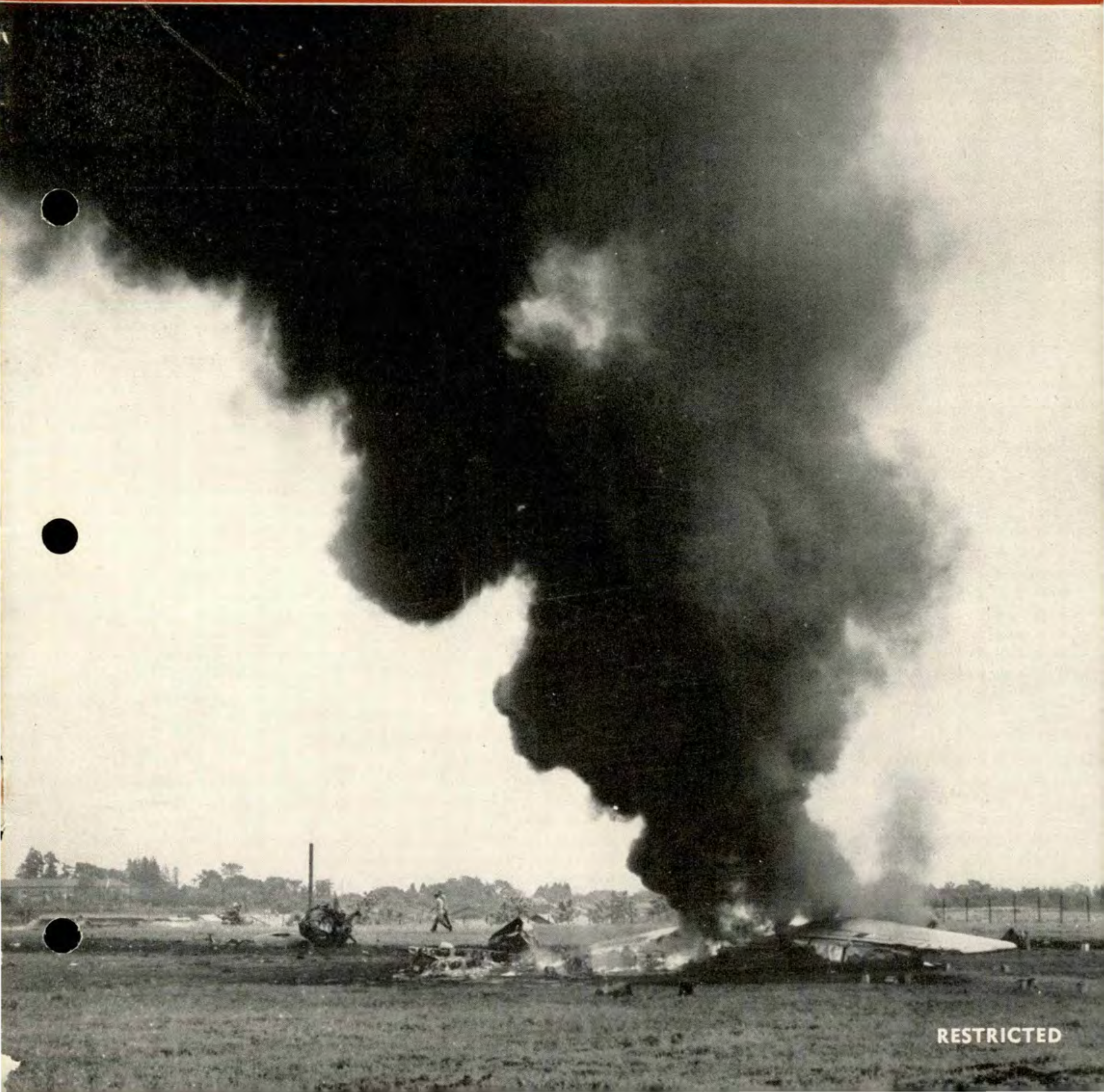
Flying Safety

HEADQUARTERS UNITED STATES AIR FORCE • RESTRICTED

OCTOBER 1948



RESTRICTED

COVER STORY

The P-61 on our cover this month crashed 175 yards short of the runway on a single engine approach. The pilot had feathered the right prop at 900 feet some miles out when the fire warning light had begun to blink on and off. He put down quarter flaps and gear about two miles out on the final and lost control just before reaching the runway.

★

DROP US A LINE

If we know what type of stories and articles you prefer we will be able to give you a better magazine. After you have read this issue drop us a card or letter with any comments or criticisms that come to mind. Mail direct to the Editor, FLYING SAFETY, Field Office of the Air Inspector, First Region Inspector General, Langley Air Force Base, Langley Field, Virginia.

FLYING SAFETY

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FLYING SAFETY is printed with the approval of the Bureau of the Budget, Executive Office of the President of the United States.

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GIVE YOUR PASSENGERS A BREAK

MILITARY PERSONNEL who hitch rides in Air Force planes have the right to know how to save their own lives in an emergency. All too often a passenger who is not familiar with the use of parachutes and emergency exits is needlessly exposed to danger.

Few would-be passengers in these days like to admit they do not know how to wear a parachute or adjust a safety belt or plug in a headphone set. So when the pilot or crew chief asks the waiting passenger, "You ever flown before? Know how to use a chute?" the passenger will likely nod and say, "Yeah, I've flown before. Lots."

"Okey," the passenger is told. "Get in the back."

What qualms the passenger must know as he tries to squirm into a chute too small, as he attempts to figure out how to call the pilot on the interphone, as he looks around to see where there is a door leading out. However, before takeoff most of them are reluctant to indicate their lack of knowledge. Besides, the carefree attitude of the aircrew as the plane is loaded seems to be a good reason for the passenger not to worry: "These guys fly all the time. I guess nothing will happen."

But emergencies do happen. And numerous people have been killed in air crashes because they were not properly briefed on emergency procedures. When a plane bursts into flames or goes out of control there is no time for the pilot to climb back and buckle parachute harnesses on his passengers — still less time to point out emergency exits. The awful realization that passengers should have been instructed adequately before takeoff comes too late.

Inadequate briefing on emergency exits has been blamed for fatalities in numerous military and civilian airplane accidents. In some instances, it has been determined positively that passengers uninjured in the crash were lost in the fire that followed because they were unable to locate or operate the emergency exits.

The pilot, and the pilot alone, as commander of the airplane is responsible for the safety of every person aboard. True, the passenger should have more respect for his own neck than to ride in a plane without demanding to know emergency procedures. Even if he thinks he knows all the emergency procedures, it is better to review every step before a flight rather than meet death through ignorance or lapse of memory.

The only way for a pilot to be certain his passengers are briefed correctly is to assume that none of his passengers have ever flown in a military airplane before.

Important as the mag check before takeoff are these points passengers should know:

1. Adjustment and use of parachute. It is a good rule to *insist* all passengers wear their chutes at all times.
2. Knowledge of emergency exits.
3. Proper functioning and operation of interphone in passenger compartment. At least one headset must be worn in the passenger compartment throughout the flight. Check interphone with passenger compartment *before* takeoff.
4. Understanding of alarm bell signals.
5. If the flight is to be conducted over water, all passengers must be briefed for ditching.

To execute this briefing requires only a few minutes before a flight. Yet those few minutes of demonstration may save a life.

MOS 1037

BY 1st LT. HAL J. BASHAM
Flying Safety Staff

IT'S THE CODE NAME for superman—ten thirty seven. Aircraft Observer Bombardment is the title they give him when and if he completes the rugged course conducted at Mather Air Force Base, California, and it means he is a qualified navigator, bombardier and radar observer all rolled into one.

This month Mather AFB begins graduating a class of 48 AOB's each month under an expanded training program designed to train over 600 men per year to man the new jet bombers.

Navigators arriving at the school receive 30 weeks of training, bombardiers get 37. Both courses cover the same subjects—navigation, visual bombing and radar navigation and bombing.

A special course in polar navigation with actual flying missions simulating polar navigation is conducted.

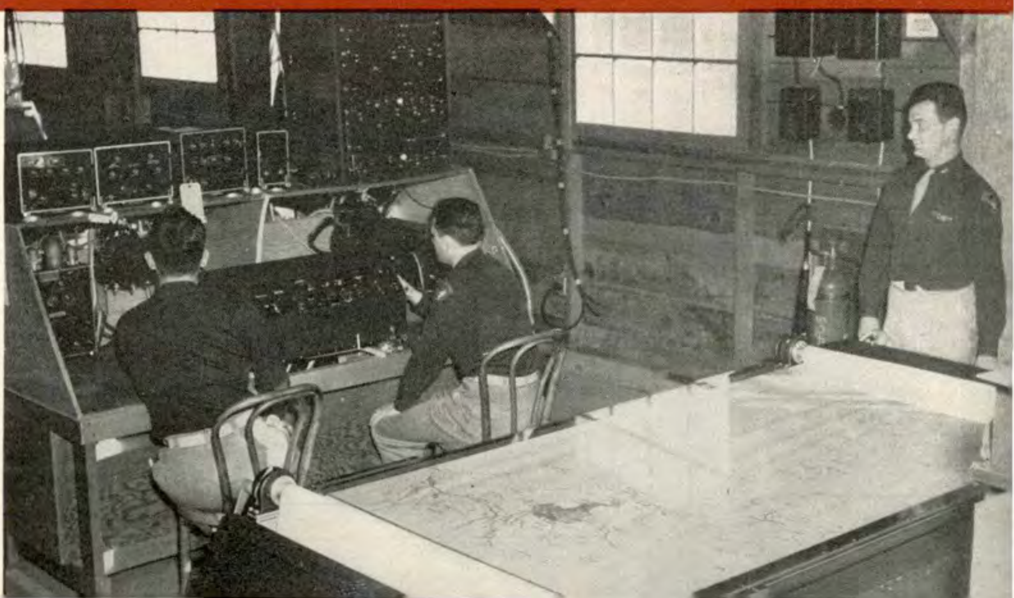
After navigation comes bombing. The pressure is on from the first day the student enters bombing training. He is frequently reminded that someday he may be called on to drop a two-million-dollar bomb. He will get only one chance. His entire training must be so intense and so carefully mastered that when that day comes he can hit his target by whatever bombing system he is called upon to use. His whole career may be aimed at the one time he might be called upon to drop that bomb. He simply must not, cannot miss! The rated navigator student drops 76 bombs with the Norden bombsight and makes countless "dry runs" in the plane and in the A-6 ground trainer. The man already a bombardier gets many hours of refresher training on latest methods and drops 16 bombs. Both navigators and bombardiers enter the radar phase of training on an equal basis.

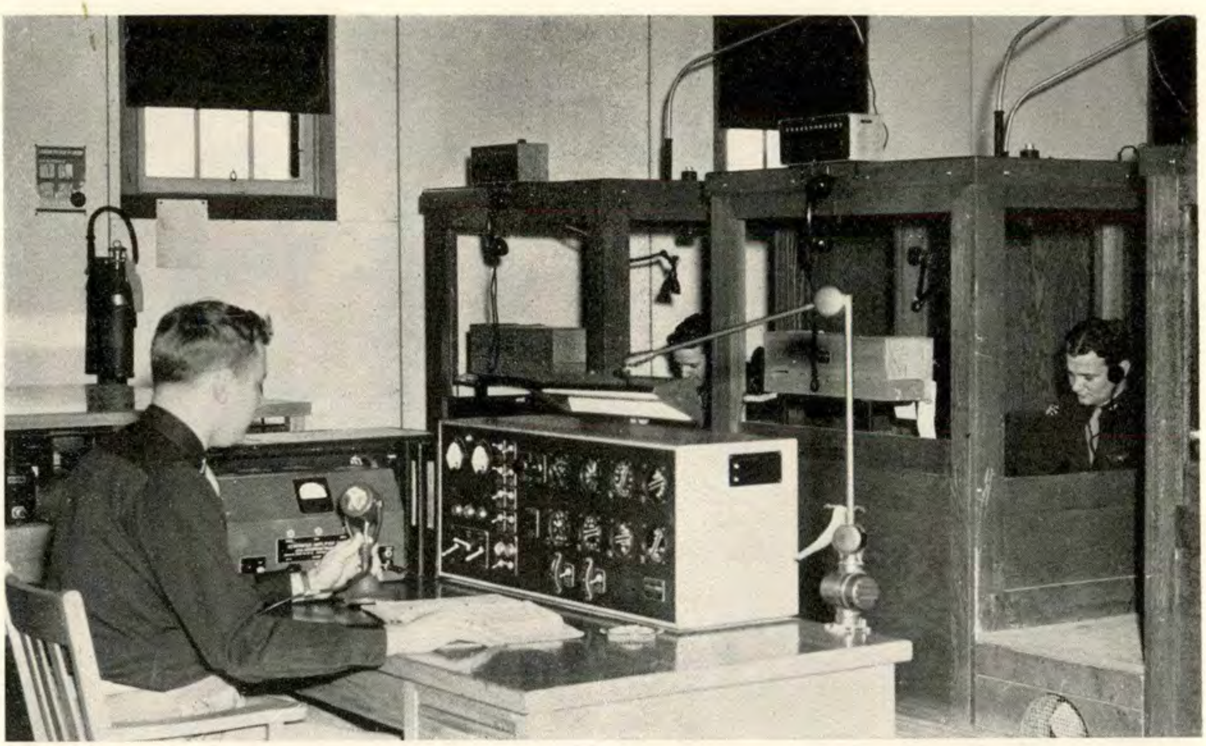
In radar the student is taught basic electricity, radar theory, construction and operation of all known types of radar bombing and navigation equipment and how to use them. He flies simulated missions with the various "bench sets" of radar and

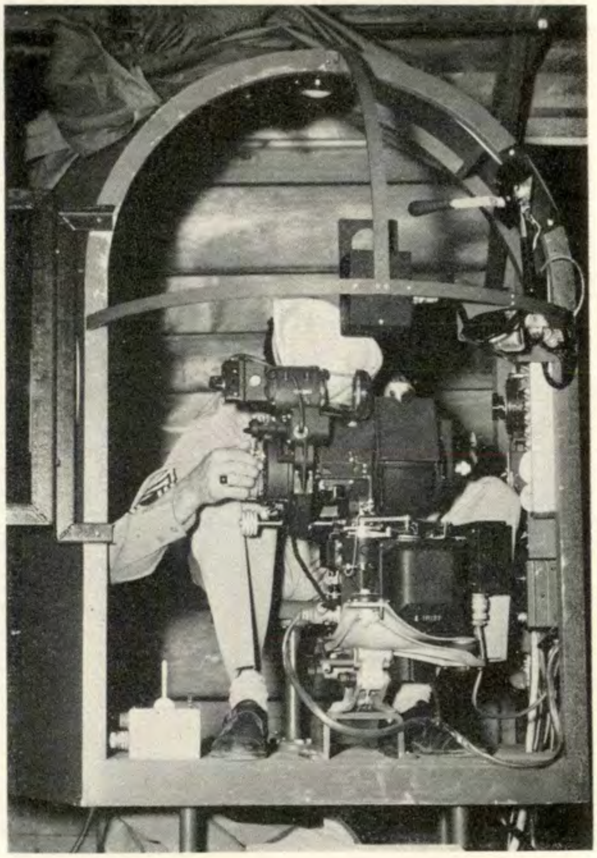
AOB students on a six-hour navigation training mission in a specially equipped C-47. Because the safe completion of every type of mission depends largely upon accurate navigation all known methods of navigating are taught students at the AOB school.

Bombing up radar equipped TB-25 used to fly visual and radar bombing missions. Students navigate over water, mountains, plains, deserts and cities, identify and bomb their target by radar from these planes. Students become proficient in the A-6 trainer (page 4) before actually dropping bombs from a plane.

In this Supersonic Radar Trainer the AOB student learns scope interpretation, radar navigation, radar bombing, log procedure and equipment SOP before starting his radar flight missions. The two students seated at the scopes see practically exact replicas of the readings they would receive on actual flight missions. This trainer can also be used in conjunction with the Norden bombsight.







Above, AOB students flying navigation missions in G-2 navigation trainer. Right, instructor is bombing target on a motion picture of the ground unrolling beneath his A-6 bomb trainer.

in the "Supersonic trainers" which almost exactly duplicate actual flight missions until he has completely mastered the use of the various types of radar.

In the specially equipped TB-25s he applies his training to actual radar bombing missions. In the last phase of training he flies mission after mission navigating to the target by radar, bombing by radar and navigating back to the base by radar without once looking outside the plane.

While the prospective Aircraft Observer Bombardier is undergoing training, the research and development section and educational advisory board at Mather are maintaining constant liaison with tactical units employing systems and equipment used in the school and working out newer, better methods of training and operation. When a 1037 leaves Mather Field he is the best trained navigator, bombardier, radar observer in the world. He can go anywhere on the globe by any navigational system known, bomb by all methods known and guide his plane home again safely. Little wonder they call him "1037—Code name for Superman."

PENNANT WINNERS

Flying Safety Pennants for the period of April through June 1948 have been awarded.

If you see a base flying one of these pennants with one or more stars on it, you will know that they have won the coveted pennant two or more times consecutively.

Air Materiel Command came out as the leader again with 11 pennants going to AMC bases. Among these bases, Wright-Patterson AFB received a blue pennant for the C-47 and retained its white pennant for the C-46. Eglin AFB won green pennants for the B-17 (one star) and the F-47. Tinker AFB also won two pennants, green (C-54) with two stars and a white pennant (B-26). Kelly AFB won the blue pennant for the C-54. Other AMC bases and their pennant wins are Griffiss AFB, green (C-45); Kirtland AFB, white (B-29); Robins AFB, white (B-17); and Clinton County AFB, white (Misc.).

Air Defense Command was second with six winners. Hamilton AFB retained two pennants, and thus has one star each on the blue pennant for the T-6 and the white pennant for the L-5. Memphis won a green pennant for the T-6 and a white pennant for the C-45. Offutt AFB and Mitchel AFB copped white pennants for the B-25 and F-47 respectively.

Tactical Air Command was third in the command standing with five winners. These included one blue pennant, McChord AFB (Misc.), and three green pennants, March AFB (Misc.), Smyrna (P-51), and Marshall AFB (L-5). Lawson AFB won one white pennant (C-47).

Training Command had three winning bases. Williams AFB won the blue pennant for the F-80, Chanute AFB won the C-47 green pennant, and Perrin AFB won the white pennant for the T-6.

Strategic Air Command had three bases flying pennants also. They are Davis-Monthan, green pennant (B-29); Selfridge AFB, white pennant (F-51); and Spokane AFB, green pennant (F-80).

The Air University was another three-time winner. Craig AFB retained its blue pennant for the C-45 and thus gained one star. Maxwell AFB took a green pennant (B-24) and Tyndall AFB a green pennant (B-26).

Headquarters Command, USAF, was represented by Bolling AFB, which won two blue pennants. They have two stars each on their B-25 and their F-51 pennants.

GO WITH THE WIND

To FIND AN ACCURATE, shortest-time flight path between two airports separated by wide oceans or continents has long been the goal of long-haul airline and military pilots. What was desired were tailwinds rather than headwinds on long flights.

Several European scientists advanced a theory of minimal flight path, which often appears to be a wide detour, in order to take advantage of favorable winds. Recently, an American scientist has re-examined the theory for the USAF and has come up with a formula which in practice has proved highly successful. He is Mr. Irving Gringorten of the Watson Laboratories, Red Bank, New Jersey. His mathematical formula, using meteorological observations as factors, selects the route under variable wind conditions most conducive to minimizing flying time and saving fuel.

Since the role of mathematician in this system of navigation goes to the meteorologist, no attempt will be made to outline or explain the formula used, but rather, an explanation will be given of the principles upon which the theory is based.

The key to minimal flight path is knowing the velocity and direction of the wind and the fact that winds follow the isobars clockwise about a high pressure center and counter-clockwise about a low.

There are, however, some limitations to the use of this system. If, for instance, the winds are negligible or are unifoım in strength and direction, the use of this system is unnecessary since the great circle course will be the minimal flight path. The flight paths between San Francisco and Hawaii are frequently a good example of this condition.

However, with the great amount of meteorological activity over the Atlantic, a practical use of minimal flight path plotting can be made.

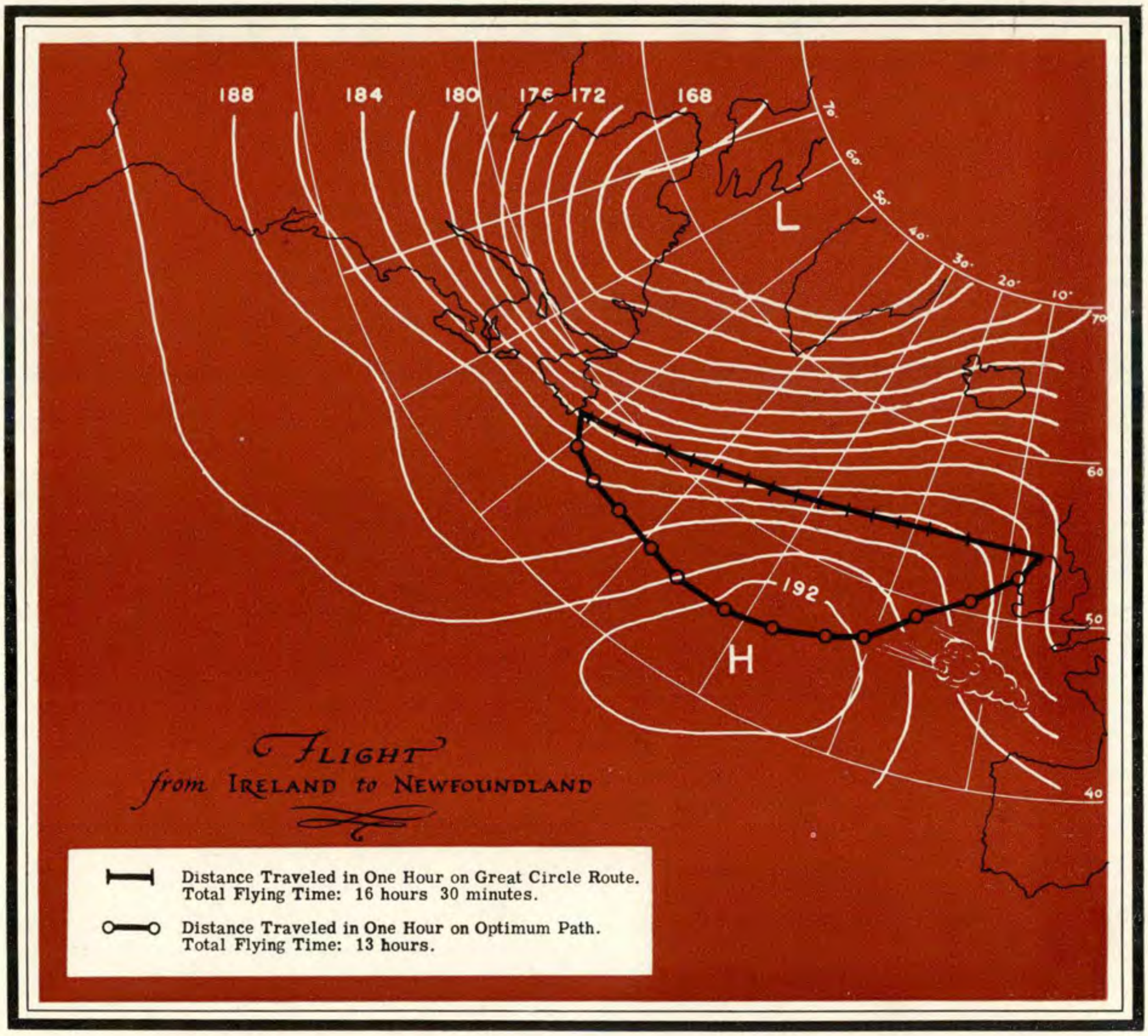
For example, assume that we are planning a flight to Newfoundland from Ireland.

If a sheet of paper is wrapped like a cylinder around a globe of the earth and tangent to the globe along the great circle route between an airport in Ireland and a field in Newfoundland, the earth's features can be projected conformally onto the cylinder. This sheet of paper when spread out would then become an oblique-mercator projection of the proposed route.

With the great circle route between the airports plotted on the oblique-mercator, the meteorologist locates the existing pressure centers and plots the pressure pattern for the flight altitude. The two major factors affecting the minimal flight path are then considered. They are crosswind and tailwind. It might be well to mention here that the usual assumptions of a constant airspeed at a constant pressure altitude and that winds are geostrophic (gradient winds above surface friction effect) are made by the meteorologist.

Then, the meteorologist considers crosswind effect. The drift correction angle may be large and may vary from right or left of the great circle flight path, yet the net drift may be small. If it was necessary to compensate only for net drift by flying a single heading, fuel and time would be saved by eliminating the crabbing of the airplane. It can readily be appreciated that crabbing to hold a great circle track would cut down on the forward speed of the aircraft.

At this point the meteorologist decides whether the single-heading track is a satisfactory approximation of the minimal flight path, or whether the single-heading track must be corrected to compensate for tailwind effect. A simple rule governs this de-



cision: If the spacing of isodees varies visibly across the general heading of the airplane, then tailwind effect cannot be considered as negligible and must, therefore, be compensated by use of a prescribed formula.

Some questions which might arise are: How does this system compare with other known methods? How much time can be saved? How accurate are weather reports? What about weather?

The system is far more accurate than any other known method of "pressure pattern flying." As shown before, if the minimal flight track corresponds to the great circle track, no time will be saved. If, however, you ride high wide and handsome on a strong tailwind, but cover more miles in keeping the wind at your tail, you will save hours of flying time. As said before, accurate winds aloft reports are essential to the application of this theory. If, after plotting the minimal path, the meteorologist finds that it cuts through weather too bad to fly through, he can prepare a new minimal flight path from any point on the original path. Each major leg of the new track will be a separate minimal path.

Undergoing tests by many of the commercial "overseas" airlines and the Atlantic and Pacific Division of MATS, this system may well become the answer to increasing the range of aircraft flying non-stop hauls of 2,000 miles or more.

PUBLICIZE THE VIOLATOR

By MAJ. B. F. McCUISTION, *Instructor*
Air Tactical School
Tyndall AFB, Florida

DID YOU VIOLATE an Air Force Regulation during your last cross-country flight? The chances are you did, but do you know the regulations well enough to realize it?

There are a number of different types of violations. First, we have the "willful" violation; second, "emergency" type violation; third, the "didn't know" type; and fourth, the "I know, but think I can make it" type. Let us look at some actual examples, although some of them are hard to believe.

First, the willful violator. This is the "daredevil" type who likes to buzz or do acrobatics below the prescribed minimum.

Example: A pilot was flying local from a Texas base when he decided to buzz a highway. He went so low that he was touching his wheels on the highway and then pulling up over cars. He caused a number of near accidents, and the only reason he was reported is that a staff car from a nearby airbase with an officer aboard happened to be one of the cars he buzzed.

Number two, the so-called "emergency" type violation. Although legitimate emergency violations are frequently made *and reported* by conscientious pilots, a larger number still concoct an "emergency" as an excuse when confronted with the report of a violation they thought they had "gotten away with."

For example, Lt. Doe was on an IFR Flight from Atlanta, Ga., to Mobile, Ala., with an alternate of Eglin AFB, Fla. He landed at Maxwell, but Maxwell operations did not know of his arrival until three hours later when the yellow copy of his Form 23 was found on the clearance counter. An alleged violation was written on the pilot by Flight Service for deviating from his flight plan without prior approval of Air Traffic Control and Flight Service, and for not filing an arrival report upon landing at Maxwell. He delayed aircraft taking off and landing at Mobile for approximately three hours.

Copies of the alleged violation report were received by Lt. Doe's commanding officer who called him into his office and notified him of the report.

"What about it?" he asked. "Were you in violation? This makes the organization look bad."

Lt. Doe thought for a moment, realizing that though he had violated the regulation, there must be some way out. Then he remembered the old stock phrase, and he said, "My radio went out and I acted in the best interest of safety. I landed at the nearest AFB, which was Maxwell, and upon landing I placed my arrival report on the clearance counter at Maxwell."

The colonel studied this over for a while. It sounded good to him, so he jumped and patted Lt. Doe on the shoulder and said, "By Gad, Lt. Doe, I believe you were right."

With this action, and this action only being taken, he forwarded the violation report to his higher headquarters with this indorsement: "It is believed that Lt. Doe acted in the best interest of safety; therefore, no further action deemed necessary."

When higher headquarters received the alleged violation report and the indorsement it was cognizant of the fact that a written report by mail, TWX or other means, including a fully detailed report of the instances, should have been mailed or sent to the Commanding Officer of the pilot's home station within 24 hours after the incident occurred, and a copy sent to the pilot's immediate superior. Therefore, higher headquarters indorsed the alleged violation back to Lt. Doe's commanding officer, asking that a copy of the written report turned in by Lt. Doe be attached to the alleged violation. A written report could not be attached to the alleged violation report because none had been written. It caused embarrassment to everyone concerned, especially to Lt. Doe and his C.O.

Then there is type number three, the "didn't know" type of violator. This is too common among pilots who are not sufficiently interested to find out things they should know in order to fly an aircraft safely. A pilot was cleared IFR on a cross-country flight and did not report his positions to airways stations or CAA radio range stations, thus causing excessive delays on letdowns and takeoffs of aircraft from all bases in his vicinity. Upon asking why he did not report his position over the CAA compulsory reporting points, he stated that he did not even know how to tell what or where a CAA compulsory reporting point was. (It's every range station you pass on IFR.)

Finally we have the "I know it's wrong but think I can make it" type. This generally involves violations that not only endanger the pilot's life, but other people as well.

Example: A pilot cleared on a cross-country VFR flight with more passengers aboard than he had safety belts. He had just enough parachutes for all passengers, but did not have extra parachutes as required by regulations. He was on his way to his home station, having been away for approximately one week.

The weather along his route of flight and at his destination was marginal, and he noticed weather lowering below marginal near his destination. As the radio range station was inoperative at his destination, he could not obtain an instrument clearance. He knew that an instrument clearance should have been obtained in order for him to continue his flight safely; he also knew that the range was inoperative, necessitating the violation of an Air Force regulation should he choose to continue on to his destination. He knew that his wife was expecting him to be home that night, so with little further thought he continued and landed at his destination, which was reporting instrument conditions.

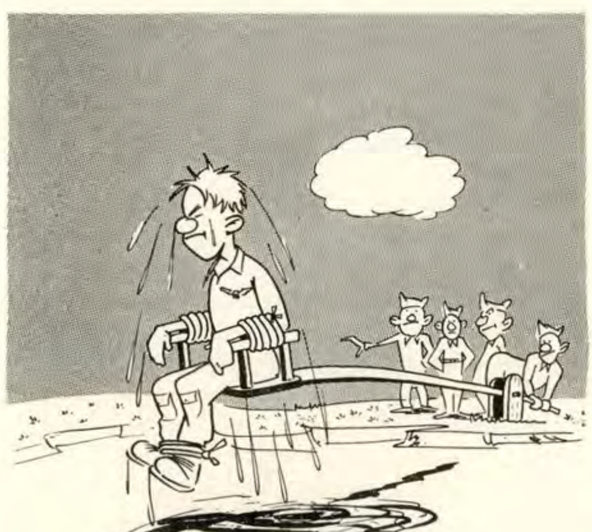
On the cases discussed above, you will notice that the most frequent violations are of Air Force Regulations 60-16, 60-16A. Air Force Regulation 60-16 covers just about everything a pilot should know in regard to flying, and it behooves all pilots to be aware of its contents. The Air Force as a team has no place for individuals with no consideration for their brother airmen.

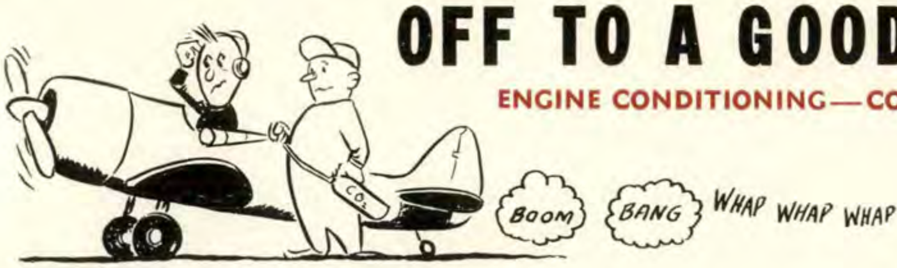
Each time the civilian population observes an Air Force pilot breaking an Air Force Regulation, it reflects not only on that pilot, but on every officer and airman in the Air Force. Each time an Air Force pilot does not file a position report while under IFR, he delays the takeoff and landing of a number of other Air Force and civilian pilots. In most cases, violations cause added expense to the U. S. Government and added worry to a number of personnel.

Supervisory personnel should know the regulations and the trouble violations cost Flight Service, Air Traffic Control and other pilots when one of the regulations is broken.

It might impress the individual violator much more if, instead of having an alleged violation report written on him, we could assemble all the people whom he had caused trouble and worry, place them in a large room, push the offender in and say, "Here he is, gentlemen." I'm sure he would be impressed. Obviously we cannot do this, but we *could* publicize the violators by other means to achieve the same beneficial effect.

On one base during the war when a regulation was broken by a pilot, his picture, his name and the regulation which was broken were placed on all bulletin boards for one week. Needless to say there were fewer regulations violated on that base thereafter. The simple but unmeasured power of public opinion could be a great force to help reduce violations if each base in the Air Force would implement some program to point publicly to each violator and his violation.





OFF TO A GOOD START

ENGINE CONDITIONING—CONTINUED*

**Ed. Note: This is another of a series of articles describing the efficient and economical results obtained through the performance of engine operating procedures and maintenance techniques developed by the Maintenance Technical Section of Air Materiel Command. For the information of engineering officers, AMC announces that special engine conditioning equipment such as compression testers, magic wands, valve-timing discs and pointers are now available in stock.*

THE NUMBER OF ERRORS committed by both flight and maintenance crews in operating aircraft engines are many and varied and have diverse effects on engine life and maintenance required to keep aircraft in a serviceable condition.

These errors are not committed with the thought in mind of actually doing damage, but are the outgrowth of hand-me-down procedures, dissemination of improper and incorrect information, and a lack of understanding of some of the basic phases of engine and aircraft operation.

The tendency for both flight and maintenance personnel to conduct rapid ignition system checks generally results in the covering up of sufficient ignition system difficulties so that actual engine malfunctioning is not encountered until after the aircraft is in flight. In this connection, there are also the "conscientious" boys who will turn the ignition switch from left or right position back to *Both* when the rpm drops to what their conscience will normally allow. When tests of this type are conducted why bother with the mechanical motions of the check?

As a result of misunderstandings and varying views regarding starting techniques, engines are "hydraulicked," backfired, and generally mistreated. This often results in broken connecting rods, blown air scoops and screens, and other structural damage.

In view of these malpractices, it becomes readily apparent that our total Air Force effort is greatly reduced. For example, a given operation that requires 20 B-29s usually winds up with an alert for 30 or more B-29s together with equipment and personnel. When one stops to consider a half-million dollars per plane it can be seen easily that in an operation as large as the Air Force operation, these petty malpractices cost a tremendous amount of money and result in a comparable amount of wasted manpower.

Not only does the Air Force lose in efficiency and economy, but also in the number of aircraft accidents in which both planes and crews are lost. Hence, it is obvious that it is a major responsibility of every maintenance man, engineering officer, and aircrew member to do everything within their power to further the safety of flight.

Safety of flight should never be a gamble!

From engine starting to engine shut-down, do it right.

Engine Starting — To simplify the procedure, starting is broken down into 14 steps:

The *ignition switch check* is to determine definitely that the ignition system is "off" before any attempt is made to pull the propeller through when checking for hydraulic lock prior to engine start. This is because the ignition system on an aircraft engine has a magneto capable of producing a spark at the spark plug at exceptionally low engine speeds.

Hydraulic lock in a cylinder results from oil or fuel collecting in the lower cylinders of radial engines. Thus, if an engine start were to be made with a hydraulic condition in one of the cylinders, the cylinder would be blown or more likely the connecting rod would be bent or broken. In this connection, slight hydraulic locks are probably the more serious since they would not be detected at the time the bending of the rod occurred, but would probably result in a complete rod failure in flight.

Approval is now granted in T.O. O2A-1-29 to make the check for hydraulic lock with the aid of the starter by energizing and then engaging the propeller intermittently to accomplish rotation of the crankshaft of the engine. Turning the engine through in this more rapid manner tends to pick up fuel or oil lying in the intake pipes more readily and results in hydraulic locks showing up that would not be apparent when the engine is turned by hand. When using the starter for "pulling through the props," sufficient force will not be exerted to bend a rod or blow a cylinder in the event a hydraulic lock is encountered. However, once a hydraulic lock is detected under no condition should the propeller be rocked either by manual effort or with the starter. The hydraulic lock is eliminated by removing the spark plug of that cylinder and then by pulling the engine through several rotations.

A *brake check* is to eliminate ground accidents by making sure that the brakes are on and locked. Because of the limited power available in the aircraft battery, it is considered essential that an *external power source* be used whenever possible.

Make sure that the *prop pitch* is in the full low pitch, high rpm (except for certain trainers), since an attempted start in any other position would make starting difficult and may result in engine backfiring, immediately after the engine starts.

Fuel valves should be in a proper position to provide an adequate supply of fuel to the carburetor since fuel starvation can result in starting difficulties or severe engine backfire.

For normal weather starts the *throttles* should be adjusted to 1000 to 1200 rpm position. A normal reference position on the quadrant can be established after repeated starts.

Carburetor mixture control should be in the idle cut-off position since any fuel dumped into the intake pipe or into the blower section prior to the time the crankshaft starts rotating may cause a hydraulic lock.

The master ignition switch should now be turned to the "on" position in preparation for the final phases of engine start.

The selector fuel valve and booster pump should be turned "on" and a check of fuel pressure made. Attempted starts made with the fuel selector valve in an off position results in serious overheating of the starter because of long cranking periods used.

Energize the starter by holding the energizing switch in the "on" position for approximately 15 seconds or until the starter speed is up to maximum.

When the starter speed is up to maximum rpm the starter should be *engaged* and the propeller allowed to make at least one complete revolution before the ignition switch is turned to the "on" position.

Next, the *primer switch* should be engaged and held in the "on" position until after the engine has roared to life and the engine speed stabilized. Thus, we have a controlled quantity of air as determined by the throttle setting and by engaging the primer after the engine is rotating. We go from a too-lean or non-combustible mixture up to a combustible mixture, at which time the engine starts. By holding the primer "on" the engine will continue to run.

In making the transition from primer operation to *carburetor operation*, the mixture control should be moved to the auto-rich position slightly sooner than the disengaging of the primer switch in order to permit the carburetor to come up to operating pressures.

Warmup should be made at an engine speed where maximum engine stability will be obtained, usually from 1200 to 1600 rpm or where engine operation sounds smoothest. During the warmup, all instruments relative to engine operation should be checked continually to determine that all phases of engine operation are correct.

The engine check should be made using a cockpit check sheet based on T.O. No. O2A-1-88 as a guide.

To obtain the maximum trouble-free service life from aircraft engines a few simple rules should be employed regarding stopping the engines. First, run the engine at 1200 to 1600 rpm for a time to permit cylinder head temperatures to stabilize at their lowest value for this speed. This will generally result in less harmful effects on metal parts after the engine has been stopped since the cooling rate has been lessened from that of a very hot engine. Also, operation at this speed results in a more efficient scavenging of the oil from the engine and consequently less possibility of a hydraulic lock exists at the next start. After engine temperatures have stabilized, the engine may then be stopped by moving the carburetor mixture control into the idle cut-off (or full lean) position. After the engine stops, move the throttle to the full rpm position and turn the ignition and master ignition switch to the "off" position.

Remember, always treat your aircraft engine with consideration. It may save your life.

SEVEN SENTINELS

By LT. RODGER W. LITTLE
Flying Safety Staff

THE ROCKY, RUGGED, WOODED TERRAIN of the Rocky Mountain region has claimed the lives of many persons. It is a tough job to find and rescue the crew members of crashed airplanes in these mountains.

Through the cooperation of both military and civilian organizations in that area a feasible rescue plan has been put in operation which is called the Seven Sentinels.

The Seven Sentinels consist of the following organizations:

1. 9th Air Rescue Unit based at Lowry.
2. Civil Air Patrol.
3. Air National Guard.
4. Colorado Ski Patrol (Branch of National Ski Patrol).
5. National Forestry Service.
6. State Highway Patrol.
7. American Red Cross.

To supplement these services during an emergency there are the Lowry-based aircraft and personnel, Air Reserve, Navy, MATS, the ski units of the Army Field Forces at Camp Carson, Colorado, and the Rocky Mountain Rescue Group. The latter is composed of professors, doctors, and students of the University of Colorado. They have been known for their daring in rescue operations and will drop their work at the University to go to the rescue of any crash victims.

With this setup in operation, the maximum effort is made for rescue anywhere in Colorado, Utah, Idaho, Montana, western Dakotas, Kansas and Nebraska.

Also the Adjutant General of the State of Colorado has made the Seven Sentinel system a part of the state defense plan.

Let's take the case of a C-47 that was lost in the Rocky Mountain region. As soon as its fuel supply was definitely known to be exhausted, a communications check by way of CAA and AACS was initiated.

In the meantime, the 9th Air Rescue Unit at Lowry was alerted to stand by. When it was apparent the plane was lost, the Seven Sentinels went into action. Lowry AF Base serves as the clearing house for proper handling of the Sentinels. The news of the lost C-47 was flashed to six radio stations, two newspapers, and three wire services in Denver.

The Air National Guard and CAP got into the blue as soon as daylight came and began their search work from the air. Close cooperation between them resulted in a sort of checkerboard search that covered all the terrain where it was believed the C-47 went down.

Sheriffs all over the state are organized to operate with the ground forces. The Ski Patrol maintains liaison with the airplanes and with Lowry.

The Park Service has a self-sustaining rescue setup and the parks are quickly checked. The park employees can work outside park boundaries too.

When the C-47 was found by the searching planes, the ground forces were notified of the location and needs of the survivors of the C-47. They had learned this via the sign language that the survivors laid out in the snow with strips of fabric, parachutes, pieces of wood and stones.

Almost every emergency is covered by the sign language. The call for medical help is the simplest of all: a single straight line ten feet long and two feet wide laid out in a manner noticeable from the air. All of the signals are shown in the chart.

The 9th Air Rescue Unit has a weasel which can get through some mighty tough country. The rescuers reached the survivors in record time with medical aids and the Seven Sentinels had scored another successful save.

No one has been overlooked in this Seven Sentinel setup. Recently, a convention of the ham radio operators was held in Denver. This was to acquaint ham station operators with the problems of the Air Force in rescue operations as these operators are sometimes the only people who receive the weak signals of crash survivors. And they can maintain close liaison between the searching Sentinels and Lowry. This is necessary because the walkie talkies aren't always effective way back in the mountains. When contact is lost, so is efficiency.

The Seven Sentinels thus become a great organization of organizations, exhibiting the closest cooperation between the civil and military to make your flights in the Rocky Mountain region safer.

NO.	MEANING	SYM.	NO.	MEANING	SYM.
1.	REQUIRE DOCTOR SERIOUS INJURIES.	I	9.	PROBABLY SAFE TO LAND HERE.	△
2.	REQUIRE MEDICAL SUPPLIES.	II	10.	REQUIRE FUEL AND OIL.	L
3.	UNABLE TO PROCEED.	X	11.	ALL WELL.	LL
4.	REQUIRE FOOD AND WATER	F	12.	NO NEGATIVE.	N
5.	REQUIRE FIREARMS AND AMMUNITION.	≚	13.	YES. AFFIRMATIVE.	Y
6.	REQUIRE MAP AND COMPASS.	□	14.	NOT UNDERSTOOD.	JL
7.	INDICATE DIRECTION TO PROCEED.	K	15.	REQUIRE ENGINEER.	W
8.	AM PROCEEDING IN THIS DIRECTION.	↑			

1. Lay out these symbols by using strips of fabric or parachutes, pieces of wood, stones, or any other available materials.

2. Endeavor to provide as big a color contrast as possible.

3. Symbols should be at least eight feet in height or larger, if to avoid confusion with other symbols.

4. In addition to using these symbols, every effort is to be made to attract attention by means of radio, flares, smoke, or other available means.

An aircraft will indicate that ground signals have been seen and understood by, 1. rocking from side to side or, 2. making flashes with signal lamp.

An aircraft will indicate that ground signals are not understood by, 1. making a complete right hand circuit or red flashes on the signal lamp.

TAKING ADVANTAGE OF RADAR WEATHER

By AIR WEATHER SERVICE

THE AIR WEATHER SERVICE is intensifying its radar storm detection program with the expectation that more and more pilots will make use of this additional aid to safe flight.

Comments of pilots who have visited the radar installations at various USAF bases indicate that many are not familiar with the availability of radar weather information and radar terminology.

The radar set AN/APQ-13 used by the Air Weather Service for detection of precipitation furnishes much valuable information for the pilot. The set was originally designed as airborne radar, and has since been adapted for use by individual weather stations. This autumn 32 sets are in operation and 21 additional sets are on hand awaiting installation. When the program is completely implemented, 93 storm detection stations will furnish radar coverage over most of the United States.

Information obtained through the operation of this equipment is normally transmitted as a radar storm report (RAREP) in the remarks section of the hourly or special weather report for the station. Since the reports give the direction, speed, and intensity of storms within an average radius of 75 nautical miles from the station, proper interpretation of the report allows the pilot to obtain a picture of meteorological disturbances which might affect his flight.

In the ZI, RAREPS are transmitted in plain language, using ordinary weather symbols and abbreviations. An example of a typical report would appear on the hourly sequence in the remarks section as follows: RAREP SCTD—NE 30 MV6→25 XTNDS NW-SE 10 BY 2 MIS. Voice transmission of the same report would be given as "radar reports light scattered echo, 30 nautical miles northeast of field, moving from 270 degrees at 25 knots. Echo extends from northwest to southeast, and is 10 by 2 miles in area."

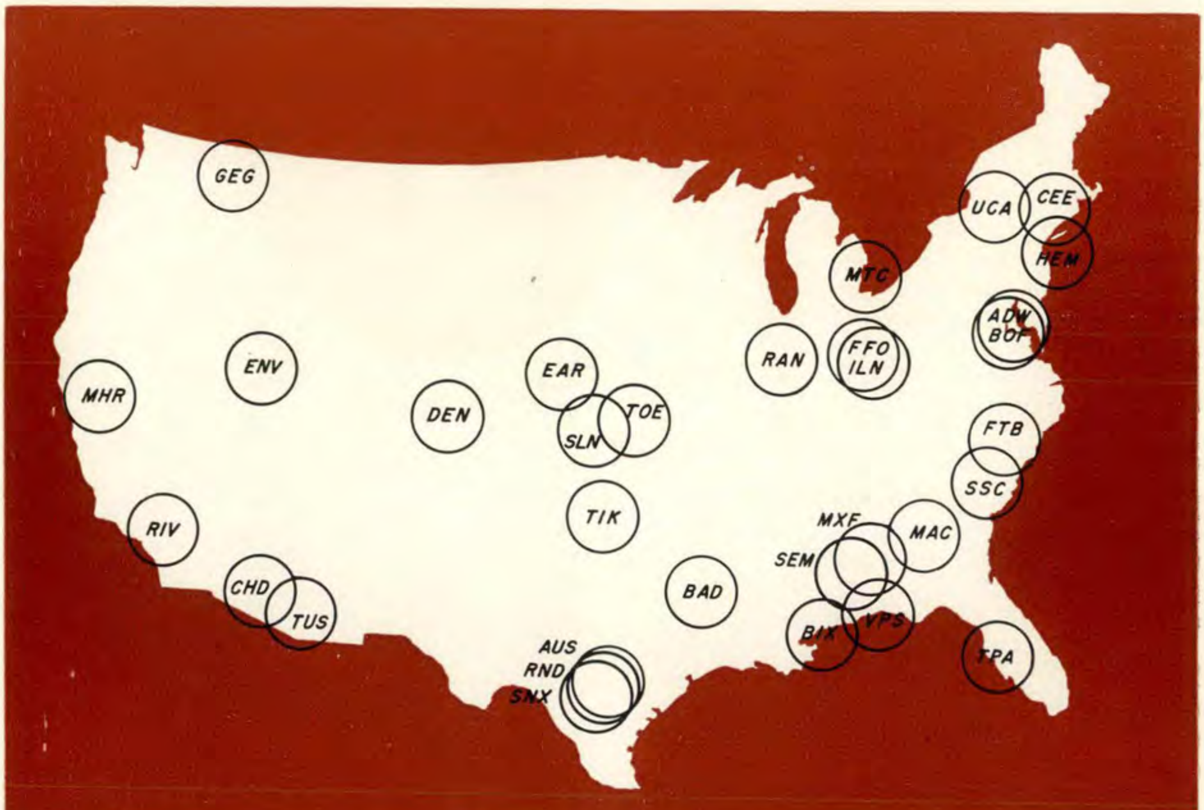
Such information can be obtained through normal radio channels from Air Force Weather Stations, upon the pilot's request, when the storms are within the operating range of the equipment. Echoes have been detected to 180 nautical miles, but the effect of terrain produces a blocking action which in some cases can materially reduce the effective range. Pending the outcome of a current Air Weather Service study on each installation, pilots should assume about 75 nautical miles coverage for a set.

The map indicates the bases now equipped for radar storm detection.

The rate of development or dissipation may be determined by tracking a given storm over a period of time. The intensity of the storm is determined by a qualitative evaluation of the brightness of the precipitation echoes. The position of the storm and its movement can be determined with a high degree of accuracy, and the height of the cloud tops can be roughly estimated by the operator.

The accuracy of radar information depends on the condition and location of the equipment and the degree of training of the operator. The Air Weather Service has been conducting an extensive radar storm detection training program, the objective of which is to provide additional qualified radar observers (storm detection personnel) at storm detection stations. A concerted effort is being made to improve the quality of reports rendered through use of this equipment.

If shower or thunderstorm conditions exist or are expected in the general area of flight, pilots are encouraged to request the latest RAREP information from the nearest Air Weather Service radar installation to assist them in planning the remainder of the flight with maximum safety.



Flying Safety BRIEFS . . .

FLY SAFE COMMITTEE

WHILE OVERSEAS BASES and commands have not been included in competition for FLYING SAFETY pennants, they have stepped-up programs to establish their own safety records.

Recently, leading other major bases in the Caribbean Air Command, Albrook AFB, Canal Zone, has piled up a total of 18,000 consecutive flying hours without a major accident. Included in the record are hazardous trips over the long stretches of water and rugged mountainous territory in Central and South America. These trips are made in the variable weather conditions found only in the tropics. Added to this is the lack of radio facilities and other navigational aids.

Captain Teaque G. Harris, Flying Safety Officer, gives credit for the accident-free hours to the pilots, aircrews and maintenance crews. However, there are three other important factors which have done much to promote safe flying. They are the pilot training program, station standardization board and the Fly Safe Committee.

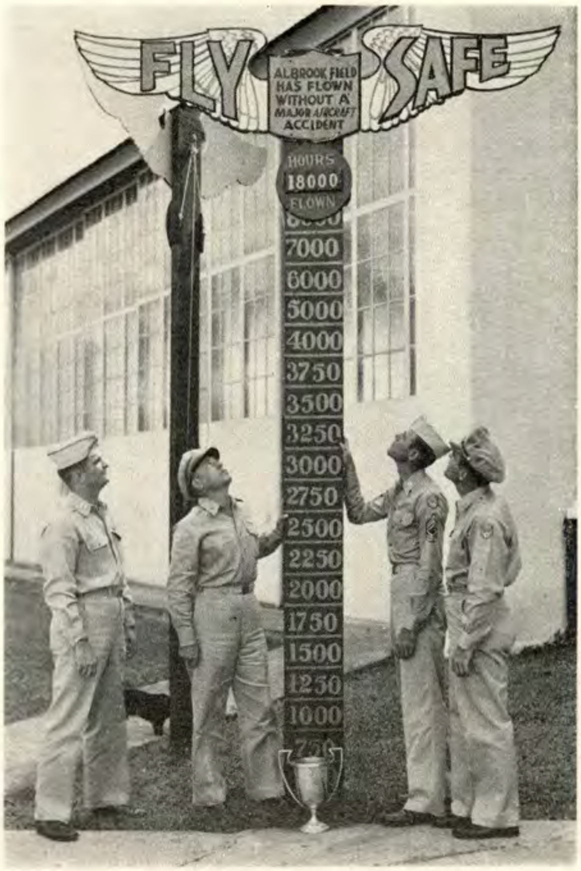
Supervised by the Flying Safety Office, the pilot training program consists of regular weekly meetings of all pilots holding less than a "command" rating. Lectures are given to the pilots by men experienced in the varied and numerous phases of flying from communications to meteorology. On occasion, guest speakers from local commercial airlines have addressed the group.

The standardization board is made up of veteran pilots who are judged the most proficient in the seven types of aircraft flown from Albrook Air Force Base. Regardless of previous experience, each pilot who flies a plane at Albrook must first be checked out by a member of the standardization board. Policies, as well as pilots, must also meet the approval of the board before they are approved for use.

Key officers of the base comprise the Fly Safe Committee. It is the responsibility of this committee to recommend appropriate action for pilots found to be lax in flying safety or guilty of infractions of safety regulations.

In the Flying Safety Office, Master Sergeant Wilburt Cowen keeps constant tab of the "good" hours and tabulates them on the huge "barometer" of accident-free hours. This is the tangible evidence of the degree of safety-consciousness which has been instilled in the Albrook flying personnel.

Not included in this 18,000 hours are those currently being flown by the Albrook-based 20th Troop Carrier Squadron, now in Germany doing a large portion of the flying in "Operation Vittles." However, the evacuation of military and civilian personnel from the city of Bogota, recently torn with internal political strife, was accomplished by 20th Troop Carrier flyers and those hours are represented in this excellent record. Also, while at Albrook, 20th Troop Carrier logged a great many hours in its flights to the Antilles and South America.



NO CANCELLATIONS

The "on-time" airline, the airline which makes all flights without cancellation because of weather conditions and gets its passengers safely there, the only true all-weather airline operating in the world today has completed two years of operation.

"The airline's record itself is a tribute to careful testing of new equipment which will aid all flying," Colonel J. Francis Taylor, chief of the All-Weather Flying Division, stated. "The schedule was set up to prove new equipment designed to make all weather flyable, and we were ordered to maintain a military precision schedule which would not tolerate takeoff or arrival error in excess of plus or minus sixty seconds."

The record shows that 1,055 flights were made between Clinton County AFB, Ohio, and Andrews Field, Washington, D. C. The airline carried 14,800 passengers a total of 45,510,000 passenger miles. During all these flights and passenger miles, there was no injury to passengers or crews for a 100% safety record. The airline averaged only 30 seconds' error in arrival and takeoff schedules over the two-year period.

Outstanding among the achievements during the two-year operation of the airline has been the work of the maintenance crews. Only four C-54's were assigned to the airline, and keeping these four planes ready for continuous operation with all of their delicate and complicated mechanisms is in itself an amazing example of efficiency and hard work.

Airline personnel are chosen carefully, and all pilots must hold a "green card," most coveted of all instrument ratings. Further requirements are a minimum of 2,000 hours' flying time, 30 hours' engineering, 30 hours' navigation, 12 hours' CAA regulations, 5 hours' theory of instruments, 8 hours' radio, 35 hours' synthetic training, and 100 hours of transitional flight training.

Fifteen night flights were scheduled and completed without change in the normal routine. Bad weather, while not the usual fare, was encountered many times with 27 flights completed in conditions under CAA minimums, defined as being 500 feet and visibility 1 mile at most fields. Six times in the two years the airline landed on time in zero-zero weather conditions. Weather at no time stopped the flights or caused the planes to be late.

The contribution to safe all-weather flying made to date by the pioneer efforts of the plane and crews cannot be measured, but it is certain that a long step has been taken toward the day when all planes fly on schedule at all times and get there at the minute planned.

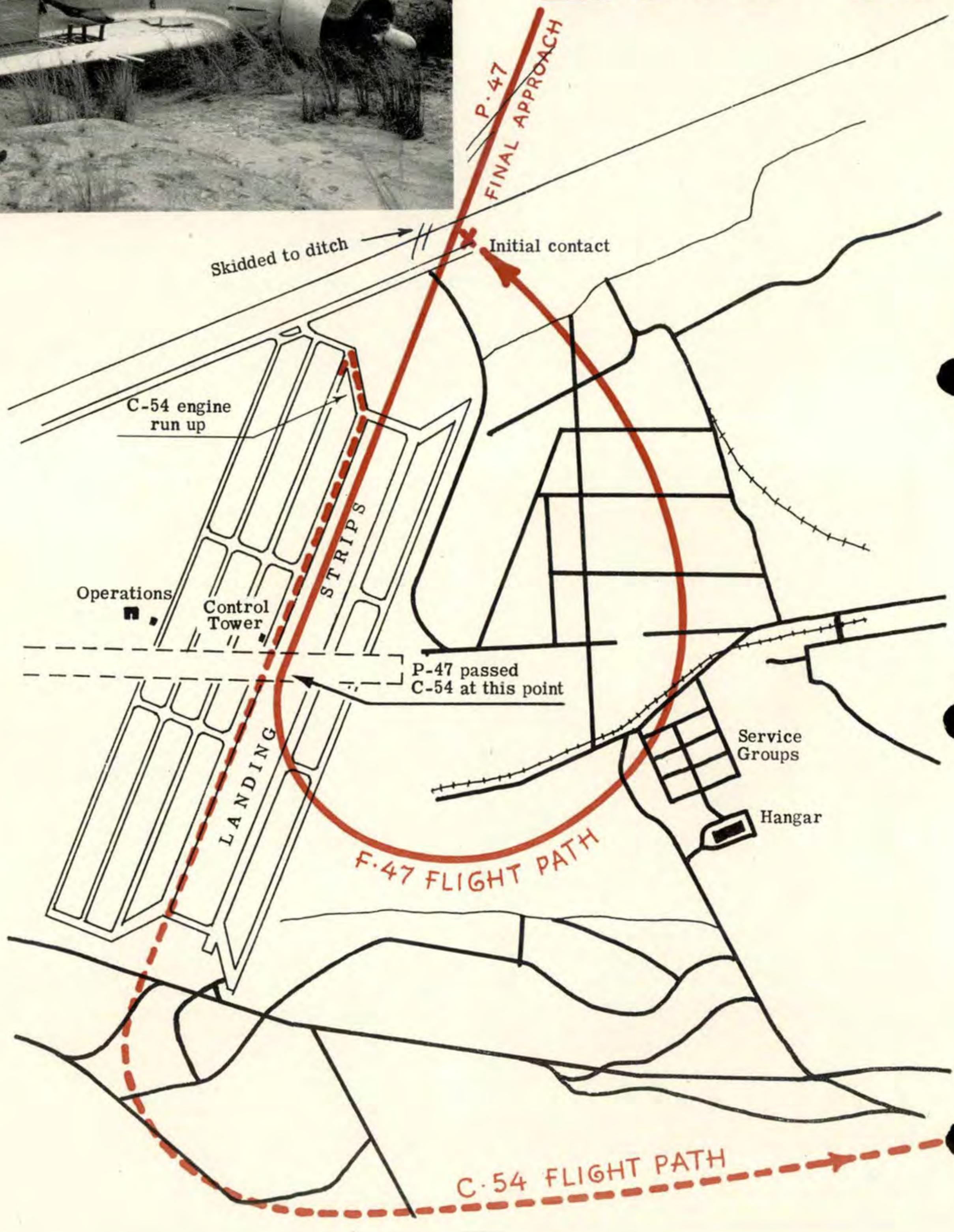
FIREMEN GRADUATE

The first crash fire-fighting school ever conducted in the Japanese Occupation Zone recently graduated fifty students at Tachikawa AFB, 18 miles west of Tokyo. The initial class was composed of teams of three men from each of the major Air Force bases in the Fifth Air Force.

The one-week course was divided into two phases: classroom instruction, and actual field demonstrations in the science of extinguishing crash fires and performing rescue work. Lectures and training films in the classroom curriculum covered such subjects as operation of fire fighting and rescue equipment, flying safety, first aid, crash kits, rescue of personnel by forcible entry into burning aircraft, and the maintenance of crash fire apparatus.

Graduates of the school are slated to go to other Fifth Air Force bases in Japan and help train crews which were unable to attend the coure at Tachikawa.

LOTS OF



P·47 FINAL APPROACH
Skidded to ditch
Initial contact
C-54 engine run up
STRIPS
Operations
Control Tower
P-47 passed C-54 at this point
LANDING
Service Groups
Hangar
F·47 FLIGHT PATH
C·54 FLIGHT PATH

ERRORS—

THE PILOT OF AN F-47 conferred with the crew chief before takeoff and learned that his plane had a new prop installed. The crew chief explained that the prop had been ground checked and asked the pilot if he would perform the flight check prior to his scheduled acrobatic mission.

All was well on runup and takeoff. At cruising altitude, the prop checked satisfactorily so the pilot proceeded on his mission.

An hour and a half later he found that the prop had stuck in fixed pitch. All emergency procedures failed to change the blade angle so the pilot headed for his home base.

Seven miles from the field, he called the tower on Channel B for clearance for an emergency landing.

The tower received the message approximately 30 seconds after a C-54 had been cleared to take the runway for takeoff.

The controller, taking into consideration that the F-47 would make a tactical approach prior to landing, believed that the C-54 had time to take off before the fighter reached the final approach.

Therefore, he cleared the F-47 for an emergency landing.

To make things more complicated the C-54 was working the tower on Channel A (VHF) and was not aware of the emergency landing about to take place. Also the tower was unable to transmit on all channels simultaneously because of an inoperative relay; thus the controller, in order to transmit to the two aircraft, had to switch rapidly between channels A and B.

With this situation prevailing, the F-47 came over the end of the runway on the initial approach. He noticed the C-54 rolling on the taxiway as he peeled off to the left.

The C-54 pilot, still unaware of the emergency, taxied out to takeoff position and, rolling slowly down the runway, requested takeoff clearance.

The tower controller advised the C-54 to expedite his takeoff, but the C-54 crew claimed the transmission was garbled, so the pilot again requested clearance. The tower repeated its instructions and told the C-54 pilot that an emergency was on the approach. Again these instructions were unintelligible.

Seeing the C-54 on the runway as he turned on the final approach, the F-47 pilot asked the control tower to "get that 54 off the runway."

At this time, an instructor pilot in the C-54 advised the pilot to hold until he could receive an understandable tower clearance. The pilot braked to a stop and the instructor again requested tower clearance on Channel A.

Seeing the C-54 stop, the F-47 pilot told the control tower to hold the C-54 where it was so he could land over it.

But during this transmission the tower was telling the C-54 pilot to expedite takeoff and he did.

After this, the tower called the F-47 pilot and advised him to go around. He had no alternative so he started retracting his gear for a go-around, utilizing the 1800 rpm and 30" Hg. available.

Noting the F-47 sinking rapidly toward the C-54, the tower controller changed his mind again and fired a red flare in front of the C-54, but it was well on its way. The F-47 passed a few feet off the left wing of the C-54 while the latter had an altitude of approximately two feet. The C-54 continued its normal climb out of traffic, but the F-47, with insufficient altitude and airspeed, crash-landed.

The pilot was knocked unconscious by the impact, but was otherwise uninjured. The aircraft was a total wreck.

With more errors in this accident than in a doubleheader ball game, the percentage error ran 10% maintenance error, 60% supervisory error, and 30% error on the part of the C-54 pilot.

Maintenance error was evident because the brushes had not been centered on the slip rings of the newly-installed prop. This improper contact and resulting arcing and burning effected complete severance of electrical connection to the propeller control mechanism, making it impossible for the pilot to change pitch in any way.

Supervisory error was that the tower controller failed to refuse to work the C-54 on Channel A, failed to notify the C-54 pilot of the emergency until he had taxied onto the runway, cleared the C-54 for takeoff at the last moment, and he failed to use the Aldis lamp to control the C-54.

Pilot error was attributed to the C-54 pilot because he used Channel A instead of B in violation of established communications procedures. Also, he taxied onto the live runway without clearing the approach properly. Only the alertness and skill of the F-47 pilot prevented a major tragedy. In fact, the F-47 pilot was the only one using sound judgment, even though he was the guy behind the eight ball, as is often the case.

MEDICAL SAFETY

WITH THE APPROACH of cold weather, flying personnel are again beginning to think of the efficiency of heating systems in aircraft. Information submitted to this office from the surgeon at Mitchel Air Force Base will serve to illustrate some of the problems with which both medical and flying personnel can expect to deal. It is possible that this same type of event will be seen at more than one place.

On a recent flight of a B-25 from Wright-Patterson AFB, the pilot and copilot felt extremely fatigued and unduly sleepy. They experienced sensations of dizziness, lack of orientation, and had difficulty in recognizing the airfield at night. After landing, both officers went to the dispensary to get relief from their headaches.

Medical personnel on duty recognized that more than a headache was involved and took blood samples. Analysis of the blood specimens indicated the presence of carbon monoxide in their systems in quantities sufficient enough to cause adverse physical symptoms. The flight surgeon, using the information from the blood analysis, combined his efforts with the engineering officer and conducted several tests on the B-25 the two officers had flown. It was discovered that when the aircraft had the gasoline type cabin heater in operation and the fresh air vent on the copilot's side of the cockpit open, dangerous amounts of carbon monoxide could be detected in the cockpit. Examination of the exterior of the fuselage disclosed that the exhaust outlet for the cabin heater was directly in front of the exterior opening of the fresh air vent.

Interrogation of aircrews indicated that the hot air outlet of the cabin heater was directly over the feet and legs of the copilot. Thus it is easy to understand why this portion of the body would become unduly hot in flights of several hours' duration. The copilot, in an effort to reduce the uncomfortable heat on his legs and feet, would open the fresh air vent on his side of the cockpit slightly. Many B-25's have a soot streak which passes directly over this vent opening. This situation may introduce carbon monoxide and exhaust gases into the cockpit during cold-weather flying.

This illustrates how flying personnel by reporting their physical symptoms to a qualified flight surgeon can aid in the investigation and remedy of aircraft conditions which are quite capable otherwise of producing, in some instances, fatal results.

Since all aircraft do not contain gasoline-type cabin heaters, it is pointed out that supervisors and maintenance personnel have a great responsibility in checking the maintenance condition of exhaust heater exchangers in aircraft such as C-45's, C-47's, and T-6's. Many of these heating devices are overlooked or checked inadequately at the 50- and 100-hour maintenance inspections.

VIOLATION!

IF YOU ARE AN INSTRUMENT CHECK PILOT, this story may be about you. When you finish, put it down and ask yourself, "Could one of the pilots I have checked cause the same situation through his lack of instrument proficiency?"

A C-47 cleared VFR from a mid-western Air Force base with Mitchel AFB as the airport of his first intended landing. En route, the pilot encountered weather which necessitated changing his flight plan to IFR. The C-47 was cleared to proceed IFR at 9000 feet, to report when over the range station at his destination for clearance to let down. Weather en route and at destination was above, and forecast to remain above, white card minimums. Arriving over the station, the pilot contacted the radio range station and was cleared to the tower. The pilot requested GCA through the tower, but was told that GCA was inoperative. It seems that the GCA unit had become stuck in the mud when an attempt was made to move it to another runway. A strong crosswind had brought on the decision to move the GCA unit.

In the meantime, two other aircraft arrived over the range station. The first, a B-26, was instructed to hold at altitude until the C-47, which had been cleared, reached the high cone. The other airplane, an F-61, was given an expected approach time and told to hold on a leg of the range. The weather was now below white card minimums.

The C-47 pilot proceeded to wander all over the eastern seaboard. Several attempts were made by Mitchel tower to contact him. Contact was finally made. The C-47 pilot steadfastly refused to proceed to his alternate. The F-61, running short of gas, declared an emergency and was sent to La Guardia, where a successful GCA approach was made. The B-26 pilot, becoming alarmed at the antics of the C-47, took a quick inventory of the 100 octane aboard and decided to make tracks to La Guardia where his only concerns would be a low ceiling and poor visibility. Just as the F-61 broke out over La Guardia with a 100-foot ceiling, the C-47 popped out of the clouds right over Mitchel. The C-47 pilot had been following the GCA instructions given to the F-61.

How that happened, no one will ever know. How a pilot can let down on one field from the instructions given by the GCA unit at another field some 15 miles distant and not become a permanent member of the Royal Order of the Six Silver Handles is inconceivable. Of course, this pilot may be saving himself for bigger things like Pikes Peak or an office building whose roof is above white card minimums. Who knows?

All three of these planes were landed safely, two by know-how and one by who-knows. The C-47 pilot violated AF Regulation 60-16 in that he did not proceed to his alternate airport when existing weather was below white card minimums. The pilot failed to report this violation in accordance with paragraph 71, AF Regulation 60-16. And who knows, maybe other pilots checked on the gages by the same instrument check pilot who signed the C-47 pilot's ticket will be just as lucky, maybe. Who knows?

SEA RESCUE PROCEDURE

NAVAL AVIATION NEWS announces a Rescue procedure to be used by aircraft trying to attract attention of ships to rescue downed personnel in the water has been put into operation by the Navy.

The system is standard for all planes on a world-wide basis. Planes will circle the vessel at least once, fly across the bow at low altitude, opening and closing the throttle, or changing propeller pitch, when possible. Then they will head in the direction of the distress scene.

This procedure will be repeated until the vessel acknowledges by following the plane. The aircraft will use the Aldis lamp, radio or message drop to explain the situation if possible. The surface craft should follow the plane or indicate that it cannot comply by hoisting the international flag "Negat" (meaning "no" or "negative") or by other visual or radio means.

The value of this system depends on normal aircraft maneuvers around ships being such that they cannot be mistaken for a distress procedure. Pilots are directed not to simulate aerial attack on fishing vessels or other ships (except previously arranged targets) so there will be no misunderstanding when a real distress "run" is made.

PILOT EJECTION SEAT

Further experimentation to perfect an ejection seat capable of safely propelling a pilot from high speed airplanes is being carried on at the Aero Med Lab, Aircraft Lab, and Aviation Ordnance of AMC. As a result of this project a new method has been developed which will eject both pilot and seat, at a maximum acceleration of about 15 G, within 0.25 second at the required velocity.

The pilot and the ejection seat, with a combined maximum weight of 300 pounds, will be ejected from the airplane at a velocity of about 60 feet per second by a 34-inch telescoping gun with a 65-inch stroke. The ejection gun is powered by a 77 gm charge of IOW 6330-S powder. The 15 G acceleration thus produced is about 10 G below the maximum which man is capable of withstanding.

Addition of arm rests to the ejection seat has reduced the effect of rapid acceleration upon the vertebral column of man. When the arms are properly placed on the rests, they will transmit some of the acceleration to the shoulders and thus relieve the pressure upon the spinal column.

TWO-FLARE LANDING

Four-engine airplanes, which maneuver for landing at 140 to 165 miles an hour, have time to land while two general-use flares are burning, tests ini-

tiated by the Civil Aeronautics Administration have proved.

Flare drop tests were made at Patuxent Naval Air Station, using a Navy DC-4 to determine if fast, four-engine airplanes of the DC-4, DC-6 and Constellation type could maneuver in time to make emergency landings with the type of flares now in commercial use. The flares were dropped at three-minute intervals. The first was dropped at 3,000 feet, the second at 2,000, the two burning a total of six and one-half minutes. The plane landed easily between the fifth and sixth minutes.

KEEP MAPS UP-TO-DATE

The paragraph headed "Up-to-date Flight Maps" in "Wing Tips," July 1948, advised Air Force personnel to use the last page of Airman's Guide to modernize their map files. This method will work for the United States and Alaska. However, Headquarters Aeronautical Chart Service advises that the correct method of maintaining a current Aeronautical Chart file is through the use of the Aeronautical Chart Service Bulletin.

The Aeronautical Chart Service Bulletin is published twice monthly and lists all the aeronautical charts that were published during the fifteen-day period prior to the date of issue. Charts published by the Hydrographic Office, Coast and Geodetic Survey and Aeronautical Chart Service are all listed. Upon receipt of the Bulletin, operations officers should check each chart in his stock against the Bulletin to determine whether a new edition is available. Those charts for which a new edition is listed should be ordered immediately. When the new edition is received, the obsolete charts should be destroyed. Reference AAF Regulation 62-85, 62-85a and 62-85b.

In addition to the latest chart editions, major chart corrections are also listed. Periodically, supplements are forwarded with the Bulletin listing all the aeronautical charts of one series with the latest available edition. An additional advantage is that this Bulletin furnishes world coverage.

Air Force Units using aeronautical charts that are not receiving the Aeronautical Chart Service Bulletin should address the Commanding Officer, Aeronautical Chart Service, Building T-7, Gravelly Point, Washington 25, D. C., requesting that they be placed on the automatic distribution list.

SINGLE-POINT SERVICING SYSTEM

A single-point servicing system which will refuel a heavy bomber with 20,000 gallons of gasoline in one hour with only two men needed to perform the operation has been perfected by AMC.

The new method is expected to replace the conventional multi-point system which has separate inlets for each tank. It also avoids the danger of overfilling and the use of much bulky ground equipment.

Other advantages of the single-point system are its ease of repair, a self-contained ground defueling rate of 150 gallons-per-minute, and the fact that all components of the system function satisfactorily at temperatures ranging from minus 65° to 135° F. The filler point or points are located so that the plane can be landed with wheels retracted without loss of fuel.

HOW RUGGED IS AN AIRPLANE?

Adapted from a report prepared by

L. S. WAIT

Administrative Test Pilot, North American Aviation

IT IS NO SURPRISE to designers and builders of airplanes when a pilot loses both wings in a high-speed pullout. Without questioning the pilot, if he survived, they could tell how many G's were torturing the plane when the failure occurred.

A military airplane is always designed to withstand certain pullout loads at a given weight. Not only the wing, but each portion of the airplane, fuselage, engine mount, and tail is designed to fail at exactly 100% of this design condition.

If some portion of the airplane fails at a higher load, it simply indicates that the material used in manufacturing that part of the airplane is excess weight with no value being obtained from such excess. As an example, repeated static tests of a wing will demonstrate that it will always fail between 99 and 101 per cent of its design load. Were the wing strengthened to take an excess load, say 13 G instead of 12 G, the next point of failure would probably occur in the fuselage at 102 per cent. And if this were strengthened, the engine mount would probably fail at not more than 103 per cent. In other words, only two things can be done to an airplane once its design has been completed: First, if maneuvers at maximum G's are required, the airplane must not be flown over its design weight; second, if flight is necessary at a weight greater than its design weight, a lower ultimate pullout factor must be accepted.

Beefing up one part of an original design, for example the wing root section, merely changes the wing failure point to another location. If in turn this location should be strengthened, either the wing will fail at another point, or the fuselage or engine mount will fail.

The only way to obtain an airplane good for higher ultimate pullout factors at higher gross weights is to start from scratch and design a completely new airplane. Actually, this was done in the F-51H, because structurally the H was brand new, and it is more stable than the D regardless of fuselage fuel or armament load.

The pilot's allowable pullout factor is usually given as two-thirds of the ultimate pullout factor where structural failure always occurs. He is permitted to use only two-thirds of the maximum G's for at least two good reasons. The F-51D will be used as an example. First, an F-51D can be subjected to the pilot's allowable pullout factor of 6 to 6.5 G's several thousand times before any structural weakness might develop, and the airplane will eventually be retired due to old age. If, on the other hand, the pilot's allowable is exceeded too often—for example 8 to 8.5 G's—the overworked structure is going to get tired and some permanent wrinkles will appear. Any pullout over 9 G's is plainly inviting trouble and will result in wrinkles that will remain in the wing after the airplane lands. Pullouts at 10 G in F-51D's with all internal fuel tanks and ammunition boxes full will cause complete failure of the wing.

The second very good reason for never exceeding the allowable two-thirds factor is to allow for pilot inaccuracies and turbulent air. It can be observed while flying through prop wash or moderately turbulent air that an acceleration factor of 2 or 3 G can often be obtained. If the pilot should be applying the limit acceleration of 6 to 6.5 G and suddenly encounter such rough air, these accelerations will be added together instantly, with the net result that the airplane might be subjected to its ultimate load factor and the wing might wrinkle or fail completely.

The original F-51 design was for a combat weight of 8,000 pounds and good for an ultimate pullout factor of 12 G, with a pilot allowable factor of 8 G. As a result of equipment and fuel tank location, the airplane was positively stable under all conditions of flight. This means that the pilot simply had to apply a pull force on the stick to produce G, had to push the rudder to produce yaw, and had to apply a side force on the stick to produce roll. In other words, the pilot always had to pull more pounds on the stick to produce more G in a turn; when this force was released the airplane immediately stopped turning. Very little trouble was encountered with instability or other peculiar flight characteristics at higher Mach numbers.

However, the progression of the war soon made it apparent that higher altitude performance was essential for the F-51. To meet these requirements, the heavier, more powerful Packard built Rolls Royce engine was substituted for the Allison with its smaller radiator and three-blade narrow chord propeller. The new engine made necessary a heavier radiator for proper cooling, and a heavier four-blade wide-chord prop to utilize the increased power at altitude. The result was an overloaded airplane which required that the pilot's allowable factor be decreased from 8 G to 7 G. The decrease in the G factor was not a serious factor as combat records demonstrated. What was adverse was that the increased engine power and four-bladed prop caused a marked decrease in directional stability. Further changes in tactics of the war made it necessary to add additional fuel to the F-51B, C, D and K airplanes. The fuselage fuel tank was installed with the airplane's center of gravity moving aft. This instability was dangerous in that a pullout at high speed was accompanied by a stick force reversal which, unless opposed by the pilot, would quickly carry the airplane into an accelerated condition where the wings would fail.

But it was felt that the additional range more than offset the disadvantages. It was necessary then to consume a large portion of the fuselage fuel before combat maneuvers could be executed.

The continued high incidence of structural wing failures in the F-51D is believed to be due to the pilot's inability to adjust his flying technique to an airplane which becomes unstable during high acceleration pullouts and turns or in attempting to fly an airplane made unstable by fuel or armament loads in turbulent air conditions or under instrument conditions. The natural and normal reaction of any pilot in executing a pullout or turn maneuver is to relax pressure on the stick as the allowable G acceleration is reached. The technique that must be used in handling an unstable airplane is not to relax pressure when the maximum safe G acceleration is reached. Rather, the pilot must definitely apply a push force to prevent further tightening of the turn and resulting G build-up.

Exceeding the allowable G's is not a test of pilot courage or physical strength, nor should it be used as a means of winning wagers from other pilots as to who can obtain the highest indicated accelerometer reading. Any airplane built must be flown within definite limits. It is mathematically certain that if the limits are exceeded the structure will fail.

I KILLED A MAN TODAY

YEAH, THAT'S RIGHT, MAC. I killed a guy today. A gun? Nah, nuthin' like that. Matter of fact I was a coupla hundred miles away ridin' in a C-46 when it happened. But I killed him just the same.

What's that? Yeah—yeah, sure, I'll talk about it. . . .

I guess it started yesterday afternoon—only it don't seem like it coulda been just yesterday—anyway, the engineering officer come over to where I was workin' and said we had to take an engine up to Olkosk Strip where one of our fighters had made a forced landing. Me and Sergeant Brinker and a coupla other guys were goin' up in a C-46 to change the engine.

We all quit what we was doin' and started gettin' the new engine ready to take up. There's a helluva lotta things you gotta do to a new engine before you can put it on a plane . . . we had to work late. . . .

I remember it was around 2100 when Davy comes into the hangar—Lt. David L. McIver, that is—his airplane was out for a 100-hour and he come by the hangar to see how near ready it was. That was just like Davy—lookin' after his ship—I remember even when we was kids Davy used to keep his bike lookin' like——

What? Yeah . . . yeah, we knew each other when we was kids. . . .

"Hey," Davy hollers to me as he comes in stampin' the snow off his boots and puffin' steam like a locomotive, "what are you doing working so late?"

"What you doin' nosin' around my hangar this hour of the night," I comes right back at him. He might be a big shot but that didn't cut no ice with me far as he was concerned. Hell, I was bossin' a ditchin' gang when he was a fresh high school brat. Always was fresh, Davy . . . cocky as hell . . . never got over it even when he went to college. Allus raggin' me cause I quit school in the ninth too. But it was my dough sent him through college.

Well, Davy comes over and watches me a minute. It was darn near as cold inside the hangar as it was outside except for the little portable heater I had.

"Heard they were sending you up on that Olkosk trip," Davy says. "They must not care whether they get that Mustang out or not."

I go right on safetying the carburetor I've just pressure-checked, thinkin' it's a good thing Davy didn't come in ten minutes sooner when I was usin' his ship to make the pressure check on the new carburetor. He allus raised particular hell when any-body but his crew chief laid a finger on that plane. I was afraid he'd notice I hadn't connected the hose back to his carburetor, but he just looked at the ship a minute, seeing the cowling all off and everything, then turns to me.

"Joe about through with my ship?" he asks.

"Said he'd have it ready for test some time after noon," I replies.

"Good, I won't have to get up early," Davy says, always thinkin' how he can spend an extra hour in the sack. "You know, I like the idea of each pilot test-hopping his own plane the way they do in this outfit," he says, holdin' his hands out to the heater.

"Yeah, you're such a hot rock you think nobody else could test-hop your plane right, huh," I needles him.

"Show a little more respect, grease monkey, when you talk to an officer," he grins. He ducks the greasy rag I sling at him as he goes out the door.

Well, I hurried the job quick as I could on the new engine. Then I connected the auxiliary hose on the F-51 I'd used to pressure check the carburetor and went to look for a clamp to put on the hose. Brinker came in just about the time that damn heater burnt out. We hurried as fast as we could to get through and get inside where it was warm. By the time we got all cleaned up and hit the sack it was near midnight.

Next morning we hadda get paid before we loaded the Charlie four six, and it was after lunch before we got off. I don't remember how far out we were when I remembered that hose clamp.

"Judas," I thought, "they'll just about be turnin' that ship loose for test." I went up front and grabbed Lt. Whitaker by the shoulder and told him about it.

He said we'd call the base by radio from Olkosk Strip when we landed. He couldn't seem to get it through his head that time was important. I went back to the radio operator and asked him if we could raise the base. He tried for ten minutes without success. We were just too far out.

We landed at Olkosk, and the Lieutenant tried to get the base on the radio but couldn't do it. He kept on tryin' because I made him.

"Dammit, Lieutenant, you gotta get through. Doncha get it? Joe ain't got no way in the world of knowin' I used his engine for that pressure check. There ain't a chance in a thousand he'll notice that hose clamp missin'. He was all through yesterday except buttonin' her up."

I kept hollerin' and yellin' at him to do something . . . do anything, but get through. . . .

Finally he says, "We'll just have to send back a TWX, Sergeant. That's the only way we can reach them."

"TWX!" I almost screams at him, "Don't you understand? Lt. McIver will be takin' that plane up any minute for a test hop!"

"Take it easy, Sergeant," he tells me, all unruffled like, "even if something does go wrong he can always bail out."

Well, course I didn't have no way of knowin' Davy had already taken off. He'd had radio trouble first time he taxied out. If we'd got through on the radio we coulda stopped him. . . . That's what gets me . . . we coulda stopped him!

They said he got to about 3,500 feet when they saw the fire. Davy pulled her almost straight up . . . musta been fightin' the flames in the cockpit tryin' to get out.

What's that? Yeah, he bailed out. He bailed out burned half to a crisp, his parachute burned all to hell . . . yeah, he bailed out all right straight to the ground without a chance. . . .

Nah, they can't tell for sure what caused the accident. Mighta been the main line drainage cock on the sump leakin'. Mighta been a broken fuel line. Mighta been a lotta things . . . only it wasn't. . . . It was a hose clamp I forgot to put on. . . .

Disciplinary action? Nah . . . didn't I just tell you they ain't sure what happened! Whatsa matter, ya deaf!

Only me, I'm sure . . . just as sure I killed him as I am he was my kid brother. . . .

LETTERS TO THE EDITOR

Dear Sir:

Our office is scanning carefully all AACS releases with the thought in mind of expanding a short item for submission to FLYING SAFETY if in our opinion the item is of sufficient stature to warrant submission to your publication.

May I mention that I consider FLYING SAFETY one of the most compact and informative service publications distributed today.

WARD CLARKE, *Capt., USAF, PIO.*

★

Dear Sir:

I enjoy the magazine you publish and I know that a great deal of good is accomplished by the accident reviews presented. I also believe that stories such as "There I Was — Or Was I" are good because they can stimulate some thought on the part of careless pilots. I don't receive a copy of FLYING SAFETY every month so if your office maintains a mailing list will you place my name thereon?

HAROLD D. SLAYDEN, *1st Lt., USAF.*

FLYING SAFETY *is mailed to units for distribution of one copy for every five persons engaged in flying activities. No individual copies can be mailed.*—ED.

★

Dear Sir:

The officers in this Command Headquarters have read with immense interest copies of FLYING SAFETY.

This publication has done much to enhance the Flying Safety and Accident Prevention Program of the RCAF Air Transport Command.

L. H. LECOMTE, *Wing Commander,*
RCAF Air Transport Command.

★

Dear Editor:

How can suggestions, improvements and new ideas be forwarded to the right parties? Is the Air Force interested in these?

Also, can an enlisted man submit technical and scientific articles to your magazine?

Six months ago I developed a faster, easier method of tuning a Bc-640-B VHF transmitter. I'd like to submit this procedure to the proper place. How do I do it?

JULIAN I. FEIGUS, *S/Sgt., USAF, Canal Zone.*

The Air Force is always interested in technical improvements. Such ideas as yours may be submitted through channels to Commanding General, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. FLYING SAFETY *welcomes contributions from anyone. Many of our better articles have been contributed by enlisted personnel.*—ED.

★

Dear Editor:

I believe the safety record of our GCA unit, the 165th AACS Squadron, is a dandy. Since put into operation at this airfield at the base of Mount Fuji in September 1946, 9,175 GCA approaches have been made. Not one accident or mishap has marred our runs which include landings made in zero-zero to practice CAVU runs.

The record comes from careful plans of operation, and the operators, all former pilots, realize that practice makes perfect. "Practice GCA Today" should be on every pilot's mind. GCA welcomes and wants their business.

WILLIAM J. HARRIS, JR., *M/Sgt., USAF.*

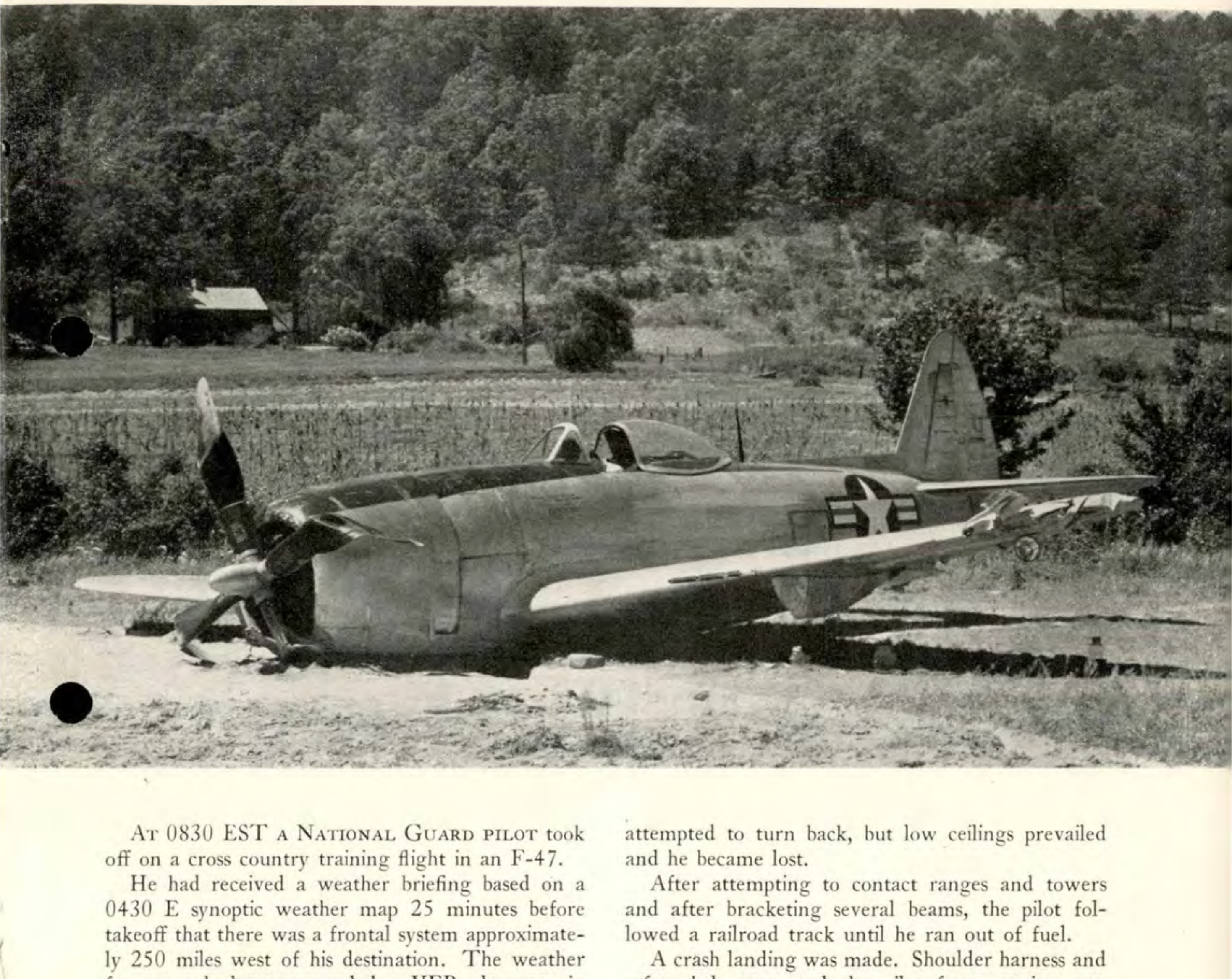
SAFETY QUIZ

1. While flying under IFR conditions, pilots are required to make position reports to
   A. CAA communications stations.
   B. both CAA communications stations and AACS airways radio stations.
   C. homing stations.
   D. commercial radio stations.
2. Frequencies and information on commercial broadcasting stations can be found in
   A. the Radio Facilities Chart (TO 08-15-1).
   B. the Radio Data and Flight Information (TO 08-15-2).
   C. Airman's Guide.
   D. Instrument Letdown Procedures (TO 08-15-3).
3. The aeronautical rating and instrument qualification of a senior pilot with a white instrument card (AF Form 8) is
   A. 3-1.
   B. 2-2.
   C. 1-2.
   D. 2-1.
4. When the authorized ceiling for an instrument approach, as listed in TO 08-15-3, Instrument Letdown Procedures, is less than 500 feet, the visibility shall not be less than
   A. 1 mile.
   B. 2 miles.
   C. 3 miles.
   D. 4 miles.
5. When flying on airways, a pilot should fly at
   A. a stated true altitude.
   B. a stated indicated altitude.
   C. an even altitude.
   D. an odd altitude.
6. An AF Form 23
   A. need not be accomplished for an IFR flight within a local flying area.
   B. need not be accomplished for a VFR flight between a home and an auxiliary base within a radius of 100 miles.
   C. need not be accomplished for a VFR flight from one station to another, provided the two stations are not over 300 miles apart.
   D. must be accomplished for all flights.
7. Airway Traffic Control approval is necessary for
   A. all instrument flights.
   B. VFR flights on civil airways.
   C. IFR flights off civil airways.
   D. IFR flights on civil airways.
8. A pilot with a white card (AF Form 8) may be cleared during daylight hours for a station which is forecast to have the following weather upon arrival. The minimum ceiling for this station is listed as 600 feet in TO 08-15-3.
   A. 800 ft. ceiling and ½ mile visibility.
   B. 700 ft. ceiling and 1½ miles visibility.
   C. 700 ft. ceiling and 2 miles visibility.
   D. 600 ft. ceiling and 1 mile visibility.
9. A pilot with a white card (AF Form 8) may be cleared at night for a station which is forecast to have the following weather conditions upon arrival. The minimum ceiling for this station is listed as 700 feet in TO 08-15-3.
   A. 800 ft. ceiling and 1 mile visibility.
   B. 900 ft. ceiling and 3 miles visibility.
   C. 700 ft. ceiling and 2 miles visibility.
   D. 600 ft. ceiling and 4 miles visibility.

★

1—B, 2—B, 3—B, 4—B, 5—B, 6—B, 7—A, 8—C, 9—B.

WHY?



At 0830 EST a National Guard pilot took off on a cross country training flight in an F-47.

He had received a weather briefing based on a 0430 E synoptic weather map 25 minutes before takeoff that there was a frontal system approximately 250 miles west of his destination. The weather forecaster had recommended a VFR clearance in view of the fact that the pilot would arrive well ahead of the cold front.

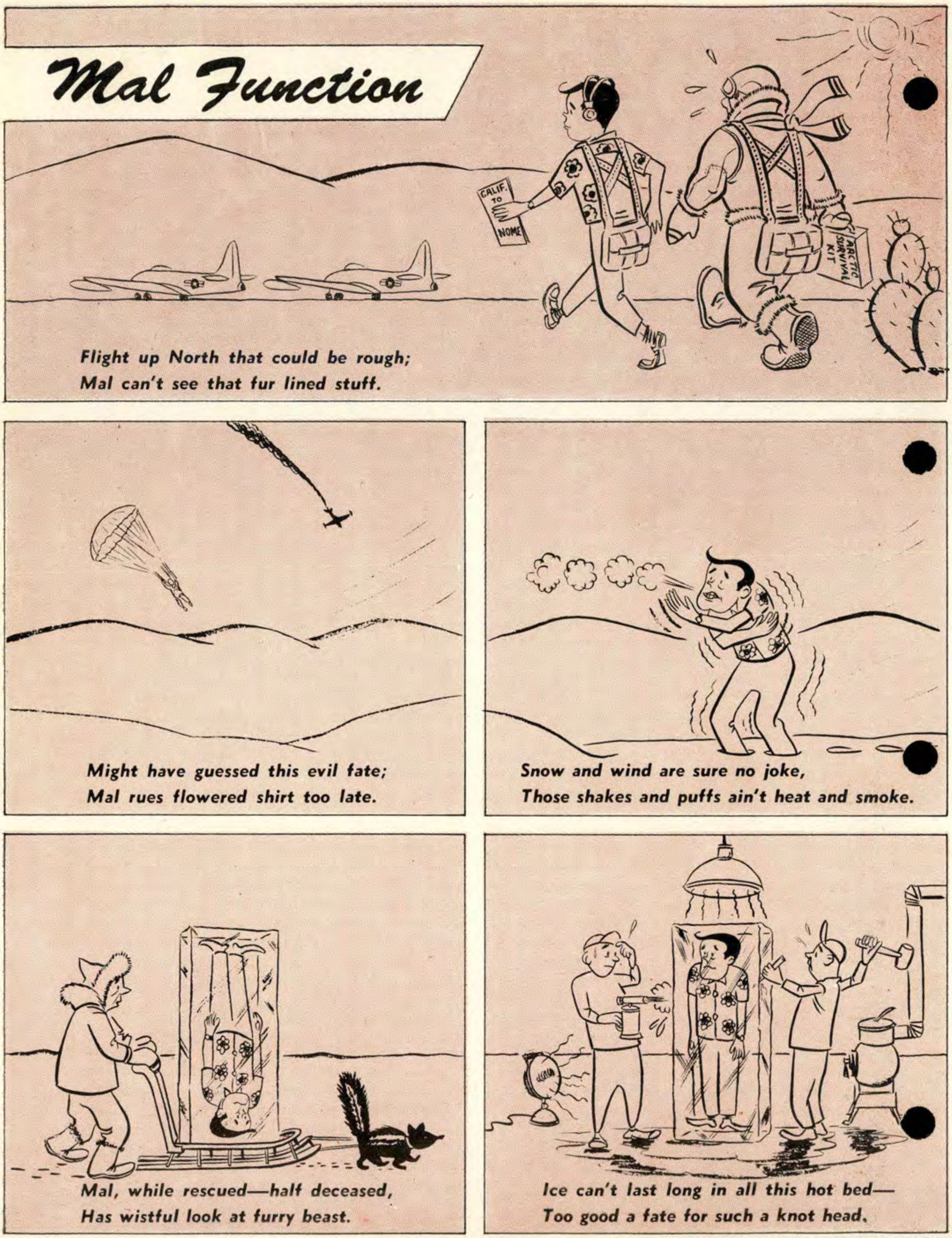
After one hour 40 minutes of the estimated two hours plus 15 minutes' flight, the pilot noticed the weather becoming marginal.

He continued on course for another 17 minutes until he encountered zero-zero conditions. Then he attempted to turn back, but low ceilings prevailed and he became lost.

After attempting to contact ranges and towers and after bracketing several beams, the pilot followed a railroad track until he ran out of fuel.

A crash landing was made. Shoulder harness and safety belt prevented the pilot from getting any more than a stiff neck, although the aircraft was wrecked.

Why the poor judgment in planning a direct flight with no radio contacts in view of a fast-approaching cold front? Why the pilot's failure to recognize the cold front and immediately make a "180"? Why the inaccurate weather forecast?



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