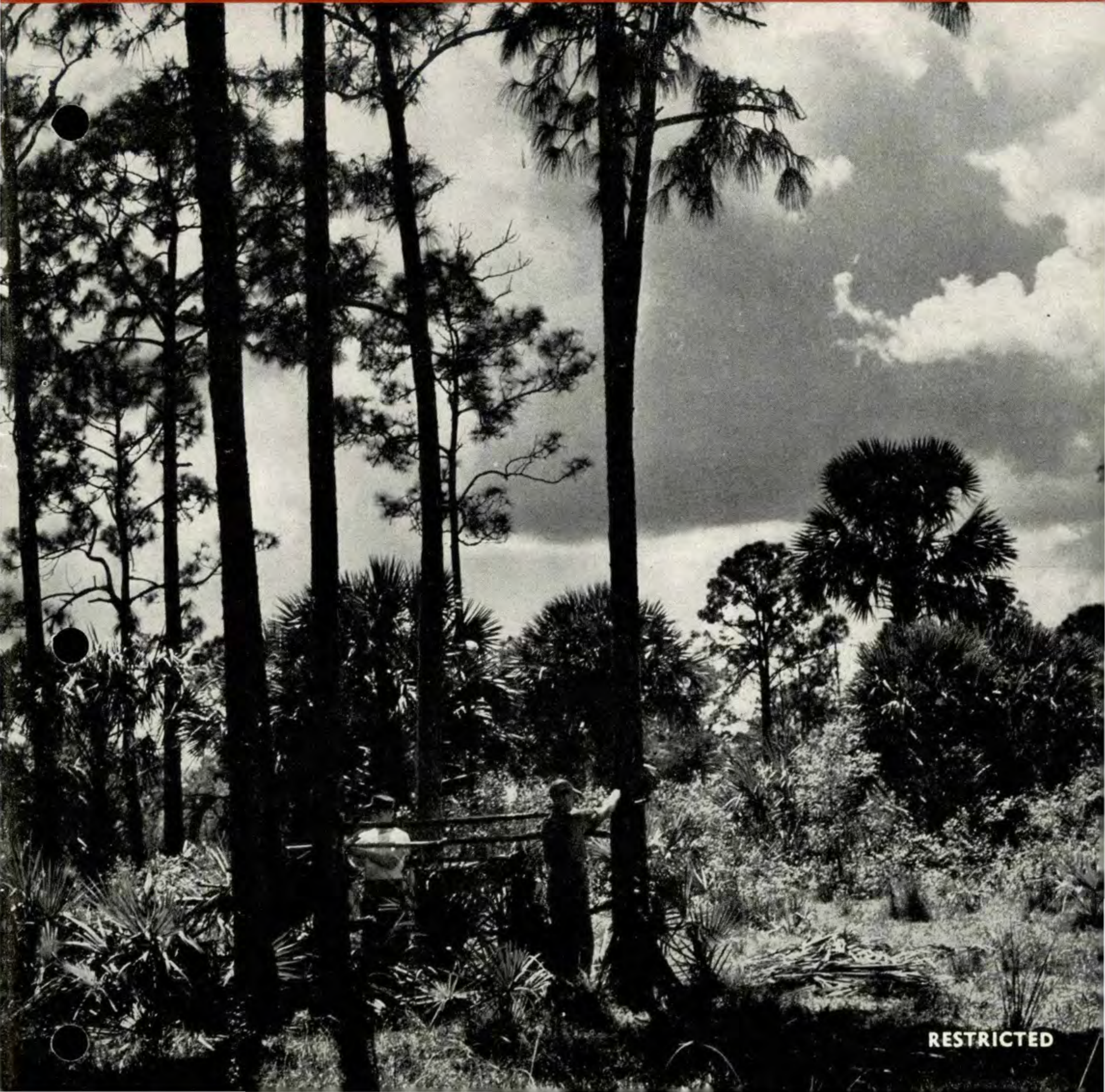
Flying Safety

HEADQUARTERS UNITED STATES AIR FORCE • RESTRICTED

MAY 1949



RESTRICTED

THE COVER PICTURE

This month's cover picture shows two airmen building a lean-to shelter in the everglade jungle country of Florida. "Jungle Survival" on page 14 of this issue is the second in FLYING SAFETY's current series on survival. Desert survival appeared last month under the title "Don't Fight the Desert." Ocean and arctic survival articles are scheduled for future issues. In order that material in this series will be authentic the writer doing the series goes on simulated survival missions into each type of wilderness with survival experts for that particular area. Lieutenant Basham went into the everglades with instructors of the survival school, conducted by 5th Rescue Squadron at MacDill AFB, to study jungle survival technique, and made a parachute jump with the jungle pararescue team to get this month's story.

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SHARE YOUR IDEAS

FLYING SAFETY Magazine welcomes comments, criticisms and editorial contributions from all members of the United States Air Force. Readers can help the magazine promote safe flight by offering information on procedures, equipment or training methods that have been effective in decreasing aircraft accidents. Address your letters direct to the Editor, FLYING SAFETY Magazine, Langley Air Force Base, Virginia.

FLYING SAFETY

DEPARTMENT OF THE AIR FORCE

The Inspector General, USAF, Office of The Air Inspector, Flying Safety Division, Langley Air Force Base, Virginia

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CONTENTS

ARTICLES AND STORIES

FEATURES

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THREE ON A MATCH

MOST OF US look with amused contempt on the superstitions of uncivilized or uneducated people—the way they rely on amulets and other medicine-man defenses against evil and bad luck. If someone pins us down on the subject, we're scornful of any belief in such bug-a-boos as "three on a match" or walking under a ladder. Superstition with us is in reality a matter of fun and nonsense.

Without realizing it, however, it is possible for either a pilot or a mechanic to be a victim of a dangerous type of nonsense—absolute blind faith in his own infallibility, a complacent self-assurance that the number of hours recorded on his Form 5 or his years of mechanical experience hold almost magical qualities. This foolish attitude is acquired any time he convinces himself that he has the business down pat.

This blind faith in his own ability may creep up on a pilot after he logs his first 500 hours or he may get that way with the additions of a *star* or a *wreath* on his wings.

What has happened is that rather than continue to learn, rather than subject himself to checks by qualified instructors, he flies on his self-created reputation and depends upon the past to get him through the future.

"I was working on airplanes when you couldn't fix your kiddy-car," is a statement that has been heard in more than one hangar. If the mechanic who said it believes it, there is little doubt that he has hypnotized himself into believing that he knows so much he can do no wrong. He may have just acquired his stripes, or he may have serviced Jennies. Age doesn't have any monopoly on this belief in one's own infallibility.

History has pretty well demonstrated that the most successful method of ridding people of superstitions is by education or replacing wrong beliefs with intelligent faiths. A man has to have faith in his own ability, certainly in flying as much as in any other field of endeavor, if he is to progress. But what we have to do to be as aware of our ignorance as we are of our knowledge is keep our minds open all the time. The Air Force will never freeze itself to one certain airplane, flight procedure, or maintenance technique, so no man can be allowed to call a halt to his learning.

You probably met a man at one time who told you he had forgotten more about flying than you would ever learn. There is a good chance that his name is now on page one of a Form 14. His blind trust in the number of hours logged on Forms 5 just isn't powerful enough medicine to keep his name off an accident report.

A universal characteristic of really great men in all fields of endeavor, including aviation, is an undying curiosity about what they do not know and an humble realization of their own shortcomings. The more a really smart man knows about a subject the more he realizes there is for him to learn.

If you laugh at the idea of three on a match being unlucky you can't help but know that any idea of your own personal infallibility is a superstition with even less basis, and one with infinitely graver consequences.

THE INSTRUMENT STORY

THE FOLLOWING story pertains to the development of instrument flying and consequently mirrors the progress in one category of aviation that has done much to raise the standards of safe flight. It is a recognized fact that progress in any field of endeavor can usually be credited to a handful of people whose insatiable desire for more knowledge is the cause of the experimentation that initiates progress. This, then, is in part the story of the pioneers of "blind flight." It is hoped that through this narrative of the growth of instrument flight, others may be stimulated with the yearning for more knowledge that will make tomorrow's instrument flight even better.

The instrument story will be published in three installments. It will not go into minute detail because of space limitations, and for the same reason many names of those responsible for advancement will not be mentioned. The few names mentioned serve as a representative cross-section of those who furthered the cause of instrument flight.

A few acknowledgments are in order: to Col. Henry O. Bordelon for the idea of the story and much useful information; to Dr. Edward O. Purtee whose monograph on the development of instruments provided much background information; and to numerous people at AMC whose help in securing information made the story possible.

Part I—The Early Era

The earliest known instrument to be adapted for aerial use was the mercurial barometer, for measuring altitude, soon after the invention of the free balloon about 1783. This is farther back than it is necessary for us to go, but the fact will serve at least to give some idea of the earliest development of aviation instruments.

To get closer to home, let us go back to the Wright Brothers' first flight at Kittyhawk. On the morning that Wilbur Wright first lifted his plane into the wild blue the weather was clear with a slight wind, and the craft flew 120 feet in 12 seconds. To the modern instrument pilot, that 12-second, 120-foot flight in clear weather would be a drop in the bucket. But by using the same modern-trained instrument pilot and by changing several factors in the test, the picture will take on an altogether different aspect.

First, Wilbur Wright had no navigation instruments on his plane, so let's take them away from our pilot. Secondly, Mr. Wright flew in clear weather, but we shall confront our pilot with ceiling and visibility zero. Now, under these conditions, let's place our pilot 12 seconds from touchdown at Tempelhoff in the midst of "Operations Vittles." Put yourself in the same position; 12 seconds from touchdown, ceiling and visibility zero, no GCA, radio, altimeter, turn-and-bank indicator, gyro-horizon or compass, at one of the busiest airports in the world. How would you like to attempt that landing?

Granted that the above is an extreme example, but it should serve to stimulate a few thoughts much like the ones that some of the early pilots found troubling their curiosity with regards to flying in weather. Such thoughts as these prompted the application of a time-worn equation to the mysteries of instrument flight—man confronted with an obstacle that blocks his progress plus his craving for a knowledge of how to overcome that obstacle equals experimentation and progress. The majority of the pilots in the early era were content to sit out the weather on the ground, but not so the handful whose curiosity had gotten the better of them. To those men, today's safe instrument flight standards are a tribute.

The Wright Brothers' prime interest was in getting their airplane off the ground, and navigation instruments were the least of their worries. However, as soon as the commercial and military advantages of the airplane were realized it became evident to some that airplanes would have to be flown in all types of weather.

Early air navigation instruments were copied to a considerable degree from marine navigation instruments. This belief was expressed in a report, "Aeronautical Instruments," made by NACA shortly after World War I. The report stated that: "The methods of marine and aerial navigation are fundamentally the same and the development of the latter (up to 1922) has involved no new general principles. But differences in the conditions encountered on the ocean and in the air, and the widely different characteristics of the crafts involved in the two cases have necessitated the modifications of the methods and instruments used in marine navigation, as well as the development of special instruments to meet the requirements of aeronautics." The NACA report went on to state that prior to World War I little research or development had been done in a real scientific sense in regards to the field of aerial navigation, and that the progress achieved in that field during the war was stimulated primarily from interest in long-range bombing.

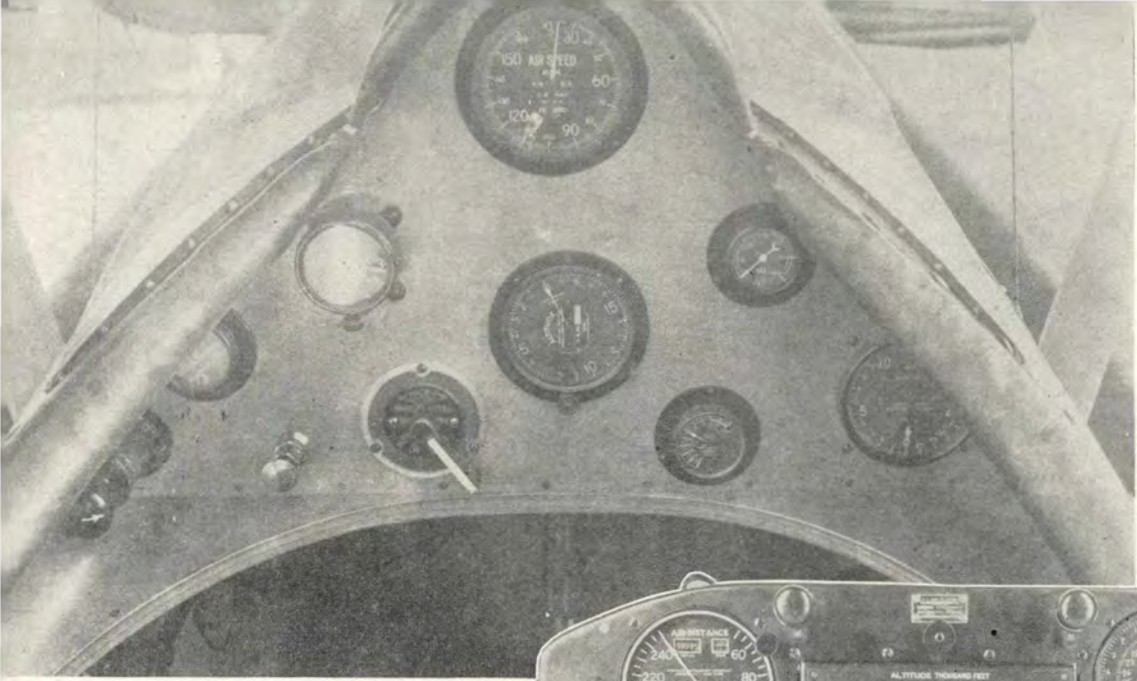
Little information is available concerning the small amount of instrument development in the U.S. prior to the first war. It is known, however, that Specification No. 27031 issued in September of 1917 by the Signal Corps required that all airplanes except trainers be equipped with the following instruments: airspeed indicator, aneroid altimeter, and magnetic compass, plus an air pressure gage, oil pressure gage, gasoline level gage, radiator water thermometer, tachometer, and clock. However, most of these instruments were either of European origin or American copies of the same. This was due largely to the fact that European air forces had been involved in the war since a much earlier date and therefore had instituted accelerated instrument development programs.

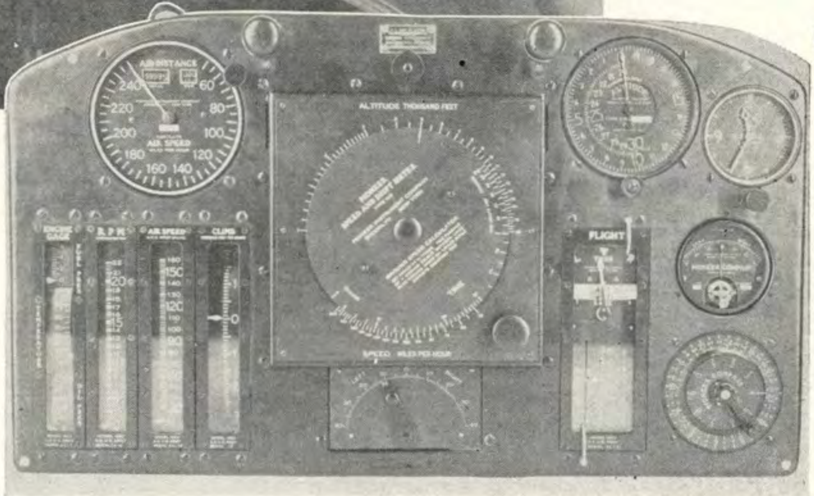
The first major step made towards development of aircraft instruments by the U.S. Army came in the summer of 1920 with the establishment of a Navigation Branch as a part of the Air Service's Engineering Division at McCook Field. It was here that many of the knowledge-thirsty men, whose work did so much for the progress of instrument flight, gathered. A glance through the old test pilot log books kept by the section reads like a list of Air Service pioneers: Hagenburger, Doolittle, Lumm, Lucky, Crane, Fairchild, Nelson, Street, Eubank, and others well known in the fields of commerical and military aviation are written there.

One such man was the late Col. William Ocker, Air Corps. Although he is not generally known through his connection with the Navigation Branch, his work with instrument flight was known by some who worked there. The extent of Colonel Ocker's work serves as a good example of unceasing effort put forth by men who do so much to further the cause of progress. Bill Ocker first started flying in 1912 in the early Wright pusher airplanes and immediately became interested in the possibilities of instrument flight. However, it was not until the mid-twenties that he started to expound some of his ideas to the service. It came about as follows.

In 1926 Colonel Ocker went to take a semi-annual physical examination for flying. Major David Meyer, Flight Surgeon, showed him a trick that proved that when blindfolded and turned around in a chair once or twice, pilots didn't know whether they were in a right or left turn. Ocker had previously fastened Sperry's turn-and-bank indicator (developed in the early twenties) to the center section of the old DH-4 airplane strut, but could not explain the difference between the turn-and-bank indicator and compass readings with his own sensations of turn. After taking this chair test, he returned later and took it again. This time,

Instrument panel of Lindbergh's "Spirit of St. Louis"





(Above) Instrument panel in Vought VE-7 airplane about 1918. (Right) Pioneer instrument panel of 1924. Note drift meter (center) and vertical instruments.

Pilot of this JN4-I flew into heavy fog, lost his bearings because of inadequate "blind flight" training and equipment, and in attempting to spiral down struck the trees at the edge of the field and crashed.

Unable to cross a mountain range closed in by low clouds and mist because he was insufficiently schooled and equipped for instrument flight, the pilot of the P-12-C above was forced to land in a valley and crashed.

holding the turn-and-bank indicator in his lap and watching the indicator, he was able to tell in which direction he was turning.

Later, Meyer and Ocker caused so much interest, and so much annoyance, while testing all the army pilots in California, that they were transferred to Brooks Field, Texas.

In 1927, Colonel Ocker and Col. Carl Crane, with whom Ocker had become acquainted through a mutual interest in instrument flight, combined their ideas and developed the first system of training in instrument flight.

About this time another aviator, Charles Lindbergh, who although not connected with the development of instruments can easily be classed as a pioneer in their use, dramatically demonstrated the worth of air navigation instruments. As we all know, he flew the Atlantic non-stop. But how many instruments did he have. Exactly five! His plane was equipped with the then newly-developed earth inductor compass, an inclinometer, turn-and-bank indicator, altimeter, and airspeed indicator, plus a tachometer, oil pressure gage, and an oil temperature gage. It is also interesting to remember that he had no forward vision, except for a small periscope. How many pilots today would be willing to make that same flight under the hood with just those few instruments?

The worth of air navigation instruments was further proved by Lieutenant Hagenburger's California to Hawaii flight. Of this flight, the Chief of the Materiel Division in his Annual Report made in 1928, said: "Several years' development in air navigation culminated in the test of navigation instruments and methods on June 29 and 30, 1927, when Lieutenant Hagenburger navigated the Air Corps' C-2 airplane from California to Hawaii. Flying at night and in clouds, this could have been accomplished only with the aid of the instruments developed by this Division (Materiel). The fact that he reached Hawaii demonstrates the utility of navigation equipment."

These examples represent just a few of the trials that went into the early development of instrument flight. They serve, however, to show how much the aviators and inventors of a few decades ago did with such little equipment, and the continual advancement they were making towards reaching today's point of instrument development.

Using the early thirties as the end of this initial period of development, let us sum up just how much advancement had been made towards "flying on the gages." Just how much progress had been made towards equipping the pilots and planes of the Army Air Corps with the knowledge and equipment necessary for safe instrument flight? This question has a paradoxical answer—quite a bit and yet not much.

Quite a bit. The number of flight and engine instruments available to the pilot had increased from seven, in the early twenties, to 11 or 12. The five primary navigation instruments (turn-and-bank indicator, rate-of-climb, airspeed indicator, altimeter, and compass) were installed in most all planes. Through the stimulation of competition in private enterprise, the Air Corps was receiving American-made instruments as good and in most cases better than those being made abroad. Vertical instruments had been eliminated and the dial form was standardized with 2¾-inch diameter for instruments and 1⅞ inches for gages. Blind flight, from takeoff to landing, had become a reality as proved by Jimmy Doolittle and his experiments at Mitchel Field. The worth of aerial navigation instruments in long-range flights had been successfully proven by Lindbergh, Hagenburger, and others. Through the efforts of Colonels Ocker and Crane an instrument flight course was added as a requisite to the flight training program at Kelly Field in 1931. Upon graduation from flight training each cadet was required to take four hours of instrument flight instruction.

And *yet not much.* Even though much progress had been made in instrument flight, the number of pilots with the thorough working knowledge of instruments enabling them to conduct safe flight remained small. A majority of the pilots were still content to wait the weather out on the ground and not much attempt was made to encourage them to do otherwise. Standardization problems became evident even in those early days. Because of the small number of instruments and the relatively spacious panels, not much attention was given to standard or efficient placement of instruments.

To this point the *quite a bit* seems to be far ahead of the *not very much.* However, what good were the fruits of all of the progress made by so few if the many could not be made to see its advantages. This broad aspect of the *not very much* was the serious deficiency. The doubters were soon to learn their lesson though, for the next couple of years were to bring an event that was to mark the beginning of the Transition or Awakening period.—*Sgt. E. P. Magaha.*

(Part II will describe the effect on instrument flying by the Air Corps' assignment of carrying the airmail, and developments in World War II.)

some guys are LUCKY

an

By a near miracle only one man died in the accidents pictured on these two pages. The accidents occurred on consecutive nights when the C-54's went below the minimum safe altitude on the final approach to the same field.

The instructor pilot of the branch-bedecked Skymaster on this page deliberately ordered the pilot in the left seat to go below the prescribed minimum safe altitude while making a night instrument approach. He lived to try to explain it and possibly face disciplinary action.

The plane was turned on final about eight miles out at 1200 feet. The tower reminded the pilot to remain above the minimum altitude of 600 feet until the station was reached.

With landing gear down, rpm at 2300, flaps 10 degrees and landing lights extended, the plane continued the instrument approach. At 600 feet the pilot leveled off. The instructor in the right seat could see lights below as the plane flew along through intermittent clouds at the bottom of the overcast. The plane was still six miles out when he instructed the pilot to let down to 500 feet in order to become completely contact.

While the instructor was looking outside the plane in an effort to pick up the runway funnel lights the plane began clipping the tree tops. The pilot instinctively pulled up. Power was advanced and the gear raised as the plane climbed up to 800 feet. The instructor called the tower and advised that the plane had struck trees but was still flying and that he wanted to crash-land on the runway.

The instructor, who had taken over when the plane hit the trees, let down quickly to 600 feet again. About one-fourth mile from the end of the runway the funnel lights were sighted and the plane lined up with the runway by steep turns left then right. The instructor returned the controls to the pilot in the left seat and lowered the gear. The pilot effected a good landing on the first part of the runway.

Braking action was effective on the landing roll, but the brakes had no effect as the plane was turned off the end of the runway. The instructor cut the engines and pulled the airbrake, but it failed to work also. The plane came to a stop after turning 180 degrees to the right.

The left wingtip light was broken, the left wingtip damaged, both landing lights were smashed and the leading edge of the wing was damaged. There were three fuel leaks in the leading edge of the left wing. Pine leaves and branches were crammed in the engine nacelles and oil cooler openings of number one and number two engines. The cowlings were bent and the propellers damaged. The right main gear and nose gear were sprung out of line and hydraulic lines to the brakes were ruptured and hanging loose. Radio antennas under the fuselage were torn loose.

That this plane was landed successfully in poor weather in its damaged condition seems little short of miraculous. Had the pilot been forced to go around, either or both of the left engines might have failed and fire might very well have broken out from the fuel leaks.

The very powerful urge to get contact as quickly as possible once the plane starts to break out below an overcast has killed many pilots. Violation of prescribed minimum safe approach altitudes under any conditions is a foolhardy act.

d some guys are NOT!

THE INSTRUCTOR pilot of the plane pictured on this page was not lucky. He's dead.

This flight had been conducted under VFR conditions, but it was a dark night with moon and stars obscured by a heavy overcast. To all practical purposes this approach like the one described on the opposite page was an instrument approach.

Throughout the flight the instructor pilot flew in the right seat. The trip proceeded uneventfully until the destination was reached. The instructor contacted the tower while turning on final approach, stating that the gear was down and checked, flaps were at 10 degrees and props at 2300 rpm. As the plane continued its descent the field was clearly in sight at all times, but the ground below could not be seen.

Upon reaching the minimum safe altitude of 600 feet the pilot carefully leveled off and maintained his altitude. Had he been allowed to continue a normal approach the accident would probably never have happened.

But the instructor chose this particular time to demonstrate a three-engine approach. He took over the controls for a moment telling the pilot he wanted to show him something. He reduced power on the number three engine, then handed the controls back to the pilot.

When the pilot took over he called out that he was losing airspeed and asked for more power. The instructor pushed the number three throttle forward again just as the plane crashed into the trees.

The instructor was killed in the crash. The engineer and student pilot escaped from the burning wreck through a hole in the fuselage. The student then went back into the plane to get the instructor out. He removed the instructor's body before the wreckage began to explode.

When he was interrogated after the crash the student pilot did not know the instructor had reduced power on one engine. The engineer had seen the instructor reduce the power and provided the accident investigators with the information. The engineer also stated the last time he noted the altimeter just before the crash it read between 500 and 600 feet.

Why the instructor picked a dark night on an approach where he knew the minimum safe approach altitude was established at a point with very little margin for error no one will ever know. A C-54 flying at 130 miles per hour with gear down and 10 degrees of flaps is flying at a relatively critical stage. Any reduction in power is almost certain to result in a momentary loss of altitude, and the pilot flying this plane was not even forewarned what to expect when the instructor took over and reduced power on one engine.

With more than half of all aircraft accidents in the entire Air Force occurring during approaches and landings, it is of critical importance that every pilot who flies devote his complete attention to the task at hand when negotiating a landing. Training in emergency procedures such as simulated engine loss should be practiced with safe altitude margins.

TEST FLIGHT

SOME PHASES of flying require more skill than others. Of these, test flying is one of the foremost.

Why is this so? Why is more skill required? What accounts for the possible increase of the danger potential of test flying over that of other phases of flying? The answer to these questions is probably best summarized in the following way:

During a flight test, the pilot assigned to test a new airplane or one with new equipment, such as newly installed engines, is working in part with machinery whose performance under certain conditions is unknown. However, the psychological influence of this unknown factor is in the favor of the test pilot. It should increase his safety potential by making him more careful. Since he does not know just what results to expect, he is more careful.

It is regrettable though that this is not always the case. It is a known fact that anyone in any profession who works continually with the same materials under much the same conditions is prone to become lax as times goes on.

A study of a recent test flight accident should serve to illustrate the dangers of becoming lax on a test flight.

A double engine change had just been accomplished on a C-82 and it was released for an engineering test hop after the ground run and inspection. The test pilot made an exterior and an interior inspection of the airplane and found no discrepancies. The airplane was given a ground check and found to be satisfactory.

During the initial takeoff roll, as the plane approached flying speed, and as the nosewheel cleared the ground, the left manifold pressure dropped eight inches. The takeoff was continued with no further drop in the manifold pressure. During the hour-long test flight each engine was feathered and unfeathered, and various settings of manifold pressure and rpm and fuel flow were checked. There were no indications of any engine malfunction.

After completing a landing, the pilot taxied back for another takeoff. The engines were power checked and performed satisfactorily. On the second takeoff the pilot purposely held the airplane on the ground until it reached an airspeed of 120 mph. This time, as the nosewheel cleared the ground the left manifold pressure, with throttles wide open, dropped 14 inches. The manifold pressure then fluctuated, dropped off, built up slightly, and then dropped between 20 and 25 inches. The pilot started to feather the engine.

At this time the airmen in the flight compartment descended into the cargo section and prepared themselves for an emergency landing. Meantime the co-pilot requested the tower to clear the field and notified them of their intentions to land on a certain runway.

As the airplane was banked to the left, the right engine manifold dropped to 30 inches with the throttle in the wide open position. Their altitude at this time was between 300 and 400 feet and the airspeed was 100 mph. The pilot then proceeded to reduce the power on the right engine and crash landed in a corn field. The touchdown was smooth and after sliding about 300 feet, the airplane approached a seven- or eight-foot embankment. Because of the contour of the nose of the aircraft and embankment, the airplane hurdled it and crashed in the adjacent field.

Results of the crash were one airplane totally wrecked, four of the seven personnel aboard killed, and two seriously injured. The one remaining escaped with minor injuries.

All aspects of the crash point to some sort of materiel failure as the immediate cause of the accident. However, a thorough investigation of all parts of the airplane, engines and accessories not too badly damaged by the crash failed to reveal deficient materiel. The left engine, the first one that lost power, was not severely damaged in the crash. Subsequent examination revealed no malfunction or materiel failure. Another point of interest is the fact that both engines had been in storage for three years prior to their installation on the airplane. During the resultant investigation, many theories were advanced as to the cause of the engine failure, but no definite conclusion was reached.

The second factor to be considered in the crash is the personnel involved. An extra pilot, the squadron operations officer, went along for the express purpose of logging time for proficiency. He sat in the right seat. Test flights are serious business with lives and valuable equipment at stake. They should be conducted only with highly qualified personnel at the controls. Only pilots who meet the requirements of AF Manual 35-1 as flight test maintenance pilots should occupy the pilot's, and where applicable, the copilot's seat. Also, it would have been in order to authorize another test flight to check operation of other equipment rather than needlessly risk the lives of the radio specialist, assistant crew chief, and electrical maintenance man. A pilot, copilot, and crew chief were all that were necessary to conduct that initial test flight.

Technical Order O1-1-300, concerning test flights, states that test flights will be conducted with the minimum air crew necessary to insure the completion of the flight, but in no case will air crew personnel be fewer than specified in AF Regulation 55-5.

This is a case where one of the many talked of regulations could have saved the needless loss of lives and a wrecked airplane. When the pilot first took the plane up he noted the loss of manifold pressure on the takeoff. However, the engine continued to function properly and he was able to complete the one-hour test flight and bring the plane back to the field.

But he didn't stop there. He was conscientious about his job. He wanted to make sure that the plane was safe for others to fly. So he took the plane up for one more short check.

Technical Order O1-1-300 states that the initial test flight will be of one hour's duration. If during this flight any defects or malfunctions are noted, the plane will be landed and corrective action will be taken, and the airplane will THEN be test flown for such additional time as is necessary to determine if measures taken are effective. Needless to say, failure to comply with this tech order didn't cause the plane to crash, but had it been complied with the pilot would probably be alive today to fly again.

So goes the story of one test flight and its resultant crash. What lessons can be learned from it? The story poses three main points: (1) That the test flight, compared with some other phases of flying, requires a higher degree of skill and intelligence. (2) Only the most highly qualified personnel should be selected for the job; and (3) it points out only too well that TO's and regulations were designed to prevent needless loss of lives and equipment.

CLOUDSTROPHOBIA

FOR LACK of pilot proficiency, for failure to heed advice and for ignoring aircraft operating restrictions, two Air Force senior officers were killed and five passengers were severely injured.

A pilot cleared himself at night and took off in a C-45 with a total of seven persons aboard. He estimated one hour and 30 minutes en route to his home base, and filed VFR. At the time of his departure the weather was VFR with an overcast sloping downwards from 8000 feet at his departure point to 3000 feet at his destination. His destination was forecasting 1500 feet and two miles visibility, with freezing rain in two hours.

After an hour and 20 minutes of flight, the airways station near his destination called the pilot and informed him that the field he was going to had dropped below VFR minimums, and they suggested that he change to IFR. Flight Service suggested that he use his departure point as an alternate. The pilot stated that he wanted to remain VFR and if he decided to change to IFR he would call them back. However, no more contacts were made with the airways station.

The exact point where the pilot encountered instrument weather is not known. For all practical purposes the pilot was probably on instruments as soon as he encountered rain. Rain on a C-45 windshield at night normally reduces forward visibility to the point where instrument flying is mandatory. In any event, a statement by the crew chief that the first part of the flight was made at 7000 feet, and a Flight Service advisory of 3000-foot ceilings indicate that the pilot was unable to maintain visual contact with the ground at that altitude. Although the pilot had been given an advisory to the effect that he might encounter freezing rain, he continued to fly into the area and without obtaining an instrument clearance went on instruments in an area where he should have known instrument traffic existed.

When he neared his destination, he let down to 2300 feet and found that he was not contact. So he called approach control for GCA assistance at a base a few miles from his original destination. This gave traffic control quite a start because they had planes in the stack, and one plane was holding at the altitude at which the C-45 pilot reported.

To avert a collision, the approach controller instructed the pilot to descend immediately to 1500 feet before questioning him about his flight plan.

The C-45 was identified on the approach control radar set about three miles east of the field and in position for a GCA downwind leg. Approach control directed a pattern for the pilot and instructed him to switch to GCA.

The GCA final controller had radar and verbal contact with the airplane, but was unable to get the pilot to descend below 150 feet above the glide path, so he instructed the pilot to pull up and go around. The airplane passed over the end of the runway at an altitude of 150 feet.

After a second unsuccessful pass at the field, the air traffic control center became alarmed and advised the approach controller that if the plane did not make it on the third run, he should attempt to get the pilot to leave the GCA pattern and fly to an alternate field which had VFR weather.

The controller who directed the pattern for this airplane stated that the pilot took corrections very poorly in that corrections were not started soon enough and that some turns were started, stopped and then continued. Instructions often had to be repeated as many as three times. For this reason, he turned the plane on final further out each time, eight miles out on the second and 12 on the third,

to give the pilot more time for corrections while on final. Radio contact was satisfactory, but the manner in which the pilot complied with instructions did not indicate a high degree of proficiency.

On the third attempt, the plane was on the glide path until five miles out, at which time it went 200 feet above. The pilot was instructed to increase the rate of descent to 700 feet per minute, and at three miles out the plane was 75 feet above the glide path. The pilot was then instructed to decrease his rate of descent to 500 feet per minute. At two and one-quarter miles the plane was slightly above the glide path when it started to lose altitude. Instructions were given to decrease the rate of descent to 400 feet per minute, but no correction was noted and instructions were given to decrease to 300 feet per minute. No correction was noted and the pilot was instructed to level off at 30 feet below the glide path. At 50 feet below the glide path the pilot was instructed to pull up. This transmission was repeated several times. The first pull-up instruction was given just after the airplane came inside the two-mile point, but it descended rapidly until it disappeared from the scope at one and one-half miles out. The airplane crashed one mile off the end of the runway.

The right wing was sheared by trees, and contact with the ground sheared both engines and demolished the plane. Both pilots were killed, and the engineer and four passengers received major injuries.

GCA operators had been landing planes with no difficulty before the C-45 crashed, and continued bringing planes in after the crash.

With seven persons aboard, the airplane was overloaded by approximately 130 pounds at takeoff. There was no seat or safety belt for the engineer and he sat on baggage in the rear of the passenger compartment. A nose tank was not installed in the airplane and no baggage or ballast was carried in that compartment. The center of gravity was within 1.2% of the rearward maximum allowable, and the weight at the time of the crash was 200 pounds over the recommended maximum landing weight.

There are two possible causes of the crash:

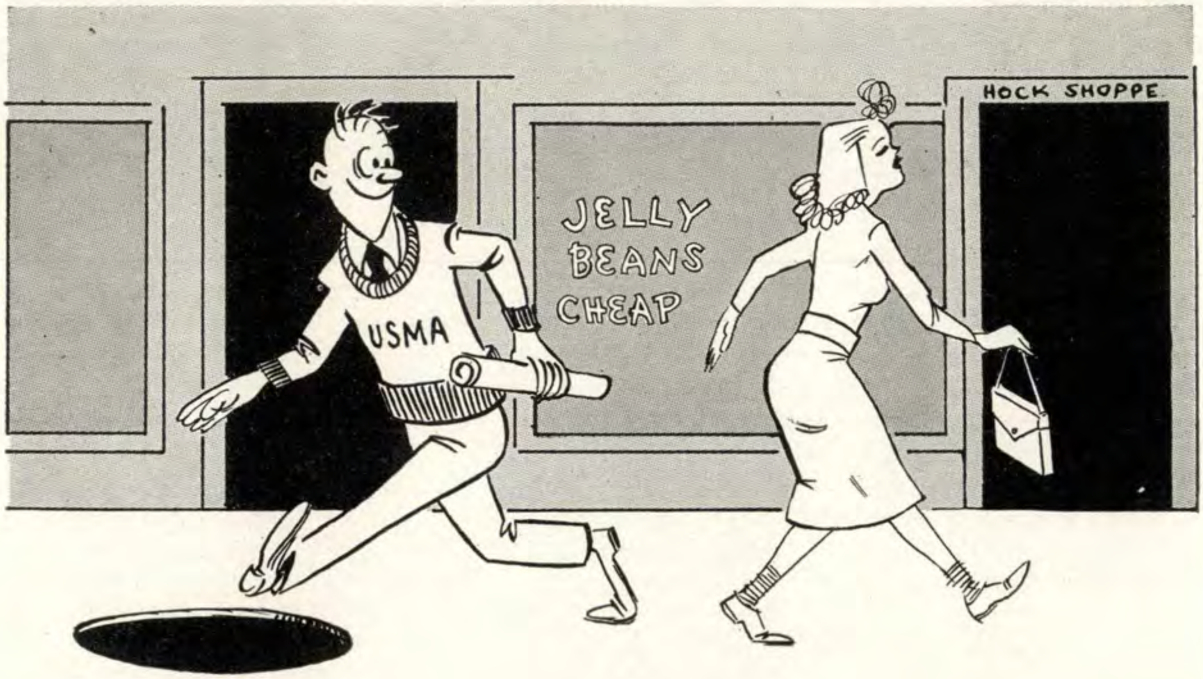
(1) Stall and loss of control, or

(2) The pilot may have become very anxious to land on the third attempt, became determined not to stay above the glide path as in his previous runs and dived the airplane, or saw lights on the ground and attempted to take over visually and flew too low.

The pilot did not have an instrument rating. Under present regulations it is not required of command pilots. He had logged three hours of weather time and seven hours 40 minutes of hood time in the seven months prior to his last flight. He had only one GCA approach recorded in his Form 5, and that had been made 22 months previously. The copilot was a senior pilot with a valid white instrument card.

This pilot showed definite symptoms of "cloud-strophobia." He displayed poor technique and unfamiliarity with procedures during the period that he was under GCA control. He violated applicable technical orders by allowing the airplane to be loaded with the total weight and distribution that existed during this flight. He disregarded Air Force regulations by having more occupants in the airplane than safety belts installed, and by flying into weather below VFR minimums while on a VFR clearance. These actions created a hazard to himself, the occupants of his airplane, and to other aircraft in the area.

DON'T FALL IN AN OPEN MANHOLE



By COL. EMMETT B. CASSADY
C. O., 3565th Basic Pilot Training Group
Waco AFB, Texas

FLYING SAFETY is a matter of grave concern to all echelons of command. We have directives from everybody to carry out the mission of saving lives, materials and money. We, the people who actually fly the planes, can best reduce loss of life and save our hard-to-replace materials and diminishing funds with which we have to operate.

In our approach to the subject of being safety conscious, we go back to antiquity. Accidents have been with us ever since we have had aircraft. We had accidents even before that. The first was that of Icarus, who, with his father, Daedalus, in flight over the Aegean Sea, fell into the sea when the sun melted the wax that fastened his wings. Thus Greek mythology records the first statistical aircraft accident report. Incidentally this is the first recorded death as a result of violating flying regulations!

Accidents have increased with the tempo of the times. As it increases, we hurry, hurry, hurry. Haste makes accidents. Losses in lives correspond to lack of knowledge of the fundamentals in the art of flying. As advances in knowledge are made, there will be a new high in safety in flight, but we will still have accidents. Few are attributable to mechanical failure. Let us explore now, what I believe is one principal reason for accidents. I call that *preoccupation.* It has been called many things—heads up and locked, and many other expressions originating on the flight line. It's the thing that lets a man walk down the street and fall in the open manhole because he is not paying attention to what he is doing. Many accidents may properly be attributed to *preoccupation.* Let us see what the dictionary says about it: "*Preoccupation*—the act of occupying before others, or the state of being or having a prior occupant." Another definition under *preoccupy* is—" engrossed in thought or business; abstracted."

We have all heard of the absent-minded professor. He should properly be called the "Preoccupied" Professor. No man in his sane mind is at all times free of preoccupation. I once knew a fellow who was a very brilliant geophysicist. He spent all of his time figuring out a better way to locate oil under the earth's surface. One day he was riding home with his wife, who was driving about 40 miles per hour, when he opened the door and stepped out. He was preoccupied.

How does that affect a pilot? I'll tell you an incident that happened to me. I took off in a T-6. I had told my wife I would be home for dinner, but I was delayed and was going to be late. Every officer who is married and due home at six o'clock knows what I am talking about. I was thinking about the chewing I would get when I got home. I climbed to 4000 and leveled off right in front of a C-54. I missed it about 10 feet. I will tell you I was not thinking about flying. I was thinking about the chewing at home. I was preoccupied.

I believe there are three broad groups of preoccupied people. Of course there can be many shades and variations or combinations of these.

The first category is the average, *normally preoccupied man.* Things are quite normal with him. He is happy in his work. He is happy at home. He may be married, and is out of debt. He takes care of himself and his family, and sees that everything is properly taken care of. He is punctual. He doesn't have to worry about his job because he knows it as well as the next fellow. He is an average man.

We come to the next fellow, the *sub-normally preoccupied man.* He believes he is the best in anything he attempts. I am sure you all know someone who is like him. In an airplane, he believes he is the best. He makes a statement and it is correct. He thinks only of himself, and strangely to say, he has few accidents. He knows he is good, and sees to it that he stays that way. He thinks he is the best and anything less will not suffice. He is a good pilot, and will probably live to be an old man. He is rarely ever occupied with anything but his flying when he is flying. But, he thinks about himself rather than about the other fellow, and is so conceited and thoughtless of others he may be a pain in the neck to everybody else who flies.

The third fellow is the individual who gives a lot of trouble. This individual can be any of us. He is the *extremely preoccupied man.* In the first place, we will say that he is unhappy over his assignment. He doesn't like what he is doing. Maybe he wants to be a doctor or a lawyer and doesn't know why he is where he is, but he is here. Maybe he doesn't get along with his wife. He may be in debt. That is your best bet. Show me a man who is in debt, that is, if he is in trouble, and I will show you a preoccupied man. It doesn't necessarily need to be any of these. It may be sickness at home. Maybe he takes care of his family. Whether it is a personal matter or something which affects him in an impersonal manner makes no difference. He has something on his mind that he carries with him. It is first in his thoughts—his debts, trouble with his wife, his work. That is the thing to be careful of. *I believe this extremely preoccupied person is the principal source of accidents.*

I believe if we, as individuals, spent less time being preoccupied, we would live longer, save materials, do a better job, and make the Air Force the kind we want it to be. If each one of us participates in this suggestion that we avoid preoccupation, it will do much to insure that you live to stay in 30 years, enjoy a good life, travel to interesting places, have a decent place to live and maybe get to be a general. Avoid preoccupation. Preoccupation can happen to an aviation cadet or a command pilot. Each has something on his mind. What is it and to what extent does it affect your flying? Give yourself a little analysis. Take a gander at the mirror. See what you observe. Maybe you won't like it. Go beyond the first, second or third layers of skin. Think about what is in your cranium.

If you find that you're inclined to preoccupation make a definite decision to start fighting the causes at once. Get a hold on yourself and lick your bad habits and personal problems so that your mind will be clear for the job of flying. Then you won't sit and twaddle your thumbs and fly into a mountain because you're too preoccupied to watch your altitude. You won't make a beautiful pattern and land wheels up because your mind is not entirely on the job at hand.

JUNGLE SURVIVAL

◄◄ Thatched lean-to's can be made into adequate rainproof shelters. Injured personnel should receive careful attention and extra rations of food and water.

Trimming edges of palm frond stalks will prevent dangerous cuts from sharp edges. Young green inside palm shoots can be split and used for thongs or ties. They can be tied just like cords. ►►

THE RAUCOUS crying of an unseen jungle bird rasped across the brooding, heat-ridden silence of the little clearing where the wrecked C-47 rested. The left wing of the plane was gone, buried a hundred yards back down the crash path in a tangled green mass of shattered palmettos and dwarf pines. The fuselage was intact except where the tail section had broken off a yard behind the exit door, and the smashed right wing was a twisted silver shaft standing in the sea of green that was the jungle.

It was the wing reflecting sunlight above the undergrowth that a helicopter pilot had spotted late the second day of the search.

The tech sergeant commanding the four-man para-rescue team which was busy folding up parachutes and unpacking the supply chute pack walked to the center of the clearing with a walkie-talkie. "Okay, captain, we're in; all OK!" he advised the C-47 pilot circling 800 feet above the wreck. "Thanks for the lift."

It was noon the following day, the fourth day after the crash, when the rescue party reached the three survivors, after following their trail away from the wreckage. The copilot had a high fever resulting from infection of a compound fracture of his right arm. The pilot and crew chief had not been injured in the crash landing, but both men were almost delirious from insect bites, fear and exhaustion.

Had the Air Rescue Service para-rescue crew not found them, the three would have perished, principally as a result of ignorance.

Unfortunately the ignorance of jungle and swamp survival displayed by this crew is widespread in the Air Force. Although many flights are made every day over areas in the United States and in other parts of the world where knowledge of jungle survival could mean life or death in the event of a bailout or crash landing, too few air crewmen possess even a minimum know-how of jungle survival. If you ever expect to fly over tropical jungles or over the desolate swamp, everglades or jungle-like areas of the Gulf Coast and Southern Atlantic states, knowledge of how to stay alive in the jungle until help comes is insurance you can ill afford to be without.

In any jungle area you have two great enemies to fight and three necessities of life to acquire. Your enemies are fear and insects. Of these, fear is the greater foe. The three necessities of life, of course, are water, shelter and food.

The jungle survival experts of the 5th Rescue Squadron, Air Rescue Service at MacDill AFB, Florida have found in rescuing downed airmen that fear brought on by ignorance is the worst hazard jungle crash survivors have to face.

Once down in the jungle or swamp, your first move should be to launch an all-out attack against your primary enemy—fear. The way to do this is to make a calm evaluation of your hazards. To begin with, you have gone down in the type of wilderness in which you have the very best chance of survival. In the desert or in the arctic, your three necessities for survival—water, shelter and food—are at best difficult to obtain. In the jungle there is an abundance of water, food, and material with which to make shelter.

You will have animals, reptiles and insects to combat. In that combat, as strange as it may sound, you will be the aggressor except against the insects.

In the United States or in any area where you are forced down in the jungle, large animals are seldom a subject for worry. There are practically none in this country, and in the wildest South American, African or Pacific jungles large animals will be more afraid of you than you of them. It is not likely that you will even see any. Smaller animals you will actively seek for food. Any animal bearing hair or fur is edible.

Reptiles are even less of a problem. The ARS Survival School instructors state flatly that you are more likely to be struck by lightning at home than to be bitten by a snake in the jungle, provided you look where you're going in the jungle and don't poke around likely snake shelter with your bare hands. All reptiles including alligators and snakes are edible and, cooked properly, even delicious.

In evaluating your situation, remember that fears you may have of animals or snakes are probably the result of movies you have seen and stories you have read. They were meant to scare or horrify you, not to give you a true picture of the jungle.

The danger from insects, on the other hand, is very real. Flies, gnats, mosquitoes and other insects can be annoying to the extent of upsetting you emotionally in a very short time, and can actually drive you into frantic distraction if they are not properly combatted. Also, they carry malaria and other diseases.

To protect yourself from insects, keep all your clothes on and wrap your ankles with parachute material so no skin is exposed between your trousers and shoes. Parachute silk can be fashioned into protective hoods to be worn over head and neck. Use repellent if you have it.

The primary rule of crash survival in the United States is stay with the plane. If you bail out, get to the plane if you can. Unless you are absolutely certain of your position and the exact course to take to get to known help, obey this rule. Stay with the plane. The military flight system and air rescue facilities are almost positive assurance that you will be found if you stay with your plane. In vast wildernesses elsewhere in the world, stay with your plane at least until you are certain you will not be found.

One of the first things to do when you go down in the jungle is make preparations to signal search planes. Get out your signal mirror or improvise one from metal. Build three piles of brush a hundred feet or so apart and have them ready to ignite day or night. Have green material and oil handy to make dense white or black smoke if you see or hear a plane in the day time.

Next, be certain you have shelter from mosquitoes before nightfall. The fuselage of your plane is the easiest shelter to make mosquito-proof. A single thickness of parachute silk placed over hatches and openings will make the shelter a suitable retreat from mosquitoes.

If you cannot use the plane you can build a lean-to framework and thatch from the bottom up with leaves, branches or grass, shingle fashion to build a waterproof shelter. Again parachute silk over the door will keep out mosquitoes. You can also make a tent or lean-to with a parachute as the cover.

Build a sleeping platform off the ground or improvise a hammock with your parachute. Whatever your shelter, once you are in it for the night


Delicatessen jungle style. All reptiles are good sources of food but should be skinned and boiled or roasted.


Palm cabbage taken from heart of a palm (below) is a good source of vegetable food, cooked or raw.

try to kill all the mosquitoes inside before you go to sleep. It will pay off in restful sleep.

In selecting a site for your shelter, take into consideration possible rising water, the danger of landslides in mountainous jungle and the possibility of a storm sending large dead limbs or trees crashing down upon you. Camp in the center of an open area on a slight rise of ground if you can. Be careful not to build your shelter in a game trail or near an ant bed. Game trails are the main streets of the jungle and traffic might be heavy.

Once your shelter and signaling preparations are complete, water and food should be further considered. Water is usually no problem since the jungles are full of streams, sloughs and marshes and, usually, pools of rainwater. Be sure to boil your water or treat it with halazone tablets from your first aid kits. Iodine may also be used as a purifier although it does not kill all types of bacteria.

Food in the form of animals, reptiles and vegetation is plentiful in the jungle. You can eat birds, rats, bats, snakes, alligators, crocodiles, lizards, frogs, turtles and terrapins. Bats are a delicacy, but before you skin them be sure to let them lie awhile so the vermin will crawl off. Grubs and grasshoppers are actually delicious roasted. Pinch off the heads and legs of grubs and the wings and legs of grasshoppers before cooking. You can usually find grubs in rotten stumps and under logs and rocks. Sound pretty bad? Forget any prejudices you have about what to eat. Your life is at stake!

Edible vegetation includes succulents (any young tender sprout or shoot), flowers, ferns, bamboo shoots and palm cabbage, and others. There is a cardinal rule to follow in eating vegetation. Don't eat plants that taste bitter or soapy or burn your mouth. Except for cocoanuts, don't eat plants with milky sap or discolored juices.

All flowers are good to eat and a mixture will taste like green salad. The curling tips of "fiddleheads" of ferns taste like collard greens when cooked. Palm cabbage is obtained by cutting to the heart of a palm below the leaf cluster. Raw, it tastes like almonds and cooked, like cabbage. It is delicious either way. In jungles outside the United States you can eat any fruit you see a monkey eat. Be sure you actually see a monkey eat the fruit and not just play with it. This test does not apply to fruits and berries you see birds eating.

Beans, bulbs and fungi are generally poisonous and should be avoided. Even cultivated beans become poisonous if left uncultivated for a few seasons. Many types of roots such as yucca plant roots are edible. Remember to apply the cardinal rule—test plants for bitter or soapy taste or discolored juices.

Your primary method of cooking should be boiling. Skin your reptiles and animals and cut into small pieces. Drop into cold water and bring to boil. Let cook several minutes, then set aside to cool. This procedure will insure cooking but will not overcook. You can roast meat on a forked stick or bake it in coals also. Eat raw meat only as a last resort.

If you are near water containing fish, you can catch them with improvised hooks, spears or parachutes stretched across a stream. Cook all fresh water fish. Salt water fish may be eaten raw safely. Beware of fish which have spines or hair, which have bony, irregular mouths with no definite teeth, or which inflate themselves with water or air. They are poisonous. If you have any idea of chewing raw fish for water, forget it. You will get not one iota of water by chewing raw fish.

In all your activities take it easy. Remember your primary job is to kill time as comfortably as possible until help arrives.

Be sure you read the tiny booklet in the pocket of your parachute on emergency uses of the parachute and its pack.

When asked what precautions he would never fail to make if he were flying across a jungle area, the first survival expert of the ARS Survival School listed these: "Wear shoes I could walk home in, carry a good two-bladed pocket knife, carry matches in a waterproof container." Those things any man can do without inconvenience before any flight over the jungle.

The most useful single tool in the jungle is a machete. Keep one in your kit if you fly a jungle route regularly.

If you go down in a jungle area, remember the most common fatal mistakes of jungle crash survivors and do not commit them. Don't let fear get the best of you. Evaluate your situation calmly and remember that you are down in the best possible type of wilderness. Get signals ready at once. Do not wander blindly about but work with a purpose—to be as comfortable as possible until help comes. Take it easy all the time and take care of your body. Keep in mind that help is on the way and it is simply a matter of time until you will be out of the jungle again, proud of the experience you have survived.—*1st Lt. Hal J. Basham.*

Shelters can be built from whatever jungle growth is at hand. Poles can be lashed together with vines or other plant fibre.

All fur or hair bearing animals are excellent food sources. Catch with snares or kill with clubs.

TAKEOFF PROBLEM

One of the problems of military flying today which vitally affects the performance, utility and efficiency of the USAF is the simple takeoff.

The trend in the past has been toward a continual increase in the length of runways to insure getting off the ground, but contrary to popular opinion, runway extension in itself does not necessarily provide a solution to the takeoff problem.

Increased runway lengths have been necessitated by the constant effort to attain maximum possible speed, range and payload of new military airplanes. Also, to get more range and payload, the gross weights of existing aircraft have been increased with a comparable requirement for longer runways.

Complications to the problem are the wide variation of characteristics of individual airplanes, different types of missions, variations of temperature and field elevation and the advent of the jet power plant.

Because the thrust of a turbojet engine is directly related to air density, it is essential that both temperature and elevation of the field be considered in the takeoff.

As an indication of the relationship of temperature and altitude, the following combinations of temperatures and elevations represent the same air density:

Sea level	100° F.
1000 feet	80° F.
2000 feet	60° F.
3000 feet	42° F.
4000 feet	25° F.

According to Air Force specifications, the thrust ratings for turbojet engines are guaranteed for an NACA Standard Day, that is, at 59° F. at 29.92 barometer pressure at sea level. Theoretically, the thrust of a turbojet engine should exceed the guaranteed ratings at air densities greater than that of an NACA Standard Day.

While the thrust ratings of a turbojet engine are limited by the use of automatic controls, it is not considered USAF policy to limit the thrust ratings for an NACA Standard Day. However, when the air density is less than that of an NACA Standard Day due to various barometric pressure, temperature, and altitude combinations, it is not possible to attain the guaranteed ratings of the engine. The following approximate relationships indicate the effect that temperature and altitude have on the thrust output of a turbojet engine.

Temperature	*Sea level*	*5000 feet*
59° F.	Rated thrust	20% decrease
80° F.	8% decrease	28% decrease
100° F.	14% decrease	34% decrease
120° F.	18% decrease	(Better not try it)

From a study of airfields, both continental and abroad, it has been found that the majority are at elevations of 0 to 1500 feet. Thus, it is evident that temperature is the most common factor in affecting the air density at a majority of airfields. And, unfortunately, high temperatures which affect the rated thrust of turbojet engines are sometimes accompanied by barometric pressures less than standard, thus compounding the effect on the thrust not available from a turbojet engine.

If you have a high field combined with high temperature, here is how these factors can gang up on a pilot.

The pilot of an F-80 was taking off from a field 4000 feet higher than his home station. Temperature was 94° F. and headwind was only two mph (headwind is always a factor to be considered).

He finally got the F-80 into the air after using up 8000 feet of runway but mushed into the ground 100 feet from the end of the runway. He bounced back into the air and continued flying. Airspeed was 150 to 160 mph at the time.

Then he encountered a gradual rise in terrain and cut through a power line on top of a hill. Luckily, he got back to the field safely after having learned his lesson the hard way.

It is well to keep in mind that the takeoff distances can vary greatly even though pilot, airplane and gross weight remain the same. It is dangerous to become a creature of habit on takeoffs. A pilot who is used to becoming airborne after a certain time and distance might attempt to abort his takeoff from a field that is far above sea level if he does not become airborne after this same time and distance. This may result in damage to the aircraft, blown out tires, noseups at ends of runways, groundloops, etc.

Consequently, the best attack is the positive one where you know beforehand from a check of altimeter, thermometer temperature and runway condition approximately the distance you'll require. Then you shouldn't have to make the decision to abort unless, of course, some other unexpected or unknown factor suddenly enters the picture.

Air Materiel Command is attempting to help pilots solve their takeoff problems through several methods. One of these, of course, is extension of runways. A good criterion of increasing runway length five per cent for each 1000 feet of field elevation should be adhered to for field elevations above 3000 feet.

If other than rigid pavements are to be used, the lengths should be increased in accordance with the characteristic *change* of rolling resistance as compared with rigid pavement. On an unpaved runway you should figure to use 150 per cent of the length established for rigid pavement runways.

Also, the relation of the established ground-run to the established runway length should be such as to provide a 25 per cent margin for variation in aircraft, engines, and pilot technique.

Another factor to be considered in the takeoff problem is the minimum climb-out angle. This should be an added requirement to that of takeoff ground-run. It is usually defined as the length required to clear a 50-foot obstacle but will vary for pilots with individual problems.

Regardless of the length of the runways, it will be impossible to take off some high-performance aircraft under adverse temperature and altitude conditions without some means of assistance.

Rocket assist is one method of insuring a shorter takeoff and clearance of obstacles. Afterburning offers another method on jets. This is the installation of a tailpipe burner. The increased temperature of the gases in the tailpipe burner results in an increased jet velocity and therefore greater thrust.

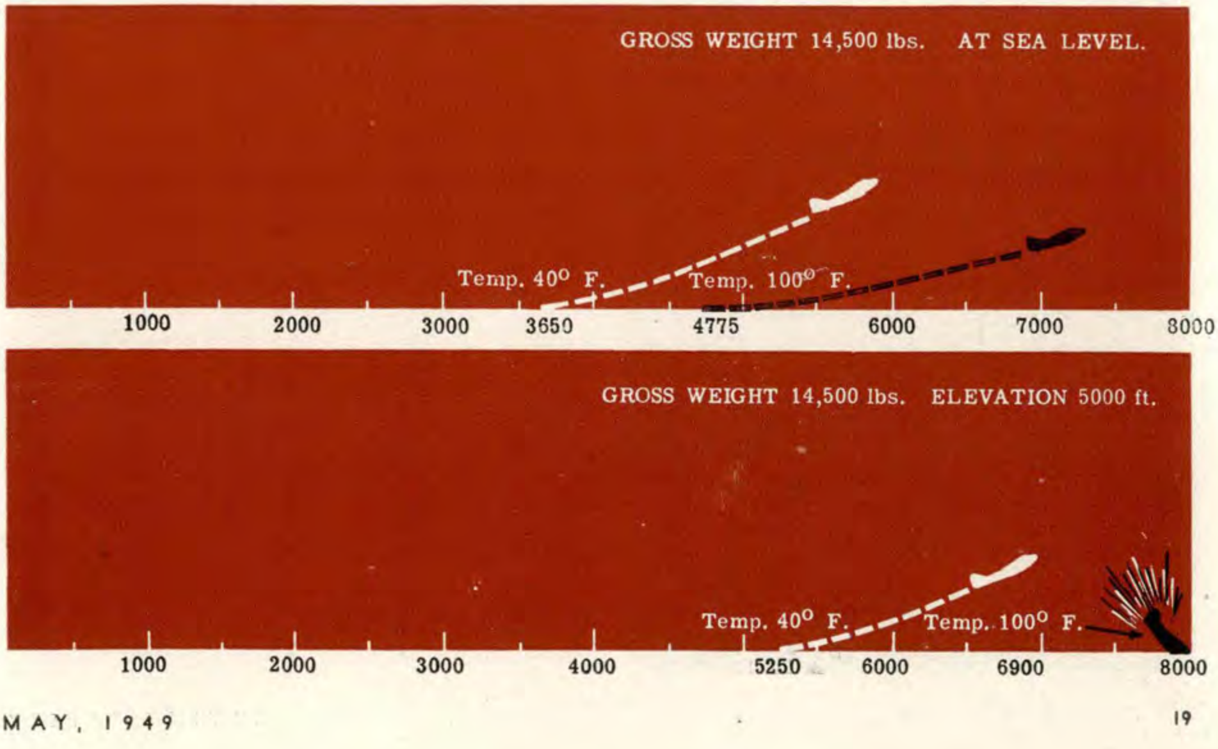
Water-alcohol injection is a relatively simple method of thrust augmentation in turbojet engines. But it has problems such as contamination of lubricating oil with the water-alcohol mixture and the installation problems.

Catapults have been suggested, but these would require installation in all four directions on an airfield. Even more complications would be encountered overseas where mobility, versatility and extra maintenance required for catapults would be at a premium.

From this overall picture it appears best, at present, to be extremely careful in computing your chances of getting off in high-performance aircraft, especially at strange fields. In fact, a runway with rolls in it can cause a jet pilot no end of anxiety.

Jet organizations, especially, could profit by briefing their pilots on why takeoff distances vary and how conditions of temperature, wind, load, and elevation can vitally affect these takeoff distances.

As the British say, "Take off with Prudence!"—*1st Lt. Rodger W. Little.*



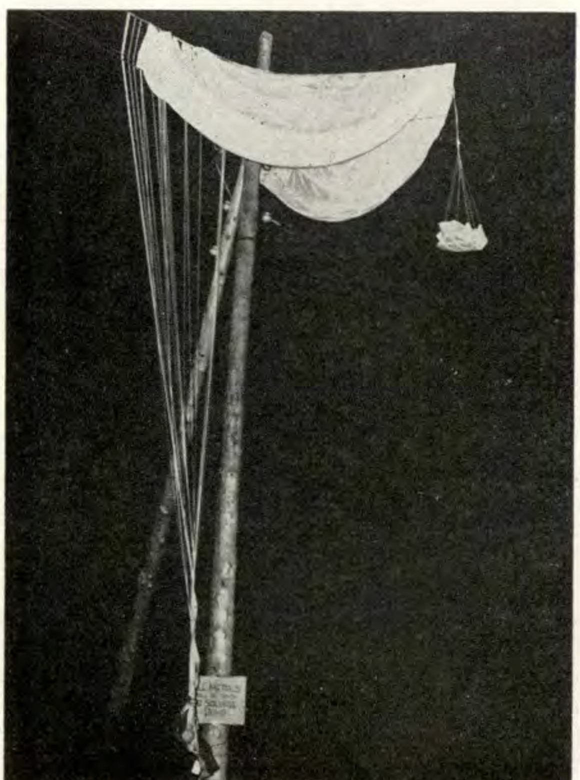
Flying Safety BRIEFS . . .

NIGHT JUMP

Bailout at night can be dangerous. An aerial engineer on a C-54 can tell you so.

The transport plane in which he was flying had maintenance trouble that required a wheels-up landing. The crew decided to salvo the load of cargo aboard and this was being accomplished when two engines quit. The pilot signaled for an emergency landing at a large Air Force depot. The engineer quickly requested permission to use his parachute rather than land with the remaining loose cargo aboard.

The pilot granted permission for the bailout. The time was 2400 hours on a very dark night. The sergeant left the airplane at 2000 feet directly over the runway as the pilot was making a 360-degree overhead approach. The parachute descent was normal, except that the sergeant could not see where he was going. Just as he was approaching ground there was an arc flash. The sergeant found himself in his harness with the canopy of the chute snagged on a high tension line pole. He had a quick detachable type harness and dropped on to the ground safely. In the meantime the airplane made a good wheels-up landing with no injury to crew.



This bailout was successful, yet the sergeant could have been electrocuted. When you have a choice of making a wheels-up landing on a lighted runway, with complete crash equipment standing by, or bailing out into the dark unknown, think twice—you may not be so lucky.

B-50 TIPS

Latest dope from Boeing on the B-50 reveals a few interesting facts that should prove worthwhile to pilots and maintenance men operating such airplanes.

First item on the list concerns the main tank fuel boost pump switches and is important because failure to comply could have drastic results. On all B-50 aircraft, except AF46-2, -3, -4, -6, -8, and AF47-117, moving any main tank boost pump switch to the OFF position will close the corresponding fuel tank shut-off valve, thereby cutting off fuel flow from the tank to the manifold or engine.

To simplify the control of fuel flow and to add the four boost pump switches required with the installation of the nacelle skate tanks and the droppable wing tanks the four main fuel tank shut-off valve switches have been eliminated from the engineer's fuel control panel. *Control* of the main tank shut-off valves has been incorporated into the corresponding boost pump switch.

The applicable tank shut-off valve will open allowing fuel flow through the valve when the boost pump switch for that tank is placed in either the NORMAL or HIGH position and will close when the boost pump switch is placed in the OFF position.

Flight crews should note that failure of the boost pump as indicated by the red warning light next to the boost pump switch does not close the fuel tank shut-off valve. Attention is also directed to the fuel manifold valve switches; on those aircraft having the additional fuel tanks, these switches move *away* from the operator to OPEN.

Boeing Field Service provides a piece of common sense that is easily applicable to not only the B-50, but also any other airplane equipped with windshield wipers. Various methods have been tried to prevent damage to the windshield wiper blades and to prevent scratches on the window surfaces during an operational check, but the most satisfactory method is to wet the windshield with water. Care should be taken to maintain an even flowing stream of clean water over the entire surface. To men working on the B-50, Boeing advises: operate windshield wipers at full hydraulic pressure and on *wet glasss only*.

TOWING THE LINE

The 1st Tow Target Squadron, stationed at Biggs Air Force Base, Texas has completed a year of operational flying without one single aircraft accident.

For the period from January 1948 through January 1949 more than 8200 flying hours were logged averaging 684 per month. Aircraft time was 6115 hours or an average of 509 hours per month. Night time totaled 600 hours and actual weather time was 148 hours.

Several different types of flying combined to make the total—target towing, ground-to-air firing, air-to-air gunnery, tracking missions for antiaircraft units, formation flying, exhibition and air show flying, and cross-country navigational, flying proficiency, transition, instrument, and instructional flying for 20 newly assigned pilots.

To accomplish all of this flying the squadron flew seven different types of aircraft—B-26, B-29, C-45, Q-14, F-80, F-51, and T-6—and covered not only Texas, but several states on the West, Gulf, and Atlantic Coasts and a few of the central states.

Major Thomas B. Joyce, CO of the 1st Tow Squadron, attributed the safe record to close adherence to all safety regulations, safety consciousness on the part of all ground and air personnel, the efficiency of maintenance crews on the different types of aircraft assigned to the squadron, and the thorough indoctrination of the pilots to operational procedures of the various aircraft.

MASTERING THE GLOBEMASTER

What would you say of a flying record of 9500 hours with only one minor accident, 8200 hours of which were unmarred by an accident of any type? The 1601st Air Transport Group at Brookley Air Force Base, Alabama has established just such a record.

The 1601st is an outfit peculiar to itself in Air Force operations because it is the only AF organization operating C-74's. Since September 1946 the unit has flown 9500 hours on both scheduled and non-scheduled flights. Since October 1948, the C-74 has been used in support of the Berlin Airlift by operating scheduled flights between Brookley AFB and Frankfurt, Germany.

For the entire period of 30 months, the one minor accident occurred in September 1947 on an emergency mission during the hurricane season. The airplane was landed on a water-covered runway and the landing flaps were damaged. Since then, 8200 hours have been flown with *no* minor or major accidents.

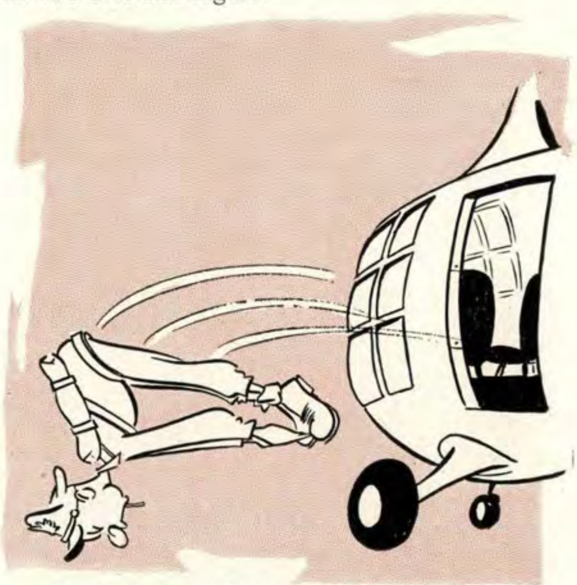
THE ROTARY JUMP

In order to obtain data relative to emergency and premeditated parachute jumping from helicopter aircraft, a series of parachute drop tests were made from the H-5 helicopter in level flight at speeds from 0 to 70 knots and using standard B-8 (24-foot diameter) and T-7 (28-foot diameter) parachutes.

The parachute openings were initiated by 15-foot static lines attached to the parachute pack. On the free type parachutes, it is considered that a fall of 15 feet would be sufficient for the individual to react to the emergency and to pull his parachute ripcord.

The conclusions were that emergency parachute jumps may be performed with a reasonable degree of safety from rotary wing aircraft of the H-5 type in level flight at altitudes of 500 feet and higher.

Premeditated parachute jumps with static-line operated parachutes may be made from rotary wing aircraft of the H-5 type in level flight at altitudes of 400 feet and higher.



STREAKS IN FRONT OF YOUR EYES

The bright sun of summer will soon be lighting the wild blue and a lot of pilots will be reaching frantically for their sun glasses. But hold it! Don't grab for those sun glasses before you know what the scoop is.

According to information released by CAA's Medical Research Lab, wearing polarizing sun glasses can be "hazardous and distracting" to a pilot flying a modern aircraft because they may cause spots and streaks in front of his eyes.

Glasses which polarize light cause the appearance of numerous dark areas in certain types of windshields. Sometimes these resemble large-screen mesh; in other cases they form parallel light and dark streaks. Visibility is greatly reduced.

The reason for the phenomena is that "strain patterns" in the original material from which the windshield was made become visible when the light is polarized. This fact has been known for sometime, and has been applied in various industrial processes. However, the appearance of such patterns in a windshield, where they are normally invisible, can be a serious flight hazard.

GOOD TURNS

Everybody's getting into the flying act, or at least part of it anyway. According to their annual "Report to the Nation," the Boy Scouts of America stated that some 20,000 of their members participated in the installation of 336 air markers during 1948.

Included in that total is one which they claim to be the largest in the world. It's on an automobile

plant in Chicago and its individual letters are 50 feet high.

Few VFR flying aids are so important and so appreciated as the simple marker on the ground that tells the man in the air where he is. Therefore, it is with 'keep-up-the-good-work' enthusiasm that fliers greet the Scouts' announcement that they will continue their air marker installations in 1949.

SOFAR

Latest poop from the Flight Safety Foundation provides a fairly good idea of the workings of "Sofar," a newly developed method for locating ditched aircraft. Although still in the experimental stage, "Sofar" shows promise of greatly simplifying search procedures for aircraft lost at sea. FSF's explanation follows:

Sound travels through water at a definite and rapid rate. Tests indicate that the source of a sound in water can be located with great accuracy by triangulation, even at distances of several thousand miles.

The ditched aircraft must carry a small distinct "sounder" which would be set off on ditching. It requires only a few stations to cover vast areas of ocean at a cost believed to be very much less than the expense of an elaborate and often fruitless search by sea and air.

"Sofar" has been used experimentally on the West Coast and very favorable results have been reported.

MORE OXYGEN TO BREATHE

A new oxygen converter system that uses the liquid form of oxygen instead of the gaseous type is being tested at Wright-Patterson Air Force Base by the Aero-Medical Lab. This new system will mean increased safety for fliers as well as a saving of space and weight required for the necessary oxygen breathing systems in the planes.

The gaseous type of oxygen supply unit for the B-17 weighs slightly over 400 pounds when charged, while the new type weighs only 130 pounds.

With all of this saving of weight and space, the volume of oxygen available for human consumption is increased by 44 per cent. This is possible because when changing from a liquid to a gas, the relative volumes are in a ratio of one to 800, which means that one cubic foot of liquid oxygen will provide approximately 800 cubic feet of gaseous oxygen upon vaporization.

Also, a mobile oxygen liquification plant has been devised that can be contained in one trailer truck. This trailer can be used on the servicing ramp for refilling planes' oxygen systems from a portable storage tank.

YOU AND AIR TRAFFIC CONTROL

By FRED L. SMITH, *Chief, Air Traffic Control Division Civil Aeronautics Administration*

Editor's Note: Mr. Smith has been associated with the Air Force for 30 years, dating back to the days of the Aviation Section, Signal Corps. His aviation career also has included 11 years of civilian experience in air traffic control. FLYING SAFETY asked him to discuss the subject of air traffic control, for it was felt that his position with the CAA, and with the Air Transport Command during the last war, had given him many opportunities to review these problems. While his suggestions are primarily addressed to reserve pilots, his story is of equal value to regulars.

AIR TRAFFIC CONTROL is a relatively new activity. The Air Force had established only eight control towers up to 1938, and at that time it is probable that few airmen, military or civilian, could foresee the expansion of air traffic control to its present state.

Even the Civil Aeronautics Administration and the old Bureau of Air Commerce were rather late in realizing the importance of air traffic control to both civil and military aviation. Although municipalities established the first control towers approximately 20 years ago, the Federal Government did not get into the traffic control business until 1936 when airway or "air route" traffic control was undertaken by the Bureau of Air Commerce. It was not until the summer of 1941 that the need for Federal operation of airport control towers was recognized and then it was undertaken only as a military necessity. Actually, the operation of control towers as a Federal activity, based on the needs of civil aviation, was not begun until July 1946.

Instrument flying as a routine activity is also of comparatively recent origin. Some 12 or 15 years ago there were very few honest-to-goodness instrument pilots in the military service. The second world war, of course, changed all this. Thousands and thousands of youngsters from farms, factories and colleges were trained to fly instruments and did a fine job of it in all parts of the world. Furthermore, in remarkably short time they were flying equipment which before the war was reserved for only the cream of service pilots.

The effect of World War II on air traffic control is highly significant in the tremendous load it placed upon air traffic control as service-trained pilots returned to civilian life and became engaged in civil aviation and Reserve and National Guard activities. The CAA's air traffic control service found itself faced with a herculean task. The pre-war problem which was confined to several hundred pilots and airplanes was multiplied many times. Instead of a few hundred pilots qualified to fly instruments we now have literally thousands and, of course, most of the war surplus aircraft which have been converted to peace-time purposes were quite well equipped for instrument operation.

Although there are dangers in attempting to classify any group of persons who are so individual as pilots, I think it is safe to say that there are two categories of Reserve pilots: (1) the commercial or transport pilot who works at flying every day and to whom the National Guard or Reserve provides a sort of "motorman's holiday" in that he can enjoy the opportunity to keep his hand in on Uncle Sam's equipment during his spare time, and (2) the reserve pilot whose regular job has nothing to do with aviation. The pilot in this group perhaps gets more of a bang out of his National Guard and Reserve activities because it is such a change from his

regular occupation. It is the second group for which I presume to offer my suggestions.

My first word of advice, therefore, is even though you were well trained during the war, don't minimize the significance of long lay-offs from flying. You will probably feel that you are just as keen as ever. But if you indulge in a little self-analysis you will admit, to yourself at least, that as the years go by you are not as sharp as you used to be, and the airplane just doesn't fly on the pilot's reputation.

You may ask, "Well, just what has all this got to do with traffic control?"

The answer is simply this. A great many, if not most, air traffic control problems arise from the tendency of such pilots to overestimate themselves. Traffic Control knows, of course, that such pilots do not get into jams intentionally, but the bare fact remains that they do become serious problems and oftentimes the pilot lives through the experience without realizing fully how much he has upset the apple cart.

Next, plan your flight carefully. This includes not only careful determination of true airspeed and calculation of estimated time en route, but evaluation of current and forecast weather, noting frequencies of navigational aids and airport control towers along the route and brushing up on instrument approach procedures at the destination and alternate. Don't make the mistake of planning a flight carelessly because you expect to conduct a VFR operation. Strange as it may seem, pilots occasionally get lost in weather which is technically VFR; and VFR weather is sometimes a temporary thing.

Be sure all your maps and charts are where you can find them easily. The 0-8-15 series of Technical Orders are excellent publications but they are no good to you if you leave them in the operations office or lock them up in the baggage compartment.

Follow your ATC clearance in detail. Once in a while a clearance may be somewhat complicated. Our boys don't make them that way unless traffic requires such action.

Make your position reports accurately. It helps a lot if your clock is set right.

If your operations are subject to Flight Service approval, don't confuse such approval with an air traffic clearance. FS approval or clearance is essentially an operational authorization such as you receive from an operations office at a military base. On the other hand, an air traffic clearance is merely authorization to fly in controlled air spaces in accordance with specified traffic conditions. You must always have an air traffic clearance if you are conducting an IFR operation and may or may not require FS approval, depending on the circumstances or your particular rating.

Air Traffic Control has no operational responsibility or authority. When the weather is really rough you can get a clearance over almost any route at any instrument altitude. Why? Because the smart operators don't want any part of it.

Now please don't get the idea from this blast that the CAA thinks that problems presented by a large and active Air Reserve are insurmountable. Sure, we have a lot of problems because there is so much Air Reserve activity, but by continuing the fine cooperation which exists between the Air Force and the CAA, we can reach our goal of utilizing air space and airports to their maximum capacity. You, as an air reservist, can help attain this goal by visiting the CAA center or control tower nearest you to discuss current operations. Most of our controllers are Air Force or Navy veterans. Many of our towers are manned almost exclusively by air reservists. There you will see that those of us who now have the job to do have no hesitancy in admitting there are many problems for which we should like to have a better answer.

Cross Feed
FLYING SAFETY IDEA EXCHANGE

PAINTED JUGS

The 373d Squadron has recently participated in two extensive search missions for aircraft lost at sea. The lack of easily visible flotsam or debris for evidence leading to the location and identification of the missing aircraft hindered the completion of our task.

A study was made for means of furnishing more highly visible and easily identifiable equipment that would increase the possibility of successful culmination of search missions. It was found that all the thermos jugs that are normally carried on aircraft for water and coffee would float even when completely full. However, the jugs are painted an olive drab and the chromium-plated cap did not offer sufficient reflection to catch the attention readily. Upon the suggestion of one of our pilots, the jugs were painted with "Emergency Yellow" and stenciled with the aircraft serial number. With the change of color the jugs became infinitely easier to see even with overcast sky.

Other organizations might benefit from our experience.

DONALD C. MCKENNY, Captain, USAF
Flying Safety Officer
373D Recon Sq. VLR, Kindley AFB

DROP TANK PROBLEM

Experiencing a rough engine while flying at 17,000 feet, the pilot of an F-51D-25 immediately let down to land at Itami AFB. The engine seemed to run somewhat smoother at a lower altitude.

The airplane was brought to squadron engineering for maintenance. Analyzing the trouble as the pilot reported it maintenance personnel changed the automatic boost control. On runup, the engine was still somewhat rough, so the exhaust plugs were changed. Upon second runup the mechanic cut the fuel booster pump switch and the engine quit. Since this happened on all tanks, it was assumed that the engine driven pump, part #109-48032, was inoperative, so it was changed. On subsequent runups the engine continued to quit when the fuel booster pump was cut. Lines were bled throughout the system to eliminate any possible air lock—to no avail. After all other efforts failed, the mechanic released the empty drop tanks on the airplane. Immediately the difficulty was eliminated.

It is believed that the pressure supplied by the output side of the engine driven vacuum pump, which is applied to the drop tanks, was causing the difficulty. It is apparent that this pressure was going through the gas line, part #106-4881, from the empty drops to the fuel selector, part #122-48347. The pressure was leaking through the fuel selector and applying air pressure against the fuel tank outlets. This was preventing constant flow to the engine driven pump, thereby stopping the engine. When the booster pump was operating, this air pressure was being overcome.

If a rough engine is encountered after running drop tanks dry at altitude, the pilot should, if possible, let down below 10,000 feet and cut the booster pump switch. If the fuel pressure starts to drop with the booster pump switch off, the trouble may be eliminated by releasing the drops. The pilot may again check by turning the booster pump off. If the fuel pressure does not drop, the flight may be continued safely.

WILLIAM H. MASON, Captain, USAF
Flying Safety Officer
38th Bombardment Wing (L)
Itami AFB, APO 660

EDITOR'S NOTE: AMC recommends a check of tanks and positive pressure relief valve (five pounds plus or minus ½ pound) on each 50-hour inspection.

MEDICAL SAFETY

PHYSICAL FITNESS

Physical fitness is a subject not confined to the Air Force, nor within the Air Force is it confined to flying personnel. However, it does play a substantially important part in the safe flight of aircraft.

For many years, rugged physical fitness programs have been a very definite part of training. The new cadet soon realizes this fact, but it does not disturb him a great deal because he is young and in excellent physical condition. He takes easily to running, jumping, climbing, calisthenics and cross-country jaunts, and he keeps at it for the entire period of his training.

But after he graduates and is assigned to heavy flying schedules, how long will he continue with push-ups and chin-ups now that it is no longer required? Not very long. He might be interested in some form of athletics but because he is not on a schedule he lets it slide. As his uniform becomes gradually but consistently tighter he blames it on the laundry or cleaner. He may smoke a great deal more than formerly, and in some cases he may have developed a taste for stronger and more deleterious pastimes. As the years roll by, the bad habits overshadow those things that would condition him physically.

The annual physical examination has always had some sobering effect. But now in this critical period of scarcity of doctors in the Air Force it has temporarily been discontinued unless the pilot is 40 or older.

In the past, the program in most places has lacked discrimination; that is, the one who was 30 to 35 was expected to cut capers and perform on the obstacle course in the same manner as those in the 18 to 20 age group. The majority of doctors are not advocates of jumping fences and cannot quite see where it fits in with the pilot. However, though they may not agree with certain forms of violent exercise, practically all agree that some regular physical exercise begun gradually is in order. This exercise should be indulged in daily—not once or twice a week.

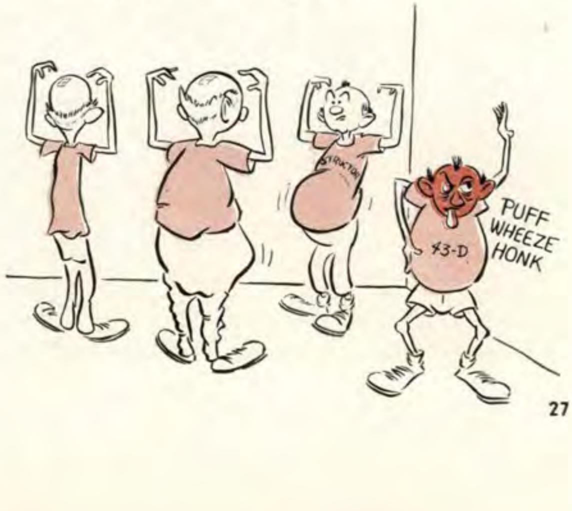
Headquarters units are by far the greatest offenders for lack of physical fitness programs. Each office chief eventually assumes the attitude that he is indispensable and that certainly he cannot be spared for any physical fitness program during duty hours. Many officers when advised that they must begin some exercise program of their own agree that they feel the need for it and have for quite a long time, but few find time to do it. When physical fitness programs are left entirely to the individual it is not generally a success. Many persons procrastinate until their girth engulfs them.

A physical fitness program that starts off with a bang and is repeated each week with another bang is less than worthless—it is detrimental to mind and body. Without great graduation in such a program, the physical structure of the body is overstrained. The older individuals soon find plenty of reasons why they have to do something else at P.T. time. Definite consideration should be given to age differences, particularly if violent exercise is contemplated.

A physical fitness program, like any other program, falls far short of its objective unless the commanding officer participates and shows interest himself.

In general, those programs that attempted to make commandos out of all age groups were ridiculous; on the other hand, those programs that encouraged perjury by weekly or monthly statements that P.T. was being accomplished by the individual were equally ridiculous. To get the best results, it has to be included as part of the daily military duty.

Lt. Col. Wendell P. Harris, MC(USAF)
Chief, Medical Safety Branch



Violation!

AF Reg. 60-16 has virtually become the pilot's Bible as pertains to what he should or shouldn't do. Yet we sometimes wonder how many pilots are cognizant of it or make their own rules as they fly along?

Here is an example of a T-6 pilot who set a minimum altitude of 100 feet for himself.

It seems that this pilot was to be moving away from this particular locale within a few days. So he grabbed a T-6, filed a local VFR flight plan, and proceeded to say farewell—he did!

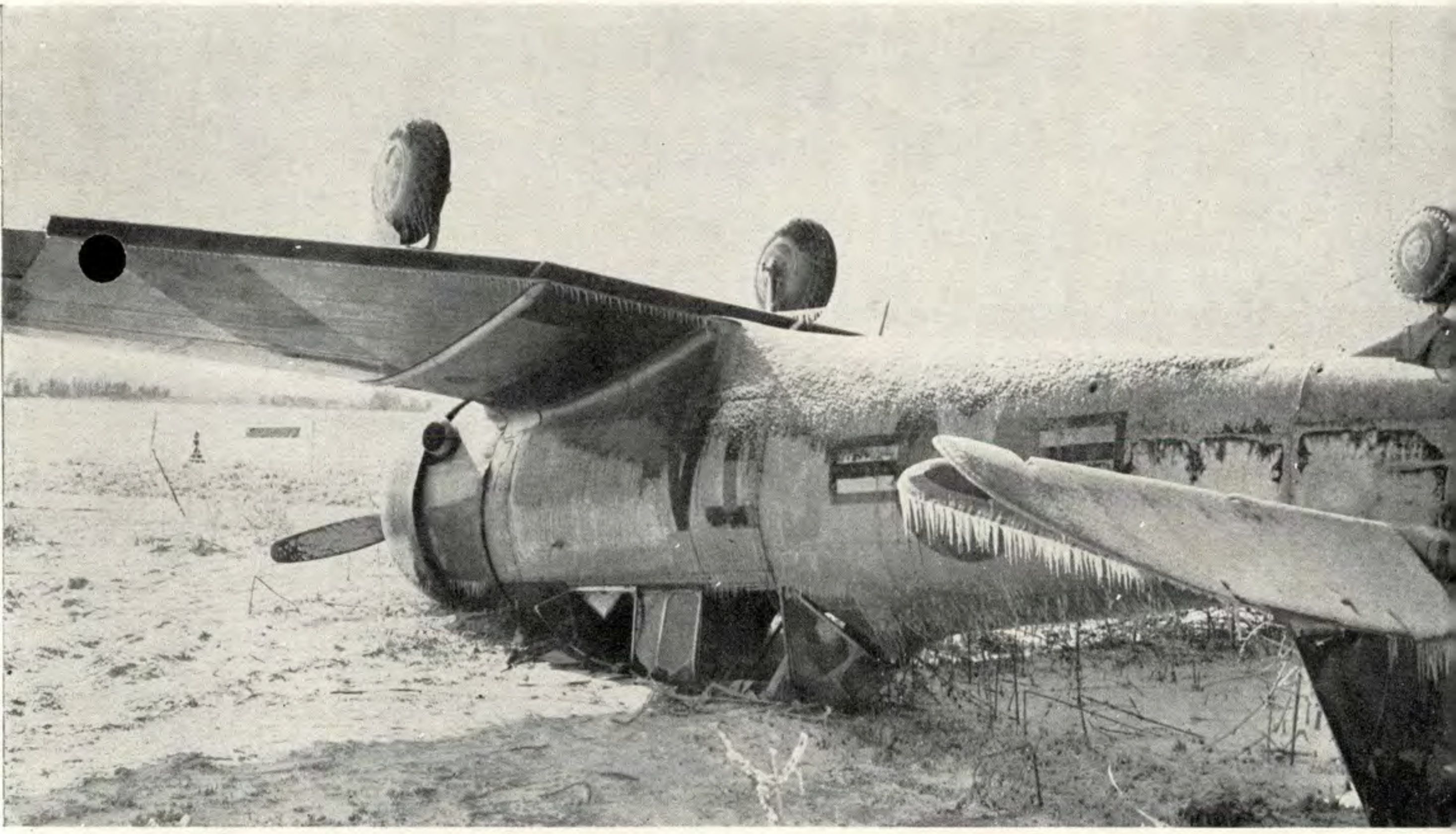
He left his local flying area as soon as he could after takeoff and headed up a river towards a nice, long lake. According to witnesses, he cleared a power line by about 50 feet and was headed toward the dam at the mouth of the lake.

The witnesses remarked to each other at the time that he would have to pull up in order to clear the dam which was 130 feet above the river.

He flew over the dam all right and was over the lake when he encountered three power lines 200 feet above the lake. He flew directly into the lowest of the three power lines without making any change in direction or altitude. The wire hooked the top half of the pilot's canopy and lodged on the vertical crash bar between the two cockpits. The airplane surged upward because of this until the crash bar was jerked free and snapped back with the power line. Then the airplane crashed into the water 400 yards past the power line. This was fatal to the pilot; luckily he had no one with him.

There was no reason to believe that there was any malfunction of the engine or the airplane prior to striking the power line—just a Malfunction pilot.

WHY?

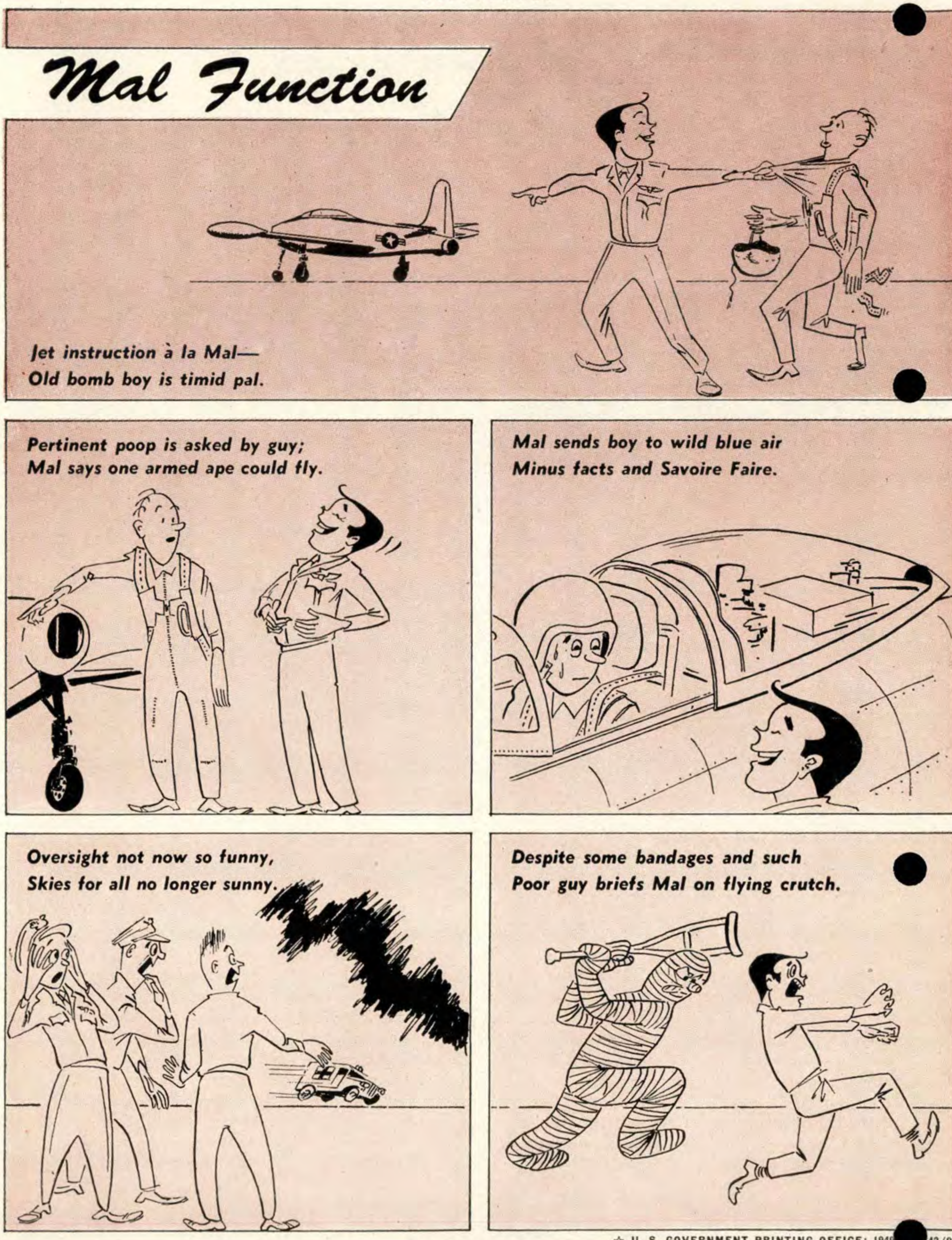


Turning T-6's upside down is not a specialty of this pilot but he demonstrated that it isn't really a tough job.

Shortly after taking off with a passenger on an X-C flight, he encountered a freezing rain squall. Although the freezing rain was of short duration, it left a film of ice on the windshield which greatly restricted the pilot's visibility. Actually, because of ice on his windshield, he was operating under IFR conditions but continued on his VFR clearance thinking the ice would evaporate before reaching destination.

Approximately 10 miles from destination, the pilot called for and received landing instructions with no mention of ice on the runways. No freezing rain had been previously reported in weather sequences although it was prevalent—why?

The pilot set up his approach at 105 IAS with half flaps. Headwind velocity was five to 10 mph. Touchdown wasn't made until half of the 3160-foot runway had gone by. After touchdown, brakes were used intermittently with no apparent reaction. Nearing the fence at the end of the runway the pilot unlocked the tailwheel and attempted a groundloop. He could get only a 15-degree deviation from his path and went plowing through the boundary fence, over a road, and wound up in the position indicated above. Neither pilot nor passenger was hurt. Why didn't he go around when he saw he was overshooting? Half the runway is not enough.



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