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DEPARTMENT OF CIVIL AVIATION AUSTRALIA

AVIATION SAFETY DIGEST

No. 55

MARCH 1968



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COVER: A Beechcraft Musketeer over one of the tourist chalets at Ayers Rock, Northern Territory. Mt. Olga can be seen through the haze in the far distance.



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EDITORIAL

SPOTLIGHT ON NAVIGATION

To anyone opening this issue of the Aviation Safety Digest, it will be immediately apparent that its emphasis is very largely directed at the problems inherent in flying light aeroplanes in the more remote areas of the Australian continent. Even a most cursory glance at the accidents covered and the summary of incidents set out on page 10, is sufficient to show that, in operations of this type, the potential for errors of far reaching and grave consequence, is indeed great.

In its overall task of air safety education, it is the function of the Digest to spotlight any aspects of civil aircraft operations which require special caution, preparation, or awareness of the particular hazards involved. It is hoped that by this means, pilots and others who could conceivably be caught in predicaments similar to those described, will take to heart these lessons from the harsh school of experience and act accordingly.

In selecting the contents of this Digest, we appreciate that amongst our readers, and particularly those in the professional category, there will be some for whom this issue will have little personal application. To those readers however, we feel we need not apologise. We believe that they, perhaps best of all, will understand our motives.

YOUR TOLERANCE PLEASE!

Many readers have written to us lately in the belief that they have missed some issues of the Digest and requesting that replacement copies be forwarded to them. It is encouraging to know that the Digest is so eagerly awaited, but the reason for the non-receipt of some issues this year has quite a simple explanation — they haven't yet been printed!

Early last year, we increased the frequency of the Digest to once every two months, because it was becoming increasingly evident that the amount of air safety material available warranted such a frequency. Each issue of the Digest however, involves a heavy work commitment in the fields of review, research and material preparation and unfortunately, we have found the volume of work demanded by the increased frequency of publication, is beyond our immediate capacity. As a result, it has become increasingly difficult to maintain our production schedule and we have been faced with three alternatives:—

- Omitting one or more issues altogether.
- Producing one or two issues of "instant Digests" which would necessarily consist largely of material culled from overseas publications.
- Continuing as before, not compromising the Australian content of the Digest, or the quality of its presentation, but using every possible means to gradually make up the lost ground.

Knowing that many readers retain their copies of the Digest for reference, and that quite a number take pride in having a complete set, we decided against the first alternative. We rejected the second, on the grounds that, though it would provide some interesting reading matter, it would to a large extent be defeating our purpose of systematically examining air safety problems brought to light by actual operations in Australia. We were thus left with the last alternative. The recent issue of Digest No. 54 has no doubt already reassured those who thought they had been overlooked. This issue, No. 55 following hard on its heels will show that we still mean business.

We have also taken steps to remedy the deficiency in work capacity and hope for tangible results in the near future. There is thus a glimmer of hope that by the end of this year, we will be able to bring out the Digest punctually every two months as we intended. In the meantime, we will continue to do our best to produce a worthwhile publication with the least possible delay — and hope that our readers will continue to be patient!

Disastrous End to Holiday Flight

SHORTLY after 1500 hours on 29th December 1967, a Cessna 206, with the pilot and five passengers on board, took off from Darwin for McArthur River Station, 390 nautical miles to the south-east.

The flight was the first homeward leg of a two week aerial "tour" from Melbourne, which the six occupants of the aircraft had begun three days before. The party flew from Melbourne to Darwin via Mildura, Leigh Creek, Oodnadatta, Ayers Rock, Alice Springs and Tennant Creek. The return flight from Darwin was to be made via McArthur River, thence to the east coasts of Queensland and N.S.W. and back to Victoria.

The day of the flight from Darwin, like many others during northern Australia's "wet season", was hot, humid and unsettled, with a few tropical thunderstorms developing in coastal areas in the afternoon.

The pilot ordered a route forecast for the flight to McArthur River Station, which indicated that northerly winds of 15 knots, scattered showers, and isolated thunderstorms could be expected over the route, particularly in the vicinity of the coast. The pilot, who had made two previous flights to the Northern Territory, studied this information and then submitted a detailed and accurately compiled flight plan covering the route to McArthur River Station via Fisher and Roper Valley. The flight plan, which allowed for a tail wind component of about 10 knots, showed a total time interval of 174 minutes for the flight, with fuel endurance of 305 minutes, and nominated a SARTIME of 1900 hours local time. The party boarded the aircraft shortly before 1500 hours and departed a few minutes later. At 1508 hours the pilot reported setting course for McArthur River Station, and by flight plan, the aircraft's estimated time of arrival at its destination was 1802 hours, nearly 90 minutes before last light.

At 1604 hours the aircraft reported over Fisher, 125 miles south-east of Darwin, at 2,000 feet, only one minute behind its ETA at this reporting point. At 1701 still at 2,000 feet, it reported

again over the Roper Valley aerodrome, 240 miles from Darwin, six minutes behind its ETA for this point. This indicated that the aircraft had encountered very little wind between Fisher and Roper Valley and was virtually making good its true airspeed of a little over 120 knots.

At 1739 hours the pilot called Darwin again to advise he was now 70 miles west of McArthur River Station and was diverting to the north to intercept the coast because of the heavy rain and turbulence associated with thunderstorms on the direct track. The pilot stated that he now intended to proceed to McArthur River "via the coast". Because communication on H/F had become very difficult however, the pilot's intentions were not clear to Darwin Flight Service Centre until 1744.

At 1746 the pilot advised that the time interval from his present position to McArthur River Station was 45 minutes, giving an amended ETA for McArthur River Station at 1831. Fifteen minutes later Darwin read, with some difficulty, a further transmission from the aircraft which stated that it was at the mouth of Limmen Bight River, still proceeding coastal to McArthur River. Twenty minutes later again, at 1821, the pilot reported he was now estimating the mouth of the McArthur River at 1837 and McArthur River Station at 1904. He requested that his SAR-TIME be extended to 1920 hours.

At 1842 the pilot reported he was over the mouth of the McArthur River but was "unable to proceed VFR". He was therefore diverting to Roper River Mission, 120 miles to the north-west. Three minutes later, the pilot reported sighting an abandoned airstrip situated about 10 miles north-west of the mouth of the McArthur River, and advised Darwin that he would land there. At 1904, the pilot called again to report he was unable to land on the abandoned airstrip because of "extremely high winds". He added that as the weather appeared to have cleared up a little to the south, he was now heading south again for Borrooloola, also on the McArthur River but 25 miles nearer the coast than McArthur River

Station. He estimated arriving at Borrooloola in 10 minutes.

At 1916 the pilot reported "I'm unable to land anywhere in this area due to bad weather and high winds," and asked whether night landing facilities were available at Normanton, 300 nautical miles to the east in Queensland, on the south-eastern corner of the Gulf of Carpentaria. In answer to questions by Darwin Flight Service Centre the pilot advised that he did not hold an instrument rating, that the aircraft's only radio navigation aid was an ADF, and that the aircraft's remaining endurance at 1920 hours was 90 minutes. The Senior Operations Officer at Darwin was advised of the circumstances and immediately suggested that the pilot consider diverting to Daly Waters instead of Normanton, as it was considerably closer and Normanton was beyond the aircraft's range. As the end of daylight was at 1924 hours, the Uncertainty Phase of search and rescue procedures was introduced. At 1930 hours the pilot confirmed that he had set course for Daly Waters and at 1942 hours, the SAR phase was upgraded to the Alert Phase. In response to further queries by Darwin, the pilot then advised that his last known position was the mouth of the McArthur River at 1925 hours and that since then he had been maintaining a heading of 260 degrees magnetic. The Senior Operations Officer then instituted the Distress Phase.

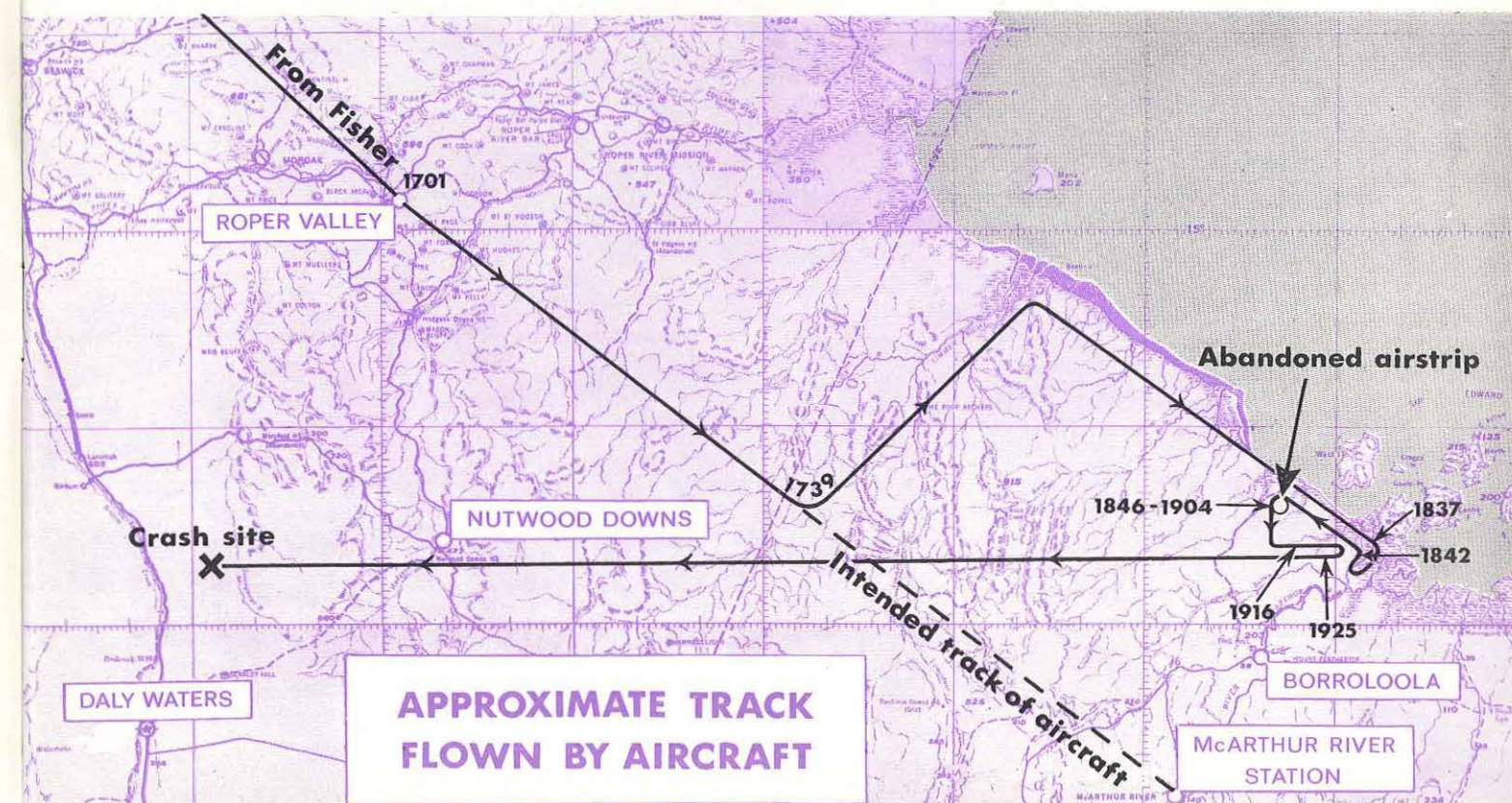
Communication was maintained with the air-

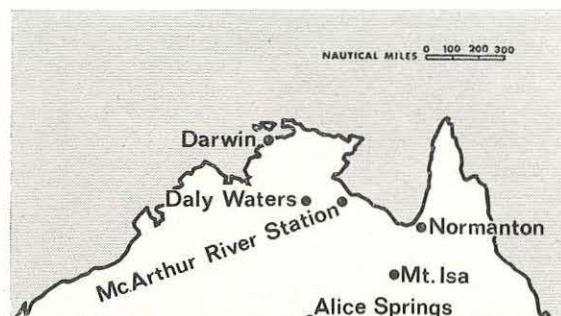
craft on 8939 kHz with some difficulty. The pilot advised that he was still maintaining a heading of 260 degrees and had the aircraft's ADF tuned to the Daly Waters NDB, but the needle was wandering because of the distance and thunderstorm interference. The pilot was informed that there were thunderstorms at Daly Waters, but all runway lighting and the rotating beacon had been turned on.

At 1955 hours the pilot advised his remaining fuel was "probably enough for about 60 minutes".

Ten minutes later a "Special Weather" for Daly Waters was passed to the aircraft, giving wind from 150 degrees at 13 knots, gusting to 21 knots visibility 800 yards, with two-eighths of cloud at 1,500 feet and six-eighths of cumulo nimbus cloud, at 5,000 feet. The pilot then reported that he was flying in cloud and was descending to 1,000 feet. Ten minutes later he said he was at 1,300 feet, in and out of cloud, and flying in rain. At 2017 hours he again reported he was descending to 1,000 feet, presumably in an attempt to remain clear of cloud.

At 2025 hours the pilot informed Darwin that the aircraft's port tank had run dry and that, as he had no fuel indication on the starboard tank gauge, he was uncertain of the amount of fuel remaining. Two minutes later, the pilot said that from moments of visibility during lightning flashes, he could see the aircraft was getting close to the ground and he thought it





Map showing relative distances of Daly Waters and Normanton from McArthur River.

inadvisable to descend much further. The aircraft's ADF, the pilot said, was still not giving any positive indication.

Questioned at 2030 hours as to the amount of fuel remaining, the pilot replied "About 10 minutes, but I think not too much". The pilot was then asked if he could see anything and replied that from occasional glimpses of the ground during lightning flashes there appeared to be low stunted trees beneath him. Darwin then instructed the pilot that if he was forced to land, to listen on 122.1 MHz after landing. At 2036 hours the pilot said his ADF was now giving some indication that the aircraft was heading towards Daly Waters, and confirmed that he was still maintaining a heading of 260 degrees. At this stage the aircraft was again flying in cloud and rain.

Asked at 2040 hours if he could see the ground the pilot replied "negative". The pilot was then requested to try calling Tennant Creek on 122.1 MHz and at 2041, he acknowledged this request.

Nothing was heard from the aircraft on this frequency, and Darwin then called the aircraft again on 8939 kHz. There was no reply and further calls on both frequencies from Darwin, Katherine and Tennant Creek remained unanswered. Nothing further was heard from the aircraft and it did not arrive at Daly Waters.

* * *

At Darwin arrangements were immediately put in hand to commence an aerial search for the missing aircraft, initially using a De Havilland Dove and a Beech Baron, which would both be available to fly to Daly Waters at first light in the morning. Arrangements were also made for a Departmental Aero Commander to leave from Adelaide to join the search.

From information transmitted by the aircraft during its flight from the mouth of the McArthur River, the time of its final transmission and the probable average wind encountered over the route, an area of probability was determined to extend from 30 miles south of Daly Waters to 12 miles north and for a distance of 55 miles to the east.

Because of severe thunderstorms in the area early the following morning, the two search aircraft were not able to depart from Darwin for the search area until 0900 hours. Despite this, most of the probability area was searched before the day was over, but without result.

A total of four aircraft were available for the second day of the search, a Cessna 310 having been made available by a charter company, in addition to the D.C.A. Aero Commander. As well, plans were in hand for a Departmental Fokker Friendship to fly from Melbourne to join the search. The search area was expanded to the north and south, and the primary probability area was searched again but as on the previous day, the result was negative.

For the third day, the search force was reinforced by the Departmental Friendship, an R.A.A.F. Dakota, two De Havilland Herons from Alice Springs, and a Cessna 337 from Darwin. The search area was extended still further north and south, and at 1220 hours the crew of the Friendship sighted the wreckage of the missing aircraft lying in timbered country 28 miles north-north-east of Daly Waters and only eight miles east of the Stuart Highway. The crashed aircraft was badly broken up with wreckage strewn for some distance, and there did not appear to be any survivors.

A ground party set off at once from Daly Waters and the Friendship stood by to guide them to the crash site. After leaving the highway north of Daly Waters, the ground party experienced considerable difficulty in penetrating the thickly timbered bushland and in maintaining satisfactory radio contact with the aircraft overhead. Although the ground party's first vehicle reached the scene of the accident at 1715 hours the rescuers were unable to re-establish radio contact with the aircraft and it was not until a second vehicle reached the site at 0900 hours the following morning that it was possible for the ground party to confirm the fact that there were no survivors.

The Cessna had crashed in flat country lightly timbered with trees up to 40 feet in height and covered with dry grass to a height of four feet. Numerous fallen tree trunks lay hidden in the long grass. The aircraft's initial impact had been with the branches of a tree 35 feet high. There was evidence that the pilot may have unsuccessfully attempted to lift the port wing over the tree at the last moment. The impact broke off the trunk and several heavy branches and tore off the port wing of the aircraft outboard from the lift strut. Seventy feet further on, the aircraft collided with a dead tree ten feet above the ground and, after a further 80 feet of travel, struck the ground heavily at a shallow angle of descent and at comparatively high speed. Sliding and tumbling, the wreckage then continued along the ground for a further 270 feet striking logs and other trees and disintegrating as it went.

Examination of the wreckage indicated that the flaps were almost fully extended at impact, and that the propeller was rotating, but not under power. No trace of fuel could be found in the fuel system. Although the cockpit area was demolished, it was possible to determine that the master switch had been turned off.

The 20 year old pilot, held a private licence and was employed on general aircraft handling duties by the charter company which owned the aircraft he was flying. The pilot had hired the Cessna from his employers to make the holiday flight to the Northern Territory and return. Enquiries established that the pilot's employers thought highly of his ability and that they were in fact grooming him to fly professionally with the company when he obtained a Commercial Pilot Licence. He had logged approximately 250 hours flying experience, about 40 of which had been on Cessna 206 aircraft. In addition, it was learned, the pilot had gained considerable "air experience" in the course of his employment but most of this flying time could not

The difficulty encountered by the ground party in reaching the accident site is clearly evident from this photograph.



be credited to him other than as a passenger. Being responsible for refuelling and other aircraft handling duties in the company, he was permitted to fly with the company's commercial pilots as often as his other duties permitted. In this way, he gained considerable air experience even before he began his initial flying training. Comments on the pilot's flying training file held by the flying school with which he did this training, reflect this experience particularly in relation to this early cross-country exercises.

As his flying training progressed and he obtained an endorsement on the Cessna 206, the pilot gained additional experience with his company by flying, under supervision, on positioning flights associated with the company's activities. The company commercial pilots, under whose supervision he had flown were of the opinion that the young pilot's flying was of a high standard and that he was particularly methodical, with a good appreciation of weather and other in-flight problems. It was estimated that this private pilot would have flown several hundred hours as a passenger or supernumerary in the course of company operations, though little of this flying would have been recorded in his log book.

It was also learned that, about three months before the accident, the pilot had hired a Cessna 210 from another operator in Victoria and had successfully carried out a "tour" through the Northern Territory and Western Australia. There was evidence too that, before this, he completed a flight to the Northern Territory and return in company with another private pilot who had hired an aircraft for the trip. Altogether, the pilot was regarded as a capable private pilot whose navigational ability was undoubted and who should have been fully capable of safely completing the December flight. The planning and execution of the sectors to Darwin were consistent with this assessment of his ability.

Before departing from Darwin for McArthur River Station, the pilot put a considerable amount of thought into the planning of this route segment. As distinct from the practice of many private pilots, he ordered route and terminal forecasts, and then compiled an accurate flight plan indicating that the aircraft should arrive at McArthur River Station 90 minutes before last light, with sufficient fuel to fly for a further 210 minutes including the statutory reserve of 45 minutes. There is no reason to doubt the pilot's

navigational accuracy during the flight, and it seems clear that there was no doubt as to the aircraft's position until after the pilot diverted towards Daly Waters and the flight was overtaken by darkness and very poor visibility.

No reports of thunderstorms or other unfavourable weather were received from the aircraft until the pilot reported he was diverting to the coast when 70 miles west of McArthur River Station. He had been briefed before leaving Darwin to expect some thunderstorms along the route and it would have been quite reasonable to attempt to circumnavigate any storm lying across his track, to determine whether it was extensive or just local in nature. Having decided to do this, however, it would have been prudent to immediately select as an alternate one of the several aerodromes behind him, where he knew the weather conditions to be satisfactory. He should also have re-planned his flight to provide a time limit for diversion to this alternate, in the daylight remaining, if conditions ahead remained unfavourable.

The diversion the pilot made, which took the aircraft some 50 miles to port of the flight planned track, indicates that the storm was of more than local extent. What thought the pilot gave to turning back at this stage cannot be known for certain, but the fact that he then passed revised estimates for both the mouth of

the McArthur River and McArthur River Station suggests that he was still confident of reaching his destination even though storms still existed to the south-east of the aircraft's position, and precluded a direct flight to the destination. This decision to continue in the circumstances ruled out the possibility of returning to a suitable alternate in daylight, and thereby forged the first link in the chain of events that led finally to catastrophe.

Eventually when the pilot accepted the fact that he could not reach McArthur River Station in visual meteorological conditions, he did turn back towards Roper River Mission, but by this time it was extremely doubtful if he could arrive there before dark. No doubt realising this, the pilot, when he sighted the abandoned airstrip 10 miles north-west of the mouth of the McArthur River, saw it as a way out of the dilemma with which he was now faced. It is also probable that, when his attempt to land on this airstrip failed because of high winds, he saw clearly that a diversion to Roper River Mission was now hopeless and he seized upon Borroloola as the next best thing.

Although the pilot no doubt realised he was in difficulties, he apparently made no attempt to declare an emergency and request navigational assistance as provided in the emergency services section of the Visual Flight Guide, Page (v). The



A Departmental investigator examining components distributed along the wreckage trail.

precise reason for the aircraft's failure to make a landing at Borroloola remains uncertain. The pilot reported, "I'm unable to land anywhere in this area due to bad weather, high winds . . .", but it is not clear if weather conditions prevented him from reaching Borroloola or if he did not persist with his intention to divert to Borroloola because of high winds on the ground. Whatever the reason may have been, the fact that no sighting or hearing reports could be obtained from people living in the area suggests that the aircraft did not reach Borroloola at any time.

It is apparent that, at this stage of the flight, with darkness imminent and nowhere to land, the pilot's judgement was affected by the trend events were taking. His request for information on night landing facilities at Normanton, was entirely unrealistic. A quick estimate would have shown the pilot that Normanton, 300 nautical miles to the south-east was now utterly beyond the range of the aircraft, which at that stage had a remaining endurance of about 90 minutes. The pilot apparently did not consider Daly Waters as an alternate until it was suggested to him by Darwin.

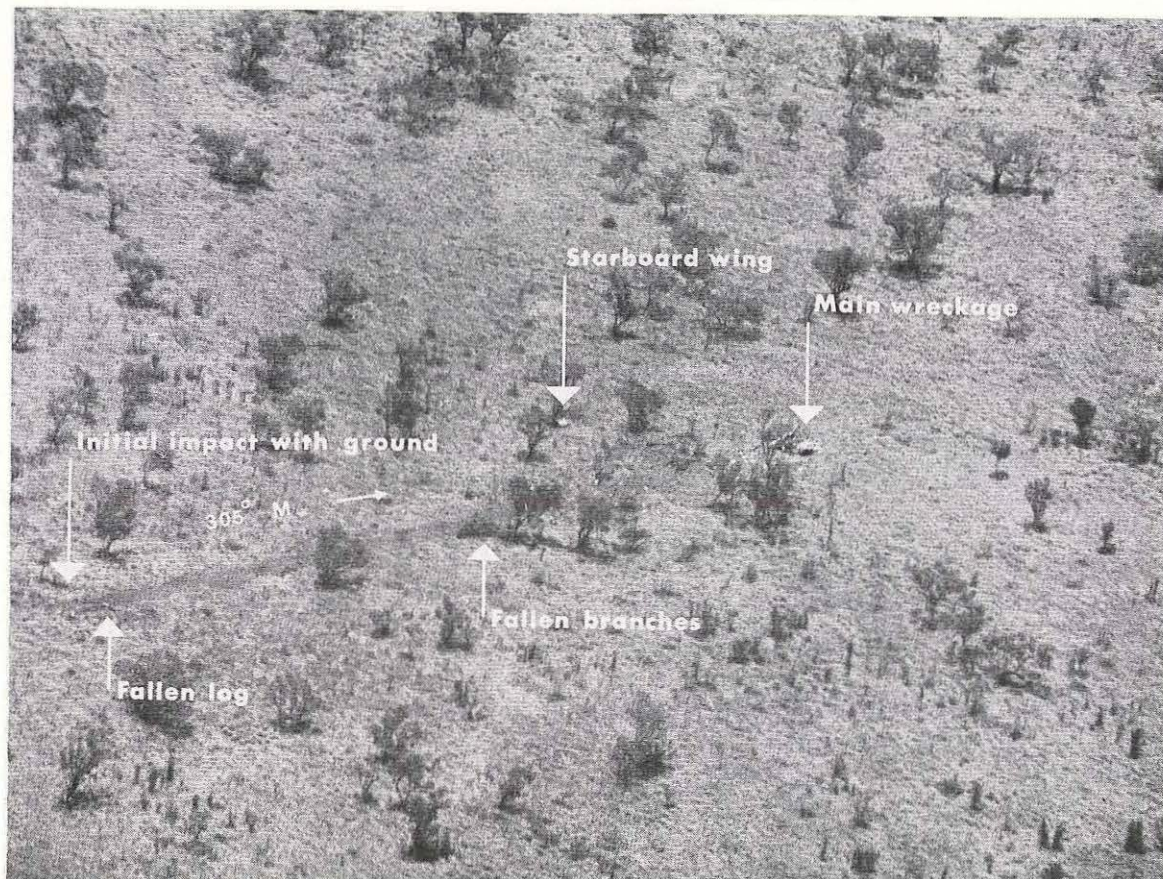
Although the aircraft's remaining endurance at the time of diverting to Daly Waters was obviously marginal, the evidence of the investigation suggests that the pilot might not have used a proper power setting to achieve maximum range. En route to Daly Waters, he reported an indicated airspeed of 125 knots, but according to the Owner's Manual for the aircraft type, the airspeed attained using the best range power setting of 2200 r.p.m. and 18 inches of manifold pressure, is 99 knots. In theory therefore, the use of

this lower power setting could have increased the aircraft's range by 23 miles from the 177 miles actually flown from the mouth of the McArthur River to the accident site. While this would not necessarily have enabled the aircraft to reach Daly Waters because of the problem of finding it, it would at least have increased its chances of finding it.

Careful consideration has been given to the actions the pilot would have taken when faced with fuel exhaustion in darkness over the inhospitable terrain in which the aircraft subsequently crashed. Several times during the flight the pilot reported his height as 1,000 feet or a little more but since the height of the terrain in this area is about 700 feet above sea level the aircraft was actually flying at only about 300 feet above the ground. The pilot knew the nature of the terrain beneath him from glimpses obtained during lightning flashes. He would have known that when the engine failed at this height, he would have little time other than to trim the aircraft, lower the flaps and turn on the landing lights to land more or less straight ahead. It is likely that, at the time of the attempted forced landing, the wind was blowing from the south-east at 15 to 20 knots or more. The pilot may not have known this, but even if he did, the aircraft was too low to be turned into the wind. In the rain, the landing lights would have been of little assistance as the aircraft was not equipped with windscreen wipers and thus it would have been impossible to see any trees until the aircraft was very close to them. The engine-off gliding speed of the aircraft is between 70 and 80 knots, but as the direction of the wreckage trail was 305 degrees, the aircraft would have been subjected to a substantial tail wind component and its ground speed at initial impact would have been 85 knots at the very minimum. The length of the wreckage trail however, was consistent with a much higher speed, probably 110 knots or more. It can be visualized that the pilot was straining to see through the windscreen, probably leaning well forward, and he might not have been able to give particular attention to the airspeed indicator in this critical period.

It is very apparent that the pilot, although not qualified for instrument flight, showed a high standard of skill in maintaining control of the aircraft in the extremely adverse conditions encountered during the flight to Daly Waters. But when the aircraft's fuel became exhausted in

Aerial view of crash site showing wreckage trail.



such circumstances, an accident was inevitable.

After careful consideration of all the evidence, it has been determined that the probable cause of the accident was that the pilot did not give due regard, at a sufficiently early time, to the availability of alternative courses of action, when faced with a situation of adverse weather and approaching darkness in the vicinity of his intended destination.

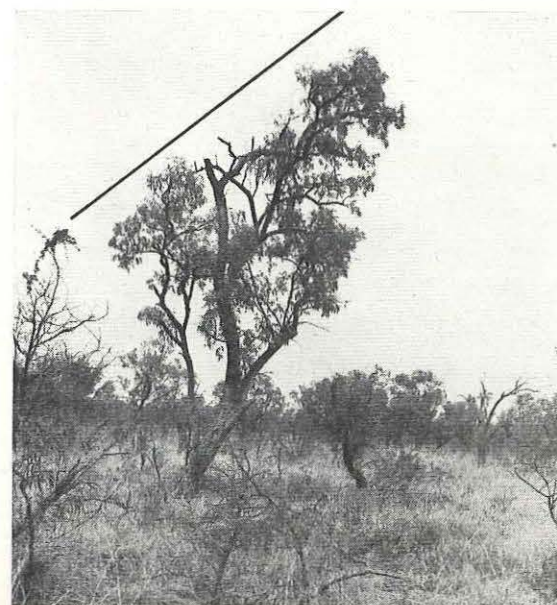
* * *

Our object in reconstructing the story of this tragic accident is to illustrate the chain of events which led to the final, inevitable crash. We sincerely hope that other pilots of similar experience, who contemplate flights into the outback, might see how easily they too, could become the victims of a similar situation.

With hindsight of course, it is easy to criticize some of the decisions made by the pilot involved in this accident. Apart from his error of judgement in persisting with attempts to reach his destination in the existing weather conditions almost to the exclusion of all other considerations, the pilot erred in not declaring an emergency and requesting navigational assistance when he finally decided he would *have to* divert to Roper River Mission. At this stage, it must have been clear to the pilot that the possibility of reaching Roper River Mission before dark was very doubtful. Indeed, the pilot's appreciation of the situation is probably reflected by his decision to try and land at the abandoned airstrip after he had sighted it by chance.

On the other hand, it is quite obvious from the records of messages exchanged between the aircraft and ground stations throughout the flight, that communications on H/F were difficult in the extreme. The aircraft was almost 300 miles from the nearest ground station and H/F communications were subject to the interference and fading which is not unusual in the late afternoon. As well, there was a great deal of electrical interference from the widespread thunderstorm activity. If navigational assistance had been requested, there is no doubt that the communications effort necessary to effect it, would have imposed considerable additional demands on the pilot.

Nevertheless, the situation of the aircraft was desperate and, had the pilot appreciated his error of judgement in not diverting earlier and had he requested assistance, the Search and Rescue Organization at Darwin would have been



The tree struck first by the aircraft, looking back towards approach path. The line shows the angle at which the branches were broken off by the port wing.

alerted to the aircraft's situation and the whole resources, judgement and experience of the Organization would have been immediately at the pilot's disposal. A decision to divert to Daly Waters at this stage, while 40 minutes of daylight and 120 minutes fuel still remained, would have given the aircraft a far better chance of completing the diversion safely. Even if the pilot had given Darwin his ETA for Roper River Station when requested, this knowledge could have alerted the Flight Service personnel to the fact that the aircraft was in difficulty and triggered action to bring the Search and Rescue Organization into operation at this earlier time.

In retrospect again, it is clear that later on in the flight when darkness was imminent, it would have been better for the pilot to have remained in the vicinity of the abandoned airstrip, or of Borroloola, if this was possible, and made some sort of a landing while daylight remained, even at the risk of seriously damaging the aircraft. It is perhaps understandable, however, that a young and enthusiastic pilot would be most reluctant to deliberately undertake a landing involving a high risk of damage unless and until he was faced with unavoidable alternatives involving higher risks.

Behind all the multifarious events and circumstances that led step by step to the final catastrophic moments, there is the fact that the

pilot was inexperienced in the ways of the North's wet season and the particular hazard it presents over featureless areas with great distances between even emergency landing places. It is vital for all pilots to realize that the weather conditions likely to be encountered in the North's wet season, particularly during the late afternoon, can be a very different proposition to the thunderstorm-type weather normally encountered in the southern areas of Australia and diversion action usually involves long flights over country where map reading is most difficult.

The sort of situation in which this young pilot found himself, is perhaps not just an isolated case. During recent years, more and more pilots

from the southern states have been undertaking holiday flights into the outback and particularly to the far north of Australia. In far too many cases, the standard of airmanship displayed by pilots on these flights, leaves a great deal to be desired. The number of air safety incidents, and indeed accidents, (See also "Inadequate Flight Planning", Page 14 in this issue) that have befallen these "ventures into the unknown" has caused the Department great concern. Even before this accident occurred, and it was intended to include the special article on remote area navigation (See Page 10) in this issue of the Digest. The events of Friday 29th December have confirmed this view only too well.



No, this one WASN'T a fatal accident! In fact, it began as the most minor of incidents. Even so, as the picture shows, it cost an agricultural operator a valuable aircraft and the pilot a very red face!

During a ferry flight in northern Queensland, the pilot of this Pawnee landed at a country airstrip to refuel. No refuelling facilities were available at the strip and the pilot had therefore made preparations to top up the aircraft's tanks from four-gallon jerry cans.

After parking the aircraft and shutting down the engine, the pilot placed an aviation fuel filter funnel in the neck of the fuselage fuel tank, mounted immediately behind the engine firewall, then climbing on to the port wing, poured in two jerry cans of fuel. Some fuel was spilt on the wing in the process.

On removing the cap of a third jerry can, which was overfull, a further quantity of fuel spilt on to the wing where the pilot was standing. As he

lifted the can to the top of the fuselage to pour its contents into the funnel, the pilot's rubber soled boots slipped on the wet wing surface and he lost his balance, falling across the top of the fuselage. The opened jerry can he was holding fell over the fuselage on to the starboard wing and then to the ground.

Jumping quickly to the ground to pick up the spilling can, the pilot found it alight. The fire quickly spread, via the spilt fuel to the aircraft fuel tank and, at the same time, the fabric covered underside of the fuselage caught fire from the flames on the ground. The entire aircraft, with the exception of the engine compartment in front of the firewall was consumed in a very short time.

Describing the events later, the pilot said he believed the fire started from a spark produced by the steel can striking the non-skid material of the wing walk as the can fell across the wing to the ground.

HOW IS YOUR

NAVIGATION?

- In Western Australia, a Cessna 182 carrying the pilot and a woman passenger with her three small children, departed from Kalgoorlie at 1030 hours on a charter flight to Warburton Mission, 400 nautical miles to the north-east. The pilot subsequently became lost and eventually landed on a clay pan at 1600 hours when he had only 20 minutes fuel remaining. An aerial search was commenced and the aircraft was finally located at 1130 hours the following morning 155 miles south-east of its destination. The occupants were unharmed and the aircraft undamaged.

- In Queensland, a Cessna 182 flown by a private pilot took off from Mt. Isa at 1040 hours for Daly Waters. Nearly four hours later he reported he was unable to find Daly Waters. Navigational assistance was given to the pilot and he subsequently sighted a homestead airstrip and landed safely. The homestead proved to be 170 miles west of his destination. The pilot remained overnight and the next day took off to fly to Katherine. During the flight he again became lost and once again had to be given navigational assistance. This eventually enabled the pilot to intercept the Stuart Highway which he was instructed to follow northwards until he reached Katherine.

- In the Northern Territory, a Cessna 180 departed on a flight from McArthur River Station to Mt. Isa, Queensland. The aircraft reported 30 miles north-west of Mt. Isa and was requested to make a visual approach and to report five miles out. Twenty minutes later the aircraft had still not reported, so Mt. Isa began calling the aircraft. Five minutes later a report from the pilot, relayed by an airline aircraft then approaching Mt. Isa, stated that he could not sight Mt. Isa and had only 40 minutes fuel remaining.

The pilot was requested to advise the headings he had flown and true airspeeds, from his last known position. Five minutes later, the pilot advised he had a homestead and airstrip in sight. Shortly afterwards the aircraft reported on the ground. The homestead was 115 miles south-south-west of Mt. Isa.

- In Queensland a private pilot, accompanied by one passenger, was flying an Auster without radio from Springvale Homestead to Longreach. Almost an hour after take-off the aircraft ran into a severe dust squall and thunderstorm activity and the pilot, although at first satisfied that he could continue, found himself in a situation where visual flight was rapidly becoming impossible. Having decided that a forced landing would be necessary the pilot selected a comparatively open area in the timbered terrain over which they were flying and made the best possible landing in the circumstances. The landing area was covered in small bushes and dotted with dead saplings up to seven feet high. After touching down the pilot had to dodge the timber, and lost some control of the aircraft, the landing run finishing in a ground loop. The occupants were unhurt but the aircraft sustained damage to the extent of a bent lift strut on the starboard side, a dent in the leading edge of the wing, severe tears on the underside of the wing and fuselage and fabric punctures in the tail plane.

After spending the night, all the next day, during which the temperatures rose to 100°F, and the following night, the pilot and his passenger realised their situation was extremely serious. The three gallons of water they had brought with them was almost depleted, though it had been supplemented by water caught during a thunderstorm, and as it was a NO SAR flight, the pilot believed it unlikely that the aircraft would be missed for several more days.

The pilot therefore decided to attempt to patch the aircraft and take-off. The two men cleared a 1,200 feet long strip for take-off by removing bushes and light timber, and repaired the fabric covering of the aircraft using sticking plaster and bandages from the aircraft's first aid kit. After testing the strip they had cleared by taxi-ing up and down it several times, the pilot made a successful take-off and flew to the nearest homestead 30 miles away. The aircraft was later returned by road transport to Longreach for repair.

The incidents we have quoted on the opposite page are but a few examples of the many that have occurred during the last two years as a result of inexperienced or inadequately prepared pilots encountering navigational difficulties in the outback. Seen in the light of the fatal accident reported on the opening pages of this issue of the Digest, it is not hard to appreciate that each of them could so easily have become another tragedy, had the circumstances been only a little more adverse.

In years gone by, apart from aircraft operated by aerial medical services, developmental air services, mining groups and aerial survey organisations, little general aviation was done in the more remote areas of Australia. The aircraft that were operating in the categories mentioned were, in the main, flown by highly experienced "bush" pilots who knew their particular area intimately and whose names often became household words in the regions they served. To-day, however, the rapid expansion that has taken place in the general aviation industry and in private flying in particular, has changed this picture completely. No longer are the outback skies the exclusive preserve of the "character" pilots who flew these remote tracts of Australia for more years than most of them care to remember. The ever-increasing use of light aircraft for business as well as for pleasure, has inevitably led to a great deal more flying being done in the very areas where the light aeroplane is by far the most practical means of transport. This in turn has meant that many pilots, whose flying training and practice had previously been confined to operations in the more "civilised" regions of the southern and eastern portions of the Australian continent, have suddenly found themselves trying to cope, often with little specialised training or experience, with the far different problem of navigating accurately in areas where hundreds of miles may separate the sort of landmarks and check points they have previously been accustomed to—highways, towns, railways and so on.

The transition to this type of pilot navigation is not one to be taken lightly, as many less wary pilots have already found to their cost. Pilots who have little or no experience in flying in remote areas must realise that the Australian

outback is a big country and although light aircraft navigation in the more remote parts of the continent is not necessarily more difficult than in our closer settled areas, it is a task abounding in pitfalls for the unwary and the ill-prepared, and by its very nature it is far less forgiving.

The following comments have been taken from the investigation files of some of the incidents that have occurred previously. They are not necessarily all from the cases we have already cited but they are typical and give some idea of the problems that are being met in the type of flights under discussion:—

- "The pilot did not positively establish his position in relation to a selected fix point before continuing on to the next fix point."
- "The pilot became lost in a remote area because he did not make adequate preparation before departure, to ensure the safe navigation of the flight."
- "The pilot's navigational competence is obviously suspect, as shown by his failure to use his computer to calculate heading, ground speeds and times, and by his general lack of directional sense. If a forced landing had become necessary, the task of establishing a search probability area would have been made much more difficult because of the poor flight plan lodged by the pilot."
- "The situation in which the pilot found himself is typical of what results from sloppy flight planning and inattention to map reading by an inexperienced pilot operating in a remote area. It could be said that this pilot was a SAR phase going somewhere to happen."

- "The procedure adopted by the pilot in following unsealed roads involved substantial deviations from the flight planned track. As this was his first flight to the northern Territory however, prudence might have dictated following the well-defined Barkly Highway to Tennant Creek, thence the Stuart Highway to Daly Waters."
- "The tendency to deviate from the flight plan with no real justification, instead of sticking to the plan, is something like people lost in forests going round in circles. Obviously a plan is a plan and it should be adhered to unless a positive fix indicates the aircraft is off track."

The case histories of these incidents, together with other accident and incident report data in the same category (See also "Inadequate Flight Planning" page 14) suggests that there are several factors contributing to the high incidence of navigation difficulties in the outback. Clearly, one of the chief weaknesses is lack of real flight preparation—not just simply filling in a flight plan form, but as Air Navigation Regulation 231 on flight planning puts it, "... studying all available information appropriate to the intended operation..." This of course includes obtaining adequate information on weather conditions, both en route and at the destination.

Once in the air, other weaknesses in navigational techniques take their toll. Principal among these seem to be the inability to map read accurately and failure to appreciate the need to keep a detailed in-flight log. Frequently too, the effect of these inadequacies is worsened by pilots becoming convinced without any real evidence that they are in a certain position (which may bear little or no relationship with reality) and by their becoming flustered, which leads them to make further rash, ill-considered decisions.

It is evident too, that some pilots, when venturing into unfamiliar territory, are reluctant to seek out and to clarify, from Briefing Officers, the very information that might save them from getting into difficulties. The reasons for this attitude on the part of some pilots is probably born of reluctance to admit or to demonstrate their lack of knowledge of the area and their unfamiliarity with particular aspects of flight planning. Pilots who feel they may be in this category should remember that pride is a quality best forgotten when undertaking flights in the remote areas of Australia.

How then can pilots who are inexperienced in remote area navigation avoid its pitfalls? As already indicated the answer lies in adequate flight preparation and in sound in-flight judgement based on that preparation. Obviously pilots who have not done their homework properly for a particular route cannot expect to make the right in-flight decisions when the unexpected occurs.

The advice summarized in the lift-out section that follows this article may seem common sense and obvious to most. So it is — but it is also so basically vital to safe cross country navigation that it cannot be repeated too often. We suggest that readers keep the sheet with their flight planning equipment for future reference. Additional copies of this summary are available for distribution and may be obtained by writing to the Editor.

Pilots who follow these rules will greatly enhance their chances of completing their flight successfully and uneventfully. If however, despite all precautions a pilot does become lost, he will have ensured that the SAR organisation is well informed about his intentions and is thereby able to provide whatever assistance is necessary. On the other hand, if a pilot has been aimlessly following odd roads or tracks without keeping any navigational log, the SAR organisation's task is immeasurably more difficult. It is hardly necessary to stress the value of carrying adequate radio equipment, especially H/F communication radio and an ADF — and preferably also a survival beacon. If a pilot cannot call for assistance when the need arises, he is obviously at a great disadvantage, and without a survival beacon he may not be found for several days.

And don't think that because you have made one or two trips in remote areas you will be immune from trouble — it takes a lot of experience spread over different seasons and conditions (summer, winter, drought, particularly favourable seasons for growth etc., all of which can change the appearance of the country radically) to become an accomplished remote area navigator. The Department's records show that the more experience a pilot has, the more he follows these golden rules.

Finally, remember that as a qualified pilot, you have the complete trust of your non-pilot passengers and that their lives are in your hands. It is a heavy responsibility. See that you are worthy of it.

AVIATION
SAFETY
DIGEST

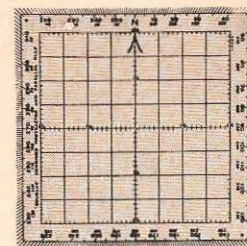
HINTS on
FLIGHT PLANNING and
NAVIGATION in
REMOTE AREAS

REMOTE AREA NAVIGATION

Plan the flight carefully and unhurriedly, making use of all available information. Ensure that your maps are adequate and that they are current editions. Study your proposed route noting landmarks and distinguishing features. Study these and try to plan your route via clearly recognizable landmarks so that you will be able to positively identify them when you fly over them. Also study the features to port and starboard of your tracks so that you will know if you drift off track. Study the advice contained in the front of the Visual Flight Guide — and follow it. Be sure that the survival equipment you carry is adequate and in good condition — and make certain it includes sufficient water, matches, a torch and a heliograph or mirror for signalling.

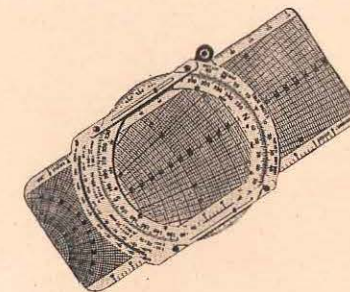


Make use of the local knowledge of briefing officers experienced in the area, and of other pilots who fly the route frequently. Determine what fix points are the most suitable and obtain all possible information on landing areas along the route. Ensure that this information is as reliable and up-to-date as possible, for non-licensed landing grounds on station properties are sometimes abandoned in favour of new or more suitable sites. As far as practicable, plan your flight over these landing areas. Be particularly careful of unmade roads and tracks as aids to navigation. In the outback, these are changing constantly and in open country new tracks can be formed literally overnight — simply because a vehicle happens to be driven through the area. Remember too that the appearance of the country can sometimes alter almost out of recognition with a change in the season, or after good falls of rain.



Obtain a thorough meteorological briefing and be particularly wary of areas where visibility may be reduced in dust or haze. Cloud shadows on the ground can also cause visual problems, so flights on days with a scattered cloud coverage require special care. *Be willing to delay the flight until conditions improve, if the weather appears marginal or difficult.*

Allow adequate time and fuel, plus reserves, not only for the planned flight, but for any necessary alternative action. Carefully consider and decide on alternative plans of action in case selected fix points are not located as expected. If the flight is being made in the latter part of the day, ensure that there is sufficient time to execute the total plan, including alternative courses of action, before dark.



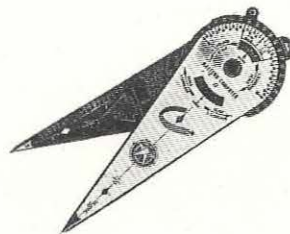
Fly headings carefully — don't allow the aircraft to wander off track simply through inattention. Check for drift soon after departure and adjust heading as necessary. Continue to check drift and make adjustments to heading at frequent, regular intervals. Map read carefully as the flight progresses and *know where you are all the time*. Where this is not entirely possible because of lack of landmarks, at least know your dead reckoning position all the time. Anticipate fix points a few minutes ahead of ETA — don't just wait for them to "show up". Record all headings flown and the times of making changes — in fact form the habit of keeping an accurate running log. In the long run it will pay dividends in the trouble it will save you.



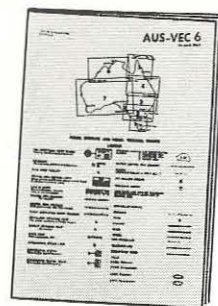
If you are unable to locate a selected fix point, immediately commence the alternative action you have decided on. This could entail returning to the last positive fix position, or perhaps diverting to some prominent landmark even if some distance away. Be prepared in these circumstances to abandon your original plan for proceeding to your destination, in favour of a destination which is easier to locate and in a more accessible area. Remember to log your headings and to check for drift.

REMOTE AREA NAVIGATION

If you do vary your original flight plan, notify your new intentions to the nearest ground station. If you do become lost, don't become flustered and don't become convinced that you *must* be in a certain position. Instead, keep an open mind and study the surrounding countryside. Advise the ground station of all headings flown from your last positive fix. They are there to help you, and this information will enable the SAR organisation, with its up-to-date wind and weather data, to commence a plot of your flight and assist you in establishing your position.



Lastly if, despite all precautions, things go unexpectedly wrong and you are caught with insufficient fuel to reach your destination or a suitable alternative, use your last resources intelligently. Don't wait for the aircraft to run out of fuel before you make a forced landing. Select the most suitable area available to you and put the aircraft on the ground while you still have engine power for a precautionary landing approach — and daylight to see what you are doing. You *may* damage your aircraft but you and your passengers should be able to walk away from it.



Having done this, *stay with your aircraft*. If possible maintain a listening watch, operate your survival beacon, lay out ground signals, light fires by night, and wait for rescue.

Take out this folder and keep it for future reference with your flight planning equipment.

Additional copies are available and may be obtained by writing to the Editor.



Loss of Power — Forced Landing

IN preparation for a ferry flight from one station property to another, the pilot of this Chipmunk refuelled the aircraft and carried out a daily inspection. When he was ready, he started the engine and, as the wind was blowing from the west, taxied out to the eastern end of the east-west strip. The pilot completed a satisfactory run-up and took-off into the west, but as the aircraft climbed to 300 feet, the engine began to run roughly and lost power.

The pilot placed the aircraft in a turn to the left, intending to make an emergency landing cross-wind, into the north on the north-south runway but, finding the engine was still developing sufficient power to maintain level flight, he then decided to complete the circuit and made a landing into the wind, back on the departure runway.

While turning on to base leg however, the engine lost still more power and the pilot saw that he would no longer be able to reach the strip. Heading the aircraft towards a clearing in the surrounding scrub, the pilot just managed to clear some trees on the nearer boundary of the clearing, and the aircraft touched down while still turning left to reach the best available landing run in the clearing. The aircraft skidded to the right, the starboard undercarriage leg collapsed, and the aircraft slid for 200 feet before coming to rest. The pilot was uninjured, and after turning off the fuel, master switch and magneto switches, hurriedly vacated the aircraft.

Investigation of the reason for the loss of engine power showed that the spark plugs in numbers

one and three cylinders were fouled by excessive carbon deposits. It was also found that the carburettor was delivering an over-rich mixture and that, because new piston rings had been fitted to the engine only 25 engine hours previously and were still "bedding in", a more than normal amount of oil was draining past the rings into the combustion chambers.

As well as this, it was learned that because the condition of the airstrip was very dusty, the pilot had selected the carburettor heat control to "hot", before beginning the take-off, in the belief that the flame trap element would filter the air being drawn into the engine.

The operating instructions for the aircraft specify that the air intake control should be set to cold air except under suspected icing conditions, pointing out that the selection of hot air causes a reduction in the power available for take-off. It was considered that the pilot's use of hot air, which would have reduced the air mass flow to the carburettor, in conjunction with the excessively rich mixture and the surplus oil in the combustion chambers, had led to the fouling of the spark plugs.

The pilot's decisions *after* the engine trouble developed are also open to criticism, firstly in that he did not land the aircraft on the cross strip when he was in a position to do so and, secondly, having made the decision to carry out a full circuit, he followed a flight path from which he was unable to regain the strip when the engine power fell below that necessary to sustain level flight.



INADEQUATE

AT 0545 hours local time, a Piper Cherokee flown by a private pilot and carrying three passengers, departed from Broken Hill, N.S.W. for Katherine, Northern Territory, with planned refuelling stops at Oodnadatta and Tennant Creek. The first two legs of the flight proceeded normally and, after refuelling for the second time, the aircraft departed Tennant Creek at 1535 hours with an ETA at Katherine of 1830 hours.

By 1815 hours, when the aircraft was approaching Mataranka, 55 miles south-east of Katherine, the visibility was reduced to about 8 miles in smoke haze and to the west the sun was obscured by a bank of clouds, making the light poor. When ground speed checks indicated that the flight's progress was falling further behind the pilot's flight planned time intervals, he became concerned that they would not be able to reach Katherine before last light, though he did not know the actual time of last light at Katherine. After considering several alternatives, the pilot decided that he would land at Mataranka where, according to the World Aeronautical Chart for Roper River that he was carrying in the aircraft,

an aerodrome was situated. The aircraft arrived over Mataranka at 1825 hours and the pilot called Katherine on 5499 kHz to obtain any available information on the condition of the strip at Mataranka, and to advise his intentions. When Katherine did not reply to his second call, the pilot made no further attempt to contact the station and began an inspection of the strip while he carried out two low level circuits. Though he saw that there was long grass growing on the strip and that there were ant hills on the south-western end, the pilot considered he could make a successful precautionary landing into wind towards the north east, by keeping to the centre of the strip which, apart from the long grass, seemed to be clear of obstructions.

As the aircraft touched down however, the pilot saw that the grass was much higher than he at first thought and that there were more ant hills concealed in the grass in a number of places near the centre line of the strip. Almost immediately, the port wheel struck an ant hill heavily. Now committed to continuing the landing run, the pilot braked hard but the aircraft struck more ant

hills in the long grass and the port landing wheel was torn off. The aircraft sustained further damage as it bumped heavily over the rough obstructed surface. It came to rest with the propeller tips bent, the nose wheel strut pushed back 15 degrees, dents in the leading edge of the port wing, and with the port flap badly distorted and almost torn off. The pilot and the passengers climbed out of the aircraft unharmed but the cost of repairing the aircraft was later estimated at several thousand dollars.

* * *

This accident is another object lesson on the pitfalls of undertaking a cross country flight, particularly one in a remote area, without first planning the flight properly.

In the first place, the World Aeronautical Chart that the pilot was using was a second

It is difficult to understand how a comparatively experienced and mature pilot with 500 hours flying behind him could so lightly approach the task of making a long cross country flight, particularly over such a remote sparsely populated and difficult-to-navigate area. The pilot was carrying a copy of the Visual Flight Guide and the Visual En Route Chart for the area which contains all the information he needed to plan his flight adequately. The Visual Flight Guide lists the current editions of all World Aeronautical series Charts applicable to Australia and Papua/New Guinea operations, and the same section of the Visual Flight Guide goes on to explain that the Department periodically issues a Class 2 NOTAM containing all hand amendments required on current charts. The flight planning section of the Visual Flight Guide on pages 92 to 97, also contains graphs and tables by which

FLIGHT PLANNING

edition chart which was superseded in 1962. The current edition of the chart does not show any aerodrome at Mataranka. In planning the flight, the pilot did not check to ensure that his copy of the chart was a current one.

The pilot had also neglected to compute or to obtain the time of last light at Katherine, despite the fact that it should have been obvious to him that he could not possibly reach Katherine until very late in the day. When questioned about this later, the pilot said he had meant to calculate the time of last light before taking off from Tennant Creek, but had forgotten to do so. It had not occurred to him to compute it later while in flight.

The third error which the pilot made and which was a further link in the chain of events that culminated in the accident, was the pilot's apparent belief that he could contact Katherine on 5499 kHz. The aircraft's H/F radio was fitted with 6540 kHz the correct H/F frequency for the Tennant Creek—Katherine—Darwin route, but despite this, the pilot tried no other frequency when he was unable to make contact with Katherine on 5499 kHz.

the time of the beginning of daylight and the end of daylight can be quickly computed for any location up to latitude 45 degrees south—in other words for any place within the Commonwealth of Australia and the Territory of Papua/New Guinea.

A factor of particular significance in the events leading to the accident is the time the pilot spent in the air that day. In flying from Broken Hill to Mataranka in one day, the pilot flew more than 8 hours in a period of 24 hours, and thereby exceeded laid down flight time limitations. It is thus very probable that fatigue is at least partly to blame for the pilot's ineptitude. So importantly does the Department regard this aspect of the case, that it saw fit to prosecute the pilot for this breach under Air Navigation Regulation 63(1) (e) and as a result he was fined.

Cause

The cause of the accident was that the pilot made inadequate pre-flight preparations and, while probably suffering from fatigue decided to land on an area which proved to be unsuitable.

RAIN, LOW CLOUD, DARKNESS -



FUEL EXHAUSTION!

AT Wollongong, N.S.W., a Cessna 172 was chartered to take three passengers to Griffith, N.S.W. The aircraft was to depart from Wollongong at 0700 hours, so as to have the passengers in Griffith soon after 0900. It was then to wait for them and fly them back to Wollongong as late as possible in the day.

The morning for the flight proved overcast, but although there were areas of rain, there was no low cloud. The pilot did not lodge a flight plan before departing and the aircraft took off from the Wollongong aerodrome at Albion Park at 0705. The flight was conducted at 5,000 feet and, apart from a few minor diversions to avoid areas of heavy rain, was uneventful and the aircraft landed at Griffith at 0930.

At 1640 hours, the three passengers returned to the aerodrome ready to leave for Wollongong. They found the pilot speaking on the telephone to Wagga Flight Service Unit, obtaining weather information. The area forecasts read to the pilot indicated generally poor weather, with rain, some thunderstorms and generally reduced visibility and low cloud in the region of the ranges and the coast. The conditions were being produced by a very moist easterly stream from an off-shore low, and headwinds of about 20 knots could be expected over most of the route.

When he had finished speaking to Wagga the pilot estimated the time interval for the return flight to Wollongong would be 135 minutes, but

again he did not lodge a flight plan or any details of his proposed flight. The aircraft subsequently departed Griffith at 1645 hours, climbing to 5,000 feet with an estimated time of arrival at Wollongong of 1900 hours. Last light was at 1943 hours.

At first the weather encountered was much the same as it had been that morning, with areas of light rain falling from middle level cloud, but when abeam Cootamundra, nearly half way on track to Wollongong, a ground speed check indicated the aircraft was making good only 85 knots and that the flight was falling well behind the planned time intervals.

Some twenty minutes later, when the aircraft was in the vicinity of Boorowa, and approaching rising ground on the western slopes of the Great Dividing Range, stratus cloud began to develop about 1,000 feet above the terrain. The lower level cloud thickened as the flight progressed and the aircraft was now flying between layers, with breaks in the cloud below through which only isolated fixes could be obtained. After a further ground speed check at Boorowa, the pilot amended his ETA Wollongong to 1923 hours.

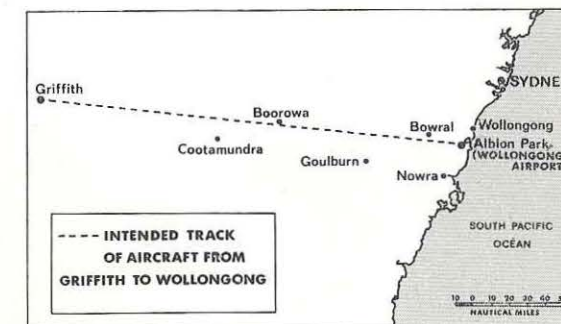
The rain falling from the overcast above also increased gradually and, under the influence of the rising terrain and the easterly stream weather, the layer of strato-form cloud below began to develop vertically into cumulus cloud, with some build-ups reaching to the middle level cloud above.

It was now becoming impossible to continue visual flight eastwards, even with numerous diversions around build-ups, but rather than turn back, the pilot decided to continue into the cloud ahead. From about a position abeam Goulburn, the aircraft flew in cloud almost continuously, with only occasional breaks. Approaching the Mittagong-Bowral area however, the aircraft emerged into a large break. Several of the towns in this area were visible and the pilot obtained a positive fix from the aeronautical light on Mt. Gibraltar. This showed that the flight's progress had fallen even further behind the original estimates and the pilot was now forced to amend his ETA Wollongong to 1930 hours, only 13 minutes before last light.

Soon after sighting Mt. Gibraltar, the aircraft again flew into cloud. The daylight was fading now, but through breaks in the cloud the pilot obtained another visual fix near Robertson. He attempted to tune the aircraft's sole radio navigation aid, an ADF, to the Wollongong NDB but could not locate the signal and instead tuned the ADF to the Wollongong broadcasting station 2WL, which is situated five miles north-east of the aerodrome.

At this stage, knowing that the aircraft was now over the edge of the steep escarpment of the Great Dividing Range, the pilot descended, hoping to find some identification for an approach to the aerodrome at Albion Park. The road leading to the foot of the Macquarie Pass was sighted through another break, but because of a large build up of cloud, with heavy rain, in the direction of Albion Park, the pilot diverted to the south-east and descended to 1,000 feet over the coast somewhere between Kiama and Berry. After some 25 minutes of searching, during which the pilot at one stage informed the passengers that they were over Albion Park, but that it was inadvisable to go any lower, the pilot estimated that his fuel had been depleted to the mandatory reserve of 45 minutes, and announced to his passengers that they would probably have to divert to Sydney.

It was after 2000 hours local time, and almost 30 minutes after last light that Sydney Flight Service Unit received a call from the aircraft, requesting radar guidance to Sydney Airport. The aircraft reported that it was east of the coast near Wollongong, flying in cloud, rain and darkness, with only 45 minutes fuel remaining. Weather conditions at Sydney Airport at the time

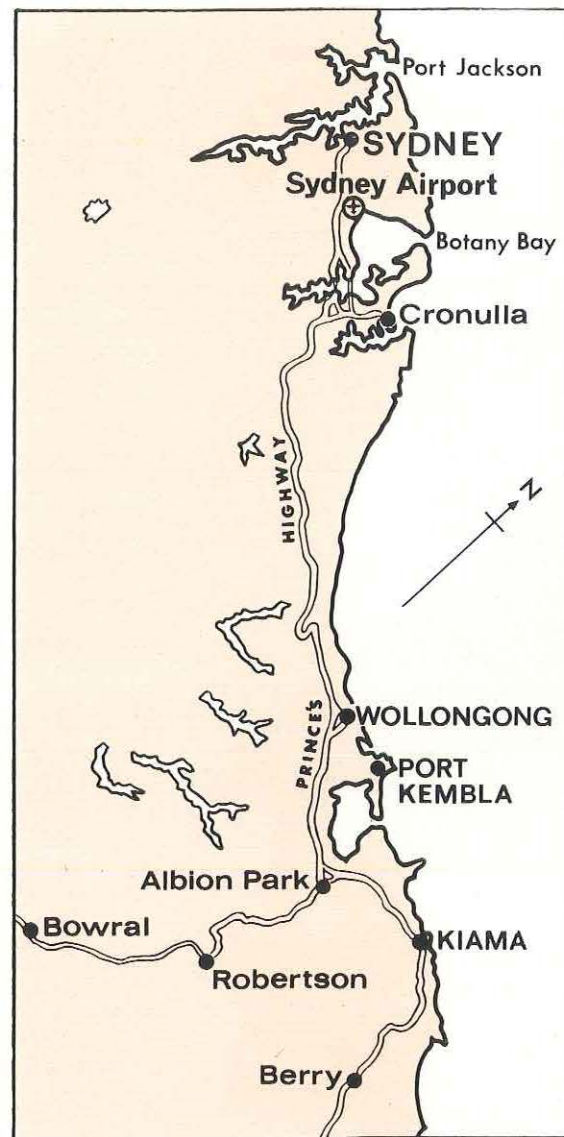


were considerably worse than the minima for flight in Visual Meteorological Conditions, with low cloud, driving rain and a 15 to 25 knot southerly wind.

The aircraft was transferred to the Sydney approach radar frequency, identified, and instructed to climb to 5,000 feet. The radar controller advised the pilot that to retain radar identification he would maintain the aircraft's altitude until it was closer to Sydney Airport, then vector the aircraft for a descent east of the coast between Cronulla and the heads of Botany Bay. Soon after the aircraft was within 25 miles of the airport, the controller told the pilot he would be vectored on to a final approach path for runway 34 using surveillance radar procedure and that, when he became visual, he would be required to break to the right and make a visual left hand circuit to land in the reciprocal direction on runway 16. At four miles out, as the aircraft was passing through 1,200 feet, the pilot reported he could see street lights through breaks in the cloud below him. The approach continued and two minutes later, the pilot reported he had the runway in sight.

When fully visual and one mile out, passing through 750 feet and aligned with runway 34, the pilot was instructed to turn right for a left circuit to land on runway 16. As the aircraft was making this turn on to the cross-wind leg, the engine failed. The pilot announced he would have to make a downwind landing straight ahead on runway 34 and began a series of S-turns to lose height, but it quickly became apparent that, under the influence of the strong southerly wind, the aircraft would over shoot the end of the runway.

The pilot began a turn to the right while the aircraft was a little to the west of the runway at comparatively low level, but did not have sufficient time to align the aircraft with runway



16, or even turn on the landing lights before the undercarriage struck the ground heavily in an unlighted area on the eastern side of the runway, only 40 yards from a small building housing an auxilliary power unit for the runway's glide slope transmitter. Despite the heavy landing, the pilot managed to straighten up and the aircraft ran parallel with the runway, bounced through a shallow spoon drain and came to rest with the occupants uninjured.

A Departmental investigation into the circumstances of this incident was begun immediately, and when the facts of the case became known, the pilot's commercial licence was suspended pending the outcome of the investigation.

Careful examination of the aircraft structure established that it had sustained no damage during the landing. The cause of the engine failure was found to be fuel starvation. When inspected, both fuel tanks were completely empty and only a few drops could be extracted from each of the fuel tank drain points.

As well as holding a commercial licence, the pilot held a flight instructor rating and had accumulated a total of 1,200 hours flying experience. Of this, some 350 hours was instructional experience, and between 500 and 600 hours had been logged while charter flying. The pilot did not hold any class of instrument rating, but claimed to have had approximately 100 hours instrument flying practice, in addition to the basic 10 hours instrument flying training for his commercial licence.

The pilot admitted that he was aware of the flight notification and meteorological briefing requirements for charter flights, but could offer no valid reason for not submitting details of the flight as required by the Aeronautical Information Publication (RAC/OPS 2-18 Appendix 2) and the Visual Flight Guide.

Statements obtained from the three passengers in the aircraft did not substantiate the pilot's contention that he had made the flight principally by visual reference. On the contrary, the passengers' accounts all referred to considerable periods from about Goulburn onwards, during which the aircraft was flying in "thick cloud", and to only "occasional" breaks through which the ground was sighted.

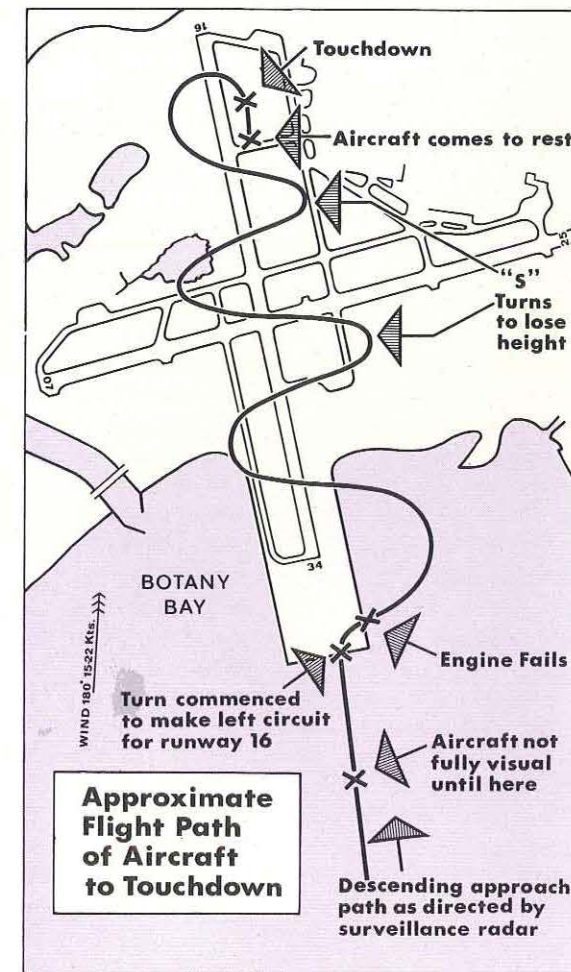
None of the passengers made any reference to the descent over the coast being made visually. Rather, all described the visibility as being "nil" at this stage of the flight. At the time the pilot said they were over Albion Park, the aircraft was in thick cloud. The pilot had reduced power and descended further after this and asked the passengers to look for lights but he made no comment on how he was going to land at Albion Park in the dark. Occasional single white lights were seen as they circled, probably street or house lights, but then the pilot announced it was inadvisable for them to go any lower and that they would probably have to go on to Sydney.

For the return leg of the charter flight, from Griffith to Wollongong, it should have been obvious from the forecast the pilot obtained by telephone from Wagga, that a head-wind component of about 20 knots could be expected over

most of the route. However the pilot chose to disregard this forecast and to plan the flight on the basis of the conditions he had experienced during the morning, when the wind component had been negligible. Even so, the existence of the headwind as forecast became evident to the pilot early enough during the flight for him to seriously consider what alternative action he should be prepared to take if conditions worsened as forecast, especially as the amount of daylight remaining at the destination would now be critical.

Even after the pilot had continued the flight into marginal conditions after passing Goulburn, when it should have been clearly evident it would not be possible to complete the flight in Visual Meteorological Conditions, there were still sizeable breaks in the cloud cover through which he

Diagram of Sydney Airport showing approach path of aircraft.



could have diverted to Goulburn or some other suitable aerodrome with ample daylight remaining. Instead, the pilot continued into further cloud and rain, and with darkness approaching, committed himself to completing the flight in Instrument Meteorological Conditions. It is evident that the pilot was not unduly concerned with the prospect before him, and that he was relying on using the aircraft's ADF, tuned to the Wollongong NDB for track guidance and probably also as a descent aid for a landing in the dark. Unfortunately for the pilot's pride, but perhaps happily in the long run for all the occupants of the aircraft, the Wollongong NDB had failed that afternoon, and a Notam advising that it was out of service had been issued at 1855 hours.

Subsequently failing to make satisfactory visual contact in the adverse weather and darkness, even after almost half an hour's searching, by which time the aircraft's flight planned endurance was reduced to the mandatory 45 minute reserve, the pilot was finally forced to call for assistance as the only means of escape from probable disaster. That the engine failed only seconds after the aircraft became visual at Sydney airport, is indicative of the extremely fine margin by which a disaster was averted.

Comment

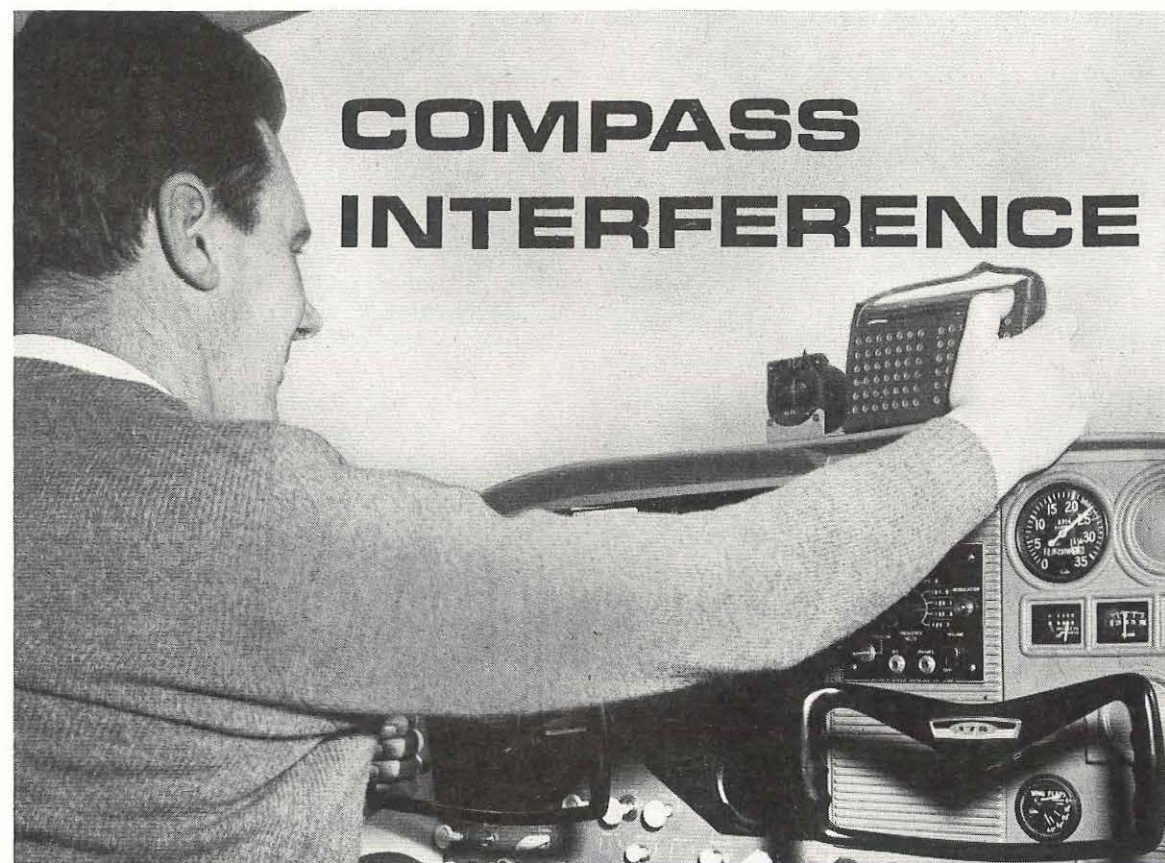
The primary purpose of accident and incident investigation is to determine what can be learnt from such occurrences for the safety of operations in the future.

For this reason it is not the normal policy of the Digest to dwell on any action the Department sees fit to take against persons whose neglect or disregard of regulations led to the occurrence.

In this case however, because of the dire peril in which the occupants of the aircraft were placed by the pilot's blatant disregard for Air Navigation Regulations and air safety in general, it is pertinent to mention the consequences of his actions.

The investigation showed beyond doubt that the pilot had failed in his duty to safely and efficiently navigate the aircraft, and that he was not fit to have the responsibilities and to exercise the privileges of the holder of a commercial pilot licence and instructor rating. His licence and rating were therefore cancelled under the provisions of Air Navigation Regulation 258(1) (c) and (d).

The pilot was subsequently dismissed from his employment.



IN the article "Compass Reading Affected" published in the series "From the Incident Files" in our November issue last year, (See Digest No. 53) we described how the pilot of a Cessna 172 found the compass readings were affected while he was carrying a spraying machine, fitted with a small two-stroke motor, in the cabin of his aircraft. The article ascribed the compass interference to the presence of the comparatively heavy ferrous metal object in the aircraft cabin.

An alert reader has since written to point out that as most small two-stroke motors have magneto ignition, the principal source of the compass interference in this instance was probably the permanent magnet in the motor's magneto. He also suggested that as there are quite a number of small machine tools driven by two-stroke motors that can easily be accommodated in the cabin of a light aircraft, we should sound a further warning on this hazard in the Digest. We entirely agree, and appreciate our reader's initiative in bringing this matter to light —

especially now that so many light aeroplanes are being used for day to day work on grazing properties, and in similar operations.

This note of caution is yet another variation on the perennial problem of interference to direct-reading compasses caused by magnetic or ferrous metal objects carried in the cockpit. Automatic cameras, exposure meters, electric razors, many of which incorporate permanent magnets in their mechanism, and of course torches, cigarette holders etc., fitted with magnetic "grips", are some of the items which have caused trouble in the past when they were deposited on that most convenient of places in light aeroplanes — the shelf above the instrument panel. Unfortunately, this shelf is also the area in which the aircraft's compass is most vulnerable to interference. As another reader has recently reminded us, this most natural of repositories for personal equipment offers a particularly insidious lure for those who carry transistor radios with them. Most types of transistor radio are highly magnetic, whether switched on or off, and, if placed in this seemingly

ideal position for radio reception, are almost certain to affect the compass readings to some extent.

Compass interference of this sort was responsible for a very serious incident involving a light aircraft in Africa recently. A pilot, with three passengers on board, was flying a Cessna 182 from Maun, Bechuanaland, to Shakawe, 150 miles to the north-west. This part of the African continent is not unlike much of the Australian outback in character. It is rather featureless and dry with high temperatures during the day, and its latitude is about that of the Tennant Creek-Daly Waters area in the Northern Territory.

Unnoticed by the pilot of the 182, the passenger sitting in the front seat placed his cigarette case on the shelf above the instrument panel. The cigarette case incorporated a powerful magnetic "grip" and the effect of this magnet on the aircraft's compass resulted in the pilot flying a south-westerly heading instead of tracking to the north-west. When the pilot finally saw that he was lost, but without realising the cause, he turned on to a reciprocal heading on the compass, and attempted to re-trace his flight path. Later however, when the aircraft's fuel position became critical, he saw that it was hopeless and he made an emergency landing. The landing was accomplished without injury to himself or his passengers but they were then exposed to extreme

heat in near-desert conditions for four days before they were found. The party had little water with them and were in a serious condition by the time they were rescued.

While on the subject of magnetic articles in aircraft cockpits it may be well to remind readers of a recent Air Navigation Order (Part 105 DCA/General 42) regulating the location of microphone stowages in aircraft, relative to direct-reading magnetic compasses. The A.N.O. was prompted by the fact that dynamic microphones are now being marketed as replacements for the carbon type microphones which were previously almost universal in aircraft. These dynamic microphones incorporate a permanent magnet which can seriously affect the aircraft compass if placed too near it. The A.N.O. requires all microphone stowages to be at least 15 inches from any direct reading magnetic compass.

Finally, to hark back to our statement at the beginning of this article, it must be remembered that it is not only magnetic articles that can affect the compass. Any ferrous metal object such as metal clips on navigation boards or the ring binders of AIPs can induce errors if placed close enough to the compass. So when flying cross-country be particularly careful where you and your passengers put your belongings — it may be good practice to declare the shelf above the instrument panel "out of bounds to all articles."

WASP TROUBLE (not the R985!)

The Digest has on several occasions reported instances of fuel tank breathers and pitot tubes being blocked by wasps' nests (See Digests No. 47 and 49, 1967). Here is yet another variation on this theme, which could have had quite serious consequences.

After completing a charter flight from Geraldton to Dirk Hartog Island, Western Australia, the pilot of a Cessna 172 saw that large quantities of oil had been leaking from the engine. On checking the sump contents, he found that only four quarts remained.

A licenced aircraft maintenance engineer was called from Carnarvon, 70 miles to the north-east,

and after checking the engine, he certified the aircraft for a ferry flight back to Geraldton without passengers.

The pilot took off on the 180 mile return trip but because the engine was still losing oil, he was forced to discontinue the flight at a station property after covering only 50 miles. Another L.A.M.E. was called in, this time from Geraldton, and further investigation of the reason for the loss of oil established that the breather pipe was blocked. When the blockage was cleared, it was found to consist of the oil-soaked muddy remains of a wasps' nest which had evidently been built in the breather pipe while the aircraft was parked.



Landing in the Rough

Just before this Cessna 150 was wrapped around the tree shown in the picture, it was being used to spot cattle on a station property in Western Australia.

Flying comparatively low in hot, turbulent conditions, the aircraft suddenly encountered a patch of quite severe turbulence which threw it into an unusual attitude. The pilot managed to return the aircraft to a more or less level attitude, but seemed unable to regain full

Entangled in the Grass

The owner-pilot of this Tiger Moth, with his wife as a passenger, had flown to a coastal resort in Queensland where the privately owned strip was nominally 3,500 feet long and 200 feet wide. When he arrived over the strip however, he was a little concerned to see that the effective width of the strip was considerably less. Long grass had grown over the strip and only a comparatively narrow area had been mown down the centre for aircraft operations. Seeing that other aircraft were using the strip, the pilot nevertheless completed his landing, concluding that although the mown portion looked less than that required for an Authorised Landing Area, the owner's of the strip would no doubt be maintaining it to the requirements for Authorised Landing Areas, and that it was adequate for his operations. Later in the day he completed two more successful circuits and landings at the strip.

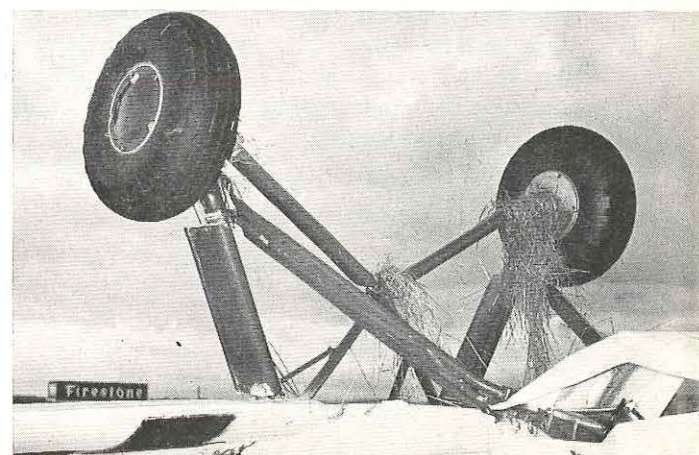
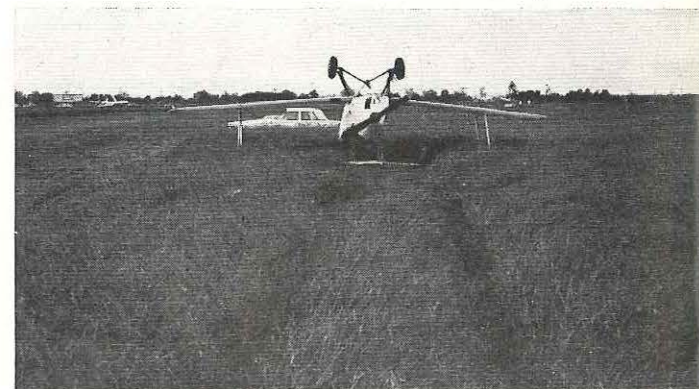
At about 1430 hours, the pilot again taxied out for take-off, this time to depart for the return flight to his home base. As before, his wife occupied the front cockpit as a passenger, the dual controls having been previously removed.

There was now a cross-wind of between seven and 10 knots on the strip and, as the pilot was somewhat inexperienced in handling DH-82 aircraft, he paid particular attention to using the correct cross-wind take-off technique and also began the take-off from the up-wind side of the strip to allow for any drift which might develop during the take-off run.

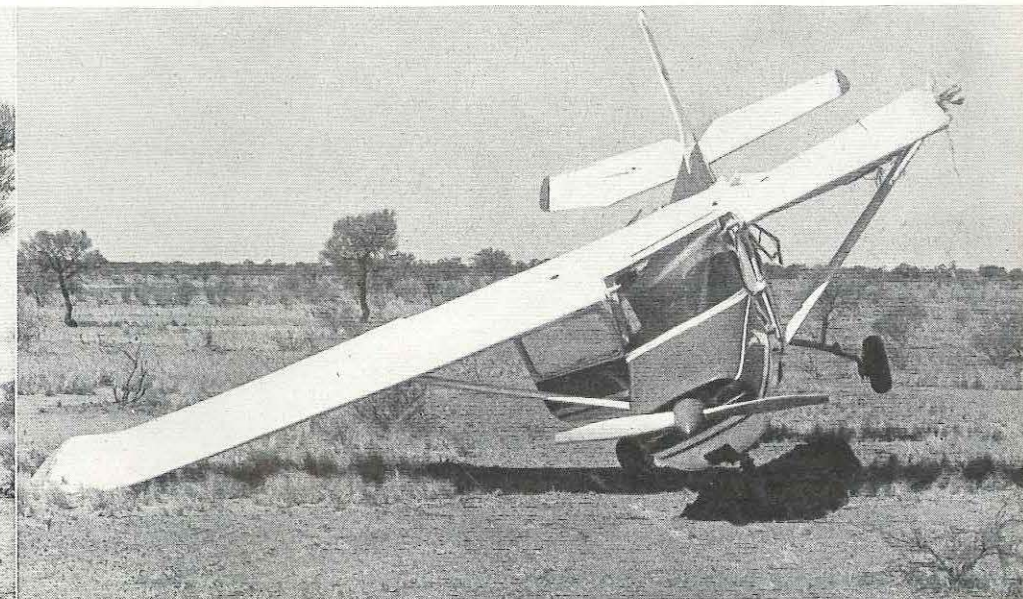
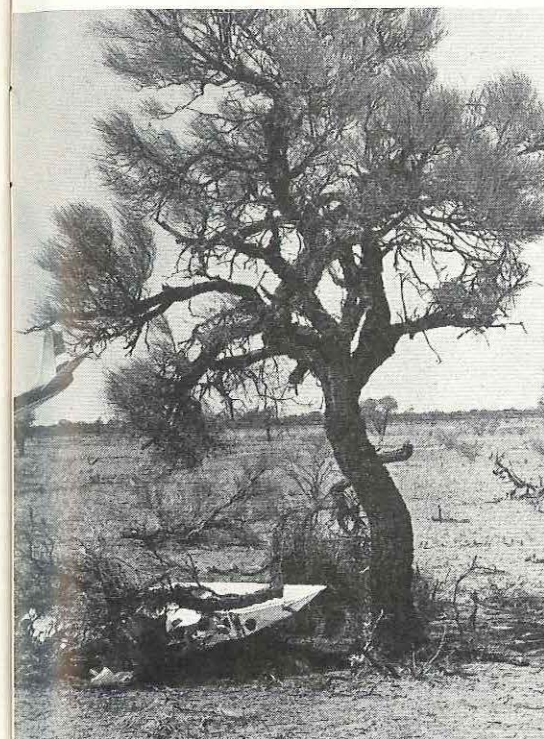
Opening the throttle, the pilot kept the aircraft straight until it became airborne at between 40 and 45 knots, but then it began to drift off the mown centre portion of the strip and over the long grass. Feeling that the airspeed was decreasing and that the aircraft would not remain airborne, the pilot decided to abandon the take-off, closing the throttle and turning off the switches.

control and prevent the aircraft descending. Believing the aircraft was going to strike the ground, the pilot closed the throttle, switched off the engine and lowered two notches of flap, levelling out as the aircraft neared the ground. The aircraft struck a tree as it touched down, tearing away the port wing tip, and rocks sheared off the port and nose undercarriage struts. The fuselage slewed to the left and collided with another tree. The impact was taken just behind the cabin, causing the fuselage to "jack-knife". The pilot and passenger climbed out uninjured, but the aircraft was damaged beyond repair and, because of the remoteness of the area in which the accident occurred, was not worth the cost of salvage. Following the investigation of the accident, the pilot was flight tested and demonstrated deficiencies in stall recovery sequences.

As the aircraft settled into the dense long grass, the undercarriage became more entangled, and despite the pilot's application of full back stick, it began to nose-down in the grass. The lower part of the nose cowling then dug into the soft ground and the aircraft somersaulted on to its back. Fortunately the soft grass cushioned the impact and damage was confined to the nose cowling, fuel tank and rudder. The pilot and his wife escaped with a shaking.



Aviation Safety PICTORIAL



A Tree Gets in the Way

A pilot who had recently gained his commercial licence but was totally inexperienced in bush flying, was engaged by a charter company to take part in aerial mustering operations at a station property in Western Australia.

After ferrying a Cessna 150 from Jandakot Airport to the station property the pilot began a period of dual training in aerial mustering techniques with a senior company pilot. The training continued the following morning until mid-day when they landed at the homestead strip to refuel.

During the refuelling, the hand pump the pilots were using broke down and the senior pilot decided he would fly to a neighbouring property in another aircraft to obtain a replacement pump. Before departing, he requested the trainee-pilot, during his absence, to fly out to one of the station paddocks and pick up a third pilot, so that the aerial mustering could continue during the afternoon.

The trainee took off from the homestead strip and flew to the area where the third pilot was working with a vehicle on the ground. From the air he was unable to sight the pilot's vehicle, but while searching, caught sight of the station manager's vehicle. After unsuccessfully trying to contact the station manager

by radio, the pilot decided to land in a nearby clay pan to ask the manager if he knew the other pilot's whereabouts. The landing was successful but the station manager could not assist him and requested that he continue looking for the third pilot.

For his take-off from the clay pan, the pilot selected what he considered was the most suitable run, though there was a cross wind of about 10 knots blowing from the starboard side.

The pilot lowered six degrees of flap, held the aircraft on the brakes while he opened the throttle to full power, then released the brakes. The aircraft accelerated and became airborne at about 45 knots, but while it was still just off the ground, a gust of wind drifted the aircraft to the left and the port wing collided with a tree. The wing, outboard from the lift strut attachment, was torn off, the aircraft swung to the left, throwing the starboard wing down, and the aircraft slid sideways on the starboard wing tip and tailplane before coming to rest as shown in the picture, 80 feet after impact. The pilot's only injury was a bruised right hand.

The pilot said that he had estimated the length of run available for take-off as 1,000 feet. He had not consulted the Take-off Weight Chart in the aircraft's Flight Manual but he believed this to be sufficient for the take-off. When, during the investigation, the required take-off distance was assessed from the chart for the conditions that existed at the time, it was found that a take-off run of 1,430 feet would have been required. The tree which the aircraft struck was 620 feet from where the pilot had begun the take-off run.

Aviation Safety PICTORIAL

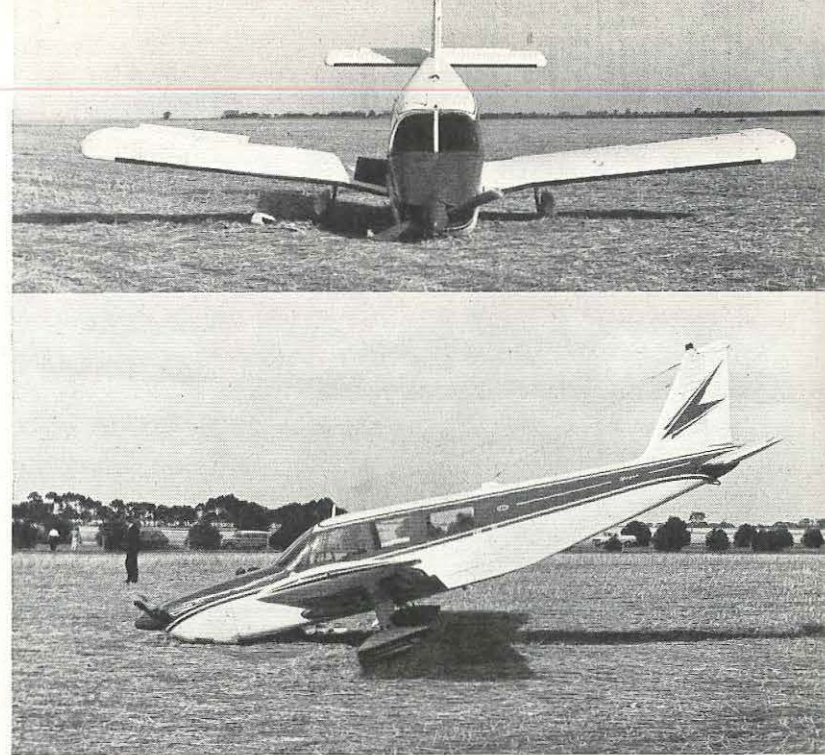
continued

Nose Strut collapses during Landing

At the conclusion of a private flight from Wagga to a private landing ground in western Victoria, the pilot of a Cherokee Six made a precautionary approach to land, and touched down normally on the stubble surface of the field. After running for about 90 feet, a slight undulation on the surface of the field caused the aircraft to become airborne again, and after touching down for a second time, it bounced to a height of about 10 feet. At this stage the airspeed had decayed to somewhere in the vicinity of 40 knots and the pilot applied full power and pulled hard back on the control column. Without gaining speed or height the aircraft remained airborne for a further 275 feet, then the nose dropped sharply and the nose wheel contacted the ground violently. The nose wheel strut collapsed and the aircraft fell on to its nose. In this nose down attitude, the aircraft skidded for 165 feet and came to rest on its main wheels and engine cowling. The pilot and his five passengers were uninjured, but the damage to the aircraft was substantial.

The pilot said that when he applied full power during the bounce, it was his intention to either go around or

ease the aircraft gently to the ground. It is evident however, that when the aircraft did not accelerate, probably because of the exaggerated nose-up, high drag attitude in which it was placed, the pilot made no positive effort to lower the aircraft to the ground. During the prolonged hold-off the airspeed decreased to the point where the aircraft stalled and the nose dropped heavily to the ground.



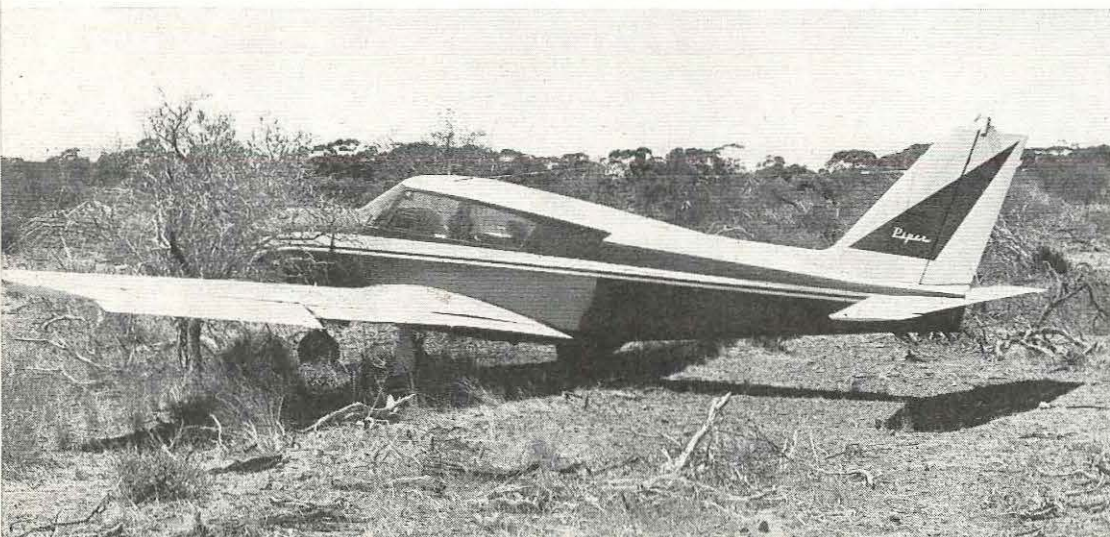
Gone Bush

Before setting out for an inland destination in Western Australia, the pilot of this Comanche had been informed that the strip to which he was proceeding was 2,500 feet long. En route, he computed that in the existing conditions his aircraft would require a landing run of 2,100 feet.

During the landing itself, the aircraft touched down on its nose wheel 328 feet beyond the threshold, but the main wheels did not make firm contact with the ground for another 1,012 feet. Although the pilot then braked heavily, he could not stop the aircraft in the remaining

length of strip. It struck a mound of earth at the end of the strip and ran through scrub for a further 140 feet before coming to rest against a tree. The pilot and passengers were uninjured, but the aircraft's port undercarriage was bent and the wing structure distorted.

The strip length, when measured, proved to be only 1,850 feet long. The pilot said that his approach to land had been "normal" but it is evident that he made no attempt to plan or carry out a type of approach that would have assisted him to stop the aircraft in the length available.



Sunset—and Position Uncertain?

On visual flights, especially in remote areas, be prepared for the unexpected—allow plenty of fuel and DAYLIGHT for alternative action.

DON'T BE CAUGHT IN THE DARK WITH NOWHERE TO LAND!

