. I applaud the dedication and professionalism of the many people involved. To maintain this record will require the continued effort and co-operation of all parties in a more rapidly changing and complex environment.

Editorial

Ringing in the changes. In the last Aviation Safety Digest we foreshadowed some changes to the ASD in line with suggestions from our readers. This edition introduces some of those changes with the inclusion of articles on Airworthiness and other specialised areas.

A second change for the Digest is my appointment as Editor. I hold a CPL, but most of my flying was on helicopters and transport aircraft during 23 years with the RAAF. I enjoyed a two year exchange with the USAF, during which I mainly flew the King Air B200. At that time I completed six American and Canadian accident investigation and prevention courses and wrote many articles for the USAF's Flying Safety magazine.

The RAAF posted me to safety in Canberra where I looked after all our transport aircraft and was the safety Spotlight magazine editor. In both Australia and the States I have investigated a number of accidents, every one of which included a fatality.

I believe very much in the role of the Digest to help us all enjoy our flying by creating a safer environment. I believe that with expanding fleets and new technology the time is ripe to widen the role of the Digest to make it an informed forum for all those engaged in aviation activities. It is in this way that we will attract a wider readership which will result in a better informed community.

My thanks to David Robson, the previous Editor, who's excellent work on the Digest has set a very high standard. To help maintain that standard I will welcome positive suggestions and criticism from you, the reader. Your input is vital; it allows me to gauge the effectiveness of the Digest and to include safety information you see as being important.

Al Bridges
Editor

Covers

Front. Ayers Rock — a different view. Cloud dropping over Ayers Rock in mid 1974.
Photographic entry by Yvonne M. Dobinson

Back. Airworthiness poster. Design by Kathy Walter

Editor: *Al Bridges*
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Graphic Design: *Lesley Boulton*

Photographs: *P4* *Steve Small*
P8 *S. Hopper*
P20 *P. Machin-Everill*

Diagrams: *P7* *Ag. Pilots Manual*
P16-17 *Peter Garfield*

Cartoons: *P14* *Peter Garfield*
P15 *Lesley Boulton*

Flying to the Black Stump

Pilot contribution

A few months ago a friend of mine asked me to take him and a couple of others on a little flight. When I asked where to, he said 'Birdsville'.

Well like any good mate, I agreed.

When he left I wiped my brow, hoping he hadn't seen the glistening beads of sweat that had formed as I contemplated what I had just done. Me, fly to Birdsville? I didn't even know where it was. Oh I had heard of it all right, and had often wondered what it would be like. I knew that it was way out west in a desert somewhere, but that was the sum total of my knowledge of the place.

I made a dash for my friendly atlas and after several minutes scanning the maps of three states, lo and behold, there it was in the south western tip of Queensland. A long way from anywhere.

By this time swallowing was becoming a bit hard; I had suddenly grown a golf ball in my throat. 'What am I worried about', I thought, and tried to settle myself down. 'After all it's only a little bit further west than I've flown before'. About four hundred miles!

I spent the rest of the night tossing and turning; my wife spent it snarling. Women, they just don't understand this aviation business. This latter point was brought home to me very forcefully next morning over breakfast when I was trying to explain to her the incredible dangers I, her brave spouse, a true man amongst men, would face navigating a tiny aircraft across corpse ridden deserts, and the occasional crocodile festooned river. She raised her eyes from the morning paper, looked squarely at me and said, 'thats what you spent all our money training for isn't it, or do I ask for a refund?'

She was right. I had spent many thousands of hard earned dollars beavering away trying to attain a childhood dream, to learn to fly. Here I was at last with a nice new private pilot licence and the opportunity to use it. Why was I so nervous?

With a new sense of purpose I sat down and spent the rest of the afternoon thinking about the forthcoming trip, just three weeks away.

What would I need to do, where should I start?

Well I thought the first thing to do would be to obtain a new set of WAC charts. I bought a new set from the CAA Administration building at Bankstown Airport and sat down and studied them in detail. While that helped me get a grip on things I felt that I should really be talking to someone who had lots more experience than myself. It was then that old Bob, my instructor, sprang to mind. He had so recently patted me on the back and pushed me out the door probably hoping that he had seen the last of me for a while. He was just the person to handle this.

Next day I packed up my charts, bundled them into my trusty Volkswagen and headed for the flying school and my instructor.

'Hey Bob' I said, 'I am going to Birdsville in the next few weeks and I was wondering if you could spare the time to give me some advice and help me plan it?' 'Sure mate, if you go about it correctly and carefully you will have a great time, its really fabulous country out there, a great flying experience.'

Well, over the next few days we planned the trip. Deciding to ask Bob was one of the best decisions I made. His experience and assistance was of immense help.

Bob told me that I should look at all trips, not only this one, in close detail. He said that as my experience increased I would feel more comfortable and confident in making more decisions for myself, but that I had done the right thing in seeking advice from an experienced person and to always seek advice if I felt the slightest doubt about anything. Between us we identified the following points to consider for this trip.

The right aircraft

Bob explained how I should consider the distance to be flown, the number of passengers and the amount of luggage we would need to carry.

On this trip there would be four of us in the aircraft and we would be away for seven days. As we would be operating over remote areas I would need an aeroplane with good radio gear, in particular HF.

We chose a Cessna 210, not because it was the only type suitable as there are many that would fill the bill. Basically, the requirement for space, speed and range could be met by several, Bonanza A36, Piper Saratoga, etc, but I decided on the 210 because of its availability and my familiarity with the type.

HF radio was important because Bob explained that although I could legally go SARTIME I would be far better off to accept the protection of the system and opt for Full SAR by making regular position reports. This sounded like a good idea to me. If the worst should happen at least the rescue teams would know where to start and if I kept the reports to every thirty minutes or so the area to be searched would be relatively small giving us the best chance to be found quickly.

Route

Bob explained that the route I should choose need not be the most direct; in fact that rarely would be the case on any flight. He explained how important it is to plan to fly over the best terrain to avoid mountain chains and large stretches of desert. He went on to say that I should study the charts and select a route that overflies topographical features that would be easy to identify from the air, such as towns, major river systems, dams, power stations, railway junctions and prominent geological features. After selecting the basic route it would then be time to compare my choice against the CAA charts to see if the route selected needed to be adjusted to avoid restricted areas or if it passed through any control zones or controlled airspace. The restricted areas would need to be avoided while the latter would need to be marked on the WAC and an alternative route selected and marked in case a clearance through CTR or CTA was not available on the day. Fuel was also a consideration. Bob told me that I should also give some consideration to refueling stops, as fuel is not always available, and, when it is, it is sometimes sold from drums. I had heard of the precautions to observe with drum refueling, like making sure the cap was secure, no water, proper filtration, never use the last gallon or so in the bottom where all the rubbish settles. But what I didn't know was that you are normally expected to buy the whole drum, regardless of how much you need. Therefore, if you don't plan the refueling stops carefully you can end up wasting an awful lot of money just to get that needed extra few litres.

Radio

The decision was taken, then, to operate full reporting, thus availing ourselves of the protection of the SAR system should the worst happen. With the decision made to proceed full SAR Bob explained that I should try and select a route that would allow me to maintain VHF radio contact as much as possible. I hadn't thought of that really, I considered that as the aircraft would have HF radio fitted it wouldn't be a problem. When I expressed this view Bob nodded wisely then explained how difficult it can be at times to establish HF contact due to sun spot and atmospheric activity. What he said made good sense, so we went back to the charts and compared our proposed route against the FISCOM chart. We found that if I planned to fly about 5000 feet I would need to adjust one of the legs further north by about fifty miles. Bob explained that I should consider 5000 feet for planning radio reporting because if I used the FISCOM to select a route that was near the edge of the 10 000 foot shaded area I would be in bad shape if poor weather forced me lower. In practice all I had to do was select a track well within the shaded area. In the finish I was left with a section of about 150 miles over which VHF contact might be doubtful. Not too bad.

Time frame

You might be scratching your head wondering how I came to allow a week for this trip, particularly as I would be flying a 210. No its not because my selection of the route had us going via Perth, its just that as my friend wasn't in a hurry to get to Birdsville and back we decided that the trip should be taken steadily with reasonable stage lengths each day. We also decided to allow an extra couple of days in case the weather bombed out and we were stuck somewhere en-route for a while. Bob thought that about three hours should be the maximum planned stage length on any one day. He explained that as I was a relatively newly licensed pilot a stage length of three hours would probably see me out physically and mentally. Besides, it would ensure that I always had enough fuel left to mount a search or divert if I either got lost or some other unexpected calamity should occur. During the actual flight I was really thankful I had taken Bob's advice on this point, he was dead right, after about three flying hours I was bushed. With all the preflight and post flight activities of planning and checking I found that I spent on average about an extra two to three hours each day on top of the flying time.

Survival gear

Apart from the radios fitted to the aircraft I also obtained the loan of an ELT from the flying school. I figured that although it wasn't legally required to be carried, as we had HF, I would be a damned fool to leave it behind. At least it had a separate power source and would work even if the aircraft's battery was flat and I reckon that that alone is a good enough reason to carry one. You never know what shape the aeroplane may be in if you are forced to make an emergency landing!

Water is another problem. When the air temperature gets to around 35 degrees Celsius we each need between 4.5 and 5.5 litres per day to survive. With four of us on board I decided to carry 20 litres. As it would be mid August when we went I was hopeful that the daily maximum temperatures would not be quite that high. In any event it gave us a full days water each, and hopefully with us operating full reporting we would not be out there too long if we came down.

Food wasn't much of a consideration, as we could go a lot longer without food than water. However, knowing that my nerves would demand that I chew something I decided to give my fingernails a break and packed a selection of things that didn't need water to prepare, or too much to metabolize. Dates, sesawheat biscuits, sugar cubes, barley sugar sweets and a nice selection of cheeses filled the bill. Clothing requirements were to ensure that we had sufficient body protection from the sun during the day and something warm for the nights, as although it can get very hot in the daytime the clear night sky means that it also gets mighty cold just before sunrise. Everyone was advised to bring a jumper or jacket and something light with long sleeves and a good hat to help avoid sunburn during the day. I also decided to pack a can of insect repellant to keep 'Louie' at bay.

The flight

'Well how did the trip pan out' I hear you ask. Not bad actually. There was one time when I was 'temporarily unsure of my position' but as I had prepared my charts by penciling in each track, 10 degree drift lines, 10nm markers and a half way point it made the actual en-route navigation problem mainly one of finding my pencil. The one time I did momentarily get bushed I was quickly able to compare distances between each 10 minute pinpoint I had been plotting on the chart and suddenly realised that I had misidentified Mt Howitt. I was able to quickly establish my error when my nav computer revealed the distance between each of the previous pinpoints related to a groundspeed 150kts. My last pinpoint had us suddenly back to 90kts. Obviously I had either made an error or flown into a hurricane. As the weather beyond the perspex hadn't changed I decided it must have been me! When I applied 150kt groundspeed since my last pinpoint I came up with a new position on the chart. Suddenly the picture outside made sense.

The picture outside is another story. I found that over feature rich terrain it was easy to establish my position by reference to a few of them. After all, I had deliberately planned to make it easy for myself. However as the terrain flattened out and definitive features became fewer I used the 'big picture' more and more. As an experienced bush pilot once told me its 'macro' navigation versus the 'micro' navigation us fringe dwellers normally use.

I deliberately kept busy with the navigation. As we went further out west I realised that if I slackened off, just for a few minutes, landmarks were so rare that one could easily go by unnoticed. If that were to happen I sensed I could easily lose the flow of things and make an error. I think thats what happened at Mt Howitt but luckily my log keeping had been consistent and accurate, and I was able to quickly remedy the situation. However if I had been a bit slack with my log I reckon re-establishing my position would have been pretty difficult.

The weather was pretty good for most of the trip so I flew the highest quadrantal level available. The radio communications were just as Bob had explained they would be. I had good VHF communication for most of the trip. The only time I had to resort to HF was around Cunnamulla. I was surprised to note during planning that there is a VHF repeater at Birdsville. So I was even able to talk to Charleville via VHF on the ground.

We stayed at Birdsville for a couple of days; most of it I even remember. Let me just say that the night life at Birdsville is really something else. I do hope the Hotel's dog, Boss, has forgiven me. He spent a long time trying to push me out of his favorite spot in the gutter, but that's another story.

What more can I say. The trip was a howling success. We all had a great time. The flying was made a lot easier by the careful planning Bob and I had done before I left. By applying all that I had been taught and keeping an accurate log of my positions and fuel burn-off as I went I know I saved the day at least once.

That, after all, is why I had taken all that trouble in the first place. Out in that country you only need one mistake.

It was probably the most challenging and enjoyable trip I have undertaken so far. I still get Bob to run his eye over any trip I plan for the first time. His comments are getting fewer as I get more experience, but when he says something, its a gem □

Living with power lines

by John Freeman, Examiner of Airmen (Agricultural), CAA

YET ANOTHER accident where a helicopter flew into a wire at right angles to its flight path prompts further thought into possible reasons.

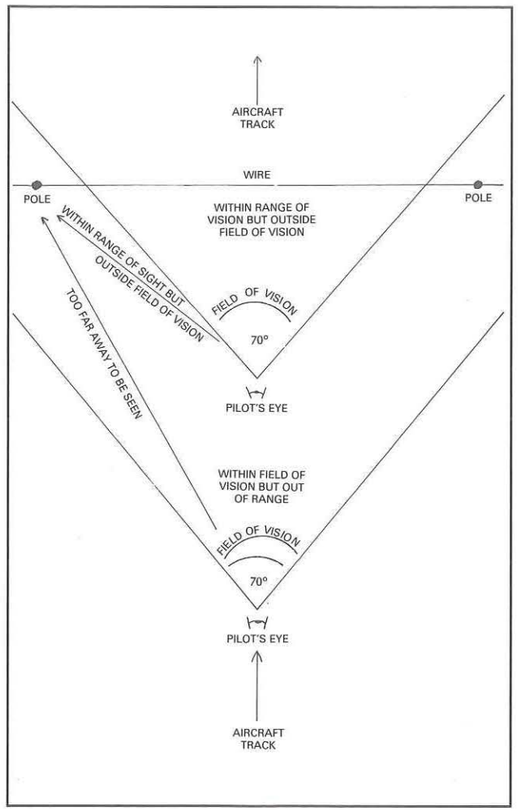
In this case the helicopter was following a road carrying out a filming exercise with rally cars travelling along the road. The clues to the wire were poles either side of the road. Unfortunately, one was hidden by trees but the other was in plain view.

This accident mirrors many others, some of which have had poles in excellent view. A large cross section of aircraft have been involved, agricultural, helicopter, fixed wing survey and private. The incidence is obviously higher in undulating terrain where wire spans are larger.

Why does a pilot fail to see such obvious clues as poles on either side of a valley or in open country? Maybe the answer lies this way —

The general field of vision is approximately 70°, i.e. 35° either side of straight ahead. The range of vision in locating and identifying potentially threatening items is limited by background, camouflaging effects, glare etc. Careful study of the diagram will show that there is a strong possibility that when the clues to the wire are within the field of vision they are outside the range of vision. When they are within the range of vision they are outside the field of vision.

In this event the sober truth is that unless the location of a crossing wire is determined before descending to its level, it may be physically impossible to see the clues, looking straight ahead, and collision is inevitable.



The solution to the problem takes two obvious forms:

First — Never fly at an altitude where wires may be encountered, without first surveying the area to locate the wire clues and the wire runs themselves. Any doubt as to the advisability of this statement can be alleviated by asking an experienced ag. pilot to descend to wire height in an area he hasn't previously surveyed. He simply cannot do it. Yet he is down there every day and knows the wire clues backwards. Our military aviators, too, conduct a thorough wire survey before allowing low level operating in any exercise area.

Second — When flying at wire height increase your field of vision by moving your head from side to side — just as forward looking low level radar does, it has a field of vision problem too. Never, but never fly at wire height looking straight ahead otherwise the first wire clue you will see is the wire itself a few feet in front of your face.

Note: The Agricultural Pilots Manual gives a wealth of information on how to locate wires □

Autumn weather

Bureau of Meteorology

AVIATION Safety Digests 137 (Winter 1988) and 139 (Summer 1988/89) contained articles dealing in considerable detail with aspects of aviation weather in those two seasons. Autumn generally sees the progressive transition between the weather experienced in summer to that in winter, with features of the summer scene (particularly the convective activity in northern Australia) often persisting into early autumn and features of the winter scene often evident in late autumn.

Generally good flying conditions are experienced during the daytime in mid-autumn. However pilots should be wary of:

- carburettor icing, particularly if flying in low level moist onshore streams.
- running out of daylight as the days are rapidly shortening.
- increased incidence of fog/low cloud.

Average number of fog days (per month) at various locations showing increased incidence from late summer through autumn.

	FEB	MAR	APR	MAY
Rockhampton	1	1	2	4
Richmond NSW	2	5	7	9
Canberra	1	3	4	8
Launceston	1	3	4	6

Late autumn generally sees an increase in the frequency of cold frontal and stream weather along the southern coastal areas of Australia. With these fronts are wind changes, often low cloud, reduced visibility, precipitation, wind shear and turbulence. (An article is planned for the Spring 1989 edition which will give more information on flying aspects of frontal weather).

While talking in very broad terms about 'average' autumn weather, large variations from the 'average' may be experienced, e.g. a late season tropical cyclone affecting northern coastal areas, an inland deep low pressure system or an upper air disturbance leading to very poor flying conditions. The principles of 'weatherwise' flying must always be observed even at this generally 'weather-benign' time of year. Anticipation and proper preparation are the key elements to obviate any potential problems that may arise □

What the pilot doesn't see

This article is a precis of a talk given by Alan Emmerson, CAA Airworthiness Engineer, to a safety seminar at the Bicentennial Air Show

Aircraft safety starts with safe aircraft

THERE seems to be a view at large that since we happily kill 1500 people a year on Australian roads, there is no need for further effort in aviation where we only kill 40 people a year.

My response is: 'That's six Australian Boeing 747s a year — one every sixty days for ever. Where would you like the first one to crash, Botany Bay or the Blue Mountains?'

The approximate accident rates which describe the risk you take when you drive a car or fly an aeroplane are shown in Figure 1. Bear in mind that the aviation accident rate shown was achieved in a climate of very strict control of all aviation activity.

COMPARATIVE ACCIDENT RATES

	Fatal Accidents Per Million Hours of Travel
Rural Roads	30
Urban Roads	55
All Australian Roads	38
General Aviation	13

Figure 1

Airworthiness control

Airworthiness control is exercised by the CAA through the Airworthiness Branch to formulate regulations intended to protect people from physical or financial injury caused by an aircraft.

To do this we specify the design, maintenance, repair and construction standards for aircraft and components and we review submissions by the industry in accordance with the standards. We then maintain surveillance of industry's compliance with the standards; and we investigate problems found with aircraft in service, both in Australia and abroad. Finally, we exercise whatever control action is necessary to ensure that the standards are met.

How successful are we?

We may never know the extent of our success because the acceptable accident rate is so low that trends are masked by chance occurrences.

The data in Figure 2 describes recent Australian experience and shows the number of reported aircraft incidents in which BASI investigators determined that malfunction of part of the aircraft was a principal or contributory cause of the incident. Excluded are malfunctions obviously caused by flight crew action — such as doors being left open. In short, they are airworthiness problems.

AUSTRALIAN AIRCRAFT INCIDENTS WITH MATERIAL MALFUNCTION AS CAUSAL FACTOR 1982-1987

Attributed to	Number Reported > 5700 kg auw	Number Reported < 5700 kg auw
Design or Manufacture Fault	26	144
Maintenance Fault	70	452
Other Cause	1720	6242
Total	1816	6838

Figure 2

What this means is that four times every day in Australia, the safety of an aircraft is prejudiced by a malfunction. We have an unpleasant maintenance error every three days. You pilots and passengers should be the judge of whether that's good enough.

New technology

We are of course obliged to keep our standards up to date. Over the past two years we have put a major effort into reviewing these standards especially in the light of new technology. Not surprisingly we found that for each technological change there was an upside and a down side — a gain and a risk. The changes we investigated included:

Continuously operated full authority automatic flight controls;

Gust alleviation systems;

Electrical display and signaling in-flight controls;

Winglets;

Propulsion fans; and

Fibre reinforced plastics.

Aging aircraft

The mention of new structural materials leads on to what has been another major worry for us over the past two years. This is the matter of aging aircraft. It is not a new problem, rather its an old one revisited.

In the period 1976-1979, severe structurally significant cracking was found unexpectedly in a number of different types of modern airliner. This was the era of the so called geriatric jets. There were several tragic accidents.

The one which provided the answers was that which resulted from the inflight failure of the starboard tailplane of a Boeing 707 at Lusaka on 14 May, 1977. Because of an error in the design and certification process of a new model the tailplane spar failed through fatigue and inadequate inspections.

As a result of these incidents we all tightened up our regulations — not so much by making them more stringent but by trying to say what we really meant.

Then on 12 August 1985, a B747 of Japan Airlines crashed into Mt Ogura, Japan, killing 520 people. The accident was caused by secondary damage resulting from rapid depressurisation of the cabin following a fatigue failure of the rear pressure bulkhead. No inspections of the rear pressure bulkhead were scheduled because Boeing believed that any cracks would be obvious and would be detected before becoming catastrophic. The fatigue process was aggravated by an improper repair to the bulkhead seven years earlier.

Following the Japan Airlines accident, inspection of several B747s revealed widespread fatigue cracking in the forward fuselage. Aeroplanes were found to have adjacent frames severed in such a way that a coincident skin crack only 20cm long would have resulted in explosive decompression and probable destruction of the aeroplane.

It is reasonable to suppose that, if the JAL accident had not happened, a catastrophic failure of a forward fuselage would have occurred somewhere in the near future.

On 29 April 1988, a B737 of Aloha Airlines experienced massive damage to the pressure cabin in flight at an altitude of about 24,000 feet. Sixty passengers were injured and a flight attendant was blown out of the aircraft. There is little doubt that the cabin rupture was caused by fatigue cracking.

The generally held view is that the continued airworthiness of those aircraft types and their cousins is ensured for the immediate future. But, extreme vigilance must be maintained, with no further complacency, so that problems which do arise will be recognised and quickly dealt with.

I don't want you to think that the problems of aging aircraft are confined to airliners. If you look at an age profile of the Australian fleet, you will note that we have 4000 aeroplanes in the 10 to 25 year age bracket.

Many people were surprised when the wing broke off a Beech King Air that was only thirteen years or 5000 hours old. The accident resulted from fatigue initiated by a metallurgical fault. The time between inspections was too long and one inspection seems to have been done improperly.

There have been quite a few near accidents of the same general type in Australia, and some catastrophes.

There is particular significance of these events to the remainder of what I have to say. In each event there was a substantial contribution from human error in the airworthiness control process.

Human error

Before discussing human error, I should make it clear that, in my view and that of our chief engineer, an honest mistake made under intolerable pressure or at the edge of the state of the art does not constitute negligence or incompetence.

The conventional view of the direct causes of major accidents to commercial jet transport aircraft is something like this:

- Flight crew error 55%
- Aircraft design, manufacture and maintenance 18%
- Other known causes 12%
- Unknown 15%

I would like to offer an alternative view which was presented to the 1986 Flight Safety Foundation seminar.

The airworthiness of aircraft systems was the first event in the chain in 39% of accidents to large aircraft. A reasonable hypothesis from the data is that human response to airworthiness problems causes about 20% of accidents. Moreover, we must not forget the errors that are made but are detected by the airworthiness control system.

In discussing human error I want to move away from the past concentration on 'operators'. We should now be looking at the singular actions of key people, especially those actions in which the output is a decision rather than an operation, and including those where the wrong decision has an unwanted result, not immediately, but fifteen or twenty years on.

An important example of human error is the situation in which the doctrine fails. That is, when the received theory, held by the profession to be generally applicable, is erroneous. Because they are so pervasive, doctrinal errors are often very serious. They can have important financial consequences for the industry which has used the faulty doctrine. This also leads to pressure being placed on the regulatory authority to relax safety standards while the situation is recovered.

Doctrinal errors are every bit as much human errors as dropped spanners and cockpit confusion.

How about errors which occur by chance ?

On New Year's Eve 1968, twenty-six people died in Western Australia from impact forces experienced when their Vickers Viscount hit the ground after a wing broke off. About four years earlier, somebody found that a steel bush in the wing spar was not a light interference fit as required. He belled out each end of the bush 0.1 mm with a conical tool and drove the bush into the hole in the spar. The result was invisible. But by changing the local stresses and surface finish he reduced the fatigue life of the spar to one half of its expected worst possible value — with catastrophic consequences.

Who could have expected that?

If we have a large range of possible error types, and a consistent cause of error cannot be found, and the time between errors cannot be predicted, then we have chance errors, and there is little we can do to prevent them happening.

What we can do is find the errors after they have been made and before they do damage. Everything must be checked, and checked again and checked that it was checked. The manufacturer designs the aircraft, the country of origin's airworthiness authority checks the design, and the importing country's airworthiness authority independently spot checks it again.

Such redundancy is, and has been for many years, a fundamental component of aviation. However, the reasons for it have not been well documented and it is expensive. In today's financial climate it is under threat.

In changing times it is easy to overlook or ignore not only the lessons that have taught us the need for redundancy but also the conditions that are needed to make it work.

There must be the time and the means for the inspectors to find errors and to respond. Each person must be given adequate role training and direction so that each understands what he is expected to do when, where and why. There must be a proper arrangement of role relationships so that the authority delegated to each person is clear both to him and to his colleagues.

The people should be technically well trained and sufficiently confident in that training to challenge things that do not seem to be right. They should stick to established organisational procedures, but above all they must keep their imagination working.

Most of those precautions seem to have been absent in the lead up to 25 May 1979 when a DC 10 suffered a structural failure during take-off. Two hundred and seventy three people were killed. The aircraft crashed because the pilots were unable to control its flight path after an engine and its support pylon broke from the wing and severed hydraulic and electrical connections as they left.

This accident was an orchestration of human misjudgment — human errors in design and in maintenance, human error in airworthiness control. (For a full description of this accident you should read the NTSB report).

This brings me to the question of motivation.

What motivates the key people in aircraft design, manufacture, and maintenance to behave with the care, skill, concentration and persistence necessary for safe aviation?

I have no doubt that character is of primary importance in aviation safety. We need people who have:

- 'a high level of responsibility for the welfare of others,
- a high level of personal integrity, and
- a high level of self discipline'.

Those are not my words but those of the Technical Director of IATA Dr R R Shaw a former chief engineer in the Australian Department of Civil Aviation.

I expect engineers who work for me to have:

- an enquiring mind with sufficient curiosity to notice and find out why;
- sufficient persistence to get to the bottom of a problem;
- clarity of observation, clarity of thought, and clarity of expression;
- the ability to get on with people — especially when persistence is not welcome; and
- a healthy protective anticipation.

I would like them to develop a 'deep inner conviction or compulsion that permits no personal indifference, or surrender to expediency, or the taking of anything for granted in the discharge of their responsibilities'.

It has been said that there are 'aeroplane people', those who understand what aeroplanes can regularly do and what they cannot; and what is necessary to keep them going — in the air, airmanship, on the ground, engineering judgement.

Perhaps the answer to the question of motivation is simply that in the past, aviation has attracted men and women of determination and integrity. These would have known that there is intrisic merit in doing things properly and in getting it right the first time. Importantly, they would have had those qualities of personality which lead others to behave in the same way.

I want to leave you with the idea that the prevention and detection of human error in design and maintenance decision making is a primary part of airworthiness control.

'An aeroplane is ten million human judgements one of them foolish none infallible'

Area forecasts

Bureau of Meteorology

THE DOMESTIC area forecast system, ARFOR, is assigned primarily to meet the needs of pilots of general aviation aircraft. There are 35 areas for which forecasts are prepared, covering Australia and the nearby waters.

Weather conditions may vary quickly in time and over short distances in space. Consequently in changing weather conditions, when forecasts are most crucial to flight safety, ARFORS tend to become very complex and lengthy. A revised format was introduced in an attempt to make the ARFOR more 'user-friendly' and overcome other difficulties (e.g. excessive use of codes, poor presentation). Some information on each of the sections now contained in the ARFOR follows.

Overview

The aim of this section is to highlight the more significant information by referring to meteorological conditions that may be hazardous or impair aircraft operations using visual flight rules. It contains reference to affected regions, and spatial and temporal variations, as required. The Overview will immediately indicate if conditions throughout an area are very poor, marginal, deteriorating or improving. The pilot will still be required to examine the body of the ARFOR to obtain the relevant details, but this can now be done with helpful background provided in the 'Overview'.

Sub-divisions

Frequently there are marked variations within an ARFOR, on a temporal, spatial or weather-related basis. 'Sub-divisions' are used in an ARFOR if the forecaster expects contrasting conditions to occur, e.g. as a result of topography, or the influence of different synoptic or dynamic factors. If sub-divisions are defined here, they are retained in the remainder of the ARFOR. If a pilot is operating through part of an area only, then he can identify and concentrate on those sub-divisions appropriate to his flight.

Winds and temperatures

These are provided at intervals from 2000 feet to 18500 feet. The forecasts are prepared in tabular format for easy interpretation.

Cloud

Some changes have been made to the previous guidelines on cloud. The term 'layers' is now used if appropriate. Also if differing cloud types with reasonably homogeneous bases exceed 4/8, then they are collectively referred to as BKN.

Weather

More plain language is used in this section.

Visibility

If the visibility exceeds 10km the precise value is not specifically referred to. If fog is referred to in the Weather section, then it is assumed the visibility is less than 1km in fog areas.

Freezing level

The subdivisions are used if appropriate.

Icing

If CB cloud is forecast, then severe icing is assumed.

Turbulence

If CB cloud is forecast then severe turbulence is assumed. Generally the main types of turbulence referred to are clear air and mechanical.

Critical locations

These are written in plain language in TAF format, with information on cloud, visibility and weather. Variation terms (INTER, TEMPO) are used as appropriate □

There must have been a real strong headwind to make us land so far short of the overrun

Extract from accident report

AIRFLOW

Feeling a little query?

The AIRFLOW column is intended to promote discussion on topics relating to aviation safety. Input from student pilots and flying instructors is 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.

Write to: AIRFLOW
Aviation Safety Digest
P.O. Box 367
CANBERRA A.C.T. 2601
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Pilot Safety Awareness Seminars

These are conducted in association with the Aircraft Owners and Pilots Association. The program for the remainder of 1989 is as follows:

April 29	Coolangatta
May 27	Broken Hill
June 24	Canberra
July 29	Perth
August 26	Dubbo
September 23	Rockhampton
October 21	Mount Gambier
November 25	Moorabbin

The above dates are provisional, and accurate at time of printing. Final dates, themes and venue details are published in the AOPA monthly Journal in the months preceding the event.

BASI contacts

24 hour contact numbers for BASI offices:

Canberra	(008) 02 0616 or (062) 57 4150
Adelaide	(08) 218 0579
Brisbane	(07) 835 3676
Melbourne	(03) 663 7015
Perth	(09) 378 1333
Sydney	(02) 281 3120

CAIR office contact (office hours)

Canberra	(008) 02 0505

Accident response

Kawasaki BK117, 15 January 1988

As a descent was commenced, the left engine access cowl unlatched and struck the main rotor blades. Vibrations were so severe that instruments could not be read. The pilot elected to land in the water close to a beach.

BASI recommendation

The CAA should evaluate suggested modifications to the latch system.

CAA action

Airworthiness Branch and Kawasaki have investigated the proposed modifications. It was decided that a modified latch system would be mandatory on any BK117 aircraft on the Australian register.

Piper PA25-260, 19 March 1988

The pilot was spraying a crop in a valley. During a procedure turn the aircraft sank into the trees. The surface wind was a light breeze, but there was a strong wind at 2000 feet. Aircraft performance was insufficient to outclimb the sink rate.

BASI recommendation

An article should be published in the ASD on the dangers of flying near mountain ranges in strong wind conditions.

CAA action

Articles have been written on this problem in the past, especially ASD 137 and the special agricultural issue of the ASD. A video is planned on agricultural flying with special emphasis on low level turbulence.

Cessna 336, 3 August 1988

While in the cruise, the rear engine lost power and smoke entered the cabin. It was found that cracks had extended along either side of the lower welded seam from the muffler attachment flange. This had resulted in separation of a large section of the left exhaust stack.

BASI recommendation

The CAA should remind LAMEs of the importance of performing thorough inspections on exhaust systems and repair defects immediately.

CAA action

A CAA investigation is still proceeding. If it is determined that cracks were present but undetected during maintenance, stronger action than that proposed by BASI may be instigated.

AERONAUTICAL INFORMATION SERVICE AUSTRALIA

NOTICE

CURRENT DOCUMENTATION & PLANNED NEXT ISSUE

Document	Current Issue #	Planned Next Issue #
DAP(E)	09.03.89	04.05.89
DAP(W)	06.04.89	01.06.89
AGA 0-1-2	05.05.88	04.05.89
Aerodrome Diagrams	06.04.89	01.06.89
* ERS A	09.02.89	04.05.89
AIP (book)	15.12.88	04.05.89
VFG (book)	15.12.88	04.05.89
AIP/MAP	15.12.88	29.06.89
VFG/MAP	15.12.88	29.06.89
DAH	15.12.88	29.06.89

dates quoted are effective dates

* New document replaces AGA 3 & AIP/ERS

Note: CLASS I & CLASS II NOTAM ARE TO BE CONSULTED

WHEN USING ANY OF THE ABOVE DOCUMENTS

ISSUE: 5
DATE: 06 APR 89

How far should passenger briefing go?

Pilot Contribution by David Shilston

RECENTLY I was the pilot in command of a C-210 flying family and friends to Brisbane for EXPO 88.

Preceding the trip I briefed my passengers with the do's and don'ts (as per CN0 20.11-14) then asked if anybody had any questions, and after the usual 'where are the parachutes' and 'is there still time to walk' etc, I settled down to the workload and to flying which resulted in a smooth uneventful and enjoyable flight.

Before starting the return leg three days later, I briefed the passengers. With everything looking good, we were cleared to line up. I applied power and moved forward.

Suddenly there was a foul smelling smoke pouring into the cabin from under the right hand side console (where the front passenger sits). Within a second or two it was non-VMC in the front of the cabin. As I contacted the tower informing them there was smoke in the cabin and that I was shutting down and evacuating my passengers, my front passenger had his head under the console with fire extinguisher at hand and reported 'no flames'.

Just as he stated this (I was turning everything I could find to 'off') I saw out of the corner of my eye his head smash involuntarily into the the dash. He tried to straighten up with a pained expression upon his face as the door flew open and the passenger who was previously sitting behind him was 200 metres down the strip before a word could be said. (The prop was still spinning.)

My inlaws, sitting right at the back, started showing signs of panic because of the actions of this passenger. My wife spoke up and calmed them down and prepared them for a quick and orderly exit when the word was given. Meanwhile, the smoke had stopped and my front passenger was still trying to get the impressions of various instruments off his face. All of this took place in about 10 to 20 seconds from start to finish and the fire brigade turned up soon after.

This incident raises certain questions and issues for me, the first of which was to get hold of Australia's latest 200 metre sprint gold medalist and debrief her (although other more unattractive thoughts did cross my mind). This debrief included:-

1. What if there had been some flames? Opening the door would have allowed more fuel (i.e. oxygen) to the fire.

2. What would have happened if she had knocked the front passenger unconscious when she pushed the back of his seat forward, and by opening the door the flames caught on? He would have received bad burns at least, as it would have taken time to run around to his side of the aircraft and probably require more strength than I possess to lift him out.

3. Did she know where she was running to? Did she look for other traffic, i.e. other taxiing aircraft or ground vehicles? Was she aware that the prop was still spinning? The answer to these questions was no.

In brief, (actually I talked to her for well over an hour) she did panic as her ignorance with aircraft led her to believe that it was every person for themselves (despite two previous briefings) and that the fuel tanks were about to explode (she thought the fire was coming from the engine).

So, how far should you go with passenger briefing? Should you brief them on the difference between engine fires and cabin fires? Should you brief them for every possible situation that could arise? Perhaps you should 'just carry a gun and shoot the first person who panics!'

People like our new gold medalist are not only a danger to themselves but to everybody else, as panic breeds panic.

I would especially like to thank my wife and my mate who sat beside me (hope the face gets better soon) who both played a responsible and co-operative passenger role. Also a big thank you to the fire unit and safety officers at Brisbane Airport who were so quick to be on the scene.

Unfortunately, it is impossible to predict who will and who will not panic in any given situation. Your passenger brief could become so long you never get off the ground and, in any case, the passengers will only retain a fraction of it. Stick to the major items, tell them who is boss and try to exude masses of confidence during the emergency □

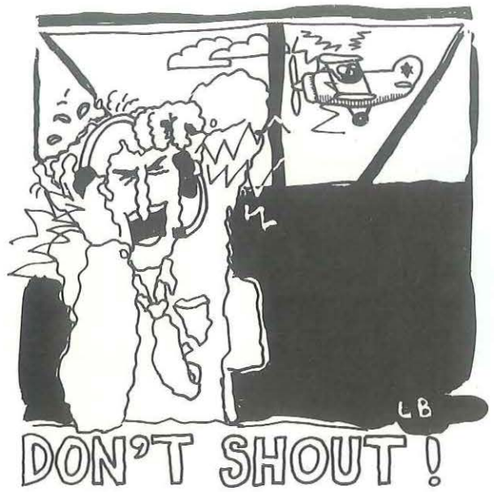
Some suggested 'rules' to help improve our R/T procedures

Pilot contribution by Senja Robey

1. Aim to be professional, even if you are a student.
2. Hold the microphone correctly.
3. Don't shout — speak normally so others on the frequency aren't blasted out of their cockpits. (otherwise they turn down the volume and miss ground transmissions.)
4. Don't acknowledge an acknowledgement — this can go on all day.
5. Preface *all* transmissions by your call sign — however tempting it is to simply answer the question.
6. If you can't *correctly* give standard reports (departure, full position, inbound etc.) 'off the cuff' then use a crib sheet under plastic with spaces for times, heights and places etc. and read it off (until sufficiently practised and skilled to manage without the crib). Then no-one will know you're not yet the Pro you're going to be.

   For standard phraseology refer VFG Section 28 — Communications.
7. *Know* what to read back — assigned levels, transponder codes, clearance limits, a level requirement or restriction.
8. On VHF, address the ground station by name *only* on the initial contact. When using HF it is normally necessary to identify the station being addressed each time as there may be numerous ground stations monitoring the same frequency.

   Every rule has an exception and when transferring from SMC to the Tower frequency (or vice versa) only give your call sign, rather than first addressing them by name as they are sitting beside each other at the console and expecting your call, probably with R/T space at a premium, so don't clutter it with unwanted transmissions.
9. If the ground station says 'Good morning' or whatever, then respond, but don't *you* start the pleasantries.
10. Always report leaving an assigned level. Remember that being told to make a visual approach is a clearance to leave an assigned level when ready.
11. When making an en-route frequency change many pilots give all sorts of details. If you check on the correct phraseology you'll no doubt be astounded at how incorrect you've been.
12. Do you really know how to correctly use a transponder? Incorrect use makes life hell for the air traffic controller.
13. If you don't understand an instruction don't hesitate to say 'Say again'.
14. If the ground station speaks too quickly then don't be afraid to say 'Say again, speak slower'.
15. The phrase 'This is', was dropped ages ago.
16. 'Affirmative' has been replaced by 'Affirm'. Strange, but true!
17. 10 is 'One Zero', not 'Ten' and so on.
18. If you want to give Full Position Reports so 'they' and 'everyone' will know where you are in the event of a dire emergency, then for goodness sake submit a formal flight plan with ALL your details rather than using the excuse of being in too much of a hurry, simply not knowing how or being too lazy and going NOSAR. Did you stop to think that when you pipe up with departure and full position reports whilst NOSAR the flight service officer, who has no details on your flight, starts a witch hunt to try and find where in the system things have got lost. This can be very time consuming and very COSTLY.



19. Do you know the CORRECT procedures relating to Departure Reports and Listening Watch when leaving GAAP aerodromes on a travel flight? Refer to VFG 61.7.
20. Imagine the busy controller's frustration at the following pilot response:

    ATC 'Alpha Bravo Charlie, are you the first or second aircraft at the holding point?'

    PILOT 'Alpha Bravo Charlie.'

    If you don't understand the question then ask, 'Say again'.
21. When the Tower frequency at GAAP aerodrome is very busy you may not be able to report 'downwind' at the appropriate place (when abeam the upwind threshold). No great hassle, but when you do get the call in, stipulate where you are e.g. mid downwind, late downwind, turning base etc. Heard recently in similar circumstances a solo student on short final blurting out '. . . downwind, touch-and-go'. There must be a lesson here for instructors.
22. Try and follow what is being said between the ground and other aircraft, particularly in busy control zones so that you can anticipate what may be said to you, thereby making it easier to understand and comply.
23. We all know we must not transmit over another person's message, but frequently a pilot's acknowledgement of a controller's instruction is lost by an over transmission, leaving the controller in doubt as to whether his/her instruction was received and understood. Make sure that the previous transmissions are complete.
24. How many have heard the call '. . . returning to base'. Makes you wonder what they've been up to at these uncontrolled aerodromes.

'Laverton approach, Tango two four is three zero miles southwest of Laverton at four two, cruising four thousand, estimate Point Cook at ... aah ... (expletive deleted)'.

It was late 1965 and I was almost home from my first solo cross country in a Winjeel. My feelings of pleasure at a successful NAVEX quickly disipated when I blew this radio call. Ever since, I have gone through in my mind what should be said before saying it.

As an Air Force transport pilot with a whole crew, including a co-pilot and navigator to help me, I would still write out any lengthy or little used transmissions. It is easy to have a plastic covered page made up so you can quickly write in the details. The risk is high you may forget a detail or confuse the numbers you jot down if they are not written in a logical manner.

With such a cheat sheet it is easy to say 'Charlie Alpha Alpha departed zero seven, tracking zero seven zero, climbing to seven thousand'. Imagine if you don't often get to fly out of your local area and you simply jotted down a series of sevens and zeros; might easily get lost in the middle of your transmission.

Even though I have always (almost!) made a habit of writing down my transmissions, I have used abbreviations. For example, there were certain routes I flew regularly and, for these, I needed only to jot down the numbers in sequence, ensuring I had crossed out all, non-pertinent information. In that way I could write 10, 140, and 30 and say 'Charlie Alpha Alpha was Cooma one zero, flight level one four zero, Livingstone three zero' (assuming I had clearance).

But it does get more complicated. No longer an Air Force pilot, I have learnt quickly the difficulties many of us have in finding the money to fly often enough to stay current.

I fly so infrequently that I jot most of it down most of the time, particularly if numbers with heights, times and tracks are involved. To avoid the need for ten hands, I prepare as much as possible before starting engines. Back in my Air Force days, the first thing I would do after arrival and passenger disembarkation would be to get out all the pertinent information for the next leg and put away all of the last leg information, even if the next leg was the next day. Part of that preparation included checking radio procedures for the departure.

Sounds like a hassle? Rather go NOSAR? Despite radio mistakes, I always go full reporting; its much safer. I think, too, it is much more professional, even if you do make the odd blunder.

Thanks for the reminders, Senja, and the reference to the VFG Section 28. Don't forget the change in the way altitude is expressed. 'One five zero zero' is now 'One thousand five hundred' □

The false climb — a fatal illusion

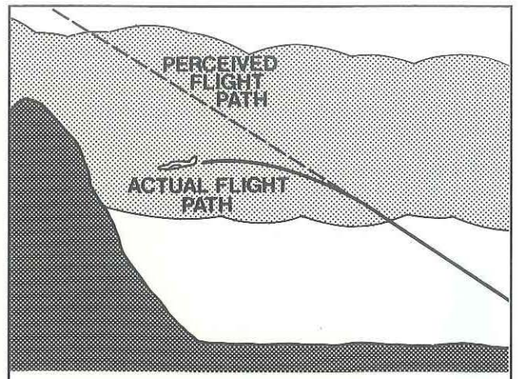
By CADUCEUS

The author of this article flew Spitfires on operations in World War II and later qualified as a flying instructor. After graduating in medicine he joined the RAAF as a Medical Officer and flew Mustangs and Vampires. As Senior Medical Officer at Point Cook in the 50's he was responsible for aircrew aviation medicine training and high altitude indoctrination in the decompression chamber. He is still flying light aircraft for pleasure.

TO MOST pilots the term 'spatial disorientation' conjures up a picture of an inexperienced flyer, caught out in bad weather and forced to fly into cloud. Very soon the unfamiliar and conflicting sensations from the body's 'position sense' organs, conflict with the pilot's interpretation of the aircraft's instruments. Panic sets in — control is lost — often with fatal consequences.

This scenario is common enough as a cause of fatal accidents but there is also *a very subtle and dangerous form of disorientation to which even experienced pilots can fall victim*. The wings may be level, and the course steady and the pilot completely unaware that it is occurring. This is the 'false climb' illusion.

Many accidents are reported in which aircraft, flown by instrument-rated pilots strike the tops of hills in cloud or poor visibility, or crash into the ground after takeoff on dark nights (see Figure 1). The actual cause of these accidents is difficult to establish as they are usually fatal and the aircraft is extensively damaged. An inordinate number of such accidents occur within a few feet of safety and it seems reasonable to presume that many other aircraft, in similar circumstances, escape the same fate by a small margin and fly on without being aware of their proximity to a disaster.



The 'false climb' illusion occuring in VFR climb into IFR conditions.

Figure 1

In Britain during World War II, an investigation was carried out into a series of accidents which occurred at flying training units in which aircraft taking off on dark nights, crashed into the ground shortly after leaving the runway. No obvious cause of these accidents was found, but eventually investigators concluded that the pilots were deluded into thinking that their aircraft was climbing or at least in level flight, when in fact the aircraft was descending. The author called this phenomenon the 'false climb' illusion.

The main culprit in this illusion was found to be the otolith — an organ which forms part of the inner ear and vestibular apparatus, as illustrated in Figure 2. The otolith has its own special function — to sense and signal to the other organs, the position of the head relative to the vertical. In the absence of visual cues, this signal becomes a powerful influence on the balance and orientation of the body. Without the otolith, it would be impossible to maintain one's balance with the eyes closed.

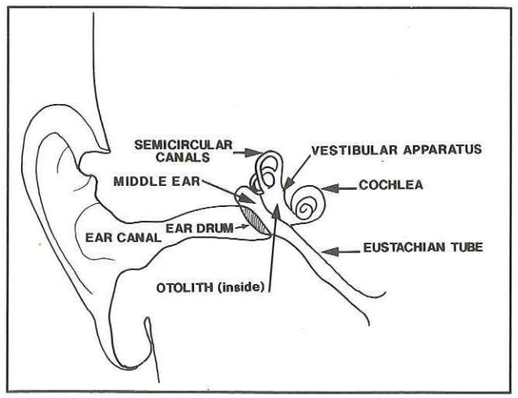


Figure 2

A detailed description of the structure and function of the otolith is outside the scope of this article but in relation to the 'false climb' illusion, it can be illustrated (see Figure 3) as a hair which stands vertically with a small stone at its tip. The base of the hair is inserted into a sensory cell which conveys information about the angle of the hair, to the brain.

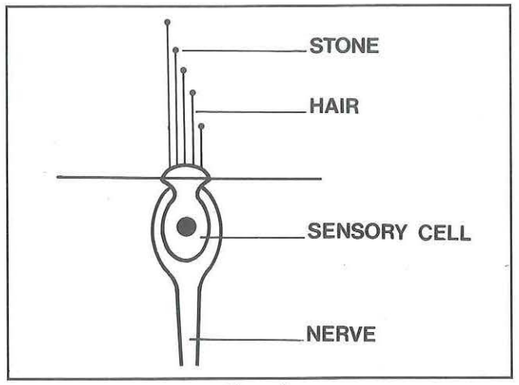


Figure 3

When the head is tilted backwards, as in Figure 4, the weight of the stone bends the hair and this message is relayed by the sensory cells to the brain, where it is interpreted as a backward tilt. If the head is held vertical and is accelerated forwards, the hair will bend in a similar fashion owing to the inertia of the stone. Thus, both tilt and acceleration produce the same response by the otolith. However, the brain is unable to differentiate between these responses. 'Acceleration' is read as 'tilt'.

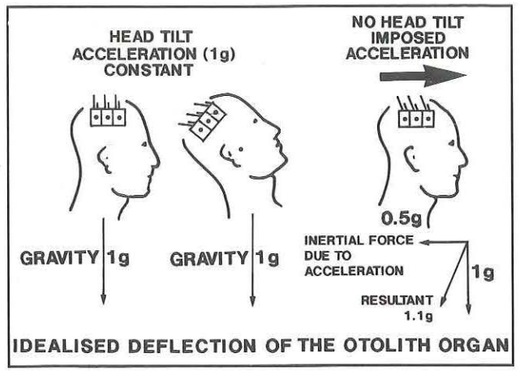


Figure 4

If tilt and acceleration are experienced simultaneously, and in the same direction, the interpretation is that of a much steeper tilt. This is the explanation of the 'false climb' illusion. *When a pilot is subjected to climb and forward acceleration at the same time, and deprived of external visual cues, he experiences a strong sensation of a steeper than actual climb*. It is this illusion which tempts the pilot to lower the nose of the aircraft. This increases the forward acceleration component — and increases the illusion of climbing steeply. Owing to lag in the altimeter and VSI, the loss of height may go unnoticed until it's too late to avoid ground contact. (By the way, this illusion is known as the 'somatogravic illusion' in the U.K. and the 'posturogravic illusion' in the U.S.)

It has been shown that a relatively low linear acceleration of 0.2g if sustained for several minutes, is sufficient to produce this illusion. After a brief acceleration, such as a catapult launching (5g for 2-3 seconds), the apparent nose-up illusion takes a minute or so to die away. Similar but opposite sensations are produced by tilting the head forward or by decelerating the subject.

There are three common situations in which the 'false climb' illusion may occur. In these cases, it is assumed that visibility outside the cockpit is absent or at least inadequate for visual flight. These situations are:

- Takeoff — night or IFR.
- Overshoot (missed approach).
- Climb from VFR into IFR conditions.

The takeoff or overshoot, on dark nights or IFR conditions, are clear cut situations where the pilot is set-up for the illusion.

During a climb from VFR into IFR conditions the illusion can be compounded by turbulence, turn or an AH that wasn't quite erect. This situation may well have been responsible for many accidents where aircraft have crashed into hillsides. Usually the decision to climb has been dictated by deteriorating weather conditions and is unplanned — this is enough to cause some anxiety and to interfere with correct decision-making. As the aircraft is already flying at reduced power and airspeed, the full-throttle climb will produce the illusion.

Summary

All pilots irrespective of experience or skill are susceptible to the illusion.

It is particularly lethal as the effect is subtle and there are few cues to what is going wrong.

The effect is an apparent positive climb as sensed by the body and perhaps even a nose-up attitude indicated by the AH, whereas in fact the aircraft may be descending. Eventually the performance instruments will show the descent but perhaps not in time to avoid impact.

The bottom line is to anticipate the illusion and ignore it, to establish a positive climb attitude, to hold that positive pitch attitude and to check the performance instruments for confirmation of the climb — then adjust the attitude to maintain the optimum climb airspeed. (In some situations this may be the speed for best angle-of-climb rather than best rate-of-climb.) □

AIRFLOW

Dear Sir,

In 1978 I flew a C206 to Mascot on a Saturday to pick up three American friends who had just arrived in Australia.

At that time I had about 960 hours most of which were on C206, C210, Piper Lance plus 182s. I was no stranger to Mascot, as for 18 months prior to that I'd flown into and out of Mascot once or twice a week on business. After all necessary clearances I asked for a departure via Runway 07's taxiway Hotel. This was granted, I called ready and was told to line up, which was done. My front seat passenger (a Delta Airlines employee in the States) was a very big man. I sat for about 50 seconds and after having heard nothing called ready twice. No answer.

I looked behind for traffic and was horrified to see an Australian airlines 727 executing a go around and the Boeing passed over me at about 100? feet. Radio failure, and in 1978 no SSR.

As I reached to turn up the volume on the ADF I noticed that the transmit (VHF) button on the top of the dashboard (This was a 1976 C206) was NOT depressed. I pressed it and immediately called ready again and a not too happy controller cleared me for takeoff probably thinking all private pilots are a menace. What had happened, as I taxied to line up, was my passenger had bumped the row of buttons with his elbow hence the temporary radio failure. My apologies to Australian airlines and the boys in the tower. I pride myself on checking everything. That was something I'll never forget to check again.

Yours faithfully,
Geoff Westbury

Small cockpits and passengers in the front seat can be a problem. I remember a RAAF Iroquois spreading its skids about 20 years ago when a passenger, while getting into the front seat, pulled up on the collective with the engine at idle. These situations demand a good briefing and eternal pilot vigilance.

Dear Sir,

I had not many hours under my unrestricted belt, so as an over-abundance of reasons were at hand I decided to take my wife flying. Our main destination was Cairns but to gain hours I thought we'd take in a trip to 'The Tip'. From Archerfield to Horn Island and back would beef up the log-book and hopefully would serve as a good learning experience.

Expecting tropical splendor at T.I., and finding little but dollar hungry locals we decided to leave ASAP. I wasn't confident enough as yet to try island hoping which I'm told is a magic experience, so we rang Horn Is. to seek fuel. Yes, $50 opening fee. Well, it *was* Sunday . . .

Checking charts showed a return via Coen was 0.K. They had to travel 30 miles to open and it was only $35 and they took a cheque! Nice people.

The last leg was Cairns via Cooktown. Things were wrong from the start. I wasn't lost, but I just couldn't get the sums right: I couldn't pick the wind.

Then when I decided to make the best of what I knew, the ranges ahead of me were shrouded with dark cumulus. So I diverted left toward clear sky and the coast which was fine. I spotted what I thought was Lizard Island and hearing a chopper making for it I made a 'Hello, I know you're over there and I'm over here' call. I thought I was twenty miles from it. I was in fact looking at Howick Island and getting my sums all wrong again. Suspicions started looming in my mind, bells started ringing; I looked at my fuel. My poor cockpit management had not detected an assymetric feed. The left tank was almost empty. A change of tanks and thinking ahead to what might have happened if things had gone very quiet at some later moment, even now raises a sweat. What it did was distract me from navigating properly.

The weather ahead was looking nasty, but, looking at the full fuel tank and at that stage feeling comfortable flying in clear skies 'knowing' where I was, I fell into the trap of letting the future take care of itself.

Cooktown is a lovely place, but the aerodrome was thirty kilometers or so from the city. Having spent hours hitching rides to and from the place two days previously, it was a priority NOT to go there. So it was Cairns and a welcome bed or bust. Well it was almost bust.

Barrelling on, I was dropping altitude, to stay under the cloud. I picked up Cooktown NDB, or so I thought. Knowing NDB errors such as mountain effect, is not knowledge merely to pass tests. I didn't figure that out at the time.

Incredibly, I started to think my compass was misreading when it didn't match my DR and the ADF.

Blind faith and knowing if I looked backwards I could still see clear air I kept going, getting lower and lower. When I was at five hundred feet, and the wings were skimming the cloud base, some mis-interpretation of meteorological lore urged me to turn west.

I ploughed into cloud and rain and for two or three insane minutes I was heading towards mountains, blind. For some reason I thought it would be clear over the beach and I could follow that to Cairns. Out of the corner of my eye, while keeping a concerned yet confident look on my face, I could see my wife looking terrified. I think it was her absolute confidence in me, even though she was terrified, that made me realise how bloody stupid I was being.

AIRFLOW

If she hadn't been there I might have done something even more stupid. I think back now, remembering the state I was in, and if the phrase 'if you inadvertently get clouded in, climb' had popped into my head, I probably would have done that and killed both of us on the side of a mountain.

God and sense finally won through and I turned 180 degrees and headed east. My wife told me later that that turn was what almost made her crack. She had lost all sense of direction and as we could only see cold water below we were virtually flying blind. I wasn't going to go any lower as memories of being two hundred feet off set altitude while training were still fresh in my head, I wanted as much space between me and the water as possible. So I doggedly flew on into sunshine.

From that point on it was as if there was a new pilot in control. I made the correct calls, found Cape Flattery where I figured it would be, put down with plenty of runway to spare.

When my wife stepped on firm ground she cried with relief. If I had been less of a fool, I would have too.

Yours sincerely,

Paul Neilsen

We have sent you a complimentary copy of our new video 'Going North — A Pilots Guide to Remote Navigation'. *It contains a lot of useful tips.*

Dear Sir,

A 'twang' was felt in the stick of a Super Cub on downwind. The aircraft remained controllable and was landed with some difficulty with a strong crosswind from the left. Something felt wrong with the stick, and much use of brakes, rudder and throttle was needed to control the ground roll. After the landing an inspection of the fuselage and tail surfaces revealed nothing unusual but then it was discovered that the left rear sliding window panel was on the rear seat, angled between the rear seat belt buckle and the stick. The knob on top of the stick prevented use of the left rear third of stick position. No amount of 'jiggling' the stick would dislodge the window panel. The panel was replaced in position in its slides and secured.

The experience of hundreds of previous landings in tail wheel aircraft was a factor in the safe landing of this incident.

Anon

A good reason for a careful pre-flight of all panel security.

Dear Sir,

I have read several times now, with interest, the article by Brian Bigg, on the Sydney training area, and some of his experiences. As one of the many who use this area, I can do nothing but agree with his article. However, I feel, as do others I have spoken to, that maybe, just maybe, you have printed this article to generate discussion on his views and experiences.

Most of my flying is out of Hoxton Park, as was all of my training, and I agree that it may be 'Rafferty's Rules' there on occasions, especially with some of the establishments there appearing to teach cross country circuits, which makes a normal circuit difficult to fly. What Hoxton Park doesn't need, however, is on a weekend, all the Bankstown students coming over there for some circuits away from the hassle of the tower. As Mr Bigg said, Hoxton Park is busy enough without the Bankstown boys and girls.

The main reason for this letter is his remarks on a circuit entry at Hoxton Park, where it would seem he had a bit of a scare. Allow me to maybe point out where Mr Bigg went wrong. The Aerodrome Directory says of Hoxton Park, 'elev. 135ft', which means that correct circuit height of 1000ft above ground level is 1135ft. We use 1100ft which would put him at an altitude of 1250 + 135 = 1385ft. Pretty high circuit for Hoxton Park, when the locals are using 1100ft. Even if his 1250 was altitude, it is still a pretty high circuit. Aircraft overfly the circuit at 500ft above circuit height, which at HOX. would be l600ft, so if he was at 1385ft, and an aircraft overflies at l600ft, he is right, there isn't very much distance between the two aircraft. I would suggest that the other aircraft was overflying before circuit entry. If that is the case, I would suggest that the one who should have been on the receiving end of the stones, is Mr Bigg. Maybe it is just as well that he has moved to less busy region, for all the Sydney area pilots sake.

As for his formation stalling out in the training area, with a CFI no less, my God! What were they looking at during the 360 degree turn, which should be carried out before practice stalls.

Hopefully we all learn from mistakes, whether they be our own or others.

Yours faithfully,

Peter Eaton

1385ft does seem a bit high for Hoxton Park. A good lookout, as described by Mr Bigg, is most important. Even with a clearing turn it is still possible to miss other traffic, especially if you do not look above you. And, yes, all *the articles are printed in the hope of generating discussion.*

Beyond the call . . . of duty

by Paul Middleton

'Aenno forty-eight, dunnomate, never heard of it, is that a replacement for 1080?'

AS COMMERCIAL pilots, how many of us have heard conversations like that? Certainly ANO 48.1, or nowadays CAO 48.1 'Pilot Flight Time Limitations', is one of the hardest to read, most maligned, vilified and probably disobeyed set of requirements in the Authority's bag of tricks. Yet, the standards and requirements laid down in that order are as near to correct and proper as any general safety requirement can be. The Order has nothing to do with industrial agreements; the requirements are there for no other reason than the protection of the passengers, the crew and the public on the ground. Unfortunately it is an area which is open to abuse by the industry and the pilot, who, while certainly not blameless, is often the ham in the sandwich.

Here is a short story from the grey distant past. I had finally wangled myself a job as a commuter pilot and felt very smug indeed. No more round and round the circuit; no more charter waiting until after dark at some cattle sale on a black ALA; nice big aeroplanes, scheduled services, a jacket with three gold bars and even days off — life was indeed good. The pilot rostering was handled by a pilot committee and was all fair and legal. We flew ninety hours a month, all scheduled with about 90% loadings — what a difference to the charter game!

On the weekend of my story, I was rostered for the normal southern run, something like; SY-NW-MRY-NW-SY then off to TUM and CTM. The difference on this occasion was that instead of twiddling my thumbs in a motel until Sunday arvo for the flight back to Sydney, I would take a charter group to the north of the state and return next day in time for the scheduled run. Looked good.

Saturday morning up at 0515, shave etc., quick brekkie, quick trip ahead of the traffic across the city to KSA. Grab the weather, toss in a plan, up to the light aircraft park, quick daily (company policy always fueled and oiled the aircraft at the end of the day) taxi down to the terminal getting my airways clearance on the way.

OK, sounds fine, where's the catch? Back at the terminal the company representative (ticket collector, baggage handler) points out that he has a message for me from the Chief Pilot who was passing through heading to points unknown for a few days. Open the note. There has been a foul up with my charter, it's a pick up out of Temora, up to the wedding and back again all today! Blood pressure rising! Southbound passengers are already boarding — expletive of four letters — into the seat, doors close 0700 on time. Arrive Nowra, south easter has pushed some muck in so I start my day with an NDB. At least with it being a weekend the navy are all somewhere else and I don't have to worry about them. Passengers out, hand out the luggage, off to Moruya. Weathers a bit better here so a visual approach, load up and back to Nowra, only a half NDB that time, load up again back to West Pymble for an ILS into Sydney.

Right, now what about this bloody charter mess — no chief pilot, no senior pilots in captivity, and managers don't work weekends do they? Western passengers are boarding so off we go to Tumut and Cootamundra. Nobody at Coota knows anything and its nearing the charter pick-up time. Quick fuel up and off to Temora to load the wedding party.

I won't continue to bore you with the flight detail but while the passengers were at the wedding I had to reposition the aircraft for fuel and then return to pick them up. The finale is a limp, red eyed pilot doing an NDB down to minima at Temora at 1145pm as in 2345 and finally buttoning the beast up at half-past midnight.

If you do the sums its an eighteen hour duty day and about nineteen hours on the run. There is not a shadow of a doubt that by the time I was making that last NDB at Temora I wasn't anywhere near the ball, let alone on it!

So thats it, but what do you do in that sort of situation? Pilot jobs were extremely hard to come by, ones in commuter operations even harder still. I had the mandatory wife and couple of kids and General Aviation was my life. The last thing I needed was a reputation as a pilot who wouldn't 'work'. If you refused to fly or lost a passenger then you were out on your ear and there were fifteen pilots beating the door down wanting your job.

There is no doubt in my mind that the task I carried out was 'rostered' even though it didn't show up that way on the roster sheets. The charter passenger spokesman was adamant they had always had a single day trip booked and hadn't changed any of the detail. I believe him and have from that day held the conviction that the operator set me up knowing that I was in a situation where I had to finish the job.

Lets have a look at the options: there was no contact numbers available to us at Mascot to talk to the charter group, and company representatives with any authority were conspicuous by their absence.

Option one — try to get our rep. (baggage handler) to try to contact somebody in authority (tried that — failed).

Option two — complete the scheduled legs as per normal and refuse to leave CTM. Charter passengers in the lurch — me sacked.

Option three — pick up the charter passengers, do first half of charter and refuse to fly back until I had a rest period (ten hours) but that would mean an overnight anyway. Unhappy passengers — me sacked.

I don't know what the answer is, but I do know that the operator breached CAO 48.1.1.5, 'An operator shall not roster a pilot for a tour of duty in excess of 11 hours'. For me I certainly busted CAO 48.0.1.4 which in part says that if the pilot is suffering from fatigue he shall not fly. In retrospect I placed the passengers, the aircraft and possibly some of the residents of Temora at risk.

My justification at the time was that I needed to keep my job and my reputation as a person who got the job done. However fifteen years later looking back in the cold clear light of day what is the difference between what I did and somebody who steals to feed his family? At least the thief is not putting other peoples lives at risk.

I would like to hear your thoughts on the subject, so take ten minutes off and drop the editor a line. If we get some good responses we possibly can analyse them and I might even give you the Senior Examiners point of view □

Quiz Quiz Quiz

How well do you know your GAAP procedures?

General Aviation Airport Procedures cater for high density operations in VMC in General Aviation control zones. When these procedures are followed correctly, airport traffic flows quickly and safely. Problems arise however when, either through lack of knowledge or understanding, the procedures are incorrectly applied. How well do you know your GAAP procedures? Try this multiple choice test and see.

1. In a General Aviation control zone in VMC who is responsible for aircraft separation?

(a) Air Traffic Control in all cases.

(b) The pilot in command in all cases.

(c) Air Traffic Control provide runway separation and the pilot provides all other separation.

(d) Nobody is responsible for separation.

2. In a General Aviation control zone when VMC do not exist, who is responsible for aircraft separation?

(a) Air Traffic Control apply positive separation.

(b) The pilot in command.

(c) Air Traffic Control provide runway separation and the pilot provides all other separation.

(d) Nobody is responsible for separation.

3. The VMC minima for General Aviation control zones is:

(a) Ceiling 800 ft; and visibility 4000 meters.

(b) Ceiling 1500 ft; and visibility 5000 meters; or as determined by ATC.

(c) Ceiling 1000 ft; and visibility 3000 meters.

(d) Ceiling 300 ft; and visibility 1200 meters; or as determined by ATC.

4. In addition to the general information on GAAP in AIP RAC/OPS 1-61/64 and VFG Section 28, where would you find supplementary operating procedures applicable to specific General Aviation aerodromes?

(a) Route IFR Operating Limitations (LIM).

(b) En-Route and Aerodrome Special Procedures (SAP).

(c) Aeronautical Information Circulars (AICs).

(d) Departure and Approach Procedures (DAP).

5. Which of the following are a pilot's responsibilities in a General Aviation control zone?

(a) To sight and maintain separation from other aircraft operating in the General Aviation zone.

(b) To comply with ATC instructions while ensuring separation is maintained from other aircraft.

(c) To immediately advise ATC if unable to comply with a control instruction.

(d) To advise ATC if unable to sight other aircraft notified as traffic.

(e) Both (b) and (d).

(f) All of the above.

6. Is an airways clearance required prior to entering a GA control zone?

(a) No in all cases.

(b) Yes, unless the pilot is returning from the training area.

(c) Yes in all cases.

(d) Only in IMC.

7. Operational terminal information required prior to departure or arrival is obtained by:

(a) Asking the MET officer.

(b) Requesting the information from ATC on initial contact.

(c) Dialing up the ATIS broadcast.

(d) (b) if unable to comply with (c).

(e) A waste of time and not required.

8. What is required of a pilot if instructed to 'follow the Cessna downwind'?

(a) The pilot is required to follow the exact path of the preceding aircraft.

(b) The pilot is required to sight and identify the preceding Cessna and regulate circuit speed and approach path to achieve correct circuit spacing.

(c) The pilot is only required to sight the preceding aircraft.

(d) The pilot has no requirement to either sight or follow the aircraft.

9. When parallel runways are utilised for simultaneous contra circuits and runway right is nominated what is the circuit direction?

(a) Either left or right.

(b) Left.

(c) Right.

(d) Not sure.

10. What has been omitted in the following transmission to BK ground? 'Bankstown Ground, Romeo Alpha Tango, for Bathurst, Runway II.'

(a) The runway designator (left or right).

(b) The ATIS designator.

(c) The SAR status (full SAR/SAR time/No SAR).

(d) Both (a) and (b).

(e) All of the above.

11. Romeo Alpha Tango reports 'ready' while still well back from the holding point and number four to depart, is there anything wrong with this?

(a) No, a 'ready' report may be made at any time.

(b) Yes, the pilot should wait until closer to the holding point.

(c) Yes, the pilot should report 'ready' when approaching the holding point and next for takeoff.

(d) Yes, there is no requirement for a 'ready' call.

12. Cherokee Alpha Bravo Charlie entering Parafield control zone at Dam Wall gives the following call. What has the pilot omitted? 'Parafield Tower, Alpha Bravo Charlie, Dam Wall, inbound, Received Bravo'.

(a) No information omitted.

(b) Aircraft type omitted.

(c) Altitude omitted.

(d) Both (b) and (c).

13. Are there any mistakes in the following statement? In VMC, both IFR and VFR category flights arriving from outside controlled airspace by day or night shall track visually via a general aviation approach point.

(a) The statement is true in all respects.

(b) The statement is only applicable to VFR category flights.

(c) The statement is only applicable during the day.

(d) There is no requirement for either IFR or VFR category flights to track via General Aviation approach points.

14. Where would you find the General Aviation approach point mentioned in question 13 specified?

(a) AICs.

(b) DAP.

(c) ERS/SAP.

(d) LIM.

15. The ATC instruction 'Join upwind':

(a) Permits entry to the circuit upwind at circuit height, clear of the opposite circuits;

(b) Authorises entry into the opposite circuit on upwind leg;

(c) Requires entry into the circuit at 1500 ft QNH on upward leg, clear of the opposite circuit/airspace; or

(d) Authorizes entry to the control zone at 1500 ft QNH, tracking upwind parallel to the duty runway centreline on the active side of the circuit, and clear of the opposite circuit airspace.

16. The ATC instruction 'Overfly':

(a) Authorizes entry into airspace associated with the opposite circuit and circuit height;

(b) Directs aircraft to overfly the aerodrome at 1500 ft QNH, and, where parallel runways are in use, authorises entry into the airspace associated with the opposite circuit;

(c) Allows the pilot to enter the circuit of the opposite airspace after overflying at circuit altitude; or

(d) All three of the above.

17. A downwind call should be made at a position abeam the upwind threshold. If, due to frequency congestion, a pilot is unable to make this report what should he/she do?

(a) Disregard the call completely.

(b) Report on base instead.

(c) Report either mid-downwind or late-downwind.

(d) Nothing, as the statement is incorrect and a downwind call is not required.

18. When a go-around has been initiated a pilot shall climb to circuit altitude, position the aircraft on the active side and parallel to the nominated duty runway, while maintaining separation from other aircraft and follow ATC instruction where issued, otherwise re-enter the circuit from upwind. Is this a true statement?

(a) No. The pilot should position the aircraft on the dead side of the runway.

(b) No. The pilot is not required to comply with ATC instructions.

(c) Yes. The statement is correct in all respects.

(d) No. There is no requirement to climb to circuit altitude.

19. When departing a General Aviation control zone a pilot may track by the General Aviation approach points and associated VFR routes. Do you agree with this statement?

(a) Yes. There is nothing wrong with tracking via these points.

(b) No. A pilot shall track well clear of these points.

(c) Yes. However caution must be exercised to watch out for arriving aircraft.

(d) No. Because there is no such thing as a General Aviation approach point.

20. What does a red flashing light from the tower mean to an aircraft on final?

(a) The pilot is authorised to land if satisfied no collision risk exists.

(b) It has no significance.

(c) The aerodrome is unsafe. Do not land.

(d) Give way to other aircraft and continue circling.

21. What should a pilot do if unfamiliar with operations at a particular GAAP Aerodrome, or not fully understanding of an ATC instruction?

(a) Give up flying as it is all to hard.

(b) Bluff his/her way through, after all what could go wrong?

(c) Ask ATC, or include this information in the Flight Plan (ATC's are there to help).

(d) Give up flying into GAAP Aerodromes.

Now check your answers and see how well you have done.

1 (c), 2 (a), 3 (b), 4 (b), 5 (f), 6 (c), 7 (d), 8 (b), 9 (c), 10 (e), 11 (c), 12 (d), 13 (a), 14 (c), 15 (d), 6 (b), 17 (c), 18 (c), 19 (b), 20 (c), 21 (c).

The purpose of this series of multiple choice questions has been for you to test your knowledge on GAAP procedures. Your score is not important, what is, however, is the answer to the question 'How good is my knowledge really?', and you are the only person who can answer it.

When was the last time you sat down and read Section 28 in VFG or RAC/OPS 1-61/64 or consulted ERS/SAP or checked to ensure your VTCs were current? Half an hour occasionally will cost you very little but in the long run may save you a lot □