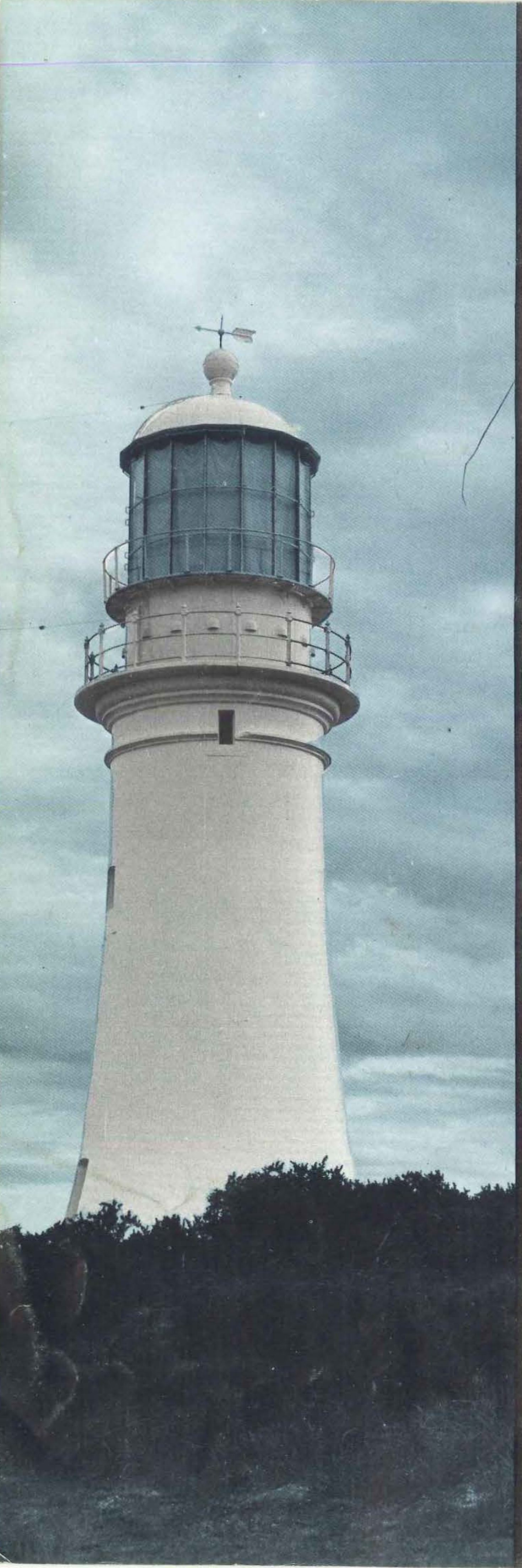
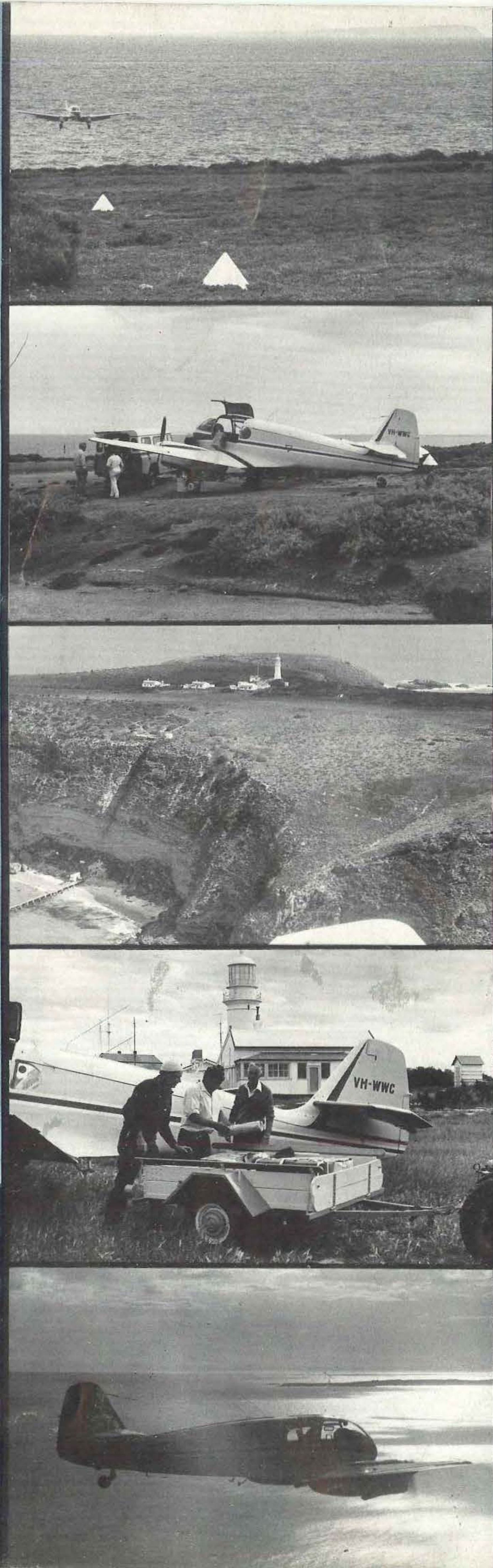
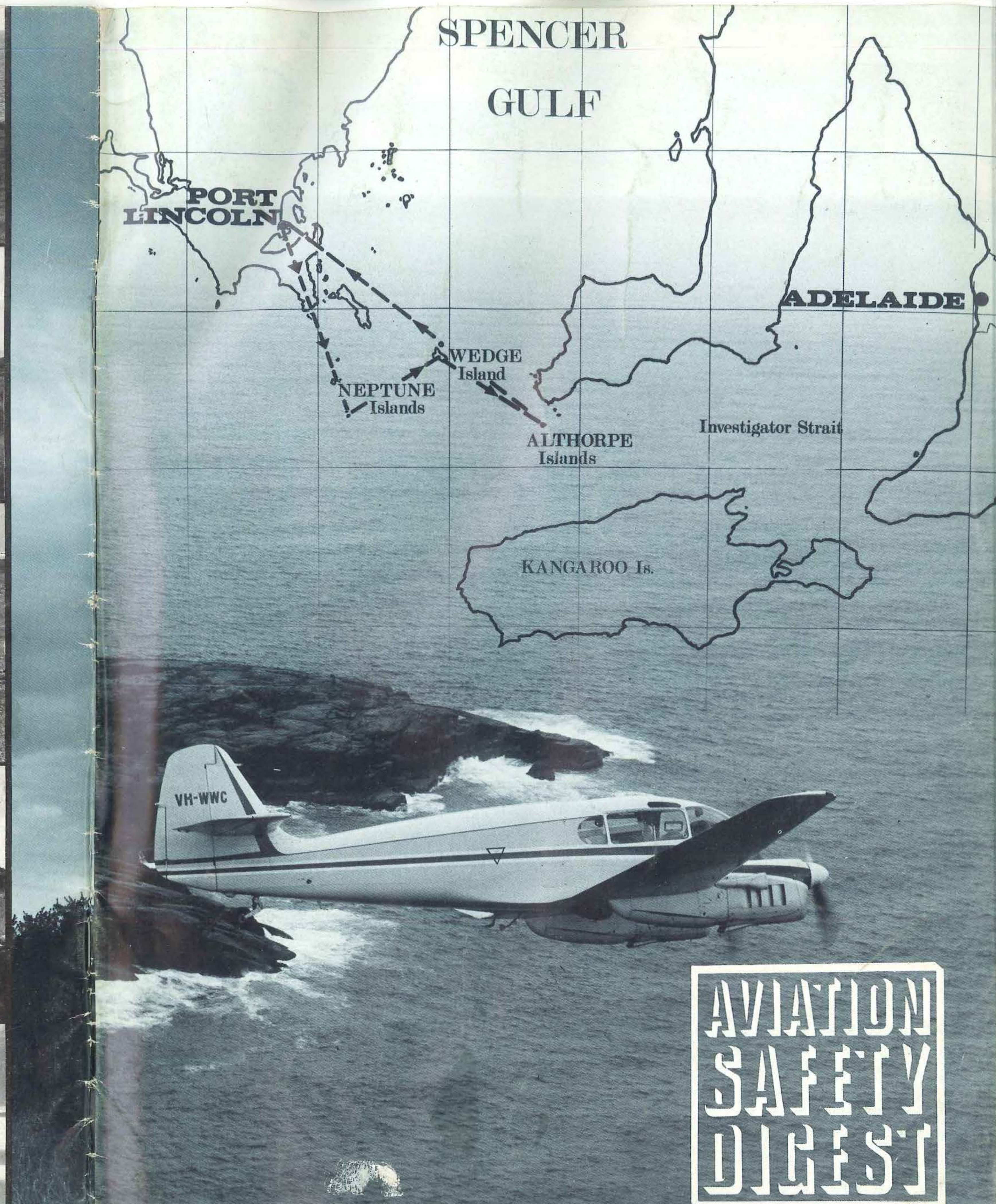
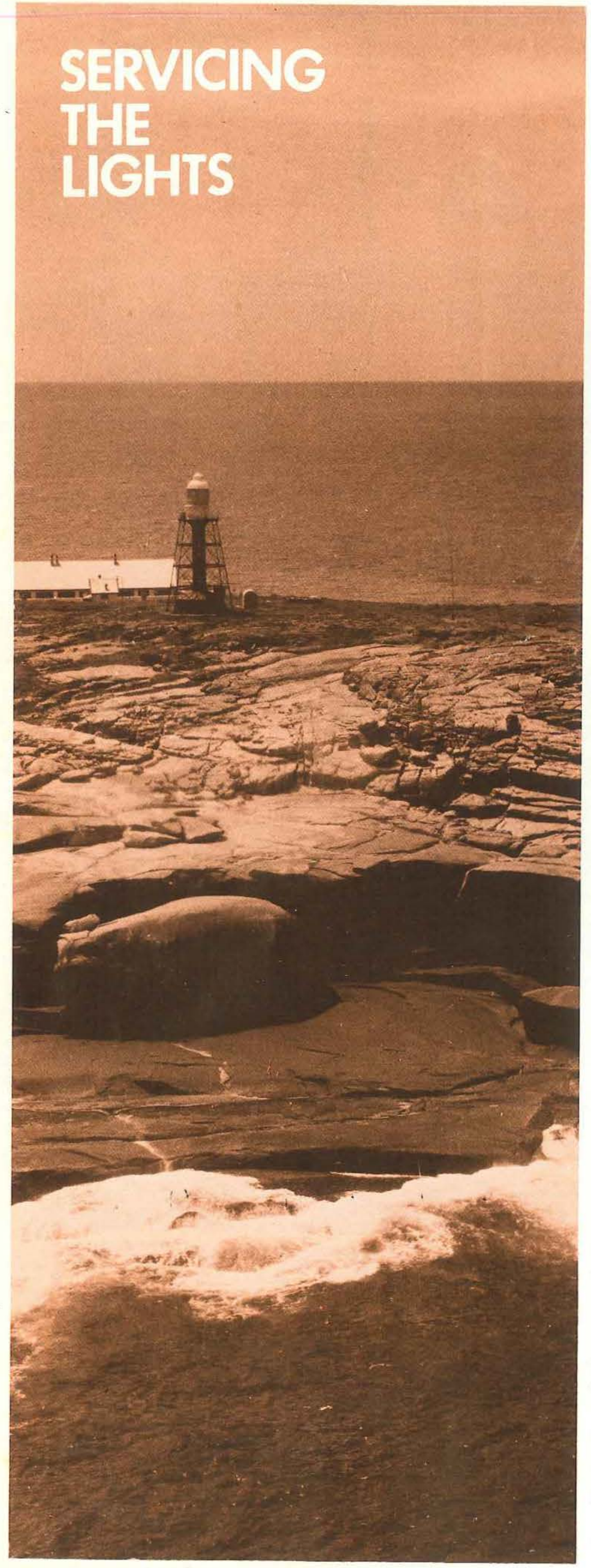






AVIATION SAFETY DIGEST

Number 87 1974 AUSTRALIAN DEPARTMENT OF TRANSPORT



THERE is something evocative about even the word lighthouse — a vision of cold grey ocean, remote headlands, rocky shores pounded by heavy seas, and lonely flashing sentinels safeguarding the passage of distant shipping. And this image is generally not far from the truth. For it is the very characteristics of which this mental picture is made up, that create the need for aids to navigation in such places.

For the same sorts of reasons, a real sense of adventure has been traditional to lighthouse services. For the lighthouse keepers themselves, with their wives and families, life in the bleak stone houses clustered at the foot of the light tower, has been lonely and at times hazardous. Far from the amenities of urban life and medical aid, their solitary weeks and months have in the past been punctuated only by the infrequent visits of the lighthouse supply ships and their equally resolute crews. Even then, like as not, boisterous weather and heavy seas might prevent the landing of supplies and mail, or the exchange of staff for days or occasionally weeks, at a time.

But in Australia today, things are changing, and at a number of places around our coastline, aircraft, both fixed wing and helicopters, are supplementing the traditional methods of supply for the Department's Navigation Aids Branch. From their base at Port Lincoln, at the foot of South Australia's Eyre Peninsula, Commodore Aviation's two Super Aero 145's have the task of maintaining a schedule of services to the lighthouses guarding the entrance to Spencer's Gulf and Investigator Strait, flying in mail and supplies to the resident staffs and where required, technicians to service the automatic lights.

Radio "skeds" are maintained between the lighthouses and Commodore Aviation's base at Port Lincoln airport; supplies are ordered, messages about intending passengers are passed, and before each flight begins, the wind velocity at the islands is provided for the pilot. In some cases, if the wind is too strong a landing will not be possible, for some of the landing areas have all the characteristics of a difficult New Guinea strip and the authorisation to use them is limited to specially approved pilots.

The supplies — as varied as those of any outback mailman's — are loaded, the engines are started and the aeroplane taxis out for take-off from Port Lincoln's pleasantly rural aerodrome. Soon afterwards it is winging its way towards the southernmost tip of Eyre Peninsula, past lonely Memory Cove where a plaque erected by Matthew Flinders still stands, and out across the swell of the Southern Ocean.

Twenty minutes out from Port Lincoln, the three low-lying granite outcrops which are the Neptune Islands lie directly ahead — tiny grey-green oases of dryness in a vast blue watery desert. On the southernmost stands an open framework light-tower and beside it, the ubiquitous solid stone buildings. A short distance away, a short, steeply-sloping one-way strip runs uphill almost from the water's edge to the crest of the island.

With the undercarriage and flaps down and propellers in fine pitch, the Super Aero 145 rumbles in towards the threshold, its wheels seemingly just above the waves. Now the rocky shoreline seems to fill the windscreen — surely the aircraft is too low even to make the threshold! But no, at the last moment the rocks slide just beneath the nose and there is the strip. The pilot checks slightly and cuts the power as the wheels touch the bumpy surface.

A Landrover is waiting as the aircraft brakes to a halt at the upper end of the 900 foot strip. There are greetings and the supplies are unloaded. There's time for a quick cup of tea while the pilot waits for a next "sked" in the radio room at the foot of the tower, then it's back to the aircraft for a downhill take-off towards the distant, sloping slab of rock standing on the rim of the eastern horizon that is named so appropriately, Wedge Island. From there it will be on again, across the mouth of Spencer's Gulf to the slightly more civilized strip on Althorpe Island off the tip of the Yorke Peninsula, finally heading homeward to Port Lincoln late in the afternoon.

For this work, the Teutonic-looking business-like Super Aero 145's, with their rugged tailwheel retractable undercarriage combined with the security offered by their twin engines, have proved themselves admirably suited. Ten years of virtually incident-free operation surely speaks for itself.

DoT Photography by T. MARTIN

DEPARTMENT OF TRANSPORT AUSTRALIA

AVIATION SAFETY DIGEST

Number 87 1974

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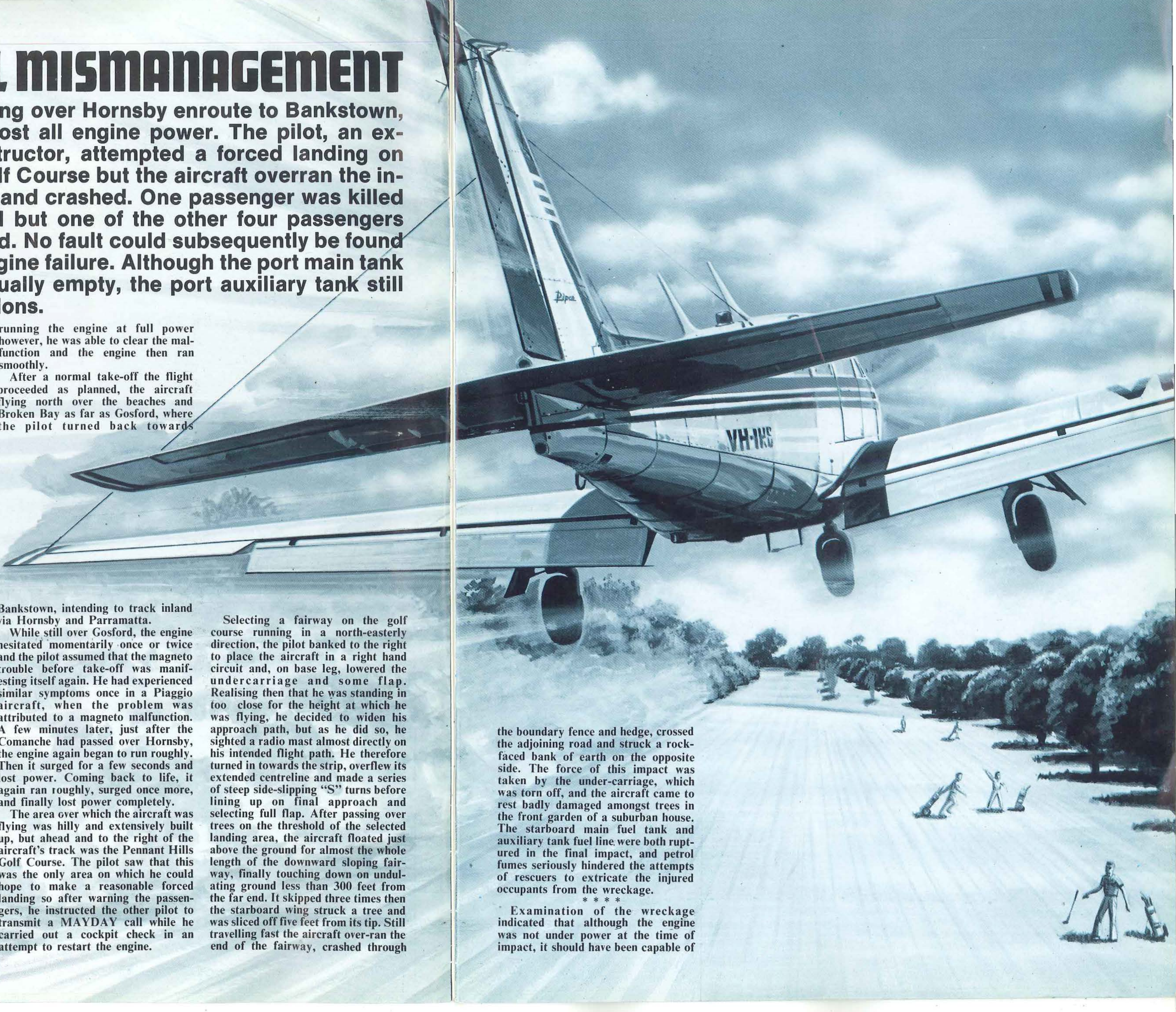
FATAL FUEL MISMANAGEMENT

Shortly after passing over Hornsby enroute to Bankstown, a Piper Comanche lost all engine power. The pilot, an experienced flying instructor, attempted a forced landing on the Pennant Hills Golf Course but the aircraft overran the intended landing area and crashed. One passenger was killed and the pilot and all but one of the other four passengers were seriously injured. No fault could subsequently be found to account for the engine failure. Although the port main tank was found to be virtually empty, the port auxiliary tank still contained seven gallons.



THE aircraft, a six seater PA24-260, was based at Bankstown and had been chartered by the five passengers for a pleasure flight over Sydney Harbour and up the coast to Gosford.

On his arrival at the aerodrome and before going to the hangar the pilot in command lodged a flight plan which indicated the aircraft had full tanks. The pilot had assumed the tanks would be full, because it was the operator's normal practice to refuel the aircraft whenever it returned from a flight.

After completing his flight planning, the pilot in command went to the aircraft expecting there would be only four passengers. One of these he had taught to fly and held a restricted private pilot licence but he had no previous experience in Comanche aircraft. Instead however, he found there were five passengers and he realized that if the tanks were in fact full, he would have to leave one passenger behind. He said so to the private pilot and asked him if he had "looked at" the aircraft. The private pilot said that he had, and that the tanks were actually three quarters full. This satisfied the pilot in command that he could carry the additional passenger after all and the six boarded the aircraft.

While conducting his prestart checks, the pilot in command rotated the fuel tank selector to all four tank positions, noting that in each instance the selected tank read full on the gauge. But as he knew that it is not unusual for this type of gauge to continue to read full until after some fuel has been drawn from the tank he accepted the indication as consistent with the other pilot's report on the tank's contents.

The engine was started and they taxied out but while checking the magnetos as he was running up the engine the pilot in command found that the RPM drop was excessive and that the engine was running roughly. By leaning the mixture slightly and running the engine at full power however, he was able to clear the malfunction and the engine then ran smoothly.

After a normal take-off the flight proceeded as planned, the aircraft flying north over the beaches and Broken Bay as far as Gosford, where the pilot turned back towards Bankstown, intending to track inland via Hornsby and Parramatta.

While still over Gosford, the engine hesitated momentarily once or twice and the pilot assumed that the magneto trouble before take-off was manifesting itself again. He had experienced similar symptoms once in a Piaggio aircraft, when the problem was attributed to a magneto malfunction. A few minutes later, just after the Comanche had passed over Hornsby, the engine again began to run roughly. Then it surged for a few seconds and lost power. Coming back to life, it again ran roughly, surged once more, and finally lost power completely.

The area over which the aircraft was flying was hilly and extensively built up, but ahead and to the right of the aircraft's track was the Pennant Hills Golf Course. The pilot saw that this was the only area on which he could hope to make a reasonable forced landing so after warning the passengers, he instructed the other pilot to transmit a MAYDAY call while he carried out a cockpit check in an attempt to restart the engine.

Selecting a fairway on the golf course running in a north-easterly direction, the pilot banked to the right to place the aircraft in a right hand circuit and, on base leg, lowered the undercarriage and some flap. Realising then that he was standing in too close for the height at which he was flying, he decided to widen his approach path, but as he did so, he sighted a radio mast almost directly on his intended flight path. He therefore turned in towards the strip, overflew its extended centreline and made a series of steep side-slipping "S" turns before lining up on final approach and selecting full flap. After passing over trees on the threshold of the selected landing area, the aircraft floated just above the ground for almost the whole length of the downward sloping fairway, finally touching down on undulating ground less than 300 feet from the far end. It skipped three times then the starboard wing struck a tree and was sliced off five feet from its tip. Still travelling fast the aircraft over-ran the end of the fairway, crashed through the boundary fence and hedge, crossed the adjoining road and struck a rock-faced bank of earth on the opposite side. The force of this impact was taken by the under-carriage, which was torn off, and the aircraft came to rest badly damaged amongst trees in the front garden of a suburban house. The starboard main fuel tank and auxiliary tank fuel line were both ruptured in the final impact, and petrol fumes seriously hindered the attempts of rescuers to extricate the injured occupants from the wreckage.

* * * *

Examination of the wreckage indicated that although the engine was not under power at the time of impact, it should have been capable of

normal operation. The fuel selector was positioned to the port main tank which was empty. There were seven gallons in the port auxiliary tank. It was not possible to determine the quantity in the two starboard tanks because of the damage they had sustained in the final impact, but the soil beneath the damaged starboard wing contained traces of fuel to a depth of several inches and small amounts of fuel remained in the ruptured tanks. Little fuel was present in the fuel lines ahead of the fire wall, but the fuel selector assembly was found to function correctly in all positions. An electrical fault was found in the fuel gauge wiring, which caused the gauge to indicate full for each tank selected, regardless of the tank's actual contents.

The damage sustained by the engine itself was comparatively slight, and after being removed from the damaged airframe, it was mounted in the test stand and subjected to a 40 minute test run. Initially, excessive RPM drop was experienced when each magneto was tested in turn, but this eventually cleared and the engine then delivered acceptable power. The RPM drop was ultimately found to be resulting from a defective ignition lead but although the malfunction would have been sufficient to warrant rectification before flight, it was not considered to have had any direct bearing on the accident.

It was learned during the investigation that another pilot who had flown a cross-country trip in the aircraft the previous day, had noticed the fault in the fuel gauge, but he had forgotten to report it on completion of his flight. Late that night he remembered about the fuel gauge and resolved to telephone the operator the following morning, but by the time he made the call, the aircraft had departed on the flight on which the accident occurred.

The pilot in command held a commercial licence, with a "B" class instructor rating and a class 4 instrument rating. His total aeronautical experience was in excess of 5,500 hours of which nearly 5,000 hours was instructional flying, but his time on Piper Comanche aircraft was quite limited, amounting to only 34 hours. In the preceding 90 days he had flown only four hours on the type.

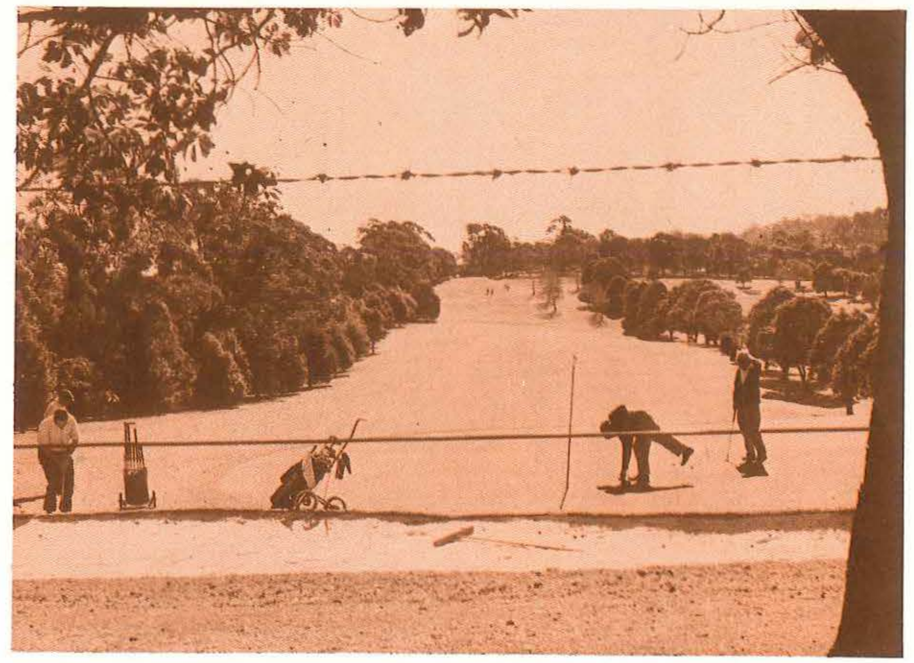
It is apparent that the events and circumstances in which the flight took place combined to condition the pilot against accepting that fuel starvation could be the problem when the engine lost power. When he prepared his flight plan he had indicated that the tanks were full, because he knew that they were customarily topped up at the end of each day's flying. This long-established practice was probably the reason why he did not check the re-fuelling records or the tanks for himself. No doubt if none of the passengers had been known to him he would have checked the tanks personally but as one was a student of his, it is understandable that he accepted this person's assessment of the tank's contents.

The fact remains however that the tanks contained a great deal less than the full quantity. The Comanche's two main tanks each have a capacity of 23 gallons and each of the two auxiliary tanks, 12 gallons. From information gained during the investigation it was apparent that before departing from Bankstown for the flight on which the accident occurred, the port main tank (on which the engine was apparently operated up to the time of the engine failure), contained seven gallons, there was another seven gallons in the port auxiliary tank, fourteen in the starboard main, and about two gallons in the starboard auxiliary tank. Thus, although there was more than enough fuel on board for the intended flight, its quantity and disposition was such that if the pilot in command had visually checked each tank's contents, the erroneous "full" indications on the gauge should have been obvious to him when he selected each tank in turn during his pre-start check. Had he done so, the pilot's past experience of magneto problems, as well as the magneto trouble he had noticed during the engine run-up before take-off, would have carried far less weight in his mind when the engine later lost power in flight.

But this was not the case and, by the time the engine failed, the pilot in command had been effectively pre-conditioned to believe that the problem was an ignition one and not a fuel one. On top of this, the pilot was comparatively inexperienced in the Comanche and had not previously run a fuel tank dry in this type fitted with the fuel injection engine. He was thus not aware that it can take up to a minute for the engine to restart in these circumstances.

Although the fuel selector was found positioned to the empty port main tank during the investigation, this fact alone could not be taken as clear evidence of its position at the time of the crash. A number of people had been involved in the rescue of the occupants from the wreckage, and it is possible that the selector could have been moved unintentionally during the rescue operation. It seems reasonable to assume that when the engine lost power, the pilot-in-command did in fact change the selector to another tank, and that he switched on the electric fuel pump. The majority of his flying experience had been gained as an instructor, and the emergency drills for such a situation should have been almost second nature to him. Some of the passengers stated in fact they saw him move his hand down towards the fuel selector, and so it seems that in time, power could have been restored to the engine.

It is considered that because the pilot in command did not know the fuel state of the aircraft, he did not persist in his efforts to re-establish power to the engine. Instead it seems that he quickly concluded the problem was an ignition one and devoted all his attention to carrying out a forced landing. In any event it is evident that at the time the engine lost power, the aircraft still had adequate fuel on board to continue the flight, and there was no evidence to indicate that the engine was not capable of operating. The forced landing that ended so disastrously was thus totally unnecessary.



TOP:
Aerial view of the forced landing area looking in the direction the aircraft was flying when the engine lost power. The landing approach was made towards the camera on the golf fairway nearest to the road. The crash site is indicated.

CENTRE:
The fairway on which the forced landing was attempted, looking in the direction of final approach. The trees with which the aircraft collided can be seen at the far end.

BOTTOM:
The aircraft as it finally came to rest in a suburban garden after crossing the road adjoining the golf course.

The circumstances that culminated in this accident were of course complex, and, as is nearly always the case, formed a chain of unfavourable events which, though comparatively minor in themselves, led step by step to the point where the situation was finally irreversible. The first link in the chain was forged when the unserviceable fuel gauge was not reported. Undoubtedly the chain could have been broken, and the ultimate result averted if the pilot in command had physically checked the tank contents for himself and accurately estimated the fuel quantities.

As a Digest safety poster proclaimed some time ago, fuel is the lifeblood of an aeroplane, a truism no one is likely to dispute. Yet it is astonishing how often such a vital requisite for flight can be taken for granted or trusted to the idiosyncrasies of fuel gauges. Quite a number of forced landings take place in single-engined aeroplanes in the course of a year, but the proportion of these that can be attributed directly to mechanical failure is remarkably small. In the great majority of cases the engine has died in flight for no other reason than that it has been deprived of fuel — either by complete fuel exhaustion or fuel mismanagement.

As should be evident from this and other accidents that have been covered in the Digest, by no means all the pilots concerned in these avoidable forced landings are novices. In many cases they are pilots of experience and maturity who take pride in their skill. But care and professionalism in all other aspects of a pilot's responsibilities can be completely negated if, by some means or another, the engine is deprived of its supply of fuel!

The number and frequency of accidents and incidents resulting from fuel exhaustion and mismanagement makes it clear that this particular aspect of airmanship warrants a much higher priority than it is generally being given.

NO ROOM FOR RECOVERY

AT a country aerodrome in New South Wales, the local aero club had organised a "fly-in" and picnic day to be held in conjunction with flying competitions. Early in the day a Victa Airtourer, as well as several other aircraft, flew in from Bankstown and, during the morning and early afternoon, made a number of flights in the course of the day's programme.

While the morning's flying was in progress, a student pilot from the local aero club asked a visiting instructor if he would show him some aerobatics in the Airtourer, and the instructor agreed. The aircraft was refuelled about mid-afternoon and, after waiting to watch an aerobatic display over the aerodrome by another pilot in a Chipmunk, the two men boarded the Airtourer and started the engine. The aircraft taxied out and, shortly afterwards, took off normally, climbing away on an easterly heading.

Almost three quarters of an hour later, a friend of the student who had helped refuel the Airtourer, went to look for the aircraft, assuming that it would be back by this time. But there was no sign of the aircraft and, when he asked about it, he learned that it had not returned. As he expected the flight to have taken only about twenty minutes, he went immediately to the temporary control tower and an aircraft operating in the circuit area was asked to call the overdue Airtourer. There was no reply.

In the meantime, on a property about four miles east of the aerodrome, a farm hand, feeding cattle, had seen a light aircraft about a mile away in the direction of the aerodrome begin aerobatics and he stopped to watch. When the aircraft began the sequence it appeared to be about 2,000 feet above ground level over relatively flat, open country. However, as it continued its manoeuvres it descended progressively and drifted slowly to the east towards rising, timbered ground. Finally, after completing a manoeuvre at a height estimated to be only a few hundred feet above the ground, the aircraft began a steady climb, slowly turning to the left in the direction of the aerodrome. But after climbing for only a short time, the farm hand saw the aircraft "suddenly loop over". Recovery from this manoeuvre appeared to progress to the stage of a steep dive and the aircraft then passed out of sight behind the crest of a hill.

At about the same time, on an adjoining property, two boys riding a mini-bike had seen a light aircraft approaching from the direction of the aerodrome. It came to within half a mile of their position and the boys stopped to watch as it began to perform aerobatics. During the manoeuvres which followed, the aircraft progressively lost height until, at one stage, it was so low that it seemed to barely clear some trees.

The afternoon was hot and eventually the boys grew tired of watching the aircraft and decided to move on. They had not gone far however, when one looked back over his shoulder and saw an aircraft descending towards a ridge. It passed out of sight and, a few seconds later, he thought he heard a crash like falling timber, followed almost immediately by a heavy thump. He heard no more, and the aircraft did not reappear.

The main wreckage of the Victa, looking back in the direction of impact. The initial point of impact was beyond the top of the rise. The separated empennage can be seen amongst the trees in the middle distance.

* * * *

When it was found that the Airtourer had not returned to the aerodrome and it did not reply to radio calls, an air and ground search was begun. But it was not until the next morning that the widely scattered wreckage of the Airtourer was sighted from the air, lying in lightly timbered country only three miles east of the aerodrome and in the general area where the witnesses had seen an aircraft performing aerobatics the previous day. When a ground party reached the site, they found that the Airtourer had been completely destroyed by impact forces and that both occupants had been killed.

* * *

Examination of the wreckage at the accident site disclosed that the aircraft, travelling at relatively high speed, had first struck the light upper branches of a large tree in a nose down, left wing low attitude. Immediately afterwards, the aircraft had struck several other trees in quick succession. The starboard wing had been torn from the fuselage and the aircraft had rolled rapidly on to its back before striking the ground inverted. Carried by its momentum, the aircraft became airborne again and, still inverted, bounced a further seventy-five feet before striking the ground again, breaking up as it went. What little of the fuselage remained, eventually came to rest over four hundred feet from the initial point of impact.

Fire had not broken out in the wreckage, and all major components of the aircraft were accounted for at the accident site. A detailed examination of the wreckage did not reveal any evidence of in-flight structural failure, or any damage to the airframe, its systems, or the engine other than that which could be directly attributed to impact with the trees or the ground.

The instructor was thirty-four years old and held a "B" class rating. His total aeronautical experience amounted to over 2,200 hours, of which 440 had been flown in the Airtourer type. He had accumulated some 50 hours aerobatic flight time, both in the course of solo practice and while giving instruction, all of which had been confined to the Airtourer. His last aerobatic flight before the accident had been a week earlier, when he had flown one hour's solo practice in the same aircraft. The instructor was considered by his associates to be a responsible person and a skilled pilot who always "flew by the rules". He had exhibited a keen interest in aerobatics since the earliest stages of his flying career and had flown several aerobatic displays at air pageants. He had been primarily responsible for aerobatic training within the organisation that owned the Airtourer. The student pilot, who was occupying the left hand seat, had logged only 18 hours total flight time and had no previous experience of aerobatics. On the day of the accident, both pilots appeared to be in normal health and the investigation did not reveal anything to suggest otherwise.

The investigation did not establish conclusively the Airtourer's movements once it had climbed away from the circuit area. There was no further sighting of the aircraft from the aerodrome and those who had watched it depart returned their attention to the competition flying which had resumed following the aerobatic display by the Chipmunk.

It was possible however, to deduce from the evidence of the three witnesses that the aircraft they saw performing aerobatics, began the manoeuvres at about 2,000 feet above the ground and that the apparent "loop over" occurred close to 1,000 feet above the immediate terrain. Additionally, the impact marks at the accident site disclosed that the Airtourer had struck the ground at a relatively high speed and in a 20 degrees nose-down attitude which is consistent with the flight path of the aircraft the witnesses saw disappear behind the ridge.

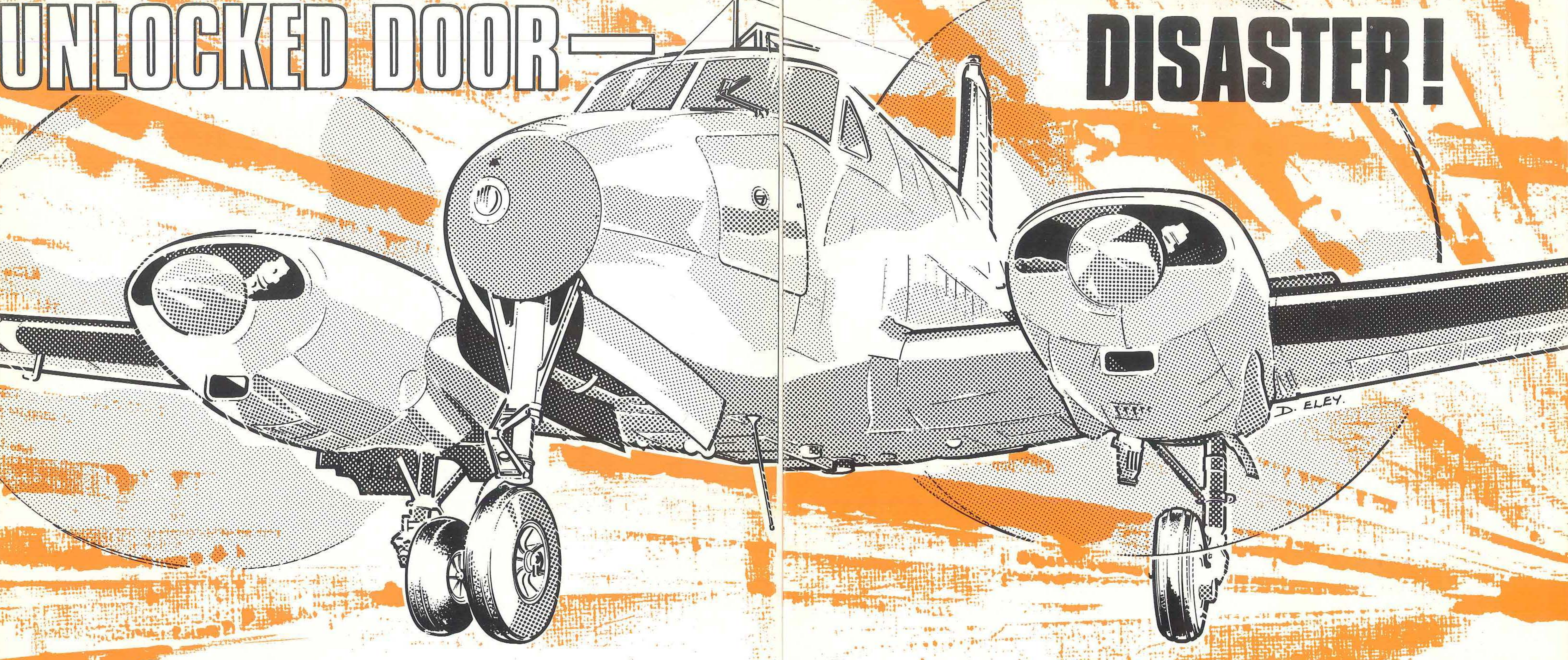
In the course of the investigation, consideration was given as to whether the pilot might have misinterpreted the altimeter reading and as a result, believed he was higher than was actually the case. Although the Airtourer's altimeter was very badly damaged in the accident, its sub-scale was found to have been set close to the QNH current at the time. Its exact reading could not be determined, but it appeared to have been approximately 2,000 feet. The elevation of the accident site was 1,900 feet. The instructor normally operated from Bankstown and had probably carried out most of his aerobatic flying in the local training area, where the height of the terrain generally is not more than about 500 feet AMSL. On these flights, assuming it was his habit to set QNH on the altimeter subscale, his actual height above the ground would not have differed greatly from the altimeter reading. But on the flight on which the accident occurred, he was operating over unfamiliar terrain that was between 1,500 and 2,000 feet higher than he had been used to in the Bankstown training area. If, on this flight, he was using as his lower height reference an altimeter reading of 3,000 feet, the aircraft would only have been about 1,000 feet above terrain even though the altimeter, set to QNH, would still have been reading close to the range of indicated heights he normally used.

Whether or not the instructor was relying on his altimeter as a "safety" reference will of course never be known. Similarly, it cannot be known if he elected to begin aerobatics at a height above the ground that he considered adequate, but then failed to realise the aircraft was drifting over higher terrain. But whatever the circumstances were, the fact remains that, for the buffer of safety provided by ANR 131 to be fully effective, a pilot must plan to effect recovery from all manoeuvres performed in normal aerobatic flight at least 3,000 feet above the terrain in the immediate vicinity of the aircraft.

CAUSE

The probable cause of the accident was that an aerobatic manoeuvre was commenced at an unsafe height.

UNLOCKED DOOR— DISASTER!



Some time ago, in Aviation Safety Digest No. 76, the article "The Turn of the Key" described two accidents in which light aircraft sustained damage when their nose locker doors opened in flight. This article stressed the importance of ensuring the security of nose locker doors before departure, but it hardly envisaged that the problem could result in a fatality. As the following report from the National Transportation Safety Board tells however, this is just what led to a fatal accident to a Queen Air in the United States.

On two quite recent occasions in Australia, Queen Air aircraft have suffered minor damage when their nose compartment doors opened into the port propeller shortly after takeoff, in circumstances strikingly similar to those of this fatal accident. We can be thankful that on both occasions, the pilots concerned handled the emergency successfully and were able to make a safe assymetric landing, but the fact that these potentially dangerous emergencies developed at all, makes the contents of this report all the more pertinent.

(Based on Report issued by National Transportation Safety Board, U.S.A.)

The Flight

A BEECH Queen Air was scheduled to depart Albuquerque, New Mexico, U.S.A. for Los Alamos, with one pilot and eight passengers on board. As well, there was 35 pounds of cargo in the rear compartment, and 86 pounds in the forward compartment in the nose.

The pilot requested and received a clearance to taxi to runway 17 and three minutes afterwards was cleared to take-off from a point adjacent to taxiway 7, which left 7,500 feet of the 8,993 foot runway available. The wind was given as "190, variable at 22".

Very soon afterwards the aircraft was seen airborne, approximately 3,500 feet further down the runway. The flaps and undercarriage had been retracted, and the port propeller was in the fully-feathered position. The aircraft had attained a height of 50 to 100 feet over the centreline of the runway and approximately 4,000 feet of runway remained. The aircraft was then observed to begin a shallow left turn to a heading of about 350 degrees.

The pilot then requested a landing back on runway 17 and the Tower replied ". . . runway 26 if you'd like, or runway 17. Wind is 20 degrees at 23." The pilot did not acknowledge this clearance, nor were there any further transmissions from the aircraft.

After momentarily flying straight and level at an estimated height of 100 feet, still on the heading of about 350 degrees, the aircraft assumed a slight nose-high attitude, then rolled to the left at a rapid rate, pitching down rapidly as it did so. After rolling through about 240 degrees, it struck the ground 7,000 feet east-southeast of the intersection of runways 17 and 26, in a right-wing-low, 80 degrees nose-down attitude. The aircraft was destroyed by impact forces and the fire that followed, and all on board sustained fatal injuries.

Investigation

Examination of the aircraft wreckage disclosed that:-

- The wing flaps and undercarriage were in the retracted position.
- There was no separation of structural components before impact.
- There were propeller slash marks on the forward cargo compartment door.
- Both engines were capable of normal operation before the damage was inflicted to the left propeller.
- The port propeller was in the feathered position and the tip had been broken off one blade.

The forward cargo compartment door was recovered from the wreckage and the door locking mechanism, which was found in the unlocked position, was checked and found to function properly. The locking mechanism consists of three bayonet-type latches which slide into holes in the door frame and are held in place by an over-centre cam. During the locking operation which requires 40 inch pounds of torque, the overcentre cam action has a distinctive "feel" which serves as confirmation of its locked position. The statement of a pilot formerly employed by the oper-

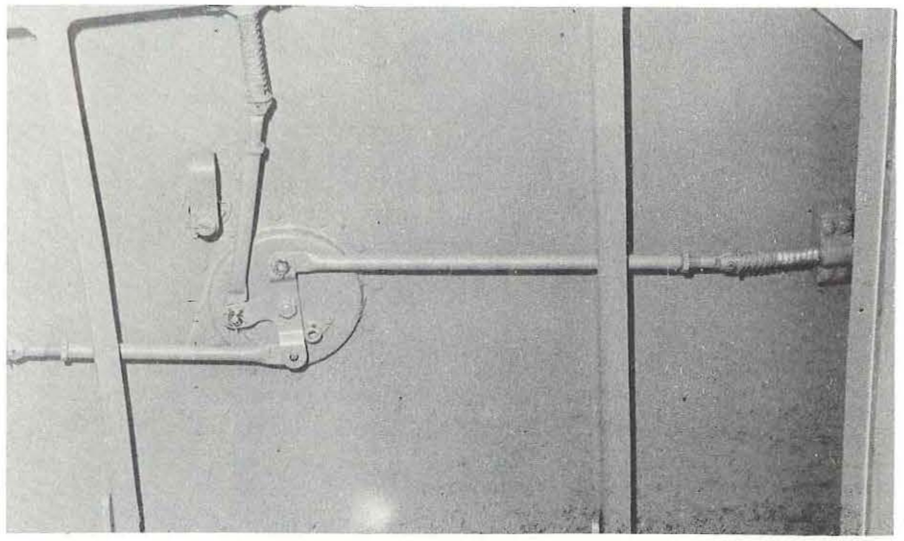
UNLOCKED DOOR— DISASTER!

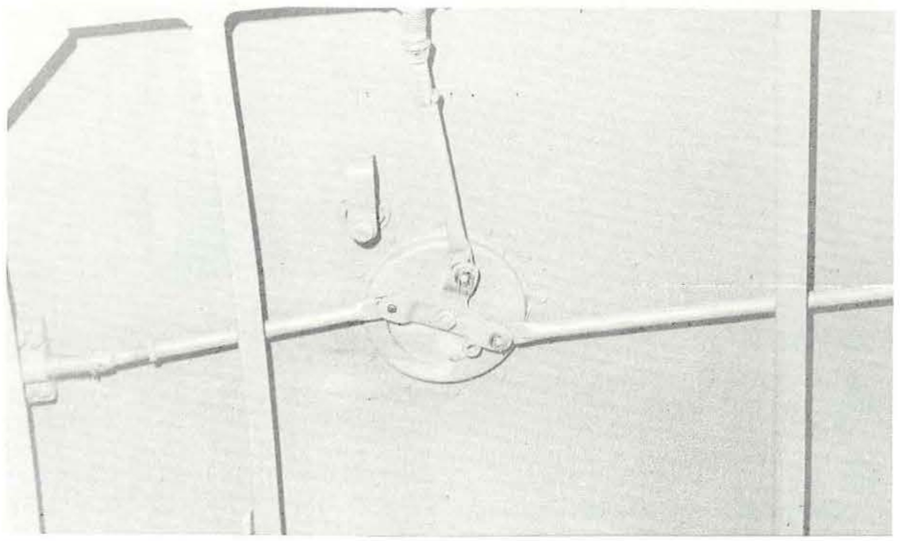
ator, revealed that the door locking mechanism on this particular aircraft was very difficult to operate and it had been his experience that some company personnel were unable to latch the door properly. The aircraft was originally equipped with an optional safety interrupter switch system, designed to preclude starting the port engine if the forward cargo compartment door was not latched properly. The Deferred Discrepancy list for the aircraft showed however, that the safety switch had been inoperative for some time and investigation disclosed that there was no wiring to the switch.

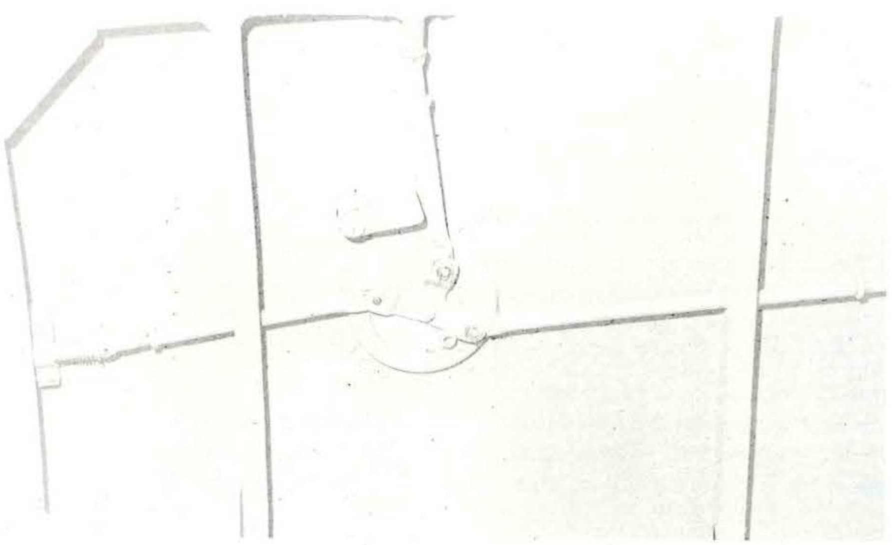
Cargo from the forward cargo compartment was found on both sides of the runway approximately 1,400 feet from the beginning of the take-off roll, and the missing tip of the port propeller was found at the intersection of runways 17 and 26, 2,400 feet from the beginning of the take-off. Four thousand nine hundred feet of usable runway remained from this point.

The take-off and climb performance of the aircraft was computed for a pressure altitude of 5,300 feet, a temperature of 83 degrees F., a take-off weight of 8,300 pounds, with the port engine stopped, and the propeller feathered. With the exception of the open forward cargo compartment door, these conditions approximate those of the take-off on the day of the accident. The calculated climb performance was based upon the assumption that the port engine was shut down and the propeller feathered at, or immediately after, lift-off. These computations showed a take-off safety speed of 93 knots calibrated airspeed, after a roll of 2,600 feet. The single-engine best rate of climb speed was 96 knots. The corresponding minimum single-engine control speed (Vmc), assuming level flight and take-off power on the right engine, would be 87 knots and the stalling speed was calculated to be 89 knots. The performance data indicated that in this configuration, the aircraft could achieve a rate of climb of 188 feet per minute.

There was no information available for calculating the drag produced by the protruding cargo door and the resulting cavity in the nose compartment. The effect of the open nose cargo door on climb performance was







Photographs showing the operation of the forward compartment door locking mechanism on the inside of the door:

TOP: Unlatched

CENTRE: Latched but not locked

BOTTOM: Latched and locked.

therefore estimated, using a method derived for determining the effect of open undercarriage doors, and indicated that the best rate of climb with the door open and take-off power on the operating engine would be 94 feet per minute. If the pilot reduced the engine's power to METO, the rate of climb would be reduced to 31 feet per minute.

The climb performance would have been further diminished by turning manoeuvres and turbulence, both of which would have also adversely affected the stalling speed. A special weather observation taken 10 minutes after the accident reported, "... temperature 83 degrees ... wind 210 degrees at 23 knots, gusting to 31 knots ... blowing dust all quadrants." An AIRMET, valid for the time of the accident, advised of light to moderate thermal turbulence throughout Arizona and New Mexico and statements from pilots verified the presence of turbulence in the traffic pattern at Albuquerque.

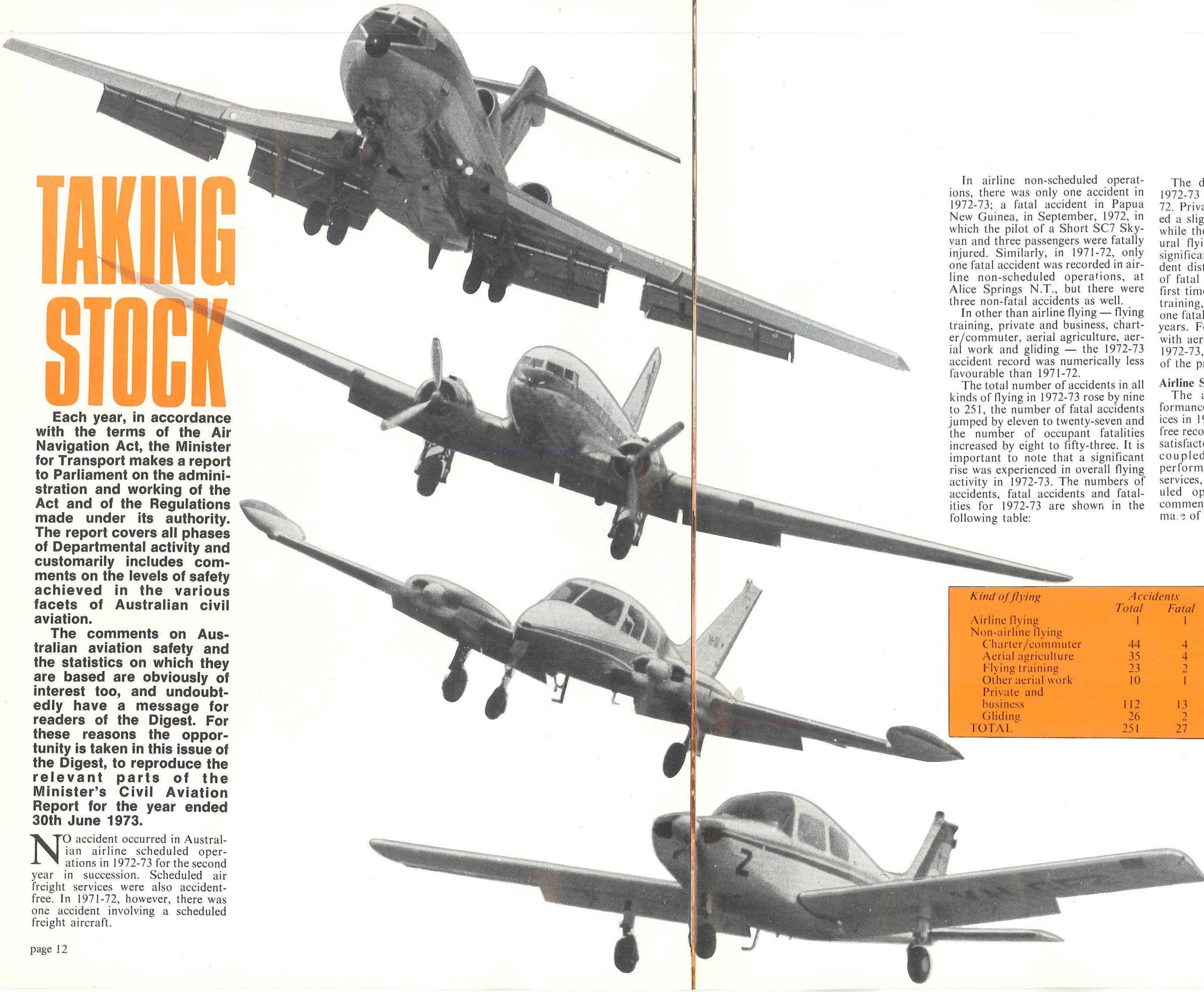
Analysis and Conclusions

From the evidence brought to light during the investigation, the Safety Board made the following conclusions:

- The forward cargo compartment door cam locking mechanism was not fully rotated to the over-centre position when the door was closed. Examination of the latching mechanism design revealed that when the cam locking mechanism is properly positioned in the over-centre detent, a positive lock will prevent inadvertent disengagement of the latching bayonets. The alignment of scribe marks on the handle assembly provides a positive indication that the latching bayonets are fully engaged and that the cam is over-centre. A 10 degree minimum displacement from the scribe mark alignment position would be evident if the cam were not over-centre. In this position, the bayonets could be fully engaged so that the door would otherwise appear to be secured. The investigation disclosed that the latching device on this aircraft had previously been difficult to operate and required more than normal force to engage the doorlatching bayonets. The Board believes that the use of excessive force might have misled the pilot to disregard the handle scribe mark alignment and to believe that the cam was overcentre and the door was fully locked.
- The cargo door bayonet-type latches became disengaged during the take-off roll and, at some point along the ground take-off path, the door opened into the port propeller arc. The Board believes that this occurred within the initial 1,400 feet of the take-off. Visual assessment of the door opening was not possible from the cockpit.
- For the next 1,200 feet of ground roll, heavy, compact metal cargo from the forward cargo compartment was falling into and being struck by the port propeller with sufficient force to shatter the pieces of cargo, break off the tip of one of the propeller blades, and heavily dent all three blades. From the point where the propeller blade tip was found, 4,900 feet of runway remained in which to stop the aircraft safely.
- The aircraft lifted off approximately 2,600 feet from the take-off initiation point. The decision to continue the flight at this point was a matter of pilot judgment, and the known existence of precipitous terrain beyond the runway might have been a factor in the decision to continue. Performance data shows that the aircraft could have stopped on the runway length remaining from the point where the undercarriage was retracted. Subsequent to that point, and on reaching a height of 50 feet, the remaining runway distance was marginal for abandoning the take-off successfully.
- Performance calculations accounting for the estimated effect of the open cargo door show that in level flight, with the port propeller feathered, the starboard engine operating at METO power, and the undercarriage and flaps retracted, the aircraft should have been able to maintain a positive rate of climb of 31 feet per minute.
- From the deterioration of aircraft controllability that would have been evident from the aircraft's handling characteristics, the pilot would have been aware of the loss of aircraft performance. However, there was no way that he could have made a reasonable judgment as to the extent of the loss. In the circumstances, it would be reasonable to expect that the pilot would land the aircraft at the first opportunity. After being cleared by the Tower for a landing on either runway 17 or 26, it is probable that the pilot increased the angle of bank slightly in an attempt to land on runway 26, the nearer of the two runways. At this point, control of the aircraft was lost.
- The decision of the pilot to turn immediately to another runway was probably influenced by the proximity of rising terrain; however, this action is questionable in view of the aircraft's calculated performance with the cargo door open.

Probable Cause

The National Transportation Safety Board determined that the probable cause of this accident was the inadvertent opening of the forward cargo compartment door and the subsequent discharge of cargo, which caused damage to the left propeller and additional drag at a critical phase of flight. The Safety Board believes that had the door-unsafe-indicating system been operational or had the security of the forward cargo compartment door been ensured, the accident would have been avoided.



TAKING STOCK

Each year, in accordance with the terms of the Air Navigation Act, the Minister for Transport makes a report to Parliament on the administration and working of the Act and of the Regulations made under its authority. The report covers all phases of Departmental activity and customarily includes comments on the levels of safety achieved in the various facets of Australian civil aviation.

The comments on Australian aviation safety and the statistics on which they are based are obviously of interest too, and undoubtedly have a message for readers of the Digest. For these reasons the opportunity is taken in this issue of the Digest, to reproduce the relevant parts of the Minister's Civil Aviation Report for the year ended 30th June 1973.

NO accident occurred in Australian airline scheduled operations in 1972-73 for the second year in succession. Scheduled air freight services were also accident-free. In 1971-72, however, there was one accident involving a scheduled freight aircraft.

In airline non-scheduled operations, there was only one accident in 1972-73; a fatal accident in Papua New Guinea, in September, 1972, in which the pilot of a Short SC7 Skyvan and three passengers were fatally injured. Similarly, in 1971-72, only one fatal accident was recorded in airline non-scheduled operations, at Alice Springs N.T., but there were three non-fatal accidents as well.

In other than airline flying — flying training, private and business, charter/commuter, aerial agriculture, aerial work and gliding — the 1972-73 accident record was numerically less favourable than 1971-72.

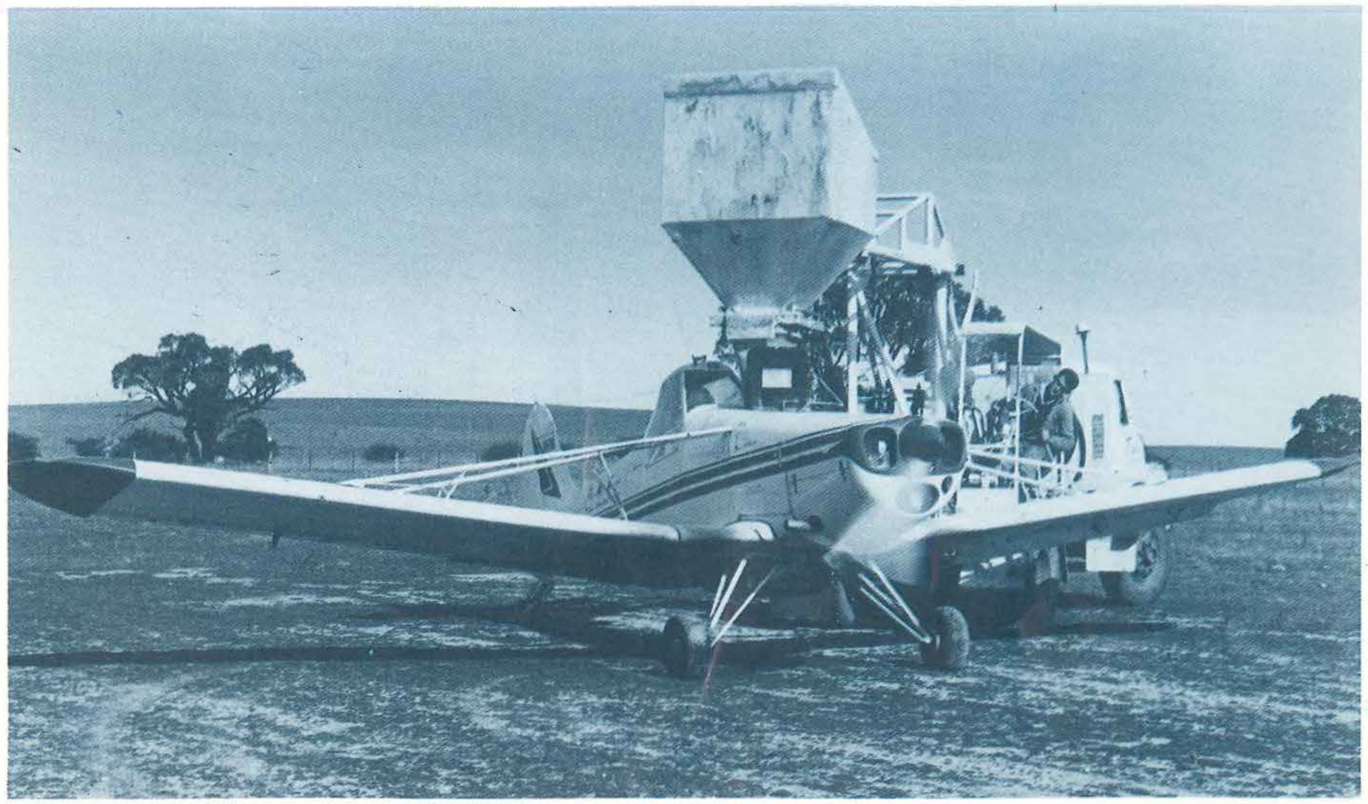
The total number of accidents in all kinds of flying in 1972-73 rose by nine to 251, the number of fatal accidents jumped by eleven to twenty-seven and the number of occupant fatalities increased by eight to fifty-three. It is important to note that a significant rise was experienced in overall flying activity in 1972-73. The numbers of accidents, fatal accidents and fatalities for 1972-73 are shown in the following table:

Kind of flying	*Accidents* Total	Fatal	*Fatalities* Crew	Pass.	Other
Airline flying	1	1	1	3	-
Non-airline flying					
Charter/commuter	44	4	3	8	1
Aerial agriculture	35	4	4	-	-
Flying training	23	2	4	-	-
Other aerial work	10	1	-	1	-
Private and business	112	13	13	13	-
Gliding	26	2	2	-	-
TOTAL	251	27	27	25	1

The distribution of accidents for 1972-73 was similar to that of 1971-72. Private and business flying showed a slight improvement on 1971-72, while the gliding and aerial agricultural flying record deteriorated. The significant feature of the fatal accident distribution was the occurrence of fatal accidents in gliding, for the first time in four years, and in flying training, where there has been only one fatal accident in the previous four years. Four fatal accidents occurred with aerial agricultural operations in 1972-73, compared with one in each of the previous two years.

Airline Safety

The airlines' accident-free performance in scheduled passenger services in 1972-73 following an accident-free record in 1971-72 is, in itself, very satisfactory. However, when it is coupled with an accident-free performance in scheduled freight services, the 1972-73 airline scheduled operations record is highly commendable. Based upon an estimate of the hours flown, the accident



rate and the fatal accident rate for 1972-73 will be 0.23 accidents per 100,000 hours flying for all operations by airline operators.

General Aviation Safety

In powered general aviation operations, the total number of accidents, 224, was only five more than in 1971-72 but the number of fatal accidents increased by nine to twenty-four against fifteen in 1971-72. As it is expected that the hours flown in powered general aviation will show an increase of about 7% in 1972-73, the accident rate for the year is slightly more favourable than the very satisfactory rate achieved in 1971-72. The rate for 1972-73 is expected to be 18.2 accidents per 100,000 hours flown compared with 19.4 for 1971-72.

The relatively sharp increase in the number of fatal accidents in 1972-73, compared with 1971-72, is somewhat disappointing. The fatal accident rate for 1972-73, at 1.95 fatal accidents per 100,000 hours flown is significantly less favourable than the rate of 1.34 achieved in 1971-72. It is important to remember however, that the 1971-72 fatal accident rate was the lowest for many years. The 1972-73 result still compared well with the rates for the two years before 1971-72, when the respective rates were 2.2 and 2.74 fatal accidents per 100,000 hours flown. The increase in fatal accidents in 1972-73 does not therefore indicate a major deterioration in general aviation safety.

The fatal accidents in 1972-73 were spread over all of the principal flying categories, each of which maintained a ratio of fatal accidents to total accidents within the band of 1:8 to 1:11. The four fatal accidents in aerial agricultural operations were disappointing and the performance of this type of flying will be watched closely in 1973-74 to determine whether an unsafe trend is developing.

Weather conditions were again a factor in nearly 50% of the fatal accidents in charter and private and business flying, a percentage little improved on previous years. This is particularly disappointing as an extensive safety education programme had been mounted in a strong effort to reduce the incidence of this type of accident.

Gliding

Gliding operations for the year resulted in twenty-six accidents, of which two were fatal. The 1972-73 figures are expected to show an increase of approximately 10% in glider operations, measured in terms of hours flown and glider launches. The pattern of gliding accidents in 1972-73 shows no discernible trend to cause concern. More than 75% of the accidents arose from circumstances peculiar to gliding, such as launchings, outfield landings in unprepared areas, and landings short of the aerodrome which are usually associated with misjudgment of the prevailing wind conditions. Other gliding accidents are related, generally, to manipulative errors of the type which also occur in powered flying by pilots of limited experience.

Safety Statistics

In airline operations, the greatest interest is logically centred on the statistics relating to scheduled operations and the relevant data for determining safety trends is in the table: "Rates for Five-Year Periods". A study of this table indicates that the stable situation which has existed over the past ten years is continuing. For each of the five safety measurements used, the rates for the final period 1968-72 are either more favourable than, or the equivalent of, the lowest rates achieved for any of the other five-year periods. The results are undoubtedly at a very satisfactory level and the degree of improvement, where it does exist, is very low, suggesting that further improvement will be a demanding task.

Rates for five-year periods: Scheduled operations

	1968-72	*1967-71*	*1966-70*	*1965-69*	*1964-68*
Accidents per 100,000 hours flown	**0.76**	0.82	1.24	0.86	0.87
Fatal accidents per 100,000 hours flown	**0.11**	0.11	0.17	0.11	0.12
Accidents per 100,000 landings	**1.02**	1.11	1.28	*	*
Fatal accidents per 100,000 landings	**0.15**	0.15	0.27	*	*
Passenger fatalities per 100 million passenger miles flown	**0.10**	0.10	0.21	0.21	0.23

*Data not available.

Accident rates: five-year periods
Powered aircraft per 100,000 hours flown

	Commuter/ Charter		*Aerial agriculture*		*Flying training*		*Other aerial work*		*Private and business*		*All powered aircraft*	
Period	*Total*	*Fatal*	*Total*	*Fatal*	*Total*	*Fatal*	*Total*	*Fatal*	*Total*	*Fatal*	*Total*	*Fatal*
1968-72	**14.72**	**1.36**	**35.29**	**1.29**	**13.32**	**0.43**	**9.65**	**1.30**	**34.47**	**3.50**	**22.16**	**1.81**
1967-71	15.34	1.52	36.51	1.94	13.93	0.34	12.41	1.89	34.94	3.43	23.12	1.92
1966-70	16.05	1.66	37.83	2.40	13.48	0.69	15.59	3.26	36.14	3.54	24.26	2.23
1965-69	15.64	1.31	37.75	2.37	13.05	0.72	19.31	3.03	36.67	3.65	24.84	2.18
1964-68	15.51	1.25	37.17	2.91	13.52	0.79	20.81	4.09	38.46	3.71	25.76	2.36

The fatal accident and passenger fatality rates reflect two fatal accidents in each of the five-year periods, except for 1966-70 in which three fatal accidents occurred — in 1966, 1968 and 1970. The number of passenger fatalities in each of those three accidents was twenty, twenty-two and six respectively, each of which is very low considering the normal load factors and the capacities of the aircraft now providing the bulk of scheduled passenger air transport in Australia. Had one of the aircraft involved in those fatal accidents been loaded to the normal level achieved in 1972-73, the fatal accident rate would have been no different, but the passenger fatality rate would have been much higher. There is therefore no room for complacency if the present favourable safety levels are to be maintained.

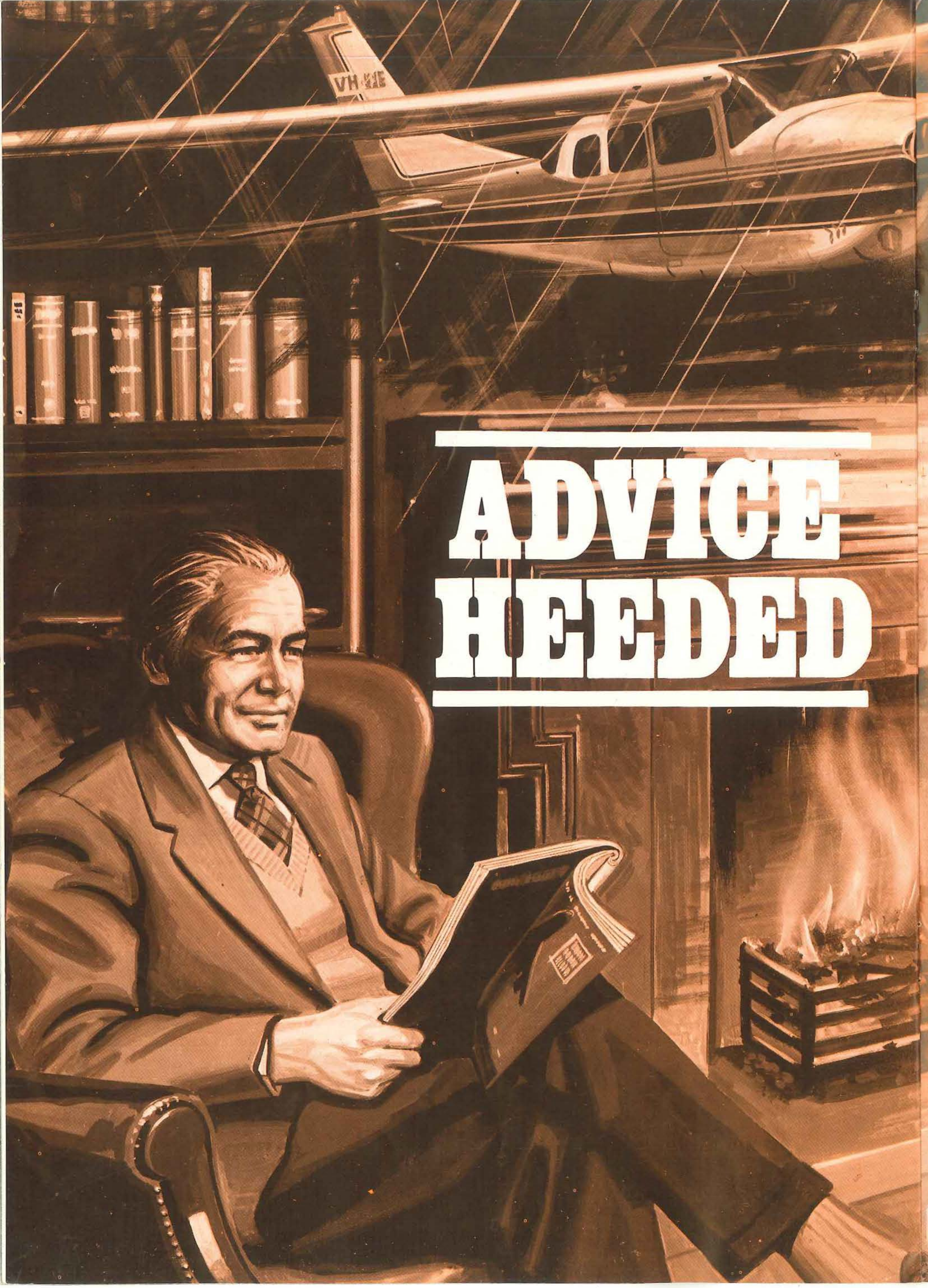
International Civil Aviation Organisation statistics include accident and fatality rates for two of the same measurements used in the tables. The five-year rates for these two measurements for ICAO member States, excluding the USSR, show a steady, though gradual improvement since 1967 at levels of between two and three times the Australian comparative rates for the same period. For the last five-year period, 1968-72, the rates of the ICAO member States were the lowest achieved and they are reproduced for comparison:

Accident and Fatality Rates
ICAO Member States 1968-72

Fatal accidents per 100,000 hours flown	0.28
Fatal accidents per 100,000 landings	0.35
Passenger fatalities per 100,000 passenger miles	0.39

In general aviation, a comparison is not possible between the accident rates achieved in Australia and those of the rest of the world because statistics are not published on world general aviation activity and accidents. Comments regarding trends in general aviation are, therefore, confined to the situation in Australia.

The table "Accident Rates: Five Year Periods", is the most reliable indication of trend in powered general aviation operations and here, it is evident that a steady improvement has been achieved over the past nine years in both the accident rate and the fatal accident rate. Within the individual kinds of flying, into which powered general aviation operations are classified for statistical purposes, the five-year rates also show a trend either of improvement or of stability at a favourable level, except for private and business flying, where both the accident rate and fatal accident rate has shown little improvement. The rates for private and business flying are more than twice those of charter, flying training, and other aerial work operations. Even aerial agricultural operations, which are usually associated with hazard, have an accident rate only slightly less favourable than private and business operations, and aerial agricultural operations have consistently had a more satisfactory fatal accident rate.



ADVICE HEEDED

We drove out of Alice Springs with gay laughter. We had spent a wonderful three days touring by hire car, and now we were off to Ayer's Rock. The sky was eight-eighths blue and the 210 was ready for action. But as we drove through Heavitree Gap, and looked towards the south-west, I could see heavy cumulus low on the horizon. My heart sank, but I said nothing to the passengers except that the strip at the Rock might be out of action because of heavy rain.

As the passengers loaded the aircraft, I bounced into the Briefing Office and asked details of the weather and strip at Ayer's Rock. The Briefing Officer said in a very polite manner that, so far this morning, the SAATAS aircraft had turned back and Connellan's had got as far as Tempe Downs and returned. The cloud build-up between Alice Springs and the Rock was the biggest they had ever known, and they were sending out some weather people in the Connellan Heron to have a look at the phenomenon.

I TOLD the Briefing Officer I was on holidays and had no intention of even heading in the direction of marginal flying — it was no way to spend a holiday. I asked about Oodnadatta and was told it was raining there too. Then I had a brain wave, and asked about Birdsville — surely it couldn't be raining there!! "No" said our man, "As far as can be gleaned from weather reports it is eight-eighths blue!" I retreated to my cheerful passengers and gave them the story.

I couldn't miss the long faces of disappointment. None of them had ever seen the Rock and as one much-travelled passenger remarked, "Going to Alice without going to the Rock is something like going to London and not seeing Buckingham Palace". But all agreed we should go to Birdsville for lunch and then to Thargomindah and Eulo for overnight.

The area forecast for the Birdsville side was not available. It would take at least thirty minutes to obtain. I told the weather man, do just that, and I'll wait! I wasn't prepared to cross the Simpson Desert and not know what was doing on the other side. For it's a long way to come back, and all strips other than sealed ones in the area were out of action. The forecast arrived — there was a weak trough moving through, but it should cause us no problems. The weather man is happy with our plans, the Briefing Officer is happy, and I'm happy. So after buying a few maps to cover our changed needs, off we go!

Gee! This new WAC chart seems different to what I remember last time I crossed the Simpson Desert. I must compare them when I get home (I did and the difference in the Hypsometric tint layout between the 4th and 5th edition is startling. No wonder it didn't seem to make sense last time and no wonder we are told to be sure our charts are current). Santa Theresa on the nose — good. Now for Hale River.

Is that the Hale River or the Todd? Well was that a river or a creek back there? If only I knew that, I would know what this is! But I'll make this Hale River and report accordingly, and if there are no more river beds further on, I will have been correct. If there are I'm wrong, because Hale River is the last I should see this side of the desert and as it is I'm 10 knots below my estimated ground speed. Yes, I was right — we are into the desert now, and I'll have to remember about my ground speed and "ops normal" calls. One hour out of the right tank, change to the left and note the time. Keep the directional gyro reset and concentrate, because to allow the aircraft to wander on this long leg would cause some embarrassment for sure!

Past the half way mark now, and what's this to the south? High cumulus then stratus down to about 2,000 feet! From here it looks as though its precipitating in patches, but at about 300 feet I see a thick line of stratus— the top precipitation going right through it. I don't like it — if you were flying in that rain you wouldn't see that low stratus coming at you. Here's hoping we beat it to Birdsville. I wish DOT would do something about their 6575 frequency so I could get a word in. If it wasn't so busy with Wyndham and Darwin, I'd ask them to check Birdsville out because if the rain beats me, will it be still serviceable? I can hear many calls from Alice telling of deteriorating weather and widespread heavy rain. But there's one thing for sure — there is no returning to Alice now!

ADVICE HEEDED

"All agreed we should go to Birdsville for lunch . . . "

I reckon I'm about 30 miles out of Birdsville now and it looks bad ahead. I have the NDB latched on — that is if it's reading correctly and not pointing to one of those big cu-nims. I'm going to have to alter heading 15 degrees to starboard — the weather man's "weak trough" has changed to bad news so the winds could be anything. I reckon it's blowing from the south west and so I'll take an NDB bearing and note the change of heading in case the NDB is wrong. There is nothing to fix on here — so much water lying about that the salt pan shapes don't match up too well, but that doesn't surprise me in this rain. Fifteen miles to go I reckon. But boy it's raining — there's no "two miles in rain showers" here, and remember that low stratus.

That low stratus! I wouldn't see it coming in this, and that's just what has trapped many pilots with more hours than me! Remember the Safety Digest saying over and over again about situations like this? And pressing on regardless? Even pilots with IF ratings have come undone at this low height and I'm below 500 feet! But if I turn back, where will I go? And where can I go? We must press on, it may lift a bit!

Press on? That's the big question. Press on — that's just what the Digest says not to do! And what about the Operational Alert No. 2 stuck up on the office wall at work? I'm stupid, I'll join all those pilots before me in this. I must get out while I can still see. If I hit that low stratus I'm done for. Remember turning this aircraft under the hood the other Sunday

"The passenger in the right hand seat opened the chart out".

with the instructor on NDB let-downs? At one stage I had it heading for the ground at 2000 feet a minute! From this height that would take about three seconds! A gentle turn to port and I'll fly due north to clear it. My passengers haven't spoken — they're terrified, I'll bet! I tell them I reckon we are about 10 miles out of Birdsville, and it's possible that better pilots than I could get there, but it's also possible to die in this stuff, so out of it we go and we'll decide where when we are in the clear!

Now we are clear and what a relief! But now we could be anywhere on the map within a 40 mile radius. What about putting her down with the wheels up? Could be done safely on these watery clay pans. All my calls to Charleville have brought nothing, and if I wander about they will never know where to look. I'm glad I tested that Impact VSB before I left — I know that works. If I put her down here I'm somewhere near where they expect me to be. But wait a minute! Remember what the Digest said about that poor fellow who tried to land on the road outside Hermannsburg and wrote the aircraft off? Remember they said that, while you have fuel and clear sky, use it to find out where you are? You can then put

"East is the way to go for sure"

down **after** using up your time, providing you use it sensibly. Be sensible and don't panic — **very** important from now on if we are going to pull out of this situation. Let me think —

- Endurance? How far can I go and for how long?
- Direction? Must make a decision on this and stick to it. Mustn't cover the same ground twice!
- Communications? Must keep calls going out to all stations on what I'm doing. Surely someone somewhere will hear them.

I've got a safe 200 minutes — say 500 miles radius from here, which gives me more than I have WAC charts for. I'll use VEC charts if forced to, but that will be the last resort, so the WAC chart it is! I tell the passenger in the right hand seat to open it out and hold it up. Then I run the nav rule about to get some idea of distance. In a few moments I come up with the following:-

- The easiest thing to see on this Cooper Creek chart is Cooper Creek!
- South from this point is out because of the weather. It's as black as night from the south and moving towards us.
- North would take us off the chart and to what? Funny how I can't think what should be north of this map now — the harder I try to remember the more blank my stupid memory seems to get.
- East is the way to go for sure. Ignore those closer strips — they're probably out of action, and I ll miss them because I'm not sure of my starting point, but the Cooper must show and Windorah situated on the Cooper has a sealed strip and an NDB. It would be good to call them up and confirm the NDB is working, but 6575 continues to garble, though I hear my call sign at odd times.

I bet the Flight Service Officer at Charleville is getting worried about losing one of his chicks at the moment, but first I must sort out what I am doing, and then I'll bash away on the line myself. O.K., decision made! We aim for Windorah and assume the NDB is not working. That way we can gain something if it is! It's well within our endurance and by the time we reach the Cooper I'll know how long I've got left to fly north or south to find it. So now for 095 degrees and no wandering!

The lake and clay pan layouts are hopeless with all this water about, but if I had to give a position I would say 20 miles south of the lakes around Glengyle (though I didn't know it then, I must have been almost "spot on"). I reckon 200 miles without a fix plus the distance we've already travelled since our last positive fix will make 525 nautical miles, and if any of my reckonings are way off we could end up anywhere within 250 miles radius of Windorah! But now it's time to give my ears a rest. I've been using the head phones for two and a half hours to save the passengers having to put up with all the static and garble on the speaker, but it's now driving me mad so I'll have to give them a taste. Off with the phones and I throw the control switch to speaker. The radio seems to have improved out of sight! "Charleville this KIG KIG KIG, tracking Windorah Windorah Windorah. Extend SAR extend SAR extend SAR to 0700 0700 0700." Now we listen. Back comes Charleville loud and clear, reading me fours, but I'm being jammed. "Try another frequency", and "Are you tracking Thargomindah?"

So much for trying the other frequencies! I've tried them until I'm blue in the face and 6575 is the only one that looks like giving me a go, so I'm into it again. "Negative negative negative . . ." and repeat, and repeat the Windorah story. At last confirmation from Charleville! I'm much happier now, the fact that they know my intentions is very comforting, for surely if there are any Notams on Windorah they will make every effort to advise me. Now there's time for a sing song to unwind the tension, and to make sure all keep a sharp look out for landmarks — roads, ranges, etc. How tempting it would be to move over there and see what that is. And what's that — a large town? — or a mass of water-hole reflections? And that's just what most of my passenger's sightings are too! So I maintain my heading and a record of times, and wait until something positive shows up. I would like to move into the maximum endurance configuration, but this weather is changing fast so we had better leave it at 23 inches and 2,400 rpm, or I may end up with fuel and nowhere to go with it. I'll lean a bit just the same, and keep a sharp eye on cylinder temperature.

Now an hour has gone and at least the NDB needle is coming back smoothly after test and it's about five degrees to port. With this southerly blowing that would just about put us spot on if I hold this heading of 095.

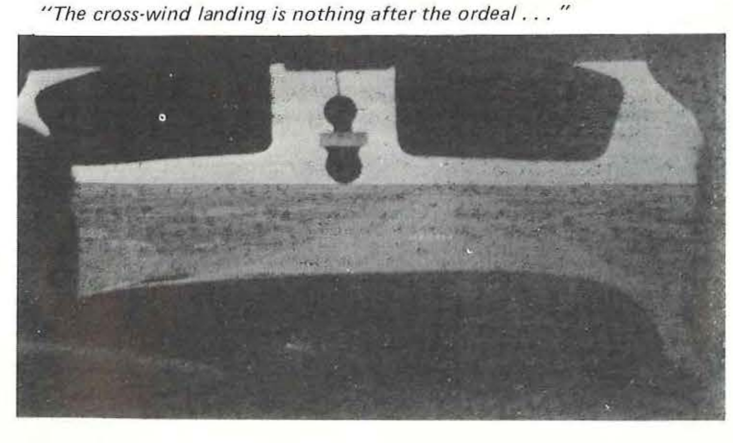
" . . . . . Windorah is in sight!"

I'd estimated Windorah at 0945 and I'll be blowed — it's now 0935 and Windorah is in sight! At 0943 I'm over the top! — I have been close to what I reckoned almost throughout the flight, but dead reckoning and being sure are **very** different feelings! The cross wind landing is nothing after the ordeal, and I fluke a beauty that should restore some confidence in my poor passengers. Silence descends as I pull out the idle cut-off. I sit quietly for a few moments and thank the Safety Digest for its help, together with all my instructors who have taken me into marginal conditions and shown me unusual situations. It has surely helped us today.

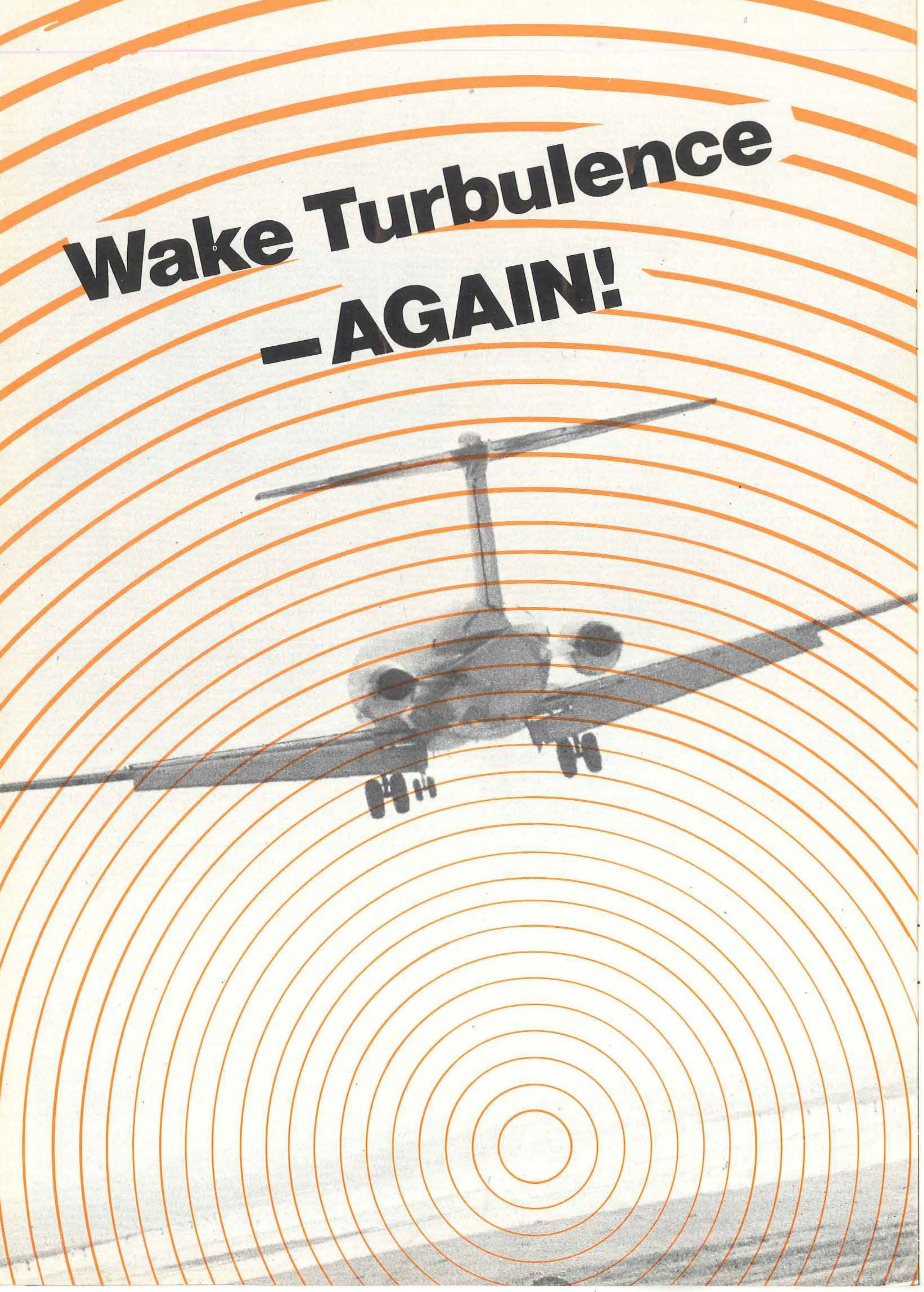
I was grateful that I had only recently spent some time "under the hood" in the 210 on NDB letdowns and VOR approaches — it clearly indicated my limitations! In spite of cluckings of approval from instructors on some manoeuvres, there were others that could have spelt disaster if they were real. I was "on top" of these things in the Cessna 172, but the 210 was "200 yards ahead of me" at times because of its high performance. I was glad I remembered this at Birdsville!

Gee, I wish the Digest came out weekly!

"The cross-wind landing is nothing after the ordeal . . . "



Wake Turbulence —AGAIN!



Earlier this year, an Aeronautical Information Circular, issued by the Department drew attention to the danger of wake turbulence, as discussed in the Aviation Safety Digest pamphlet "Wake Turbulence is Dangerous', and mentioned that a recent overseas accident to a DC-9 had shown that even heavy aircraft are not immune to the potentially catastrophic effects of this hazard.

The National Transportation Safety Board in the United States has since issued a report on this fatal accident, which occurred when the DC-9, engaged on a training flight, was approaching to land on runway 13 at Greater Southwest International Airport, Fort Worth, Texas. The aircraft was destroyed and the four occupants, three pilots and an FAA operations specialist, were killed.

THE Board said that just prior to the landing approach of the DC-9, a DC-10, also on a training flight, had completed a "touch-and-go" landing on runway 13. The final approach of the DC-9 appeared normal until it crossed the runway 13 threshold, when it began to oscillate noticeably. Finally, some 1,200 feet down the runway, it rolled nearly 90 degrees to the right, the right wing tip struck the pavement and the aircraft rolled nearly inverted before it crashed and burned.

The Safety Board determined that the probable cause of this accident was . . .

". . . an encounter with a trailing vortex generated by a preceding 'heavy' jet which resulted in an involuntary loss of control of the airplane during the final approach. Although cautioned to expect turbulence, the crew did not have sufficient information to evaluate accurately the hazard or the possible location of the vortex. Existing FAA procedures for controlling Visual Flight Rule flights did not provide the same protection from a vortex encounter as was provided to flights being given radar vectors in either Instrument Flight Rules or Visual Flight Rules conditions."

As a result of its investigation of the crash during 1972, the Board issued two recommendations to the FAA in June, and six in December, all of which called for corrective action aimed at preventing aircraft accidents from vortex turbulence. The FAA is now acting upon these recommendations, which involve revisions in pilot and controller operating manuals, extensive education programmes for pilots and controllers, and technical research.

Both the DC-9 and the DC-10 were using the Greater Southwest International Airport for flying training. The DC-9 had left Dallas for Greater Southwest under an IFR clearance and, after arriving in the Greater Southwest area, was cleared for an Instrument Landing Approach to runway 13, sequenced behind the DC-10. Separation between the two aircraft was established by radar and exceeded six nautical miles. The approach was uneventful, unmarked by turbulence, and the IFR clearance was automatically terminated when the DC-9 landed.

The DC-9 was subsequently issued a take-off clearance under VFR and there was no evidence that an IFR clearance was requested or reissued. Thus, under VFR without radar control, separation from other traffic became the responsibility of the flight crew. After this take-off, the DC-9 made a second ILS approach, which was terminated by a practice missed approach. Next, the DC-9 executed an approach to runway 35 which the flight terminated by requesting a full-stop landing on runway 17. A short time later, the flight changed this request and asked for approval to land on runway 13 behind the inbound DC-10. The clearance for the DC-9 to land on runway 13 was issued with the advisory "caution turbulence".

After the DC-9 had turned on to final approach, it was slightly to the right and below the path of the DC-10, which was then lifting off the runway following completion of a touch-and-go landing. The distance separation during the approach between the DC-9 and the DC-10 was 2.25 nautical miles, the Board said, and the time separation was 53 to 54 seconds. The DC-9 descended into the circulatory vortex of the DC-10, the core of which was stationary about 60 feet above the runway centreline — and, of course, invisible to the DC-9 crew. The velocity distribution of the DC-10 vortex induced a severe rolling moment on the DC-9, resulting in a lateral upset from which the pilot was unable to recover in the available altitude.

The last approach of the DC-9 was much closer to the DC-10 than the two previous approaches, but the evidence indicates that the DC-9 flightcrew expressed no concern over this separation. In this connection, the Board pointed out that the vortex turbulence data available to pilots in the form of training aids and advisory circulars are not specific in their discussion of "safe" separation intervals. "The upset might have been averted", the Board concluded, "had there been greater separation between the two aircraft."

Commenting further, the Board said that the "caution turbulence" advisory is often degraded by the frequency of issuance. The Board noted that in this case the DC-9 crew had successfully completed two approaches behind the DC-10 without difficulty. "Frequent caution advisories without a resulting encounter with a vortex, may lead pilots to disregard such notices", the Board said.

Concerning vortex hazards, the Board pointed out that controllers are basically required to provide five nautical miles separation, or two minutes time separation, to any landing aircraft behind a "heavy" aircraft if the following aircraft is operating under IFR — or VFR under radar control. On the other hand, the controller is required to issue only a wake turbulence cautionary advisory to VFR arriving aircraft which are not under radar control. Under these conditions, the Board concluded that the pilot of the DC-9 accepted the clearance for a visual approach and it was his responsibility to establish separation or institute other vortex avoidance measures.

After examining various flight test data, the Board decided that, while weight is certainly one of the significant factors relative to the vortex intensity of "heavy" aircraft, the size of the penetrating aircraft is of equal importance. Thus, the hazard which a DC-10 vortex poses to a DC-9 is relatively as severe as the hazard that a Boeing 727 or DC-9 vortex poses to a Piper PA-28 or a Cessna 150.

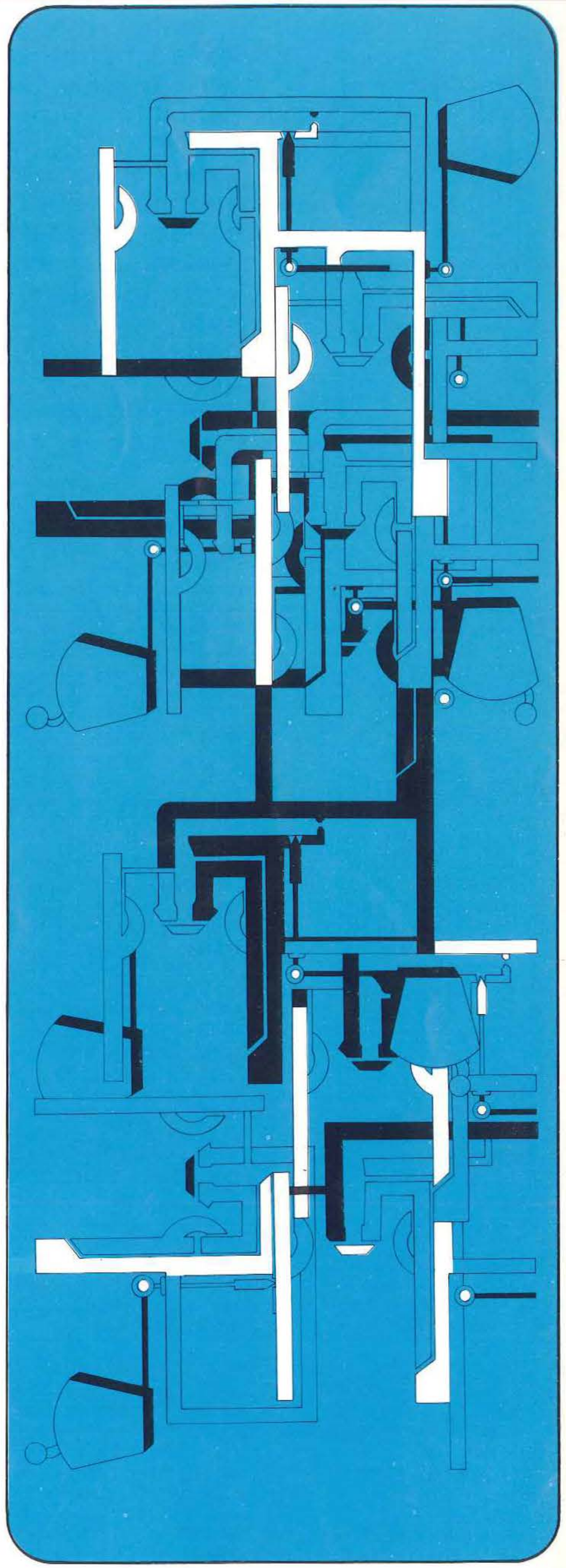
Indeed, the Board said, the data available from vortex measurement tests to date are not sufficient to present indisputable evidence that a five nautical mile or two minute separation is adequate to ensure that the hazard will be avoided under all conditions. The Board's statistical records reveal that "encounter with vortex turbulence" has been assigned in the causal areas of 120 aviation accidents between 1964 and 1971, indicating the seriousness of the vortex hazard. The Board concluded there is a need for more research of the vortex turbulence problem as called for in its recommendations to the FAA.

MIXTURE CONTROL

WITH today's efficient, high performance and increasingly sophisticated light aeroplanes, it could be reasonably expected that the days would have long passed when aircraft came to grief for the sole reason that they simply ran out of fuel. Despite these expectations however, the very opposite is the case. During the past eighteen months, there have been sixteen accidents or incidents which have occurred because the pilots of the aircraft concerned allowed their fuel supplies to become exhausted.

Several instances of fuel exhaustion have certainly been caused by such fundamental omissions as failing to check the contents of fuel tanks before take-off, with the result that the aircraft departed with insufficient fuel on board to reach their destinations. But in other cases the tanks were full at the time of departure and the flights concerned terminated prematurely because the fuel consumption in flight proved to be greater than the fuel consumption rates on which the flight was planned.

The expected fuel consumption at the power settings to be used, and the aircraft's range and endurance, are all factors to be determined and taken into account during the planning stages of a flight. But once in the air, these figures cannot be realised unless the pilot uses the mixture control correctly. In fact, correct use of the mixture control in flight for adjusting the air to fuel ratio is one of the most important factors in the operation of aircraft engines. The difference in range and endurance with the mixture rich and the mixture leaned can be great indeed. It may not be fully appreciated that, in a typical light aircraft, proper leaning can reduce the fuel consumption by over twenty-five percent at normal cruising heights and power settings. Apart from achieving maximum range or endurance operation, proper leaning of the mixture also provides smoother engine operation and more power for a given engine setting; but there are two sides to the story, and misuse of the mixture control can soon ruin an aircraft engine.

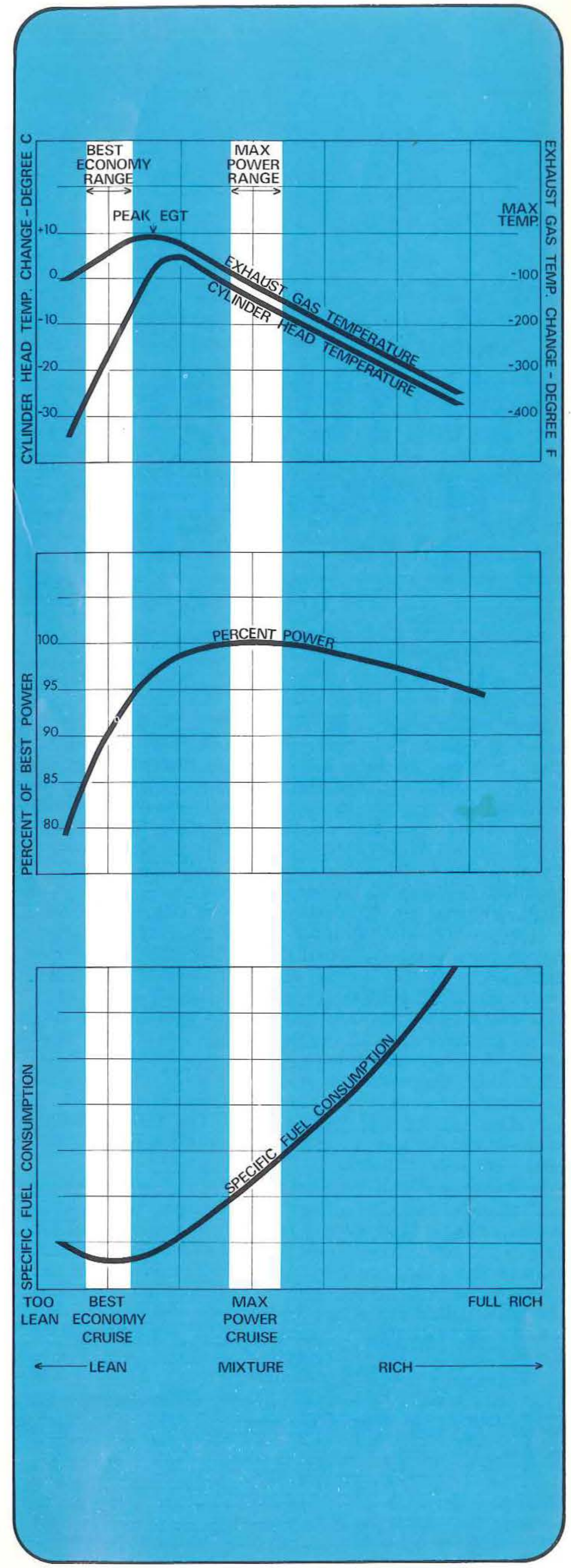


Many modern piston engines use direct fuel injection into the induction manifold, and some models are also geared or turbo-supercharged. In the main, these engines have evolved from reliable, low compression ratio, carburetted, non-supercharged engines with a reputation for being able to withstand some abuse. The modern engines developed from them deliver a lot more power with little, if any, increase in structural weight. This improvement in performance has not only involved an increase in complexity and in mechanical and thermal stresses but, not unnaturally, has also resulted in a greater dependence on correct adjustment and handling.

INFLUENCE OF MIXTURE STRENGTH ON POWER AND TEMPERATURES

Air to fuel ratio is the ratio of the weight of the air and the weight of the fuel that enters the cylinders. In a conventional petrol engine, the workable limits of air to fuel ratio (mixture strength) are from 9:1 (rich) to 18:1 (lean). Ratios in the range 11.5:1 to 13.5:1 produce maximum power per stroke for a given manifold pressure, i.e. "best power". The **cylinder head temperature** reaches its peak value at a mixture close to the "chemically correct" ratio of 15:1, where all the air and all the fuel is burned. The **maximum exhaust gas temperature** occurs at a slightly leaner mixture than maximum cylinder head temperature, and the ratio for theoretical "best economy", at a point leaner still.

The shaded areas in the graph on this page show ranges of mixture strengths for both maximum power output and best economy specific fuel consumption. On the rich side of the chemically correct mixture there is not enough oxygen in the air to allow all the fuel to be completely burned. However, the excess fuel has an important cooling effect and, during take-off, climb and high performance cruise, provides the necessary protection from detonation, pre-ignition and overheating. It is for this reason that full rich mixture is specified for take-off, at other than high elevation aerodromes, and climb and cruise at high power settings. In fact, above seventy-five percent power, the mixture should never be leaned beyond the minimum extent necessary to avoid rough running or excessive power loss such as may occur during take-off from high elevation aerodromes or during climb at higher altitudes. In such cases, the mixture may be leaned, but only sufficiently to restore smooth operation. Failure to observe this rule can quickly cause serious engine damage.



MIXTURE CONTROL

MANUAL LEANING TECHNIQUES

Depending on the power settings used and engine handling limitations contained in aircraft owner's manuals, engines may be operated at lean mixture settings corresponding to maximum power and, where specifically permitted, best economy. The following are recommended methods for manually setting maximum power and best economy mixtures.

Tachometer — Airspeed Indicator Method

The tachometer and, in favourable conditions, the airspeed indicator are useful guides in establishing these mixture settings. For aircraft with fixed pitch propellers, the throttle should be set for the desired cruise RPM as shown in the owner's manual, and the mixture then gradually leaned from full rich until either the tachometer or the airspeed indicator gives a maximum reading. At peak indication, the engine is operating in the maximum power range. In the case of constant speed propellers, the mixture should be leaned until the airspeed indicator reading peaks or there is a significant power loss or evidence of rough running. The mixture should then be richened until the engine runs smoothly and power and airspeed are fully restored.

Where the use of cruise powers at best economy settings are permitted, the mixture is first leaned from full rich to maximum power, then leaning is slowly continued until the engine begins to run roughly or power and airspeed decrease rapidly. When either occurs, the mixture should be richened sufficiently to obtain an evenly firing engine or to regain most of the lost airspeed and engine RPM. Some engine power and airspeed must be sacrificed to achieve a best economy mixture setting.

Fuel Flow or Pressure Gauge Method

For aircraft with fuel-injected engines, the mixture can be leaned manually by using the fuel flow or pressure gauge. Settings for a given cruise power and altitude may be obtained from tables or other data provided by the aircraft manufacturer, or the indicator may be marked with the correct flow for each power setting. For any given set of conditions, the pilot need only lean the mixture to the specified fuel flow value to obtain the correct mixture.

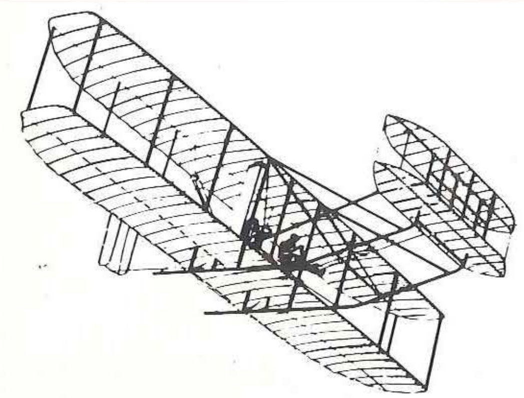
Exhaust gas temperature method

One of the most accurate methods of establishing correct mixture strengths is to use an exhaust gas temperature gauge. This device measures the temperature of the exhaust gases and in this way indicates the proportions of the air-fuel mixture. To establish the maximum power setting by this means, the mixture is leaned to the point at which the temperature reading reaches a maximum, and then richened again, to achieve a fixed temperature drop. Whenever best economy operation is permitted by the aircraft owner's handbook or the engine operating manual, the mixture may be leaned to peak EGT. The accompanying graph shows that peak EGT occurs essentially at the rich edge of the best economy mixture range. It also shows that operation at peak EGT not only provides minimum specific fuel consumption but also ninety-five to ninety-six percent of the engine's maximum power capabilities for a given engine speed and manifold pressure.

Aircraft with turbo-charged engines frequently have an exhaust gas temperature pick-up installed in the turbine inlet to measure turbine inlet (exhaust gas) temperature. The procedures for leaning these engines, using turbine inlet temperature, are slightly different and the technique and reference temperatures published in the owner's handbook should be strictly observed. For these installations, it is important that the maximum turbine inlet temperature specified by the manufacturer is not exceeded.

PRACTICAL ASPECTS

Cruise performance and range data contained in light aircraft owner's handbooks is usually given for operation with the mixture correctly leaned. Operating with the mixture richer than necessary is not "being kind" to the engine — in fact, the opposite is usually the case. Operating an unsupercharged engine at high altitude with an excessively rich mixture not only wastes fuel, but the power produced will be less than that which is available at that altitude with the mixture correctly leaned. Surplus fuel is rarely required for combustion chamber cooling at high altitudes and the use of mixtures that are too rich usually only introduces other problems such as spark plug fouling. Spark plugs are designed to operate within certain heat ranges in order to function properly and operate without fouling. An excessively rich mixture will lower the temperature of the spark plug centre electrode below normal which, in turn, will lead to the formation of carbon and lead deposits. These deposits are electrically conductive and when they reach a sufficient depth, the electric current will flow through the deposit rather than "jumping the gap" in the spark plug to ignite the air and fuel charge. It is essential therefore, that an air to fuel ratio be maintained which will provide sufficent heat in the combustion chamber to vapourise any deposits which may form on the ceramic centre of the spark plug.



Many pilots believe they should never lean the mixture for operations below 5,000 feet. The theory behind this practice is that, by the time an aircraft with an unsupercharged engine has climbed to 5,000 feet, the power output will have dropped to about seventy-five percent at the throttle setting normally used for climb, and at this power, there is less likelihood of an engine being damaged through improper leaning techniques, since the cylinders and other engine parts are operating at lower temperatures. **The fact of the matter is however that, unless specifically prohibited in the owner's manual, the mixture may be leaned at any height, provided the power setting is below seventy-five percent.**

The mixture must always be returned to full rich before increasing power, and then re-set. It should also be re-set for any change in altitude or the application of carburettor heat. It is good practice always to select full-rich mixture before joining the circuit for a landing. Other distractions near the ground can cause the mixture setting to be overlooked and a pilot could encounter serious difficulties with detonation or overheating if a go-around became necessary.

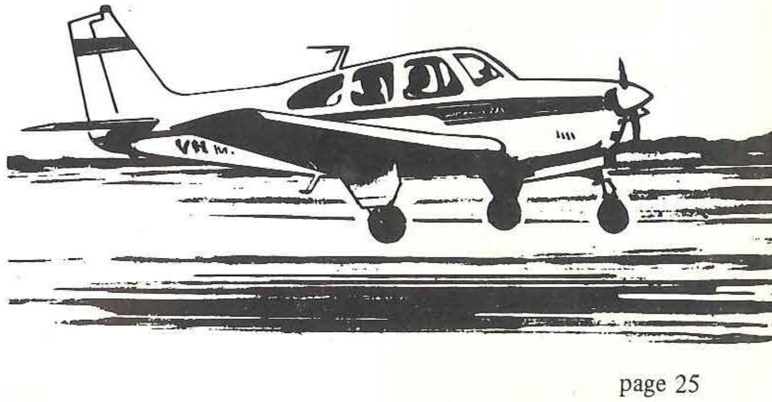
Although cruise operation on the lean side of the best power range produces the most economical fuel consumption, excessive leaning can cause overheating and misfiring or detonation. In carburetted engines, there is always a variation in effective mixture strength from cylinder to cylinder. This means that, if the overall mixture strength were to be set leaner than the best power condition, there would be some cylinders receiving still weaker mixtures and possibly experiencing distress. Overheating, or even detonation, confined to one or two cylinders of an engine will not necessarily be apparent to the pilot, especially in a multi-engine aircraft, and he may be unaware that any damage is being done until it is too late. It is because of this risk that cruise power operation of any carburetted engine using mixtures leaner than "maximum power" must be conducted with extreme caution. Even in fuel injected engines where, theoretically, all the cylinders receive an equal amount of fuel, "best economy" settings must only be used where specifically approved in the owner's manual.

When setting the mixture by means of an exhaust gas temperature gauge, it is not sufficient merely to adjust the mixture to obtain a given temperature reading based solely on previous experience. Not only are there likely to be characteristic variations in exhaust gas temperature from engine to engine, but changes in calibration of the indicating equipment can also lead to inadvertent over-leaning of the mixture unless the correct "temperature drop" method is always used.

Similar considerations apply also to setting the mixture using a fuel flow gauge in that, while the specified fuel flows have a built-in margin of safety under normal operating conditions, unless the gauge remains accurate within close limits, the engine could be receiving a mixture that is either too rich or too lean. Thus, while determining the correct strength by means of a fuel flow or exhaust gas temperature gauge is clearly preferable to setting it "by ear", the accuracy of settings established by these methods still depends on the cockpit gauges and sensing units remaining close to correct calibration at all times.

* * * *

For engines equipped with manually-operated mixture controls (which includes most types of modern light aircraft engines), the pilot has a particular responsibility to understand the fundamentals of engine operation and to use the mixture control safely and intelligently. Proper leaning of the mixture is essential if maximum range and endurance are to be achieved, and it is a factor to be considered in take-off from high elevation aerodromes. On the other hand, over-lean mixtures can result in excessive engine temperatures and detonation which in turn can lead to such serious damage as piston and ring failures, failed cylinder heads, and burned and eroded exhaust valves. This type of damage can occur in a relatively short time and, in the case of a twin-engine aircraft, could possibly affect both engines at the same time. Thus, regardless of the leaning technique used, careful consideration must also be given to such factors as any reduction in engine power, actual fuel consumption, engine cooling, smoothness of operation and other relevant engine limitations. As a final check, once the mixture has been set for cruise operation, the cylinder head temperature and oil temperature gauges should be constantly monitored. Although these two instruments have slow response times, the trend of their readings is a useful guide in maintaining correct mixture strengths and preventing engine damage.



AROUND THE INDUSTRY

THE CORRECT FUEL

FROM time to time "the grapevine" tells of certain pilots (who shall of course remain nameless), who will persist in using motor spirit to go flying (we don't really know why!). We admit that the original manual for the Gipsy Major rather quaintly specified that "any good grade auto-mobile fuel may be used", but that was written a long time ago and times have changed. In any case, we don't think that's the reason!

But whatever their excuse may be, the fact of the matter is that these pilots are apparently unwilling (or perhaps unable?), to appreciate the fact that there are very real hazards involved in the practice. Some readers will recall this being pointed out in the Digest on a number of occasions in the past.

Just recently, the Popular Flying Association in the U.K. summarised in their "Popular Flying" a service instruction from AVCO Lycoming on aircraft fuels. It is reproduced here as a reminder to those of our own readers who have not yet "got the message".

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Engine certification depends on the use of approved fuels, and it is mandatory that only such approved fuels, and not motor gasoline, are used. There are differences between the properties and composition of motor and aviation gasoline which make the former unsuitable for use in aircraft engines. Motor gasoline is deficient in the following main respects:-

- It has a wider distillation range than aviation gasoline, and this can promote uneven distribution of the anti-knock components of the fuel in the induction manifold.
- The knock rating of motor and aviation fuels are not directly comparable because of the different methods used to determine the knock ratings of the two types of fuel. This results in an appreciable difference in actual detonation characteristics of two fuels which are ostensibly of the same knock rating. This difference could lead to destructive pre-ignition or detonation.
- It is more volatile and has a higher vapour pressure which can lead to "vapour lock" occurring, particularly at altitude.
  Compared with aviation gasoline, which contains only the chemically correct amount of bromine, the tetraethyl lead additive in motor gasoline contains an excess of chlorine and bromine. The chlorine is very corrosive and under severe conditions can lead to exhaust valve failures.
- It is not handled or controlled in accordance with the same rigid procedures as is the case with aviation gasoline.
- It is less stable than aviation gasoline and can form gum deposits which can result in valve sticking.
- It has solvent characteristics which may not be suitable for aircraft engines. Seals, gaskets and flexible fuel lines are susceptible to attack.

Convinced now? We hope so! There are quite enough problems in operating fully serviceable and properly maintained aeroplanes safely. Let's not add to these by introducing doubtful and quite unnecessary short cuts!

FIRE?

WHILE climbing, soon after taking off from Townsville, the owner-pilot of a PA22 noticed a strong smell of burning. He requested an immediate clearance to return and land.

After the aircraft had been brought to a stop, a smouldering piece of rag was found in the engine compartment in a difficult-to-see position just above the air intake, having apparently fallen from where it was lying on the exhaust pipe.

The pilot, who makes a practice of wiping out the engine compartment after each flight, commented: "Some parts of the engine bay are not easy to inspect closely during each pre-flight, but certainly I will be giving particular attention to this area in the future. . . ."

There can be no doubt that although the piece of rag was a potential fire hazard, the "spotless" condition of the aircraft's engine compartment, minimised the risk of a serious fire developing.

SAFETY MATCHES

BUT THERE'S NO SAFETY IN NUMBERS!

THE pilot of a Musketeer decided to relax with a cigarette during an instructional flight with a student. Although he had three boxes of matches in his pocket, they were not easily accessible because the pocket was being held down by his safety belt. Eventually he succeeded in pulling one box free, only to hear the sound of one of the other boxes igniting. Reacting swiftly, he grabbed the pocket and squeezed until the fire was extinguished, a move that averted damage to himself — or his flying suit!

The point of this seemingly minor occurrence is that it is the second time that we know of in the last three years, that a pilot has inadvertently ignited a box of matches as a result of the striker pad on one box rubbing against the matches of the other. Although the lesson in this case proved an inexpensive one, either incident could easily have been the subject of a sadder tale by far!

— "Flight Comment," Canada.

POCKET CALCULATOR VERSUS YOUR ADF

DEPARTMENT of Communications tests in Canada confirm that electronic pocket calculators can interfere with ADF radio compasses. Of five calculators tested, two paralyzed the radio compass when held within three feet of the loop antenna; the other three caused varying degrees of deflection to the radio compass needle. When a calculator is turned on, the greatest deflection of the ADF occurs at maximum range from the station, when signals are weak. Calculators produce interference in the 200-450 kHz band. Tests on these calculators are continuing.

Meanwhile, avoid carrying these miniature transmitters — or make sure they're switched off. They don't need to be operated to lead you astray!

— Air Safety Letter, Ministry of Transport, Canada.

LIGHTS & BIRDS

THE Flight Safety Foundation in the United States has received enquiries concerning the effectiveness of strobe lights to decrease the incidence of bird strikes. They have no further information on strobe lights, but the National Research Council of Canada provided the following interesting bit of information:-

"One airline has been using one landing light from 10,000 feet to ground level during approaches to land, and on radar, geese have been seen to take avoiding action when their path intersects that of an approaching aircraft with its lights on."

The Flight Safety Foundation, with others, has long advocated the use of landing lights when approaching airports, by day as well as by night, for the purpose of helping other pilots "see and avoid". But a bonus is obviously paid if they also help birds see and avoid the aircraft!

AFTER ALL IT'S YOUR NECK!

A PILOT'S No. 1 rule of survival is to check the fuel quantity — and quality — during the pre-flight inspection. The quality check includes draining the sumps into a clear container and checking the colour brightness, clarity and the presence or absence, of water.

This important duty should not be passed on to anyone other than a crew member. Neither does the wise pilot depend on "someone else" making the check.

— Flight Safety Foundation

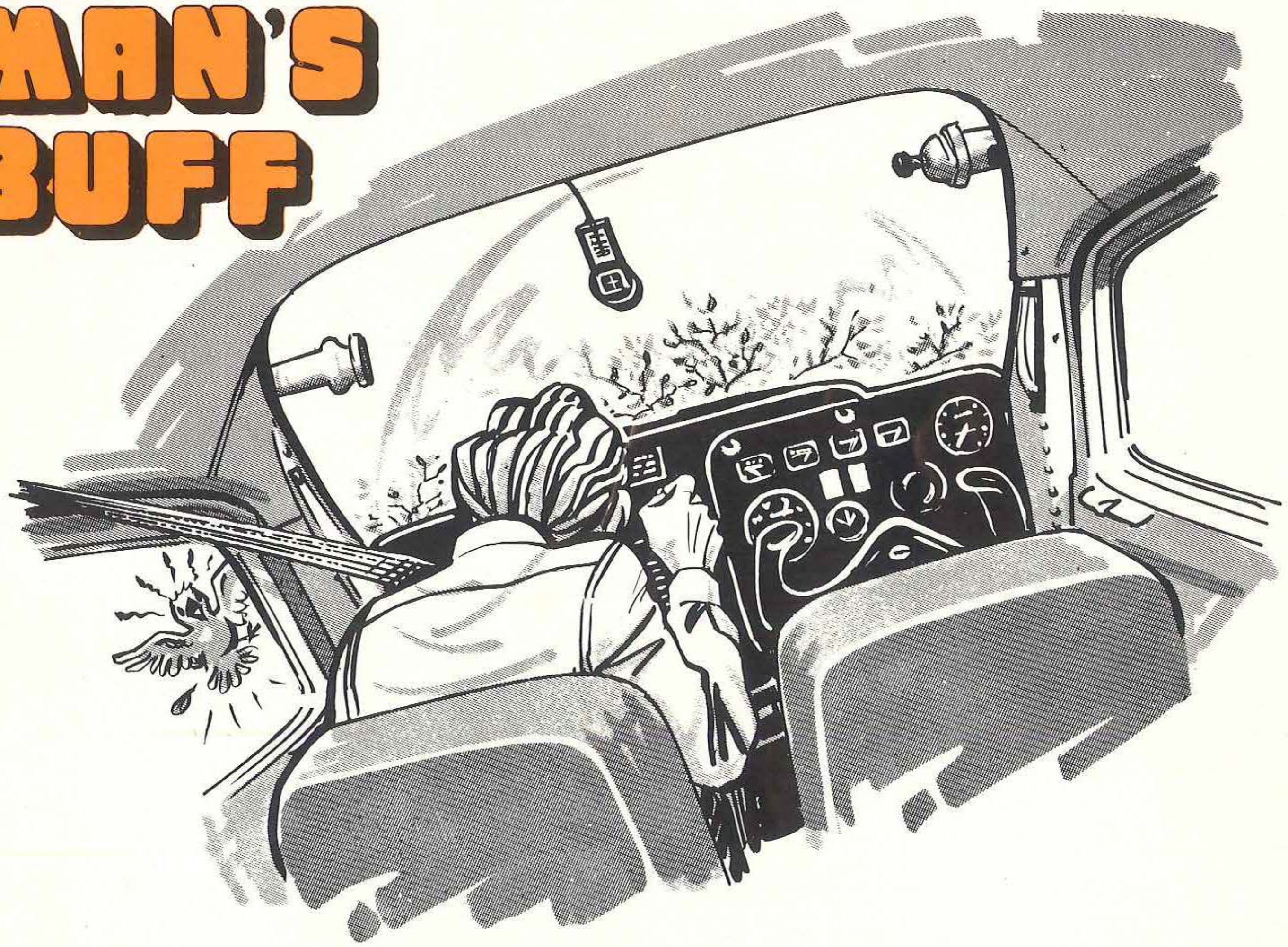
A CLOSE SHAVE

SOON after beginning his first take-off for the day at Jandakot, the pilot of a Piper Cherokee experienced a loss of power from the engine, so he closed the throttle and turned off the runway at the first taxiway. As he did so, the engine stopped altogether. He then saw that the fuel selector was in the "off" position.

The pilot, who had planned some solo circuit practice, said that during his pre-flight check before boarding the aircraft, he had ensured that the fuel selector was turned to the port tank position. While climbing into the cockpit however, he had fumbled as he moved across to the left hand seat, and apparently knocked the fuel selector into a neutral position. He had taxied out, run the engine up, and begun the take-off, without noticing that the fuel was off.

Undoubtedly there is now at least one pilot who ensures that the fuel is well and truly turned "on", during his pre-take-off checks!

BLIND MAN'S BUFF



While flying solo between two N.S.W. inland country towns, a distance of 55 nautical miles, in the local Aero Club's Cessna 150, I put myself in a nasty position, by doing what I had been told not to do — flying on instruments, with my "head in the cockpit" — and not checking even once when things should have been double checked!

I HAD selected an altitude of 3,000 feet for cruising to my destination — there was seven-eighths of cumulus cloud, with a base of 4,000 feet. Visibility was good — more than 20 miles.

Because I lived in the area and knew it extremely well, navigation was no problem and, as I was on my own, I soon became quite "fidgety", playing with various switches and knobs in the cockpit. As I didn't know the extremes the altimeter subscale read to, I decided to find out and, after mentally noting the QNH of 1007 mbs, wound the subscale back to find the lowest reading — 960 mb. I then wound it up to the highest reading and found this was 1050. My curiosity satisfied, I began to wind it back to the QNH setting of 1007, but while doing so, my attention was distracted by something on the ground.

A few minutes later, I decided that, as it happened to lie on my planned track, I would descend and fly over my family's property, at the minimum height of 500 feet above the terrain. This meant descending to 1100 feet AMSL, and I mentally calculated that at 250 feet per minute, it would take about eight minutes to descend from 3000 feet. At a speed of 90 knots, I would cover 12 nautical miles in this time, so reaching a point 12 miles from the property, I trimmed the aircraft for a 90 knot, 250 feet-per-minute descent, and glued my eyes on the panel. I had only just completed five hours of training in instrument flying and I thought a descent on instruments would be good practice!

Levelling out at an indicated 1100 feet, still flying on instruments, I trimmed the aircraft before I looked up from the panel. When I did, I was both amazed and startled to see the tops of trees almost brushing the underside of the fuselage! Immediately I applied power, climbed the aircraft to a safe height, and began to investigate how this could have happened.

I soon discovered the reason. I found that the altimeter subscale was still set at 1023 mbs, 16 mbs more than the QNH setting of 1007 mbs. As a result, my altimeter was over-reading by about 480 feet! After I had been distracted while "fiddling", I must have forgotten to finish re-setting the altimeter.

Obviously I should have checked the altimeter for the appropriate QNH, before commencing my descent. More importantly, if I had been flying visually as good airmanship should have dictated in the circumstances, I wouldn't have nearly flown into the "dirt"!

TARGET FOR TODAY?

Don't spoil your day!
Pilots who ignore Restricted Areas could be in for a nasty surprise!