Printed by David Syme & Co. Limited, publisher of "The Age," 233 Collins Street, Melbourne, C.1.

AVIATION SAFETY DIGEST

DEPARTMENT OF CIVIL AVIATION AUSTRALIA

No. 46 JUNE, 1966

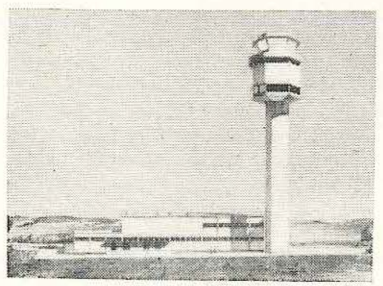
AVIATION SAFETY DIGEST

Department of Civil Aviation · · · Australia

No. 46 JUNE, 1966

Contents

Keep It Trimmed - - - - - - - - - - 1
No Thoroughfare - - - - - - - - - - 4
Engine Precautions in Winter - - - - - - - 5
Engine Fails During Take-off - - - - - - - 6
Meteors—Are They a Hazard to Aircraft? - - - - - 8
Loose Wing Walk Causes Control Difficulties - - - - - 11
Helicopter Tail Rotor Damaged - - - - - - - 11
Beagle Auster Loses Wing in Flight - - - - - - 12
Weather Below V.M.C. - - - - - - - - - 13
Electrical Hazards - - - - - - - - - - 14
From the Incident Files - - - - - - - - 16
Fuel Exhausted in Auster - - - - - - - - 18
Beware of Frost - - - - - - - - - - 20
Survival in the Outback - - - - - - - - 21
Overseas Accidents in Brief - - - - - - - 23
Don't Let It Happen to You - - - - - - - 26
Microphone Troubles - - - - - - - - - 28
Aircraft Tug Catches Fire - - - - - - - - 28



Artist's impression of the Control Tower and Operations Building for the new Melbourne Airport at Tullamarine. The tower will be 150 feet high and is expected to be in operation late in 1967.

Aviation Safety Digest is prepared in the Air Safety Investigation Branch and published quarterly. Enquiries and contributions for publication should be addressed to The Editor, Aviation Safety Digest, Department of Civil Aviation, Box 1839Q, P.O., Elizabeth Street, MELBOURNE, C.1.

Out of trim conditions have been responsible for several accidents to light aircraft in recent months. All have occurred either during take-off itself or during the ensuing climb out, and in every case the elevator trim was subsequently found to be well forward of the normal take-off or climb setting. In each case, the pilot concerned was lacking in general or recent flying experience, and examination of the aircraft involved failed to reveal the existence of any pre-impact fault.

The most spectacular accident, which was also remarkable for the escape of its occupants with only minor injuries, occurred to an aero club Cessna 172 in Tasmania. The pilot in command, who had accumulated a total of just over 100 hours' flying experience, was taking three passengers on a private sight-seeing trip from Cambridge to Lake Pedder and return.

Lake Pedder, a large freshwater lake 1,000 feet above sea level, lies in swampy plain country covered with low, dense scrub, some 50 nautical miles west of Hobart. The area is wild and uninhabited and almost completely encircled by steep mountain ranges rising in places to over 4,000 feet. Aircraft provide the only means of ready access to the area, and landings can be made in complete safety on a wide beach skirting the shore of Lake Pedder. The scenery is spectacular and a flight to Lake Pedder is a favourite excursion for light aircraft from Cambridge.

The outward flight was uneventful and the pilot took off on the return leg at 1205 hours local time. The day was fine and clear, the wind light and variable, surface temperature 25 deg. C., and there was very little turbulence. After orbiting the lake at 300 feet, the pilot set course for Mt. Anne, 15 miles east of the lake on the direct track to Cambridge. Because Mt. Anne rises to 4,500 feet, the pilot immediately began climbing to clear the high terrain. As the aircraft ascended towards the mountain range, he concluded that the rate of climb was less than normal and lowered 20 degrees of flap under the misapprehension that this would steepen the climbing angle. A few minutes later, believing that the aircraft would now safely clear the mountain range, the pilot retracted the flaps.

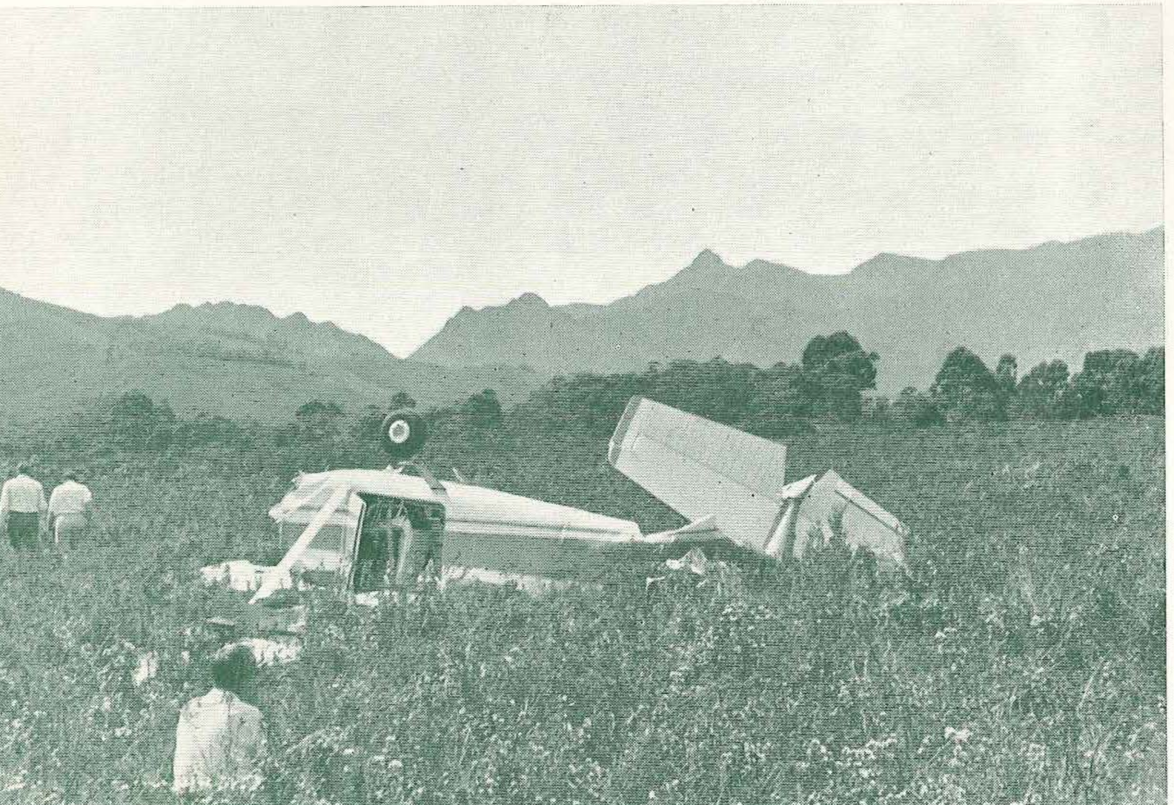
Very soon afterwards the nose of the aircraft dropped and it entered a steep dive.

Even though the stall warning had not sounded and the air-speed indicator was registering 80 knots, the pilot believed the aircraft had stalled and allowed the airspeed to build up to 105 knots before he attempted to recover, then found difficulty in levelling the aircraft out of the dive. He finally recovered only 50 feet above the ground, but still found it difficult to keep the aircraft from diving. Thinking some abnormality had developed in the aircraft, the pilot then began a wide, shallow turn to go back to Lake Pedder. As the aircraft swept around, low down, the pilot had trouble in clearing a clump of trees 30 feet high and he picked up the microphone to begin a distress call. As he did so, the aircraft struck the ground with the port wing, cartwheeled for 235 feet through the scrub, and came to rest upside down with the engine, undercarriage, port wing and tail assembly torn off. The pilot and his three passengers climbed out with only slight injuries and were picked up by a helicopter which happened to be passing over the area only 10 minutes later.

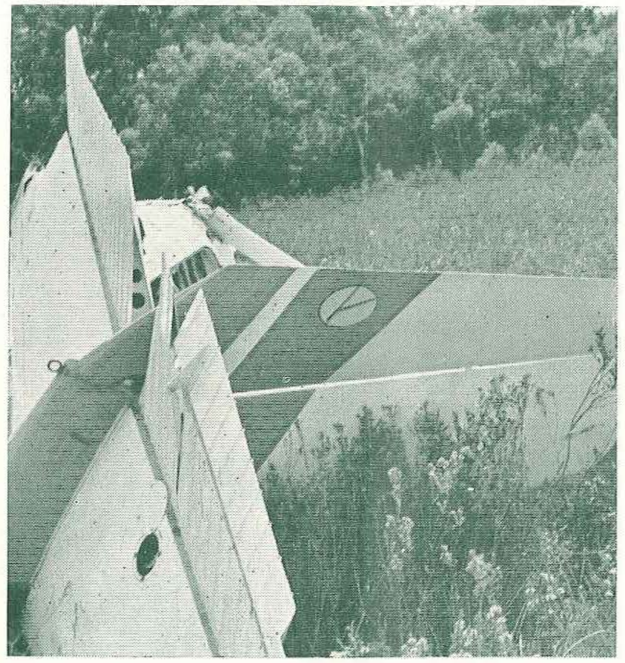
Examination of the wreckage showed that at the time of the crash, the elevator trim was almost in the full nose-down position. Flight tests carried out in another Cessna 172 confirmed that this type of aircraft, in common with many others, will become nose heavy if it is not re-trimmed after the flaps are raised. The test aircraft was loaded to establish a centre of gravity position similar to that of the crashed Cessna and, with the aircraft trimmed to climb with 20 deg. of flap selected, the elevator trim indicator position was found to correspond with that found in the wreckage. Immediately the flaps were raised with the elevator trim left in this position, the aircraft developed a strong nose-down tendency and any relaxation of the control force necessary to hold the level attitude, resulted in the aircraft going into a dive. In such a situation, the control force required to recover from a dive increases as the airspeed increases in the dive, and this fact tends to compound the impression of inability to retrieve the situation. At no time during the tests, however, was any difficulty experienced in re-trimming the aircraft correctly.

It is probable that the pilot trimmed his aircraft correctly when he lowered 20 degrees of flap during the climb, but did not re-trim when he raised the flaps again, with the result that the aircraft nosed down. The pilot's error in attributing this sudden and unexpected dropping of the nose to a stall, and his action in allowing the aircraft to build up speed, would account for the loss of height and the difficulty he experienced in regaining level flight. After he had managed to level out, he was just able to maintain what little height he had left. The unusually heavy feel of the controls was apparently sufficient to lead him to believe there was something seriously wrong with the aircraft, and he was consciously or unconsciously reluctant to pull the control column back firmly to climb the aircraft. It is probable that when he tried to transmit the distress call, he unconsciously relaxed his backward pressure on the control column and the aircraft flew into the ground.

In Queensland, a pilot attempting to take-off was deceived in somewhat the same way, even though his aircraft had not reached the stage of becoming airborne. After carrying out a satisfactory run-up and cockpit check, during which the elevator trim was set to the neutral position, the pilot lined up and commenced his take-off run. Soon afterwards, he felt compelled to adjust the elevator trim forward to keep the nose from rising too early.



Left: The wreckage on the scrub-covered plain five miles east of Lake Pedder. The mountain range and Mt. Anne can be seen in the background.



Above right: The tail assembly as it came to rest, showing the elevator trim tab set almost fully nose down.

Acceleration seemed normal up to about 45 knots and he pulled back lightly on the control column intending to lift off at 50 knots. The nose lifted, but the main wheels remained on the ground and he lowered the nose again to try and gain more speed, then tried another rotation. Again the aircraft failed to lift off and the pilot abandoned the take-off. He closed the throttle and braked hard but the aircraft over-ran the end of the strip into soft ground, nosed over, and came to rest inverted.

The pilot said that the aircraft and engine had felt sluggish during the take-off. Acceleration was not what he expected and the airspeed would not increase above 45 knots. Examination of the aircraft, however, revealed no suggestion of any pre-impact defect. The damaged propeller was replaced and the engine was test run with completely satisfactory results. Inspection of the aircraft showed that the elevator trim was in the full nose-down position. It was considered that the unusually heavy feel of the elevator controls when the aircraft reached flying speed had given the pilot the impression of a sluggish performance and influenced him to abandon the take-off at a point where there was insufficient airstrip left in which to bring the aircraft to a stop.

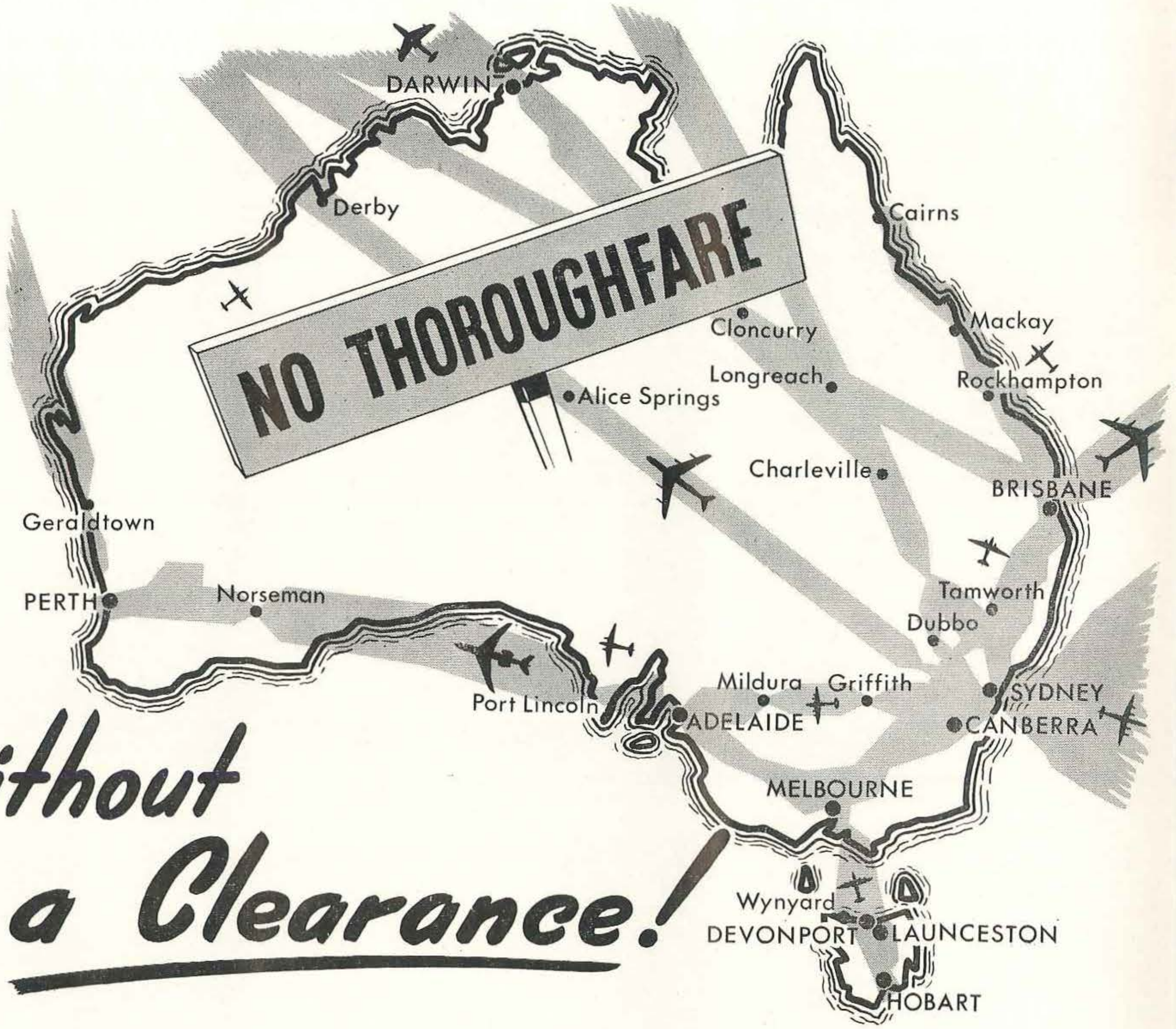
A third accident in this category occurred to a light aircraft attempting to take-off from a paddock in a country district of South Australia. The wind was light and variable and the pilot decided to use the maximum available down-hill run diagonally across the paddock. Although the length available was only slightly in excess of the required length according to the take-off chart, the three per cent. down-hill slope was in the aircraft's favor and should have shortened the take-off run. The pilot held the aircraft on the brakes until he had applied full power, released them, and the aircraft accelerated rapidly, giving the impression that it would break ground well before reaching the far corner of the field. Halfway down the field the pilot tried to lift the aircraft off with "firm back stick" but it would not become airborne, and he eased the control column forward again. Realising it was too late to abandon the take-off, he decided to try to lift the aircraft over the fence and put it down again in a relatively clear area in the next paddock. He pulled back on the control column as the aircraft approached the fence, but it struck the top of the fence and the starboard wing collided with a dead tree a few feet further on. The aircraft landed heavily, collapsing the nose and port undercarriage struts, and came to rest badly damaged after skidding for 150 feet.

Once again the elevator trim was found well forward of the normal take-off position and there was no evidence whatever of pre-impact defects. The pilot would have been expecting normal control pressures when he attempted to lift off, and the excessive elevator load resulting from the nose-down trim apparently led him to believe that the aircraft was not ready for take-off. The pilot's initial application of back stick was insufficient to overcome the effect of elevator trim and his attempt to lift the aircraft off just before reaching the fence was evidently too late for the elevators to be effective.

★ ★ ★

Don't ignore the obvious lessons of these three accidents, particularly if you are a pilot who flies at infrequent intervals. Unfamiliarity with the "feel" of the aircraft you fly **can** be misleading. Another situation in which relatively heavy out-of-trim control forces are likely to be experienced is the case of the missed approach. With flaps lowered, and the aircraft trimmed in the approach configuration, the elevator trim position will be well aft of neutral. The sudden application of power when the approach is abandoned will inevitably produce a very marked nose-up tendency, until the aircraft can be re-trimmed to climb normally.

Lack of recent flying experience must be compensated for by even greater-than-usual care in carrying out cockpit drills and checks methodically and intelligently. Always make absolutely sure your trim settings are correct before take-off, leave them set until you are airborne, then make full use of the elevator trim to achieve a "hands-off" control column loading in all attitudes of flight. Remember that although the longitudinal control forces of a modern light aircraft in an out-of-trim condition can be quite large, and perhaps beyond those encountered by a pilot in normal circumstances, this situation only reflects the degree of longitudinal stability built into the aeroplane, and is an inescapable by-product of a modern, stable, easy-to-fly, aircraft design.



—without a Clearance!

During the past twelve months there have been over a hundred instances of aircraft straying into controlled airspace without an ATC clearance. When you compare this figure with 48 reported cases in 1964 and only 28 in 1963, it becomes abundantly clear that the concept of traffic separation within controlled airspace is being compromised to a hazardous extent.

For the concept of controlled airspace as we know it in Australia to be effective, it is vital that aircraft do not enter controlled airspace without first obtaining a clearance to do so. The only permissible exceptions are cases of communications failure when the nearest suitable aerodrome lies within controlled airspace, or when the sudden development of an emergency necessitates an immediate intrusion into controlled airspace, e.g., when an emergency change of level is demanded, taking the aircraft through the vertical limits of a control area or a control zone. The procedures to be followed on such occasions are set out clearly in AIP MAP 5, "Emergency Procedures," and at the back of the Visual Flight Guide, Page (vii).

Aircraft that wish to fly within the confines of control areas and control zones may do so only in accordance with an ATC clearance. An aircraft operating under visual flight rules may be granted a clearance to operate in controlled airspace, provided it is fitted with radio equipment and frequencies that will enable the pilot to comply with the air traffic controller's directions.

A request from an aircraft to enter controlled airspace triggers off a whole chain of considerations. Before clearing the aircraft to enter, the air traffic controller needs to look at what flight levels are available, the point and route of intended entry, the time at which the aircraft will enter, weather conditions, and what radio frequencies the aircraft is able to use. It is to allow time for all these factors to be examined as well as for the unavoidable time lag that occurs when air traffic control clearances have to be relayed through communication channels, that aircraft should pass their requests for clearances at least 15 minutes before their estimated time of entry into controlled airspace. This advance notice eliminates the possibility of the aircraft having to hold outside the controlled airspace while the clearance is being obtained, and permits the flight to continue uninterrupted.

Whenever their work-load allows, air traffic controllers and communications officers try to anticipate clearances for aircraft intending to enter controlled airspace, and sometimes a clearance will be passed to an aircraft even before the pilot has requested it. This, however, is entirely an "ex gratia" service, and there is no basis for pilots to assume it will always be done for them.

It also in no way absolves pilots from their responsibility to obtain a clearance before entering controlled airspace. Often the volume of traffic being handled makes it impossible for ATC and Com. staff to anticipate each aircraft's requirements and, in these circumstances, it is vitally important that pilots recognize that **the responsibility is theirs and theirs alone.**

It is of equal importance that pilots comprehend any ATC instruction passed to them—several incidents have occurred recently simply because the pilots concerned didn't fully understand what the controller said. If there is any doubt whatever, pilots should not hesitate to request the controller to repeat or to confirm the instruction he has passed.

We don't think we are being unfair in saying that in many cases pilots have not given sufficient attention to the airspace limitations applicable to the route of their intended flight. Whether or not we are right in this contention, there is certainly a great deal of up-to-date information on the heights and boundaries of all controlled airspace readily available to pilots in the form of maps issued with the Visual Flight Guide, the Aeronautical Information Publications, Aeronautical Information Circulars and NOTAMS, and a pilot should be able to obtain an adequate working knowledge of the airspace restrictions over the route he is to fly.

One final word of advice: If you are in doubt about any detail, ask for guidance, whether in the air or on the ground. ATC and Com. staff are there to assist you with your flight planning and your operations and will be glad to clarify any point about which you are unsure.

What we have said has been directed primarily at light aircraft pilots because they have been the principal offenders. There has, however, been more than a sprinkli:ng of "big boys" who have also trespassed and this article is of equal relevance to them!

Engine Precautions in Winter

Winter is a time when aircraft engines often have to work under more critical operating conditions than at other times of the year. Although there are not many places in Australia where winter conditions become very severe, it is, nevertheless, desirable that pilots should be familiar with the problems than can arise during operations in cold weather.

Engine lubrication systems especially need to be looked at. A change to a lighter grade oil may be warranted, depending on where and under what conditions the aircraft is being flown. It is also good practice to pay closer attention to the lubrication system itself—oil filters, for example, may require more frequent attention than under warmer weather conditions — the combination of a dirty, partially blocked filter element, and the high oil pressure developed immediately after a cold start before the oil has warmed up, can sometimes prove too much for oil filter gaskets.

Pilots should follow recommended starting and engine run-up procedures scrupulously and be careful that R.P.M. limits are not exceeded. Remember that it takes longer in cold weather for oil temperatures to reach the required minimum after starting, and so it is even more important than at other times that the oil temperature, oil pressure, and cylinder head temperature are "in the green" before beginning a take-off.

Most aircraft owners' manuals supplied by the manufacturers recommend special procedures and precautions for operating the aircraft in cold weather. Some of these, of course, may not apply in the comparatively mild winter experienced in many parts of Australia, but it is nevertheless sound practice for pilots to study and make themselves familiar with the manufacturer's advice. Thus armed, knowledgeable pilots will be able to interpret these instructions to suit the particular winter conditions that confront them.

ENGINE FAILS DURING TAKE-OFF

Immediately after taking off from Wynyard Aerodrome, Tasmania, the engine of Cessna 180 lost power to the extent that flight could not be sustained. The aircraft was force-landed straight ahead in light scrub and was substantially damaged, but the crew of two escaped uninjured.

The aircraft had completed three weeks of aerial photography operations at Strahan on the west coast of Tasmania and was returning to its base at Moorabbin, Victoria, via Wynyard and Flinders Island.

The 70 mile flight from Strahan to Wynyard was uneventful and the aircraft was refuelled. After flight planning for his next leg to Flinders Island, the pilot taxied out, carried out a satisfactory run-up and commenced to take-off. The aircraft accelerated normally at first, but at full throttle the engine surged and the pilot abandoned the take-off. Several other run-up checks at full throttle produced the same response and the pilot taxied back to the apron.

The fuel tanks and fuel filter drain points were checked for signs of water or other contamination but none was evident. The pilot then telephoned an aircraft engineer at another aerodrome for advice before taxi-ing out on to the runway and conducting further engine operating checks. The engine would run normally to 2,450 r.p.m., but surging occurred when power was increased beyond this figure.

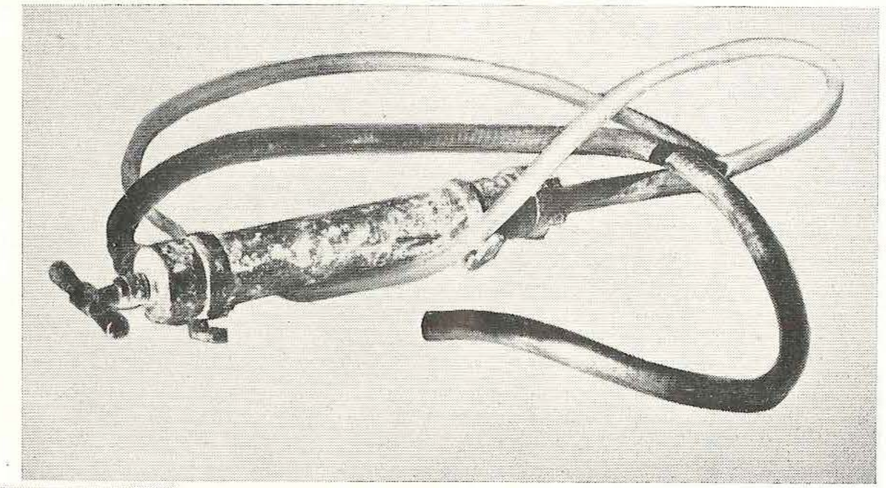
During the last of these tests, the pilot actually lifted the aircraft off the runway briefly, then returned to the apron. After consulting the aircraft engineer by telephone once again, the pilot decided that, as there was a 10-15 knot wind from the south-west, he should be able to fly the aircraft off at reduced power settings using Wynyard's 4,400 runway 26, and continue to Launceston to have the defect rectified.

After submitting a flight plan, the pilot and his navigator boarded the aircraft again, taxied out, and after a further run-up, began take-off on runway 26 at reduced power using 10 degrees of flap. The engine ran smoothly at first and the aircraft became airborne, but at about 50 feet the engine began to lose power. Already too far down the runway to land again, the pilot levelled out to increase speed then, realising he had insufficient power to maintain height, closed the throttle and made a forced landing into wind in the scrub-covered area beyond the end of the strip. The undercarriage collapsed and the aircraft came to rest amongst ti-tree bushes 1,700 feet from the end of the runway.

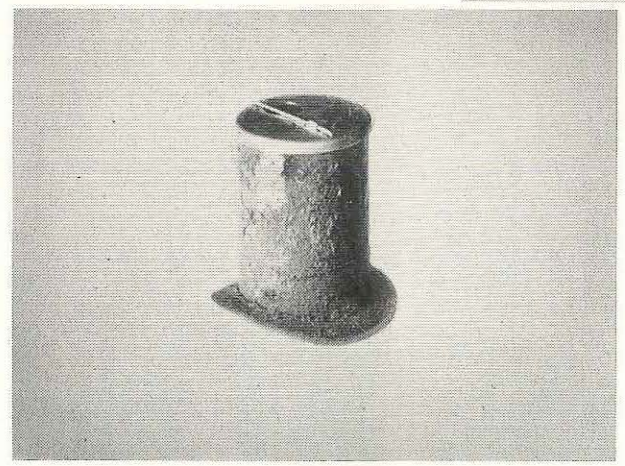
When the damaged aircraft was taken back to the aerodrome for inspection, it was found that the metal gauze filter element in the carburettor filter bowl was completely blanketed by a matted mass of fine cotton fibres, dirt and rubber particles. Further investigation revealed that, during the period the aircraft had been operating from Strahan, it had been refuelled from drums using an old marine bilge pump which had been borrowed locally. The pilot had dismantled and cleaned the pump before using it and had subsequently refuelled the aircraft with it on about seven occasions. He had seen no sign of contamination in the fuel checks he had made after each of these refuelling operations.

The pilot said he had strained the fuel using a funnel lined with a chamois leather he had been using to clean the aircraft's windows. It was clear, however, that the primitive method of filtering he had employed was ineffective.

Examination of the pump showed that portion of the rubber pump valve had been eroded away exposing the cotton fibre reinforcement in the valve rubber. The rubber hose attached to the pump, was also found to be in an advanced state of decay and the inside surface was covered with a layer of rust. Particles of rubber and rust could be loosened by flexing the hose. Laboratory examination of the material accumulated on the fuel filter gauze identified it has having come from the pump valve and hose.



(Above): The marine bilge pump used to refuel the aircraft at Strahan.



(Left): The aircraft's fuel filter after being removed from the filter bowl. Note the matted material completely covering the metal gauze.

COMMENT: This accident provides yet another object lesson on the absolute importance of adhering to established refuelling practices. The aircraft refuelling procedures laid down by the Department and by some of the oil companies have not been arbitrarily devised. They have been evolved in the hard school of experience. To disregard them, therefore, is to ignore facts made manifest in many accidents arising from faulty refuelling practices. This pilot **thought** he was taking all reasonable precautions by cleaning the pump, to begin with, and then by carefully carrying out fuel draining checks after each refuelling operation. But it is now obvious that there were two weaknesses in his refuelling procedure — the old marine bilge pump itself, the rubber components of which deteriorated under the effect of the aircraft fuel, and the inadequate method of filtering the fuel. The accident would not have happened if the pilot had employed an effective filtering system and a pump designed for handling petroleum products.

Apart from the fuel contamination aspect, the pilot showed very poor judgement in attempting a flight in an aircraft which had developed a major defect. By so doing, in fact, he contravened ANR 34 (1) (d), in that he flew an aircraft while its Certificate of Airworthiness was deemed to be suspended. Also, if the engineer to whom the pilot had spoken on the telephone had given the impression that a flight should be attempted at reduced power, the advice given was, to say the least, very ill-considered.

A few months ago the captain of a DC.8 reported that his aircraft was being fired on while cruising some 200 miles south-east of Bali, en route for Derby, Western Australia. It was soon established that what the captain had mistaken for tracer bullets was a particularly active shower of meteors !

The incident raises some very interesting questions for pilots, particularly in view of the advent of high-flying supersonic aircraft. We are grateful to the staff of the Mount Stromlo Observatory for providing us with some of the answers in this article.

METEORS

Are they a hazard to aircraft?

BY M. J. MILLER, MOUNT STROMLO OBSERVATORY, CANBERRA.

An airliner somewhere in the United States was proceeding on its way under clear skies. There seemed no reason to supect any danger, but in any case the speed at which disaster arrived left no time for avoiding action. Spearing down from outer space at interplanetary velocity, a meteor several feet across, blazing incandescent from the fury of its passage through the atmosphere, struck the port wing just outboard of the engine. There were no survivors.

The summary of this accident report was never published, because it occurred in the first episode of the movie serial, "Flash Gordon", in 1937 ! It has no basis in fact — in recorded history there is no truly authenticated instance of a human death from this cause, and only one case of injury has been proved in recent times, when in 1954 an Alabama housewife received a glancing blow from a small meteorite which fell through the roof of her home.

The exploration of space, and the expected advent of the SST, have led to a need for re-evaluation of the potential hazard to aircraft operations posed by meteors, small bodies moving through space at speeds of up to 50 miles per second. Aircraft operators can draw encouragement from orbital investigations that have been conducted by specially equipped unmanned space vehicles; the chances of an astronaut having his craft wrecked by a body of sufficient energy are so small that he could spend a lifetime in space without encountering such a catastrophe. Each successive improvement in instrumentation for measuring the meteor hazard to space vehicles, has led to a reduction in the estimated likelihood of a meteor collision.

A typical large nickel-iron meteorite, with 15-inch rule for comparison; all-up weight 1½ tons, airspeed 300 knots at 50,000 feet—straight down! This meteorite was discovered at Cranbourne, Victoria, in 1854.

Courtesy National Museum of Victoria, Melbourne.

It is not generally known that meteors and meteorites differ widely in nature. Indeed, objects reaching the Earth from space vary over an enormous range of constitution and consistency, from solid masses of metal weighing many tons to fragile "dustballs" of a fraction of a gramme. The nickel-iron meteorites which can be seen in museums are typical of the former, but the numerous "shooting stars" we see on any clear night are overwhelmingly from the latter class. In recent years, it has been possible to collect these fragile objects on special fittings on Lockheed U-2 aircraft flying at an altitude of nearly fifteen miles, as well as by instrumented high altitude balloons.

Meteors of the shooting star type become visible at heights between 75 and 30 miles. Their average velocity is about 27 miles a second, and they disintegrate long before reaching the altitude at which even the next generation of commercial airliners will fly. Estimates of the total daily infall of meteoric material of this kind are around a thousand tons a day for the entire Earth. Obviously, they do not represent a danger.

The iron meteorites, and the more numerous stony meteorites are much more substantial bodies, and it is obvious that impact with an aircraft could cause major damage. What are the chances of such an impact ? The best estimates suggest that no more than 2,000 meteorites fall to the surface of the entire globe each year. The average mass of these bodies is about 20 kilogrammes, which is quite a substantial object, but the frequency of falls is only one in each hundred thousand square miles each year. It may be thought that meteorites are likely to be incandescent, travelling at thousands of miles an hour, and therefore so much more dangerous than mere lumps of rock. Observations show, however, that they are retarded so powerfully by atmospheric drag, that below about 50,000 feet, all of the "cosmic velocity" is lost and they fall under the influence of gravity. Terminal velocities are of the order of 300 to 350 miles per hour.

Newspapers still carry items about reported falls of "red-hot" meteors now and then, but in fact newly-fallen meteorites are only warm to the touch. The explanation of this is quite simple; although the outer layer has been heated to melting point during the ballistic entry into the Earth's atmosphere, the

A big one stopped here. With an impact equal to the explosion of a two megaton H-bomb, an 80 - feet diameter meteorite travelling at 36,000 m.p.h. made this ¾-mile crater in Arizona. A few score such craters are known on the entire surface of the earth.

Courtesy American Museum of National History, New York.

actual entry takes only a few seconds, and the heat generated penetrates only a few millimetres. Most of the kinetic energy is carried away by the "ablation" of the thin outer layer, a process which is used with great success to slow down space vehicles to the stage where it becomes safe to open a parachute. The interior of a meteor remains at the temperature it had in outer space, typically, about 0 deg. C.

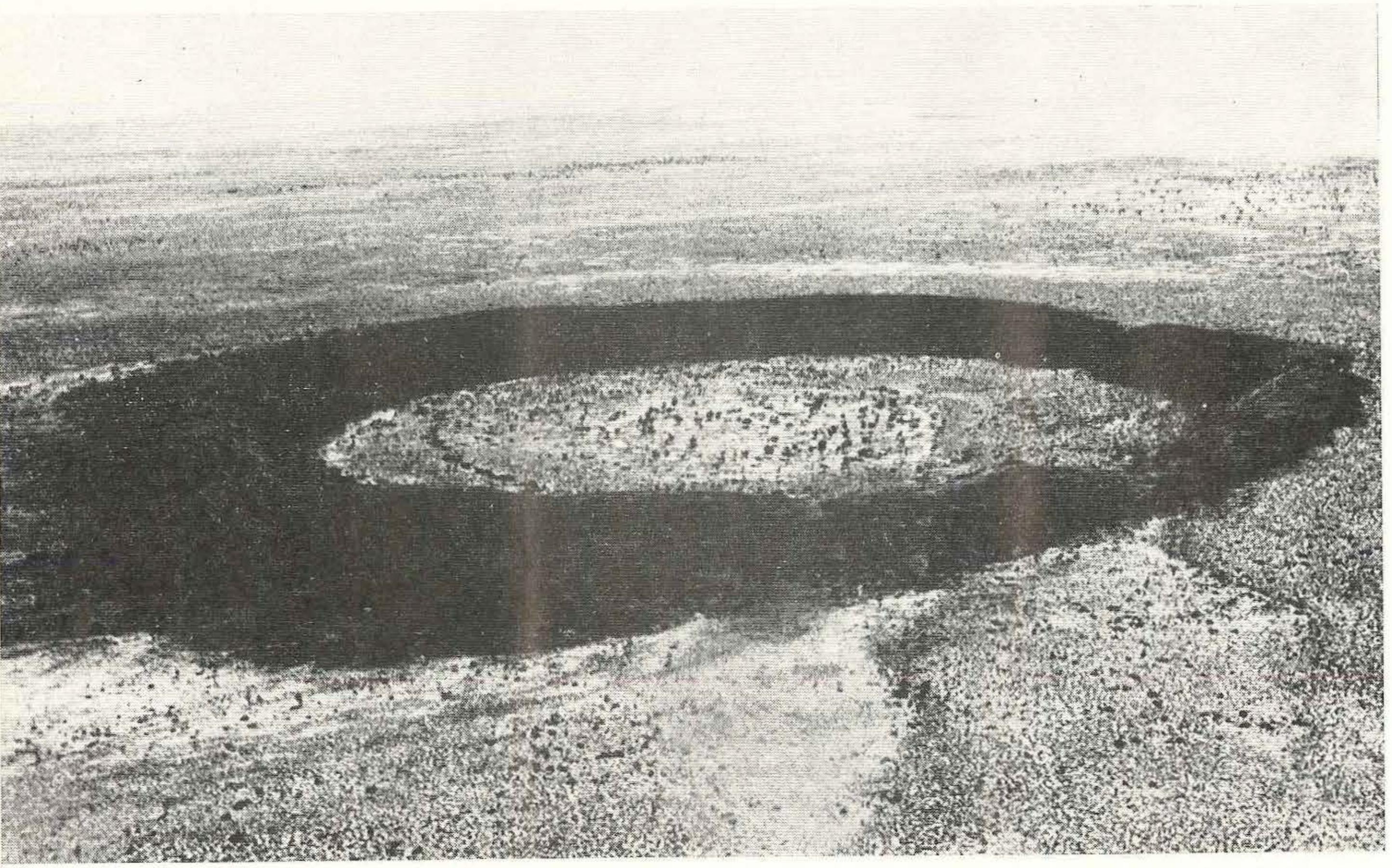
Thus the collision hazard is low, the fire hazard nil. No building has ever been seriously damaged by a meteorite fall, though 17 cases of slight damage, such as broken tiles, have been confirmed. In cases where falls have occurred on snow-covered ground, it has been noted that the bodies did **not** penetrate entirely through the snow to the solid surface. For the earthbound, then, insurance against meteor injury or damage seems quite unnecessary.

There is one other kind of meteoric event which is in every way catastrophic. This is the arrival of a really large body which reaches the Earth's surface with most of its cosmic velocity intact. The resulting impact has most of the qualities of a nuclear explosion. A typical example is Meteor Crater, Arizona, U.S.A., which is 600 feet deep and three-quarters of a mile across. Calculations show that this crater resulted from the impact of a meteor only 80 feet in diameter! Travelling at 10 miles a second, this mass of 63,000 tons had an impact energy equal to nearly two million tons of TNT. Luckily, such encounters are rare, only about one having occurred in each 50,000 square miles of the earth's surface in the last 2,000 million years.

We are thus left with the following conclusions: ordinary "shooting stars" present no danger (and these include the meteor showers such as those that occur yearly at about mid-August); boulder-sized meteorites falling at a few hundred m.p.h. could be dangerous, but are very rare; really giant objects, weighing thousands or millions of tons can be compared with H-bombs but arrive at the rate of about two every million years! If intercontinental flights are going to be made at heights of 20 to 100 miles in the future, some skin damage to aircraft can perhaps be expected from meteoritic dust, but it will only be a mild sandblasting. A greater danger may be from radiation, but that is another story.

Second only in size to the crater in Arizona, this meteorite crater at Wolf Creek, in the east Kimberley District of Western Australia, is 3000 feet in diameter. It was discovered as recently as 1947.

Courtesy National Museum of Victoria, Melbourne.



Loose Wing Walk causes Control Difficulty

A Cessna 310 with a crew consisting of the pilot and two technicians was making a night flight to take atmospheric soundings over the sea south-east of Wilson's Promontory as part of a programme of research into VHF radio wave propagation. The tests involved making a spiral descent from 5000 to 500 feet then climbing back to 5000 feet.

Having completed the tests the pilot set course for Moorabbin Airport. The flight was uneventful until soon after commencing descent into Moorabbin. About eight miles south-east of the airport, whilst passing through 2000 feet at 160 knots, the aircraft suddenly began to porpoise severely. The upset was accompanied by an abrupt increase in noise level.

The technician in the rear seat told the pilot he thought the luggage hatch had opened, but the pilot could not verify this because it was dark and he was concentrating on controlling the aircraft and reducing speed. At 140 knots the pilot lowered 15 degrees of flap and immediately the starboard wing dropped 45 degrees. The pilot regained control, reducing speed further to 120 knots. With the aircraft still shuddering but no longer porpoising, the pilot reported his difficulties to Moorabbin Tower. The tower alerted the airport emergency services and cleared the aircraft to land. The pilot flew a full circuit at 2000 feet to check the aircraft's handling characteristics as he lowered the flaps and undercarriage, then made a successful approach and landing.

Inspecting the aircraft after he had taxied in and shut down the engines, the pilot found that a newly installed wing walk made of carborundum self-adhesive sheeting had lifted at its forward edge, near the centre of pressure, and had been rolled back about 10 inches by the slipstream. In this position near the leading edge and front spar, the folded adhesive sheeting had disturbed and separated the air flow over the starboard wing, creating turbulence and causing a loss of lift. It was found that, in fitting the wing walk to replace the original badly worn material, the new sheet had been cut oversize with the result that it extended too far forward towards the leading edge of the wing and had not made good contact with the wing surface. The new wing walk material was trimmed back to well behind the centre of pressure and refitted. No further trouble was subsequently encountered.

It was found that the luggage door had remained closed all the time. Discussion with the technician who had suggested it had opened in flight disclosed that he had reached back and put his hand on it in the dark and, because it was vibrating, thought it must be open.

HELICOPTER TAIL ROTOR DAMAGED

Establishing a hover over a landing pad at an oil-drilling site near Kieta, in the British Solomon Islands, the pilot of a Bell 47 helicopter suddenly felt a violent vibration shake the whole aircraft. He quickly landed the helicopter and shut down the engine.

Inspection of the aircraft disclosed that the tail rotor had been severely damaged. It could not be established what the rotor had struck, but the landing pad was littered with items of drilling equipment, stones and various pieces of timber. There was also a dilapidated palm leaf shelter to one side of the pad. It was obvious that the tail rotor had struck either the shelter or a small object thrown up by turbulence created by the main rotor.

A number of lifts had previously been made from the pad and it was clear that the accident could easily have occurred on any one of these operations.

The danger of rotor wash throwing up loose objects is always present when a helicopter is landing or taking off and it is most important therefore that landing pads be kept free of any such hazards. The responsibility for determining the suitability of landing areas rests finally with the pilot. As this accident demonstrates, operations continued from areas that invite disaster must frequently end in disaster.

Beagle Auster loses Wing in Flight

(Summary based on Report issued by Ministry of Aviation, United Kingdom)

The pilot of a Beagle Auster was returning to his aerodrome of departure after towing a glider to 3,000 feet. While making a diving turn to rejoin the circuit, the port wing structure failed and the aircraft crashed in a field. The pilot was killed.

The aircraft was based at Rearsby aerodrome, Leicester, United Kingdom, where it was being used for flying training and glider towing. The weather was fine on the day of the accident, but strong turbulence was reported within 1000 feet of the ground, with gusts of 15 feet per second or more expected. The aircraft was used to aero-launch a glider soon after 1715 hours and after taking off, the pilot climbed to 3000 feet with the glider in tow, looking for an up-draught. After about 10 minutes, the glider pilot cast off in the vicinity of the aerodrome and made a climbing turn to port. The tug pilot, as was his habit, broke away in a diving turn to starboard, diving at about 60 degrees to rejoin the downwind leg of the aerodrome circuit. At about 700 feet, when the pilot had almost recovered from the dive, the port wing failed. The wing structure folded rearwards, twisting until it lay alongside the fuselage, then broke away completely. The aircraft rolled rapidly to port and dived into the ground.

The port wing, with the front lift strut, part of the rear lift strut, and the outer portion of the port flap still attached, was found some 700 feet from the main wreckage. The outer portion of the starboard wing had also become detached just before the aircraft struck the ground. The cockpit had been shattered in the impact and the engine was buried in the ground. The flaps had been set at 20 degrees at the time of impact. No pre-crash failure was found in the flying controls or the elevator trim tab wires and laboratory examination of the main spar fractures showed that the material of both spars was to specification and that the strength of the timber was satisfactory. It was concluded that the wing failure was the result of over-stressing in flight.

The aircraft had been built originally in 1949 as a military Auster Mark VI and had been modified and rebuilt by the manufacturer in 1962 as an A.61, Series 2 Terrier. At this time the flaps were redesigned and the movement adjusted to provide zero degrees of flap in the up position, 20 degrees in the take-off, and 40 degrees in the landing positions. The flaps were aero-foil in section and were hinged below the wing trailing edges on three steel ribs extending through the chord. The maximum flap extension speed was 65 knots I.A.S., and a placard to this effect had been placed in the cabin.

The possible results of over-stressing were investigated for both the flaps up, and 20 degree flap configurations. Flight tests showed that with the flaps up, the control column force per "g" on this type of aircraft varies from 7.4 pounds at 60 knots to 14 pounds at 140 knots. The ultimate design strength of the aircraft at the authorised maximum weight of 2150 poinds is 6.75 "g" but would have been about 7.25 "g" at the 2000 pounds weight at which the aircraft was operating at the time of the accident. A very large control force would therefore have been necessary to exceed the ultimate design strength during the recovery from the dive, and it was very unlikely that the pilot would have applied such a force. Furthermore, the manufacturer's calculations showed that the maximum span-wise bending moment in a high speed recovery from a dive with the flaps up, is at the front spar lift strut attachment. The wing had not failed at this point, but at a point further inboard between the lift strut attachment and the wing root.

The point at which the failure actually occurred coincided with the point calculated by the manufacturer to be that of the maximum span-wise bending moment during a recovery from a dive with 20 degrees of flap extended. Levelling out from a dive with the flaps in this position, would result in a substantial increase in the bending moment of the wing spars, particularly the rear spar between the lift strut and the wing root attachment. In these circumstances, a small increase in positive "g" loading could overstress the wing. With the flaps in this position, the rear spar would fail under a positive "g" loading of 3.6 at 85 knots. At the never-exceed speed of 150 knots, the rear spar could be expected to fail at about 1.7 "g", or if allowance is made for the tendency of the flaps to blow back a few degrees, at 2.4 "g".

From the evidence of the eye witnesses, it seems likely that the aircraft would have reached a speed of about 120 knots during the dive to the down-wind leg of the aerodrome and that the recovery would have imposed a loading of about 2 "g". The structural strength of the wing is more than adequate to withstand a loading of this order with the flaps up, but not with the flaps at 20 degrees and in these circumstances a gust of 15 feet per second or more could have over-stressed the wing.

Although there is no doubt that the flaps were in the 20 degree position when the wing failed, it could not be determined whether or not the pilot had intentionally set them to this position. The pilot of the glider thought the flaps were up during the tow. On the other hand, it was known that the pilot had sometimes used 20 degrees of flap for towing. It had also been his practice, at times, to fly the tug aircraft with the flaps in the "trail" position, i.e., between the up and the 20 degrees down positions. The spring-loaded flap lever cannot be locked in this position, but if it were moved either way while in the "trail" position, it would then normally lock in either the up or in the 20 degrees down positions.

The investigation finally concluded that the accident had resulted from failure of the port main spars when the wing was over-stressed with 20 degrees of flap lowered, but the reason for the flap being in this position at the time of the failure remained undetermined.

COMMENT:

Whatever the reason for the flaps of the Beagle Auster being in the 20 degree position, this accident makes one point tragically clear: **To disregard aircraft operating limitations is to invite disaster.**

Particular aspects of this problem have been discussed previously in the Digest. The article, "What Are You Doing to Your Aircraft?" (Digest No. 38, June, 1964) dealt with the dangers of operating agricultural aircraft in excess of the maximum loadings authorised by the Department, and "You Can Loop Them But —" (Digest No. 40, December, 1964), pointed out the extreme hazards involved in performing acrobatic manoevres in normal category aircraft. There may have been many pilots who felt that these particular articles were not directed at them, but there is no doubt that the lesson from the Beagle Auster accident applies to all of us. How very easy it is, sometimes, to lower the flaps at excessive airspeed during an approach, especially if there is a tendency to overshoot. A few extra knots may not **seem** to matter much at these times but we must remember that the load on an aircraft structure increases as the **square** of the speed. In turbulent conditions, a strong gust on top of the excessive approach speed could easily compound the loading on the wing to the point where structural deformation or damage could occur. As with some other incidents involving structural damage that have been reported in the Digest, this damage may be internal and may not be evident for some time, but it is not hard to imagine the possible consequences of repeatedly over-stressing a wing structure in this way.

WEATHER BELOW V.M.C.

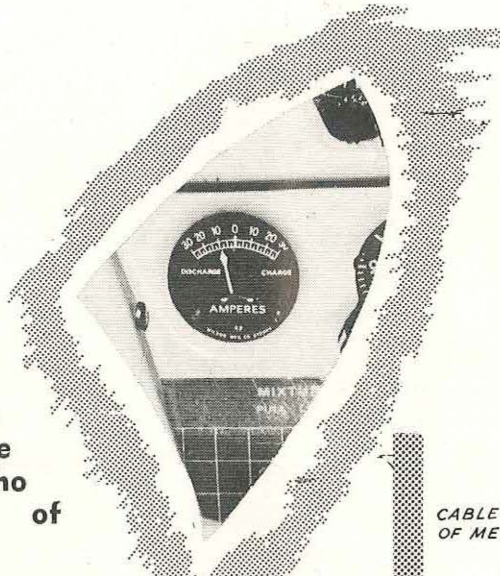
— Another timely warning from Overseas

Engaged in moving personnel and equipment from a camp site on a mountain top to a lake at the foot of the mountain, the pilot of a helicopter made two trips while fog was moving in and out of the area. Before beginning his third lift from the mountain the pilot waited for a break in the fog, then started down.

When the helicopter was about half way down the mountain however, fog moved in again and the pilot lost all visual reference. He then caught sight of the tree tops and tried to follow the tree line down the mountainside, but was unable to control the helicopter adequately and it crashed and caught fire. The pilot was thrown clear in the impact, and the passenger was able to escape from the wreckage after receiving serious burns. It was two days before the pilot and passenger were rescued.

C.A.B. United States

Electrical Hazards and Generator Failures



Although this diagram and the following comments are of greater significance to aircraft maintenance personnel, they should also be of more than passing interest to pilots who inevitably suffer the consequences of generator failures.

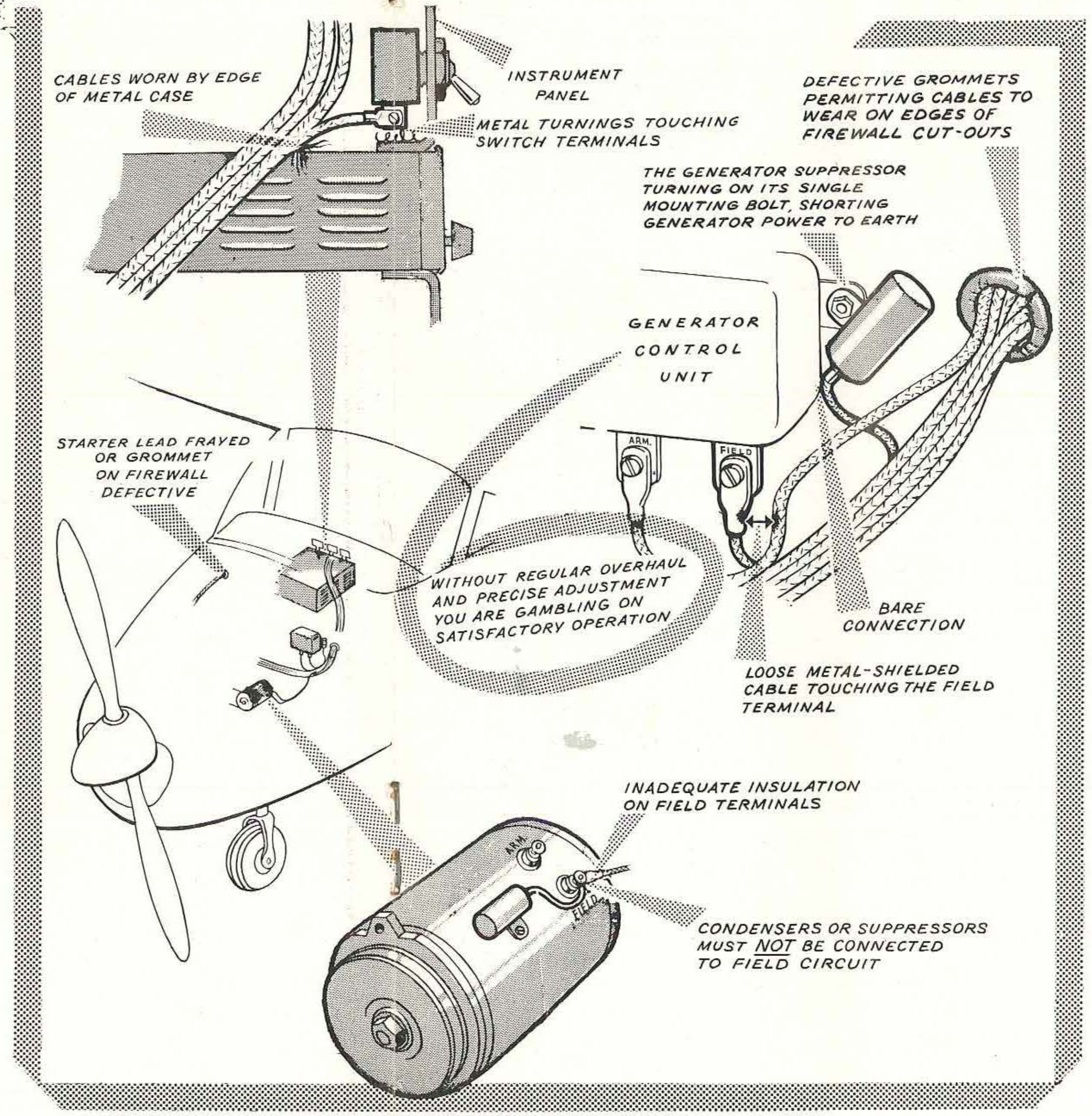
In the drawing we have shown some of the faults which in the past have been responsible for generator failures in flight. These, of course, are only a few of the possible causes, but they may provide food for thought on "where to look" and "what to look for" next time an inspection is due.

SERVICING

Generator system servicing instructions provided by the manufacturers are normally adequate to achieve satisfactory reliability. Details given, usually include such things as brush length, lubrication, commutator condition, belt tension and so on. But such checks obviously cannot cover EVERY aspect that may lead to a generator failure. In carrying out routine servicing therefore, every effort should be made to watch the general condition of the various components used in the generating system.

TROUBLE SHOOTING

For successful trouble shooting, it is important to have a knowledge of the system concerned and also to satisfy yourself that the reported trouble has been accurately described. Take a few moments to arrange the checks you intend to carry out into a logical sequence. This will avoid duplication of work and is more likely to find an unusual or intermittent fault. Above all, do not fiddle with the generator control unit as this can easily lead to the introduction of another fault. Frequently it also fails to correct the original fault, which is usually elsewhere anyway! Except for voltage adjustment, work on the generator control unit should not be carried out in the field as these units must be maintained exactly to the manufacturer's specifications. Voltage adjustment, if necessary, should be attempted only when the manufacturer's instructions and an ACCURATE voltmeter are available.



CHECK YOUR AIRCRAFT REGULARLY FOR FAULTS SUCH AS THESE

from the INCIDENT FILES

PITOT-STATIC SYSTEM TROUBLES

At Lae, New Guinea, a DC.3 was departing for Rabaul. The engines were started and the aircraft had taxied to the end of the take-off runway when the crew noticed the rate of climb indicator was showing a 1200 feet per minute descent. The aircraft returned to the apron, the instrument was changed, and the aircraft again taxied out for take-off. The run-up was satisfactory and the take-off began, but when the first officer called V_2, the captain's airspeed indicator showed only 68 knots. The captain cross-checked the instruments and saw the first officer had called correctly according to the starboard airspeed indicator. Knowing that the first officer's airspeed indicator had also been replaced before the crew had taken over the aircraft, the captain suspected the new instrument was indicating incorrectly and abandoned the take-off. Applying full braking, he brought the aircraft to rest just before the end of the runway.

Investigation revealed that earlier in the day, after a flight in heavy rain, another crew had reported the first officer's air-speed indicator fluctuating five to eight knots. A maintenance engineer had disconnected the pitot head to airspeed indicator line in the aircraft nose section, and, while using compressed air to remove water trapped in the line, had mistakenly applied air pressure to the pitot line leading back to the airspeed indicator instead of to the pitot head, as was his intention. The high pressure air burst the pressure capsule of the starboard airspeed indicator, filled the case of the instrument, and pressurised the static line and all the instruments connected to it, before shattering the glass of the starboard airspeed indicator.

The engineer replaced the damaged starboard airspeed indicator but did not notice that the rate of climb instrument had also been affected.

It is possible that the rate of climb indicator needle remained in the neutral position until shaken down to the 1200 feet per minute indication while the aircraft was taxi-ing out for take-off.

When the aircraft returned after the abandoned take-off, it was found that the captain's airspeed indicator had also been damaged by the compressed air and was actually reading 12 knots less than the correctly reading first officer's airspeed indicator. The captain's instrument was replaced, all pitot-static lines were again blown clear and a pitot-static check carried out, before the aircraft was again released for service.

The engineer responsible could not give any explanation why he had inadvertently connected the air pressure to the airspeed indicator line. He said that after the failure of the starboard airspeed indicator he had visually checked all pitot-static instruments and as he saw nothing unusual, he assumed that no other damage had occurred.

Water in the Fuel again!

A DH-82 was making a private flight from Mortlake to Moorabbin, Victoria. About four miles south of Carrum, while cruising at 1500 feet, the engine lost power without warning, and the RPM dropped to 800. The pilot selected a field, set up an approach and made a successful forced landing. The services of an aircraft engineer were obtained from Morrabbin airport and the aircraft was inspected. Water sediment was found in the fuel filter bowl. After all the water had been eliminated from the fuel system and the fuel tank thoroughly checked for any further signs of water, the engine was ground-tested and found fully serviceable. The length of the field in which the forced landing had been made was more than adequate for take-off and so the aircraft was flown on to Moorabbin.

Discussion with the pilot disclosed that he had been refuelling his aircraft from drums but had used only a mesh filter instead of a water-trap funnel. He said that after refuelling on this occasion he had tested the fuel tank for water but had found no sign of it. It was apparent that the water had not settled at the time of carrying out the water test. Had the pilot used a recommended type water trap filter funnel, the water would not have been passed in to the aircraft fuel tank.

Engine stops during acrobatics

After taking off from Moorabbin Airport, the pilot of a Victa Air Tourer flew to the training area and began practising acrobatics. The aircraft responded normally throughout a range of manoeuvres until the pilot began a recovery from a stall turn to the left. The pilot closed the throttle as the nose of the aircraft passed through 45 degrees, checked the swing and began to ease out of the dive. At this stage the engine stopped and he noticed that the fuel pressure had dropped to zero. He selected the electric fuel booster pump on and the fuel pressure rose to three pounds per square inch, but the engine failed to re-start. The pilot carried out the forced-landing cockpit drill, transmitted a MAYDAY call and then made a successful forced landing in a paddock. An inspection by an aircraft engineer and the chief flying instructor could find no fault with the aircraft. Its engine started easily and, as its tanks contained adequate fuel, the Victa was then flown back to Moorabbin airport.

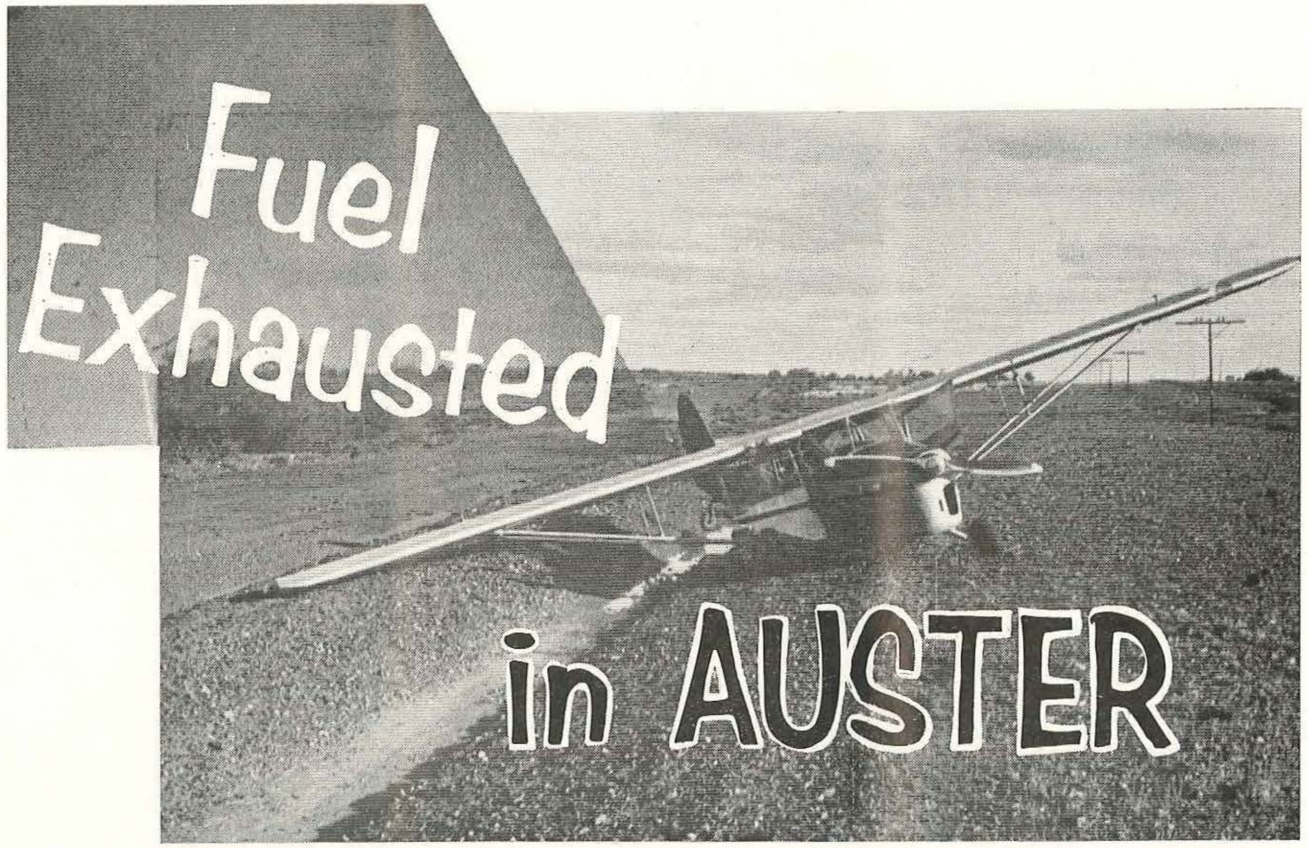
It was apparent that the propeller of the aircraft had stopped during the stall turn and it had not occurred to the pilot to use the electric starter in flight. It is not unusual for the engines of light acrobatic aircraft to stop during certain types of acrobatic manoeuvres, and the engine can be re-started simply by operating the starter motor. The operations manual of the flying school concerned, lists two methods of re-starting the engine in flight — one by operating the starter and the other by diving the aircraft up to a speed of 140 knots. The pilot had not been trained on Victa aircraft and had been converted to the type after gaining his private licence. He had however, signed the required statement indicating that he had read and understood the school's operations manual.

The incident stresses how important it is for instructors to ensure that pilots do in fact understand engine starting-in-flight procedures before they are authorised to practise acrobatics solo.

Shoes are not the Point

While landing at Bankstown in gusty, cross-wind conditions, a Piper PA-24 blew out both main wheel tyres and came to rest to one side of the runway. The pilot said afterwards that, in correcting cross-wind drift just before touchdown, he had made fairly heavy applications of rudder and believed that the pointed toes of his shoes had touched the toe pedals of the rudder controls causing the brakes to be applied just before the aircraft touched down. The starboard tyre blew out first and then his sudden corrective action on the port rudder pedal caused the port tyre to blow. No other damage was done to the aircraft.

Despite the views expressed by the pilot, it is very doubtful whether the type of footwear being worn by the pilot has very much bearing on accidents of this sort. Most instructors would probably agree that this type of accident can happen if a pilot has his feet high enough up on the rudder-brake pedals to unintentionally apply braking during the stress of making a landing in difficult conditions. Pilots of aircraft that employ this type of braking system can normally guard against braking too early, by ensuring that their heels are resting on the cockpit floor until after the aircraft has touched down. In this position, the pressure of each foot is against the lower portion of the brake pedals and the toe brakes cannot be depressed without a deliberate ankle movement.



Fuel Exhausted in AUSTER

A private pilot was ferrying an Auster from a cattle station near Wittenoom, Western Australia, to Jandakot Airport, via Meekatharra and Mt. Magnet. On the second leg of the flight, almost an hour after taking off from Meekatharra, the engine failed while the aircraft was cruising at 3,000 feet and the pilot made a forced landing on a disused road. The landing would have been successful except that the port landing wheel ran into a patch of mud left by heavy rain and the aircraft swung off the road into a ditch, collapsing the starboard undercarriage leg. Neither the pilot nor his passenger was injured. The aircraft had run out of fuel, despite the fact that the fuel indicator gauge was still showing four gallons.

The pilot, accompanied by his passenger, had delivered another aircraft to a Wittenoom cattle station from Camden, New South Wales, and at the request of the owner, was taking the Auster, which the new aircraft had replaced, to Jandakot for overhaul and disposal. The Auster had a usable fuel capacity of 28¾ Imperial gallons, distributed between a 15 gallon main fuselage tank and a 13¾ gallon auxiliary belly tank. Only the main tank was fitted with a contents gauge.

After he had arrived at the station property and handed over the new aircraft, the pilot was briefed on the serviceability of the Auster and handed the aircraft's documents. The tanks were filled to capacity and the pilot then made a brief test flight, before preparing to make an early start the following morning.

Again accompanied by his passenger, the pilot took off on the 270 nautical mile leg to Meekatharra at 0610 hours local time. The auxiliary tank was emptied in the early part of the flight, and the main tank was then selected. Two hours 50 minutes later, the pilot landed in a clearing, near where a road gang was working, to check his position. His check confirmed a substantial drift to port and he set course again for the remaining 70 nautical miles to Meekatharra at 1008. The aircraft landed at Meekatharra 47 minutes later with the fuel gauge indicating 9 gallons.

Before taking off for Mt. Magnet, the pilot decanted four gallons of fuel into the auxiliary tank, from a container he had been carrying in the luggage compartment. He selected the auxiliary tank on immediately he had set course for the 99 nautical mile flight to Mt. Magnet at 11.50 hours. At 12.30 hours, the aircraft was over Cue, 60 miles south-west of Meekatharra when the auxiliary tank ran out and the main tank was again selected. At this stage, the fuel gauge was still showing nine gallons and the pilot had no hesitation in continuing towards Mt. Magnet. Fifteen minutes later the engine failed, and the pilot saw that the fuel contents indicator had suddenly dropped to 4½ gallons.

Inspecton of the aircraft showed the fuel lines, pumps and carburettor bowl to be devoid of fuel and left no doubt that the engine failure had been caused by fuel starvation. Examination of the fuel contents gauge showed that it read 4½ gallons when the tank was empty and that it was sticking intermittently in various positions above this reading. The gauge appeared to have been in this condition for some time but the fault may not have been noticed on local flights of short duration.

The fact that the fuel contents gauge was reading incorrectly had undoubtedly contributed to the pilot's miscalculation of fuel reserves. The fuel gauge fitted to this aircraft was a hydrostatic type of instrument operated by a diaphragm located in the fuel tank, with a pressure transfer capilliary line to the indicator. The pilot was quite experienced on Auster aircraft and himself owned and operated an Aiglet in Western Australia, but his particular model had a direct reading float type fuel gauge —a simple mechanical gauge that the pilot had come to regard as completely reliable.

Discussing the accident later, the pilot admitted that he should have recognized the inconsistencies in the gauge readings during the earlier stages of his flight and

Landing path of the Auster, with initial touchdown marks in the foreground.

Inset: The collapsed undercarriage.

realised the instrument was incorrect by the time he reached Meekatharra. Comparison of the fuel consumption and flight times yielded results consistent with the aircraft's normal overall fuel consumption of seven gallons per hour. The total fuel available, including the four gallons added at Meekatharra, amounted to 32¾ gallons, and including the brief test flight on the previous afternoon, the aircraft had flown a total of 4 hours 44 minutes. The pilot had flight planned the leg to Mt. Magnet on an estimated fuel consumption of 5.9 gallons per hour — a figure he had determined from the time it had taken to consume the contents of the auxiliary tank on the first leg in cruising flight. But even at this somewhat optimistic figure, which allowed no margin for ground handling, take-off or climb, only 6½ gallons would have been left in the main tank on arrival at Meekatharra. In admitting his error, the pilot pointed out that on the outward ferry flight from Camden he had flown 33 hours in five days. This is in excess of flight time limitations permitted by Air Navigation Regulation 63(1)(d) and fatigue may well have been a contributing factor.

COMMENT: This accident is only one of a number in recent months caused by pilots miscalculating fuel consumption or fuel on board during cross-country flights. It clearly demonstrates the importance of **knowing** how much fuel is in the aircraft's tanks, ensuring that the flight is planned with adequate reserves, and constantly checking the aircraft's fuel contents gauges against time flown. The possibility that fatigue had contributed to the pilot's lack of awareness of his true fuel state is another interesting point arising from this accident and manifests the purpose behind flight time limitations.

One other matter must be mentioned, and that is the pilot's decision to carry a four-gallon container of fuel in the luggage compartment of the aircraft. Not only was this contrary to the provisions of A.N.R. 120 (1), it was also quite unnecessary. Fuel supplies are available at Meekatharra and the pilot could easily have arranged to refuel his aircraft there instead of running the risk involved in carrying so dangerous a load. His refusal to make adequate use of the facilities available on the route suggests a poor standard of flight planning and airmanship. Indeed, had the pilot elected to refuel properly at Meekatharra, the fuel tanks would undoubtedly have been filled to capacity and there would have been no likelihood of the aircraft running out of fuel before reaching Mt. Magnet.

BEWARE OF FROST

Pilots who leave their aircraft standing in the open overnight in cold weather should be on their guard against attempting to take off while there is frost on the wings or tail surfaces.

In Canada, a Bonanza with four persons on board failed to become properly airborne while taking off from a private airstrip and stalled into a lake that lay beyond the end of the strip. All four occupants evacuated the aircraft without injury but two drowned in the lake before a boat could reach them. The cause of the accident was attributed to frost on the wings causing a loss of lift.

In New South Wales last winter, a Callair taking off at first light from a strip nearly 3,000 feet long, failed to become properly airborne in similar circumstances. After running the length of the strip, the aircraft ran through three fences and came to rest badly damaged in an adjoining wheat paddock.

Although a coating of frost hardly affects the aerofoil shape of the wing, the frost's surface roughness increases the drag, destroys the smooth flow of air over the aerofoil and raises the stalling speed by promoting early airflow separation. For this reason, an aeroplane coated with frost can fail to become airborne at the normal take-off speed and, even if it does manage to struggle into the air, the margin of airspeed above the stall will be lessened so that only a medium turn or moderate turbulence can be sufficient to induce a stall.

Always ensure that any sign of frost is completely hosed or rubbed off your aircraft before you attempt to take-off!

SURVIVAL IN THE OUTBACK

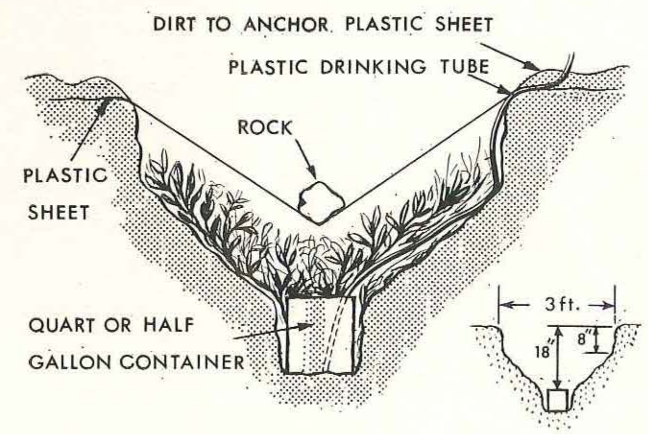
When an aircraft is forced down in dry, arid parts of the outback, the occupants need no longer die of thirst if their water reserves become exhausted while awaiting rescue. Now a few small items of equipment carried in the luggage compartment could make all the difference. A simple water still has recently been developed which, using the energy of the sun, can extract small amounts of water from soil that looks quite dry.

This method of obtaining drinking water from the ground in dry areas has been developed by Doctors R. D. Jackson and C. H. M. van Bavel, of the United States Water Conservation Laboratory in Arizona. It was demonstrated recently in Australia by the C.S.I.R.O. and we are grateful to Dr. R. O. Slatyer, of their Arid Zone Research Section, for providing us with the material for this article.

Basically, the still consists of a sheet of clear polythene which is placed over a hole in the ground, preferably containing freshly cut or broken-off pieces of desert shrubbery. The sun shining through the polythene heats the soil and plant surfaces, causing water to evaporate from them. Some of the resulting vapour then condenses on the polythene sheet, which is kept relatively cool by the outside air blowing over it. The sheet is weighted with soil or stones so as to sag in the centre and form an inverted cone over a container placed underneath in the hole, and the condensed droplets then run down the sheet and drip into the container. In this way, about one pint of water per 24 hours can be obtained from a hole about three feet square dug in apparently dry desert soil. If the soil is moist, or if green vegetation is available, up to three pints of water can be obtained per day, but it is wise to only count on one pint per hole.

In mid-summer, the average person requires at least six pints of water daily for indefinite survival. He can survive on less for a short time, provided he rests as much as possible, preferably in any shade that may be available. To ensure survival for several days therefore, it is necessary to have four or more sheets of polythene, each about four feet square, for each person in the aircraft, and a small container for each sheet, capable of holding 2-3 pints. It is suggested that pilots should carry, in their luggage lockers, enough sheets of polythene to provide for the maximum number of persons that can be seated in their aircraft, an appropriate number of containers, and a shovel. It is also desirable, but not essential, to carry a length of polythene tubing for each hole, so that water can be sucked out of the containers as it accumulates, without having to remove the sheet.

Clear polythene which "wets" easily is best for the purpose but ordinary clear kitchen polythene sheet (or preferably the thicker .004" variety such as is laid down before concrete floors, etc., are poured) is satisfactory, particularly if its surface is roughened so that the droplets of water will cling to it more easily and are not wasted by dropping off before they run down to the point of the cone. It is wise to cut the sheets to size and roughen them with sandpaper **before** they are stored in the aircraft, rather than waiting until one is stranded



Schematic Diagram of Water Still.

somewhere in the outback. If a "nesting" set of containers are obtained and the sheets and tubing rolled inside them, a very compact bundle can be made. But see that it is very well wrapped—it may have to lie around in the luggage compartment for a long time before it is needed !

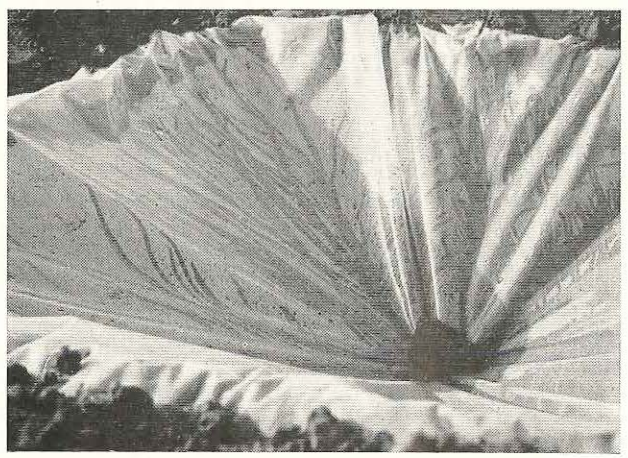
Setting up the Survival Kit

Select a spot close to your aircraft but in the sun, well away from the shade of trees. If possible choose moist soil, or a small depression or creekbed where the soil is likely to be more moist. However, this is not essential, since water can still be obtained from soil which appears quite dry.

Dig four holes for each person, preferably completely setting up each hole before starting on the next one. The holes should be about three feet square, eight inches deep at the edges, tapering to about 18 inches deep in the centre if green leaves, roots, etc., are to be placed in it; shallower if these are not available nearby. Make an additional small excavation in the centre of each hole. Place a container in this, with a piece of tubing starting from the very bottom of the container and extending right outside the hole. If no sticky-tape is available to secure the tube to the side of the container, wedge the end of the tubing in with a clean dry stick or stone.

If green leaves or shrubbery are available, pick an armful, break it up and place it in the hole. Although this is desirable it is not essential, particularly if the soil is moist. Make sure the leaves do not touch the lip of the container or the plastic sheet, lest they give the water a bad taste. Cover the hole with the polythene sheet as quickly as possible and place soil all around the edges to prevent the water vapour escaping. Place a stone or a handful of sand in the centre so that the plastic sags to form an inverted cone. Carefully centre the point of the cone over the container. The first still is now operational, and other holes can be dug and set up in the same way.

Water will generally begin to condense in about six hours, and enough will be available for drinking an hour or two later. Do not remove the sheet at this stage, however. Instead, obtain the water by sucking through the tube. If no tubing is available, it is best to remove the water as infrequently as possible, preferably late at night after the soil has cooled off, to avoid upsetting the operation of the still. After about 24 hours most of the water available in the top inch of soil, and in the plant material, will have evaporated. At this stage, remove the polythene and take out the container. Deepen the hole by scraping out an inch or so of soil and replace the vegetation with fresh material. Body wastes, scraps of food, etc., can also be added to the hole, since pure water will be obtained from them also—provided of course that care is taken not to contaminate the container or the plastic sheet by direct contact. The container can then be replaced, the hole re-covered, and the still is operational again.



The still in action. Note the water droplets condensing on the plastic sheet.

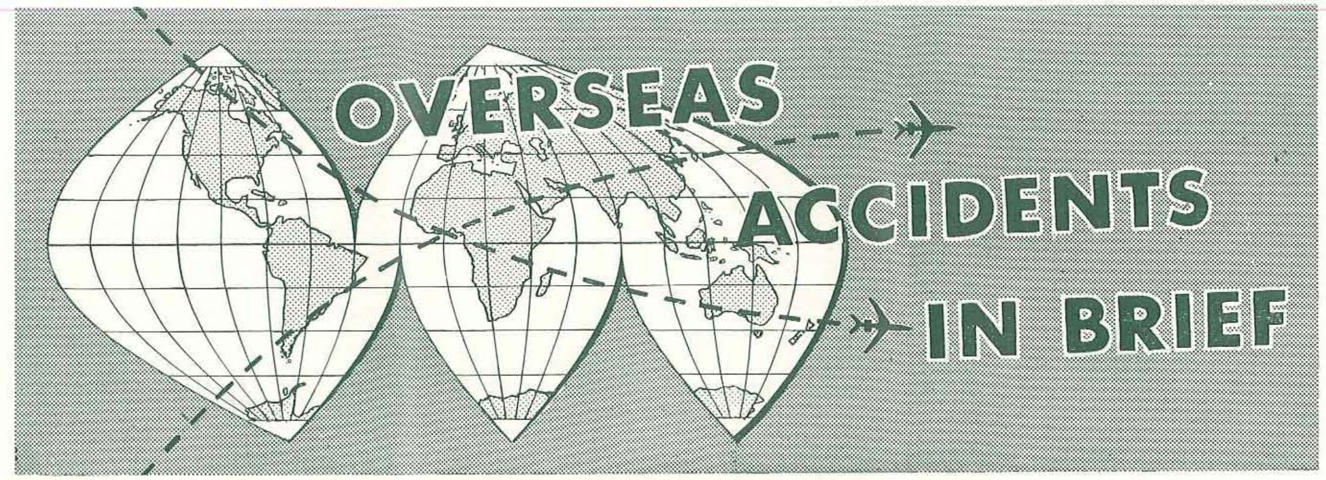
If you do not have as much polythene sheeting as has been suggested, it is still worth setting up as many stills as you can with whatever material is available. Even if you only only obtain one pint a day, it will increase your chances of survival and enable you to eke out your other sources of water, such as in food and drinks.

The best way of reducing your own water requirements is to make a shelter from the wind and sun and stay in it protected, as far as possible, from exposure. And don't wait too long before starting to carry out these jobs. Exhaustion can come very suddenly once you are only a little dehydrated ! A further article in the next issue of Aviation Safety Digest will discuss these aspects of desert survival in greater detail.

The importance of remaining with your aircraft cannot be stressed too much. Not only is the distance a person can walk very limited, but the aircraft itself is far more readily discernible to the crew of a searching aircraft than persons on the ground or even laid out ground signals. This may seem an obvious statement, but experience has shown that it is not generally realised how difficult it is to sight a person on the ground from the air if he is not near some more easily recognisable object such as an aircraft, vehicle, tent or hut. Then too, the track likely to have been flown by a missing aircraft is usually in some way predictable from the information pieced together by the search and rescue organisation, but the direction survivors of a downed aircraft might have taken, could be anybody's guess !

The instructions contained in this article are not intended to imply that equipment for constructing water stills can be regarded as a substitute for carrying adequate reserves of water. Far from it ! In fact, it would be hard to sum up the situation better than in the old adage. "A bird in the hand is worth two in the bush"—the water still equipment should only be regarded as a back-up to water reserves carried in the aircraft.

Remember that in the Australian outback there is virtually no wet season and it is always dangerous to fly without adequate water reserves. Be well prepared on both counts, should you be unlucky enough to make a forced landing remote from help. The advice contained in this article could save lives.



CARBON MONOXIDE CAUSES BONANZA CRASH

The pilot of a Bonanza, with one passenger, departed on a return 130 nautical-mile private flight to his home airport late in the afternoon. The aircraft failed to reach its destination and its wreckage was found the following day, on steep slopes of a mountain range that lies across the track being flown by the pilot. The disposition of the wreckage, at a point on the mountainside 4,600 feet above sea level, indicated that the aircraft had struck the mountain in a nose-up attitude while banking to port. The engine was developing substantial power up to the moment of impact. Examination of the wreckage disclosed a high degree of deterioration in the exhaust muffler and the heat exchanger for the cabin heater, and in places rust had penetrated right through the sheet metal surfaces of these components. The total time that this equipment had been in service could not be determined, but the aircraft had flown 2,146 hours since new, and the engine had run 1,620 hours. The aircraft had flown only 57 hours since its last airworthiness inspection.

Post mortem examination of the occupants' bodies revealed evidence of carbon monoxide poisoning sufficient to cause severe headaches, dizziness, deteriorating vision, nausea, finally collapse. At the elevation of the crash site, or at the higher altitude at which the aircraft was probably flying before the crash, the effect of the carbon monoxide would have been even more severe.

C.A.B., United States

COMMENT

The article "Cabin Heaters and Carbon Monoxide" in our last issue (Aviation Safety Digest No. 45, March, 1966), discussed the danger of carbon monoxide in aircraft and emphasised the need for carefully maintaining cabin heaters and associated equipment.

Investigation of an air safety incident that has occurred since, revealed that a damaged flap rod seal in a Victa 115 was permitting an excessive amount of carbon monoxide to enter the aircraft cockpit. Although this fact had no bearing on the incident itself, its discovery prompted checks on other Victas and a similar situation was found in another aircraft.

These instances show that, in addition to correct cabin heater maintainence, it is also important to regularly inspect and maintain the cockpit or cabin sealing in an aircraft. Remember that although cabin heater systems are the most likely source of carbon monoxide, exhaust fumes finding their way into the cabin by **any** means can be hazardous, even if present only in small quantities.

Comanche Disappears in Deteriorating Weather

A PA24 departed on a private flight from Plymouth, Wisconsin, U.S.A., at 1030 hours local time, carrying the pilot and two passengers, but failed to arrive at Buffalo, New York, nearly 400 nautical miles away, over portion of the Great Lakes area.

It was not known if the pilot obtained a weather briefing for the flight, but the forecast available stated that scattered snow showers south of Lake Huron were expected to reduce visibility to two miles and occasionally to half a mile, with a cloud base of 500 feet, obscured.

At 1120 hours, a single-engined light aircraft was sighted near New Glasgow, Ontario, on the northern coast of Lake Erie, during a snow squall. The aircraft then turned south and flew out over the lake. A body washed up later on the northern shore of the lake was subsequently identified as one of the passengers in the missing aircraft.

The pilot had no instrument qualifications and his decision to continue the flight into deteriorating weather conditions was determined to be the probable cause of the accident.

Department of Transport, Canada

Control lost when Engine fails

Shortly after taking off, with only the pilot and one passenger on board, the starboard engine of a PA 23 failed. The pilot was unable to maintain directional control and the aircraft crashed on the airport. The occupants were not injured, but the aircraft was substantially damaged. Investigation showed that the fuel filter bowl on the starboard engine was loose enough for it to leak fuel when the main tank was selected. The bowl's retaining nut had been lock-wired in the wrong direction and the nut had apparently backed off to the extent permitted by the locking wire. Tests showed that the engine would run for about one minute at full throttle with the fuel filter bowl leaking, but after this time the fuel pressure would drop away and the engine would stop. It was determined that the starboard fuel filter bowl nut had backed off sufficiently to allow air to be drawn into the fuel system, and cause an air lock.

The pilot said that the take-off was normal and that he retracted the undercarriage about 35 feet above the runway. Shortly afterwards, while climbing at about 74 knots, a swing developed to starboard. The airspeed decreased, and he was unable to maintain directional control with full opposite rudder.

As the aircraft descended, gradually turning to starboard, the pilot considered he could land on a tarmac area of the airport that lay ahead in the path of the aircraft. He selected the undercarriage down, but the aircraft stalled and crashed.

The flight manual for the aircraft lays down the following procedure to be followed in the event of an engine failure after take-off, when there is insufficient runway left for a landing:—

- Maintain best climbing speed of 82 knots—minimum 74 knots.
- Apply full power to the live engine.
- Feather the dead engine.
- Retract the undercarriage and flaps.
- Trim aircraft directionally with rudder trim.

In this case, the pilot already had the undercarriage retracted. He had not attempted to feather the failed engine and had permitted the airspeed to decay from 74 knots after the engine had failed. It was found that, although the pilot had over 5,000 hours flying experience, he had flown only 10 hours in the previous five years and only six hours of this time was on PA 23 aircraft.

Department of Transport, Canada

AILERON CONTROLS CROSSED

A Beaver sea-plane was to make a test flight after having undergone maintenance at a sea-plane base on a lake in Canada. With the pilot and an engineer on board, the aircraft began its take-off. The take-off run seemed normal, but shortly after the aircraft became airborne, it rolled violently and the starboard wing struck the water. The aircraft cartwheeled and was badly damaged, but the occupants escaped and only the pilot sustained a minor injury.

Examination of the Beaver's control system showed that the aileron control chain had been installed incorrectly with the result that the ailerons worked in the opposite sense. The pilot said that he had checked the functioning of the aileron controls before taking off, and was satisfied they were working correctly.

Department of Transport, Canada

COMMENT: Accidents arising from this cause are not infrequent. How often do **you** look at the ailerons during your pre-take-off checks to see that they are moving in the correct sense? Remember, Murphy is never far away!

Passenger walks into Propeller

A private pilot was taking friends for sight-seeing flights in a Piper Cub. After taking two passengers for brief flights, he then taxied in to pick up his third passenger, a man who had never flown previously. The pilot parked his aircraft on the apron in front of the hangar and left the engine running while his passengers changed over.

After taking the third passenger for a flight of about 25 minutes, the pilot landed and again taxied in towards the hangar. This time, he taxied his aircraft to a point on the apron facing the hangar, ready for it to be pushed in, but again he left the engine running while the passenger alighted. As the passenger was climbing out, he asked the pilot if a friend that he had seen sitting in a car nearby, could also be taken for a flight. The pilot agreed, and signalled to the person in the car. Meanwhile the passenger left the aircraft on the starboard side and went to walk around the front of the aircraft towards the car. The propeller struck him on the left shoulder knocking him to the ground with serious injuries. The pilot had not warned him of the danger of the rotating propeller.

Department of Transport, Canada

Helicopter and Aeroplane collide in flight

A Hughes helicopter carrying the pilot and one passenger was being used to take aerial photographs near an airport where the pilot of a Taylorcraft was practising solo circuits and landings.

After manoeuvring in the area for a time, the helicopter landed near the up-wind end of the runway, while the Taylorcraft was on the ground. As the pilot of the Taylorcraft was preparing to take off again, the passenger in the helicopter was seen to climb out, walk over to the aeroplane and speak to the pilot. The passenger then returned to the helicopter and resumed his seat, and both aircraft took off.

A short time later, while both aircraft were flying close together at about 500 feet on near parallel headings, witnesses saw the Taylorcraft overtaking the helicopter from behind on the port side.

As it did so, the helicopter's rotors struck the front of the aeroplane, the Taylorcraft's port wing folded back, and both aircraft fell to the ground. The pilot of the Taylorcraft was fatally injured by the helicopter's rotor blades before the aeroplane struck the ground in a steep nose-down attitude. The helicopter exploded on impact and was destroyed by fire, killing both its occupants.

Examination of the wreckage of both aircraft showed that the impact of the collision had separated the helicopter's main and tail rotors in flight. A press type camera was found amongst the helicopter wreckage.

C.A.B., United States

Fuel Exhaustion in Beech Bonanza

A private pilot was being given endorsement training in a Beech Bonanza by an instructor with whom he had not flown before. The port tank was full but the starboard tank only partially filled and when they started the instructor told the pupil to select the port tank for the flight.

About 45 minutes later, when the aircraft was on an extended downwind leg for a landing, the engine lost power. The instructor directed the pupil to change tanks and to work the wobble pump to restore fuel pressure, but from his seat he could not see exactly what the pupil was doing and the engine only surged two or three times then stopped. The instructor then made an approach into a recreation ground that was the only forced landing area available. The aircraft touched down hard and slid into a fence, injuring the instructor.

Examination of the aircraft showed that the fuel selector was positioned to the empty starboard tank. The port tank was still full. It was found that another instructor had previously given the pupil an erroneous briefing on the positioning of the fuel selector in this particular aircraft, he having told the pupil that the long end of the selector indicated the tank. Although this was the case with selectors fitted to certain other models of this type of aircraft, the reverse was true for this particular aircraft.

C.A.B., United States

COMMENT: Confusion over the correct positioning of fuel tank selectors has been responsible for a number of accidents to light aircraft in Australia. The subject was discussed in some detail in the article, "Fuel Mismanagement — Forced Landing," which appeared in the September, 1965, issue of the Digest. The problem is still very much with us, however, and earlier this year a Piper Cherokee was force-landed at Goulburn when the engine failed simply because the pilot wasn't familiar with the operation of the fuel selector fitted to that aircraft. One of the contributing causes to incidents of this sort is that some student pilots are seldom required to operate the fuel selector in the normal course of their training. Flying training periods are usually less than one hour, and a number of flying schools and aircraft operators have regrettably adopted the practice of leaving the fuel turned on when their aircraft are not in use—a practice, incidentally, which contributes nothing towards inculcating sound cockpit habits in students, and which could conceivably have undesirable effects when the pilots concerned graduate to more advanced aircraft with multi-selection fuel systems.

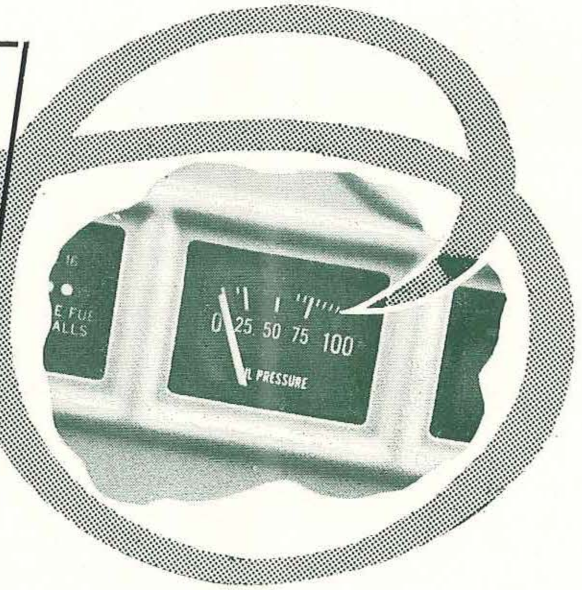
The only practicable answer to the overall problem is a twofold one. Flying intsructors must place greater emphasis on briefing both students and qualified pilots obtaining endorsement training, on the layout and operation of the fuel system of the particular aircraft they are flying and **all pilots** must **ensure** they **fully understand** their aircraft's fuel system before they attempt any solo flights.

NOT MEANT TO DIE

A Mooney departed on a V.F.R. night flight from Springfield, Missouri, to Amarillo, Texas, a distance of about 430 nautical miles. Cloud bases as low as 1,100 feet with drizzle and patches of fog were forecast over the route. After cruising at first at 2,000 feet, the pilot was forced to descend to maintain visual contact. About 150 miles from Springfield, the aircraft encountered fog, and the pilot began a shallow descent in an attempt to regain visual flight. At 130 knots, while in a level attitude, the aircraft struck the ground and bounced back into the air. The pilot lowered the undercarriage and allowed the aircraft to settle again in nose-up attitude. The aircraft touched down on the ground again, tipped forward on to its nose, and slid for 200 feet before coming to rest upright on a road. Fire broke out, but the pilot and both passengers escaped.

C.A.B., United States

DON'T LET IT HAPPEN TO YOU



A Cessna 172 belonging to a country aero club was due for a 100 hourly inspection. Arrangements were made for the inspection to be carried out at an authorized workshop some 70 nautical miles away, and the ferry flight to and from the workshop was planned as a solo cross-country training flight for a club member holding a restricted private licence. He was to fly the aeroplane from its home base to the workshop early in the morning, allow ample time to have the inspection carried out, and make the return flight home late in the afternoon.

The pilot arrived at the workshop with the aircraft rather later than planned, and the engineering staff were already at work on another aircraft in the hangar. To try and make up time, the Chief Engineer himself set about draining the engine oil while the aircraft was still on the apron, without waiting to issue the standard 100 Hourly Inspection Schedule or to raise a job number. The aircraft was moved into the hangar before the oil had drained completely, and the engine work was then taken over by the other engineering staff. The Chief Engineer did no more to the engine but went on to inspect the airframe. Meanwhile, the other members of the staff proceeded to remove and clean the oil filter, the oil drain pipe and the spark plugs, dividing their time between this and the other aircraft in the hangar which was also undergoing a 100 hourly inspection. After re-fitting these components and lock-wiring the oil filter and pipe, they gave their attention to correcting a number of reported oil leaks in the engine.

When the inspection was nearly complete, the aircraft was pushed out of the hangar and the engine started for a test run. But because an ignition defect was immediately evident, the engine was shut down after a few seconds and the aircraft returned to the hangar.

After the ignition trouble had been rectified, the aircraft was again taken out on to the apron and started, but this time another engineer was at the controls and carried out only an ignition check. The check was satisfactory and the engine was shut down and the fuel turned off. A Maintenance Release was issued and the aircraft was handed over to the pilot, who, for the preceding hour, had been watching the maintenance engineers at work while he waited.

Anxious to be on his way to reach his home base before last light, the pilot boarded the aircraft without making an inspection, started up, and began to taxi out. As he did so, the engine stopped and the pilot found he had not turned on the fuel. He re-started the engine, taxied out to the end of the runway, ran up the engine, and took off. At 800 feet, the engine lost power, then seized. The pilot made a 180 degree turn and glided back to the aerodrome, narrowly missing the windsock and one of the hangars as he approached downwind. The aircraft touched down on a non-maintained area between the strips, fortunately damaging only the nose-wheel fairing. Inspection of the engine showed that **there was no oil in the sump.** Two pistons, two big-end bearings and the camshaft, had seized.

COMMENT

The events leading to the seizure of the engine and the consequent forced landing provide a classic illustration of the fact that an accident is seldom caused by a single isolated event, but rather by a chain of small, seemingly unimportant omissions, and unfortunate associations of circumstances.

The first was the Chief Engineer's desire to save time by starting the inspection without first issuing a 100 Hourly Inspection Schedule. The Inspection Schedule normally used by this workshop is adequate and, correctly used, constitutes a check list of the items to be performed in the course of a 100 hourly inspection. Item No. 3 on the Inspection Schedule, requires certification by the engineer concerned that the engine oil has been replenished after draining. The use of a schedule would have precluded the possibility of the aircraft being cleared for flight without the maintenance work being satisfactorily completed. Starting from this grave omission, with several members of the engineering staff dividing their time between the two aircraft in the hangar and with no one engineer supervising or even fully aware of just what items had been completed, the danger of overlooking some vital part of the work could only be compounded.

When the inspection was almost complete and the engine was started to be given a test run, during which the oil pressure would normally have been checked as a matter of course, the attention of the engineer responsible was diverted because the ignition system required some adjustment. And when this had been rectified and another engineer started the engine for a second time, his interest and attention was concentrated only on ensuring that the ignition system was working satisfactorily.

Then the pilot took over the aircraft. After watching the engineers finish off their work, and having been handed a new Maintenance Release with the assurance that the aeroplane was in excellent condition, he did not see any need for a pre-flight inspection. He was in a hurry to be on his way and because it was his training organization's practice not to turn the fuel off on their Cessna aircraft, he did not think to first check the fuel selector before starting the engine. But the engineer who ran the engine **had** turned it off, and so the engine stopped soon after he began to taxi. This further disguised any symptoms the engine might have been developing to indicate there was something wrong.

Apparently in too much of a hurry even to make a normal check that the oil pressure was registering after each of his engine starts, the pilot then failed to notice there was no oil pressure during his run-up. So the stage was finally set. He took off, the engine seized, and a serious accident was averted only by the narrowest of margins.

What is there to be learned from this accident ?

Firstly, the Chief Engineer has no doubt that it arose from his failure to employ the proper workshop procedure, and he does not intend to permit haste to place him in this situation again. He has also instituted a system of attaching large warning notices to the controls of every aircraft from which the engine oil has been drained.

Secondly, even though re-filling the sump **was** overlooked on this occasion there were no less than **five** opportunities for the error to be detected:—

- When the engine was test run.
- Before the pilot boarded the aircraft, had he not chosen to dispense with his pre-flight inspection.
- When the pilot started the engine before beginning to taxi.
- When he re-started the engine after turning on the fuel.
- While he was running up the engine before take-off.

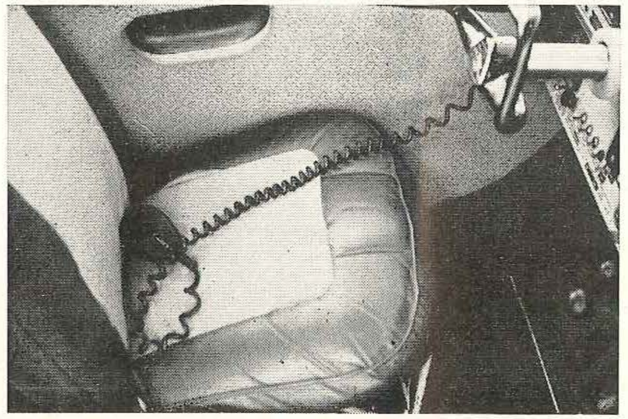
Yet all these opportunities were missed !

The pilot concerned has now seen the lack of wisdom in not checking for **himself** that an aircraft is fully serviceable, and in starting up, taxi-ing and carrying out a pre-take-off run-up without positively checking the oil pressure. No doubt the other engineers involved in this occurrence have also learned a lesson they are not likely to forget.

But how many are in the same category as this pilot was—confident in relying on other people's say-so that an aeroplane is fully airworthy, and being content with only the most cursory pre-flight checks ? We venture to say that the number could be surprising !

MICROPHONE TROUBLES

A Piper Twin Comanche had flight planned from Bankstown for Coffs Harbour, nominating full reporting procedure. After departing, the pilot called Sydney, giving an estimate for Port Stephens at 0045 hours. The aircraft subsequently failed to report at this time, despite calls by Sydney, Sydney Area and Dubbo, and at 0100 the Uncertainty Phase was declared. At 0110 the aircraft answered a call by Coffs Harbour and reported it has passed Taree at 0109, and was now estimating Port Macquarie at 0125. The aircraft's transmission was good and the Uncertainty Phase was cancelled.



When the incident was discussed with the pilot on his return to Sydney, he explained that he had experienced transmitter troubles throughout the whole flight. He had heard the calls from ground stations but had been unable to contact them on either HF or VHF. He had made the return flight to Sydney NOSAR to avoid a repetition of the incident. The pilot said he believed the fault lay in the aircraft's microphone and pointed out that it was in a "knocked around" condition. It did not fit the stowage bracket in the aircraft and would repeatedly fall to the floor of the cockpit. It was obvious that this had been going on for some time and the microphone had eventually succumbed to such treatment.

How often have you entered the cockpit and found that the microphone is on the seat, the floor, draped over some control or anywhere but in the microphone stowage clip or bracket provided in the aircraft ? And often when you do attempt to stow it properly you find it won't fit the clip or bracket in the aircraft because this was designed for a different model microphone !

Provision of the proper stowage facility for the model of microphone fitted to an aircraft is a definite requirement for the issue of a Certificate of Airworthiness, and all Maintenance Releases. Quite frequently however, microphones are afterwards changed from one aircraft to another — some pilots have a personal preference for a particular model — and as most aircraft type microphones are electrically interchangeable, no incompatibility arises with the communication equipment in the aircraft. Unfortunately, this practice of exchanging microphones of different models or type often means that a microphone in an aircraft is incompatible with the stowage bracket fitted to that aircraft. All too often the microphone is not in the aircraft when maintenance inspections are carried out and this aspect cannot be checked.

Ensuring that your microphone is properly stowed before take-off is good insurance against probable microphone damage and loss of communication. There is no need to elaborate on the potentially hazardous situations that can arise when there are loose objects in the cockpit, particularly ones that have cords attached !

Aircraft Tug catches fire on tarmac

At Perth Airport, Western Australia, the engine of an aircraft tug burst into flames as it was being started on the apron in front of the passenger terminal. The engine burnt fiercely from the vehicle's open engine compartment and the fire crew turned out. Three DC-3's and one Bristol Freighter were on the tarmac at the time. The fire was quickly put out by the tarmac crew with CO^2 portable extinguishers just as the fire crew reached the site.

It was found that the fire had been caused by fuel spilt over the engine while the vehicle was being re-fuelled on the tarmac. The tug had previously run out of fuel on the tarmac and its fuel tank above the engine was re-filled from an open container. Very strong winds were blowing at the time and petrol was blown over the engine as the fuel was being poured. The ground crew had allowed insufficient time for the spilt fuel to evaporate before re-starting the tug and the engine had burst into flames.

UNDERSHOOTING

For ten million years the eagle family has been flying. Yet the eagle cannot take flying liberties. Young eagles fall if they do. On the short side during the approach, this eagle puts on power and completes his landing with a few beats of his wings. He made up his mind early.