AVIATION SAFETY DIGEST

100

DEPARTMENT of TRANSPORT - AUSTRALIA

AVIATION SAFETY DIGEST

Number 100 1977

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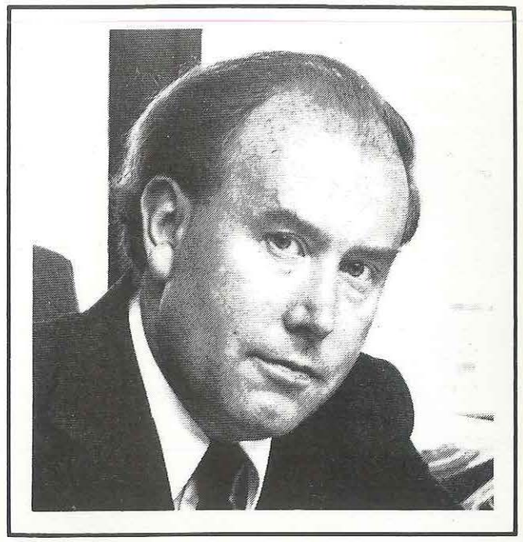
Note: Metric units are used except for airspeed and wind speed which are given in knots; and for elevation, height, and altitude where measurements are given in feet.

COVERS

'Australian aviation at work' has been the continuing theme of Aviation Safety Digest cover illustrations. In this anniversary issue the Digest takes pride in paying tribute to the products of Australia's own aircraft manufacturing industry — the Government Aircraft Factory's Nomad N22 and the Transfield Corporation's well proven Airtruk.

Photographs courtesy of the Government Aircraft Factory and the Transfield Corporation.



A Message From The Secretary

Recommended Retail Price $0.50

The publication of this 100th issue of the Aviation Safety Digest is a notable milestone in the efforts of the Department of Transport to promote safety in aircraft operations.

Since the Digest was introduced 25 years ago, its goal has been the prevention of accidents and the saving of lives. It has sought to do this by bringing those circumstances, which have been shown to lead to accidents and incidents, to the notice of the industry so that all who are concerned with the operation of aircraft have the opportunity to learn from the experience of others.

In this issue of the Digest it is appropriate therefore, to take stock of the success or otherwise of what we have done — is it possible to measure the effectiveness of the Digest over the years that it has been in publication — a period which has encompassed major technological developments, a rapid increase in the density of operations, and significant changes in regularity of operation, procedures and the operating environment?

Accidents are continuing to happen — currently of the order of 270 annually — many of them in circumstances that have been well covered in the Digest. In simple terms of numbers of accidents we could well be discouraged. On the other hand, however, over the life span of the Digest there has been a reduction in the accident rates which are a measure of safety against activity. Furthermore, in response to a question in a recent Digest reader survey, almost 90 percent of the 1300 or so readers who replied said that the Digest had helped them to avoid potentially dangerous situations. If in fact the Digest has played a part in the reduction of the accident rates then, in this regard, it could be said that we have been successful.

Looking back through the accidents discussed in the Digest over the years, one is struck by the number that could so easily have been avoided. Very few of these accidents resulted from any one factor or circumstance; almost invariably they have evolved from combinations of adverse situations, each a chain of untimely events, any one of which, in isolation, would have amounted to no more than an incident.

It follows that, if any one of these links in the chain of events could have been eliminated, the particular sequence which led to that accident would not have developed. Obviously therefore, if accidents are to be avoided, it is important that the various contributing circumstances be recognised and isolated, and deficiencies remedied. Obviously, also, the circumstances which contributed to incidents are as important in this context as those where an accident actually followed. It is from recognition of these factors that, over the past 30 years, both accidents and incidents have been regarded as having equal significance in the Australian air safety investigation system.

This long experience in air safety investigation has shown that in relatively few instances do individual accidents or incidents point up a specific deficiency which, when remedied has a significant effect overall in accident prevention endeavours. When investigations of occurrences with common characteristics are examined collectively however, it is often possible to identify areas, rather than individual items, which require action and which otherwise would have remained undetected. For this reason, computer processes for recording and analysing accident and incident data have been developed in recent years and are now being used to direct our safety education and accident prevention efforts. Future issues of the Digest and other safety education material will reflect the results of these developments.

The Department's air safety investigation system is only as good as the information available to it. The quality of its output is largely dependent upon the extent to which the system is supported by individual members of the industry. Though some 8000 occurrences are reported annually, there is reason to believe there are others, possibly involving individual performance, which go unreported. In support of this reasoning is the fact that accident statistics show over 70 percent of human factor involvement, but corresponding incident statistics show a human factor involvement of about 15 percent.

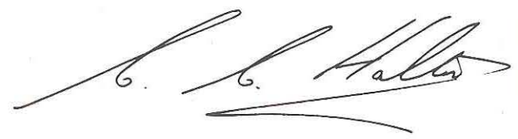
Certainly it can be said that such statistics are understandable — human factor involvement might be interpreted as an operational shortcoming on someone's part and for this reason a person is reluctant to report such an incident. Yet these are the very occurrences in which accident potential is significant, and which can be effectively countered by safety education effort when the underlying causal factors have been isolated and identified.

Some years ago, in an effort to encourage people to report and share the knowledge gained from their experiences it was declared that immunity from punitive action would be granted in certain circumstances. Also, it was declared that no person calling for assistance when encountering difficulties would incur punitive action by the Department. Unfortunately however, the statistics in relation to the submission of reports suggest that the industry is still wary of the air safety investigation system. It is appropriate therefore, in this 100th issue of the Aviation Safety Digest to clearly state the objective of air safety investigation, and to reiterate the assurances which have been given from time to time in respect of immunity and the reporting of air safety incidents.

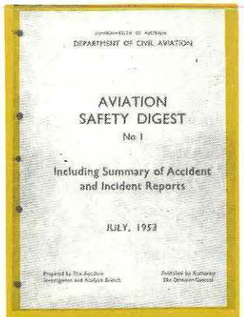
The fundamental objective of air safety investigation is the promotion of safety— it is not the purpose of this activity to apportion blame or liability. I will not impose any punitive measure upon any pilot who, because of navigational or other difficulties, has a need to request assistance from airways operations units. Further, I will not impose any punitive measure on the originator of an air safety incident report for any of his actions in an incident which is brought to notice by his submission of such a report. There is one explicit exception to this policy. If the investigation of an incident shows beyond doubt that persons or property have been exposed to danger because of a deliberate or contemptuous disregard for the law, or because of dereliction of duty amounting to culpable negligence, then and only then will I consider initiating punitive action against the person concerned. Each occurrence will, of course, still be investigated to the extent necessary to determine and record the facts, for it is absolutely necessary to ensure that proper information is available for future analyses in our continuing accident prevention efforts.

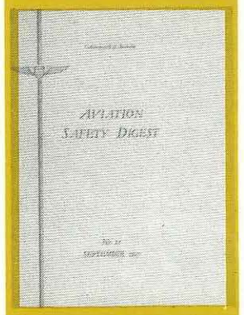
Whatever our position in the industry, it is no platitude to say that we all have a part to play in promoting safety — both by our own operational standards and by a willingness to share whatever insights we may have gained through our own operational experience. The pronouncement and reiteration of the 'immunity policy' should be seen as an expression of good faith and an endeavour to provide a basis on which we can so share.

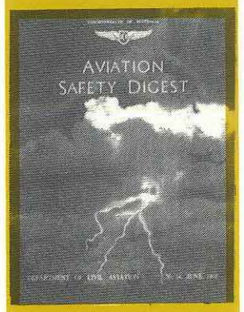
As the Digest embarks on its second 'century' of safety promotion, I take this opportunity to wish all its readers well in their own efforts to achieve an accident-free record. There can be no doubt that if all who read the Digest would seriously and continually resolve to put the ideals of accident prevention into effect in their day-to-day operations, the industry as a whole would be much closer to the ultimate goal of a zero accident rate.

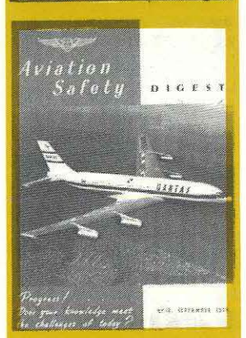


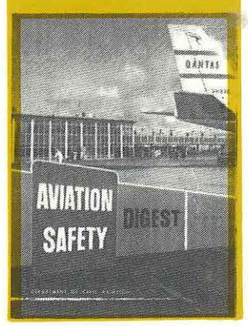
C. C. HALTON
Secretary, Department of Transport, Australia.











TO PRESS FOR THE 100TH TIME!

To those of us who were around at the time, it seems more like a thousand years than twenty-five since Aviation Safety Digest No. 1 burst unexpectedly upon the small fraternity of aviators that made up the Department's distribution list in 1953.

And what a quarter century it has been! As far as Australian civil aviation is concerned, it has witnessed the transition from the leisurely, if adventurous, pre-war type era of DC-3s, Dragons and Moths, to the complex, highly systematised industry of specialists that is the aeronautical world of today.

Twenty-five years is something of a publishing record for any periodical and with the advent of Digest No. 100, it is appropriate to reflect for a moment on the way it has come — from its humble beginnings through the evolutionary processes that have brought it to its present form. As we do so, one thing seems to stand out: those who were responsible for the Digest's inception all those years ago were unusually perceptive and far-sighted; they succeeded in bringing into being a departmental publication which has not only won consistent acceptance with its readers, but has forged a link between authority, practice and people, that may be unique in the world.

How then *did* the Digest come about?

During the austere days of war, civil aviation in Australia had been cut to the bone, strategic airlines and outback medical services being virtually the only exceptions. But with the war's end in August 1945, civil flying quickly resumed and, perhaps more than any other public activity, was plagued with the difficulties of transitioning from the exigencies of war to the different but equally demanding disciplines of peace.

The mood of the times was hardly an ideal one in which to develop a high standard of conformity to operational procedures. Pilots taking up civil flying were for the most part men freed from the constraints of service life who had sharpened their skills in the climate of action against the enemy and had been thoroughly conditioned to calculated risk-taking. Added to this was the fact that ex-disposal aeroplanes, particularly Tiger Moths and Ansons could be had almost for a song and were available in quantity. Small wonder then that something of a cavalier attitude tended to prevail as newly-founded commercial and private operations began to proliferate. Inevitably the number of aviation accidents began to rise.

Because of the difficulties in which the industry found itself, the newly structured Department of Civil Aviation saw the need to examine the problem in depth, and in 1946 an Accident Studies Branch was formed as part of the then Directorate of Air Navigation. As it set about gathering information from which to develop safety standards, this Branch found that the relatively small number of accident reports available made it difficult to draw worth-while conclusions from accident statistics alone. The Branch therefore saw a need for some system of industry report, not only for actual accidents, but for any instance in which the safety of an aircraft was compromised. Thus the air safety incident reporting system, then unique to Australia, was born.

Through the new incident system many deficiencies came to light but at first only those directly associated knew of the consideration a report had been given, or of the resulting action. Before long however, it was evident that there would be benefit in publicising these findings for the edification of the whole industry. And so it was in March 1948 that the Department's 'Monthly Summary of Incident Investigations' consisting of six roneoed pages stapled to a blue paper cover first found its way to the offices of airlines, charter and aerial work operators, and aero clubs. Limited by an extremely tight budget, only 400 copies were available for this initial distribution. But even this did not damp the prophetic note of its editorial: '. . . it is felt that the educative data from such reports would prove most informative and beneficial if accorded a wider circulation.'

How right it was! Interest in the summary grew and in 1950 its content was expanded to include local and overseas accidents. And with these changes the new title, 'Summary of Accident and Incident Investigations' was adopted.

Not long after this time, the Accident Studies Branch and the Department's Accident Investigation Branch, both of which had been separate entities, were merged to form the group which has since developed to become the present Air Safety Investigation Branch. The merger added impetus to the need for accident prevention through safety education and in June 1953 the 'Accident and Incident Summary' as it had come to be known, found fulfilment in a new publication, printed letterpress with a yellow board cover under the inspired title 'Aviation Safety Digest'. The first issue offered a greatly improved type of presentation and for the first time was distributed individually to all licence holders. 'For some time, we have been of the opinion that the wide interest displayed in the ''Accident and Incident Summary'' merited better presentation of this material,' explained the Foreword, 'Our efforts have resulted in the ''Aviation Safety Digest'', the first edition of which we now present.' Progress over the years since has been slow at times but at least it has been sure!

Though from the first the Digest was to be issued quarterly, its production schedule soon ran into difficulties. At that stage the preparation of articles was the responsibility of the normal air safety investigation staff — there was no digest staff as such. Not long after Digest No. 3 had been distributed the first Australian-registered Viscount crashed during a training exercise at Mangalore. The subsequent investigation taxed the resources of the Branch to the limit, and it was almost a year before the next issue of the Digest — a small edition containing only the Mangalore accident report — was in the hands of its readers. A series of other fatal accidents requiring major investigations followed, with the result that again more than 12 months were to elapse before the Branch could recover sufficiently to produce Digest No. 5 in February 1956.

From that time on production became reasonably regular but as the Branch became increasingly taken up with day-to-day investigation work, those responsible for the Digest were forced to depend more and more on content adapted from overseas safety publications. So much so that by 1959 the comment most often heard on the Digest was 'not enough Australian stuff'. Even so the presentation of the magazine continued to improve and in Digest No. 14 the traditional yellow board cover was dropped in favour of glossy art paper. The Digest was beginning to look like a magazine!

As issue succeeded issue the rapidly expanding aviation industry was demanding still more of the Branch's effort, and it was finally realised that the only solution to the problem of issuing the Digest regularly was to appoint specialist staff to produce the magazine. Accordingly, in 1964, the Digest gained its first full-time editor, his first task being to make good the four-month production lag that had developed over the years and to 'Australianise' its content. Emphasis was also given to including effective illustrations to support and enhance the message of the text.

By 1967, in response to many requests from readers and with the increased safety information becoming available from a burgeoning aviation industry, the Branch felt the time had come to increase the frequency of the Digest from four to six issues a year. To cope with the increased work load an assistant was appointed and appropriately the new policy was announced in Digest No. 50. 'With this, its fiftieth issue, Aviation Safety Digest takes a further step forward in serving the interests of air safety . . .', explained the editorial, '. . . the Department hopes the publication will be able to more effectively fulfil its function . . . and that all who have a part to play in the operation of aircraft . . . will strive for operations that are as accident free as it is humanly possible to make them.'

All this time the number of licence holders receiving the Digest had been steadily growing. By the beginning of 1972 the production run of copies had reached the point where a change from letterpress to offset printing became economical. This immediately gave scope for greater flexibility in lay-out with the result that more imaginative design and illustration began to characterise the Digest from issue No. 79 onwards. The effectiveness of its presentation and content gained international recognition in 1972 when the United States Flight Safety Foundation named the Digest its 'Publication of the Year'. The final step in the evolution of the Digest to its present form was taken in 1973 when, with the issue of Digest No. 86, the standard international A4 size was adopted in place of the original smaller format.

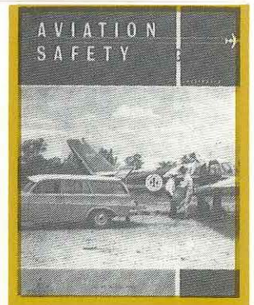
For a variety of reasons, the Digest has had great difficulty maintaining its objective of six issues a year. But hopes burn brighter for the future. Meanwhile there is some consolation in the fact that a typical issue of the Digest today contains almost twice as much copy as did Digest No. 50 and its near-contemporaries!

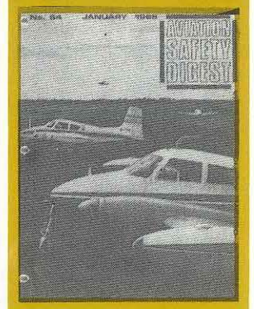
What then of the future? Part of the answer lies in the results of the Digest reader survey conducted late last year and discussed elsewhere in this issue. But on one point — the whole aim of the Digest — there can be no change. For the purpose of the Digest today is identical to that of the modest first Incident Summary all those years ago in 1948 — to be a channel to the industry of what has been learnt in the harsh school of experience.

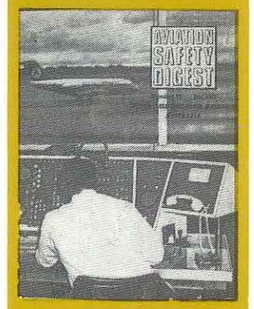
There can be little doubt that over the years the Digest has carried a message for everyone involved in aviation. Yet it is obvious that these messages do not always find their mark. Doubtless there are many reasons for this — possibly one of them is the way the message has been presented, despite our best intentions. Yet probably foremost is that very human, if illogical thought, which is the arch-enemy of safety in aviation or anywhere else — 'it can't happen to me'. To those who in their better moments know that they are inclined to suffer from this affliction, we would recommend a course of reading — none other than Digests 1-100! Some things never change and the hazards that plagued the helmeted and goggled occupants of the open cockpits of yesteryear are the same that catch out those who fly in the snug comfort of today's sleek aeronautical machinery. Those hazards moreover, have no respect for persons!

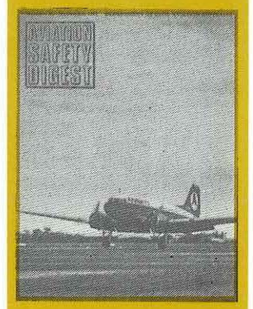
Whatever the format of the Digest in the future, it will continue the aim it has had from the beginning. But just as the shared experience of the industry was the catalyst that brought the Digest into being, so it is still the force that enables it to function. In fact the quality of the Digest's content is in direct proportion to the information provided by the industry.

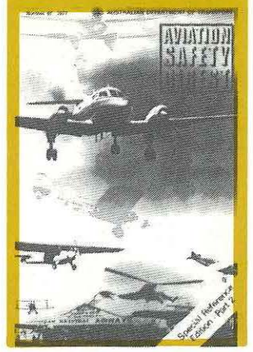
By continuing to use the incident reporting system as it was originally intended and, more personally, by writing contributions for the Digest itself, every reader who holds a licence can play a valuable part in the never-ending task of making flying safer.











MAYDAY!

'MAYDAY!. . . cannot disengage the auto-pilot. We're reading 70 degrees of bank angle and we can't hold it. We've tried every means to get it out — we've got . . . taken the power right off the bus. If it's of any significance, the flight fine unlocked light came on. We're orbiting right three miles west of the Parkes aerodrome. We're going to try and get up the right wing, but it doesn't look as if it's going to be any good.'

The strained voice of the Friendship captain was the first indication to Sydney Flight Service that all was not well aboard the F-27 service bound for Broken Hill with a crew of four and 29 passengers.

Under the command of a company training captain, the flight was being conducted by the first officer from the left-hand seat and had been normal in every way. Cruising at flight level 145 with the auto-pilot in the heading mode, the first officer had just replaced the public address handset after making an announcement to the passengers when he and the captain noticed the propeller 'flight fine unlocked' warning had illuminated. A few seconds later, the aircraft very slowly began a gentle bank to the right. At this stage of the flight the aircraft had just passed over the Parkes NDB and the captain, who was about to transmit a position report, at first thought the first officer was making the minor heading change required at this point.

But the change of heading had not been initiated by the first officer, and, as the bank continued to increase, he disconnected the auto-pilot using the switch on the control column, and attempted to correct the roll with aileron. Apart from some slight initial give however, the control wheel seemed to be locked solid.

Assuming that the auto-pilot had failed to disengage, both pilots attempted to overpower the controls, but the bank continued to increase. Still believing the auto-pilot was the problem, they tried everything they knew to disconnect it — turning off the auto-pilot master switch, operating the individual channel switches for elevator, aileron and rudder, pulling the circuit breakers, operating the gang bar (which disconnects the batteries and generators from the aircraft wiring system) and rocking the elevator controls to and fro, but all to no avail.

By this time the angle of bank had increased to about 70 degrees and the aircraft, now in a very steep turn to the right, was being subjected to periods of pre-stall buffet. At this point the captain transmitted his MAYDAY call. Soon afterwards, as the aircraft continued to orbit tightly, it began to lose height and the captain reduced power on both engines to avoid exceeding V_{ne}. Meanwhile, back in the passenger cabin, the two hostesses, though themselves uncertain of what was actually happening, did their best to reassure passengers who were becoming concerned by the continuing steep turn and the increased 'g' loading.

By the time the crew had exhausted every way they could think of to free the controls, the aircraft, descending at around 2000 feet a minute, had completed a number of turns and was approaching 5000 feet. In an attempt to reduce the angle of bank by the only means left to him, the captain re-applied power to the starboard engine. To his surprise, he found that an increase of only 60 lbs of torque was effective in decreasing the bank to about 35 degrees. With this greater margin of control, the captain then decided to try increasing power on the other engine as well in an attempt to gain more time to sort out the problem and avoid the accident that had seemed so inevitable only seconds before.

As he did so, he felt the power lever for the port engine restrained by the baulk which prevents both power levers being advanced at the same time, whenever the aircraft's integral gust lock is engaged. This immediately alerted him to a further possibility and he called to the first officer to check the gust lock. It was in the fully locked position! As soon as the first officer unlatched the lever and moved it to the unlocked position, the controls became free and the crew regained normal control at a height of about 4500 feet.

Yet still the 'flight fine unlocked' light remained on and, as there had been no apparent reason for the unexpected gust lock engagement in flight, the captain felt the safety of the flight was still in jeopardy, particularly in regard to a possible propeller malfunction and that an immediate landing at Parkes was warranted.

On entering the circuit at Parkes two minutes later however, the crew saw there were works in progress on the main runway and advised Sydney they were diverting to Dubbo. Twenty-five minutes later, after a cautious flight below 5000 feet at a comparatively low power setting, the aircraft made an uneventful landing with aerodrome emergency services standing by.

Investigation of the whole circumstances of the incident revealed that the entire in-flight problem had a very simple explanation — the gust lock lever had been inadvertently moved into the locked position in flight without the crew realising it. Contrary to the captain's suspicions, there had been no propeller malfunction; rather, as when the aircraft is on the ground and ground fine pitch is required for taxi-ing, the 'flight fine' propeller range had been unlocked by movement of the gust lock lever into its locked detent. Moreover, the 'flight fine unlocked' warning had subsequently remained illuminated only because the engine power selected by the crew after they recovered control was insufficient to operate the solenoids which isolate the ground fine pitch when the power levers have been advanced to a setting of about 14 000 rpm. Simple as this explanation was however, the probable circumstances that led to the movement of the gust lock lever in flight were found to be a highly unusual combination of seemingly commonplace events.

As shown in the accompanying photograph, the gust lock lever in the Fokker Friendship is situated behind the left-hand control seat on the cockpit bulkhead. It is designed to be operated by the pilot in the left hand seat using his left hand. From the unlocked to the locked positions, the lever handle moves upward in a slot for a distance of 24 cms and is spring-loaded towards the unlocked position. The handle is designed to engage in detents in both the unlocked and locked

positions and is released from either position by depressing a button in the centre of the handle. To lock the controls, the button is depressed to release the handle from the unlocked position detent and the handle is then raised against the spring force until it engages in the upper, locked position detent.

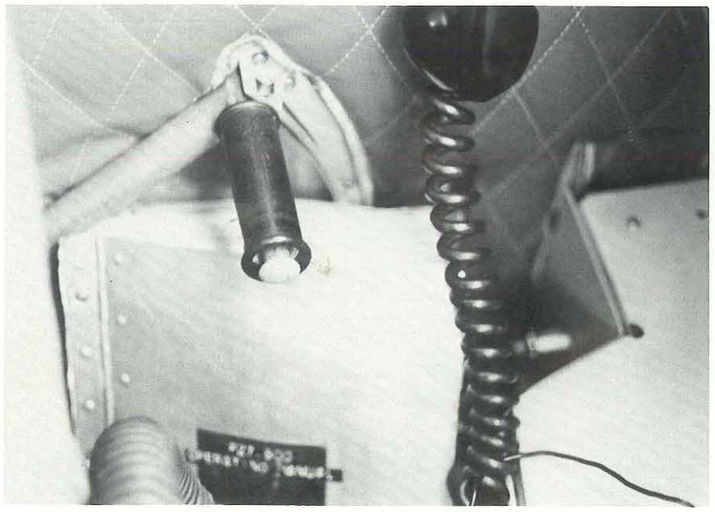
With the lever in the locked position, the elevator, aileron and rudder locks will engage when the controls are moved to appropriate positions, one of the two power levers is baulked, and ground fine pitch is available for selection with the power levers. The aileron and rudder locks engage when the controls are centralised, and the elevators when the controls columns are fully forward.

The controls are unlocked by depressing the button on the gust lock lever handle and lowering the handle gently to the unlocked position, rather than allowing it to descend under the force of the spring. All functions of the gust lock system are withdrawn by the time the handle has descended through about three quarters of its travel. Thus, even if the handle is not engaged in its lower detent, there is no interference to the operation of the aircraft's controls provided the handle of the gust lock lever is in the lower section of its slot.

When the aircraft was examined at Dubbo after it landed, nothing was found in the vicinity of the gust lock handle which could have obstructed its full downward travel. However, lying on the right-hand control seat was a substantial operations manual, the aluminium cover of which was distorted. The manual, which was the only article in the cockpit capable of restricting the movement of the gust lock handle, is normally stowed in a cockpit compartment to the left of the left-hand control seat.

It was not possible to positively determine the position of the operations manual before it was placed on the right-hand seat after shut-down, but the circumstances suggest it had been behind the left-hand seat and that a particular sequence of events had followed its placement in this position. Experiments on the ground showed that with the left-hand seat moved forward to a typical in-flight position, the manual could be positioned in such a way that, when the gust lock handle was lowered, the manual prevented the handle reaching its full down position and engaging in the unlocked detent. Yet in this position all the controls were free and the power levers were not baulked. Furthermore, when the seat was slid back from its forward position, the consequent rearward and upward movement of the manual pushed the gust lock handle fully up so that it engaged in the locked detent.

The area behind the left-hand seat showing how the aircraft's operations manual applied pressure to the gust lock lever handle when the manual was forced into an upright position by rearward movement of the seat.



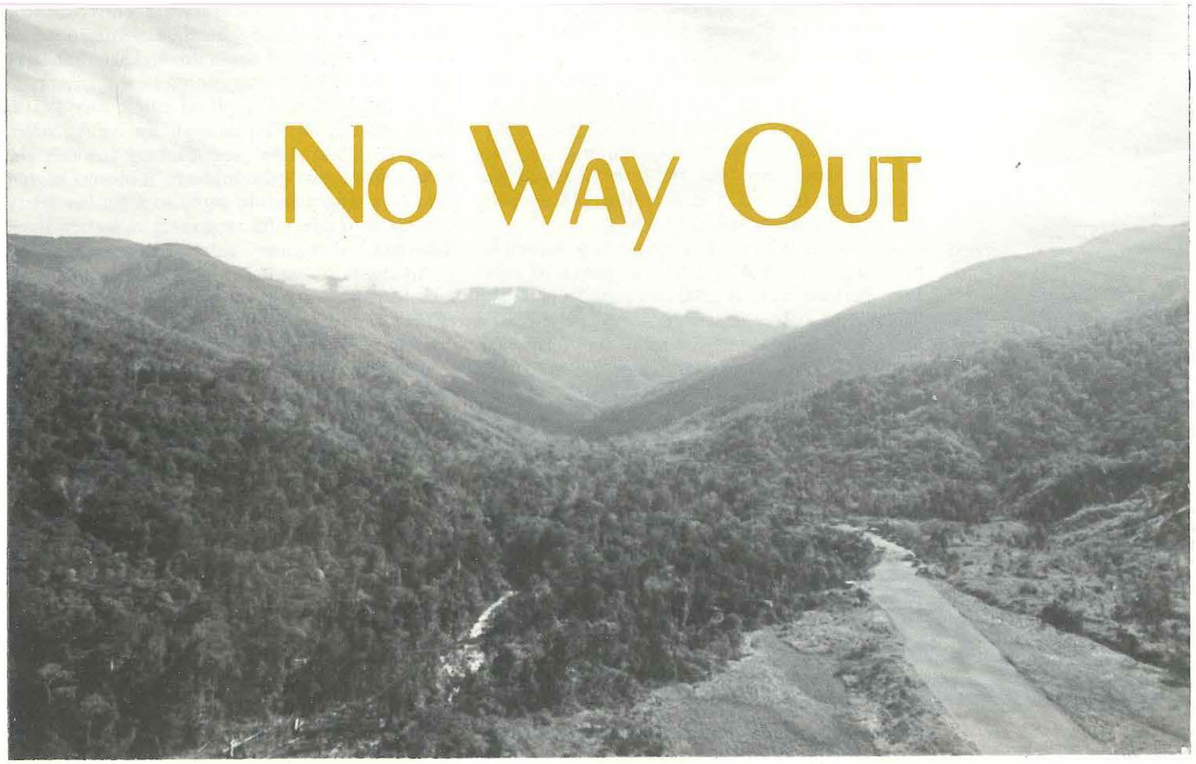
Although neither of the crew actually saw the 'flight fine unlocked' warning illuminate, it is quite evident that this had occurred as the gust lock handle moved to the locked position and entered the upper detent. The warning light was first noticed shortly after the first officer had made his announcement to the passengers and just after he had replaced the public address handset on its cradle behind his seat. A few seconds later the control problem became apparent.

The first officer recalled that he had held the public address handset with his right hand and that he would not have been able to reach back and take the handset from its cradle without first moving his seat rearwards. Even though he could not specifically recall having done so, the first officer was convinced that he would have moved his seat back to reach the handset before he made his announcement.

From all the evidence it seems that, before the aircraft departed from Sydney, the operations manual was placed behind the left-hand seat instead of in its correct stowage beside the seat. When the first officer moved the gust lock handle to its unlocked position during the pre-take-off checks, it seems likely that the sound which the crew took to be the handle engaging in the lower detent was actually the contact of the handle with the aluminium cover of the operations manual. And later in the flight when the first officer slid his seat back to reach the public address handset, this action pushed the manual in such a way that it moved the gust lock handle, already out of its lower detent, upwards into the locked position. With the gust lock lever thus positioned, the aileron and rudder locks engaged almost immediately, but the control columns, occupying a centralised 'in-flight' position, were not at any time far enough forward to allow the elevator gust lock to engage.

The likelihood of such a sequence of events is so rare that the crew's misinterpretation of the problem when it first developed is entirely understandable. Their initial response to the emergency was no doubt conditioned by the first officer's impression that he was unable to disengage the auto-pilot. It can only be to their credit that they succeeded in recovering the situation without injury to the occupants or damage to the aircraft.

There can be no doubt that the conduct of both flight crew and cabin staff throughout this very frightening emergency was exemplary. The captain in particular showed commendable presence of mind under stress.



No Way Out

After an apparently uneventful flight from Cairns, Qld, a Piper Aztec with a pilot and three passengers on board landed at Port Moresby, Papua New Guinea. None of the party had visited Papua New Guinea before and this was to be the start of a tour of the country.

The group spent the next day in Port Moresby and, early the following morning, the pilot went to the briefing office to plan the next stage of the trip. He prepared an IFR flight plan, showing the aircraft would be tracking to Lae via the Kokoda Gap and Girua, and indicated he would be using VFR procedures, a normal practice in Papua New Guinea. The meteorological forecast obtained by the pilot predicted extensive cloud enroute but, as it was expected to be broken and in layers, flight in VMC should have been possible.

When the plan was submitted, the briefing officer noted that the pilot had specified that his cruising altitude for the first segment of the flight from Port Moresby to the Kokoda Gap would be 7000 feet. The briefing officer pointed out that this altitude was barely sufficient to negotiate the gap and that most pilots planned through at 8000 to 9000 feet. The pilot then expressed surprise that the published lowest safe altitude on his flight-planned track was 13 500 feet and asked why it should be so high when the mountain peaks shown on the chart near track were only about 11 000 feet. It was explained to the pilot that the lowest safe altitude for this route was based on obstacle clearance requirements applied to the NDBs both at Port Moresby and at Girua. The pilot said he had not planned to track direct to Girua across the ranges at that altitude because the Aztec would be 'grunting a bit at that height!'. He added that it was hard to imagine mountains as high again as his planned altitude of 7000 feet, and said he would amend his planned cruising altitude in flight if necessary.

At this stage they were joined by another briefing officer and between them, the two officers briefed the pilot on landmarks on the proposed track, using the Port Moresby Visual Terminal Chart. The pilot said he had his own chart and he seemed to be familiar with the general features of the route. It was pointed out to him that the Kokoda Gap was not a chasm through the mountains but merely a saddle lower than the surrounding mountain peaks. Other features on the chart which were prominent from the air were the airstrips at Manori, Efogi and Kagi, and the lakes at Myola. The pilot was cautioned that the gap would not be visible as he approached the main ridge and that an easterly turn was required in the Efogi-Kagi area. The gap could then be seen as the aircraft neared the Myola lakes. He was also warned to avoid two distinct valleys to the left of track, one leading to an area known as the False Gap, and the other running north of the village of Manumu.

The briefing officers impressed on the pilot that one of the greatest dangers to flying in Papua New Guinea was pressing on into deteriorating weather, and that if he was in any doubt whatever he should not hesitate to turn back and climb to the lowest safe altitude.

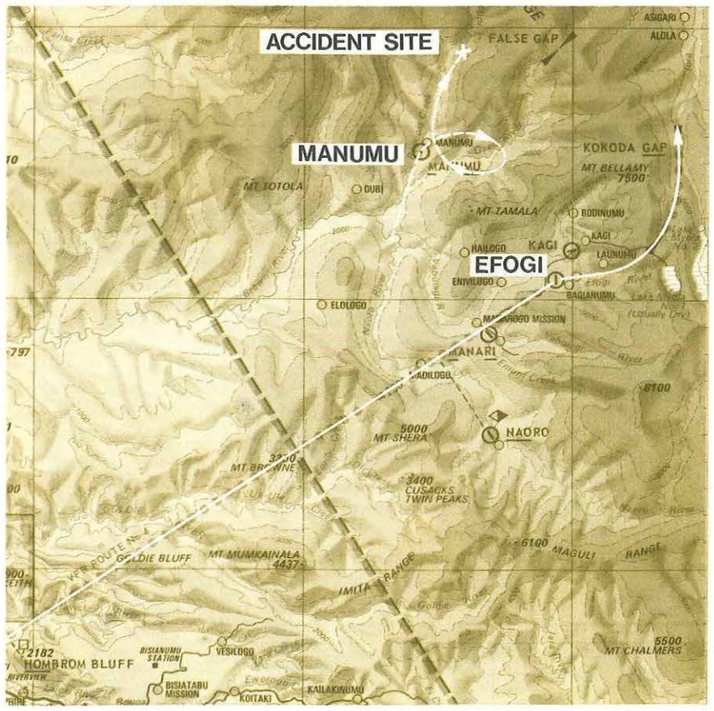
* * * *

At 1015 hours local time, the aircraft reported taxi-ing at Port Moresby and seven minutes later was passed an airways clearance which included 'cruise seven thousand VFR'. Shortly afterwards, the aircraft was advised that another aircraft inbound to Port Moresby suggested a higher altitude might be required and the pilot acknowledged this. At 1024 the aircraft was cleared for take-off and the pilot subsequently reported departure at 1027 hours.

A short time later, in response to a request by the tower, the pilot said he was about 10 miles from Port Moresby at 2500 feet and that he would be 'staying below seven thousand due cloud at this stage'. The tower controller then instructed the aircraft to maintain 'not above 3000 feet' and to report when ready for further climb. The pilot merely acknowledged this transmission. At 1037 hours the controller tried to contact the aircraft again, asking if it was ready to climb. The reply from the Aztec was unreadable and several calls subsequently directed to it by the tower and other aircraft in the vicinity went unanswered.

By now, the Aztec should have been close to leaving controlled airspace and, two minutes later, Port Moresby Flight Service called the aircraft. This time, the pilot replied, saying he had been trying to call on VHF and that he was flying 'down the gullies at three thousand due low cloud'. When asked for his position he replied: 'We're just approaching Kokoda Gap this time, we're below three thousand as advised earlier due low cloud'. The pilot was then given traffic information on another aircraft inbound to Port Moresby which was circling and climbing to 8000 feet in the Kokoda area before overflying the gap, and the pilot acknowledged this transmission.

A section of the Port Moresby Visual Terminal Chart showing the Aztec's flight planned track and the accident site.



The pilot's continued reference to his low cruising altitude was by this time causing concern in Port Moresby and seven minutes later, at 1044 hours, Port Moresby again asked the aircraft to report its position. The pilot replied: 'We're still trying to find a way through up here'. When asked to confirm he was tracking towards the Kokoda Gap, the pilot replied: 'Affirmative, but it looks clagged in.' In reply to a further query on his altitude, he reported: 'We're three thousand.'

Attempts to contact the Aztec again two minutes later were unsuccessful and despite efforts by other aircraft and flight service units, nothing further was heard from it.

* * * *

Meanwhile, villagers at Manumu, in a valley some 18 km west of the Kokoda Gap and at an elevation of about 1700 feet, had sighted a twin-engine aircraft approaching from the south. There was extensive cloud cover in the valley, but to the south, the mountain peaks were clear. Flying low, the aircraft passed over Manumu, turned, and headed along a valley towards the east. A short time later it returned to Manumu and entered another valley, this time flying in a northerly direction. The villagers watched it fly up the valley for some distance but lost sight of it as it turned behind a hill. A few minutes later, they saw black smoke rising.

In Port Moresby, when nothing further had been heard from the aircraft, the Distress Phase of search and rescue procedures was declared, and an air search for the missing aircraft was begun. Three hours later, observers aboard a Cessna 206 searching the valley north of Manumu sighted smoke and the wreckage of the Aztec about eight km from the village. When a member of the rescue team eventually reached the site after clambering from a helicopter, he found that the aircraft had been destroyed by impact forces and fire, and that all on board had been killed.

* * * *

The aircraft, while flying on a northerly heading, had struck steep, heavily timbered terrain on the eastern side of a blind, narrow valley, some 17 km north-west of the entrance to the Kokoda Gap. The elevation of the accident site was 4200 feet. A little further to the north, at the head of the valley, the terrain rises steeply to the highest peaks of the Owen Stanley Range.

The pilot was 24, and held a commercial licence with a Class One instrument rating. His total flying experience was some 440 hours of which about 125 hours had been flown in Piper Aztecs. This was the first time the pilot had flown in Papua New Guinea.

An aircraft tracking from Port Moresby to the Kokoda Gap must use one of two basic procedures. It may proceed IFR and cross the ranges at the published lowest safe altitude, which is 13 500 feet if the aircraft tracks off the Bootless Bay locator or 15 300 feet if the Daugo VOR is used. Alternatively, it may track to the gap VFR at a minimum of about 7000 feet, maintaining clearance from terrain visually. In practice, the latter option is most commonly used, even by IFR category aircraft, as it avoids the prolonged climb to the lowest safe altitude and the associated oxygen problems.

When a flight is planned IFR and the pilot indicates he will be using VFR procedures, the aircraft is separated from other traffic in accordance with IFR standards, but may cruise below the lowest safe altitude with the pilot providing his own terrain clearance. The pilot of the Aztec, having nominated this procedure, was thus entirely responsible for the safe conduct of the flight with respect to weather and terrain clearance. Although the cruising altitude of 7000 feet which the pilot nominated is the minimum altitude at which the gap can be negotiated, it is not uncommon for aircraft to flight plan at this altitude. Similarly, it is not unusual for an aircraft operating in the Port Moresby control zone to be cleared below 3000 feet initially, in anticipation of a request to climb to a higher altitude to remain clear of terrain. However, when the pilot of the Aztec had not requested further climb by the time he might have been expected to do so, he was queried by Port Moresby. He replied that he was maintaining 3000 feet because of low cloud.

The only way the pilot could maintain 3000 feet and avoid the terrain to the west of the gap was to divert to the left of track or turn back. As the aircraft was sighted over Manumu, it is clear that the pilot had diverted. It is possible that when he first passed over Manumu heading east, he was confident he had reached the entrance to the Kokoda Gap. The pilot was aware that he had to turn on to an easterly heading over the airstrip at Efogi to proceed to the gap. This airstrip runs in approximately the same direction as the one at Manumu, and he could have been misled into believing he was in the right area. But the valleys to the northeast and north of Manumu are 'blind'. At the end of the valley running north the terrain rises steeply to over 8000 feet in only five kilometres, and once the Aztec entered this valley it was trapped. The valley is so narrow that, at the elevation of the accident site, there was not sufficient room for the aircraft to turn around and fly back the way it had come.

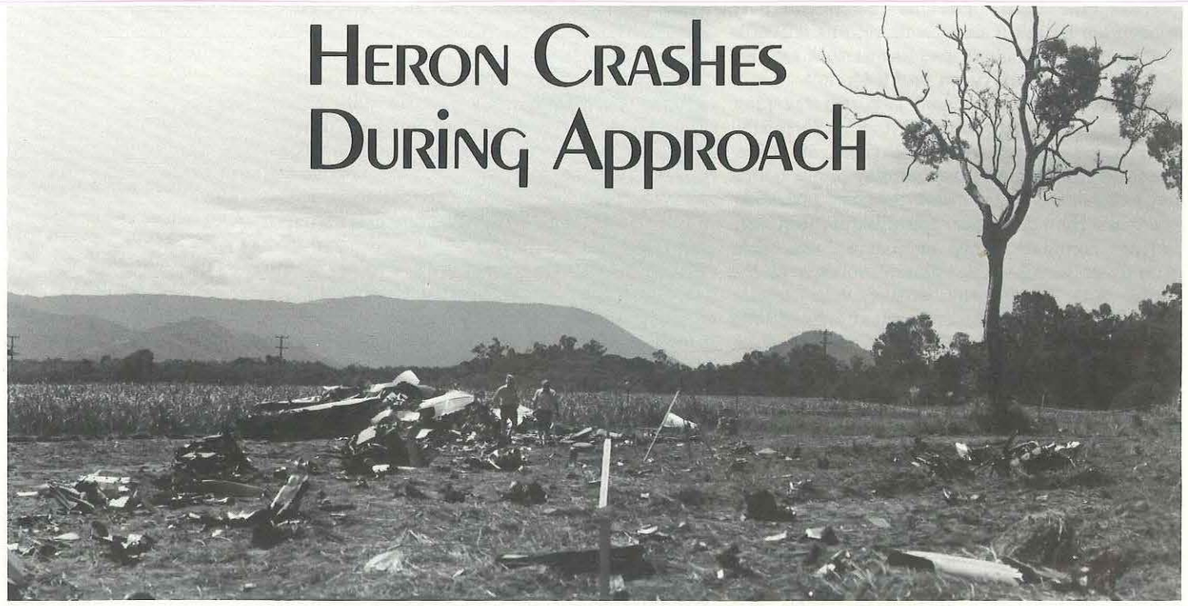
During the examination of the wreckage at the accident site, a 35 mm camera was found lying on the ground near the burnt-out cabin. When the film it contained was processed, it was found that the passenger in the front right-hand seat had been photographing the view from the aircraft. The final four frames on the film had been taken while the aircraft was flying low over mountainous terrain beneath heavy cloud. The last picture was taken in the valley along which the aircraft was seen flying, and shows a ridge line subsequently identified as being only a kilometre from the accident site. When this photograph was taken, the aircraft was already hemmed in by the low cloud base and the steep terrain on either side of the valley, and thus could neither climb nor safely turn back.

During the pre-flight briefing, the pilot had commented on features shown on the chart such as the position of the 5000 foot contour in relation to his planned track and the steepness of the terrain. It would appear that in attempting to reach the gap by tracking along unfamiliar valleys at 3000 feet, towards steeply rising terrain and beneath a low cloud base, the pilot had been unable to relate the features on the chart to those of the real world. Possibly the word 'gap' created in the pilot's mind an image of a cleft or canyon through the mountains, but such an impression is quite wrong, as the gap is only a shallow depression in the main ridge line of the Owen Stanley Range. It is apparent that the weather south of Manumu was clear, and from his position over the village, the pilot could still have diverted safely in that direction or turned back to Port Moresby. Instead, he persisted in his efforts to find a way to the Kokoda Gap, and after retracing his steps when he entered one blind valley, he entered another with disastrous results.

Actual photograph taken by the passenger in the right-hand seat of the Aztec as it was flying up the blind valley. Although already hemmed in by the low cloud and by the valley walls to either side, it is not evident at this stage that there is no means of escape for the aircraft.

The dangers of mountain flying apply to operations in Australia as well, but they assume even greater significance in Papua New Guinea where the combination of tropical weather and precipitous terrain is vastly different to the conditions encountered over most of Australia. The circumstances of this accident emphasise the need for pilots visiting Papua New Guinea to recognise these differences. They show clearly the importance of meticulous flight preparation, accurate flying, and timely and correct flight decisions, not the least of which requires a willingness to ensure that an escape route remains open at all times, and to have no hesitation in using it when circumstances demand.

Heron Crashes During Approach



Several minutes after acknowledging instructions for an ILS approach to runway 15 at Cairns, Queensland, a Hawker Siddeley Heron reported that it was going around. Shortly afterwards it crashed nearly three kilometres north-west of the runway threshold. The aircraft was destroyed and its eleven occupants were killed. Heavy rain was falling in the vicinity of the airport at the time of the accident.

The Heron engaged on a RPT flight, had departed Alice Springs, NT, for Cairns via Mt. Isa at 1257 hours local time. The flight to Mt. Isa was uneventful and, with the crew of three and eight passengers, the aircraft departed Mt. Isa again at 1646 hours. Because of forecast intermittent periods of reduced visibility and low cloud, 30 minutes holding fuel was required at Cairns in addition to the normal reserves. The aircraft's endurance of 350 minutes was more than adequate for this purpose.

At 1910 hours the Heron reported over the Biboohra VOR, 20 nautical miles west of Cairns, and, in preparation for an ILS approach to runway 15, was cleared to the Buchan Locator at 3700 feet. Ten minutes later, after receiving a further clearance, the aircraft reported leaving 3700 feet on the final approach segment of the ILS, and Cairns Tower cleared it to land.

After the aircraft had begun its final approach, the tower transmitted that there was now a 'moderately heavy shower' at the field reducing visibility, and that the high intensity approach lighting was on. Almost four minutes later at 1926 hours, the aircraft reported it was going around. The aircraft's acknowledgement of the controller's missed approach instructions proved to be its final transmission.

Just before 1930 hours, after a number of unsuccessful attempts by the tower to contact the aircraft, Cairns Flight Service received a telephone call reporting that an aircraft had crashed near Holloway Beach, some three kilometres north-west of the airport.

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The site of the crash was a little less than three kilometres from the threshold of runway 15 on a bearing of about 333 degrees true. The aircraft had first struck the tops of trees twenty metres high in a nose-down attitude whilst steeply banked to starboard, the impact heading being approximately 332 degrees true (i.e., away from the airport). After cutting a swathe through the trees, the aircraft had struck an adjoining cleared area of ground and broken up. From the point of first impact, the wreckage trail extended for about 180 metres.

Examination of the wreckage showed that at the time of impact the undercarriage and flaps were retracted, and all four engines were running at substantial power with the propellers in fine pitch. No evidence was found of any defect or malfunction which could have affected the aircraft's operation.

At the time of the aircraft's approach there was a thunderstorm in the vicinity of the airport with moderate to heavy rain. Special aerodrome weather reports had been issued from 1855 hours and the report prepared just after the accident indicated that there were two OKTAS of cumulo-nimbus cloud at 3000 feet, five OKTAS of strato-cumulus at 4500 feet, and two OKTAS of stratus at 1000 feet. The visibility was temporarily reduced to 4000 metres.

From the time that it reported commencing descent at the Buchan Locator, the aircraft was seen or heard by no less than 50 witnesses. Some of these witnesses had considerable aviation experience, and some had sighted the aircraft clearly enough to be able to establish its position and height in relation to known landmarks. They were also able to describe the localised weather conditions in relation to the flight path. Overall, there was little conflict in the various observations and, as a result, it was possible to reconstruct the aircraft's final flight path with a high degree of accuracy. The flight path reconstruction is shown in the accompanying diagram.

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The investigation as a whole indicates that about the time the Heron commenced its ILS approach, the cloud base generally was about 2300 feet and the visibility 30 kilometres. However, a line of moderate storm cells had formed adjacent to the western side of the ILS track and heavy rain had begun to fall ahead of this line at Trinity Beach, Holloway Beach and Machan's Beach. There is some evidence also that the storm activity was more severe in the Yorkeys Knob area, eight kilometres north of the airport.

After leaving the Buchan Locator, it is probable that the aircraft was initially clear of rain. The first sighting report, north of Yorkeys Knob, suggests that though the aircraft might have been flying the ILS track, it was flying below the cloud base and at least 1000 feet below the ILS glideslope. Sighting and hearing reports suggest the aircraft then diverted seawards, possibly to avoid storm cells, and then followed the coastline from Yorkeys Knob to Holloway Beach. At this stage the aircraft was approaching a well-settled area with numerous lights on the ground.

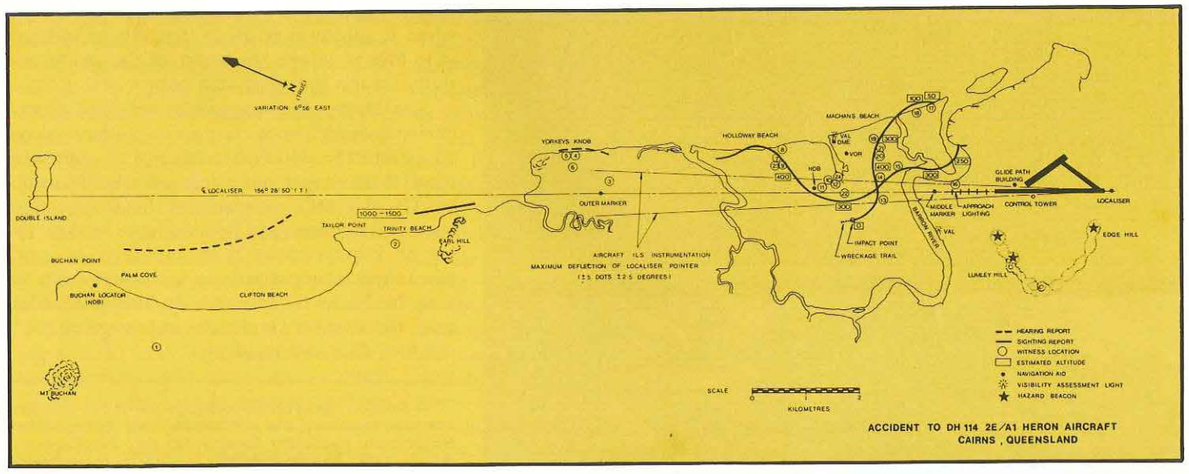
The flight path which the aircraft then followed is consistent with an attempt to intercept the ILS localiser at about the altitude of the glideslope at the Cairns NDB. The overshoot to the west of the ILS centreline and the subsequent over-correction to the eastern side of the centreline, is typical of an attempt to intercept a narrow localiser signal at a relatively large angle.

The evidence also indicates that at about this time, the leading edge of a storm cell had reached a position between the Cairns NDB and the airport, bringing with it heavy rain and reduced visibility. By this time however, the approach lighting, operating at high intensity, would have been clearly visible to the captain, indicating the close proximity of the runway and the fact that the aircraft was not in a good position from which to continue with a landing.

The crew's advice that the aircraft was going around was transmitted 17 seconds before the aircraft's ETA over the runway threshold, when it would have been about one kilometre out. The timing of this transmission is thus consistent with the crew making the call as the aircraft turned on to an easterly heading over the Barron River. The time interval between this transmission and the estimated time of the crash is also consistent with the final flight path as reconstructed from witness evidence.

There is little doubt that before commencing the ILS approach, the captain was aware that the aircraft would encounter instrument meteorological conditions. Not only were occasional thunderstorms predicted in the route forecast, but during the flight from Mt. Isa, the Cairns terminal forecast was amended to predict thunderstorms of less than 60 minutes duration. Also, the aircraft would have encountered thunderstorms and lightning while flying between the Biboohra VOR and the the Buchan Locator and during this time the crew were advised that there was a thunderstorm in the vicinity of the airport.

The witness evidence clearly indicates that, after reporting leaving the Buchan Locator, the aircraft did not conform precisely with the ILS procedure, nor subsequently, after the captain found he was unable to continue with the landing, with the missed approach procedure. The witness evidence suggests that, shortly after commencing the final approach, the captain reverted to flying the aircraft by visual reference and continued to do so until the aircraft crashed. There is no doubt that the



Reconstruction of the aircraft's final flight path as determined from witness evidence.

Heron encountered heavy rain during the final critical stage of its approach, and that visibility would have been reduced, but there is nothing to suggest that low cloud, significant turbulence or excessive wind gusts were associated with the rain. Nor was the loss of ground visibility such as to prevent a landing on completion of an ILS approach.

Why the captain did not conform with either the ILS or the missed approach procedure is a matter for conjecture, but as far as could be established nothing was amiss with the crew or with the operation of the aircraft. Any attempt to fly the aircraft by visual reference in the existing conditions was not only contrary to the IFR procedures under which the aircraft was required to operate, but exposed it to the well-known and long-established dangers inherent in any IFR-VFR compromise (see 'Its Got to be One Thing or the Other' and 'Not Quite Contact' in Digest No. 95). In particular, in the first part of the aircraft's attempted visual orbit, there was a gradual loss of height as it turned from the Barron River towards Machan's Beach. This is consistent with an attempt to maintain height by visual reference over featureless terrain on a dark night with no horizon. It is perhaps significant that the aircraft regained height as it flew west over the lights of the Machan's Beach residential area. But when the aircraft turned steeply to the right as it passed beyond this lighted area, it was once more flying over featureless unlit terrain with absolutely no visual reference ahead. During the turn, the nose would tend to lower and, if not corrected, the aircraft would descend. In the existing flight conditions it would be difficult to detect this change of attitude visually. Alternatively, to revert from visual to instrument flight at this point and then to detect the change in attitude and loss of height, would have taken some seconds. In either case in the existing conditions, an accident was almost inevitable. The situation could also have been compounded if the lightning flash which some witnesses saw in the vicinity of the aircraft at this time, had temporarily blinded the captain.

At this stage, with the undercarriage and flaps retracted, the engines in fine pitch at high power, and the aircraft turning away from the airport, it is probable that the captain was in fact abandoning his attempted visual approach when the accident occurred.

One aspect considered in assessing the events that led to the accident was the aviation background of the captain. Before gaining his first class instrument rating and his command of Heron aircraft, the captain had no experience of airline operating procedures. Rather, most of his previous experience had been gained in VFR operations in general aviation. Since commencing airline operations, he had not been confronted with a weather situation which required him to divert or to contemplate diversion to an alternative aerodrome; nor had he been confronted with a weather situation which required him to hold pending an improvement in the conditions. Before the approach on which the accident occurred, the captain had completed only two ILS approaches in actual instrument meteorological conditions. Nevertheless, it is considered that the weather conditions encountered during the final minutes of flight were not beyond the capabilities of either the captain or the aircraft.

There is little doubt that, en route from the Biboohra VOR to the Buchan Locator shortly before commencing the ill-fated approach, the aircraft would have encountered moderate to severe turbulence while flying in cloud. This, together with the captain's extensive background of visual flying, might have influenced him to attempt a visual approach to Cairns when it appeared possible that this would enable him to avoid the worst of the storm activity on the ILS approach path.

Similarly, the captain's relative inexperience of airline operations might have played a part in his decision to attempt an approach when there should have been no urgency to do so. The aircraft's endurance at this stage was at least 180 minutes, and it could have held pending an improvement in the weather. In most cases thunderstorm activity will move from an area in 30 to 60 minutes. In this particular case, the weather conditions improved only 15 minutes after the accident.

Aerial view of accident site looking in the direction of Cairns airport. The direction of impact was in a direction towards the right of the camera.

A detailed report on the investigation of this accident has been published and is available from the Australian Government Publishing Service, PO Box 28, Canberra, A.C.T., 2600. Its reference title is 'Special Investigation Report 76-1'.

Don't Rush In

Elsewhere in this issue is an account of the loss of a Piper Aztec in mountainous country east of Port Moresby, Papua New Guinea. Operating in an environment with which the pilot was not familiar was a prominent factor contributing to this tragedy.

A further example of unfamiliarity in relation to Papua New Guinea flying — this time with a happier ending — is provided in the following story from the crew of a Fokker Friendship.

* * * *

We were on descent into a non-controlled aerodrome and had been advised that the only other traffic was an Australian-registered Cessna 210 (let us call it VH-XYZ), bound for the same aerodrome as ourselves but with an ETA some 15 minutes earlier. Flight Service then began calling the 210 on HF to advise it of our position, but their transmissions went unanswered. Our own efforts to contact the aircraft were likewise to no avail.

Then, when we were only about five minutes out, we heard the 210 transmit: 'All traffic in the — area, XYZ overflying at 2000 feet'. Once again we called the aircraft, this time to establish whether it was over the town or over the aerodrome. But as before, there was no reply. We resolved to keep a particularly sharp lookout.

Approaching the aerodrome at 1500 feet, fully expecting the 210 to be on the ground, the radio suddenly came to life and we were startled to hear the other aircraft transmit on HF: 'XYZ, circuit area —, will report on departure'. At that instant, the 210 materialised on a converging heading on our port side, at the same level. After taking avoiding action, we were at last able to establish VHF communication with the pilot. Feeling somewhat irked, we asked him his intentions. He replied he would 'follow us in.'

We cancelled our SARWATCH and made a normal approach and landing, rolling right through to the end of the runway 'just in case' as we knew the 210 was following closely behind. As we did a '180' at the end, and before we could taxi clear, to our disbelief, we saw the Cessna touch down and then turn off about a third the way along the runway! The pilot seemed to have made no attempt to go around and, rather tersely, we suggested he remain at his aircraft as we wished to speak to him.

The pilot, contrary to expectations, was by appearance a mature and responsible person, but quite oblivious of his transgressions! After 'clearing the air' with him, we established he held a private licence and had done most of his flying at an Australian capital city secondary airport. As the conversation went on, it became obvious that he did not have the slightest idea of normal operating procedures. He had not yet even cancelled his SARWATCH, which we suggested he do so straight away — he had only a minute to go before an Uncertainty Phase was declared!

The pilot said that his next port of call was to be a major coastal airport, after which he and his friends would be proceeding to the highlands. On hearing this, we asked him if he knew that, when operating aircraft with normally-aspirated engines in the highlands, it was necessary to lean the mixture to obtain optimum take-off performance. He looked surprised and asked us what setting that should be! At this stage we could only suggest that, before going any further than the major airport, he obtain a comprehensive briefing on Papua New Guinea operations in general, and highland flying in particular, from the senior pilot of a large charter operator based there. After reminding him to be sure to obtain an airways clearance before entering the control zone, we departed.

* * * *

The point of our contributor's story is directed to similarly inexperienced pilots — perhaps accidents just going somewhere to happen — whose ignorance of procedures and aircraft performance requirements makes them a danger to themselves and to others. Because of high terrain and difficult weather, flying in Papua New Guinea is vastly different to that in Australia.

Over the years Papua New Guinea operations have claimed many aircraft. Unless visiting pilots recognise what they are up against and raise their standards accordingly, they will claim many more.

This series of photographs, taken during the investigation from an aircraft simulating the flight path of the Cessna 206 shows the tortuous route which the pilot was forced to follow to Marawaka.

Well Done!

Concerned as we inevitably are with human error and judgement, it is often difficult to avoid presenting a rather negative view of air safety in the review of accidents and incidents published in the Digest. For this reason it is a welcome change when we can feature the positive side of accident prevention with an instance in which pilot skill and initiative have averted an almost certain catastrophe. The story that follows is one such case.

Many airstrips in the highlands of Papua New Guinea are notorious for their difficulty, and the one at Usarumpia, in Eastern New Guinea, is no exception. This one-way strip lies in rugged mountainous terrain at an elevation of 5700 feet. It is only 450 metres long, with a gradient of 1:10, and the lower end of the strip drops sharply into a mountain stream. Once having begun a take-off, there is little opportunity to abandon it without being involved in a disaster.

It was from this strip one morning that a private pilot planned to fly three passengers to the village of Marawaka 11 kilometres away. Immediately before take-off the pilot checked the controls of his Cessna 206 for full and free movement, then, satisfied they felt normal and were functioning correctly, lined up on the strip and opened the throttle. But about half way down the strip, as he eased back the control wheel to lift off, it moved freely in his hand and there was no response from the elevator. The question of abandoning the take-off flashed through the pilot's mind but he immediately thought better of it as an accident would have been inevitable.

Rotating of its own accord, the aircraft became airborne with the nose continuing to rise quite sharply. The pilot reduced power a little and the nose dropped back to a more normal climbing attitude. The airspeed fluctuated, but never rose above about 70 knots, and the pilot then found that as the aileron and rudder controls were still functioning, he could control the aircraft's attitude by varying the engine power. In an effort to gain a greater measure of control, the pilot tried different flap settings, but found the best result with the 15 degree flap setting he had used for take-off. He also experimented with the elevator trim but as the aircraft was slow to respond, he decided that he was better off controlling the attitude with power.

Ahead of the aircraft now lay the twisting valley leading through the mountains to Marawaka, the aircraft's destination. With such limited attitude control, the pilot decided not to attempt to climb above the high terrain hemming the aircraft in on either side. As the one-way strip at Marawaka has the same elevation as Usarumpia and is aligned with the valley, the pilot saw that his best hope was to continue up the valley to Marawaka and attempt a landing there.

Reporting his problem and his intentions to Lae Flight Service, the pilot followed the tortuous route through the valley. Though he was able to steer with ailerons and rudder, the pilot found that turbulence and the need for frequent power changes made it impossible to maintain anything like a constant attitude. But at last the strip at Marawaka hove into sight and the pilot reported he would be making a straight-in approach. Crossing the threshold at about 10 feet, the pilot reduced power slightly to descend, then increased it again to try and flare the aircraft. But the aircraft did not respond quickly enough and struck the ground heavily in a nose-down attitude, breaking off the nose leg. The aircraft bounced, struck the ground again and skidded off the strip to the right where, now at low speed, it ran down an embankment and somersaulted quite gently over on to its back. None of the four occupants were injured.

When the damaged aircraft was examined later, the bolt connecting the elevator push rod to the elevator torque tube horn was found to be missing, together with its lock nut. As a result the elevators had become disconnected, depriving the pilot of longitudinal control.

Major repairs had been carried out to the rear fuselage of the aircraft a few weeks before the accident, during which the elevator controls had been disconnected. The bolt had been refitted on completion of the work, but apparently its retaining nut had been either not properly tightened or left off altogether. Though the bolt must have been at least partially in place while the pilot was carrying out his take-off check, it obviously fell out soon afterwards as the aircraft was taking off.

Serious as this omission was however, it is not our purpose to dwell on this aspect of the story, but rather to commend the pilot for his calm, resourcefulness and skill in the face of an ugly situation. In the ten minutes that he was airborne he schooled himself to control the aircraft with power, experimented with various flap settings to improve controllability, tried the elevator trim as a means of control, told one of his passengers to refasten his seat belt and made two calls to Lae Flight Service to advise them of his predicament — all the while guiding the aircraft at low level through the difficult winding valley to Marawaka.

Altogether it was an outstanding performance — a view with which the pilot's three passengers are certain to agree!

CAUTIONARY TALES!

(Some things never change)

Vacant Vera

Vera checked the fuel for water,
Merely 'cos she thought she oughter.
Unperturbed at the drop she found,
She never guessed there was more around!
So while intent on navigation,
Vera succumbed to gravitation!

Grasping Gilbert

Gilbert's plane is fairly bulging,
In overloading he's indulging.
' She'll handle it,' he's heard to boast,
- whenever he is over-grossed.

Another kilo he tries to squeeze,
But beyond the strip - a clump of trees!
'Twas density altitude Gil forgot,
–and that is how he copped the lot!

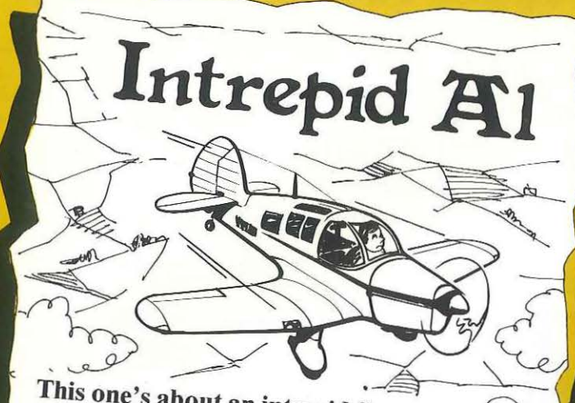
Fearless Fred

VALE POOR FRED - an aspiring flyer,
A shame he wasn't flying higher!

VALE POOR FRED - he was lost for ages,
And now he's in the Digest pages!

especially for our 100th. issue.

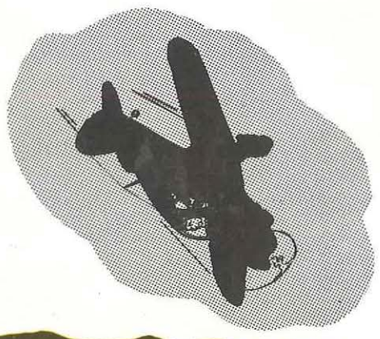
Intrepid Al



This one's about an intrepid flyer,
the sort admired for being a trier.
For when the sky ahead looked black,
Al was hardly one for turning back.

In most respects Al's more than capable,
except for being instrument rateable.
' We'll make it through with a bit of dodging,
If not - we'll look for alternate lodging.'

When nimbus clouds precipitate,
Ceiling and vis deteriorate,
And soon by rain they are surrounded,
Al's optimistic hopes are ill-founded!
He slows it down, with flap for drag,
But suddenly they're in the clag.
Al goes for power; with the noise level rising
Instrument readings are quite surprising.
Which way is up? I can't see the ground -
Why is the DG spinning around……?



(with the Digest's thanks to Ian Wilson)

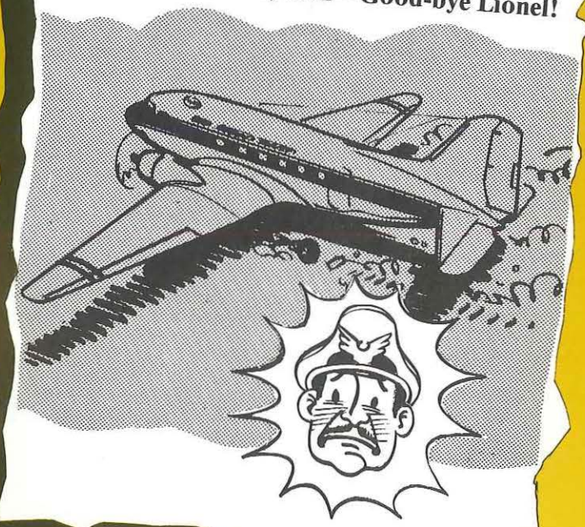
Likeable Lionel

Captain Lionel is cool and charming,
In female company quite disarming,
With several thousand hours in hand,
Captain Lionel prepares to land.

The first attempt was by the book,
Down to the minima to take a look.
Without a break they go around,
Then suddenly they glimpse the ground!

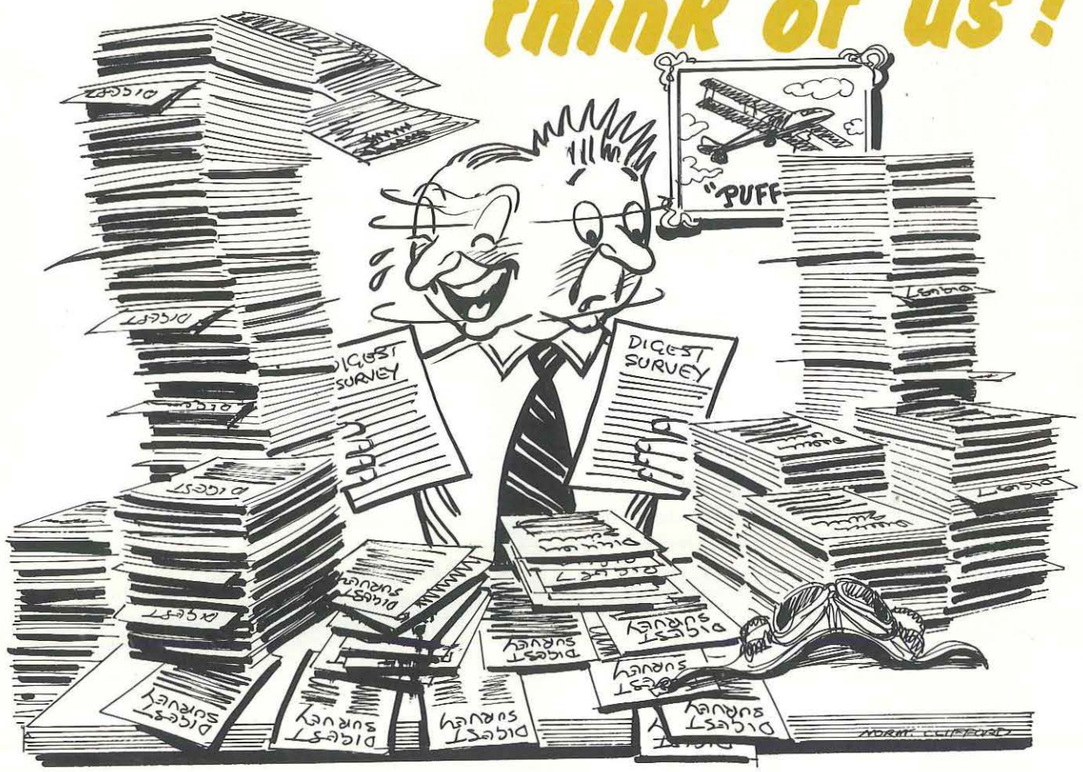
'Twas so close to being a go'er!
If only they'd been a little lower!
But for sure this time he'd get it in,
If he feels it down where the ceiling's thin.

A procedure turn - and back on final,
Below the minima, then—Good-bye Lionel!



Now this appalling verse is ended
May it keep you from getting bended!

So that's what you think of us!



O wad some Pow'r the giftie gie us
To see oursels as others see us!

— Robbie Burns

How much at times we would all like to be able to look at ourselves objectively! The truth, it is said, nearly always hurts, but whatever the cost there is that compelling desire to know.

And so it was that, after nearly 25 years of churning out safety education stories for the edification of all who would read them, we felt that the time had come to find out just what our readers really think of us. Certainly we'd had some inklings over the years — particularly from those kind readers (as well as a few not-so-kind!) who were energetic enough to put pen to paper. Yet compared to our total circulation, these were but a drop in the bucket. What of all the rest who, whatever they really think, might never get around to telling us?

Were we continuing to get through to our readers? Was it time for a change? Certainly for our part there was the feeling that we'd said all there was to say on some subjects — especially accidents of the 'Below VMC' sort. Though places and circumstances differed, the same sorts of accidents seemed to go on repeating themselves over and over again, and there was little more that we could say without repeating *ourselves*.

One of the difficulties of assessing the effectiveness of any safety education effort is that there is no way of determining the accidents that haven't happened! Would things have been any different, we wondered, if there had been no Digest? Or would there have been even more accidents had it not been for all those rather grisly stories on the same theme? All in all, it was high time to find out. Were our readers as weary of what often seemed to be the same old stuff as we were? Perhaps they thought there should be some entirely fresh approach to the whole problem of educating for safety? Clearly there was only one way to find out — ask them!

And so we did ask — at least we asked a healthy sample of 2000 pilots, representing some eight percent of our readership. The response surpassed our most optimistic hopes, with 63 percent completing questionnaires, many of them containing detailed comment. Sixty-six percent of the private and commercial pilots who were sent questionnaires returned them, 51 percent of the senior commercial pilots returned theirs, and, most heartening of all, 71 percent of the airline transport pilots responded.

For most, this was the first time they had been offered the chance to really say what they thought and the great majority of replies were extremely well expressed. Perhaps most encouraging was the sincerity of those who replied and their willingness to be frank.

It was clear from the survey that all categories of pilots find the Digest useful for reference. Answers to whether the Digest has ever enabled readers to avoid an accident were also encouraging, both from the viewpoint of readers' attitudes and our own effectiveness. Though very few were specific about any one article plucking them from the jaws of calamity, some 90 percent of those who replied feel that the magazine stimulates a continuing awareness of aviation's pitfalls, helping them to recognise potential dangers as they develop.

Almost 70 percent of readers who responded to the survey like the Digest in its present format and would not like to see its quality compromised. Few criticise our 'style' of writing, though some think we sometimes get a bit too 'preachy'. And because we've always tried to give readability and comprehension the highest priority in the Digest, we rejoiced to learn that most readers find our articles easy to read.

By contrast, a number believe some of our editorial comments to be out of touch with the average pilot's real problems and viewpoints. As one so candidly put it, '. . . many articles set up a teacher-pupil relationship — and a heavy-handed teacher at that. The editor's comments read like headmaster's sermons!' Another wrote '. . . most articles appear to level the entire responsibility at the pilot-in-command'. And some readers suggest we need to be more oriented to 'the way things are', in seeking our goal of 'the way things ought to be' if we are to continue to have the ring of authenticity. Conversely, others expressed the view that 'preaching' is unavoidable if we are to get the message across.

Some readers feel the Digest is not sufficiently controversial or positive and our utterances sometimes lack punch. And we ought to be prepared to argue the point more — not just push a 'party line'. Some think that past issues were more stimulating than those we are producing at present.

A significant number think the Digest should be more diverse in its approach. Rather than confining ourselves to actual accidents and incidents, we should include more technical articles on various aspects of aircraft operations. A large number of topics, ranging from navigation, through principles of flight to aviation medicine, have been suggested. And many readers want more accidents and incidents reviewed in a shorter, more concise form in each issue, rather than the present practice of analysing comparatively few accidents in minute detail. Quite a few readers are understandably critical of the time lapse between the occurrence of an accident and its coverage in the Digest — a problem to which there is no easy solution.

There is a clear conflict of opinion over the audiences at which Digest articles should be aimed. Quite obviously, senior commercial and airline pilots operating large multi-engined aircraft have very different views on what should be included in the Digest to those who fly single-engined and light twin aeroplanes!

Difficulty in interpreting Departmental requirements and procedures are mentioned by quite a number who would welcome articles explaining and commenting on these things. Others advocate more effective and mutually beneficial communication between the Digest and its readers, with suggestions for 'I Learned About Flying from That' type articles, contributions from well-known aviation identities, a forum section, and test questions in the form of a quiz. Still others see value in humour, recalling the antics of Pilot Officer Prune of 'Tee Emm' war-time fame, and suggest a civil counterpart for the Digest. They point out that the joke, and therefore the message, is remembered long after the words themselves have been forgotten.

There is some criticism that the Digest dwells constantly on the negative side of air safety and a number of suggestions have been made for counteracting this with 'Good Show' stories, Safe Flying Awards, and more safety poster illustrations. We were especially cheered to find that our safety posters, which have appeared on the inside back cover for the past 10 years, and have often been reproduced overseas, are as popular as ever. There have been many requests for larger reproductions of these.

Altogether the survey showed that readers look forward to each issue of the Digest and that it plays quite a vital part in safety education. Yet many see a need for changes which could improve our effectiveness and some are totally dissatisfied with the Digest as it is — but only two readers were blunt enough to suggest we should stop production altogether!

It is not possible to please all the people all the time, but interestingly enough, the most critical comments seem to come from young senior commercial pilots engaged in single-pilot IFR operations. On reflection it is perhaps fair to say the Digest has tended to overlook their particular problems. Their response shows how sensitive we need to be to readers' needs — clearly much of our impact is lost if we seem ignorant of the pressures under which some pilots work, or if we appear only to defend unrealistic requirements.

Our thanks go to all who responded to our survey. And we apologise to those who were not offered the opportunity to have a shot back at us! Obviously, all the changes readers want cannot be accomplished overnight. But now we know what they are we can at least work towards that goal.

For the present we hope readers will like the 'new look' planned for the first of our 'second generation' Digests — No. 101. And perhaps the way forward for the future could hardly be better summed up than by these words from the editorial in the very first issue of the Digest: 'Having achieved an improved form of publication, we do not intend to rest on our laurels. Already we can see avenues for further improvement . . .'

IMPOSSIBLE ODDS!

It was soon after first light on a late autumn morning at Polo Flat airfield on the outskirts of Cooma, N.S.W. In one of the hangers, the pilot of a Pilatus Turbo-Porter was carrying out a daily inspection. Outside, the temperature was about minus 4°C and, typically for that time of year, the airfield was enveloped in fog.

Before long, the pilot was joined by the operations officer of the company which owned the aircraft and together they hooked a tug to the aircraft and towed it from the hangar. The aircraft was then refuelled and seven waiting passengers were helped aboard. While the pilot made a final walk-around, the operations officer ensured the passengers were properly strapped in and closed the sliding door. He stood by while the pilot started the engine and, when all was ready, the aircraft taxied off into the fog.

The operations officer then entered his office and heard the aircraft's taxi-ing call on the base radio transceiver. A short time later, still in fog, the aircraft took-off into the south, and the pilot called again to report his departure time and to advise he was changing to the area frequency.

* * * *

Polo Flat airfield is privately owned and has two intersecting strips. One of these, aligned north-south, is some 1625 metres long, while the other, aligned northwest-southeast, measures 885 metres. About 100 metres east of the southern threshold of the north-south strip is the transmitter mast of a local broadcasting station. This mast is 266 feet high but its position is such that it does not cause any restriction to the use of Polo Flat as an authorised landing area.

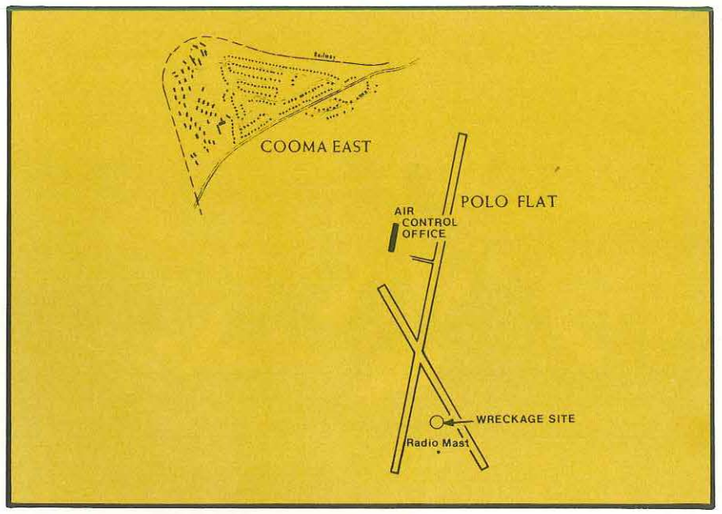
The aircraft, based at Polo Flat, was normally used for communication and co-ordination flights in the Snowy Mountains area and on this particular morning was scheduled to fly to Khancoban and Talbingo, before returning to Polo Flat. Of the seven passengers, three were to disembark at Khancoban and a fourth at Talbingo. The other three passengers were to remain with the aircraft for the whole flight.

Before departing that morning, the pilot had telephoned Cooma Flight Service at the main Cooma aerodrome, some 17 kilometres to the south-west of the town, to obtain a weather briefing and to submit a flight plan. He indicated that the aircraft would be conducting a private flight and that it would be operating VFR.

* * * *

After taking off from Polo Flat, the aircraft climbed initially in thick fog. About a minute and a half later it broke out into bright sunshine and continued in clear conditions towards Khancoban. As it did so, one of the passengers noticed that Cooma aerodrome, which had also been covered in fog earlier, was now completely clear.

The flight to Khancoban, and on to Talbingo, was without incident and at about 0900 hours the aircraft, now with only the pilot and three passengers on board, departed Talbingo to return to



Polo Flat. A short time afterwards, the pilot passed a position report to Cooma Flight Service and also called his company operations office to advise that his ETA was 0935 hours. Fifteen minutes later the pilot reported to Cooma that he was in the circuit area at Polo Flat, and requested that his SARWATCH be terminated.

Meanwhile, at Polo Flat, the airfield was still blanketed by fog. Though it was beginning to break up, and patches of blue sky were visible from time to time, the fog was still on the ground and the maximum visibility was only about 100 metres. The operations officer transmitted this information to the pilot and advised him that the wind conditions were light and variable.

Hearing the sound of the Porter's engine to the south, the operations officer went outside and, looking up through the fog, saw the aircraft making what appeared to be a landing approach into the north. The aircraft descended to about 10 or 15 feet directly over the strip, but the operations officer then heard power come back on and the aircraft went around, climbing back to a higher altitude to hold overhead.

When the aircraft did not land, the operations officer telephoned Cooma Flight Service and ascertained that the weather at Cooma aerodrome was fine and clear. He then called the aircraft again and, as there was no urgent need for it at Polo Flat, he suggested the pilot divert to Cooma aerodrome, to wait until the fog dissipated. But the pilot declined, saying he would remain in the Polo Flat area.

For several more minutes the aircraft held over Polo Flat. The operations officer maintained contact with the aircraft, but the pilot gave no further indication of his intentions. At one stage, the operations officer saw the outline of the Porter quite clearly through thin and wispy fog as the aircraft flew overhead at about 500 feet. It then turned to starboard, continued on what would normally be a downwind leg for an approach into the north, and passed out of earshot.

When the operations officer next heard the sound of the engine, the aircraft was approaching

Burnt-out wreckage of the Pilatus Porter. The damaged transmitter mast can be seen in the background.

from the south. Sitting at the radio console in his office he suddenly heard the pilot transmit: 'Hit the . . .'. There was nothing more, and a moment later he heard a loud impact. Quickly, he had another company employee alert all emergency services and the two men drove hurriedly to the south end of the airfield. Here the fog was still thick, and at first there was no sign of the aircraft. The men then saw a main undercarriage wheel on the edge of the northwest-southeast strip. Driving on through the fog in the direction of the transmitter mast, they came to the main wreckage. A fire was burning in what remained of the fuselage and, despite attempts to extinguish it, the fire spread rapidly until the whole wreckage was engulfed in flames. The pilot and passengers had obviously been killed. Looking back towards where the aircraft had struck the mast, the operations officer could see only its lower portion, but conditions were now improving rapidly and within a matter of minutes the fog had dissipated, leaving the area around the mast completely clear.

* * * *

The port wing of the aircraft had struck the transmitter mast about 32 feet below its top, 234 feet above ground level. Most of the wing was severed by the impact and the aircraft crashed to the ground in a near vertical dive, 147 metres beyond the mast.

Although the flight was planned VFR, the aircraft was not operating in VMC when it departed from Polo Flat. The aircraft had taxied out and taken off in dense fog and when it arrived back at Polo Flat, it was flying in conditions of fog.

The pilot held a senior commercial licence with a total aeronautical experience of more than 13 000 hours. Of this over 3000 hours had been flown in the Turbo-Porter. He had also held a Class One instrument rating but this had lapsed five years before and had not been renewed. The aircraft was equipped with an ADF and a DME, but was not approved for IFR operations.

In the course of the investigation, it was learned that the pilot had taken off from Polo Flat in fog on other occasions. Though the aircraft's departure was usually delayed when the fog was extremely thick, at other times the decision to take off seems to have been influenced by the fact that favourable conditions existed at other aerodromes enroute. It was also normal practice to tune the aircraft's ADF to the Cooma broadcasting station and occasionally, in conditions of reduced visibility, to use the station as an approach aid to Polo Flat.

It was not possible to establish the pilot's intentions at the time the aircraft struck the transmitter mast. The heading of the aircraft on impact with the mast was 015 degrees, which is not consistent with an approach to land on either strip. However, the fog was dissipating and, as the aircraft was actually sighted through thin patches from the ground, the pilot might well have glimpsed strip markers or other ground features and been attempting an approach to land, utilising the aircraft's steep descent and short landing capabilities.

* * * *

It cannot be known whether or not the aircraft was actually flying in fog when it struck the mast, or if the top of the mast was protruding from the fog bank. If the latter was the case, it is possible that glare could have obscured the mast from the pilot's vision since, at the time, the sun was almost directly ahead of the aircraft. Thus even if the top of the mast had been 'in the clear', it might have been difficult to see against the sunlight reflecting from the top of the fog.

No doubt the pilot was confident of his ability to fix his position accurately because of his familiarity with the airfield. Certainly, he had operated at Polo Flat in conditions of reduced visibility before and it is unlikely he would have forgotten the presence of the transmitter mast.

Cooma aerodrome, only 17 km away, was clear of fog and there was no reason why the aircraft could not have landed there and waited for conditions at Polo Flat to improve. As it was, despite the pilot's long experience, his lapse of judgement led to the loss of four lives.

DID YOU KNOW THAT . . . ?
"Analysis of aircraft accident and registration data shows that the life span of a general aviation aircraft is approximately 20 years and during that time it may be expected to be involved in 1.5 accidents, with a one in three chance of being involved in an injury producing accident and a one in eight chance of a fatal accident. Ninety-five percent of aircraft are removed from the Australian Register because of irreparable accident damage."

Into the CLAG!

The hazards faced by non-instrument rated pilots attempting to fly in cloud have been stressed time and again in the Digest. Yet still this remains one of the most recurrent factors in fatal light aircraft accidents in Australia. So much so that the Digest sometimes seems to risk losing the interest of its readers by continuing to review accidents of this sort. 'We've heard it all before' they say. Well, so they have — but so also have the air safety investigators who go out and pick up the pieces when pilots *thought* they could fly in cloud!

So it is refreshing in this issue to be able to present a pilot's account of what it is *like* to fly unexpectedly into cloud. It is interesting to note that in this case the pilot concerned did have a little instrument time: a total of eight hours, three more than the requirement for the issue of an unrestricted PPL. Had he not been able to use that limited experience, then this is one contribution we might not be publishing!

* * * *

I had departed Hoxton Park in a Bonanza for an afternoon trip to Blayney and return to take some photographs, flying via Katoomba and Mount Victoria. The visibility was poor all the way to Katoomba because of brown smog and the fact that we were flying into the sun. On the coastal slopes of the mountains there was broken cloud between 4000 and 8000 feet but I flew beneath the cloud to Katoomba, easily maintaining VFR conditions. The flight was normal to Mount Victoria, but at this stage I was forced to abandon the photography because of turbulence. I then reached Blayney without any further difficulty.

For the return flight I climbed to 5500 feet to avoid standing waves over the mountains and as I approached Katoomba, the weather seemed to be similar to that on my outward journey — cloud between 5000 and 6500 feet, beneath which was brown smog.

About five nautical miles west of Katoomba I commenced descent and entered the smog to have a look. The visibility was reduced but quite safe. But as I continued the cloud base also descended, and by the time I was abeam Katoomba, about three miles south, I had been forced down to my lowest safe altitude. At this stage I recalled the words of my instructor: 'If you are ever forced to your lowest safe altitude, it's time to turn around.' So I began to turn to the left and called Sydney Flight Service to advise them I was returning to Bathurst. There was no sign of cloud other than above me at this stage and the ground was quite visible.

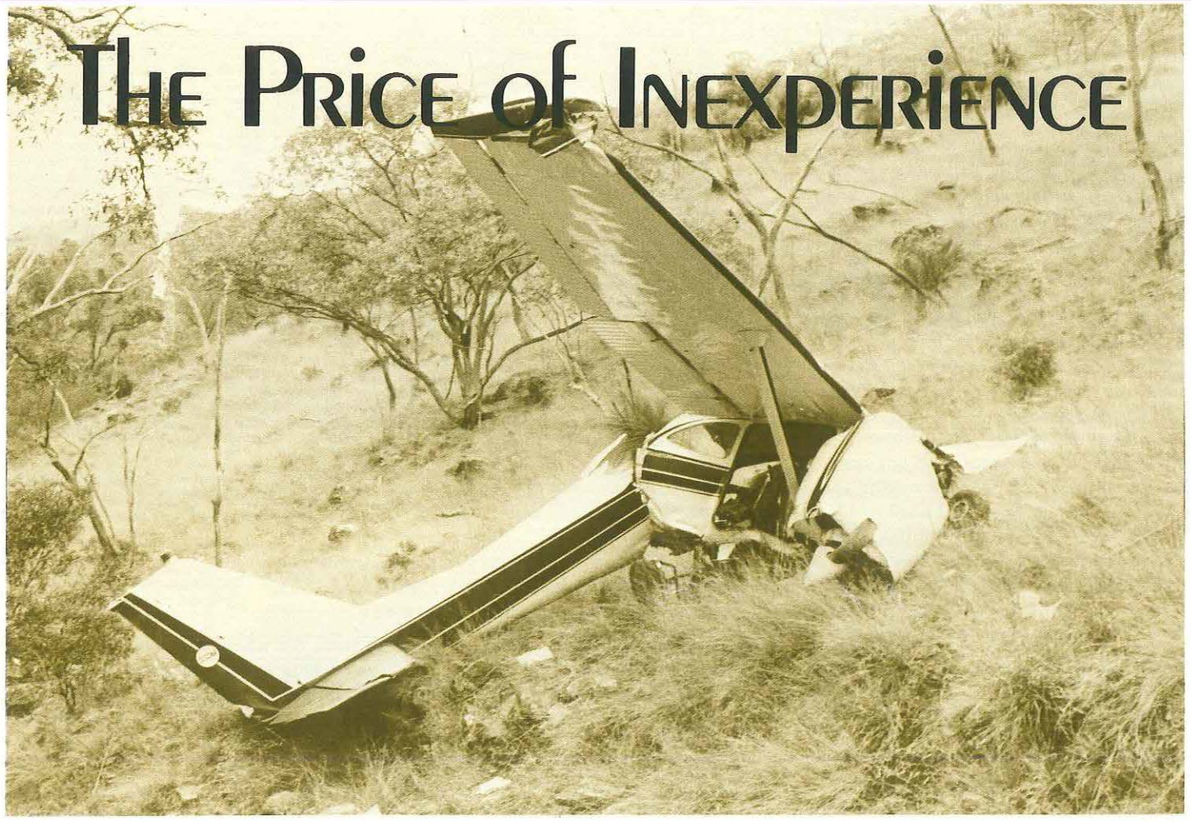
Suddenly the visibility in the smog dropped and a few seconds later all went white — I had flown into some stratus cloud! I was still talking to Sydney when this happened and I guess they detected the change in my voice — from calm to sheer panic!

The next ten seconds were hell. Sydney Flight Service was asking if I was visual; the passengers were asking what was happening; I was wondering what was *going* to happen — not about the Department and being in IMC on a VFR flight — but if I was going to plough into something in this cloud; I was trying to work out which way was UP; Sydney was asking for the lowest safe altitude; the aeroplane was feeling as though it was upside down — sideways — all over the place! After losing about 300 to 400 feet of my LSALT, I finally forced myself to concentrate on the instruments and discovered that I was in a very steep descending turn to the left — I would have sworn blind that I was going up! I reduced power and got the aircraft flying straight and level according to instruments — all over the place according to my head. Then I slowly raised the nose, washed off speed, adopted the maximum angle of climb and aimed for clear skies at 6000 feet. I knew it was clear above the cloud because I had been able to see above it before entering the smog from the west.

The stratus broke for a second and the ground became visible — uncomfortably close! I couldn't see a way out and climbing seemed the safer action. The cloud colour changed to a thicker white and I knew I had climbed into the cumulus cloud somewhere between 4500 and 5000 feet. At this point I called Sydney Flight Service again and advised that I was climbing to 6000 feet and that I expected to break clear of cloud at this level. All the instruments said that I was going up, but how I wished that I had a real horizon!

Finally, much to my relief, the aircraft broke out of cloud at about 6200 feet. I continued climbing to 6500 feet and levelled off. I informed Sydney that I could now see Bathurst and was proceeding to Bathurst aerodrome.

The Price of Inexperience



Inexperience is no sin; every pilot who ever flew has had to begin building up his hours one by one — and with them his skills. But the inexperienced, newly licensed pilot, by virtue of his inexperience, is faced with many fundamental dangers. Two of these lie in recognising the limitations of his new skills, and in assessing the hazards of unusually demanding operations.

In most cases the low-time private pilot has gained his experience almost entirely in operations from the familiar, if congested, environment of an established aerodrome, with its long, level runways. It is not surprising then that a theme often repeated in accident reports is that of the inexperienced pilot coming to grief while attempting to land for the first time at a difficult bush strip — in many cases one suitable only for agricultural operations. One such accident which had particularly tragic consequences occurred recently in New South Wales.

A private pilot had set out in a Cessna 172 to fly to a property where his wife's relatives lived. With him on the flight were his wife and their four young children, one of them a baby in arms. The pilot's total flying experience was only 70 hours and he had never before landed other than at an established aerodrome.

Some time before the flight, the pilot had approached the chief flying instructor of his local aero club to arrange to hire the aircraft. The instructor had discussed the requirements for authorised landing areas with the pilot, and asked if he was familiar with the strip at the property. The pilot left the instructor with the impression that the strip at the property was suitable for the operation. However, the pilot's knowledge of the strip apparently came only from a single ground observation made before he had begun flying training, and from a subsequent aerial inspection during a cross country navigation exercise.

The flight to the property was uneventful and the pilot's brother-in-law, who was awaiting the aircraft, saw it overfly the strip and complete a normal circuit. The approach was also normal and it appeared the aircraft would touch down the usual distance into the strip. However, when it had descended to about 20 or 30 feet the aircraft suddenly rocked as though it had been buffeted by a gust of wind and it rose to about twice its previous height. The engine power then came on loudly and the aircraft climbed away as the pilot commenced to go around.

Despite the pilot's earlier impressions, the strip at the property was originally established for agricultural aircraft and for a number of reasons did not meet the requirements for private operations. Firstly, it was a 'one-way' strip, sloping upwards with a gradient of 1 in 30. More importantly, the strip was at the entrance to a gully and the ground beyond it rose quite steeply, with an approximate gradient of 1 in 15. This meant that as the pilot began to go around, he was faced with rising terrain in front and to either side.

As the aircraft flew beyond the end of the strip it passed through a gap in a line of trees. At this stage it was lower than their tops. It then veered slightly to the right and flew on up the gully towards more steeply rising terrain.

The pilot's brother-in-law then lost sight of the aircraft as it passed behind some nearby trees and he walked on to the strip to try to keep it in sight. He was still unable to see it, but he could hear the engine, which sounded to be at full power.

A few moments later, he caught sight of the aircraft again. It was in a steeply banked turn to the right, quite low and below the level of the hills in the background. It went out of sight again and a few seconds later he heard a thud and the sound of the engine stopped. The aircraft had crashed.

When other witnesses reached the wrecked aircraft a short time later, they found that it had struck the side of the gully at a steep angle. The youngest child had been killed on impact. The two adults were unconscious and the three older children seriously injured. Although every assistance was given, and a trained nurse reached the site quickly, the pilot and his wife did not regain consciousness and died before the ambulance arrived.

* * * *

The immediate cause of the crash was that the aircraft had struck two high tension power cables some 90 feet above the ground during its steep turn to the right. Part of its port wing had been ripped away by the impact, and the aircraft had then cartwheeled and crashed heavily to the ground.

As the investigation proceeded however, it became apparent that the accident had been almost inevitable from the time the pilot had applied power to go around. The aircraft had been forced into a rising gully with steep terrain at the far end. Its ability to outclimb this terrain was at best marginal and depended entirely on the aircraft being flown to achieve the best angle of climb. It is doubtful if a pilot of such limited experience would have the judgement to do this in such demanding circumstances.

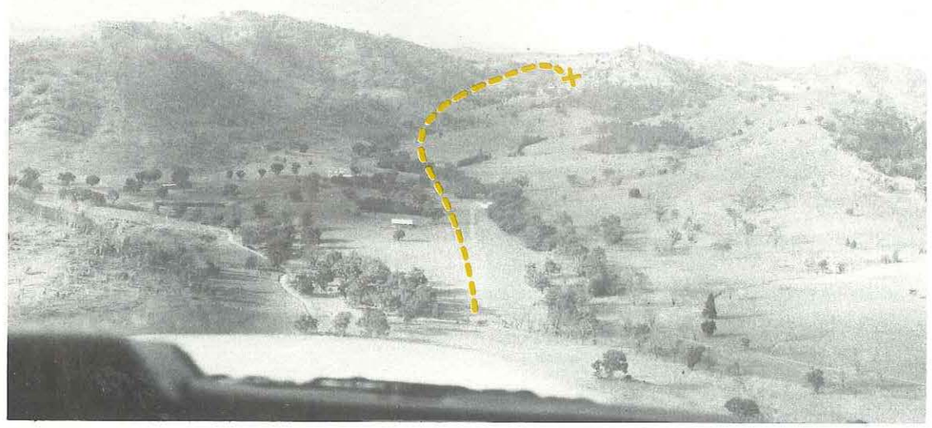
As the aircraft approached the end of the gully and was faced with steeply rising ground, it must have quickly become apparent to the pilot that he would be unable to outclimb the terrain. In this situation, he was faced with two unenviable alternatives. He could either try to land straight ahead on the rough, undulating ground amid trees and rocks or he could attempt to escape from the narrow gully by making a 180 degree turn. He had attempted the latter and was in the middle of a steep turn to the right when the aircraft struck the power line. Had it not done so, it is just possible that the pilot could have successfully completed the manoeuvre and escaped from his appalling predicament.

It seems unlikely that the pilot could have seen the cables before the impact as they were against a dark background. But even if he had done so, there was very little that he could have done to avoid them. It would have taken a very high degree of skill to have turned beneath the wires and still avoided the terrain. As it was, the aircraft struck the wires, with fatal results.

Though it is possible that a more experienced pilot might have been able to retrieve the situation once it had begun, this is not the point of the story: a more experienced pilot would have recognised the serious limitations of the strip at the property and that going around from a missed approach to this strip was not to be considered.

The requirements concerning what constitutes an authorised landing area have good reason for their existence. They are based on experience gained over many years and are there to protect the pilot not to limit him. Ignoring these requirements can have very grave consequences.

We all have to learn — but learning from past experience is less hazardous than making the mistakes ourselves.



An aerial view of the accident site showing the strip on which the Cessna attempted to land, and the aircraft's subsequent flight path.

Pilot Incapacitation?

(Condensed from report published by Department of Trade, United Kingdom)

After an apparently uneventful night flight from Ostend, Belgium, to Birmingham, England, a Beech Baron made three unsuccessful ILS approaches to land in thick fog. Shortly after commencing a missed approach from the third attempt, the aircraft lost height and struck the ground 1500 metres beyond the end of the runway. The aircraft was destroyed by impact and fire, and all four occupants were killed.

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Examination of the wreckage revealed no evidence of any failure or malfunction which could have contributed to the accident, and damage sustained by both propellers indicated that they were rotating under considerable power at initial impact.

At the time of the accident the left-hand seat was occupied by a pilot who had been declared medically unfit a year before and who no longer held a valid licence. He was however the managing director of the company that owned the aircraft and was responsible for its operation. The right-hand seat was occupied by a flying instructor friend, who was officially the pilot in command.

After recovering from the heart attack which had rendered him unfit, the managing director had continued to use his company's aircraft, taking the precaution of having another pilot accompany him in case he should become incapacitated. Even so, he rarely let any other pilot handle the controls or assist with the navigation or radio communications and it is apparent that the loss of his licence had not deterred him from continuing to fly the aircraft himself. The flight on which the accident occurred was entirely consistent with this pattern and from all the evidence, including the radio communications made during the flight, the investigation led to the conclusion that the aircraft was in fact being flown by the pilot in the left-hand seat during the attempts to land at Birmingham.

The crew had been informed of the poor visibility at Birmingham on first contact with Birmingham Approach, but though better conditions existed at other available aerodromes and it was not imperative for them to land at Birmingham, the pilot handling the aircraft evidently decided to 'have a look'.

Initially the pilot might not have realised how bad the conditions actually were, but it is difficult to understand why he persisted in his attempts to land after two approaches had proved unsuccessful. Having sighted some lights during the first approach however, he might have thought a later attempt would be more successful. There is always a strong compulsion to complete a landing at one's destination, but in the existing conditions it would have been prudent to divert instead of making repeated attempts to land in conditions that precluded airline operations.

On the third attempt the aircraft made a very low approach and was sighted at a height of only 50 to 100 feet when it crossed the runway threshold. The landing was not completed however, and when last seen the aircraft was flying normally above the runway. But, shortly after re-entering the fog it began a gentle turn to the right, lost height and struck the ground at a shallow angle. There was no evidence that the aircraft's failure to climb had resulted from any violent manoeuvre such as a steep turn or stall and the fact that the aircraft's undercarriage and flaps were fully retracted at the time confirms that a further missed approach had been initiated when the accident occurred.

Injuries to the left hand of the instructor pilot in the right-hand seat indicated that he had been holding the control wheel at the time of impact, as though he had recognised the development of a dangerous situation and attempted to take control. Because the only flight instrument provided for the right-hand control seat of this aircraft was an altimeter, it would have been very difficult to fly accurately on instruments from this position.

The investigation was unable to determine the exact reason for the instructor pilot's attempt to take control, but a possibility which must be considered is that the pilot flying the aircraft became incapacitated. He would have been feeling tired at the end of a long day's flying and his three attempts to land in such poor visibility would have caused him considerable mental and physical strain. Such circumstances are frequently associated with the development of the symptoms of coronary heart disease and this pilot would have been particularly susceptible to a further heart attack because of his physical condition. Such an incapacitation when followed by death rarely leaves any evidence by which it can be identified. Thus, although there was not enough evidence to show that the pilot had in fact suffered a heart attack, his medical history suggests a strong possibility that he did so and that the aircraft struck the ground before the other pilot could establish control.

The British Civil Aviation Authority makes a practice of withholding the medical certificate of any pilot who has suffered a coronary attack and the waiting period of two years which is imposed before consideration of the re-issue of any licence is based on statistical evidence that a recurrence of coronary illness is most likely to occur within this time. Re-issue is not automatic, but depends on the subsequent fitness of the pilot concerned. In this case the pilot had undergone several physical examinations in an effort to be declared fit, but had failed to satisfy the Authority that his condition had improved sufficiently. In addition he was considerably overweight and had been advised to reduce weight accordingly.

It is clear that the pilot had recognised the advantage of using his company's aircraft for business trips, and he regarded flying as one of his major interests. It was therefore a great disappointment to him to be declared medically unfit. But apparently because he suffered no recurrence of the symptoms of coronary heart disease, he did not accept the seriousness of his illness or the possible consequences of another heart attack. Having been told by doctors, that he was clinically in good condition, he considered the Authority's action unjustified and made repeated efforts to have the decision reversed, or to have a safety pilot endorsement added to his licence so that he could continue to fly. He was nevertheless told that his condition did not warrant an early return of his medical certificate and was advised in his own interests not to fly until his condition had greatly improved.

Even so it is evident that he did continue to fly, though he accepted the wisdom of carrying a safety pilot. However, there are situations when a safety pilot can only be partially effective, particularly in aircraft not equipped with a full set of flight instruments on the right-hand side. In this situation, flight in instrument conditions places considerable responsibility on the safety pilot.

The investigation concluded that the accident had resulted from the aircraft losing height while carrying out an overshoot in conditions of poor visibility. The reason for the height loss could not be determined but in view of the handling pilot's medical history it is possible that he became incapacitated and the second pilot was unable to maintain control of the aircraft.

COMMENT

Heart disease continues to be one of the most common causes of death in the industrialised nations of the world, and Australia is no exception. It is, perhaps, a price we pay for our high standard of living.

As far as aviation is concerned, the consequences of a heart attack can be very grave indeed. Often a heart attack strikes without warning, and can completely incapacitate a pilot. Even if there is a second pilot on board the aircraft, he may not be able to regain control, either from lack of instrumentation, as in the accident just discussed, or because the incapacitated pilot interferes with the controls.

This latter factor was believed to be the cause of the crash of a DC-4 near Brisbane airport in 1961. Medical examination after the accident showed that the captain had suffered a disabling and possibly fatal heart attack during the approach to the airport, and it is believed that he collapsed over the control pedestal, closing all four throttles and depriving the aircraft of power. Unable to move the captain's body, the first officer had no alternative but to crash-land in a mangrove swamp and was killed.

Of more concern, perhaps, are those cases where a pilot has been suffering heart problems for some time and is aware of his condition, yet continues to fly, as in the overseas accident just discussed. Such an accident occurred in Australia in 1972, when an elderly pilot lost control of his Auster when flying solo, and died in the ensuing crash. It became evident later that the pilot had been receiving treatment for his heart condition, but he had not revealed this fact to the aviation medical examiner when his licence became due for renewal. He had suffered severe chest pains only days before the accident.

By its very nature, flying is an operation in which safety devolves more personally upon the pilot than in most other forms of human endeavour. Indeed, there can be a few tasks where the cost of sudden, total incapacitation is likely to be as high. For this reason, pilots carry a heavy responsibility to ensure that no one is ever placed at risk because of their physical condition. Honesty with our medical examiner is a price we should be prepared to pay for the privilege of holding a pilot's licence.

What is likely to happen if a door on the aircraft you are flying comes open in flight? If it is the cabin door, there will be a sudden, unnerving roar, a disturbing rushing of air — and probably some embarrassment because you think you should have checked it more thoroughly before you took off!

But sometimes there could be more serious problems — buffeting, loss of performance resulting from the disturbed airflow, and even controllability problems, especially at higher airspeeds.

This in fact was the experience of a Baron pilot departing from a secondary airport after having his aircraft serviced. The work included adjustments to the cabin door latching mechanism and though the pilot and passenger were certain they had closed the door correctly, it flew open just as the aircraft took off. The pilot retracted the undercarriage, reported the problem to the tower and returned for an immediate landing. Meanwhile, the passenger in the right-hand seat held the door closed as best he could, but even using two hands it was still open about 10 centimetres. As he flew a circuit for landing, the pilot felt a sloppiness and some buffeting in the elevators and kept the speed above 100 knots. Also, because he believed the starboard elevator was largely ineffective, he decided to use no more than 10 degrees of flap for his approach which he made at a higher than normal speed. The landing was accomplished safely. Only the pilot and one passenger were on board at the time and from the feel of the controls during the brief time the aircraft was in the air, the pilot wondered how the elevators would have coped with the disturbed airflow if the aircraft had been fully laden.

The pilot no doubt believed he was 'playing safe' in maintaining a higher than normal airspeed during the approach, but his controllability problems would have been less if he had used the normal approach airspeed, as recommended for this situation by the owner's manual for the type. The Baron has been flight-tested by the manufacturer with the door open and airflow disturbance is minimal at the recommended airspeed. The aircraft is adequately controllable under these circumstances.

However, some aircraft types have not been flight tested in this respect and consequently no recommended procedure is specified in the manuals for these. In such cases a safe approach and landing can usually be made using an approach airspeed at or slightly above the normal value. But where any doubt exists as to the amount of residual elevator response which will be available to flare at the normal approach airspeed, it may be prudent to carry out a handling check at a safe altitude at speeds reducing to the normal approach IAS.

Overseas experience has in fact shown that controllability problems from the disturbed airflow are not usually the real cause of accidents which result from doors opening in flight. In most cases the aircraft, despite some loss of performance, is still quite controllable, and the problem is rather the pilot's reaction to the sudden, unexpected distraction of the open door. As a result there is a tendency to concentrate on the problem rather than flying the aircraft, and the pilot either loses control or flies into the ground.

Perhaps the most potentially dangerous door openings are those involving the nose locker door, particularly on twin-engined aeroplanes, where the door or the contents of the nose locker can inflict serious damage to one of the propellers.

Some readers will remember the accident to the Beech Queen Air at Albuquerque, New Mexico, reviewed in Aviation Safety Digest No. 87. Just as the Queen Air became airborne on take-off, the nose locker door opened, spilling the contents on to the runway and breaking the tip off one blade of the port propeller. Well over 1500 metres of runway remained in which to land the aircraft but instead the pilot feathered the damaged propeller, attempted to go around, lost control and crashed. All nine persons on board were killed. The point to note is that it was loss of control, rather than the open door or the damage it inflicted, which was responsible for the accident.

A five year review of instances in which cabin, nose locker, and inspection doors opened in flight on Australian aircraft revealed 282 reported occurrences — 27 involving airline aircraft, the other 255, general aviation aircraft. Of the latter, 118 involved single-engined aircraft and the other 137, multi-engined aircraft. Study of the circumstances of the 282 occurrences is continuing, but basic statistics available for three popular types of twin-engined aircraft — the Beech Baron, the 400 Series Cessnas and the Piper Navajo — are representative of the general information.

In the case of the Beech Baron, the over-wing cabin door was involved in 75 per cent of the instances. Nose locker doors were involved in 15 per cent. Of the total occurrences only 10 per cent were assessed as being associated with inadequate maintenance or maladjustment of the doors and their fastenings.

Nose locker doors accounted for 50 per cent of the 400 Series Cessna occurrences. The remainder were equally divided between the cabin door, the wing lockers and the cabin emergency hatch. Again only some 10 per cent were assessed as being associated with improper maintenance of components.

Piper Navajo door openings in flight mainly involved the cabin door, with 15 per cent involving the nose locker door. The maintenance percentage was again some 10 per cent.

For all three of these types of aircraft, some 90 per cent of the door openings resulted in the intended flights being abandoned.

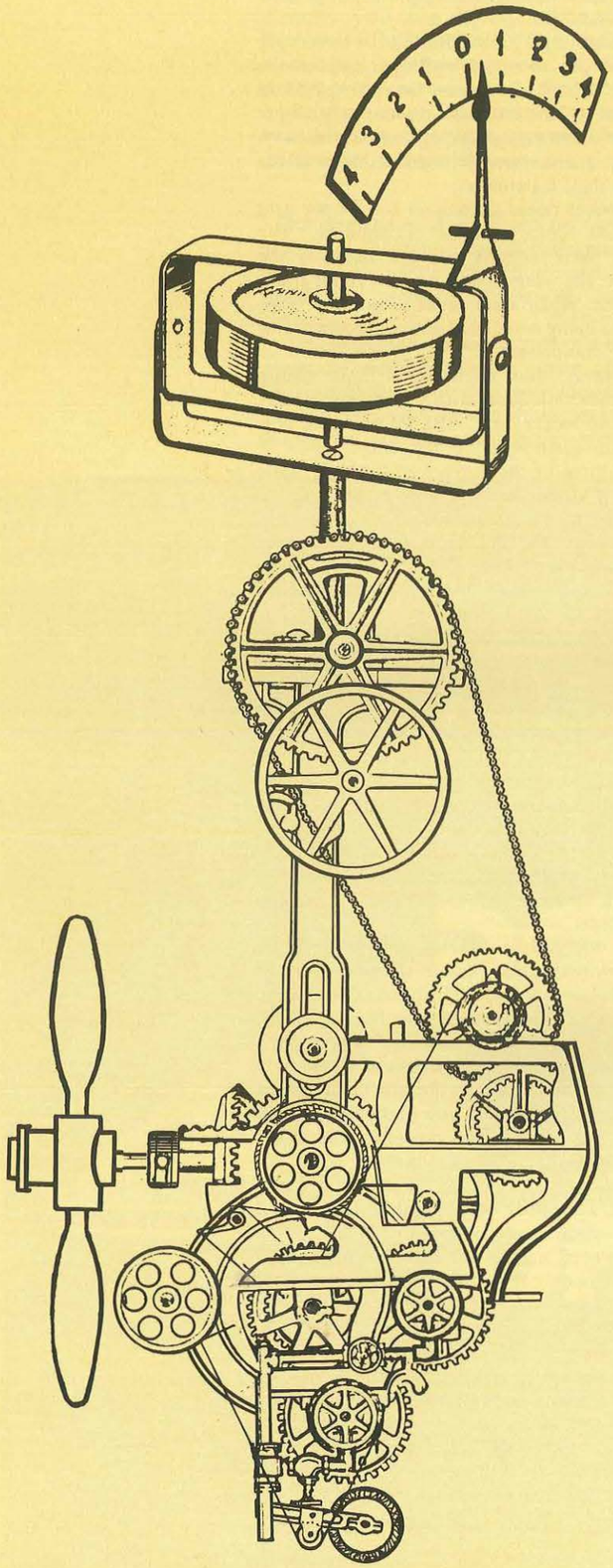
Statistics can be misleading if all the factors are not taken into account. But all pilots — in particular the commercials and senior commercials who mainly fly the aircraft types mentioned — should be concerned that inadequate procedures or pre-flight inspections appear to be involved in some 75 per cent of all reported door openings. Some might wish to reply that the latching mechanisms of some aircraft doors leave something to be desired. Yet if this is so, it is surely all the more reason for the pilot-in-command to exercise all the care and supervision he can. It is also good reason to report door problems to the Department, thus providing a fund of information from which further detailed study can be undertaken with a view to seeking design improvements.

Faulty, doubtful or difficult latches should be adjusted without delay, rather than be tolerated and thus become a potential source of difficulty. In the case of the Queen Air in New Mexico, attention to the nose locker latching system at the proper time could have saved several lives.

But if the worst comes to the worst and despite all reasonable precautions you find yourself with an open door in flight, do not allow the emergency to pressure you into making some ill-considered decision.

Instead, keep your cool, plan the best course of action and do it calmly and deliberately. Some aircraft owners' manuals contain instructions for closing an open cabin door in the air, such as first opening a window then side-slipping the aircraft. But this can be tricky, particularly if the flight is a single pilot operation. Nearly always the best advice is to restrain the door if possible and make a normal approach and landing as soon as it is safe to do so.

Remember, when the door comes open it is not usually the hole in the aeroplane that imperils the flight — it's the pilot's actions that count!



Flying in Cloud

In view of the interest shown by so many of our readers in this problem, we reproduce the following extract from a paper entitled 'A Further Three Years' Flying Experience', read by Captain B. C. Hucks before the Aeronautical Society of Great Britain. Captain Hucks, a very experienced pilot, explains the difficulties which confront an aviator when flying in cloud. We commend his remarks to all concerned with the problem.

Captain Hucks said:

'Personally, I seldom use an instrument as an assistance to piloting. Do not assume that I am sneering at instruments; as I have stated, there are times when they are a necessity. In fact, I am going to suggest that one more instrument be fitted as standard equipment, an instrument to reduce the risks connected with flying in cloud. It may not be generally known that there have been such a large number of fatal accidents during the last three years entirely due to flying through cloud and I consider this subject wants going into pretty carefully. The accidents to which I refer have not been due to a want of height; the machines have become hopelessly out of control. I will give you an instance which happened to myself a few weeks ago in the West of England. You will then realise why I consider this is a serious matter requiring particular attention. I set out on a very cloudy, windy day to do a test climb to 10 000 feet on a late type two-seater. I had so often on previous occasions succeeded quite comfortably in reaching this height in spite of cloudy, overcast days, by pushing up through the clouds, usually only a matter of a few minutes, into bright sunlight and the bluest of skies, and after reaching the desired height, coming down again through the clouds, having flown by compass and time. On this particular day however, the wind was very gusty, and on reaching 1200 feet we got into dense rain cloud, but carried on to beyond 5000 feet, still in the cloud, when the compass apparently began to swing. (Really it is the machine that begins swinging, not the compass.) Efforts to check the compass had the effect of causing it to swing more violently in the other direction. The airspeed then rushed up far beyond normal flying speed; all efforts to pull her up checked her only slightly; then the rudder was tried — back went the airspeed to zero; there was an unusual, uncanny feeling of being detached from the machine, and I knew her to be literally tumbling about in the clouds. All efforts to settle down again to a straight flight seemed to no avail until we emerged from the cloud very nearly upside down. Assuming control again was then an easy matter.

'This sort of thing is frightening but it has happened to me more than once and has happened many times to other pilots. In some cases they emerge from cloud in a spin; others are known in which the wings have collapsed under the strain of the sudden pull-up from the vertical nose dive. A few days ago, a squadron commander told me that on one occasion, everything loose in his machine fell out whilst in a cloud. A week or so ago, on the South Coast, a machine disintegrated in a cloud and the main-planes landed half a mile from the fuselage. From my own experience, I know this is a very unpleasant state of affairs, and in consequence I avoid cloud when possible.

'Let us try to examine the cause of this. First of all you must realise that in cloud you see nothing whatever but your machine around you. There is no fixed point visible. The only means by which you can tell if you are flying a straight course is by your compass and your airspeed. The compass should give you your direction horizontally, your airspeed your direction vertically. The first thing that happens, and very readily too if windy and bumpy, is that your compass will begin to move slightly. It really appears to you that the compass was suddenly affected by the cloud, and you are still flying straight ahead. How often do you hear a pilot say that as soon as he got into a cloud his compass started spinning! The moment the compass starts moving it requires extremely delicate ruddering to get it back to a steady position; in fact, one invariably over-corrects the compass movement, and so the trouble begins. Once the compass starts on a good swing I have found it nearly impossible to get it steady again until out of the cloud. Before your compass starts to move, your machine has already started to turn. You rudder the opposite way to check it, over-correct it, and turn sharper the other way into a banked turn; then the nose drops and the speed goes up. Pulling back the stick has little or no effect, for if you are banked above an angle of 45 degrees, the elevator becomes the rudder. All this occurs without the pilot being in the least bit aware of the position that his machine is in relative to the ground. The instruments available are of little service once he loses his control.

'Of what use is the airspeed indicator showing 150 mph if the machine is on a spinning spiral and the pilot imagines that he is merely descending too fast on a steep, straight glide? He naturally tries to pull up, but with no effect. The bubble does not help him, as centrifugal force will send that anywhere. It may be argued that a stable machine left alone under these circumstances will right itself eventually and assume a normal glide. It very likely would if the pilot could steel himself to let it entirely alone, but before it did so it would have to be left to do a sheer vertical nose dive for some moments and in these days of big weights and little head resistance one is liable to attempt to pull out too suddenly from the dangerously high rate of speed attained in this dive. What I want to see fitted is an instrument which will show a constant vertical or horizontal line and be independent of centrifugal force. I have no ideas on the subject nor suggestions as to how this is to be brought about, unless something in the nature of a small gyroscope driven by an air-screw could be employed in some way to meet the requirements of flying in cloud. But until something is provided, I think we shall continue to have accidents from this cause.'

— From the Journal of the Royal Society of Arts, 1917.

COMMENT

VFR pilots please note! As we all know very well, Captain Hucks' prophetic words have proved true. Though his suggested 'small gyroscopes' are now fitted to most aeroplanes, the whole problem of loss of control in cloud is still with us, and we still need to be trained to use them if we are not to repeat his experience. For flying in cloud today, it's an instrument rating or nothing!

An ideal for Pilots, too?

From a tribute in the Cooktown Museum, Queensland:

JAMES COOK

'The ablest and most renowned navigator this or any country hath produced . . .

Cool and deliberate in judging, sagaceous in determining, active in executing . . .

Never wanting presence of mind, and always possessing the full use of a sound understanding'

— Captain Hugh Palliser, later a Lord of the Admiralty

A MATTER OF SOME DELICACY...

The story that follows is reproduced from a letter which the Editor received from a reader. The pilot's experience and the object lesson it contains, speak for themselves.

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This letter concerns a matter of some delicacy. For reasons which will become apparent to you, the following details concerning a single-engined aircraft which crashed at a Victorian country aerodrome last December were withheld and until this time have remained unreported. As a commercial pilot of several years' experience, however, I now feel obliged to advise you of the facts and can personally vouch for the authenticity of this account:

On the afternoon concerned, I was aroused from a state of lethargy following Christmas dinner with a request from a very new private owner, who is still unlicensed, to fly his aircraft. We drove out to the aerodrome, situated some five miles from the township, and arrived at approximately 1600 hours. It was during the 'pre-flight' that I first experienced misgivings; though well versed in its handling notes, I was somewhat unfamiliar with this particular type. Also, although conditions were fine, the steady southerly breeze had stiffened appreciably as we stood on the tarmac. But by this time my reputation as a pilot was on the line.

There was no other traffic about and because it suited my purposes (but only after careful consideration) I elected to take-off down-wind. At this juncture, I would point out that during the pre-take-off check, two items in particular received special attention. Firstly, with a shade temperature of around +30°C, I leaned the mixture to provide optimum performance in respect of density altitude. Secondly, as always, I checked the controls for full and free movement *and in the correct sense*. Having satisfied myself on these scores we were ready to roll.

Although I was actually flying the aircraft, my young partner was holding the aircraft on the brakes, and with the engine developing full power, I instructed him to release them for take-off. The aircraft accelerated very quickly and, once airborne, I commenced to orbit at a fairly low level. But shortly afterwards the aircraft began to porpoise and at the same time I began to experience dizziness — it was probably the Christmas dinner! Whatever the reason, the combined effect resulted in involuntary over-controlling which rapidly compounded itself. With my right hand fully occupied in fighting the elevators, I was unable to reach the engine controls, and contrary to all my past experience, I would at that moment have welcomed fuel exhaustion to get the aircraft down as quickly as possible. But before I could think, the aircraft had made a sweeping zoom and slammed into the ground under full power.

In the ensuing silence I brought my eyes back into focus and surveyed the wreckage. The young new owner looked at me speechless. His silent rebuke spoke volumes. I was still reeling from giddiness as I helped him gather up all broken bits and pieces and put them back in the box.

Well, that's one endorsement I didn't qualify for! Eleven-year-olds are the roughest examiners you'll ever have to face and I have since been relegated to tarmac duties for this class of flying! Now I watch him make immaculate circuits with cool poise (you see he has now had the benefit of instruction). But I'm hoping for another go at control line flying — one day!

If your reputation is ever on the line when transitioning to unfamiliar or long-time-since-I-last-flew-one aircraft, never depend on your previous experience to substitute for informed instructional training.

In other words friend, never disdain a check-ride!