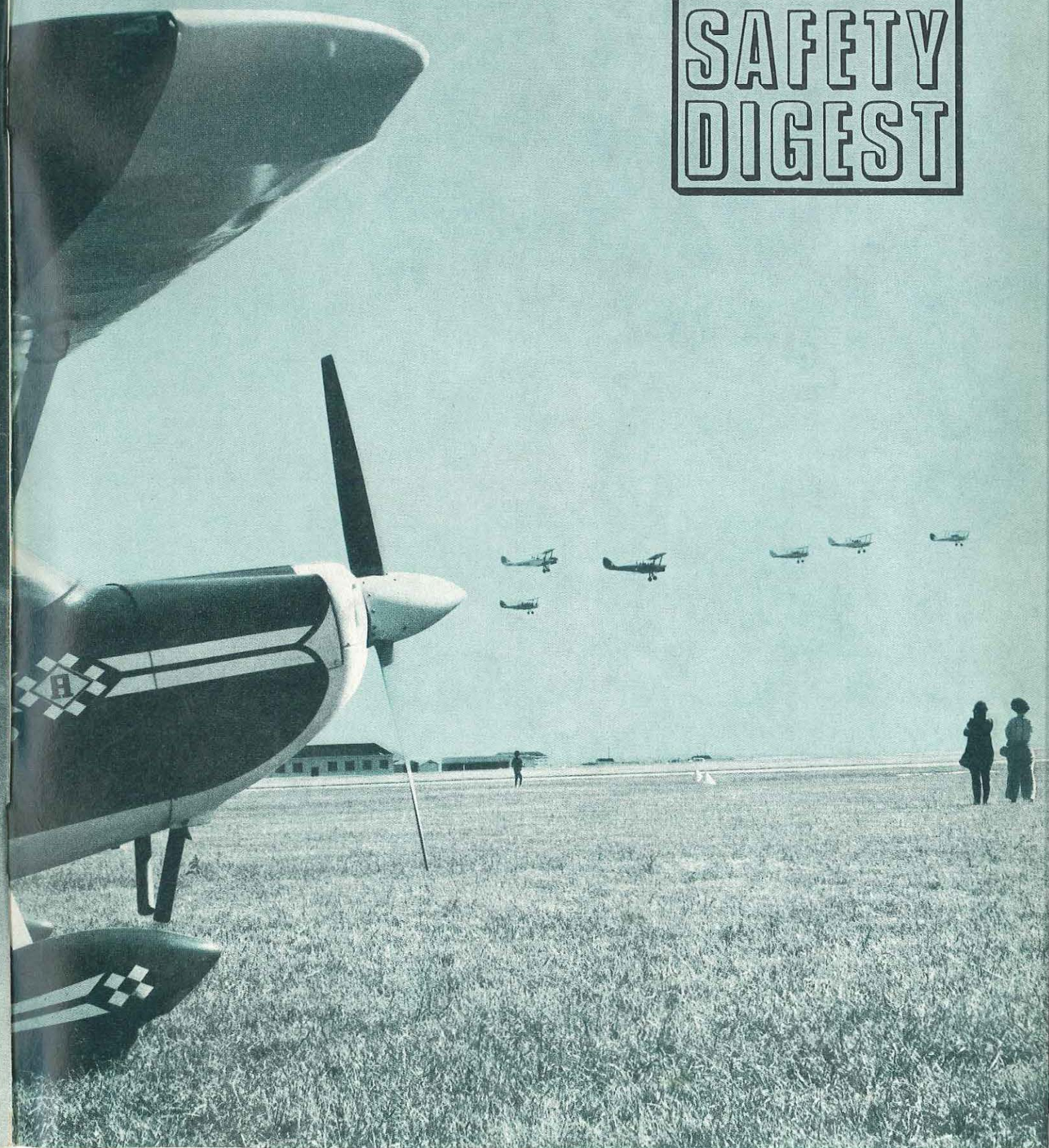
Number 78 March 1972 DEPARTMENT OF CIVIL AVIATION AUSTRALIA

AVIATION SAFETY DIGEST



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Contents

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AUSTRALIA

"If you can fly a Tiger you can fly anything". In this era of well behaved nose-wheel aeroplanes, these oft-quoted words from yesteryear are probably more true than ever they were. Happily, many would-be owners are not daunted by this prospect and the evergreen Tiger Moth, now celebrating its 40th year of service, is still much in evidence on the Australian register.

Front Cover: An open formation of civil Tigers over Point Cook, birthplace of the A.F.C. and R.A.A.F., stirs nostalgic memories during a recent picnic meeting when members and friends of the Ultra Light Aircraft Association were guests of the R.A.A.F. Station.

—D.C.A. Photograph by T. Martin

Back Cover: Real flying! Blue skies, fleecy cumulus, the wind in the flying wires, and the song of a Gipsy Major at 1900 RPM!

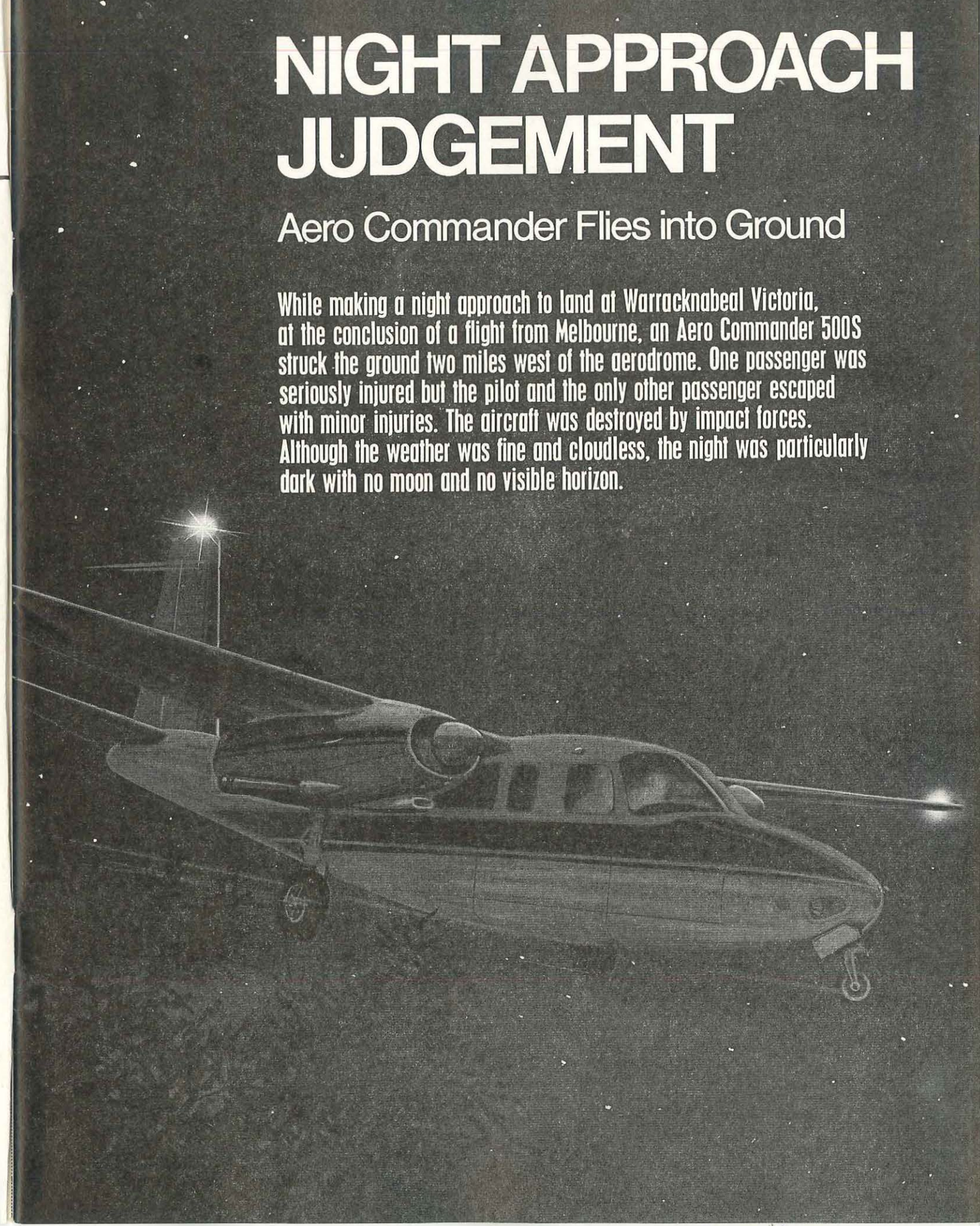
Above: A fine example of the marque, restored to a war-time type livery, comes over the fence to land at Casey Airfield, Berwick.

—S. H. McKenna Photographs

NIGHT APPROACH JUDGEMENT

Aero Commander Flies into Ground

While making a night approach to land at Warracknabeal Victoria, at the conclusion of a flight from Melbourne, an Aero Commander 500S struck the ground two miles west of the aerodrome. One passenger was seriously injured but the pilot and the only other passenger escaped with minor injuries. The aircraft was destroyed by impact forces. Although the weather was fine and cloudless, the night was particularly dark with no moon and no visible horizon.



THE aircraft was engaged on a scheduled passenger commuter service between Essendon and Warracknabeal. The flight was a single pilot IFR operation and the aircraft departed Essendon at 1836 hours with two passengers on board. One passenger occupied the right hand front seat, and the other passenger the centre row, left hand seat, immediately behind the pilot.

The earlier part of the flight, flown at the planned cruising altitude of 6,500 feet, was uneventful in all respects and when the aircraft was about 40 miles from its destination, the pilot commenced descent. The lights of Warracknabeal were clearly visible and when some 20 miles out, the pilot sighted the aerodrome lights as they were switched on. A little later he saw the lights of the 08-26 runway.

Still maintaining a north-easterly heading the pilot allowed the aircraft to pass slightly to the east of the aerodrome at an indicated height of between 1,500 and 2,000 feet, and noted that the surface wind, blowing from the south-east at 10 to 15 knots, was stronger than he had expected. The pilot called Melbourne to report "Circuit area Warracknabeal" and to cancel SAR, then turned left to join a normal downwind leg for a landing on runway 08. After selecting the undercarriage down, the pilot allowed the aircraft to descend gradually, reaching 1,000 feet indicated as he turned on to base leg. The elevation of the aerodrome at Warracknabeal is 365 feet and at this stage the aircraft should have been a little over 600 feet above the ground.

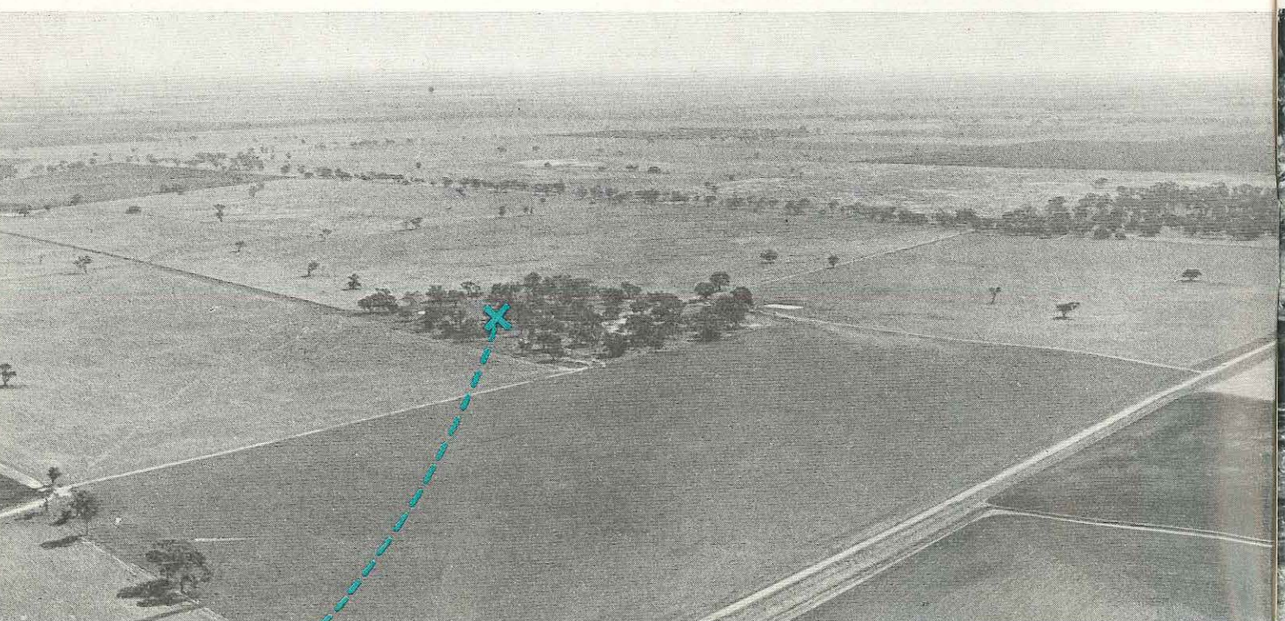
The pilot, as he expected, had lost sight of the runway lights after passing abeam the downwind end of the runway, but was surprised to find that they did not re-appear as he turned on to base leg. Somewhat puzzled, the pilot decided to go around. Leaving the undercarriage down and maintaining about 115 knots at 1,000 feet, he turned the aircraft on to an easterly heading towards the Warracknabeal NDB, which is situated about 300 yards directly north of the threshold of runway 08. At this stage the passenger in the right hand seat asked the pilot why he had abandoned the approach and the pilot replied that he thought the altimeter had stuck. However, after he had tapped the instrument, varied the sub-scale on either side of the QNH setting, and cross-checked it with the other altimeter, the pilot was satisfied that it was functioning properly.

As the pilot approached the aerodrome, concentrating on homing on the NDB he noticed the runway lights again briefly, but as the aircraft passed over the NDB, they were hidden from his view by the nose and cockpit of the aircraft.

Still at an indicated altitude of 1,000 feet, the pilot continued east across the aerodrome and turned left to position the aircraft for a wider circuit than previously. After turning downwind once more, the pilot looked for the runway lights again. Their appearance now seemed abnormal. They were indistinct as though viewed from a greater altitude and from further away, and the spacing of the two lines of lights seemed to be closer together. The pilot formed the impression he was too high, but as he had never seen a lighted runway with so indistinct an appearance he became apprehensive that a fog might be forming. He did not continue to watch the lights, but concentrated on flying the aircraft on instruments at 1,000 feet until he turned on to base leg.

On straightening out the turn on to base leg, the pilot again looked for the runway lights but they were nowhere to be seen. At this stage the altimeters were still indicating 1,000 feet, and the power settings had remained unchanged throughout the approach. The pilot again decided to abandon the approach and began turning back towards the NDB but almost immediately there was a tremendous impact. Other impacts followed quickly and when the noise and violence had subsided, the three occupants found themselves hanging upside down by their seat belts in the darkness.

The pilot crawled out through the forward door and went to the rear door to release the passenger in the centre aisle seat. Assisting her to a safe distance from the wreckage, the pilot returned and helped the other passenger through the front door. After trying unsuccessfully to attract the attention of a passing car with the aid of a torch, the pilot and one of the passengers lit a fire to indicate their position. About 20 minutes later they were found by a man who, while working on an adjacent property, had heard the sound of the aircraft's engines cease suddenly and the noise of impact follow. He had immediately reported the crash to the operator's agent at the aerodrome and had set out to look for the wreckage.



Left: Aerial view of terrain to west of airport showing approximate final flight path and accident site.

Right: The Aero Commander as it came to rest inverted in the timbered area visible in the centre of the photograph on the opposite page.

* * *

Warracknabeal aerodrome is five miles south of the town and, as the photograph on page 2 shows, is situated in flat, rather featureless, sparsely populated farming country. The aerodrome, which as already mentioned, has an elevation of 365 feet AMSL, is equipped with standard electric lighting on the sealed 08-26 runway and has an illuminated wind indicator. There is also lighting at the terminal building.

Impact marks made by the aircraft showed that it had first struck the ground with the port undercarriage on a heading of 110°N, close to the fence of a large stubble paddock and a mile and three-quarters north-north-west of the runway threshold. After running 200 feet, the aircraft had torn its way through the fence into a patch of timber, where after colliding with several trees, it had cartwheeled and come to rest upside down.

It was evident from an examination of the wreckage, that all structural damage had been caused by impact forces. There was no evidence of any airframe or engine malfunction which could have contributed to the accident. At the time of impact, the undercarriage was extended and locked down and a quarter flap was lowered.

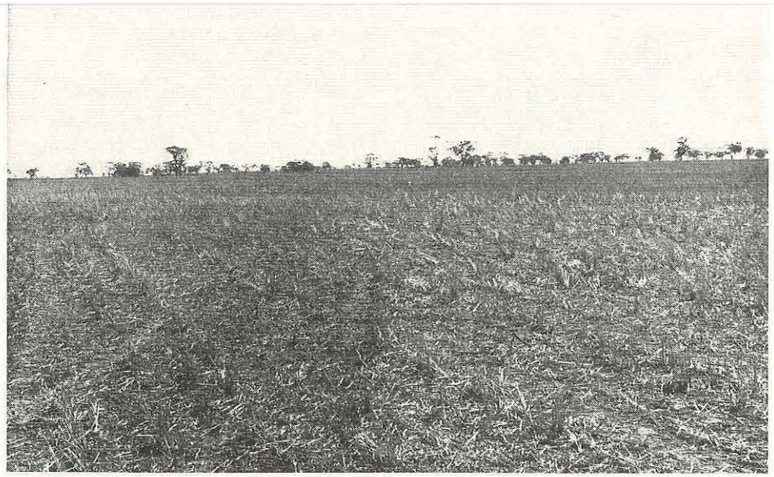
When recovered from the wreckage, both altimeters were found to be giving erroneous readings. Detailed examination of these instruments however, showed that each had been capable of normal operation before the accident, and that the errors were the result of impact damage.

It was found that the static pressure system connected to the altimeters in this aircraft was fitted with a selector valve that provided for an alternative source of static pressure. The selector valve was mounted on the left hand side of the cockpit, immediately below the instrument panel and adjacent to the cabin air controls. Tests conducted in a similarly equipped aircraft of the same type showed that it was possible for the valve to be placed in a mid-position where no static pressure was available to the system from either source. This had the effect of locking the altimeters at the height they were indicating when the mid-position selection was made, and caused the airspeed indicators to over-read with any subsequent reduction in altitude. Because of impact damage however, it was not possible to determine the position of the aircraft's static system selector valve at the time of the accident.

The pilot held a commercial licence with a first class instrument rating and had almost 5,000 hours flying experience. Of this, about 1,000 hours had been flown in Aero Commander aircraft. At the time of the accident, he had flown 334 hours in instrument conditions and 292 hours at night. He had flown to Warracknabeal many times, several of them in the aircraft involved in the accident.

* * *

In the statement he made after the accident, the pilot said that the sky was clear at the time, but no horizon was visible. The passenger who was sitting in the front seat described conditions as



The stubble paddock in which the aircraft first struck the ground, looking back along flight path. The initial impact marks made by the aircraft's undercarriage can be seen in the foreground.

"cloudless and impressively dark" and the witness who heard the aircraft crash and later located the crash site, said that the night was "exceedingly black" and that, because of the blackness "the horizon was virtually impossible to determine". The evidence left no doubt that the weather conditions at the time, in combination with the geographical features of the area in which the aerodrome is situated, would have made the approach a difficult one, for which a great deal of care would be necessary.* At the time the operators first began the service to Warracknabeal, they issued an "Operations Guide" to their pilots which stated, in relation to night-landings at the aerodrome: "The surroundings are completely black, and I suggest that you make your turn on to final at not less than 1,000 feet on your altimeter because of difficulty in visual height judgement". The pilot had a copy of this guide in his navigation bag at the time of the accident.

The normal circuit procedure for a visual night landing at this aerodrome would be to descend, with the altimeter set to the current aerodrome QNH, to 1,400 feet indicated (i.e. just over 1,000 feet above the ground) before beginning the downwind leg, and to maintain this height until ready to turn on to base leg. During or immediately after this turn, a descent to not less than 1,000 feet (approx. 600 feet above the ground) would be commenced, aiming to reach this height by the time the aircraft was positioned for the turn on to final approach. During the approach which preceded the accident however, the pilot did not check the aircraft's descent at 1,400 feet indicated on the downwind leg, and descended to 1,000 feet indicated by the beginning of the base leg, rather than when ready to turn on to final approach. It was also apparent that the pilot changed several times from visual to instrument flight and back again to visual flight while attempting a visual approach, rather than remaining in visual contact with the aerodrome lighting which was the only external source of visual reference, and that he deliberately made his second circuit wider than the first. As well as this, having descended to 1,000 feet indicated (i.e. only 635 feet above the aerodrome) on his first circuit, he chose to remain at this altitude rather than climb back to the normal circuit altitude of 1,000 feet above the ground. It seems possible that if the pilot had climbed back to 1,000 feet above ground level after abandoning his first approach, the accident might have been avoided.

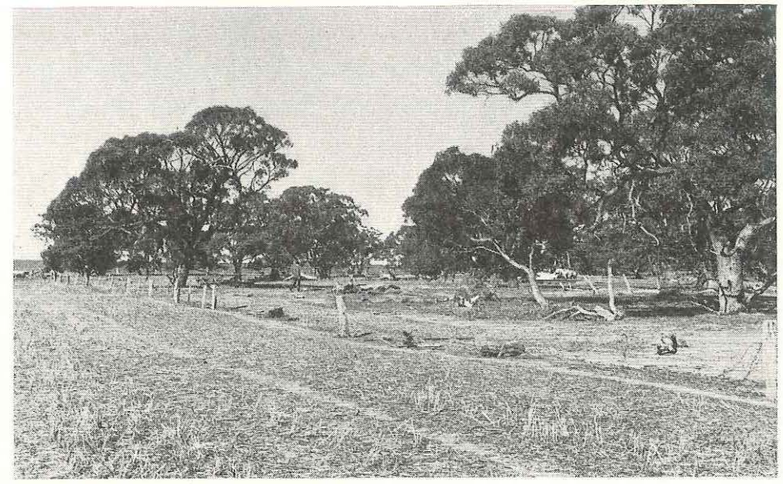
The pilot said that throughout the second circuit, his altimeter indicated from 900 to 1,000 feet, and the passenger who was sitting in the right hand seat said that the altimeter was indicating 1,000 feet immediately before impact. The witness who first located the scene of the crash and spoke to the pilot and his passenger, said that soon after he found them, they told him that "they believed that they were still at about 1,000 feet when they struck the ground". The circumstances of the accident thus suggested that the altimeters might have become "locked" at 1,000 feet shortly before the accident.

The manner in which the static pressure selector valve could have been moved accidently to a mid-position, thus "locking" the altimeters, about the time the aircraft descended to 1,000 feet, was carefully considered. Although there was no evidence of any subsequent over-reading of the altimeters, which would have occurred in this situation during the remainder of the descent, the possibility of the altimeters having become "locked" in this way cannot be ruled out.

In his statement, the pilot said that he had last used the cabin air controls near the selector valve during the descent when the aircraft was at about 4,000 feet, and that he replaced the microphone on its hook after his call to Melbourne when the aircraft was at about 1,400 feet. It is perhaps possible that the pilot could have unintentionally moved the selector valve at either of these times. While this possibility was being examined, it was found that the amount of movement required to alter the selector valve from a position where normal static pressure was available, to the point where the static sources were shut off altogether, was very slight and could probably have been brought about merely by aircraft vibration, if the selector

* The fact that some combinations of light patterns and terrain can be dangerously misleading, has been demonstrated in the U.S.A. during research conducted as a result of a number of night visual approach accidents. (See Aviation Safety Digest Nos. 48 and 67). A further overseas accident in this category is reviewed on page 14 of this issue. The problems of making visual approaches at night is to be the subject of another Digest article in the near future.

View looking along impact path as seen from point at which aircraft first struck the ground. The main wreckage can be seen in the middle distance amongst the trees.



control was already close to this position. It was also found that, just before reaching the mid-position where no static pressure was available, the selector valve could occupy a position where the static pressure available to the system was so restricted that the altimeter indications lagged behind changes in altitude.

Reconstructing the sequence of events from the evidence of the investigation, it is apparent that during his first circuit, the pilot did not check the aircraft's descent at 1,400 feet indicated at the beginning of the downwind leg, but allowed it to continue. Because of the fairly strong south-easterly wind, the downwind leg would have been wider and possibly longer than usual and the turn on to base leg was commenced at perhaps 1,200 feet and completed at 1,000 feet indicated. At this point, the aircraft's height was 400 feet less than in a normal circuit and as well, it was probably further away from the runway than usual. The resulting lack of visual cues then surprised and confused the pilot when he looked for the runway lights after completing the turn on to base leg. From this point on, either the altimeters became "locked" at the 1,000 feet indicated position and the pilot did not subsequently notice that the airspeed indicators were progressively over-reading, or he no longer watched the altimeters, but attempted to fly the aircraft by reference to the few visual cues available to him.

There can be no doubt that the pilot was misled by the paucity of visual cues in the position in which the aircraft was placed, but it seems likely that his departure from standard circuit procedures helped set the stage for the accident, by preventing him from making the best use of the visual information that was available. An analysis of the statements which the pilot made after the accident shows this to be so. Approaching the field for the first time he saw the lights "briefly". On his first downwind leg they looked "normal" but he then lost the flare path when turning on to base leg. The pilot's reaction was simply to track to the NDB, leaving the aircraft in the same configuration he had so far maintained throughout the circuit. He evidently did not feel it was necessary to climb. This in effect meant that, even if the altimeter indications were correct at this stage, the aircraft began its second circuit at low speed in almost a landing configuration and at a height of only 600 feet above the ground. During the second downwind leg, the "two rows of runway lights were close together and hazy" and the pilot believed he was too high. But as he was already flying a low circuit, the spacings of the lights should have suggested that he was in fact lower than he thought. On base leg, he again could not see the runway lights and as there was no sudden descent from this point on, it is probable that a considerable portion of this second circuit was flown at a dangerously low altitude.

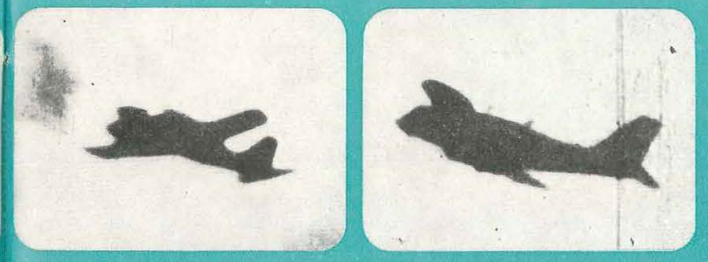
The operator's agent at the aerodrome said that when he saw the aircraft during its first approach, it seemed to be lower than normal, and when it passed over the aerodrome, it appeared to be only about 200 to 300 feet above the ground. The witness who was working on an adjacent property about three-quarters of a mile north-west of the accident site and who subsequently found the wreckage, saw the aircraft overfly his position lower than any other aircraft he had seen in the area. A little later he saw the lights of the aircraft to the south of his position. They seemed to be just above the horizon which, in the darkness, was almost impossible to distinguish. Though he could hear the aircraft's engines and they sounded normal, the aircraft seemed to be "exceptionally low". A few seconds later he heard two distinct impact sounds which were followed by silence, and the aircraft's lights were no longer visible.

There can be little doubt that, although the pilot intended to level out at 1,000 feet indicated during his second circuit, the aircraft in fact, continued to descend slowly throughout this circuit until it eventually flew into the ground. It seems likely that if the pilot had carried out the accepted "go around" procedure, applying power, raising the undercarriage and climbing to the normal circuit height, he would have given himself the opportunity to either detect any defects in the instrument indications, or if these were correct, to re-orientate himself with the aerodrome lighting for another visual circuit. Altogether, it appears that the pilot concentrated too much on the instruments during what was intended to be a visual approach and tended to ignore the visual information provided by the aerodrome lighting. The result was that he misinterpreted the more limited visual information available to him in the latter stages of the circuit.

The quotations which form the title of this article are in fact two of the headings under which the Department's accident records are coded for statistical purposes. The Digest would be amongst the first to admit that, on its own, cold statistical data can be a dull and colourless method of presenting facts. But in this case the two quotations provide a most apt description of an accident pattern that has been repeated, usually in tragic circumstances, over and over again throughout the

Film sequences taken by an amateur photographer during the Aztec's ill-fated flight. The horizontal series shows the aircraft as it performed a barrel roll to the left at low level over the airstrip.

Right: The vertical sequence taken a short time later shows the Aztec diving steeply during its attempt to recover from the stall turn type manoeuvre. In the last frame the aircraft can be seen disappearing from view behind trees, a split second before impact.



"Unwarranted Low Flying – Collision with Terrain or Water"

history of aviation. If recent events are any guide (and we can say no more at this stage because the accidents concerned are still under investigation) there are signs that some of these lessons from the past are being forgotten and that some pilots need to be reminded of the unpleasant realities that lie behind the majority of these statistics.

WITH this thought in mind, the Digest would like to turn the clock back two years to review two very similar accidents which occurred in different parts of Australia within a short period of time. Ideally, of course, it would have been desirable to have examined these accidents in the Digest as soon as the investigations were completed and the findings released. Unfortunately the amount of safety education coverage which the Digest can provide at any one time is limited and for this reason, some problems, important though they are, have sometimes to be put aside for other priorities. At the time the findings of these two accidents became available for release, the Digest's safety education emphasis was necessarily focused on some of the problems of night VMC navigation and a little later, with the hazards of conducting ostensibly visual flight in weather worse than that specified as visual meteorological conditions. Despite the lapse of time however, the message of the two accident reviews that follow is as relevant as ever and provides unequivocal evidence that the stakes in the exhilarating game of "Unwarranted Low Flying" are very much akin to those of Russian Roulette.

The first of the two accidents to which we refer occurred at a station property in Queensland after two pilots had taken off for a local flight in a Piper Aztec. The pilot occupying the left hand seat was a Sydney businessman who held a private licence and had nearly 600 hours experience. The pilot in the right hand seat held a commercial licence and was the manager of the Bankstown firm that owned the aircraft. His total aeronautical experience was about 500 hours of which 130 had been flown on the PA23.

The private pilot with four friends had hired the Aztec for a holiday tour of Queensland island resorts. This pilot was endorsed on the aircraft type, and in fact flew the aircraft from the left hand seat throughout most of the trip. The manager of the company owning the aircraft also accompanied the party and occupied the right hand seat during the tour. On several occasions during the trip, this pilot assumed control from the right hand seat.

On the day on which the accident occurred, the party departed from Lindeman Island in the Aztec at 1120 hours and flew to Mackay, where the aircraft was refuelled preparatory to the return flight to Sydney. Instead of flying directly back to Sydney however, it had been arranged for the aircraft to call at a station property some 40 minutes flying from Mackay, to enable the manager-pilot travelling with the party to visit some relatives. The flight to the station property was uneventful and the aircraft landed there at about 1300 hours.

After the party had called on the manager-pilot's relatives at the homestead, where they had afternoon tea, the manager-pilot invited the private pilot to accompany him on an inspection of the property from the air. The latter agreed and it was then arranged that another member of the party would film the take-off and other aspects of the flight with the movie camera he had brought with him.

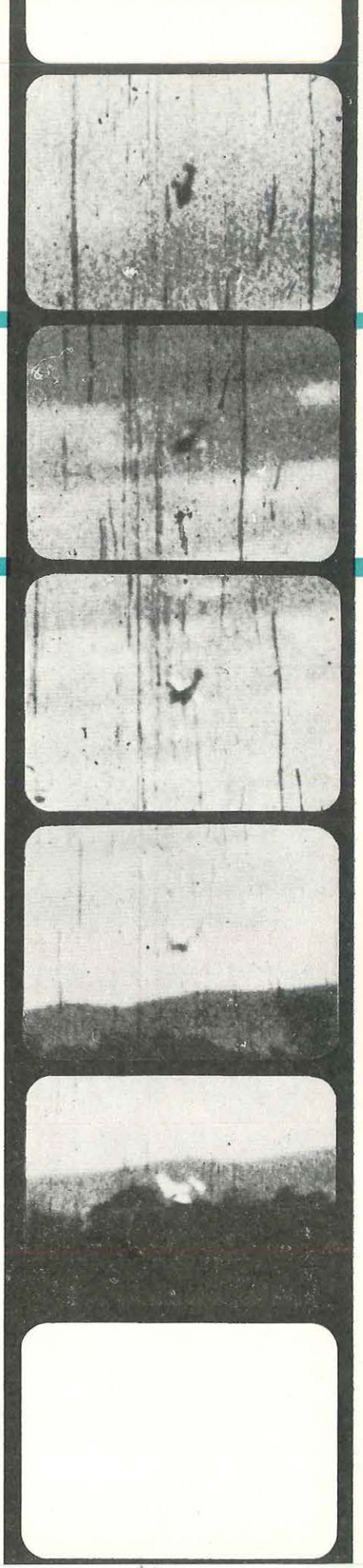
The two pilots then boarded the aircraft, occupying the same seats as before, and the engines were started. After the aircraft had taxied to the eastern end of the strip near the homestead, it took off normally into the west.

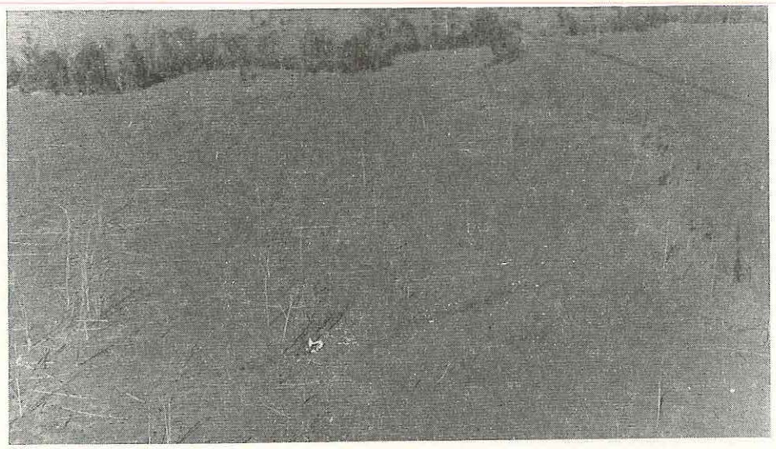
Climbing to about 700 feet, the aircraft flew a left hand circuit and, as previously arranged with the photographer, flew over the homestead from the east and began a run parallel with, and almost directly over the strip. As the aircraft reached the western end of the strip again, still at about the same height, it began a controlled barrel roll to the left. Completing the roll without any marked loss of height, the aircraft resumed straight and level flight until it was about a mile and a half beyond the western end of the strip. At this point, the aircraft was seen to zoom upwards suddenly and enter a stall turn type manoeuvre to the left, which resulted in it entering a very steep dive towards the ground. The aircraft's speed increased rapidly as it descended and its angle of dive gradually lessened as it began to recover from the dive. By the time it had dived to about 200 feet above the ground, it had almost regained a level attitude but was still descending rapidly. Shortly afterwards the aircraft passed out of sight behind trees. It did not reappear and sounds of impact followed.

Some of the witnesses drove at once to the scene of the crash and found the aircraft destroyed by impact forces and both occupants dead.

Examination of the scattered wreckage and ground marks showed that intial impact had occurred with the trunk of a dead tree, 40 feet above the ground. The tree had broken off at this point and the aircraft had continued for another 170 feet before striking the ground and disintegrating. A trail of wreckage was scattered for more than 500 feet, the main section coming to rest 340 feet from ground impact point. Analysis of the cine film record of the aircraft's final two and a half seconds of flight established that it attained a speed of 200 knots shortly before its impact with the tree, and that it would have been subjected to a positive load factor of 4.3g during the attempt to recover from the dive.

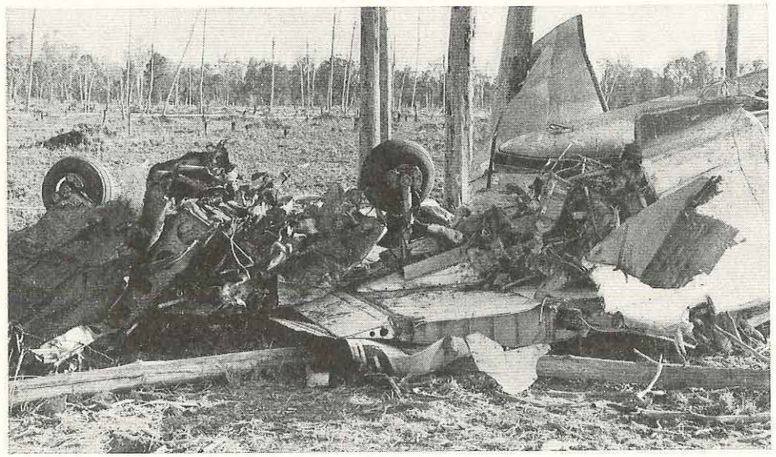
Although it was not possible to determine which pilot was flying the aircraft at the time, statements made by some of the passengers who had been travelling in the aircraft during the tour indicated that aeronautical behaviour of this sort would have been quite out of character for the private pilot who had occupied





Top: Aerial view of Aztec accident site showing wreckage trail. The point of impact is at the right of the picture.

Bottom: All that remained of the aircraft's structure. The severity of the impact forces is clearly evident from the degree of disintegration.



the left hand seat. The passengers variously described this pilot as "careful", "considerate", and "competent". On the other hand, there was evidence, some of it from the same passengers, that the pilot in the right hand seat was given to some impetuosity at the controls of an aircraft.

Whichever pilot was in fact flying the aircraft immediately before it crashed, the accident was undoubtedly the direct result of irresponsibility on the part of that person. It is hard to believe that anyone would indulge in aerobatics in a twin-engined aircraft of this type, especially at low level. The fact that such an accident can happen is an indication of how difficult it is to persuade some pilots that their privileges and responsibilities are to be taken seriously.

* * *

The second accident involved a Beagle Pup, at a Victorian aerodrome. The aircraft had been handed over to its operators, who were to act as distributors for the type, only the day before, when the aircraft's aerobatic capability was demonstrated by the highly experienced delivery pilot. After the aerobatic display, the delivery pilot made a short flight with the operator's manager and was somewhat concerned to find that, although the manager's private licence was correctly endorsed for the Beagle Pup, his general handling of the aircraft left much to be desired. After they had landed, the delivery pilot told the manager that he would need to do a number of hours training on the aircraft before undertaking any solo demonstration flying.

The following morning, the manager came to the aerodrome early, to begin a busy day of flying in the Pup. He taxied out for his first flight at about 0745 and a little later, after making a normal touch and go, the aircraft was seen and heard making a low pass over the aerodrome. This was followed by a steep climb and a series of very steep turns over the tarmac area at a height of about 350 feet.

The manager continued to fly the aircraft locally throughout the day, taking up in turn a number of different passengers and the other pilots who wished to try the new aircraft type. Two of the pilots who accompanied him on demonstration flights were experienced in aerobatics and, as well as handling the controls while the aircraft was airborne, they tried out several aerobatic manoeuvres. The manager, though obviously inexperienced in aerobatics himself, was clearly most impressed with the aircraft's performances in the hands of these pilots.

During a number of other demonstration flights throughout the day, the manager "buzzed" the field on several occasions and made steep climbs to demonstrate the aircraft's agility and performance. On one flight, when a former airline pilot was in the passenger's seat, the manager made a low pass over the field at high speed, then rotated the aircraft rapidly into a steep nose-up attitude. The passenger thought the pilot intended to execute a stall turn, but because of their low altitude and the pilot's limited experience on the type, the passenger demanded that he "put the stick forward". The pilot then completed a normal circuit and landing.

As the day drew on, although the manager remarked several times that he was very tired, and that the "constant aerobatics" were "very fatiguing", his enthusiasm for the aircraft and excitement with his flying seemed to mount.

By 1700 hours, the day's flying at the

Right: Though at first glance the Beagle Pup appears relatively intact, the high vertical deceleration forces of the impact are evident on closer inspection.

aerodrome was almost finished. The manager himself had flown nearly five hours in the Beagle Pup, and had given the impression to other members of the staff that he had done enough for the day. But about this time while the Beagle Pup, with its port side door open, was still standing on the tarmac in front of the operations room, the manager happened to be talking to a woman member of the company's office staff on the operations room verandah, and he invited her to come for a flight. She agreed to go on the condition that there would be no aerobatics and they boarded the aircraft. They taxied out and shortly afterwards took off on the runway into the south-east, climbing away steeply before commencing what appeared to be a normal circuit, with the aircraft standing well out from the field.

A few minutes later a Tiger Moth was in the final stages of an approach to land on the runway and, as it touched down, the Beagle Pup was sighted in the distance. The Pup also seemed to be on a normal final approach for the runway but soon afterwards was lost to view behind a rise which obscured the runway threshold from the tarmac area. The Tiger Moth had turned off the runway and was well clear, taxi-ing towards the tarmac area, when suddenly the Beagle Pup came into view from behind the rising ground, flying low and parallel with the runway at high speed. It passed the Tiger Moth and when about halfway down the runway, nosed up sharply and climbed very steeply.

Watchers on the ground expected to see the aircraft's nose lower to a more normal attitude and the climb away continue. Instead, the aircraft continued to climb into a near vertical attitude until, at a height of about 200 feet, it was approaching the stall. It then began a wing-over to the left. The aircraft turned through 180 degrees without losing much height, but it was now in a steep nose down attitude with very little airspeed. The aircraft dived, almost vertically at first, gaining speed and levelling out as it did so. But there was insufficient height for it to recover fully and when in an almost level attitude, it struck the ground with great force. The undercarriage collapsed under the impact, and the aircraft skidded to a stop. From the distance of those watching, the airframe seemed to have remained intact, but there was no sign of movement from within the cockpit.

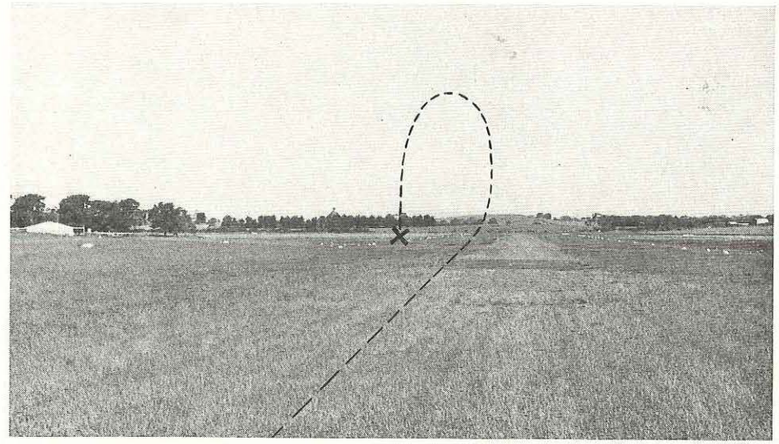
Those who had witnessed the crash, including the pilot and passenger of the Tiger Moth that had just landed, ran immediately to the aircraft to render assistance but, on wrenching open one of the cabin doors, they found both occupants dead.

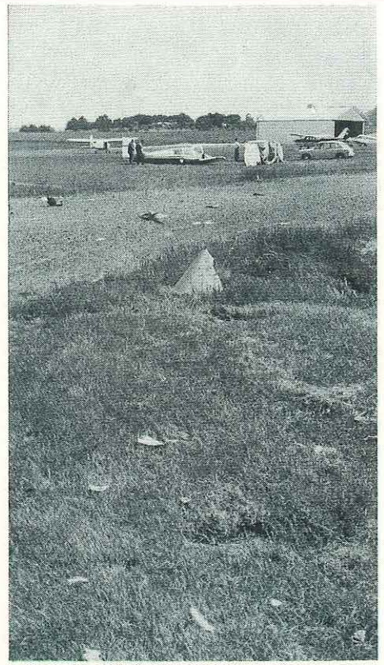
* * *

It was clear from the subsequent examination of the wreckage that there had been no defect or malfunction in the aircraft which could have contributed to the accident. The examination showed that the impact had produced extremely high vertical deceleration forces which had distorted almost the entire structure and had undoubtedly been responsible for the fatal injuries to the occupants.

The pilot, who was a middle-aged man, held a private licence endorsed for the Beagle Pup, but his experience on the type was minimal. The pilot had fostered the impression that he had a great deal of experience as a pilot of heavy air-

View looking along runway in direction of low run showing approximate final flight path and point of impact. The height at which the aircraft commenced the manoeuvre was estimated to be only 20 feet.





View of Beagle's wreckage trail as seen from point of impact.

craft, but enquiries made during the investigation did not indicate that his ability was consistent with such a wide background of experience. Indeed, there was evidence to suggest that his flying was rough and lacking in precision and that he was over-confident. Log book entries showed that his actual flying experience as a pilot was quite modest.

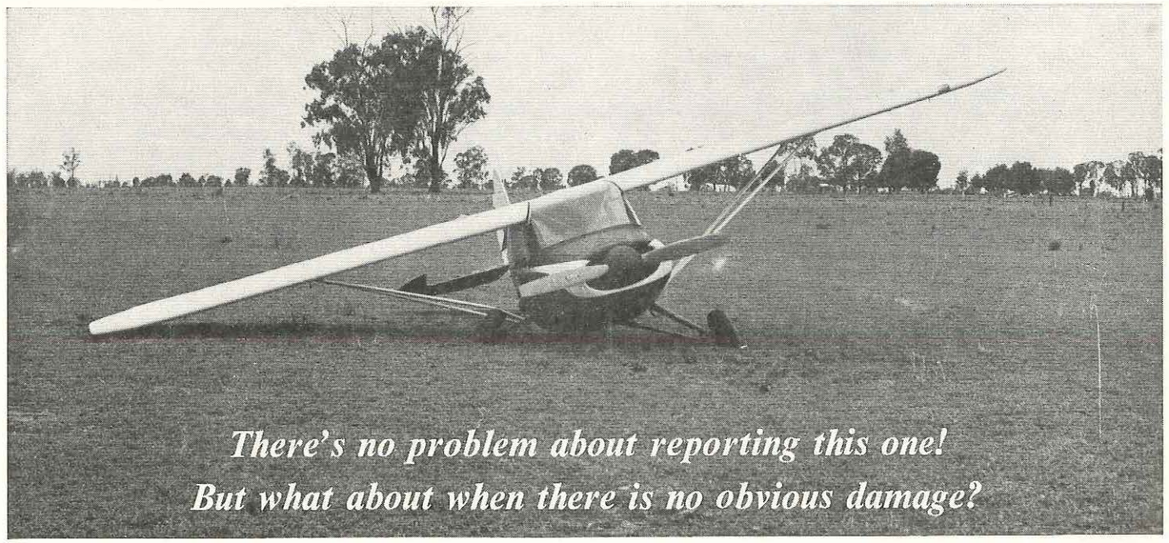
The evidence of the investigation all points to the conclusion that the combination of the pilot's particular temperament, his apparent desire to create an impression with the newly acquired aircraft, and the perhaps false level of confidence he had developed while flying the aircraft that day, led him to attempt a dangerous but spectacular manoeuvre, close to the ground. Unfortunately, for the pilot and his hapless passenger, as in so many cases of unauthorised low flying, the execution of the manoeuvre was beyond his ability and probably beyond the capability of the aircraft at the height at which it was performed.

Comment

It is well to reflect that the unfortunate pilots involved in these two accidents were probably little different from the majority of us. Whatever our temperament, most of us who fly light aeroplanes are sooner or later faced with the temptation to indulge in unauthorised low flying or to "play to the gallery" by attempting impressive feats of manipulative ability at low level. The "wing-over" or "stall-turn" type manoeuvre, following a low run in front of the audience, seems to have a particularly fatal attraction.

The circumstances of these two accidents, like those of the Cherokee crash reviewed in our January issue, provide subject matter for sober reflection on the results of yielding to such urges. Whether the indulgence happens to be the result of a spur-of-the-moment decision (which it often is), or whether it is the culmination of a history of increasingly flamboyant flying behaviour, the final result is usually the same. There is little solace for the individual in the distinction of becoming another significant statistic in the Department's accident records.

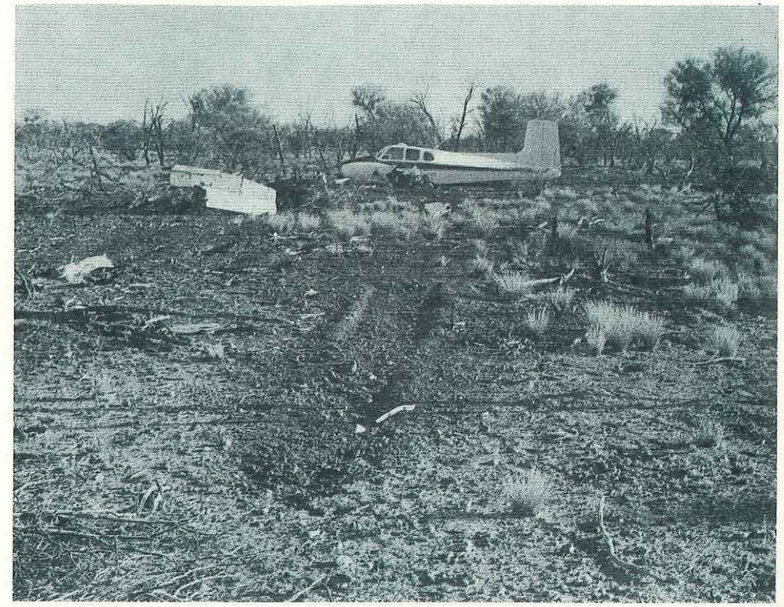
REPORT THAT HEAVY LANDING!



There's no problem about reporting this one!
But what about when there is no obvious damage?

Looking for Trouble!

Needless Crash Landing in Scrub . . .



ABOUT 40 minutes after departing from Alice Springs for a flight to a station property 150 miles to the south-west, and while cruising at 4,000 feet, the pilot of a Beech Twin Bonanza noticed a light intermittent vibration in the aircraft. The vibration seemed to be increasing in intensity and, suspecting that carburettor icing might be causing the trouble, the pilot applied carburettor heat for a minute or so. After noting that this decreased the manifold pressure indications about one inch and raised the carburettor air temperatures, he re-selected cold air and checked the magnetos of both engines in turn.

None of these measures seemed to affect the vibration, which had continued to increase in amplitude, and after about six minutes it had progressed to the extent that the instrument panel was shaking visibly and the movement could be felt through the control column. The pilot also noticed a noise, apparently in the rear of the cabin, which sounded as though the chain attached to the "air-stair" door was slapping the cabin wall.

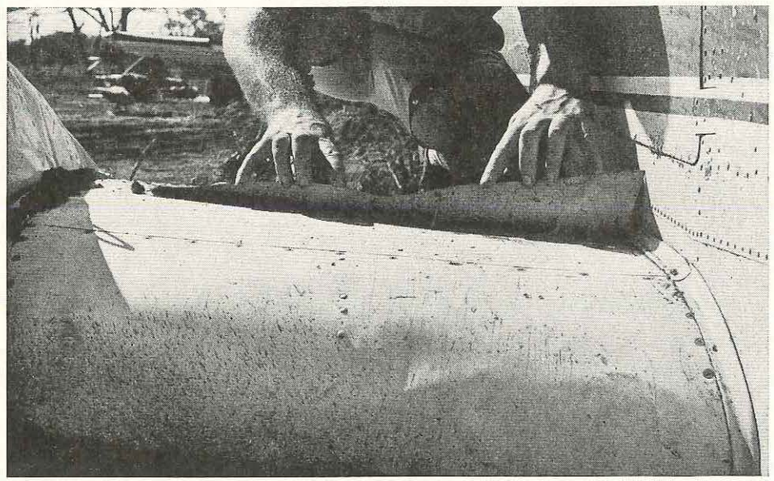
The pilot decided to return to Alice Springs, but after turning on to a reciprocal heading, he noticed that, although the aircraft was in a normal cruising configuration, with the undercarriage and flaps retracted and the engines at power settings of 31 inches of manifold pressure at 2,600 RPM, the indicated airspeed of 120 knots was 20 knots lower than it should have been. The pilot was unable to account for this loss in cruising speed and called Alice Springs Flight Service to report that he was returning because of an unidentified engine malfunction. Alice Springs immediately declared the Alert Phase of search and rescue operations and an airways clearance was passed to the aircraft.

The pilot then advised Alice Springs that he was changing to his company frequency to obtain advice on the engine malfunction. After talking to his company's engineers, the pilot again applied carburettor heat, but after about five minutes of engine operation in this condition, the vibration seemed unchanged and he was convinced that carburettor icing was not the cause of the trouble.

The pilot changed back to the Flight Service frequency and, in response to a query from Alice Springs, confirmed that he would be able to maintain height and make a normal approach and landing. On receipt of this information from the aircraft, the Alert Phase was cancelled.

The pilot next began a series of checks to isolate the cause of the vibration, intending to shut down the defective engine to prevent damage. He moved each mixture control lever in turn to the idle cut-off position but did not alter the positions of the throttles or the propeller pitch levers. The engine instrument indications remained normal during the checks, but the vibration seemed to lessen when the port engine's mixture control was moved to the idle cut-off position. The pilot also tried moving the fuel tank selectors to different positions and turned on the electric booster pumps in turn. The response of the flying controls remained normal throughout these checks, though the vibration was still severe enough to be shaking the instrument panel.

Suspecting that the port engine was the source of the vibration, the pilot again selected the port mixture control to idle cut off and wound on rudder trim to offset the asymmetric rudder load produced by the live starboard engine. Apart from the mixture control lever, the pilot again left all the other port engine



Top: View of accident site showing the aircraft as it came to rest with the port wing and tailplane torn off. The wheel tracks in the foreground are those of the salvage vehicle.

Bottom: The forward edge of the non-slip walkway showing its separation from the upper surface of the wing. The resulting turbulent airflow over the tailplane was probably responsible for the vibration which alarmed the pilot.

controls at the normal cruise setting of 31 inches of manifold pressure and 2,600 RPM, with the carburettor selected to cold air.

When the aircraft had been in this configuration for several minutes, he realised that the aircraft was continually losing height and noticed that the airspeed was now only 90 knots. Although the aircraft had been cruising at 4,000 feet on QNH when the pilot first began the engine checks, it had descended gradually to an indicated 2,300 feet. In the area in which it was flying, this meant that the aircraft was now only about 500 feet above ground level. The pilot therefore moved the port mixture control back to the rich position to re-start the engine, and advanced the throttles and propeller controls of both engines to the climbing power setting of 39 inches MP and 3,100 RPM. But instead of climbing normally as the pilot expected, the aircraft climbed only about 100 feet and then, still in the climbing attitude, remained in level flight at an indicated 90 knots.

During his attempt to restore climbing power the pilot had felt no asymmetric foot load or yaw of the aircraft, despite the fact that the rudder trim was still in the position to which he had adjusted it after closing down the port engine. The pilot then noticed a steep rise in cylinder head temperature and he lowered the aircraft's nose a little, leaving the engine controls as they were. The aircraft began to lose height again, and because of the type of terrain over which the aircraft was flying, and the fact that he now lacked manoeuvring height, the pilot concluded that his safest course of action was to make a forced landing straight ahead.

Lightly timbered tea tree and salt bush country lay below the aircraft's flight path and the pilot decided that he would attempt to stall the aircraft into the tree tops with the undercarriage and flaps retracted. After transmitting a MAYDAY call to Alice Springs, he waited until the aircraft had descended close to the tops of the trees, then cut the mixture controls to idle cut-off, retarded both propeller pitch levers to the feathered position, turned off the master switch, and held the nose up. The aircraft struck the tops of two trees and descended rapidly in a nose-up, laterally-level attitude. The port tailplane was torn off against a tree stump as the aircraft itself fell to the ground heavily. The port wing collided with a tree and was torn off, slewing the aircraft to the left and it finally came to rest, damaged beyond repair, after sliding for nearly 180 feet. The pilot, who was the sole occupant, sustained only a small abrasion on his nose.

* * *

Careful examination of the damaged aircraft failed to associate the source of the vibration with any failure or malfunction of the engines, flight controls or aircraft systems. No doors, hatches, access panels, or other sections of the airframe were missing, and apart from impact damage, the engines and propellers should have been capable of functioning normally. But on the starboard wing inboard of the engine nacelle, the non-slip walkway, which is normally secured to the upper surface of the wing with adhesive, had separated from the wing at its forward edge. It seemed likely that this section of the wing-walk, protruding into the slipstream, could have created a turbulent airflow over the starboard tailplane and caused the vibration experienced by the pilot.

However, the additional drag produced by the loose wing-walk would clearly have been insufficient to account for the loss of performance that led the pilot to believe the crash landing was inevitable. In view of the fact that, before beginning to experiment with the engines, the pilot had reported he would be able to maintain height and make a normal approach to land, it was apparent that, although the vibration led to the actions that culminated in the accident, it was not itself responsible for the accident.

* * *

The pilot was inexperienced on the aircraft type, having been endorsed on it only nine days previously and at the time of the accident, his experience on the type amounted to 19 hours. His total experience was approximately 1,500 hours. of which nearly 300 hours had been logged on light twin-engined aeroplanes.

When the pilot's initial shut-down checks on each engine led him to suspect that the vibration was coming from the port engine, he again shut it down by moving the mixture control to the idle cut-off position, and unaccountably left it in this condition for several minutes. Although he took the trouble to trim out the asymmetric load on the rudder pedals, he did not attempt to maintain height by increasing power on the starboard engine. The result was that the aircraft lost both speed and height.

According to the pilot, the aircraft had descended to a height of about 500 feet above the ground when he realised it was getting too low and he then attempted to re-start the port engine and apply climbing power to both engines. But as the aircraft did not yaw noticeably and the pilot felt no asymmetric foot load in the previously-trimmed rudder pedals, it seems possible that the port engine did not re-start and produce any substantial power. It had been in idle cut-off, with the throttle in the cruise position, for several minutes and might well have been too cold to pick up immediately.

But even assuming this engine did not deliver any power, the pilot's actions and decisions from this point on are difficult to understand. A height of 500 feet is normally considered a reasonable one from which to execute a missed approach with one engine feathered, and the undercarriage and flaps fully extended. In this case one engine was windmilling, but the aircraft was at 600 feet and the undercarriage and flaps retracted.

The pilot said that, having applied climbing power of 39 inches MP and 3,100 RPM, the aircraft climbed only 100 feet, then flew level at an airspeed of only 90 knots. He apparently accepted this situation as unalterable, yet he had 600 feet in which to gain airspeed and still had full power available on one engine. Had he made use of this height and power to gain airspeed, the engine temperatures would probably have remained within limits and the aeroplane should have climbed. According to the performance specifications for the aircraft type, it should have been capable of climbing with one propeller windmilling and the live engine at rated power of 44 inches MP and 3,200 RPM. Even so, in the situation that was developing, it seems extraordinary that the pilot did not use full power earlier to try and avert the course of action he subsequently took.

* * *

It was clearly evident from the investigation that the pilot's inexperience and unfamiliarity with the aircraft type, coupled with a general lack of knowledge of multi-engine aircraft handling techniques, had contributed in no small measure to the accident. This deficiency first showed itself in the procedure he adopted to try and isolate the source of the vibration. It is of course good practice (and much kinder to the engine concerned) to use the mixture control, rather than the throttle, to simulate a sudden engine failure during asymmetric flying training. But in this instance, the use of the mixture control to shut down each engine in turn to see if it was producing the vibration went a long way towards defeating the purpose of the exercise. The correct and far more effective method would have been to carefully close the throttle of the engine concerned, pause long enough to see if the reduction in power and manifold pressure had affected the vibration, and then re-open the throttle.

It was also evident that the pilot's later action in closing down the port engine for several minutes with the mixture control alone, leaving the other engine controls in their cruising RPM settings, and waiting until the aircraft was getting dangerously low before attempting to re-start it, had far more serious consequences. It was this that led to the loss of height, airspeed and aircraft performance, and finally convinced the pilot he had no alternative but to put the aircraft down.

The accident serves as a clear demonstration of the fact that piloting a light twin-engined aeroplane in a professional manner is a very different matter to flying single engined types, and requires a sound understanding of the techniques and procedures peculiar to the operation of all multi-engined aircraft in asymmetric flight. Not only must the pilot-in-command be thoroughly familiar with the performance and control characteristics of his aircraft in its various configurations, but he must ensure that if any defect develops in flight, the aircraft does not unnecessarily lose height which might be impossible to regain.

The probable cause of the accident was that the pilot who was inexperienced on the type, was not sufficiently familiar with the aircraft's performance nor with the relevant operating procedures.

NIGHT APPROACH JUDGEMENT

DC-9 Undershoots

While making a night visual approach to land at Louisville, Kentucky U.S.A. a DC9 touched down short of the runway where the ground sloped downwards from the aerodrome level. The aircraft bounced, touched down again on the runway and finally came to rest with its back broken. None of the 94 occupants were seriously injured.

The aircraft was making a scheduled passenger flight from Chicago, Illinois, to Atlanta, Georgia, with intermediate stops at Louisville and Lexington, Kentucky, and had departed Chicago at 2013 hours. At 2101 hours, Louisville approach control established radar contact with the aircraft. It was then vectored on to a heading that would intercept the inbound ILS localiser course to runway 29, and cleared for an ILS approach.

The aircraft's landing weight had been computed at 92,000 lbs giving an approach reference speed of 123 knots. The final approach, made at 130-132 knots, with 50 degrees of flap extended, seemed normal in all respects to the crew, but the aircraft did not seem to flare properly and it struck the sloping ground heavily with its main undercarriage 156 feet short of the threshold. The wheels remained on the ground for 73 feet before the bounce took effect, then the aircraft became airborne again, landing the second time on the runway 262 feet past the threshold. It finally came to rest in the condition shown in the photograph, 4457 feet past the threshold.

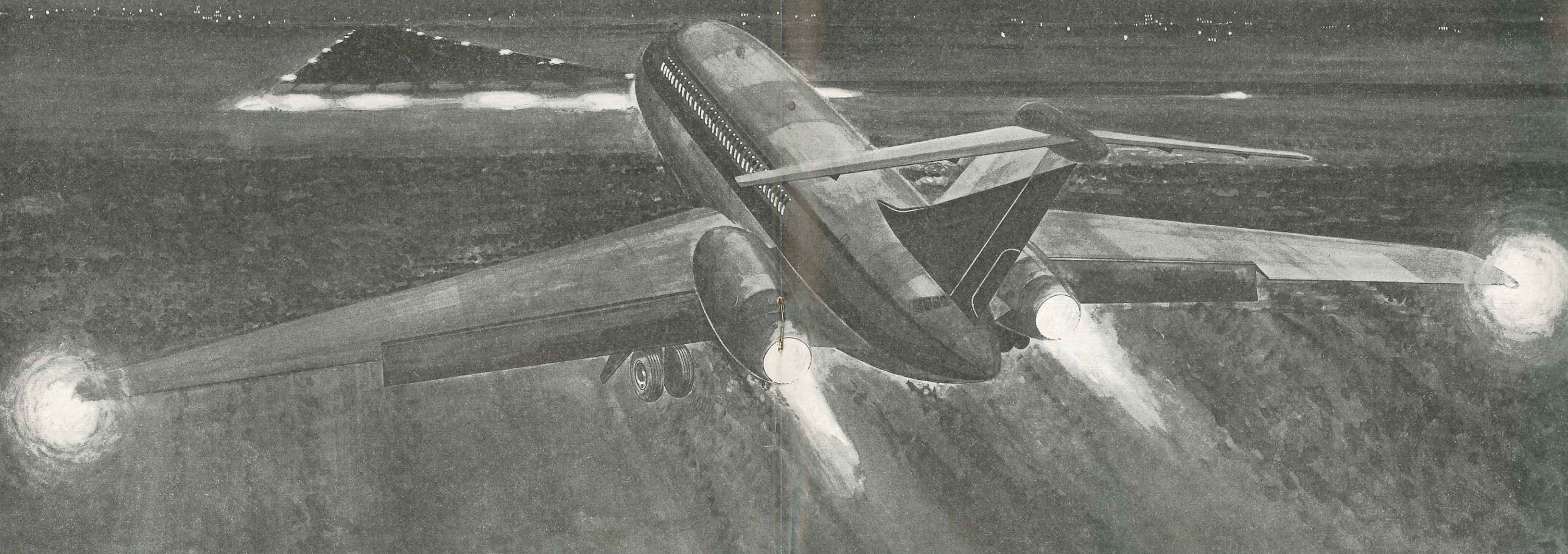
* * *

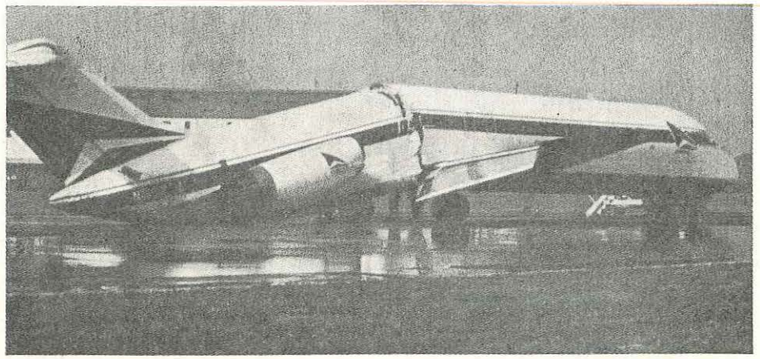
Examination of the aircraft showed that the fuselage had buckled and fractured symmetrically immediately aft of the wing, between fuselage stations 737 and 794. The tailcone rested on the runway and its underside had been worn flat with heat discolouration visible on both sides. There was no apparent damage to the undercarriage or its supporting structure but both port undercarriage tyres had flat spots, which had penetrated the casings, worn on them.

Examination of the aircraft's instruments and controls pertinent to the approach, showed that all were functioning within prescribed tolerances and there was no evidence of any aircraft system or component malfunction. The aircraft had never been subjected to excessive airframe loads which could have induced the fuselage failure.

The loads and forces necessary to cause the failure sustained by the fuselage were analysed by the manufacturers, and it was concluded that the increase in effective sink rate, resulting from the landing on the upward slope, was the primary cause of the damage. If the aircraft had landed on the level runway at the same actual rate of sink, it would probably not have been damaged.

Both the flight data, and cockpit voice recordings, were recovered from the aircraft in an undamaged condition. Because of a very high level of





The DC-9 with its back broken as it came to a stop on the runway.

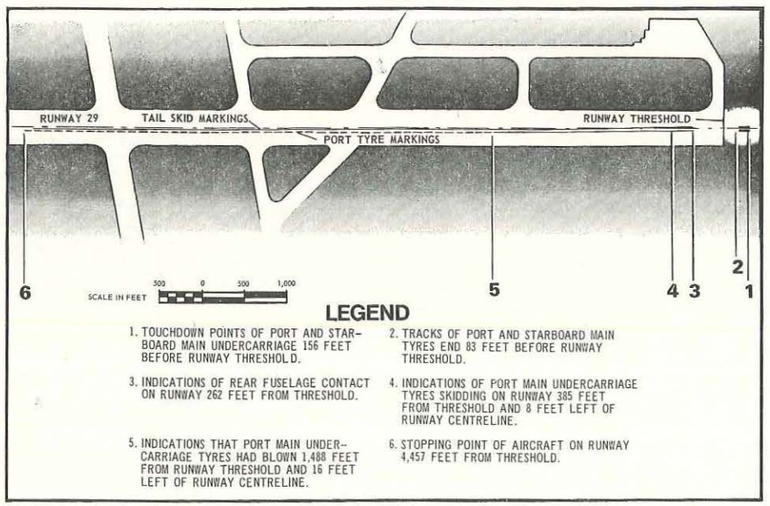


Diagram of approach end of runway showing point of touchdown and impact marks.

background noise on the cockpit voice recording however, no useful information was available from it. Examination and analysis of the flight data record indicated that though the aircraft was established on final approach at a uniform rate of descent, it was constantly below the ILS glideslope path. This finding was confirmed by the evidence of an eyewitness who saw the aircraft making its final approach.

The runway on which the aircraft was landing when the accident occurred is 7,200 feet long and 150 feet wide. The airport's elevation is 497 feet. The runway has no prepared area short of the threshold, and the ground at this point slopes down from the aerodrome level at a gradient of approximately five per cent. The runway is served by an instrument landing system and is now equipped with standard high intensity runway lighting, but at the time of the accident no approach lighting was installed.

The aerodrome is located five miles south of Louisville, which as seen from the air at night, is a sprawling city with an irregular complex of lights. The approach to runway 29 passes for the most part over a varied distribution of lights, but the sloping terrain between the runway threshold and a four lane highway, 1,000 feet to the south-east of the aerodrome, is devoid of lights.

At the time of the accident, the weather was fine with a visibility of seven miles, and the wind was blowing from the north-west at eight knots. Both the captain and the first officer were experienced DC9 pilots and familiar with the airport. The captain had a total of 5,600 hours experience, and had been flying regularly into Louisville for the past eight years.

* * *

Because of the absence of any factor such as turbulence, poor visibility or aircraft emergency, which could have contributed to the accident, the investigation was concentrated on the circumstances and conditions under which the final approach path was flown.

It is a well recognised fact that with large aircraft, the descent path described by the main undercarriage during an approach differs from that described from the pilot's eyes, because he is placed above and ahead of the main wheels. The path described by the main wheels terminates in the touchdown point, but the path followed by the pilot's eyes intersects the runway at the aiming point. During a visual approach, the pilot judges his position above or below the glide path by reference to the horizon and the aiming point he has selected on the runway. As the aircraft approaches the threshold, the pitch attitude of the aircraft is changed and a new aiming point on the runway is selected. This aiming point is always some distance down the runway from the touchdown point.

As a result of training and experience, a pilot develops a visual frame of reference which allows him to conduct safe conventional approaches to flat terrain. Many successful approaches are made by effectively maintaining a "visual null" (i.e. no apparent change in the visual angle). A pilot may "fly the null" so consistently that when deceptive conditions are introduced, such as irregular light patterns, lights on upward sloping terrain, or other topographical features, a lower approach path may be flown unintentionally, resulting in a touch-down short of the runway.

As a result of a study undertaken some time ago on the visual judgement of pilots during approaches to land, Dr. Calvert of the Royal Aircraft Establishment in the United Kingdom wrote, "The brain interprets the two dimensional perspective image in the retina, selecting the possible meaning it may have in the light of other data available to it. If the wrong meaning is attached to the visual scene, then so-called illusions occur. The most important features of the visual field are the plane of the ground, and objects of known size on the surface".

Because the vertical situation is difficult to assess accurately, the pilot usually tries to check his judgement of it in every way he can. One way of checking this at low altitudes is to estimate the height of features such as trees, houses, roads, and to a lesser extent, the size and spacings of approach lights, where they are installed. Applying his experience, a pilot sets this height against the estimated range from touch-down. The probability of a misjudgement, resulting in an accident, increases if the terrain has a pronounced slope, or if there is some other peculiarity which gives a false impression of the position of the horizon.

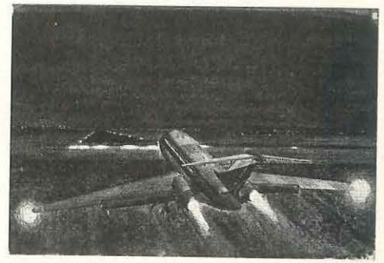
In subsequent studies, Dr. Calvert concluded that if landing approaches were to be conducted with safety in jet aircraft, a more positive method of determining the descent path during an approach was essential, even in good visual conditions. Other studies confirmed this opinion and led to the development of the visual approach slope indicators that are now installed at many major airports throughout the world, particularly where they are not served by an ILS.

In the case of this accident at Louisville, a complex pattern of lights from residential and commercial areas provided height reference between the ILS outer marker and where the four lane highway traversed the approach path, 1,000 feet from the threshold of the runway. But between this and the runway threshold at the time of the accident, there were no fixed lights on the rising terrain and a pilot making a visual approach had to transfer his height judgement to the runway and the runway threshold lighting complex.

The ILS serving runway 29 at Louisville provides a ground clearance of 130 feet at the point where the approach path crosses the four lane highway and, had the aircraft been stabilised on this glide slope, its wheels would have been about 50 feet above the ground when the aircraft arrived over the runway threshold. It was evident that the pilot did not use this ILS guidance, but relied upon visual reference during his approach to land.

Federal Aviation Regulations provide that turbine powered aircraft, and other large aircraft, approaching to land on a runway served by an ILS, shall if the aircraft is ILS equipped, fly at an altitude at or above the glideslope between the outer marker and the middle marker. This procedure was adopted when past experience had shown that there was a need for high performance aircraft to establish a constant flight condition during a final approach to land. The approximate three degree glideslope provided by the ILS establishes this constant approach flight condition and assists the crew in maintaining the proper approach profile. The National Transportation Safety Board concluded that the cause of the accident was related to the crew's operational technique, the absence of adequate lighting in the approach zone and the sloping terrain short of the runway threshold.

Probable Cause



The National Transportation Safety Board determined the probable cause of this accident was the pilot's misjudgement of altitude due to the absence of sufficient lights in the approach area, misleading information produced by deceptive sloping terrain, and that the pilot did not position the aircraft on the ILS glideslope while he was establishing the final approach profile.

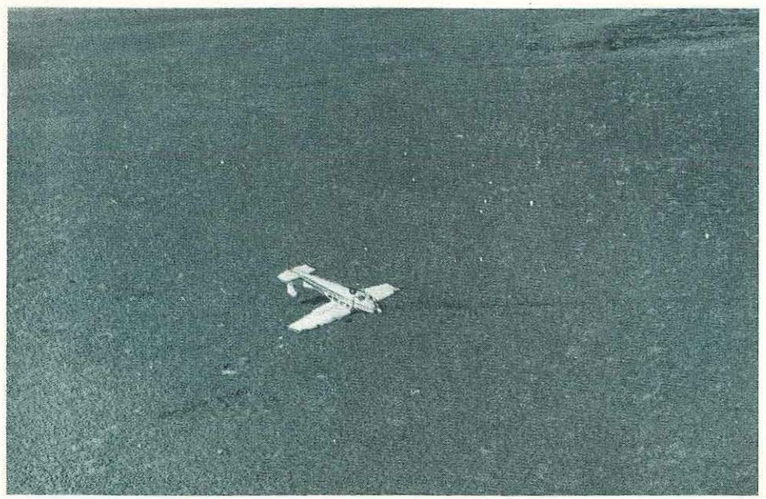
(Based on report published by National Transportation Safety Board, U.S.A.)

—The Search Began at First Light

THE safety poster reproduced here was first published four years ago this month, in Aviation Safety Digest No. 55. It was subsequently included in the fourth edition of the Visual Flight Guide. Unfortunately for the owner-pilot of the battered and overturned Cessna 185 depicted on these pages, he had apparently not seen it or if he had, its message had made little impression.

The pilot was a farmer from the Bunbury district of Western Australia, who held a private licence with a little over 100 hours flying experience. When a friend, who had earth-moving machinery working at a road construction camp in the Paraburdoo area 625 miles north of Perth, mentioned that he would be visiting the camp-site to supervise repairs to his equipment, the pilot offered to fly him up to Paraburdoo in his Cessna 185. The pilot had not flown north of Perth before and saw that the trip was an opportunity to further his experience.

The four and a half hour flight to the Paraburdoo camp-site, made on a Saturday, went according to plan and the men stayed in the Paraburdoo area helping to service the earth-moving equipment for the next two days. They intended returning south via Meekatharra and Narrogin on the Monday, but further trouble with the machinery made it necessary instead to fly to Port Hedland to obtain some spare parts. Without consulting the VEC 11 Chart which he was carrying in the aircraft's navigation bag, the pilot and his friend took off for Port Hedland NOSAR, NO DETAILS. Subsequently, as a result, the aircraft entered the Port Hedland control area without a clearance. After landing, the pilot was required to make a written report on the incident and was afterwards given a thorough briefing on the extent of the controlled airspace at Port Hedland and the procedures to be followed when operating into it. In the meantime, his companion went into town to collect the machinery parts.



The missing Cessna upside down on the gibber plain, as located by the search aircraft, two days after the accident.

Later, at about 1550 hours, the pilot submitted a NOSAR flight plan for his return flight to the Paraburdoo camp-site, showing an ETD of 1630 hours. The pilot had been given a copy of the area forecast, but his flight plan showed no wind calculations or any intermediate check points. The time interval to the camp site was 75 minutes and, as last light at the destination was 1800 hours, there would be only 15 minutes of daylight to spare.

The passenger was delayed in town and did not arrive back at the aerodrome until some time afterwards. When he did so, the parts he brought with him proved to be heavy pieces of cast steel, some of them quite large. The pilot did not weigh them, but estimated the total weight as between 200 and 300 lbs. In order to keep the load well forward, he placed them in the cabin under the two front seats, but did not restrain their movement in any other way. More time had been lost in loading, but at last all was ready and the men boarded the aircraft and departed.

Because he had broken his watch at the camp-site before leaving for Port Hedland, the pilot did not note the time of departure but believed it was still within the allowance he had made when preparing the flight plan. About twenty minutes later however, as the aircraft was approaching the Pilbara mining centre some 50 miles south of Port Hedland, the pilot noticed the westering sun closer to the horizon than he expected. On checking his companion's watch, he found it was already 1730 hours. He then realised that, when they had departed, it was about an hour later than he thought and that they had no hope of reaching the camp-site before dark. The pilot considered returning to Port Hedland, but in view of the embarrassment he had experienced there earlier in the day, decided to go on to Wittenoom which he estimated he could reach before dark. Wittenoom was a little to the east of the aircraft's track, 112 miles south of Port Hedland.

Shortly afterwards, Port Hedland Flight Service called the aircraft on VHF, to point out that the flight could not reach Paraburdoo until after last light. The pilot replied that he was diverting to Wittenoom but when Port Hedland asked the aircraft for its ETA Wittenoom, they were unable to read the pilot's transmission and requested him to call on HF. This the pilot did, but although his HF receiver was working, he found that he was unable to transmit on this frequency.

A little later, as the sun was setting, the pilot sighted in the distance what he believed were the ranges to the south of Wittenoom and he descended from his cruising height of 6,000 feet, hoping to see the lights of Wittenoom. He attempted to pin-point his position in relation to Mumibillina Bluff, but in the fading light he was uncertain of its appearance. The pilot then saw that although the Hamersley Ranges were lying to port of his track, the compass was indicating 150 degrees, apparently having been affected by the heavy ferrous metal load in the cabin. The pilot estimated that the aircraft's heading was now 240 degrees and turned on to what he believed would have been a southerly heading, but the compass did not move. Realising his position was now uncertain, he continued to scan the distance ahead for the lights of Wittenoom, but when his view of the Hamersley Ranges, now his only means of position fixing, faded into the increasing gloom, the pilot decided that he would have to make a precautionary landing and continue the flight in the morning.

The country over which the aircraft had been flying was rugged with low hills and valleys offering little prospect of a successful landing, but in the dusk the pilot sighted a large, comparatively flat area about two miles wide. He descended and made a low run across it and the area appeared to be gibber plain country dotted with spinifex and low bushes. Selecting what seemed to be a suitable landing run, the pilot made a precautionary type of approach with full flap and touched down at about 40 knots. But in that moment, the pilot saw that the surface was much rougher than it had appeared from the air and that what he had taken to be low bushes in the fading light, were in fact sizeable boulders. After running for only 20 feet, the starboard landing wheel struck a boulder and broke off. The spring steel undercarriage leg gouged a furrow into the ground, and after the aircraft had bumped and skidded for a further 100 feet, it somersaulted over on to its back.

* * *

At Port Hedland in the early hours of the morning, the Flight Service Unit received a telephone call from the worried manager of a tractor firm in the town. The manager explained that the passenger travelling in the Cessna had not arrived at his destination and he had had no communication from him. Checks were begun and when it was learned that the aircraft had not landed at Wittenoom the night before, the Uncertainty Phase was declared. Further checks at a number of other air strips in the area were made, but when nothing more had been heard of the aircraft, the Distress Phase was declared and 14 aircraft were alerted to search the area in which it was considered the missing Cessna could have come down.

The search was carried on throughout the day without result, and resumed at first light the following morning. Shortly after 0800 hours, as a Baron aircraft was completing the final search leg of its allotted area, its crew saw a flash of reflected sunlight some distance to the south of their position in an adjoining search area. The aircraft flew over to investigate and found the missing Cessna on its back with its two occupants standing nearby, obviously not badly hurt. Another aircraft, carrying a torpedo, was dispatched to drop food to the survivors and arrangements were made for a helicopter to fly to the crash site from Port Hedland to pick them up. The helicopter landed at the accident site just after 1100 hours and reached Port Hedland again with the survivors two hours later.

* * *

The site of the crash proved to be forty nautical miles north-north-west of Wittenoom. The aircraft carried no water or survival equipment of any kind but, fortunately for the occupants, it was the middle of the "wet season" and there was plenty of drinkable surface water lying in nearby water courses. The occupants also had with them a small quantity of barley sugar.

Despite the heavy unrestrained load in the cabin, the pilot and his passenger sustained only minor cuts and bruises when the aircraft overturned. They got out quickly and, in the dark about half an hour later, removed the battery from the inverted aircraft and tried to operate the HF radio to report their position. Although the receiver seemed to be working satisfactorily they were still unable to transmit.

The following morning they lit a signal fire by shorting the battery on to a fuel soaked piece of cloth, as they had no matches with them. By 0945 hours however, when they still had not been able to make any contact on the radio they decided to leave the aircraft and walk south-west towards some lights they had seen during the night. After laying out a ground signal to indicate which way they had gone, they walked for about six miles, but at 1400 hours they decided that the lights they had seen in the night were the flames of a bush fire that was burning in the distance. They set out to return to the aircraft and at 1530 hours, on the way back, heard a search aircraft in the distance, but it was much too far away to be able to see them. Thoroughly exhausted, they finally arrived back at the crash site about half an hour after dark and slept the night in the cabin.

The next morning, when they saw a search aircraft flying a pattern to the north of their position, the pilot used one of the main cabin side windows as a heliograph to attract its attention.

* * *

If ever there was a case history that demonstrated that accidents don't "just happen" but are the culmination of a chain of unfavourable events and circumstances, this one does. In this case, the chain was formed by a series of factors which, for the most part, could be listed under the general headings of "inadequate flight preparation" and "lack of planning".

The pilot was inexperienced both in flying generally and with the remote area in which he was operating. His aircraft carried no survival equipment, water, matches or survival beacon, yet he had set out on the flight in the first place without properly ensuring that his HF radio equipment was serviceable. When he decided to fly on to Port Hedland from the camp site, he did not make any attempt to study or to refer to his VEC, though he knew there was controlled airspace at his destination. His flight planning for the return flight from the camp site was meagre in the extreme, and made no allowance for wind or for checking the progress of the flight in relation to recognisable land marks. Despite the fact that the flight was to be made into a remote area late in the day, with no survival equipment on board, the pilot still elected to proceed on a NOSAR basis.

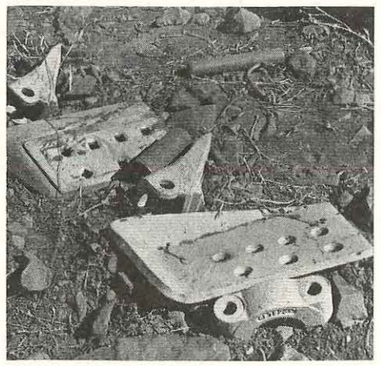
When his passenger arrived with the heavy load of ferrous metal parts, the pilot gave no thought to the possibility that they would disturb the compass, and though his flight plan showed that he would have only 15 minutes daylight to spare at his destination at the end of a 160 mile flight, he did not bother to check the time before departing, and apparently did not record his departure time after take-off. Although he was only 20 minutes out of Port Hedland when he realised how late it was, he allowed his experience earlier in the day to influence him against returning and instead, attempted to divert to Wittenoom, which he had never visited before, and which, even at the most optimistic estimate, he could barely reach before last light. It also seems that the pilot made no attempt to fly a compass heading from the time he left Port Hedland, but merely "track crawled" with the aid of his WAC Chart. As a result, he did not notice that the compass was reading incorrectly until it was too late to remedy the situation!

Perhaps the best that could be said for the owner of the aircraft was that, as a pilot he was probably a good bushman! Though, when it literally came to the "crunch", he applied his accumulated practical experience and common sense and put the aircraft on the ground while he still had some light to see what he was doing, thereby abiding by the warning in the "punch line" of the Digest poster, all the events that led up to this final denouement were the very embodiment of the sort of situation the poster was designed to prevent. Similar situations, together with detailed advice on the problems peculiar to flights in the remote areas of Australia, have been the subject of discussion time and again in the pages of the Aviation Safety Digest. As well, this advice has been widely circulated in summary form in the Digest supplement, "Hints on Flight Planning and Navigation in Remote Areas".*

One cannot but wonder what sort of training the pilot originally received, and what his aeronautical environment had been since obtaining his licence. As has been found so often in accidents resulting from navigational errors or shortcomings, the pilot seems to have tried to operate his aircraft with an "aerial driver" philosophy, rather than with a proper "pilot-in-command" concept of his responsibilities. In this case, the pilot as well as his passenger, was fortunate enough to emerge from his experience comparatively unharmed and will no doubt profit from it. But as the accident discussed on the following pages shows so clearly, not all exponents of this philosophy are given the same chance.

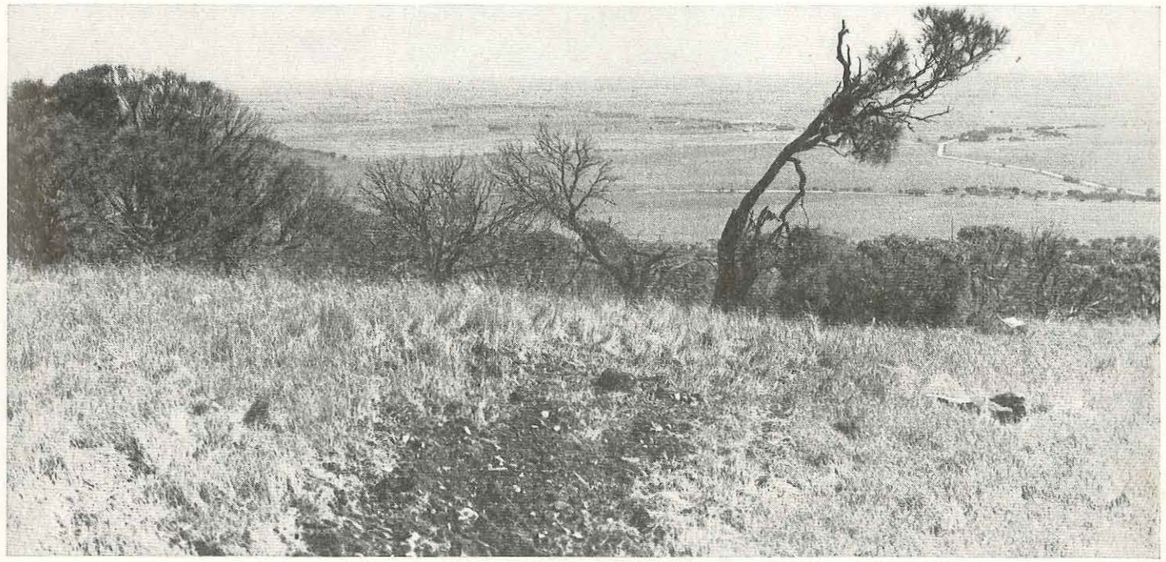
Top: The extremely rough surface of the area on which the pilot chose to land. The starboard wheel broke off when it struck the large boulder in the foreground.

Bottom: Some of the heavy ferrous metal spare parts that were carried in the aircraft. This cargo, stowed under the front seats, probably affected the aircraft's compass.



** Copies of this supplement are still available and may be obtained by writing to the Editor.*

Towards the end of a NOSAR private flight from Coober Pedy to Parafield, South Australia, a Cessna 172 flew into the Hummock Range north of St. Vincents Gulf and was destroyed. Both occupants were killed. At the time, the hills were enveloped in cloud and a strong westerly wind was blowing.



Descent into Solid Cloud

THE aircraft belonged to an Adelaide opal buyer who used it regularly to visit the opal fields at Andamooka and Coober Pedy. The owner-pilot, with his wife as passenger, had departed from Parafield the previous day and, after refuelling at Port Pirie, had flown to Andamooka where they made a brief stop. They then continued to Coober Pedy, where the pilot spent the afternoon and evening transacting business, and stayed overnight at a motel.

The pilot and his wife were up at 0500 hours the next morning and were driven to the aerodrome in time to depart again for Parafield as soon as it was light enough to do so. As was his practice, the pilot did not first obtain a weather forecast or prepare any plan, and after he and his wife had boarded the aircraft, it was seen to taxi out and take off in the direction of Adelaide at about 0600 hours. The time of beginning of daylight at Coober Pedy that day was 0618 hours.

At 0920 hours the aircraft landed at Port Pirie, and was refuelled again with 22 gallons of avgas. The weather at Port Pirie at the time was fine and clear, but further to the south it was poor under the influence of a strong, moist, westerly airstream. Although the pilot had not obtained a forecast, he apparently realised that conditions would deteriorate as he continued southwards, and mentioned to the refuelling agent that if the weather "closed in", he would land at a private airstrip 12 miles north of Bute, near Port Broughton. While on the ground the pilot also told the refuelling agent that he was in a hurry to get back to Adelaide, and asked the agent to telephone his home in Adelaide to arrange for them to be met at Parafield at 1045 hours. This the agent did while the aircraft was departing from Port Pirie again at about 0945 hours.

Later that afternoon, a friend of the pilot's, who had driven to Parafield airport to meet the aircraft, telephoned Adelaide Flight Service to report that it had not arrived as expected, and that he had already checked that it had departed from Coober Pedy that morning. After a number of checks by Adelaide Flight Service, it was learned from the agent at Port Pirie the aircraft had been refuelled there that morning and that it had left for Parafield at 0945 hours. The Alert Phase was introduced and, when it was not possible to contact the owner of the private airstrip near Port Broughton to learn if the aircraft had landed there, the Distress Phase was introduced and an aerial search for the missing aircraft was begun. At 1750 hours that afternoon, the pilot of one of the search aircraft reported that he had sighted wreckage on the western slopes of the Hummock Range north of St. Vincent's Gulf.

Because it was late in the day, the pilot offered to land at nearby Snowtown and escort the local police and ambulance party to the scene of the wreckage. The party subsequently reached the site of the crash soon after dark, and positively identified the wreckage as that of the missing aircraft. Both occupants had obviously been killed when the aircraft struck the hillside.

* * *

The aircraft had struck the ground heavily in a shallow nose-down attitude,

The main wreckage of the Cessna, with both wings torn off, as it came to rest on the down-slope of the hill. The initial impact point, shown in the photograph on the previous page, was higher up the slope.

on the north-western slopes of the Hummock Range, immediately to the south of the Barunga Gap at an elevation of 1,050 feet AMSL. Although the first impact mark had been made by the starboard wing tip, the main impact had been taken on the nose. The aircraft had disintegrated, and the wreckage had bounced and skidded downhill in a westerly direction until it came to rest against a clump of trees. Examination of the wreckage indicated that the aircraft was intact at the time of impact and there was nothing to indicate that any abnormality could have contributed to the accident. It was also evident that the engine was delivering substantial power at the time. The mode of impact and disposition of the wreckage indicated that the aircraft was under control when it struck the hillside.

No maps, charts, flight plan, navigation log, or navigation equipment were recovered from the accident site, and it was not possible to determine the time of the crash from any evidence found in the wreckage. The aircraft was not equipped with a clock and the impact had not stopped the watches worn by the occupants. Most of the contents of the fuel tanks had spilt or been drained from the tanks by broken fuel lines, and the flight time from the last refuelling operation at Port Pirie could not be calculated. There were no eye witnesses to the accident itself, but at about 1055 hours that morning the wife of a farmer working in the kitchen of her home three miles north of the accident site, heard a loud thud following by a scratching and scraping noise which at the time she took to be a car accident. Subsequent enquiries established that no motor accident had occurred in the area that morning, and it seems probable that the noise was in fact the sound of the aircraft's impact with the hillside.

Evidence obtained from a number of farmers and other residents in the area established beyond doubt that the weather in close proximity to the accident site was very poor during the morning of the accident and that the tops of the Hummock, as well as the Barunga Range immediately to the north, were shrouded in low cloud with associated drizzle, for most of the day. As well as this, evidence provided by the pilots of four other light aircraft which had operated in or near the Snowtown area at different times during the morning of the accident, confirmed the fact that the ranges were enveloped in cloud and indicated that the weather was generally poor on the direct Port Pirie—Parafield track, east of the ranges. However to the west of the ranges, towards Spencer's Gulf, conditions rapidly improved. The area forecasts issued during the morning of the flight indicated westerly winds of 40 knots and that south of latitude 34 degrees south (i.e. 45 miles south of Port Pirie), there would be three to four eighths of stratus cloud at 1,000 feet, three eighths of cumulus at 2,000 feet, and five eighths of strato-cumulus cloud at 3,000 feet. A Sigmet, valid until 1130 hours on the morning of the accident, also warned of severe turbulence below 6,000 feet in the Adelaide area, south of 34 degrees south. Parafield Airport was closed to VFR traffic on three occasions during the day, the third time for two and a half hours.

It was apparent from all this evidence that the area of low cloud and poor weather extended east from the Hummock and Barunga Ranges to beyond the North Mount Lofty Ranges, and consisted of both stratiform and cumulo form cloud. To the south, it extended over St. Vincent's Gulf and well to the south of Adelaide. The area and terminal forecasts would have been available to the pilot either by telephone from Coober Pedy or Port Pirie, or on the route frequency of 122.1 MHz from the Flight Service Units at either Whyalla or Adelaide, but there was nothing to indicate that the aircraft had attempted to contact either of these Flight Service Units before or after landing at Port Pirie.

There was some evidence to show that, during some flights he had made in the past, the pilot had not been reluctant to fly through patches of cloud, though he held no instrument rating. He had also been involved in an incident 16 months previously in which, while completing a late afternoon flight from Andamooka to Parafield, he had pressed on in showery conditions and landed at Parafield 49 minutes after last light. As a result of this incident, the pilot was formally advised to seriously consider discontinuing his practice of conducting flights to and from Andamooka and Coober Pedy on a NOSAR basis. It is apparent that he paid little attention to this advice. It was also learned that, when departing from Parafield for a flight to Port Pirie only three days before the accident, he had disregarded advice from the tower to obtain a pre-flight briefing. It was thus clear that the pilot was inclined to operate his aircraft entirely to meet his own requirements, regardless of whether any regulation or other safety consideration was compromised in the process.

It was not possible to establish the flight path flown by the aircraft between the time it left Port Pirie and when it struck the Hummock Range on a westerly heading and the tracks made good during this time can only be surmised. However, as the pilot was very familiar with the route, and probably confident of his ability to continue in marginal weather conditions, it seems likely that he would have continued on track, maintaining visual reference to the ground for as long as possible. But approaching the area of low cloud in the vicinity of the Barunga Range, the pilot would have been forced to climb to clear the higher terrain. Two of the other pilots who had flown in the area that day, said that the cloud was layered to the east of the ranges, and it is possible that the pilot climbed through gaps in the underlying stratus cloud to remain above the height of the ranges while he continued the flight southward, between layers of cloud, hoping to find a break further south, through which he could descend again and continue the flight to Parafield visually.

But if a break in the clouds did not eventuate and the pilot was not able to regain sight of the ground as he continued southwards, it is possible that he would have turned west towards Spencer's Gulf where the weather was clearer and where, once past the Hummock and Barunga Ranges, a descent could be made over low lying terrain. Because of the strong westerly wind however, which according to other pilots who flew in the area that day, was very much as forecast, the aircraft on its southerly heading would have been subject to about 20 degrees of port drift. Though this large amount of drift should have been evident to the pilot before he reached the area of deteriorating weather, he could easily have "lost track" of the aircraft's real position once his view of the ground was obscured. In view of the evidence that the pilot had obtained no forecast, prepared no flight plan, and was keeping no form of navigation log, it seems likely that he would have had only a very approximate idea of the aircraft's position from the time it climbed above the lowest level of cloud.

In these circumstances, any subsequent flight through the underlying cloud cover would be fraught with danger. In this case, unfortunately for the pilot and his passenger, because the aircraft was probably much further east than he estimated, or the aircraft's ground speed on its westerly heading was less than he allowed for, or perhaps because of a combination of both these factors, the aircraft had not cleared the ranges when the pilot commenced the descent.

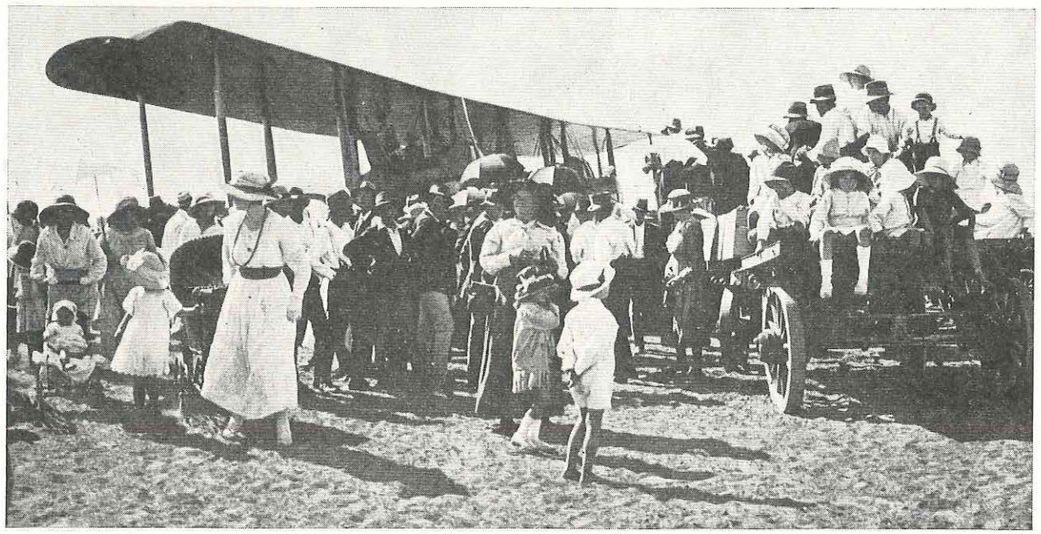
Like the less serious accident reviewed on page 18 of this issue, this pointless tragedy provides eloquent testimony to the outcome of regarding a light aeroplane as some sort of aerial motor car, to be merely driven in the direction one wants to go. It is indeed unfortunate that this concept has been so actively fostered in recent years in the interests of sales promotion. Such a concept can be dangerously misleading, and has undoubtedly contributed to poor standards of airmanship amongst some pilots who have acquired an aircraft and learnt to fly solely as a means of providing themselves with a fast and convenient means of transport in more sparsely settled areas of Australia.

Far from being akin to driving a motor car, the responsibilities of a pilot-in-command of a light aircraft on a cross country flight have much more in common with those of the master of a vessel at sea. For like the sea, as has been pointed out many times in recent years, aviation of itself is not inherently dangerous, but is terribly unforgiving of any incapacity, carelessness or neglect.

Cause

The probable cause of the accident was that the pilot proceeded into weather conditions in which terrain clearance could not be maintained visually.

AIR SAFETY ADVICE-ILLUSTRATED



"The aircraft was overloaded because the operator's procedures for load control were inadequate".

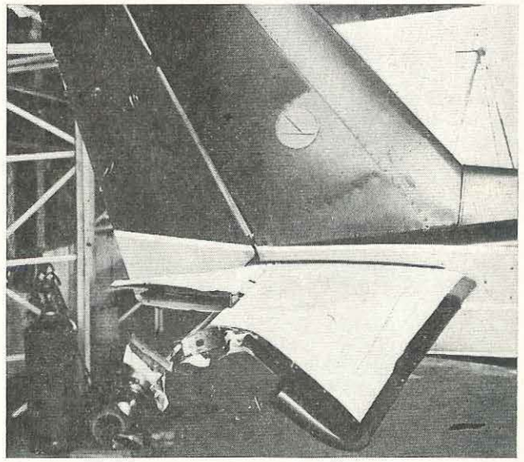
—Aviation Safety Digest No. 35.

In Brief In Brief In Brief In Brief

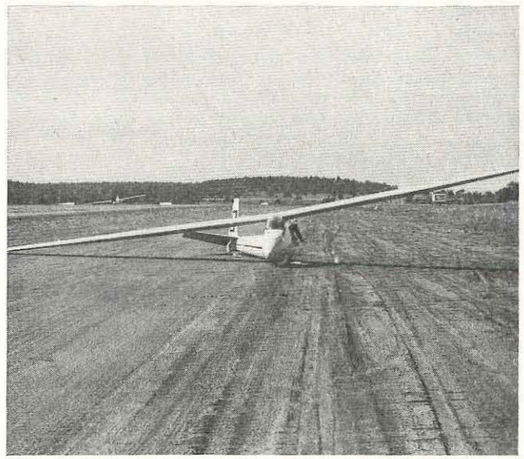
THIS Cessna 205, owned by a north Queensland cattle station, was being flown by a jackeroo employed by the station, who held a private pilot licence. The pilot departed late in the afternoon to fly two of the station's directors to Cairns, where they were to catch a south-bound airline flight. The flight was expected to take two hours and the aircraft's ETA at Cairns was 19 minutes before last light.
The pilot had flown the route many times, and as the weather had been fine all day at the station, he did not obtain a forecast before taking off. However, when he called Cairns from 50 miles out, he learnt that the coastal weather was under the influence of a moist south easterly stream, and that there was low cloud and showers on the ranges. The pilot reported that if he was unable to reach Cairns, he would divert to Mareeba. As the aircraft approached the Great Dividing Range from the west, the weather progressively deteriorated, making it necessary for the aircraft to divert from track a number of times to remain in VMC. More time was lost in an attempt to penetrate the Kurunda Gap and it was not until 1814 hours, nine minutes before last light, that the pilot reported he was diverting to land at Mareeba. At 1822 he reported in the circuit area at Mareeba but shortly afterwards lost sight of the aerodrome in the darkness and rain. He was unable to locate the aerodrome again and hurriedly selected a ploughed field for a precautionary landing while it was still light enough to see. The aircraft touched down normally, but after running parallel with the furrows for about 500 feet, the nose undercarriage dug into soft soil and snapped off. The three occupants were shaken but otherwise unhurt.

While cruising at 2,000 feet during a ferry flight from Weipa to Horn Island, Queensland, the engine of a float-equipped Bell 47 helicopter suddenly lost power and began to run roughly. At the time the helicopter was a mile inland from the coast and over scrub covered country offering no suitable area for an emergency landing. With the height and remaining power available to him, the pilot estimated he would be able to reach the beach and he turned the helicopter in that direction. As the aircraft was fitted with floats, it was necessary that the emergency landing be made into wind and at zero forward speed. The pilot succeeded in manoeuvring the helicopter accordingly, but after completing the final turn into wind low over the beach, he found he had insufficient power remaining to arrest the rate of descent. As the helicopter landed heavily, the rotor disk drooped and one blade severed the tail boom. Examination of the engine showed that the exhaust push rod of No. 6 cylinder had failed.

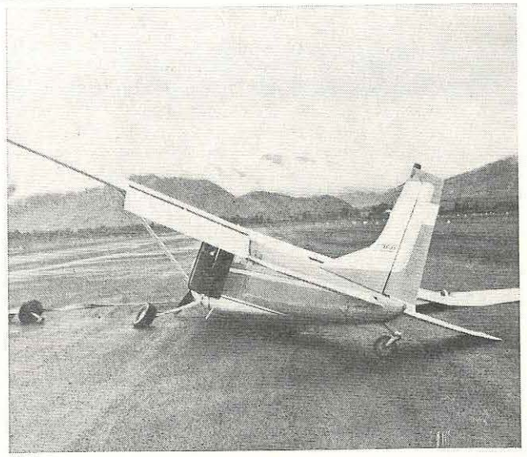
A Cessna 172 had departed from Lae, P.N.G., for a parachute dropping operation nearby. A student parachutist was to make a static line exit first from 2,500 feet, after which an experienced jumper and a parachute instructor were to make free fall descents from 7,000 feet.
When the aircraft was over the drop zone and correctly aligned, the student moved out ready to jump, but before he could settle himself in the normal position, standing on the starboard landing wheel, his parachute pack caught on the door jamb and opened. The parachute deployed in the slip-stream, dragging the parachutist from his position. His helmet struck the starboard tail plane heavily, and he was dragged across it, causing substantial damage, before he fell clear. The aircraft immediately entered an uncontrolled dive, with violent control flutter, and the second parachutist jumped. At about 1,000 feet, a section of the damaged starboard elevator tore away and the pilot was able to regain control. The parachute instructor then also jumped from the aircraft to see what had happened to his student. The student parachutist's descent meanwhile had stabilised and he subsequently made a normal descent.
Despite the serious tailplane damage shown in the picture, the aircraft returned to Lae and made a safe landing.

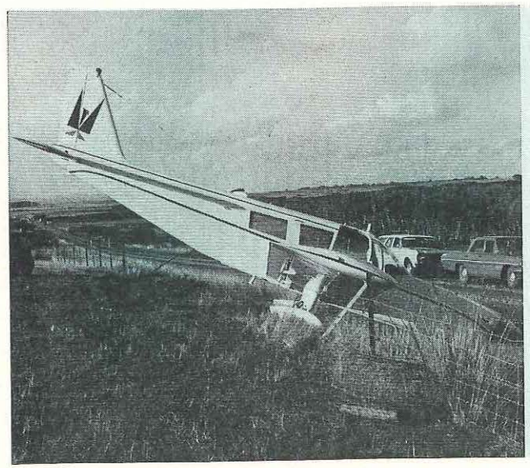


Although the pilot of this Slingsby Skylark was experienced in winch launching, he was undertaking only his third flight in this type of glider.
The wind was light and variable and when he was ready and slack had been taken up in the cable, the pilot called for full power and the winch launch began. The glider left the ground after a short run and after climbing to 60 feet the pilot assumed the full climbing attitude at the recommended speed of 55 knots. Meanwhile the winch driver, after commencing the launch, believed there was a malfunction in the winch and, thinking the glider was still on the ground, he de-clutched the winch and closed the throttle.
Realising that the glider has lost power from the winch, the pilot lowered the nose and pulled the cable release knob, but the glider sank rapidly with insufficient forward speed. The pilot attempted to flare the aircraft for the landing but it struck the ground heavily in a flat attitude, breaking its back. The pilot was not injured.



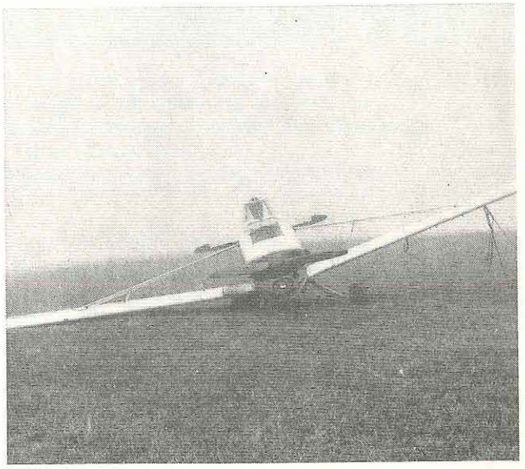
While en route from Madang to Tari, the pilot of this Cessna 185 was advised of unsuitable weather at his destination, and decided to divert to Mt. Hagen. Approaching Mt. Hagen the pilot was instructed by the tower to land Runway 30 and informed that the surface wind was south-westerly at 5-10 knots.
The aircraft made a normal final approach, but just before touching down it commenced to drift to starboard. The drift was arrested by the application of left rudder, but shortly after touchdown the aircraft swung to the left. Despite the application of right rudder and brake, the aircraft ground-looped to the left.



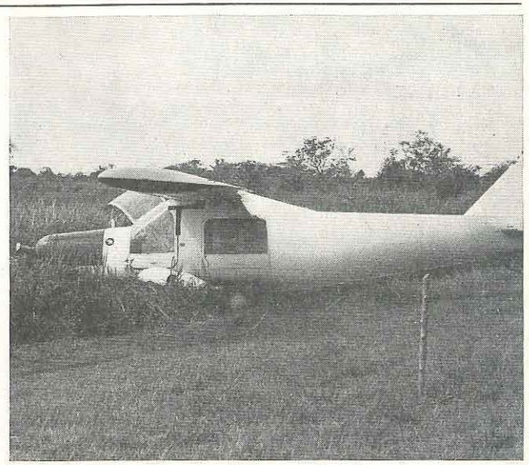


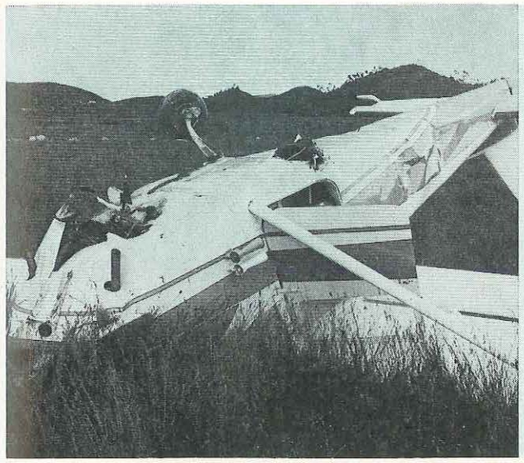
Despite the fact its surface was wet and slippery, a privately owned airstrip near Wonthaggi was serviceable throughout its full length of more than 2,000 feet. However, the pilot of this Cherokee Six, who had never been there before, did not obtain any accurate information beforehand on its condition. After arriving over the strip and making several inspection runs, he erroneously concluded that an area of low bracken midway along the strip was rough ground. Deciding that he would land beyond this area, he made a fully flapped approach at low airspeed and touched down with 1,200 feet of strip remaining. He raised the flaps and applied the brakes but, on the slippery surface, he was not able to bring the aircraft to a stop before it over-ran the strip and collided with the boundary fence.

Arriving over an unattended airstrip from which he intended to conduct superphosphate spreading, the pilot of this Piper 'Pawnee' saw that sheep were grazing on the landing area. As his loader driver had obviously not arrived, he made a very low run to clear the sheep from the strip. Near the end of the run the aircraft struck two sheep, substantially damaging the starboard undercarriage assembly. The pilot completed a circuit however, and then landed the aircraft with very little additional damage.



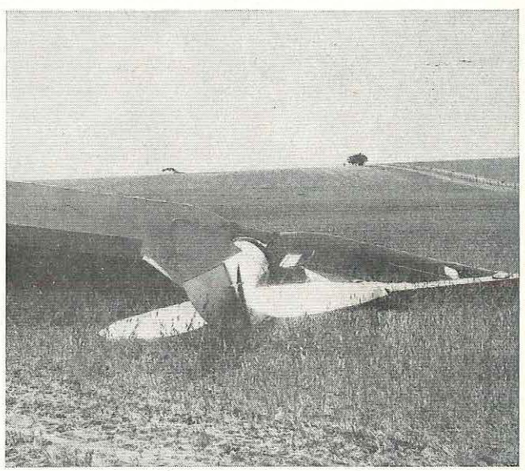
Entering the circuit area at Kunjingini, New Guinea, the pilot of this Dornier positioned the aircraft for a landing into the north. After turning on to final approach and lowering 35 degrees of flap, the pilot saw there was a horse grazing in the shade of a tree about half way down the western side of the strip. The horse was not moving and the pilot considered it would be safe to continue the landing. Lowering full flap he made a normal touchdown, but after the Dornier had rolled a short distance, the horse suddenly turned and bolted straight at the aircraft, striking the propeller and starboard undercarriage leg. The aircraft swung to the right, and before the pilot could regain directional control, it ran into a ditch on the eastern side of the strip. Both undercarriage legs were torn backwards, but the three occupants were not injured.





Unaware that the single runway at Zeehan, Tasmania, was only 140 feeet longer than required by the type of aircraft he was flying, the pilot of this Cessna 172D crossed the threshold at about 100 feet and touched down with less than half the runway length remaining. The pilot applied the brakes but then realized he would not be able to stop. He attempted to go around but there was insufficient distance left in which to become airborne, and the aircraft overturned after striking a low earth embankment 22 feeet beyond the end of the runway. The pilot sustained minor injuries.

The pilot of this Tiger Moth had previously reported that recovery from spins to the right was more prolonged than from the left, and the rigging of the aircraft had been, checked and both ailerons and a strut replaced.
After climbing to 5,000 feet the pilot spun the aircraft and recoverd several times but, believing the recovery from a right hand spin was still taking longer that it should, he climbed back to about 3,600 feet and again placed the aircraft in a spin to the right. When the pilot applied full left rudder to recover, the aircraft continued to spin, and after two further rotations, the pilot moved the control column forward progressively, still holding on left rudder. When this also seemed unsuccessful, he held on left aileron, then tried rocking the control column backwards and forwards, and finally applied power. The aircraft still did not recover, and continued to spin in a nose-down attitude until it struck the ground. The pilot was seriously injured.
Examination of the wreckage did not disclose any defects, and although the pilot later demonstrated the correct spin recovery technique during a flight test, it was concluded that, possibly because of the effects of the prolonged spinning, he had not sustained the complete technique for spin recovery.



Pilot Contribution

Learning from the Mistakes of Others

These words could fairly be said to be the "theme" of the Aviation Safety Digest. Indeed they are probably a fair commentary on most aspects of human progress and development. In this issue's Pilot Contribution, the writer develops this theme a little further and offers some thoughts on airmanship which he himself has acquired by putting this same philosophy into practice.

WE can all learn by the mistakes of others; it's cheaper that way! Though it has taken me 18 years to log my first 1,000 hours, I feel that I have avoided accidents and incidents by looking and listening. There is no substitute for experience of course, but listening to fellow-pilots dissecting accidents and incidents is one way of learning. If one can sift out the "line-shooting" and bear the facts in mind for future reference, it is a quite painless way of adding to one's storehouse of knowledge. After all, good airmanship always begins on the ground.

With this thought in mind, the following comments might be useful, for no matter how much or how little experience an individual pilot may have, what might be termed "self-training" can make the difference between good and bad airmanship.

SELF-DISCIPLINE: How many of us still say our cockpit checks aloud? There is nothing embarrassing in this, no matter how much experience one has, and there is less chance of forgetting some vital action. A perfunctory check might fail to disclose the one item that is about to cause a prang, and that **would be** embarrassing! Self-discipline is also the art of resisting beat-ups, or flying even "when the birds are walking," or performing low aerobatics for the benefit of the girl friend who, bless her, would not know a barrel roll from a spring roll! Self-discipline doesn't come from any book, but it CAN be acquired. Basically it is MAKING yourself do the right thing at all times, until it eventually becomes second nature.

STANDARDS: Never accept that your best is good enough; you can always improve on it. When others start to copy you, then you know your standards are getting near the mark, but these standards have to be maintained in all departments. So you've recently had a hundred hours of aerobatic practice, and are a wizard! But how good are your cross-wind landings? . . . your navigation? . . . , your radio procedures? . . . your subject knowledge? The same standards should apply throughout.

MANNERS: There is no substitute for good manners, in the air as on the road. You're coming in to land at a country aerodrome, 140 knots downhill, and someone in a Tiger Moth ahead is sedately letting down at 58 knots. There's no room to land on the right, so, what do you do? Land in front of him, just to teach him a lesson? Land to the right anyhow? Panic? How about being a gentleman and going around again? This is also another way of building up hours! Bad manners are usually the result of a like temper or a super ego, but here again, these can be brought under control by self-discipline.

OVER-CONFIDENCE: This can be defined as "a dangerous weapon in the hands of a fool". The pilot who exudes over-confidence is usually cultivating this foolish trait to overcome some defect in knowledge, experience, ability or all three. He is also heading for an expensive fall. The cockpit is no place for over-confidence, and a Tiger Moth can kill you just as effectively as a supersonic Mirage. But let us have ordinary, everyday confidence by all means; confidence in our ability to handle our aircraft in a given situation — and with it, the wisdom to stay on the ground when we know that we can't handle it!

PRACTICE: Do you have an hour's flight today, then come back in six months' time for another hour, just to "keep in practice"? Guess who you're fooling? And guess what's happening to your standards? I have occasionally returned to home base after a long cross-country flight, only to perform a rotten landing. So, before turning it in and ending on a sour note, I have promptly gone up again and done some circuits and landings until they were right. If I could do it when a student pilot, why not now? There's no disgrace in this, or in going around again when necessary, in fact, it's plain common sense.

KNOWLEDGE: The pilot who knows **all** there is to know about flying has yet to be born. The one who claims he does, is either a fool or a liar. And the expression "A little knowledge is a dangerous thing" is very true—if you place the emphasis on that key word, "little". All the self-discipline, manners and other attributes of airmanship that we can acquire are to little avail unless we have the theoretical and practical knowledge necessary to back them up. As pilots we are expected to have knowledge of ANO's, ANR's, AIP's, NOTAM's and other documents, apart from our practical flying. Don't knock them—it took a lot of bent aircraft, and a lot of sadder but wiser pilots, to compile the knowledge contained in these documents. But **we** can acquire this knowledge from their hard-won experience the easy way, and at little or no expense to ourselves!

EXPERIENCE: You will only acquire this with time, money and opportunity. These considerations aside however, the only real way to ensure that you stay alive long enough to amass experience yourself is by paying heed to the fund of knowledge and experience that is freely available to all pilots. Then you're on the way!

I don't know if any of these thoughts will save lives, but they may help to do so. I am now working on my second thousand hours, and hope to be wiser myself when I have reached that stage!

WHY DIDN'T HE GO ROUND?

The answer to this question is the key
to many an overrun accident.
There's no disgrace in going round again -
even the best pilots do it!