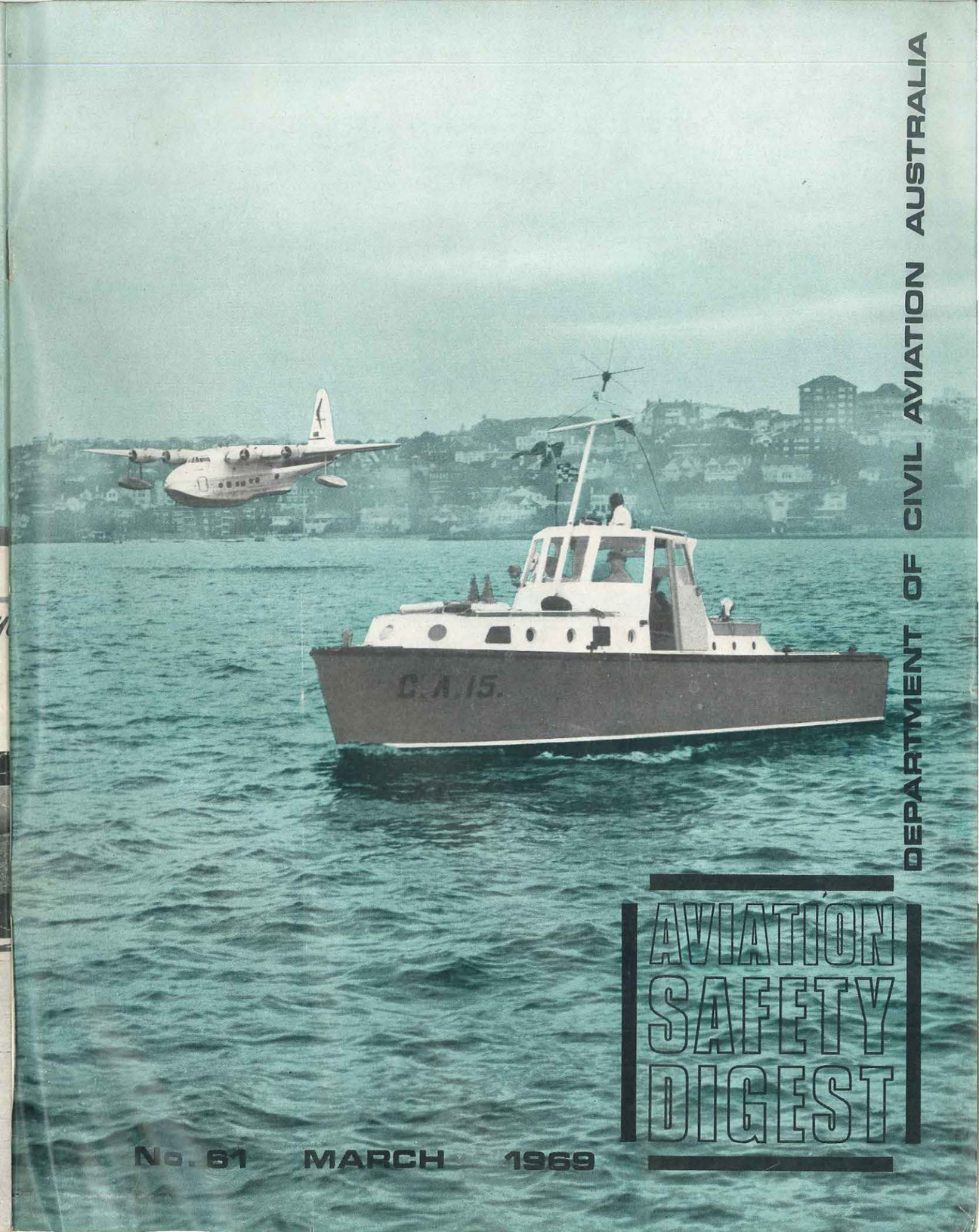


DEPARTMENT OF CIVIL AVIATION AUSTRALIA

AVIATION SAFETY DIGEST

No. 61 MARCH 1969

AVIATION SAFETY DIGEST

No. 61 MARCH, 1969
DEPARTMENT OF CIVIL AVIATION, AUSTRALIA

Contents

Collision with Glider Cable 1
Fatal Obstruction in Controls 6
Help us to help you 10
Take-off Warning Horn Ignored 12
Pilot Contribution 18
Collision — with a Signpost! 20
Oxygen the Antidote 22
You Can't Land in Fog 24
An Unusual Icing Difficulty 25
Don't Shilly-Shally with Carburettor Icing 26
Unfair Wear and Tear 28
Without Comment 28

FRONT COVER: Not a scene from the past, but one of the less well known facets of Australian aviation today. A Departmental control launch stands by while the Ansett Sandringham "Beachcomber" approaches to land at Rose Bay flying boat base, N.S.W., after a flight from Lord Howe Island.

BACK COVER: Passengers from a country centre alight from a Commuter Airlines Piaggio at Essendon Airport, Victoria.

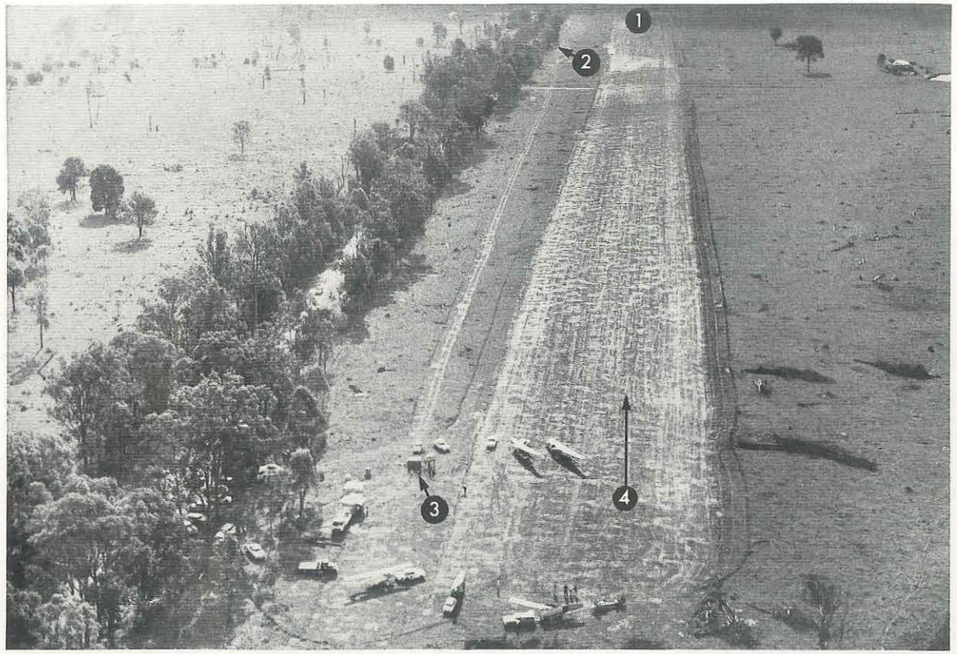
Printed by The Ruskin Press Pty. Ltd., 39 Leveson Street, North Melbourne

COLLISION WITH GLIDER CABLE

While approaching to land at a gliding club's airstrip in Queensland, a Cessna 210 collided with the winch cable of a glider which was just completing its winch-launch. After striking the cable with its starboard wing at a height of about 50 feet, the Cessna swung to the right and crashed to the ground at the side of the strip. The pilot and one passenger were killed, the other two passengers were seriously injured, and the aircraft was destroyed by impact forces.

The gliding club, which had been formed just a short time before, had been operating from the strip for only two months. The day on which the accident occurred had been planned as the official opening day for the club, and the pilot of the Cessna 210, who conducted an engineering business in a neighbouring town and had manufactured some parts of the club's winch, had been invited by the president of the club to attend the official opening.

Knowing that the pilot intended flying to the strip to attend the opening, the club president contacted him a few days beforehand to inform him of the dimensions and physical characteristics of the strip. The pilot was advised that the strip ran east-west and although its physical length was 4,600 feet, the effective operational length was reduced to approximately 2,500 feet by the presence of trees at either end. The president also told the pilot that the strip had a considerable gradient throughout its length, the eastern end being 100 feet higher than the western end, and that there was a noticeable "hump" in approximately the centre of the strip. The pilot assured the president that he had previously landed on many similar strips and that he would "give the place a good look over" before he landed this



Aerial view of glider strip from over eastern end looking west, showing (1) position of winch, (2) accident site, (3) duty pilot's tent, (4) take-off path of glider.

time. On the morning of the official opening, the pilot telephoned the president's home and left a message that he hoped to arrive at the strip in a Cessna 210 aircraft at approximately 1300 hours.

The gliding club had began operations at 0930 hours that morning, with a series of winch-launches conducted into the east. The weather was fine and hot with some haze and there was a light north-east wind blowing. Two wind socks approximately six feet long and 12 inches in diameter were positioned to the north of the strip.

Shortly before mid-day, the wind changed to the west, and it was decided to alter the circuit direction accordingly. The winch was moved to the western end of the strip but, before any further glider flights were made, the pilot of a Chipmunk tug aircraft, who was also an experienced glider pilot, took-off into the west to assess the characteristics of the strip and take-off path for aero-towing operations in this direction. Landing into the west at the end of the flight, the Chipmunk pilot found the downhill slope of the strip a problem in the light westerly wind that was blowing. For this reason, while the wind remained light, the Chipmunk pilot obtained permission from the club's officials to continue making his landings into the east at the completion of each aero-tow, though this meant landing contrary to the traffic pattern.

At about 1246 hours, the Chipmunk began another take-off into the west, this time towing a Kookaburra glider. The aircraft climbed to 1,200 feet and the glider cast off a little over a mile to the south-east of the strip. The Chipmunk then approached and landed into the east as previously arranged.

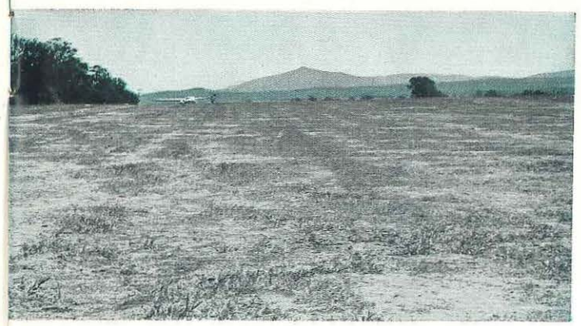
Meanwhile on the strip, preparations were being made to resume winch-launching in the revised circuit direction. Five gliders were lined up at the eastern end of the strip awaiting their turn to be winched into the air. Shortly after the Chipmunk had landed and taxied clear of the take-off path, and while the pilot of the first glider was preparing for his launch, a Cessna 210 with its undercarriage retracted, was seen passing some two miles to the north-east of the strip at about 2,000 feet, heading in a north-westerly direction. After settling himself in the cockpit, the pilot of the first glider

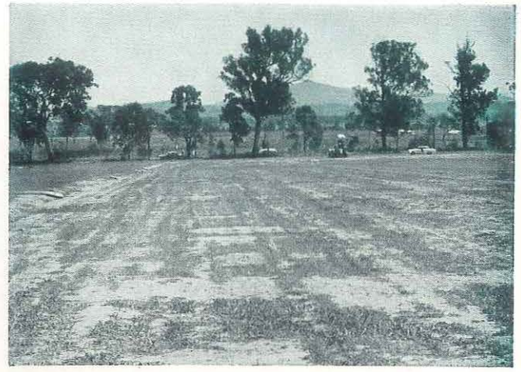
looked for the Cessna again but, seeing that it was even further from the strip, still heading towards the north-west, he assumed it was just by-passing the glider strip and had no intention of landing. Shortly after this, the aircraft passed from the glider pilot's view.

The pilot continued with his preparations for the launch and checked that both the circuit area and the strip were clear of conflicting traffic. Club members assisting with the launch then pointed out that the Cessna, now well north of the strip, was heading towards the west, and drew the pilot's attention to the glider that had been aero-towed into the air a few minutes before, and which was now circling on the southern side of the strip before joining the downwind leg of the circuit. When the glider pilot was ready, he signalled for the slack to be taken up in the cable, and again asked whether all was clear for take-off. Told that the aircraft was still heading away from the strip and that the glider in the circuit area was still circling, presumably to allow the winch-launch to proceed, the glider pilot signified his readiness and the full power signal was given to the duty pilot situated in a small tent by the side of the strip. The duty pilot passed the message by telephone to the winch driver and the take-off commenced.

The Cessna 210 had also been seen by several other people on the strip, including the president of the club. The president assumed the aircraft was that of the pilot whom he had invited to attend the official opening but because the pilot had told him that he intended to examine the field closely before landing and the Cessna's undercarriage was still retracted as it passed the strip he did not pay a great deal of attention to the aircraft's movements at this stage.

View looking west from the eastern end of the strip. Note the distant background of hills and the way in which the western portion of the strip is hidden by the "hump".





The tall timber at the western end of the strip. The glider launching winch can be seen in the centre of the picture.

In the meantime, further back in the line of gliders awaiting launching, another crew were making ready for their flight. As the first winch-launch was commencing, one of the two pilots, a gliding instructor, had just walked back to their glider after collecting the daily inspection schedule from the duty pilot's tent. As he approached, the other pilot spoke to him.

"Is that an aircraft?" he asked, pointing due west.

The instructor looked to the west and saw a speck in the distance in line with the direction of the strip. It was low down and, against the background of the surrounding hills, it was difficult to see. As the pilots watched however, the speck resolved itself into an aircraft that was obviously approaching downwind towards the strip. At once the two glider pilots began shouting for the winch-launch to be stopped, but their cries were not heard. By this time, the first glider was almost 100 feet above the ground. Both pilots then ran the intervening 250 yards to the duty pilot's tent, continuing to shout as they went, but still the duty pilot, who was in telephone conversation with the winch driver at the opposite end of the strip, failed to hear them until they actually reached his tent. Immediately then, the duty pilot told the winch driver to discontinue the launch.

At the other end of the strip, the winch driver, seated facing down the strip with his back to the direction of the aircraft's approach, had just caught sight of the aircraft passing over the top of him, at a height of about 100 feet. Seeing that its approach path was taking it directly towards the cable, the winch driver threw the winch out of gear. By this time the glider had gained about

1,100 feet and as the power was cut, the cable released itself from the glider only seconds before its pilot was expecting it would do so in the normal course of events. Quite unaware of the dangerous situation that was developing below, the glider pilot went on with his local flight.

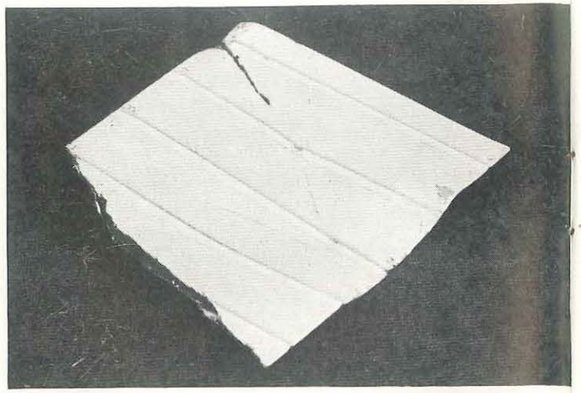
Oblivious to the presence of the cable, the pilot of the Cessna continued his approach to land into the east and the aircraft struck the falling cable with its starboard wing at a height of about 50 feet. The cable coiled around the wing, and restrained by the winch, cut progressively into the trailing edge as it pulled tighter, yawing the aircraft to the right. A piece of the starboard aileron fell to the ground, and the aircraft, still veering to the right as it was gradually retarded by the tightening cable, lost height and struck the ground in a banked attitude at the edge of the strip. The starboard landing wheel and the nose strut were torn off, and the aircraft, skidding along the ground, continued in a curve to the right until it collided with a large tree in a line of timber situated on the southern side of the strip.

* * *

It was established beyond doubt that, at the time of the accident, the pilot was making a normal approach to land on to the strip into the east and that there were no unforeseen circumstances such as an engine failure or airframe malfunction which had compelled him to land in this direction while the glider winch-launching was in progress. The investigation was therefore concentrated on determining the chain of circumstances that led to the confliction of operations on the strip, and culminated in the accident.

It was found that, at the eastern end of the strip, only one person had followed the Cessna's movements as it continued west past the strip and carried out a wide left hand circuit. This witness, a student pilot, said that the aircraft was just a speck in the distance as it turned to the south on to a base leg and was difficult to see because of the hazy conditions. It was not until the Cessna made this turn that he realised the aircraft might be making an approach to land. The witness did not appreciate the dangerous situation that was developing and did not consider the possibility of an accident occurring until the winch-launch began a little later.

To establish as closely as possible the flight path flown by the Cessna up to the point of its collision with the cable, an exercise was carried out in the vicinity of the strip, using a single engined aircraft of similar performance to the Cessna 210. The exercise also aimed to establish the detail on the strip which would have been visible to the pilot



Section of aircraft's starboard aileron which fell from the aircraft after being severed by the cable.

throughout his approach and also the extent to which the Cessna would have been visible to club officials on the strip, and the pilot of the glider being winch-launched at the time of the accident. The exercise was assisted by many of the witnesses present on the day of the accident.

The exercise confirmed the evidence of eye witnesses that the aircraft passed nearly two miles to the north-east of the strip at a height of about 2,000 feet, before commencing a wide left-hand circuit. It showed that the pilot of the aircraft should have had no difficulty in seeing the disposition of the gliders parked at the eastern end of the strip as he was joining the circuit, but by the time the first glider was lined up for take-off, the Cessna would have been on its downwind leg and the area would have been at least partly obscured from the Cessna pilot's sight. The winch vehicle should have also been visible to the pilot as he joined the circuit and, because he was familiar with gliding operations, the direction in which the winch-launching was being conducted should have been obvious to him. At the distance the aircraft was from the strip however, it would not have been possible to see the two small windsocks used by the gliding club and it seems likely that the pilot had assessed the surface wind by some other means before joining the circuit. In the circumstances, it seems very probable that the pilot had no intention of landing in the direction in which the gliding operations were being conducted and, before reaching the circuit area, had already made up his mind to land into the east. It was learned that, in conversation with other pilots before undertaking the flight, the pilot had stated that in normal circumstances he would always land up the slope into the east on

this strip. A further possibility is that the pilot had seen the Chipmunk landing in this direction while he was passing to the north-east of the strip and subsequently conformed to the pattern of the Chipmunk's approach.

Apart from witnesses on the strip, the Cessna's final approach to land was also seen by two separate witnesses located on properties a mile and a half to the west of the airstrip. From the descriptions supplied by these and other witnesses, including one of the passengers who was travelling in the rear seat of the aircraft at the time of the accident, together with the information gained during the exercise flown to reconstruct the sequence of events, it was determined that the Cessna was already established on final approach when some 6,500 feet west of the strip, at a height of only 250 feet. At this height, the final approach would have required the pilot's full concentration because of the tall trees in the aircraft's path. The passenger's evidence indicated that at this stage of the flight, both the pilot and the front seat passenger were giving most of their attention to the trees at the western end of the strip.

The exercise also showed that, from the approaching Cessna, the glider being winch-launched would have been almost impossible to see against the background of the distant hills for the first 500 feet of its climb. The glider should have been clearly visible from the Cessna immediately it rose above the horizon, but for only a few seconds before it climbed beyond the pilot's field of vision. It is apparent that the Cessna pilot, with his vision focused ahead and downwards, missed seeing the glider during these vital few seconds and that he was not aware that a winch-launch was in progress. At this stage of the aircraft's approach too, the winch itself would have been obscured by the trees on the western end of the strip. The belief that the pilot did not appreciate that a winch-launch was in progress is also supported by the evidence of the passenger. The passenger said that the Cessna's approach to land seemed perfectly normal until after the aircraft crossed the western end of the strip. He then felt a slight bump and the pilot exclaimed "What's that?" The passenger said he then looked out his window and saw the cable twisting around the wing midway between the fuselage and the wing tip. The aircraft's forward movement seemed to be arrested and it began swinging to the right towards trees on the southern side of the strip.

The final aspect to be considered is why the winch-launch was commenced while the Cessna was joining the circuit area of the strip.

Although the aircraft was seen by a number of experienced people as it flew past the strip, the general feeling amongst those who witnessed its arrival was that its distance from the strip did not place it in the category of conflicting traffic, and that there was nothing to indicate the aircraft was going to land. Most of the witnesses either lost sight of the aircraft or paid no attention to it after it passed to the north of the strip. The duty pilot, who had not been advised of the pilot's estimated time of arrival, was quite certain that the aircraft's height and distance from the strip precluded any possibility that it was joining the circuit for a landing. The president of the club likewise paid little attention to the aircraft's movements at this stage, because the pilot had previously indicated that he would make a close inspection of the strip before landing.

The exercise confirmed, that in the conditions of visibility at the time, the aircraft would have passed beyond the ground witnesses' range of effective vision as it continued on its downwind leg. During the aircraft's base leg and the first part of its final approach, it would have been effectively camouflaged against the distant background of the hills and would not have been readily discernible from the strip until it reached a point on final approach about a mile and a half to two miles to the west of the threshold. From the cockpit of the glider waiting to be winch-launched, the aircraft would have been even harder to see. The exercise showed in fact, that with the reduced range of vision through the transparent cockpit canopy, the aircraft would have disappeared completely from sight at a distance of three to four miles and would not have been discernible during any subsequent part of its circuit.

There is little doubt that if the pilot of the Cessna had indicated his intentions clearly by flying closer to the glider strip and by extending his undercarriage, all gliding operations on the strip would have been suspended until the aircraft landed. Even a circuit which suggested the slightest possibility of a landing would have been sufficient to bring operations to a standstill until the pilot's intentions became clear. It is also certain that, if the glider pilot being winch-launched had been able to see the aircraft while it was on its base leg or during its final approach, he would not have initiated the launch.

Cause

The cause of the accident was that the pilot, in making a wide and then low approach to land, did not make an adequate inspection of the field and the glider pilot initiated a winch-launch in the mistaken belief that the take-off area was clear of other aircraft.

FATAL OBSTRUCTION IN CONTROLS

While being flown on a training exercise from Bankstown Airport, N.S.W., a Chipmunk carrying a flying instructor and a student pilot spun to the ground and crashed. Both occupants were killed and the aircraft was destroyed by impact forces.

The purpose of the flight was to give the student some revisionary training to bring his flying to the standard required to undergo a flight test for the issue of a private pilot licence. The aircraft took off from Bankstown in fine weather at 1440 hours and advised the tower that it was proceeding to the training area. As is normal, the student pilot occupied the front cockpit and the instructor the rear.

After reaching the training area, the pilots carried out a series of bad weather circuits and some forced landing practice in the Wallacia area. After climbing to altitude, stalls and recoveries were then practised satisfactorily. According to evidence found during the investigation, the student pilot then carried out a spin and as a result, the instructor found that the student's recovery technique was not up to the standard required. Shortly afterwards, another intentional spin was begun, but it is apparent that neither the student nor the instructor were able to effect a recovery from this spin and at about 1535 hours, two witnesses on the ground sighted the aircraft at an altitude of only about 1,000 ft. still descending in a spin. As the witnesses watched, the spin continued unchecked until the aircraft crashed in a nearby paddock.

* * *

The site of the crash was several miles to the north-east of Camden aerodrome. The aircraft had struck the ground in an attitude consistent with that of a Chipmunk in a fully developed spin. Examination of the wreckage showed that, at impact, the aircraft was rotating slowly to the right, with the starboard wing down about 10 degrees and the nose some 20 degrees below the horizon. There was very little forward movement of the aircraft after the initial impact. The flaps were retracted and the damage to the propeller indicated the engine was developing little or no power at the moment of impact.

A detailed examination of the engine and airframe revealed no evidence of any defect or failure. The complete flying control system was then removed from the aircraft for further detailed examination. All bell cranks, brackets, cables, chains and bearings were found to be intact, correctly assembled and structurally sound, and at first sight the whole system appeared to have been capable of normal operation before impact. While the flying control system was being removed from the aircraft however, a 20 cent coin was found in the fuselage a short distance forward of the rear control column mounting. The coin was distorted and mutilated in places on its edges, and had obviously been subjected to mechanical pressure. The marks on the coin appeared to be significant and a searching examination of the control system then revealed corresponding marks in the saddle forging which forms the base of the elevator control mechanism for the rear cockpit.

It was found that the coin could be inserted in the saddle forging in such a way that the respective marks on the forging and the coin matched one another. The only way in which this could be done however, was by first moving the control column almost to the limit of its backward travel. With the coin placed in position the control column would then jam when moved a few degrees forward from the rearmost position (see photographs and diagrams). The coin was not in this position in the saddle forging when found, and the aircraft's controls were free to move over the whole range of their travel, but it is quite possible that the coin could have moved from the saddle on impact.

Also, in the course of dismantling and retrieving the aircraft from the crash site, before the control system was removed, the fuselage was tipped at various angles which would doubtlessly have caused the coin to move from the position in which it came to rest after impact.

A number of tests, made by inserting undamaged 20 cent pieces in the rear saddle forgings of other Chipmunk aircraft, were found to produce similar jamming of the controls when the control column was moved forward from the fully rearward position. The original coin, together with the

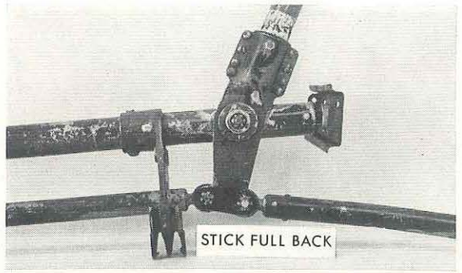
The wreckage as it came to rest. The mode of impact is clearly evident from the damage sustained by the aircraft.

control column assembly removed from the wreckage, were next forwarded to the University of Sydney for examination and testing. As a result of these tests, which included a microscopic comparison of the markings on the coin and the saddle forging of the control linkage, it was concluded that the damage to the coin had been produced by intimate contact with the forging, under heavy mechanical pressure.

It was established that the restriction to the aircraft's controls which the coin would have imposed if in such a position, would have prevented the control column being moved farther forward than about 17 degrees behind the neutral or central position. With the controls jammed in this position, it would have been impossible for the aircraft to recover from a spin. In Chipmunk aircraft, the control column must be moved forward to at least about the neutral position for a successful spin recovery.

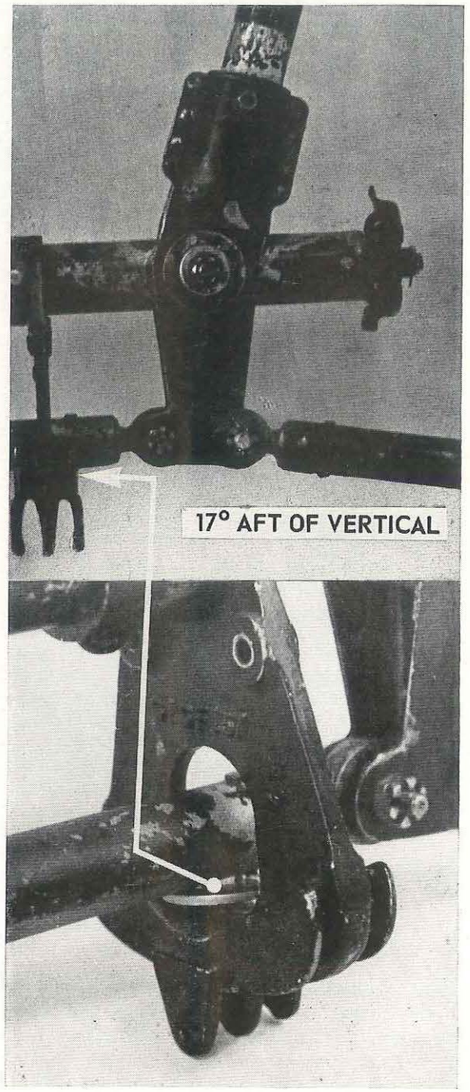
From notes found in the wreckage, which the instructor had made on the student's technique during the flight on which the accident occurred, it was possible to broadly reconstruct the sequence of events before the commencement of the final spin. It was clear from the notes that the control response of the aircraft, during the recovery from a spin carried out shortly before the final spin, was quite normal. It was apparent therefore, that the coin could not have lodged in the critical position in the saddle forging, at least until the control column was moved to almost the fully rearward position as the final spin was initiated. The general "upset" of G forces that occurs at this time as the nose of the aircraft pitches down rapidly and autorotation begins, could possibly have completed the sequence of movements that would have been necessary to lodge the coin in the position in which it could jam the controls. The investigation was unable to shed any light as to how or when the

The mutilated coin found in the fuselage during the investigation.



Left: The elevator control linkage removed from the aircraft showing the rear cockpit control column in the fully rearward position.

Below: Photographs showing the location in which the coin could prevent further forward movement of the control column from the 17 degree aft position.



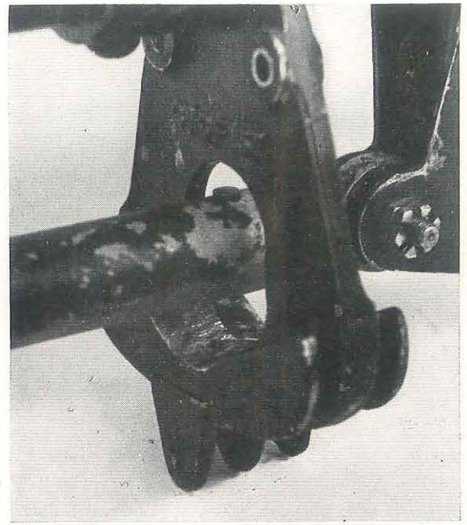
20 cent coin entered the flying control linkage area, but as the aircraft had undergone an inspection 11 days before the accident, during which the control linkage area was thoroughly cleaned and checked for the presence of foreign objects, it seems highly unlikely that it was in the aircraft at that time. Between the time of the inspection and the flight on which the accident occurred, the aircraft had been flown by several different persons, but none of them had reported any irregularities in the control system. Even so, it seems possible that the coin could have fallen from the pocket of a person flying in the aircraft at any time during this period, and somehow found its way into the structure which houses the flying control linkage beneath the seats and floor of the aircraft. Having fallen into this position, it would then need a chance combination of timing, manoeuvres and G forces to position the coin where it could prevent the aircraft recovering from a spin. In terms of probability, the likelihood of such a chance combination occurring would be extremely remote, but even remote probabilities occasionally come into play and the evidence supports the belief that this was one such occasion.

Cause

The probable cause of the accident was that an obstruction in the elevator control system deprived the pilot of the elevator movement necessary to recover from a spin.

Comment

The implications that can be drawn from this investigation hardly need further emphasis. Although the combination of circumstances that



Marks on the saddle forging apparently caused by the jammed coin. The marks shown in the picture were found to match those on the coin.

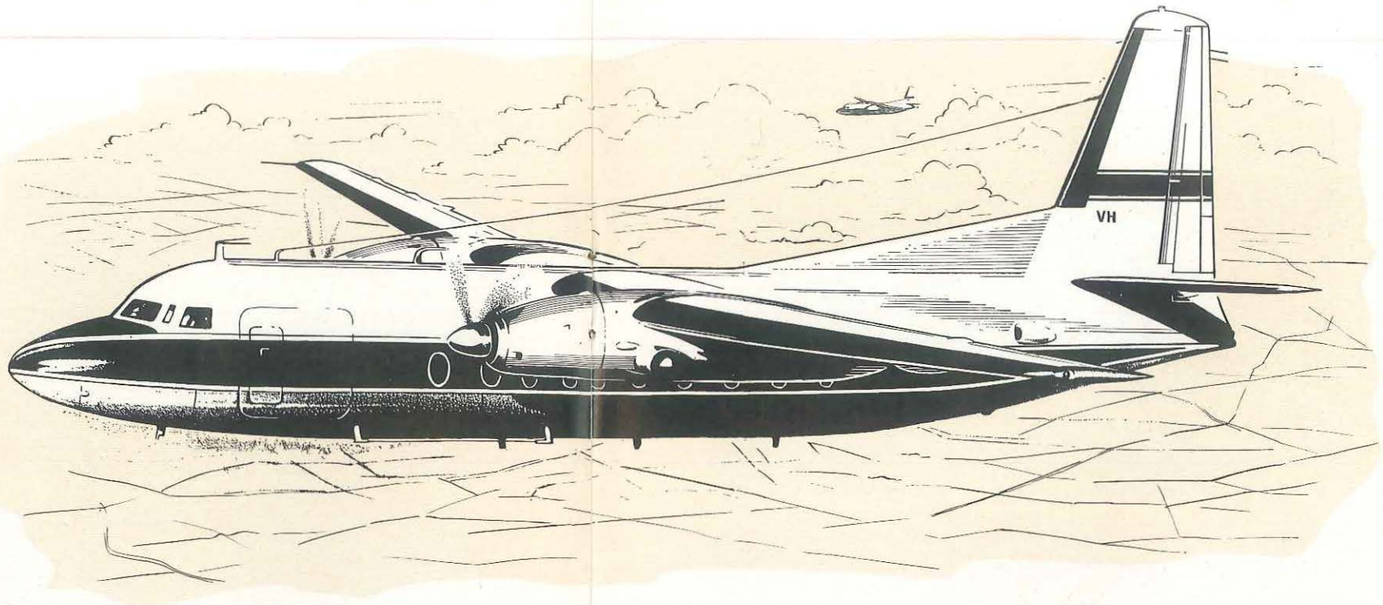
culminated in this particualr fatality are unique enough to render their repetition extremely unlikely, the accident sounds a most important general warning on hazards of dropping or leaving articles in aircraft in places where they can interfere with the operation of the aircraft's systems.

The responsibility for ensuring that this does not occur lies with pilots and maintenance staff alike—and in small aircraft pilots must also accept responsibility for their passengers' actions in this regard. Unfortunately, retrieving articles dropped on the floor of aircraft like the Chipmunk or Tiger Moth is not always as easy as it is in most modern aircraft, where the "works" are usually well covered by flooring, carpets, or neatly fitting trim panels. Yet for the same reason, the need to find and remove any lost objects which could possibly foul some part of the control system is probably more vital in aircraft of this sort than in any other type. As this accident shows all too well, even seemingly remote possibilities cannot be discounted. Particular attention should be paid to the condition of the leather or fabric boots, which are attached to the base of control columns to prevent foreign objects entering the control linkage area. The boots should be in good condition and should fit snugly around the control column. When one control column is removed from an aircraft for single pilot operations, the boot should be closed over the open socket to prevent the entry of foreign matter through the socket itself.

It is also important that aircraft be thoroughly checked for forgotten tools and other loose material after any maintenance work has been performed. Pilots and L.A.M.E.'s should have no need to be reminded of this, yet random checks still reveal items of equipment, surplus nuts and bolts, etc., that have been left lying in aircraft. Aircraft owners, operators and pilots can assist in overcoming this continuing problem by drawing any such instances to the attention of maintenance personnel, and for the safety of their own well being, by checking for themselves that no tools or other equipment remain when work in their aircraft has been completed.

Sectional view of control linkage saddle forging, showing relationship of coin and control linkage tube, with control column in different positions.

HELP US TO HELP YOU —



THE Department has repeatedly exhorted pilots to always report situations in which safety is in any way compromised. As the Director-General pointed out in a message published in the January Digest last year (see Digest No. 54), it is only in this way that the experience gained in the course of every-day operations can be applied to the vital task of preventing accidents. This is the primary function of the Department's air safety incident reporting system.

A recent serious incident, involving two Fokker Friendship aircraft, shows that this need to report anomalous situations is not fully appreciated even by highly trained professional pilots. This incident came to light only because a check captain happened to overhear a casual conversation between two off-duty first officers. Investigation of the incident revealed a previously undetected weakness in the Department's airways operations system and, in this instance, the weakness had allowed the safety of two airline aircraft to be compromised. These circumstances demonstrate the value of reporting unusual situations and show how incident reports can play a very real part in eliminating chinks in the air safety "armour".

As a result of enquiries which were initiated on receipt of the check captain's advice, it was found that, about one month previously, two Fokker Friendships had departed Brisbane Airport within minutes of each other and had flown the same track at the same flight level in controlled airspace for some thirty minutes. During this time the second aircraft overtook the first but neither crew was aware of the other aircraft until they each subsequently reported position and flight level to Brisbane Flight Service Unit when beyond the control area boundary. Although both crews then appreciated the relative positions of the aircraft and one crew actually sighted the other aircraft at the same level, neither crew apparently recognised the situation as an incident which should be reported.

Investigation of the incident established that the error had occurred while details of the second aircraft's flight plan were being processed by Brisbane airways operations staff. The first aircraft's flight plan, providing for a departure in controlled airspace via Kilcoy, was processed normally and the flight proceeded as intended. The flight plan form lodged by the crew of the second aircraft however, had been blocked out to show two alternative departure routes, one via Roma and the other via Kilcoy. The top section of the plan, providing for the route via Roma, had been completed to the point of designating the flight level, but did not include wind components or time interval calculations. The lower section of the plan, covering the route via Kilcoy, had been completed in all normal respects. It was the crew's intention to fly the second route (via Kilcoy) but at first sight, the only flight plan evidence of this intention was the inclusion of the wind component and time interval data for this route, and the first route shown on the form could easily be mistaken for the flight planned route.

When details of the aircraft's flight plan, together with those of several other aircraft, were being passed over the intercommunication system to the Tower, the transmitting officer gave, as the planned route, the first of the two routes (via Roma) set out on the flight plan form, rather than the second, correct one (via Kilcoy). A routing via Roma was acceptable in the existing traffic situation and the tower controller issued a clearance on this basis by using the phrase "clearance via planned route". He also accordingly informed the other airways operations units concerned.

As far as the aircraft crew were concerned, the flight planned route was the route via Kilcoy and they departed on this route. Not knowing this, the tower controller then instructed the aircraft to transfer to the flight service frequency, because he believed the aircraft would be flying directly into uncontrolled airspace from the Brisbane Control Zone. This would have been quite proper had the aircraft actually been flying the route via Roma but, as a result of the misunderstanding, the air traffic controllers responsible for aircraft separation in the controlled airspace on the route via Kilcoy were unaware of the aircraft's departure by that route.

Unfortunately, because a month elapsed before the incident was finally investigated, it was not possible to reconstruct the whole sequence of events which somehow contrived to prevent the breakdown in separation being detected by airways operations staff at the time. It was evident however, that although there were a number of "cues" that might have alerted air traffic controllers and flight service officers to the situation, had they noticed them, there had been no specific failure in the airways operations system, other than the original error of passing the wrong departure route details. The responsible airways operations staff were thus unaware that a breakdown in separation had occurred between the two aircraft and, for this reason, the incident was not reported by ground units. Had it not been for the casual remarks overheard by the check captain, the incident would never have been investigated.

Through a combination of circumstances and the alertness of a check captain, the Department **did** become aware of the incident, and the ensuing investigation revealed a system "weakness". Action has now been taken to ensure that any redundant information, on both the original and duplicate copies of a plan, is crossed out by the briefing officer who receives the flight plan from the pilot. Pilots can also assist by ensuring that the submitted flight plans clearly reflect their intentions and, in those cases where there is a necessary area of ambiguity, by ensuring that the briefing officer is made aware of the circumstances requiring this situation.

The investigation also revealed a need to qualify the use of the expression "via planned route" when airways clearances are being issued to aircraft. Although this is a useful phrase, in that it can significantly reduce the length of a clearance, it is obviously only acceptable if there can be no misunderstanding, between pilot and controller, as to what is the "planned route". As a check against transcription errors, action has been taken to stipulate that the expression "via planned route" will be used only if the flight is to proceed in controlled airspace beyond the first reporting point and, when used in this way, that it will be preceded by a specification of the track to be flown to the first reporting point.

It is hoped that the circumstances of this incident and its investigation will demonstrate beyond all doubt that the Department's constant requirement for incident reports is nothing more than sound common sense. The misguided belief that filling in an incident report is tantamount to making out a charge sheet must somehow be overcome if the cause of air safety is to be furthered. Pilots willing to help the Department in this way by their frank reporting are, in the long run, only helping themselves to safer flying.

fully forward position and in the detent. Finally, the first officer called "trim" and used his torch to verify that it was in the aft section of the green band.

The second officer stated that when the horn began to sound, his first reaction was to check that the warning lamp for the auxiliary power unit door was out. He also recalled that the flap indicators "looked normal".

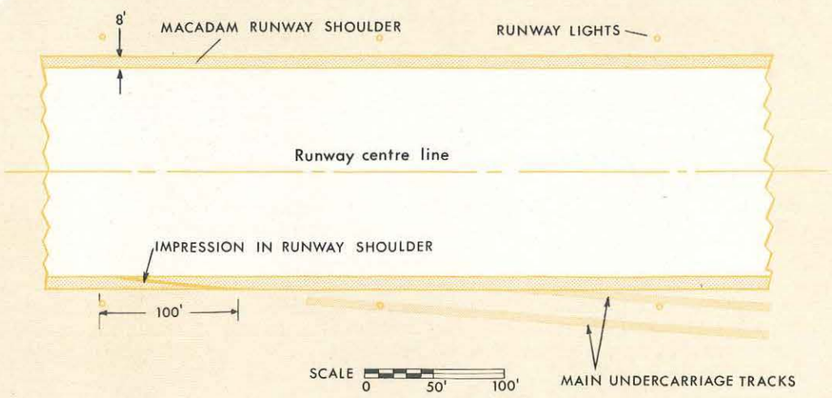
The accident was seen by a number of witnesses on the ground. They described the take-off as smooth and normal, but that after lifting off in a normal nose-up attitude, the aircraft did not climb away. The maximum height attained by the aircraft was variously estimated between 10 and 50 feet above the runway before it touched down again, still in a nose-up attitude. Describing the position of the landing lights during the take-off, one witness said that he saw a light "shining down ahead of the wheels," while another witness said that the landing light on the port wing appeared to be about half retracted. The outboard landing lights on the Boeing 727 are mounted on the outboard kreuger flaps, so that they are directed forward when five degrees or more of flap is extended. With a flap setting of only two degrees however, they are directed downwards.

* * *

To try and determine how the flaps came to be in the two degree position, the events that took place while the aircraft was taxi-ing out were carefully scrutinized. The first officer stated that he placed the flaps in the five degree position as the aircraft began to taxi. He then checked the flight controls while the aircraft was still in the well-lit cargo area, and detected outboard aileron movement on both wings, a situation which could have existed only with a flap setting of five degrees or more. At this stage, the cockpit voice recorder shows that the flap setting was checked at the five degree position as the first and second officers called the pre-take-off check list. At this point therefore, it is apparent that the flaps were set to the required take-off position.

It is difficult to ascertain exactly how or when the flaps subsequently came to be in the two degree position, but there are two possible explanations: Firstly it is possible that, as the flight turned around to taxi back when the anti-ice valve malfunctioned, the first officer, through force of habit, began the taxi-in checklist. This is accomplished by the first officer alone and is not made by the call and response method, which could account for the lack of any mention of the checklist on the cockpit voice recorder. The first item on the taxi-in checklist is "flaps-up", which requires the flap handle to be moved to the zero position. When the flaps are being selected to this position in flight however, a pause is made at the two degree position to allow for the operation of the leading edge devices. It is thus possible that the first officer instinctively paused at the two degree detent, even though this pause is not required with the aircraft on the ground, and that before he could continue retracting the flaps, he became absorbed in the attempts to correct the anti-ice valve malfunction. The cockpit voice recorder shows that the first officer actively participated in the efforts to alleviate this problem. When the anti-ice light went off, and the crew resumed taxi-ing towards the runway, the pre-take-off checklist was also resumed. However, the crew started again where they had left off, and in the process of completing the checklist, did not check the preceding items. Thus if the flap lever had been inadvertently left in the two degree position, this incorrect setting would have remained undetected.

The second possible explanation for the incorrect flap position is that, when the flaps were posi-



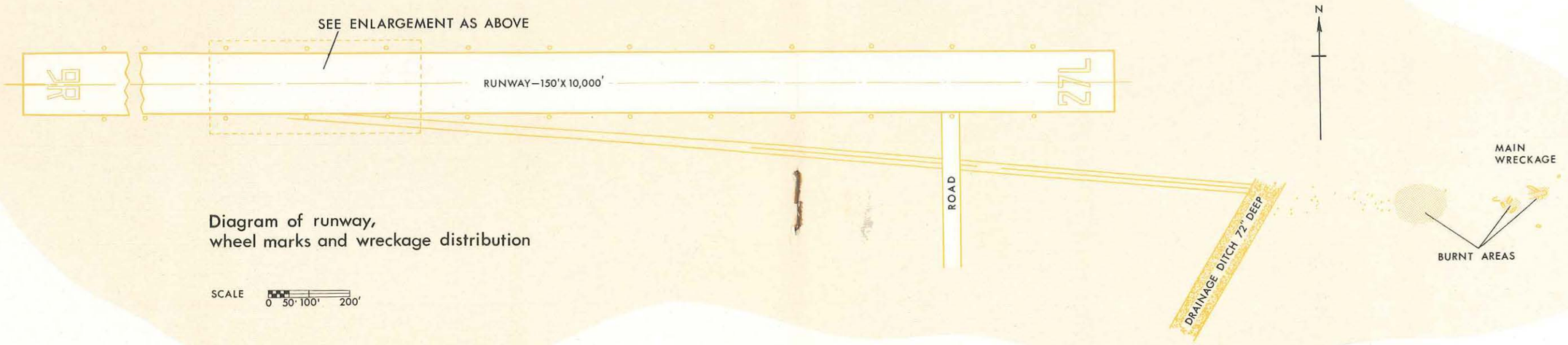


Diagram of runway, wheel marks and wreckage distribution

SCALE 0 50' 100' 200'

tioned to the five degree setting as the aircraft began to taxi, the flap handle was placed just short of the five degree detent rather than in the detent itself. As the aircraft was taxi-ing out, the handle then crept forward until it reached the two degree detent. To test the validity of this theory, a number of experiments were conducted during the investigation by placing the flap handle of a Boeing 727 on the lip of the five degree detent and then taxi-ing the aircraft at normal speeds. These tests demonstrated that the flap handle **will** slip towards and into the two degrees detent, and not towards the closer five degree detent.

Both these theories however are only possible explanations of what happened, and are not based on direct evidence. From the available evidence, the Board is not able to determine with any reasonable degree of certainty, how and when the flaps came to be in the two degree position and the only conclusion that can be reached is that the flaps **were** in the two degree position at the time the warning horn sounded during the take-off.

It is difficult to understand why the crew were unable to detect the incorrect flap setting during the 31 seconds that the horn was sounding. The statements of the crew, however, offer some explanation. The first officer's determination of the flap handle position was based on feel rather than visual observation, apparently because of lack of lighting. The captain also stated that the flap handle is difficult to see at night. The actual distance between the two and five degree detents is only about one inch. Both the captain and the first officer also appear to have relied to a certain extent on the fact that the green leading edge flap lamp was illuminated. Such reliance was not justified however, because a green flap light indicates **not** that the flaps are within the take-off range, but only that the leading edge devices agree with the position of the flap control lever. The lamp will thus be illuminated when the flaps are in the two degree or any other position, as long as the leading edge devices are in the correct position for the selected flap setting.

However, regardless of the reasons why the crew did not detect the incorrect flap setting, it is obvious that the take-off roll is not a time for "trouble-shooting" an unsafe take-off condition. During this period, the aircraft is accelerating rapidly, leaving a progressively decreasing amount of time in which to discover the problem. Furthermore, any attempts to scan the cockpit for the trouble, particularly at night, only serves to distract the crew from their other critical duties. The only safe procedure is to discontinue the take-off and correct the problem before attempting another take-off. Indeed, any other action has the effect of defeating the very purposes for which the warning system is installed on the aircraft. Had the crew discontinued the take-off in this case, they could have readily identified the problem and recommenced their departure safely after only a minor delay.

It was found that the Company's operations manual set out in detail the circumstances in which the take-off warning horn will sound, and also the means by which it can be silenced, but contained no instructions on the action to be taken by the crew if the horn should be activated during the take-off. A review of Boeing 727 operations manuals used by other operators revealed similar deficiencies. During training also, it was found, pilots were being taught the conditions which would activate the warning horn, but were being given no explicit directives to discontinue a take-off if the horn sounded before the aircraft reached V_1 speed. Crews were apparently permitted some degree of discretion in attempting to correct an unsafe take-off condition, rather than being required to immediately discontinue a take-off in these circumstances. Indeed, while the investigation was in progress, several reports were received from airline crews that they had been able to locate and correct an unsafe condition while continuing a take-off. The Board has therefore recommended that specific instructions be issued to all Boeing 727 operators, requiring that take-offs be discontinued if the warning horn sounds during a take-off roll before the aircraft reaches V_1 speed. In this case, the explanation for the warning horn ceasing two seconds before the first officer called V_R, is probably that, just prior to reaching V_R speed, the nose strut became sufficiently extended to actuate the switch that cuts out the ground operating mode of the warning horn.

In analyzing the actions of the captain during the brief period in which the aircraft was airborne, it must be remembered that he believed the flaps were set at five degrees, whereas in fact they were in the two degree position. Accordingly, the required rotation and lift-off speeds of the aircraft were actually considerably higher than the planned speeds, with the result that the aircraft was rotated and lifted-off prematurely. As well as this, the stall warning was in the speed range of "at or below 169 knots" for two degrees of flap, rather than in the "at or below 143 knots" range for a flap setting of five degrees. This would account for the stick shaker becoming activated immediately after lift-off.

The captain reacted to the stick shaker by lowering the nose and adding power, which is the

View of the wreckage showing the burnt-out fuselage and detached tail section.

normal method of averting a stall. At this stage of the take-off, the first officer observed that the airspeed indicator had passed through the 161 knot mark by "five degrees of the dial", and it appears that the aircraft must have closely approached the speed of 169 knots at which the stick shaker would have ceased to operate. The Board does not believe, however, that the captain acted unreasonably in deciding to discontinue the climb-out. Even after he had added power and pushed the nose down, the aircraft did not climb or accelerate through the stick shaker speed range, and he was presented with the risk of crashing into the major road beyond the end of the runway if he chose to continue the flight.

With hindsight, it is clear that, had the captain been able to keep the aircraft aligned with the runway while airborne and during the ground roll, the degree of damage sustained by the aircraft would have been far less severe. The fact that the aircraft would have been rolling over a paved surface, rather than muddy terrain, would have greatly increased the effectiveness of the wheel brakes. Even if the aircraft had still overrun the end of the runway, the drainage ditch would not have been a hazard, because the section of the ditch where it is aligned with the runway is underground.

The Board is somewhat concerned with the failure of the crew to wear the shoulder harnesses installed in the aircraft. The Board believes shoulder harnesses are a proven safety factor and should be worn during take-off and landings. This view is borne out by the circumstances of the accident. The crew's most vivid recollection of the impact is one of being violently tossed around the cockpit. The wearing of shoulder harnesses would have restrained the upper parts of their bodies and have tended to reduce the severity of their injuries, which included lacerations and bruises on the chest, face, and arms, as well as back injuries. Flight crews should be encouraged to wear shoulder harnesses, not only to enhance their own safety, but also so that they will be available to assist in the evacuation of passengers once the aircraft has come to rest. The Board has since recommended that the Federal Aviation Agency and airline operators re-examine their attitude to shoulder harnesses with a view to stipulating their use in revised pre-take-off and pre-landing checklists.

Probable Cause

The Safety Board determines that the probable cause of this accident was the failure of the crew to abort the take-off after being warned of an unsafe take-off condition.

Pilot Contribution

THE following thought-provoking article has been specially written for the Digest by a highly experienced flying instructor. Compiled from personal observations and experiences gained in 20 years of general aviation flying, the article poses some searching questions for personal examination. We commend it to readers with the thought that for most of us, at one time or another in our flying careers, some of the questions have been uncomfortably close to the truth!

Are you as Good as you Think you are?

A.N.R. 65: "Whenever the Director-General considers it necessary in the interests of the safety of air navigation for the holder of a licence . . . to demonstrate his continued fitness or proficiency . . . the Director-General may require the holder of the licence to undergo . . . examination".

IF for some reason you happened to draw attention to yourself to the extent of having A.N.R. 65 invoked upon your head, how would you measure up? Would you come up to scratch? Ask yourself these questions before you decide—then act accordingly!

Do you understand your VEC's and VTC's and consult them prior to a cross country flight so that you don't blunder into controlled airspace or a Prohibited or Restricted area?

Do you read and understand NOTAMS. Or do you just put them aside to use as scribbling paper? Do you consult the VFG or AIP's to ensure that a right hand circuit is not required at a particular aerodrome?

Do you make sure that you are physically fit for the flight you intend to make. That you aren't overtired, or worse still, suffering from "the morning after the night before"! Of course you would never mix drinking with flying — would you?

Do you—

- Make a conscientious pre-flight inspection? Understand what you are looking for in this inspection? Check the aircraft's paperwork?
- Understand and use the aircraft's performance charts? Check fuel and oil—or do you accept somebody else's say so?
- Fumble through pre-start-up, pre-take-off, after-take-off and pre-landing checks without really THINKING what you are doing?

Do you taxi at a speed consistent with safety considering the space available, obstacles, slope, surface, wind strength and direction and your familiarity with the aircraft? Are you a "throttle basher", wearing out the brakes by using unnecessary power when taxi-ing?

Can you taxi intelligently on a strange field, having a thorough understanding of the meaning of different markers? Or would you ignorantly taxi between white gable boundary markers instead of using designated taxiways? There may be a ditch or pot hole waiting for you!

When you position your aircraft for run-up, do you first consider the possibility of damage to your own aircraft? And the effect you may have on others —even to the extent of overturning an ultra-light?

* * *

Do you try to improve your polish each time you fly? Perhaps you don't know what this means? Imagine Grandma in the back seat on her first flight and that you are trying to fly so that she is unaware of any change in attitude, balance, flap settings and minor power variations! Do you fly with the ball in the centre, or have you forgotten it exists and are content to just slop along?

Are your R/T procedures according to the book, or do you say the first thing that comes into your head? Or do you just repeat what others say? Do you follow the R/T and have a clear picture of what is happening around you so that when an instruction is given to you, you have already anticipated it?

Do you abide by the rules for VMC, or do you think your experience will get you out of trouble? How many times have you illegally flown over the top? How many times have you flown in very marginal conditions? Have you stopped to think that the next time may be your last?

Do you fully appreciate the requirements for VMC? Can you judge when conditions fall short of VMC? Can you correctly interpret what looks like reasonable weather ahead, when in fact it is less than minimum VMC and vice versa? Do you consider the nature of the terrain when making this assessment?

Do you allow your better judgment to be overridden by less experienced people or by outside pressures? Must get home tonight for instance! It might be in a box rather than in an aeroplane!

When flying cross country do you use your ADF as a means to navigate instead of as an *aid* to navigation? In the meantime are you forgetting the basic methods of visual navigation? Have you ever thought you may be an accident going somewhere to happen?

Do you positively identify check points? Or do you assume they are what you are looking for simply because they happen to appear under your nose at about the right time?

How good are you at reading sign posts in the air? Wind strength from white caps on the water; rising dust; a change in wind direction from clear to hazy conditions, from calm to turbulent air, from the smell of fresh to "muggy" air. How quickly can you detect a change in visible drift?

* * *

Do you always display good manners and sound commonsense and know beforehand what you are going to do? Are you easily rattled and likely to drop your bundle, or do you keep your head and carefully plan a safe solution to a problem?

Do you ever get that disturbing feeing that the aeroplane is flying you and that if some emergency arose you'd be unable to cope? For instance, in the event of engine failure could you—

- Choose a field and plan intelligently?
- Thoroughly and automatically carry out trouble, safety, and shut down checks and give a Mayday call?
- Rely on your judgement for a gliding approach?

* * *

Do you know the CORRECT procedure for joining a circuit? Or do you blunder along with no preplanning and hope no one is looking? Of course you wouldn't dream of descending into a live leg of a busy circuit! What about other circuits?

Do you give consideration to the relative speeds of aircraft in a busy circuit with a view to positioning and to careful speed control in order to maintain separation? Do you allow for drift where relevant in the circuit?

Do you use your flaps intelligently, or just extend them haphazardly by rote? Are you thoroughly familiar with aircraft speeds that could be critical in an emergency?

Can you assess a bad landing, then swallow your pride and go around again? Are you sure you can safely cope with a baulked approach under extreme conditions of weight, weather or attitude?

Have you ever shut down your aircraft with the tail pointing into the hangar? Then don't be surprised if one day someone hands you a broom to sweep out the hangar! And, of course, it would never occur to you to be so silly as to taxi the aircraft right into the hangar! Or would it?

* * *

Have you ever cheated and signed the declaration for your licence renewal stating you've flown the required number of hours when in fact you have not?

Do you ever yield to the temptation to indulge in a bit of unauthorised low flying, when you think nobody is looking?

Do you ever try to sneak through an R.A.A.F. or Navy Zone and hope the man on Radar is asleep?

Would you sneak back into an uncontrolled aerodrome after last light? Would it occur to you that another invisible aircraft may be doing the same thing?

Do you happily imagine that all those hours you've notched up while trying to impress unsuspecting passengers have improved your standard? *Or do you* realise that your standard is now probably short of what it was when you did your last licence test? Do you remember when you last flew with a senior instructor?

Well how did you score? Not too brilliantly? It's not too late to do something about it, you know. Improving your standard will lessen your chance of running foul of A.N.R. 65—as well as the risk of an incident or accident!

COLLISION — with a Signpost !

IN Western Australia, a private pilot was making a business trip throughout the north-west of the State. After arriving at Port Hedland, he learnt that another member of his company, who was travelling in another Victa aircraft, was at Whim Creek 60 miles away and, as they had business to discuss, he flew from Port Hedland to Whim Creek with the intention of staying there overnight. The township of Whim Creek is on the highway midway between Port Hedland and Roebourne.

As he arrived over the settlement, the pilot noticed that his colleague's aircraft was parked in front of the hotel in the township itself. The pilot landed at the nearby aerodrome but soon afterwards a local resident arrived and informed him that the other aircraft was parked in front of the hotel for safety because there was a risk of a bushfire. There was also the fact that other aircraft which had previously been left unattended at the aerodrome had been looted. The resident explained that the other Victa had landed normally on the straight stretch of road immediately to the west of the township, and then taxied to the hotel area.

To assist the pilot to locate this suitable area of the road, the local resident boarded the aircraft with the pilot. After taking-off, the pilot made a low run along the recommended section of road and decided he could land. Because the sun was low on the horizon and visibility into the west was considerably reduced, he then decided to land into the east although it meant landing with a slight downwind component.

The landing was made successfully and after selecting the flaps up, the pilot applied power and maintained a fast taxi-ing speed. Approaching a bend in the road just before reaching the hotel area however, the aircraft seemed to crab to the left across the road. The pilot applied full starboard rudder but the aircraft continued to move to the left and the port wing struck a signpost, as shown in the photograph, and swung off the road. The port wing sustained both major skin damage and distortion of the basic wing structure. Both blades of the propeller were severely damaged as a result of striking stones on the side of the road.

The pilot said afterwards that he believed the accident was the result of his anxiety to clear the roadway as soon as possible, in that he had attempted to taxi too fast which, with the tailwind component, caused the aircraft to swing.

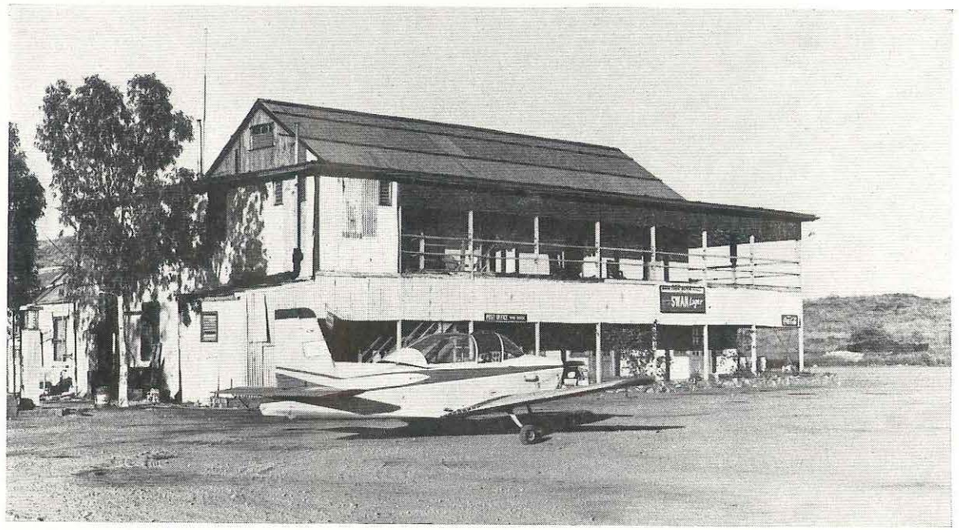
Left: The white arrow indicates the point struck by the aircraft's wing.

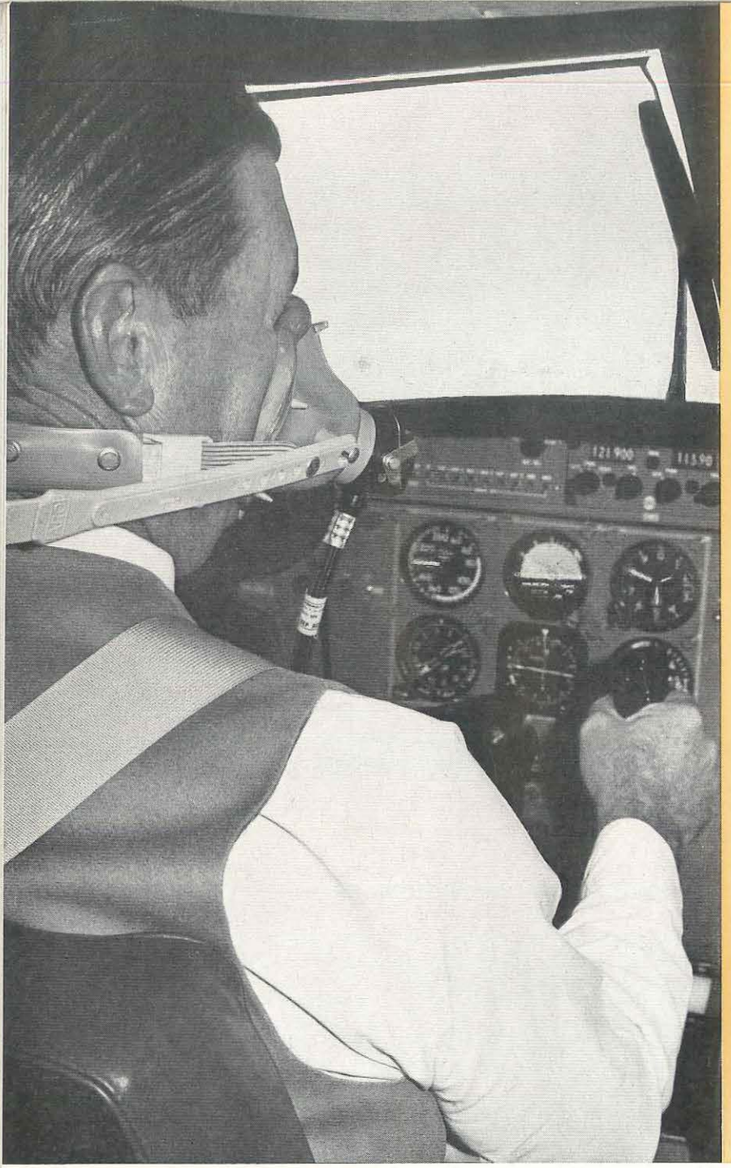
Right: The aircraft where it came next after striking the signpost. The section of road on which the aircraft landed can be seen in the distance.

Such an explanation however, is surely only rationalising what was an inherently hazardous operation, as the stretch of road on which the pilot landed fell well short of the minimum requirements of an authorised landing area. In the circumstances, the expensive outcome of the pilot's decision, especially when considered in the light of the accidents described in the September Digest last year, is hardly surprising.

It is important to note that even if the stretch of road on which the pilot landed in this instance had met the physical requirements for an authorised landing area, as specified in AIP AGA-4 and the Visual Flight Guide, the landing would still have been illegal. AGA-4-1 states, among other general requirements, that "the area shall not be used without the occupier's consent". In the case of a public road the "occupier" would normally be the local government authority or the road board with whom the control of the road is vested. It is thus an offence to land an aircraft on a road, no matter how suitable it would appear to be, unless the pilot has first obtained the consent of the controlling authority.

The other Victa parked in front of the hotel. It was the position of this aircraft that inspired the pilot involved in the accident to attempt his landing on the road.





OXYGEN the ANTIDOTE

INSTANCES in which the air in aircraft cockpits and cabins has been contaminated by fumes during flight are not uncommon. The sources from which this contamination has occurred are varied—smoke produced by malfunctions in electrical or electronic equipment, smoke from burning oil or hydraulic fluid, and fumes escaping from inadequately packed freight are typical examples of the cause of cabin air contamination incidents that crop up from time to time.

The danger in these situations arises if, as is usually the case, the gas or fumes causing the contamination are noxious. In such cases, even slight concentrations can affect a pilot's critical judgment and constitute a hazard to the safety of the aircraft. For example, a concentration of even 1000 parts per million of jet fuel in the cockpit air is sufficient to be dangerous.

The smoke produced even by the apparently harmless sources of fumes already mentioned, such as an electrical malfunction, may contain carbon monoxide, while the minor fires that are likely to develop from such sources of ignition can produce a number of noxious gases. Burning oil or hydraulic fluid, already mentioned above, as well as plastic products and fabrics used for electrical insulation material, and in cockpit and cabin furnishings, can generate varying quantities of carbon monoxide, irritant aldehydes, sulphur dioxide, and even phosgene. To complicate matters further, some of the chemicals used for fire extinguishing purposes, and the by-products they form when broken down by combustion, can also produce noxious fumes in significant quantities when used on fires in a confined space. Carbon tetrachloride is particularly dangerous in this respect and should never be used to extinguish a fire inside an aircraft.

Volatile anti-freezing fluids, and fuel vapours, can also expose pilots to danger. It must be remembered, too, that increased altitude and temperature produce an increase in the volatility of such liquids.

Experience has shown that cargo can be a source of toxic gases or fumes, even though no dangerous cargo is listed on the aircraft's manifest. Even passengers' luggage is not always above suspicion—in one case the cockpit of an airline aircraft became contaminated with ether fumes from a doctor's bag! Despite the publicity which most airlines display prohibiting the carriage of dangerous goods, unless they are packed and carried in the prescribed manner, it is difficult to completely eliminate situations of this type developing from time to time.

The presence of noxious fumes or gases is usually detectable from their smell (though carbon monoxide is a notable exception), and a mere suspicion of their existence should be enough for pilots to don oxyen or smoke masks to counter the effects of the contamination. It is unwise to wait for further symptoms. Headaches, nausea and dizziness are late signs of toxication, and by the time of their onset a pilot's critical judgments may already be seriously impaired. Pilots cannot, of course, be expected to be expert toxicologists, but by far the best antidote available to them is oxygen. If oxygen is not available on the aircraft, then the cabin air should be changed as quickly as possible in accordance with the emergency procedures laid down in the operations manual for the aircraft type.

The use of oxygen to overcome the effects of inflammable fumes such as fuel vapours in aircraft has been the subject of some controversy in the past. (See Aviation Safety Digest No. 52, Page 21.) It has been argued that the oxygen enrichment of the cockpit atmosphere resulting from the pilot's use of oxygen, together with the vapour already present inside the aircraft, could produce a highly inflammable mixture, and in the event of some minor source of ignition occurring, such as an electrical short circuit, an explosive conflagration could result.

Is there then any danger of the use of oxygen increasing the risk of an explosion or creating a more favourable atmosphere for combustion? An examination of the amount of oxygen released into the atmosphere by a person using oxygen equipment should help answer this question.

Air inspired and expired by a person breathing under normal conditions consists of oxygen, nitrogen and carbon dioxide in the following volumes per cent.:—

	Inspired Air	Expired Air
Oxygen	20.95	16.3
Nitrogen	79.02	79.2
Carbon Dioxide	0.03	4.5

In other words, roughly 20 per cent. of the oxygen in the air is used by the body and replaced with carbon dioxide.

In the case of a pilot breathing 100 per cent. oxygen through a demand valve, and with no air inlet, about 500 millilitres of oxygen would be inhaled with each breath in normal conditions. The nitrogen remaining in his lungs would be washed out after a short time, and the air he expires would then consist of about 400 millilitres of oxygen and about 30 millilitres of carbon dioxide. The normal rate of breathing is 12 to 15 times per minute, so on this basis some six to eight litres of oxygen would find its way into the cockpit atmosphere every minute. This figure is, of course, an approximation and in certain circumstances could be more than doubled, depending on such variables as the fit of the oxygen mask and the rate and depth of breathing—exertion, for instance, can cause a marked increase in the quantity of oxygen absorbed by the body.

The fact remains however, that the few litres of oxygen that would be added to the cockpit atmosphere in these circumstances is a negligible quantity. Thus, taking into account such factors as emergency depressurisation and other methods of rapidly changing the air in the cockpit, the use of oxygen by pilots in an emergency situation to counter the effects of fumes and vapours is fully justified.

The safest rule for flight crews is therefore: If in doubt about the effects of fumes in the cockpit —USE OXYGEN!

You can't land . . .

. . . Unless of course you happen to be the captain of a Hawker Siddeley Trident fitted with the Autoland system!

This may seem a fairly obvious sort of statement—especially considering the time, money and effort that has been spent overseas developing a system for landing aeroplanes in zero visibility conditions! And so it is. But it is all the more reason for incredulity that an experienced agricultural pilot should not only consider himself capable of landing in fog, but actually try to do it! Needless to say, his attempt was not exactly crowned with success, as the pictures of the Pawnee show.

The pilot had arrived over the strip early in the morning, after a ferry flight from his base in a N.S.W. country town, and saw that the area was covered in a shallow ground fog. The pilot could nevertheless see the strip through the fog as he flew overhead, and as it appeared to be only 10 to 15 feet deep, he decided to land.

Making a right hand turning approach towards the threshold, the pilot lowered full flap and closed the throttle with the intention of landing "short". When the aircraft was aligned with the strip, the pilot side-slipped to the left to try and place the aircraft on the ground as soon as possible. But as the aircraft descended into the fog layer, the pilot's visibility was suddenly reduced drastically and the port landing wheel struck the ground about 100 feet short of the threshold. The aircraft then ran off to the right of the strip, skidded sideways, fracturing the port wing spar and bending the propeller blades, and came to rest 700 feet from the initial point of touch down. Fortunately neither the pilot nor his loader-driver-passenger was injured.

There was no reason for the pilot to have been in such a hurry to land in such unfavourable conditions. He had plenty of fuel to hold over the strip until the fog dispersed, or to have returned to his base if it did not do so after a reasonable time. It is ironic that another Pawnee, which arrived over the strip only a short time after the accident, was able to land in near-perfect visibility as the fog had by that time drifted off the strip.

It seems certain that, on seeing the obviously shallow fog when he arrived over the strip, the pilot believed the visibility was adequate because he could see the ground through it, from overhead. He thus became another victim of the old snare of "slant visibility", which has been responsible for approach accidents almost from the earliest days of aviation. The fact that it is possible to see the ground vertically through a few feet of fog is no measure whatever of the likely visibility in the direction of approach, and along the proposed landing path.

The degree of damage inflicted on the aircraft is clearly evident in this picture, taken looking back in the direction of approach.

AN UNUSUAL ICING DIFFICULTY:

APPROACHING the west coast of Greece at 29,000 feet during a flight from Paris to Athens, the crew of a Comet noticed that the auto-pilot had disengaged itself and the aircraft had entered a slight climb. When the crew attempted to trim the aircraft and re-engage the auto-pilot, they found the control column could not be moved either way. The auto-pilot was switched off and the flying controls hydraulic supply was changed from the primary servodynes to the secondary servodynes. This produced no effect so the primary system was reselected and the aircraft was trimmed to maintain level flight by a combination of engine power, airbrakes and movement of the cabin staff.

Athens Control was informed of the situation and the problem was discussed by radio with a company engineer. The Flight Engineer then went aft to inspect the elevator servodyne area under the aircraft's floor. The flight engineer found that there was four inches of water lying in the bottom of the fuselage, covering portion of the servodyne input lever. With the outside air temperature at minus 47°C, this standing water had frozen, preventing movement of the servodyne input lever. After the aircraft had descended to a height where the temperature was above freezing point, the servodyne input lever was freed, using hot water from the aircraft's galley. The elevator controls then returned to normal.

Inspection of the aircraft after it landed showed that the fresh water tank, which is situated immediately above the elevator servodyne bay, had been leaking from a number of spot weld locations. The damage to the tank had been caused by excessive pressure during replenishment. In addition, it was found that the pipe from the drip tray which should have carried the leaking water to the waste tank was disconnected. This had allowed the leaking water to find its way from the bulkhead to the bottom of the fuselage where the servodynes are located.

—B.E.A. Monthly Review.

You can't land . . .

. . . Unless of course you happen to be the captain of a Hawker Siddeley Trident fitted with the Autoland system!

This may seem a fairly obvious sort of statement—especially considering the time, money and effort that has been spent overseas developing a system for landing aeroplanes in zero visibility conditions! And so it is. But it is all the more reason for incredulity that an experienced agricultural pilot should not only consider himself capable of landing in fog, but actually try to do it! Needless to say, his attempt was not exactly crowned with success, as the pictures of the Pawnee show.

The pilot had arrived over the strip early in the morning, after a ferry flight from his base in a N.S.W. country town, and saw that the area was covered in a shallow ground fog. The pilot could nevertheless see the strip through the fog as he flew overhead, and as it appeared to be only 10 to 15 feet deep, he decided to land.

Making a right hand turning approach towards the threshold, the pilot lowered full flap and closed the throttle with the intention of landing "short". When the aircraft was aligned with the strip, the pilot side-slipped to the left to try and place the aircraft on the ground as soon as possible. But as the aircraft descended into the fog layer, the pilot's visibility was suddenly reduced drastically and the port landing wheel struck the ground about 100 feet short of the threshold. The aircraft then ran off to the right of the strip, skidded sideways, fracturing the port wing spar and bending the propeller blades, and came to rest 700 feet from the initial point of touch down. Fortunately neither the pilot nor his loader-driver-passenger was injured.

There was no reason for the pilot to have been in such a hurry to land in such unfavourable conditions. He had plenty of fuel to hold over the strip until the fog dispersed, or to have returned to his base if it did not do so after a reasonable time. It is ironic that another Pawnee, which arrived over the strip only a short time after the accident, was able to land in near-perfect visibility as the fog had by that time drifted off the strip.

It seems certain that, on seeing the obviously shallow fog when he arrived over the strip, the pilot believed the visibility was adequate because he could see the ground through it, from overhead. He thus became another victim of the old snare of "slant visibility", which has been responsible for approach accidents almost from the earliest days of aviation. The fact that it is possible to see the ground vertically through a few feet of fog is no measure whatever of the likely visibility in the direction of approach, and along the proposed landing path.

The degree of damage inflicted on the aircraft is clearly evident in this picture, taken looking back in the direction of approach.

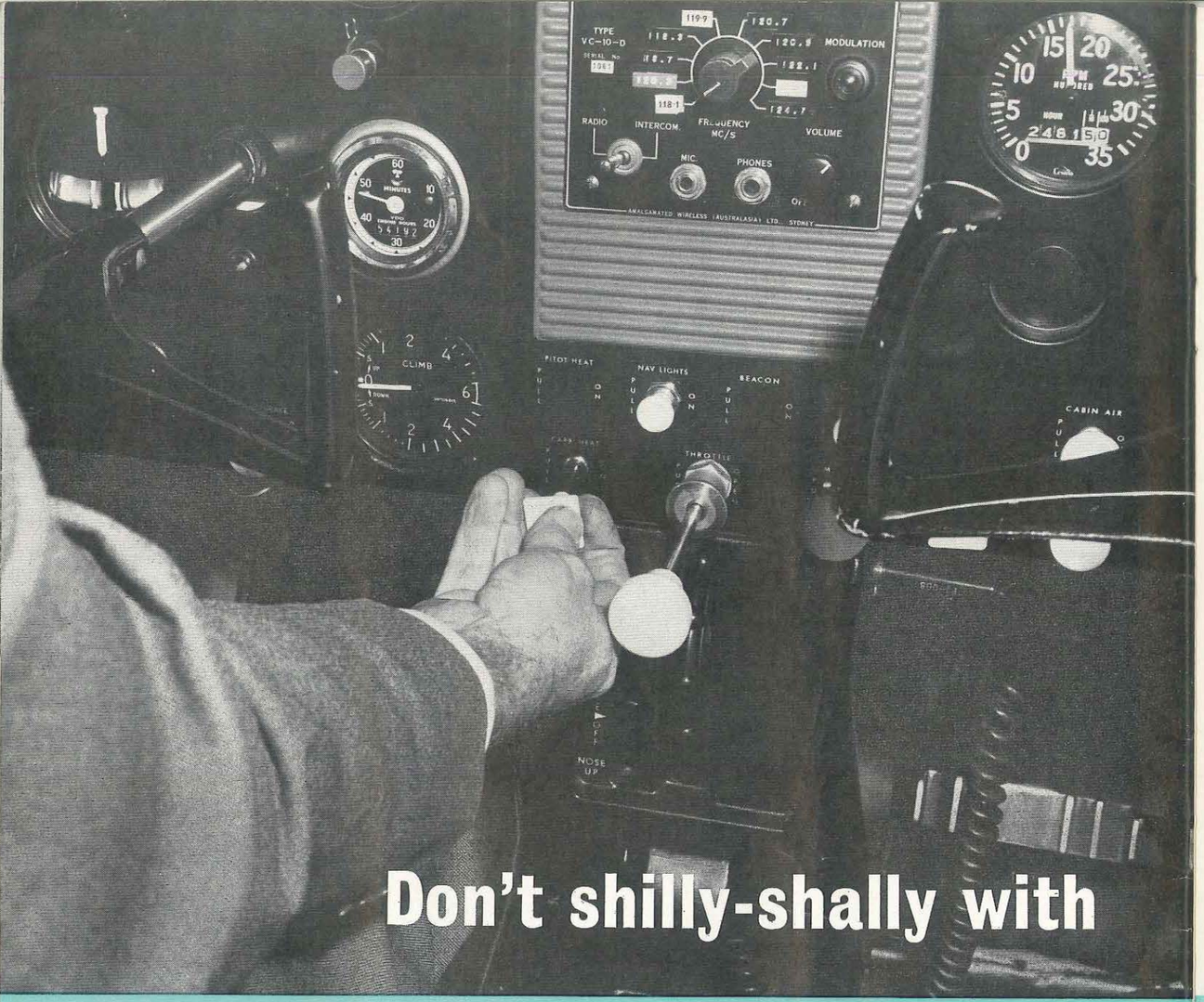
AN UNUSUAL ICING DIFFICULTY:

APPROACHING the west coast of Greece at 29,000 feet during a flight from Paris to Athens, the crew of a Comet noticed that the auto-pilot had disengaged itself and the aircraft had entered a slight climb. When the crew attempted to trim the aircraft and re-engage the auto-pilot, they found the control column could not be moved either way. The auto-pilot was switched off and the flying controls hydraulic supply was changed from the primary servodynes to the secondary servodynes. This produced no effect so the primary system was reselected and the aircraft was trimmed to maintain level flight by a combination of engine power, airbrakes and movement of the cabin staff.

Athens Control was informed of the situation and the problem was discussed by radio with a company engineer. The Flight Engineer then went aft to inspect the elevator servodyne area under the aircraft's floor. The flight engineer found that there was four inches of water lying in the bottom of the fuselage, covering portion of the servodyne input lever. With the outside air temperature at minus 47°C, this standing water had frozen, preventing movement of the servodyne input lever. After the aircraft had descended to a height where the temperature was above freezing point, the servodyne input lever was freed, using hot water from the aircraft's galley. The elevator controls then returned to normal.

Inspection of the aircraft after it landed showed that the fresh water tank, which is situated immediately above the elevator servodyne bay, had been leaking from a number of spot weld locations. The damage to the tank had been caused by excessive pressure during replenishment. In addition, it was found that the pipe from the drip tray which should have carried the leaking water to the waste tank was disconnected. This had allowed the leaking water to find its way from the bulkhead to the bottom of the fuselage where the servodynes are located.

—B.E.A. Monthly Review.



Don't shilly-shally with CARBURETTOR ICING . . .

THIS is the time of the year when carburettor icing is likely to catch some light aircraft pilots unawares—that is, unless they are ready to take positive, correct action to counter the condition as soon as the very first symptoms of carburettor icing appear. Uncertain, hesitant, "fiddling" with the carburettor heat control can often do more harm than good (by raising the carburettor air temperature just enough to put it in the optimum icing range) and the stage can quickly be reached where the engine has lost too much power to be able to provide the heat necessary to clear the accumulated ice from the throat of the carburettor. Take this case for example:

On the northern tablelands of New South Wales, a pilot was making a private cross-country flight in a Cessna 150. Some 15 minutes after take-off, while cruising normally at about 4,000 feet, the engine began to run roughly. Believing the trouble was carburettor icing, the pilot operated the carburettor heat control several times but the rough running continued intermittently. The pilot then decided, that as carburettor heat did not seem to be rectifying the trouble, to return to his departure aerodrome. Soon after turning back the rough running worsened and even with full throttle applied, the engine continued to lose power.

Eventually the pilot realised he would have to make a forced landing. He selected a suitable paddock, transmitted a MAYDAY call and commenced an approach. By this time the engine was running extremely roughly and the maximum r.p.m. had dropped to 1,600. Turning on to final approach, the pilot closed the throttle and the engine stopped completely. The forced landing was nevertheless successful and the aircraft was not damaged.

Subsequent examination of the engine failed to find any fault and after a satisfactory ground check, the aircraft was flown back to its base without further trouble. It was established that the existing meteorological conditions were favourable to the formation of carburettor ice and it was learned that another pilot who was flying in the same area at the time had experienced a tendency for carburettor ice to form. In the circumstances, there was little doubt that carburettor ice was the cause of the engine trouble and that the pilot had not used the carburettor heat control correctly to counter its development.

Three years ago a Digest article on carburettor icing (see "Be Alert for Carburettor Ice," Aviation Safety Digest No. 45, March 1966)*, recommended using full carburettor heat at frequent intervals in suspected icing conditions to check for the presence of ice. The article also pointed out that carburettor heat must be applied for long enough — 30 seconds was suggested — to rid the induction system of the ice that had formed. It seems clear, however, that the pilot of the Cessna 150 did not appreciate this point. When his application of carburettor heat did not immediately cure the symptoms he was experiencing (and probably caused a further, though very temporary, loss in power), he concluded that carburettor heat could not correct the trouble.

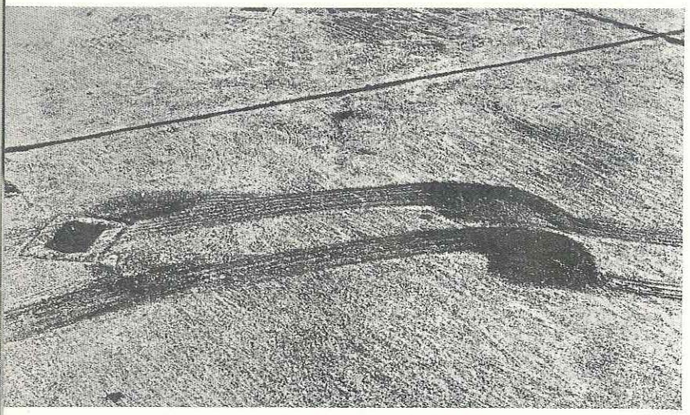
The pilot's reference to gradually increasing the throttle opening, eventually to full throttle, to try and compensate for the loss of power is also significant. As our earlier article pointed out, it is just this set of circumstances that can lead to a complete loss of power if sufficient carburettor heat is not applied for long enough to overcome the rapidly increasing accumulation of ice in the induction system.

There may be some pilots who, on reading of this incident, feel that they too may be a little "rusty" on the theory of carburettor icing. There may be others who have not yet experienced symptoms of carburettor icing themselves and who may not be fully confident about using the carburettor heat control in flight. Pilots who believe they may be in these categories should obtain a thorough briefing on the subject from an instructor experienced in the type of aircraft they intend to fly, before venturing off into conditions in which carburettor icing is possible. It is important to remember too that these conditions are not confined only to cold weather. Carburettor icing can occur on quite warm days if the humidity is high enough. For example, with a relative humidity of 60 per cent, any outside air temperature between 5°C (41°F) and 27°C (81°F) can be conducive to the formation of carburettor ice.

It is not the Digest's usual practice to identify persons or aircraft registrations but in the case of the Cessna 150 in this article the tempation is irresistible—we hope the aircraft owners will excuse us. Believe it or not, the aircraft's registration was VH-ICE!

* A few reprints of this article are still available and may be obtained by writing to the Editor.

UNFAIR WEAR AND TEAR . .



Take a look at the illustration. The black marks you can see were made by an aircraft being moved by a tractor in such a manner that the rear wheels of the bogie were "screwed" into the concrete before skidding sideways and the turn continuing.

The heat generated by the "screwing" action melted the rubber of the tyre at its contact area and molten rubber was evident on the concrete over approximately 39 feet of the turn.

There have been a number of unaccountable incidents to wheels and tyres, e.g., main wheel flanges cracking, tyre treads lifting and splitting, that could have resulted from incorrect aircraft movement. In some cases these incidents have led to major aircraft damage.

Before you move an aircraft make sure you and your staff know and understand the limitations applicable to moving that aircraft type and ensure these limitations are observed. The push-pull limitations are given in the appropriate maintenance manual.

—Flight Safety Focus, United Kingdom.

WITHOUT COMMENT !!

THE following masterpiece of understatement, extracted from an overseas air safety publication, is reproduced for the edification of our own readers:

"Shortly after take-off while in a normal 2,400 feet per minute climb to 22,000 feet, a Boeing 727 experienced the following upset:

"A warm frontal surface was penetrated at 4,700 feet. Wave action increased the aircraft's rate of climb to 5,300 feet per minute and nose down elevator and trim were applied. Thrust was reduced. At 8,900 feet a dive averaging 14,400 feet per minute began. The aircraft pulled out about 400 feet above ground. Recovery was effected using elevator, trim, and thrust producing a 7,200 feet per minute climb up to 5,000 feet. This was followed by a 10,000 feet per minute dive to 4,000 feet. Flight was subsequently stabilised at 5,000 feet.

"Airspeed at the bottom of the first dive was 475 knots, with the pull-out developing 4.75 G. Elapsed time for the upset excursions was about two minutes. Flight conditions were IMC except for a few visual seconds at the bottom of the first dive. No significant turbulence was encountered throughout the upset incident.

"Contrary to established operating techniques, sudden and large elevator inputs were made, stabilizer trim was used, large scale thrust changes were made, and the all-important maintenance of attitude was not accomplished. It would seem pointless to speculate on what might have been, but the incident surely highlights with alarming clarity the value of those proven flying techniques required in our manuals."

UNAUTHORISED ENTRY!

The near miss depicted above typifies several that have occurred during the past 12 months. And if the frequency with which light aircraft are still encroaching on control zones is any guide, further potentially dangerous situations like this could develop at any time. More adequate pre-flight preparation, closer attention to map reading and conscientious observance of vertical airspace restrictions are the only insurance against these possibilities.

Airline aircraft carry a lot of passengers. You wouldn't want them on your conscience!