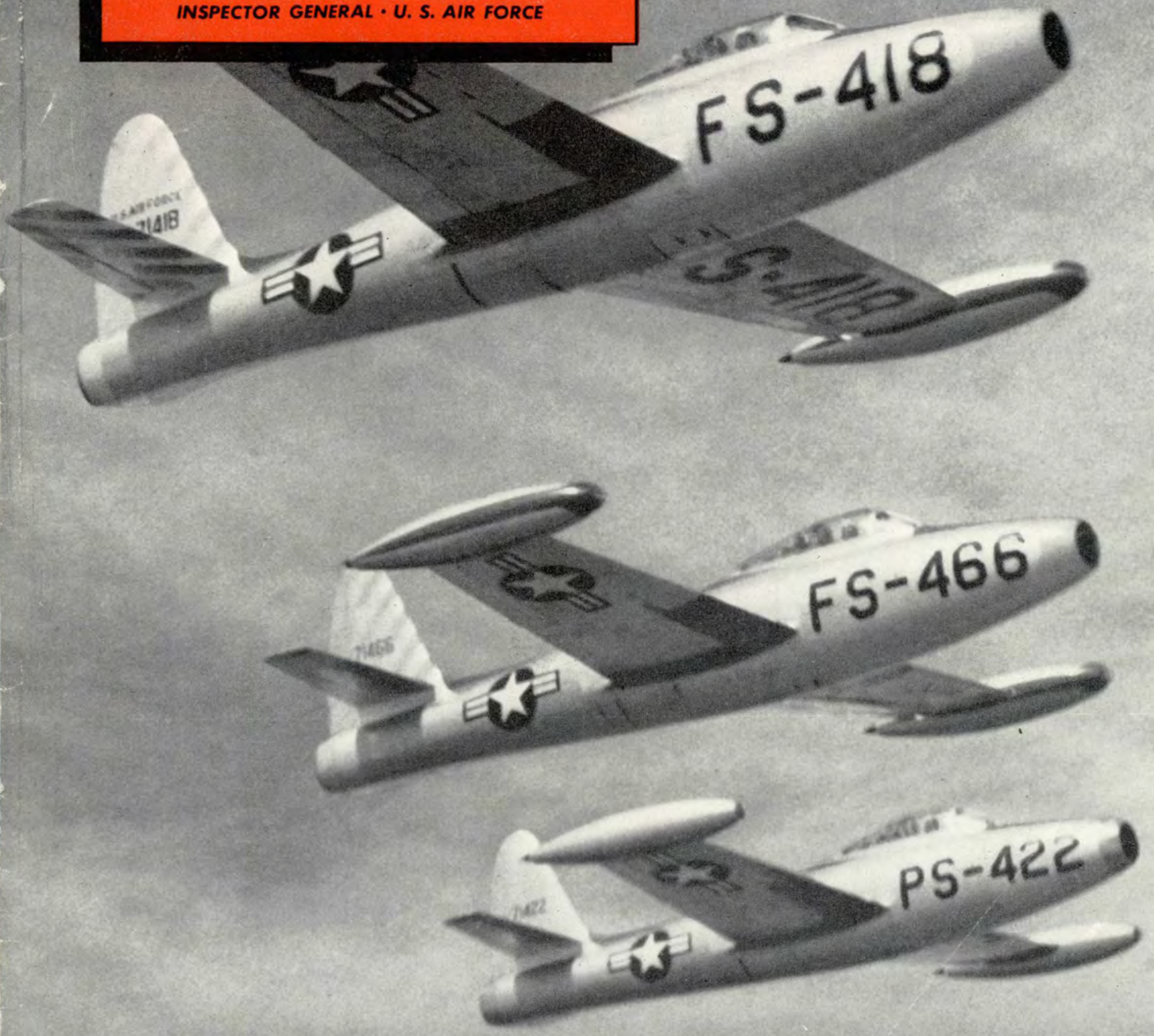
FLYING SAFETY

INSPECTOR GENERAL • U. S. AIR FORCE



ASK FOR FLIGHT SERVICE

page 2

JUNE 1952

A MEMBER OF THE TEAM
THE MAINTENANCE MAN

FROM any standpoint, the man who maintains airplanes is one of the most important persons in the Air Force. Upon the quality of his work depends the safety of those who fly. Good maintenance can mean a good safety record. The reverse is also true, of course. The man on the flight line must often work under adverse conditions. Like the postman, weather extremes cannot keep him from accomplishing the job—nor can shortages of equipment—nor can sometimes primitive working and living conditions. He is an important man. He deserves the respect and consideration of all who fly.

THIS MONTH

Our lead off article for this issue of FLYING SAFETY is in the form of a tribute to Flight Service, the men behind the scenes of your cross-country safety. These people are pretty much taken for granted by most pilots, yet they play a very important part in the safe completion of many flights. Although material for this article was obtained only from the centers at Maxwell and March Air Force Bases, all the other centers (Olmsted, Wright-Patterson, Carswell, Lowry, Hamilton and McChord) do the same type of work. This article is dedicated to all of them.

In last December's issue of FLYING SAFETY, we carried an article entitled, "GCA Saves Lives," which opened with the statement, "The GCA-ILS controversy is a closed issue." This inferred that GCA was the better system. We've been apologizing for that statement ever since. It seems that many Air Force pilots disagreed, some almost violently, claiming that ILAS is far superior to GCA. We withdraw our statement, and adopt herewith a neutral position. Actually, both GCA and ILAS are very good systems, it depends upon which the individual pilot is more familiar with as to which is better for him. The article on ILAS which begins on page 6 is intended to present the other side of the story. We hope it is written strictly from the neutral standpoint. But, we hasten to add, ILAS also saves lives. Incidentally, the article was reviewed by the USAF Instrument Pilot School, now located at Moody AFB, Ga., and we can therefore assure you that it is the latest word.

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DISTRIBUTION

Most Air Force Bases which have in the past been receiving in excess of 500 copies of FLYING SAFETY will find that their quota has been reduced this month. The reason is that newly activated or organized units have to be included in our distribution and the only way it can be done is to reduce existing distribution. We're attempting to obtain authorization to print additional copies, and if successful will restore all cuts. Meanwhile, we again ask the cooperation of all in insuring that available copies are passed around.

THE COVER

SHARPIES: Three Thunder jet pilots put on an exhibition of precision formation flying for the camera.

Flying Safety

DEPARTMENT OF THE AIR FORCE
THE INSPECTOR GENERAL, USAF

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The printing of this publication has been approved by the Director of the Bureau of the Budget, June 4, 1951.

Facts, testimony and conclusions of aircraft accidents printed herein have been extracted from USAF Forms 14, and may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in accident stories are fictitious.

No payment can be made for manuscripts submitted for publication in FLYING SAFETY magazine. Contributions are welcome as are comments and criticisms. Address all correspondence to the Editor, FLYING SAFETY magazine, Deputy Inspector General, USAF, Norton Air Force Base, San Bernardino, California. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning.

ASK FOR *Flight*

For The Pilot Who Runs Into Trouble, Assistance Is As Near As His Microphone

"I'M LOST and I'm not kidding!" called the jet pilot. "And I've got thirty minutes of fuel."

This was the terse message from a Thunderjet pilot relayed one routine afternoon by the Birmingham tower to Maxwell Flight Service. Ordinary matters were forgotten for the time as the clearance officer began a plan of action to help the pilot of the F-84. A quick check showed the jet was en route from Langley AFB, Virginia, to Eglin AFB, Florida. The flight was under visual flight rules. Scattered thunderstorms was the weather for the Thunderjet.

Soon as Flight Service got the call, they alerted all direction finding (D/F) stations in the area. Maxwell D/F and Atlanta Naval Air Station D/F were both able to get very weak signals from the lost jet.

So, Lieutenant C. E. Watts, flight service clearance officer, and Sgt. Douglas A. Jernigan, sector operator, went to work. These signals were strong enough to give Class C steers. The team used their steers and their D/F board to locate the aircraft's position over Stevenson, Tennessee.

Working through Maxwell D/F, Lieutenant Watts asked the pilot if he could see a lake.

"I could see a lake when I started but I'm heading for Maxwell now," the pilot said. But by now the aircraft was down to 15 minutes of fuel.

Now the Atlanta Naval Air Station gave a steer of 90 degrees. By crossing the strings on the D/F board, Lieut. Watts and Sgt. Jernigan placed the jet about 25 miles due north of Anniston, Ala. The jet now had less than 10 minutes of fuel.

"If you're heading for Maxwell, you might have to walk the last 35 miles," Lieut. Watts told the jet pilot.

A quick check of the Field Survey cards showed that Anniston had an old Army Air Force field with 5,300-foot concrete runways. So, Lieut. Watts advised the pilot to land there.

Lieutenant Watts gave the pilot—via Maxwell D/F—the latest weather and wind conditions at Anniston.

SERVICE

Then he called the Alabama State police to alert local crash equipment.

The jet landed at Anniston. Then Flight Service made the arrangements to send jet fuel to Anniston. Less than four hours later the jet was on its way. Flight Service's personnel had worked a total of approximately 25 minutes to chalk up another "save" for their record of service.

While cooperation was the key to solving this particular jet emergency, such cooperation is made possible only if the pilot himself follows certain rules. Six such general rules have been outlined:

- Be definite about destination.
- Make regular position or progress reports.
- File any change in route.
- If any difficulties are suspected, notify somebody.
- Report on weather conditions.
- Be sure to close the flight plan.

Every year there are a few cases of real emergency saves through helping a lost pilot who gets through to one of the eight military flight service centers in the nation. But this all-important emergency service is just one of the many safety purposes and missions of flight service.

The biggest and most prosaic load of course is acting as the clearance agency and "checker-uppers" on all flight plans originating within a particular control area. And according to all reports it is the work in this capacity

In the above photo it's regular "roundtable" set-up for flight plans pouring into the Flight Service center at Maxwell AFB, Alabama. Other photos show plan routing from receipt through ADIZ to clearance at March AFB, Calif.

Top, the weather man gives out with the good word at March AFB Flight Service center shown at work below.

that develops into the biggest headache for flight service personnel—migraine caused by the pilots who fail to close their flight plans.

Just how big a job this may turn out to be is reflected in the number of flight plans handled. Maxwell, for a recent example, processed more than 35,700 for one month. Flight Service at March AFB, California, a more average center handled 20,000 flight plans for a typical month. Besides this work, March flight service approved more than 3,000 clearances from non-military stations; gave out with thirty advisories and processed numerous ADIZ violations.

"We have our share of flight plan troubles," said Capt. George Hanlon, operations officer of the March center. "We get 'em usually with an error in judgment involving wrong altitudes, below minimums, no alternates or reserve fuel, and a few that list the wrong airways," he added.

The most common violations listed by Captain Hanlon were those involving an ADIZ, and they came in at the rate of about four to five reports a week.

Aside from the foregoing, flight service also functions as the air raid alert center with a direct wire hookup to a responsible defense command headquarters; as the operations office for a base that does not have an established operations, and as a hurricane or emergency evacuation control center.

Flight Service is not too old an agency. Originally, it was established as the Flight Control Command which had the purpose of advisory supervision of point-to-point flight for more safety en route. In 1943 it came under the Office of Flying Safety, and was later under ATC. When MATS came into being, flight service became one of the operational services.

In 1946, a communications network was added to aid the pilot in the use of flight service facilities. This communications system was operated by the AACS and was known as "Plan 62." Under this Plan 62, the communications circuits were put into operation at the various bases for an "interphone communication hookup." Proving cumbersome and in many cases duplicating messages due to a steadily increasing volume of traffic with two agencies involved, the latest change to come about is the recent merger of Flight Service with Plan 62.

Under the new setup, the procedures involving flight service will be more streamlined and all major functions will have a faster and cleaner handling. Other major objectives accomplished through the merger have been a saving in manpower, more efficiency and the rulings of only one boss at operation level.

As an example of the scope of the change-over, at the Maxwell center a team of ten officers and sixty airmen headed by Major M. D. Gentry integrated flight service routine with Plan 62.

The old Plan 62 with AACS utilized an 86-man staff. This number of personnel was in addition to 37 officers and airmen of Flight Service who all did a job that, although cooperative, had slow results and duplications.

Largely, this delay of messages came about with the interphone as an extra relay station. For instance, Atlanta Control, which is a Schedule "B" (CAA teletype) relay center for messages in the Maxwell area, now sends messages direct to Maxwell Flight Service. Previously, AACS took them in first.

With the new system in operation, pilot reports come in quicker and the various centers are enabled to expedite their services through faster and more accurate contact pertinent to the movement of air traffic.

Along with the improved service, however, it is still necessary for the pilot to play his role of maintaining a constant listening watch on a station in his vicinity because the success or failure of flight assistance—whether it be weather, alternate planning or advisory—depends upon contact with the man flying the plane.

Proper flight planning is just as essential to a quick and safe flow of air traffic and the heart of the matter is the ability to use the right procedures at the right time. Both military flight service and CAA flight assistance is available to the pilot, who, when in doubt should ASK for assistance.

PILOT PROCEDURES WITH FLIGHT SERVICE

● Upon departing from an airfield other than active USAF, USN, USMC, or USCG bases the pilot must utilize one of the following procedures:

At "P" fields, file a flight plan with military flight service and secure approval. ATC clearance must be obtained if the flight is to be IFR involving or crossing a civil airway. At "PC" fields, the pilot must file a flight plan by long distance telephone or by use of CAA communications facilities. If unable to obtain clearance through these methods, a takeoff and VFR flight to the nearest contact point may be made in order to file the flight plan.

● For a change of route and/or destination while airborne, under VFR conditions only, notify flight service through a CAA facility. Approval is not required.

● In closing a flight plan at a destination not having an active military base operations office, the pilot must personally close his flight plan with the nearest flight service center; at "P" fields by the CAA communications facility, or at "PC" fields by radio or a collect long distance telephone call. Do not close, or file a flight plan with CAA towers.

● Flight advisory service will be given pilots by military flight service at any time that the pilot requests assistance. This same service is also available to pilots through CAA facilities. CAA service provides flight planning information such as weather conditions along a proposed route, winds, ceilings, visibilities, and forecasts for the route and destination. Other service includes terrain information, radio fixes on the route at which compulsory reporting is required.

● When flying under VFR, pilots must maintain a continuous listening watch on a CAA frequency and make position reports to CAA communications stations approximately every hour. The CAA stations will transmit any flight advisories requested by military flight service or information requested by the pilot.

● When flying under IFR, maintain a continuous listening watch on a CAA frequency and give a position report upon passing all CRP's, and other points specifically directed by CAA.

● If the airport of intended landing does not have a control tower, but does have a CAA communications facility, information will be relayed upon request of the pilot. No air traffic control will be made by the facility, and assistance will usually be of advice on local traffic, wind direction, velocity, altimeter settings and field conditions.

Top, weather is carefully checked and followed with a study of control board in the March center. Bottom, flight plans go out and come in on the teletype circuits linking the flight service centers. Information which is not available in sequence reports or other operational services may be obtained from military flight service. Flight service does not absorb the responsibilities of local clearance. The original clearing agency should furnish the pilot with complete information to plan a good flight.

INSURE LIFE AND SAFETY — ILAS

By Maj. Richard A. Harding
Facilities Branch
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TO QUOTE an old saw, "Differences of Opinions Make for Horse Races."

This goes back to about 5000 B.C., when UG, who had always dragged his wife along by the hair, disagreed with POG, who favored dragging his wife by one foot. Both methods gained the same end, that of getting the missus to the point of termination, albeit slightly ground-weary.

During the middle years of aviation, many beers and much wind were expended in furthering or refuting the theory of control surface action in a vertical bank (if you are in a vertical bank, does the elevator act as a rudder, and vice versa?).

Today there is much hangar-yak centering around the comparative value of Ground Controlled Approach (GCA) and the Instrument Low Approach System (ILAS).

GCA and ILAS are the two instrument approach systems in use by the Air Force. Note the term "approach." Neither of these systems is a blind landing system . . . yet! However, blind landings are the goal of both these systems, which are still in the process of development, and which still depend to a great extent on lighting design and runway length.

The Ground Controlled Approach system has been well covered in the November and December, 1951, issues of FLYING SAFETY. This article endeavors to cover the design and operation of the Instrument Low Approach System, and does not compare the two systems.

The Instrument Low Approach System (ILAS) is the Air Force system of instrument approach which makes use of radio transmitting equipment on the ground and receiving equipment in the airplane. It provides the pilot with a visual indication of a path to the runway, and tells him when he passes marker beacons at known distances out from the landing end of the runway.

For all general purposes, the ILAS is divided into three parts. They are the localizer, the glide path and the marker beacons. In addition to these there may or may not be low-powered homing facilities located at either or both the outer and middle marker.

On the ground are two highly directional transmitters, with three marker beacons located along the approach. The boundary marker is 250 feet from the end of the runway; the middle marker is one mile out from the runway end, and the outer marker is three and one-half miles from the middle marker. Some CAA installations utilize only two markers but this is not the standard USAF design.

The localizer transmitter is located at the far end of the landing runway. This transmitter operates on one of six channels and sends out two highly directional beams consisting of two signal patterns each. These beams are formed by the overlapping of the two signal patterns similar to the overlap of the A and N signals on a low frequency radio range. One of these beams is directed so that the on-course follows a line formed by a projection of the ILAS runway; the other beam is transmitted along a bearing 180 degrees from the ILAS runway. The localizer transmitter has a maximum range of about 40 miles at an altitude of 5,000 feet, and a range of 80 miles at 10,000 feet.

The beam passing over the ILAS runway is called the APPROACH BEAM, and the other beam is called the BACK BEAM. When flying a heading that corresponds to the bearing of the ILAS runway, the area formed by the signal pattern to the right of on-course is called the BLUE AREA, and the area formed by the signal pattern to the left is called the YELLOW AREA. Thus, the aircraft lines up with the runway on the approach by proceeding inbound on the APPROACH BEAM while keeping the reception of the two patterns equalized.

The other transmitter is the glide path transmitter. It is located about 750 feet down the runway from the approach end, and roughly corresponds to a "touchdown" point. It is installed 400 feet to the right or left of the center line as a matter of flight safety.

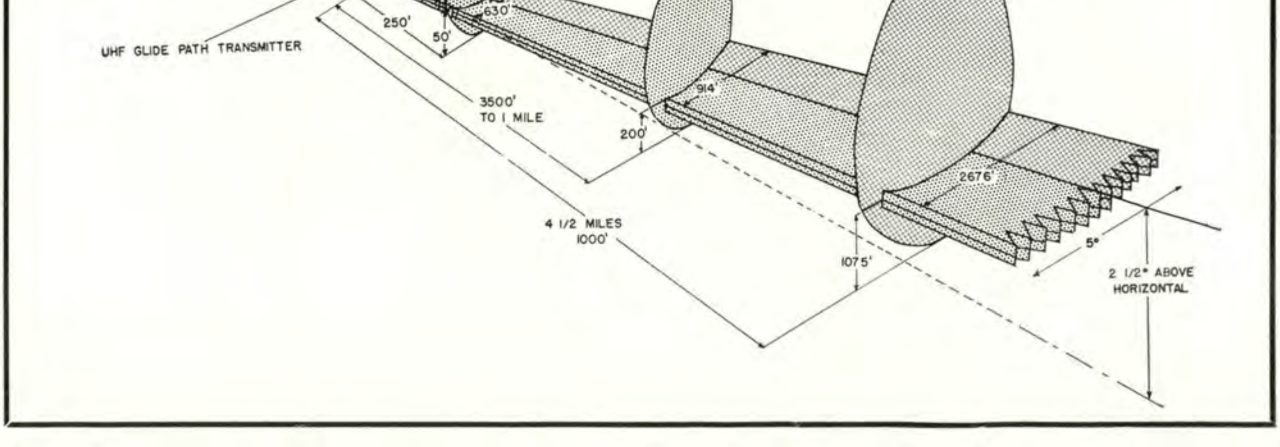
This transmitter sends out a glide path beam at an angle of approximately two and one-half degrees, sloping upward from the transmitter, out along the approach. However, this transmitter sends out a signal only in the direction of the approach. Like the localizer, it sends out two patterns, the center of which is the glide path line.

So here you have your two approach aids: the localizer for right and left (azimuth control), and the glide path transmitter for up and down (horizontal or pitch control).

So much for the ground equipment. In the airplane is an instrument called an "approach indicator," which has two needles, one vertical and one horizontal. The vertical needle tells you whether you are right or left of the approach course; the horizontal needle tells you whether you are too high, too low, or on the glide path. When the needles are both crossed in the center of the indicator, you are right on the money.

The vertical needle goes into the yellow half of the indicator if you are flying in the yellow area of the transmitter, or swings into the blue half of the indicator if you are flying off-course into the blue area of the transmitter. If you get more than two and a-half degrees off course, you get a full scale deflection of the needle.

One thing to remember is that the direction toward the on-course is not necessarily indicated by the direction of deflection of the needle from the center. When you are flying either of the localizer beams on a heading corresponding to the heading of the approach runway,



With the variety of radio equipment now being used in aircraft, antennas pose problems.

turn toward the needle; when flying the reciprocal of the approach bearing, turn away from the needle in order to bring it back to center. This is especially well worth remembering because if you are using the cross-pointer instrument of the VOR equipment, the blue and yellow are not indicated on the instrument.

The trick in flying ILAS sharply is in the interpretation of the cross-pointer needles and aircraft control. The ILAS instrument on the panel has a series of small dots horizontally and vertically through the center reference point. As a general rule, you will be within the width of the average 150-foot runway if your vertical needle does not move farther from the center than one dot. This is just about like getting the "on-course" signal from an aural (low frequency) range. When your needle gets farther to the left or right than one dot, you are in what can be compared to the bi-signal zone of an aural range. Naturally, the farther out you are from the station, the wider your zones.

The glide path pointer is directional because the glide path transmitter produces a single on-course beam. If the horizontal needle is above the center, the aircraft is below the glide path; if the needle is below the center, the airplane is above the glide path. Remember, the dot in the center of the instrument, which in newer models is shown as a small airplane, is the aircraft, so fly the center circle, not the needle.

Flying an ILAS requires, repeat, requires skill in flying precision basic instruments! In addition, it requires planning prior to reaching the destination.

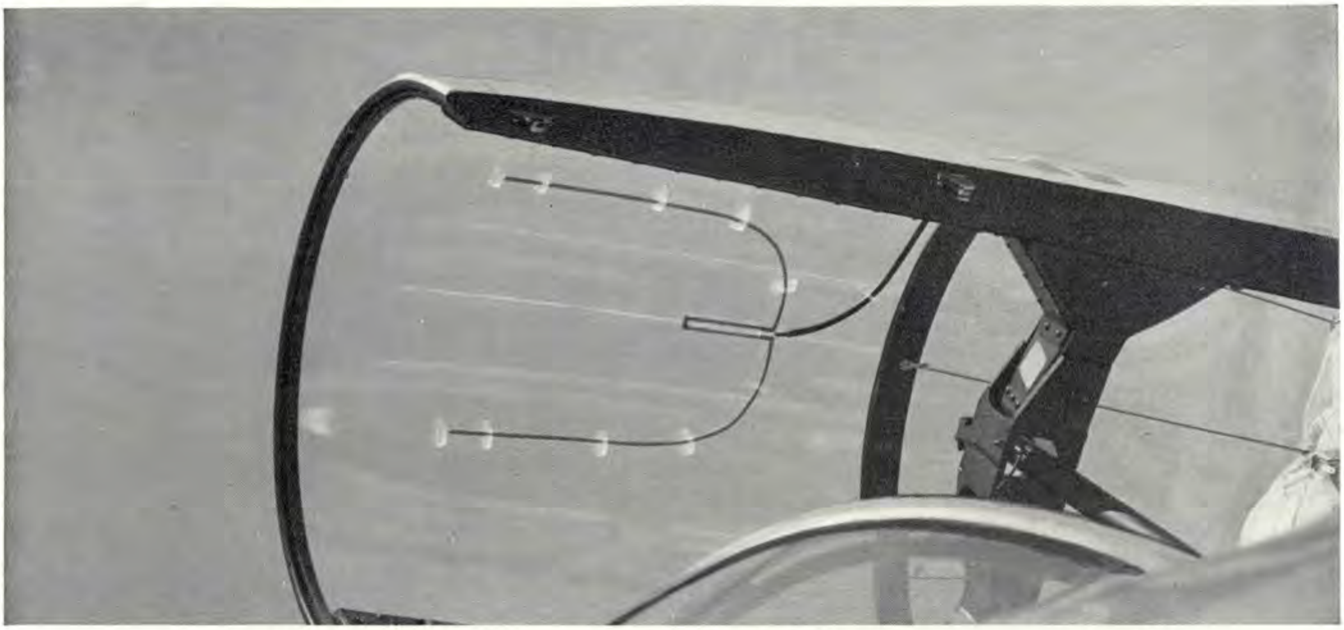
The necessary information is contained in the Airman's Guide, The ILS Handbook, and the CAA Flight Information Manual. Information concerning the availability of ILAS is also contained in the Pilot's Handbook (PHACUS), as well as in AN 08-15-1, The Radio Facility Chart. The ILS Handbook, the Pilot's Handbook (PHACUS), and AN 08-15-1 can be found in every well-appointed airplane.

If you anticipate making an ILAS approach, the ILAS Charts in the ILS Handbook will give you the best and most complete information. From the applicable chart, familiarize yourself thoroughly with the pattern, headings, altitudes, missed approach procedures, and frequencies as well as the surrounding terrain features prior to reaching the destination. This preparation does not eliminate the necessity for having the appropriate ILAS chart available for ready reference during the approach.

The ILAS chart gives one or more points or fixes from which you can transition to ILAS. You select the designated point or fix best suited to the direction from which you are approaching. When over this fix, you call APPROACH CONTROL or the Tower and ask for permission to make an ILAS approach.

When you receive clearance, depart the fix and follow the procedure outlined on the ILAS chart unless otherwise instructed by the Approach Controller. Of course, by this time you have the ILAS receiver on and properly tuned. Oh yes, you tune the "Bird Dog" to the low-powered homing facility located at one of the markers if there is one. That "Dog" is always in on the act. By following the procedure outlined on the ILAS chart, you will intercept the localizer beam and will descend to the proper altitude prior to reaching the outer marker inbound.

Depending on the location of the fix from which you transition to ILAS, the initial interception may be made on the approach bearing or the reciprocal of the approach bearing. When intercepting the ILAS localizer beam, you



For this T-33, the localizer antenna is on the canopy and the glide path antenna in the nose.

bring the cross-pointers into the cross-check. As soon as the vertical needle starts to move toward the center (away from a full scale, 4 dot deflection) its speed of movement will determine the right time for you to start a turn to the published beam heading. The closer you are to the transmitter when intercepting the beam, the faster the needle will move and the sooner you will have to start the turn to the beam heading.

If you intercept the beam on the reciprocal of the approach bearing, you will have to make a procedure turn beyond the outer marker to put you in a position to make the approach. The ILAS chart will indicate the direction and the altitude of the procedure turn. Regardless of the bearing on which the localizer is intercepted, the final cockpit check will be made, gear down and locked, the final flap setting will be made, and the airspeed will be reduced to the final approach airspeed prior to reaching the outer marker inbound. Incidentally, the final approach airspeed should be approximately 30 kts/mph above the stalling speed for the weight and balance condition of the aircraft at the time of the approach.

Now you are inbound on the localizer beam to the outer marker at the proper altitude with the aircraft set up for the approach. Get set for some precision flying. As you intercept the glide path, usually over the outer marker, all you have to do is bring your pitch into "consonance" with the glide path, and reduce power to maintain the desired airspeed. No change in this power setting is made during the remainder of the approach unless the airspeed varies more than five miles per hour. As you might guess, the rate of descent on the approach is then controlled by varying the pitch attitude of the aircraft. The necessary changes of pitch should be very small and made with reference to the flight indicator or attitude gyro used in conjunction with the vertical speed indicator.

Prior to starting the descent, you should have a good idea of what the wind conditions are and have the necessary drift correction determined. This does not mean that the wind direction and speed will remain the same throughout the approach. If it does remain the same, that's "gravy"; but if it changes, you will have to make corrections to stay on the beam. These corrections should be small—3 to 5 degrees in most cases. After you have made a correction, allow time for it to take effect before making additional corrections. It is of prime importance to make all turns to directional or slaved gyro headings and to hold those headings! It is only by holding constant headings and interpreting the vertical needle that you can maintain the desired track.

When you hit the middle marker, which sends a signal of alternating dots and dashes, check your altimeter to see if you are at the altitude specified on the ILAS Chart. If you are 50 feet or more too low at this point and you can't see the ground, go around. Otherwise, you are just before donating the material for Mrs. Bluebird's new gown of K-1 Birdcloth from a rather embarrassing location.

If the altitude is correct and the "needles" of the cross-pointer instrument are "wired," continue on and the first thing you know, you'll pass the boundary marker and be on the ground.

At this point, is should be mentioned that the Air Force has established minimums for ILAS approaches. This emphasizes the fact that ILAS is not a blind landing device, although it is possible that it may some day be. Until then, there are weather minimums for ILAS as well as for GCA. Violating them unjustifiably is no different from violating any other flying regulation—with the possible exception that you may contribute to the formation of a party of head-hunters: the type that hunt with a shovel and a basket.

O_2 and You

By Maj. Charles F. Lombard
Medical Safety Div., DFSR

IT HAS BEEN STATED, "You might be able to live without food for 60 days, or without water for six days, but you cannot live without oxygen more than a few minutes."

This was written years ago and the author certainly did not mean a few minutes in a high velocity jet aircraft. He did not consider that after the loss of oxygen supply at high altitude, the pilot's brain no longer directs the aircraft and that, within seconds, the aircraft and pilot lose their "oneness" and become disintegrated parts. It is true that some of the cells of the body will live for several minutes but "you" as an individual will exist only in memory.

Be serious in your knowledge of oxygen equipment, your bodily needs for oxygen, and your supply of oxygen. Submit unsatisfactory reports to help in the improvement of oxygen and cabin pressurization equipment. Remember you can be without food or water for relatively long periods of time but without oxygen at altitude, the pearly gates are wide open for you—now.

"O.K.," you say, "I believe you. Where do I start? Let's go!"

Where do you want to go? Slow down! Relax and learn.

For emphasis let's go back to a near accident in a World War II type aircraft. This near accident involved an F-47D piloted by a service test pilot in the summer of 1944. The pilot's report reads:

"I had been flying several days previous to this flight at high altitude, using oxygen for a short period of time. Each time I landed, I took it for granted that my oxygen pressure had been checked and the system refilled, as I found it consistently maintained a 400-pound pressure indicated on the gage. This apparently had not been done as on this flight from Cheyenne, at 33,000 feet, I just made a report in my flight log that everything was in order, my oxygen gage indicating 400-pound pressure. I then started to check my position.

"My first indication that something was wrong was when I started to write on my map. My pencil did not go where I was looking. After trying several times to place my pencil on a spot on the map, and being unable to do so, the fact came to my mind that something was wrong with my oxygen system. Upon looking at the gage, I found my supply to read '0,' and the warning light definitely on. I knew then that I was in trouble as I could not get down into denser air in time to remain conscious. However, I did think of retrimming my ship for a glide as I was at this time trimmed for level flight. I remember getting my hand on the elevator trim tab control. I am sure of that fact, but from then on, I just don't know.

"The first thing that recorded in my mind was something going around and around. After some difficulty in focusing my eyes and mind, I decided that it was the altimeter that was going around and should be stopped. Apparently, I did pull up because it stopped and started to go the other way. Then the turn indicator went all the way over to the left and the ball to the right. By this time my mind was doing a little better job and I decided that I was in a spin. One thing I do remember very clearly: At this time it seemed that I was listening to a broken phonograph record, playing over and over again these words, 'Stop the turn—center the ball.' This I don't remember doing, but the turn indicator moved over from left to right and the ball changed corners. By this time, I began to realize where I was. I do remember stopping this spin.

"After getting all the instruments back in position where they should be, I took a look out and found myself in instrument weather. The whole thing struck me as being funny, the fact that I was spinning on instruments, recovering from one spin just to get into another and finally leveling off. I did think it might be a good idea if I was to climb up and out of the weather. I again made an instrument check and reset my artificial horizon and gyro compass. I also at this time remember taking my altimeter reading and it read 6,000 feet. I then went up and broke out of the weather at 11,000 feet. All this time I was not worried in the least.

"After breaking out of instrument conditions and spending several minutes in the clear, over weather, it all seemed to hit me like a club, just what had happened. When I finally realized the predicament I had been in, perspiration broke out on my forehead so bad it burned my eyes. I also experienced at this time a slight case of the 'shakes.' I should also mention perspiration was not caused by any weather condition I was encountering at 11,000 feet.

"I then went on to finish my flight into Des Moines."

What happened? You guessed it. The pressure gage malfunctioned giving a false reading which indicated ample oxygen pressure. No one checked on the oxygen pressure gage. No one checked on the oxygen actually serviced to the aircraft. What else could cause the loss of the supply of oxygen? Here are a few things which could cause such an incident if today's equipment were in use:

- Failure to seat check valve in filler line (with back leak through filler connection after filling).

• Leaking or ruptured connections in system.

• Ruptured diaphragm in pressure reducer of regulator (bottom diaphragm).

• Excessive use of 100 per cent oxygen at low altitudes.

• Leaving the A-14 Pressure Demand Regulator set on "Pressure" when not in use.

• Use of an A-14 mask with an A-14 regulator set on pressure breathing.

• Using a pressure breathing setting on the A-14 Regulator when the pressure breathing mask A-13A is loosely fitted or when the exhaust valve of the mask is leaking.

• Malfunctioning relief valve of pressure reducer in A-12 or A-14 regulator with excessive flow and pressure through the mask.

Loss of the oxygen supply at a high altitude cabin pressure for any of the above reasons could place a pilot in jeopardy. Partial recovery of consciousness by the pilot at altitudes of 10,000 feet or less in a diving jet at high speeds would probably be too late to effect recovery.

In addition to losing your oxygen supply, hypoxia can result from malfunctioning oxygen regulators and masks, poor connections, and techniques, and especially from lack of knowledge.

Test your oxygen system and equipment before flight and frequently (when possible) during flight. The preflight check is the not too familiar P. McCRIPE Test, T. O. 03-50-1. Read this T. O. before your next flight. Here is what the test for the Demand oxygen system consists of:

P. McCRIPE

P ressure gage
M ask
c onnections at mask
C onnections at regulator
R egulator
I ndicator
P ortable Unit
E mergency cylinder

P M c C R I P E

PRESSURE GAGE—The gage should read between 400 and 450 psi, and should agree approximately with the gages at other stations. Know the minimum operating limits of your oxygen system. Some units cannot deliver oxygen to your regulator and mask if the pressure in the storage cylinders is less than 50 psi.

MASK—Be sure that you have your own mask and helmet, and that they are properly and securely attached. Look for cuts, tears, and cracks in the rubber; and for faulty fasteners and loose tubing clamps. If there is no mask microphone, be sure that the pressure relief vent is sealed. Test for fit (Par. 3-35, T.O. 03-50B-8).

CONNECTION AT MASK—Be sure that the gasket is in place on the male part of the "quick disconnect." Test the pull required to separate the two parts; (10 to 20 pounds without the locking device). Be sure locking device and clothing clamp are in working order. Check clamp position for free head movement.

CONNECTION AT REGULATOR — See that the regulator outlet elbow is pointing in the right direction, that the knurled collar is tight, and that the tubing is securely clamped to the elbow. Run the tubing through your hand to detect kinks, cuts, or flat spots, which could cause malfunction, or breakage of the tube.

REGULATOR —Before takeoff, the diluter should be set at "Normal" (automix "ON"). See that the emergency valve is tightly closed and secured with wire. You can detect large leaks in the regulator diaphragm by placing the open end of the mask-to-regulator tube against your mouth and blowing into it for about five seconds.

INDICATOR —The flow indicator may not blink at ground level unless you set the diluter at "100" OXYGEN (automix "OFF"). After you have checked the action of the indicator by taking two or three breaths of oxygen, make sure that the diluter is left in the position marked "Normal" (automix "ON").

PORTABLE UNIT—Check clothing clamp; plug mask into regulator and test disconnect pull required. Blow gently into mask tubing opening of regulator to detect leaky diaphragm or faulty check valve. Connect unit to recharger hose; fill to 400 psi. Disconnect; listen for recharger valve leakage. Recap the valve.

EMERGENCY CYLINDER —The pressure gage on your emergency cylinder should read 1800 psi. Examine the release mechanism for any obvious defects. If you have an H_2 emergency assembly, check the mating of the parts that connect the tubing to the mask, and leave them connected so that the equipment will be ready for immediate use. See that the cylinder is securely fastened to your leg and to your clothing. Remove caution tag prior to flight to make unit operational.

For the pressure-demand type oxygen system, the checks are essentially the same except for the regulator. Here's how it is checked:

With your mask disconnected, and with the dust cap open, set the regulator dial at "SAFETY." A slight but steady flow of oxygen should result. Higher settings should increase the flow. Turn the dial back to "Normal." The flow of oxygen should cease. Leave the dial at "Normal" until you need to use it. Before takeoff, the diluter should also be set at "Normal." The blow-back test for a leaky diaphragm or check valve may be used with the A-14 regulator.

Failure to accomplish these checks has caused many accidents and near accidents. Here are a few examples:

F-86—Prior to takeoff on a camera gunnery mission the pilot had trouble with the head set. He sent the radio man to get him a new helmet and mask, then took off. Fifteen minutes later at 20,000 feet the cabin pressure fluctuated and a rumbling noise was reported by the pilot. The cabin pressurization was turned off. Shortly after this the pilot claimed he could not see the tow ship even though it was within 500 feet. His speech at times was unintelligible, revealing mental confusion. When told to go to 100 per cent oxygen his response was confused and unsatisfactory. The aircraft climbed to 27,000 feet, started a wingover to the right and entered a steep dive. Finally the pilot responded to instructions and extended the speed brakes just prior to entering a thin overcast at 8,700 feet. The aircraft struck the ground, 1000 feet elevation, at an 80° angle, and exploded. The Accident Investigation Board assumed that "the pilot suffered from the effects of hypoxia, causing loss of control and subsequent crash."

In this accident we see the result of carelessness in the use and care of oxygen equipment.

The pilot erred in not properly fitting and testing the oxygen mask and helmet prior to takeoff—which raises the question: "Why wasn't it SOP for the Personal Equipment Section to insure proper fitting and testing of oxygen equipment prior to releasing it to the pilot?"

F-86—Recently on a navigational training mission and immediately after climbing to 37,000 feet, the leader of two F-86's started a diving turn to the left, off course. The wing man requested the reason for the turn but received no response. The diving turn progressed into a series of wild gyrations that varied from inverted flight to airspeeds beyond the mach limitations of the aircraft. The wing man remained tucked to his leader's wing repeating instructions for recovery of control of the aircraft. Finally at 25,000 feet (cabin altitude of 15,000 feet), the leader began to respond to the wing man's instructions but still did not acknowledge. After many corrections the leader was again straight and level in flight. At the wingman's request the leader checked his oxygen system to discover the oxygen mask hose disconnected from the regulator hose at the quick disconnect. The oxygen hose was connected, oxygen regulator set on 100 per cent and the flight resumed at the assigned altitude.

It is your individual responsibility to know the oxygen system in the aircraft which you are going to fly and to know where to go and what to do for an emergency supply of oxygen. The ultimate emergency supply is the bailout bottle.

F-84B—After 35 minutes, at 21,000 feet cabin and aircraft altitude, a student pilot noticed his oxygen pressure was down to 50 psi. He notified the flight leader, who was also the instructor, of the low oxygen supply. The flight leader started a letdown with in-trail acrobatics. Short of landing, the student's engine flamed out due to fuel starvation. (Pilot error.) The student also failed to use the emergency gear extension soon enough and the aircraft was badly damaged in landing. Numerous errors were made by the student. A post flight check showed that the oxygen system leaked back through the filler valve and check valve causing the pressure to drop from 400 psi to 50 psi in 30 minutes. Although faulty equipment caused the student to incur hypoxia, the seriousness of the situation could undoubtedly have been lessened if the instructor had given his immediate attention to getting the student down to a lower altitude as soon as possible.

B-45C—On a high altitude flight, a portion of the canopy blew out. The explosive decompression and air blast disconnected the pilot's oxygen hose. The pilot lost consciousness but the aircraft was controlled by the copilot, who started an immediate descent, while the crew chief tried to help the pilot. Finally at lower altitude the pilot partially regained consciousness, grasped the controls and pulled the aircraft violently into a climb. With difficulty the copilot wrested and held control from the pilot. At still a lower altitude the pilot recovered his senses to the point that he could sensibly control the aircraft.

After a canopy failure with wind blast, etc., an immediate check of oxygen equipment is necessary.

YOUR A-13A OXYGEN MASK

In selecting your oxygen mask, care must be exercised in the:

- selection of the proper size,
- alteration of the mask to fit,
- attachment to helmet, and,
- inspection by qualified personnel for proper fit and function (Flight Surgeon, Aviation Physiologist, Physiological Training Officer, or the Personal Equipment Officer).

Preflight tests should be made to establish the security of all parts, with special attention being given to the inlet check valves. The plastic shields with the arrow pointed downward must be inserted over the inlet check valves at all times. If the mask is damaged, replace it with a properly selected mask.

Service troubles and remedies listed in T. O. 03-50B-16 are given in the following table:

TROUBLE	PROBABLE CAUSE	REMEDY
Inlet check valves do not hold suction	Valve not seated properly	Insert valve correctly
Moisture in inlet check valve	Shield improperly placed	Position shield with arrow pointing down
Air leaking from mask during respiratory cycle	Loose suspension harness	Tighten upper and lower straps
Oxygen continues to flow while inhaling	Exhalation valve not holding pressure	Replace valve
Skin irritated	Perspiration on cheek and chin flaps	Line flaps with chamois or trim flaps
Mask does not fit properly on nose	Goggle flange prevents comfortable fit	Trim goggle flange
Goggles fit uncomfortably	Goggles placed in front of mask	Place goggles behind mask
Lip strap uncomfortable	Temporary condition	Use for a longer period

If you do not understand your oxygen mask in all the details of construction, function, and care, look up the T. O. and study it. Consult your Physiological Training Officer or your Flight Surgeon.

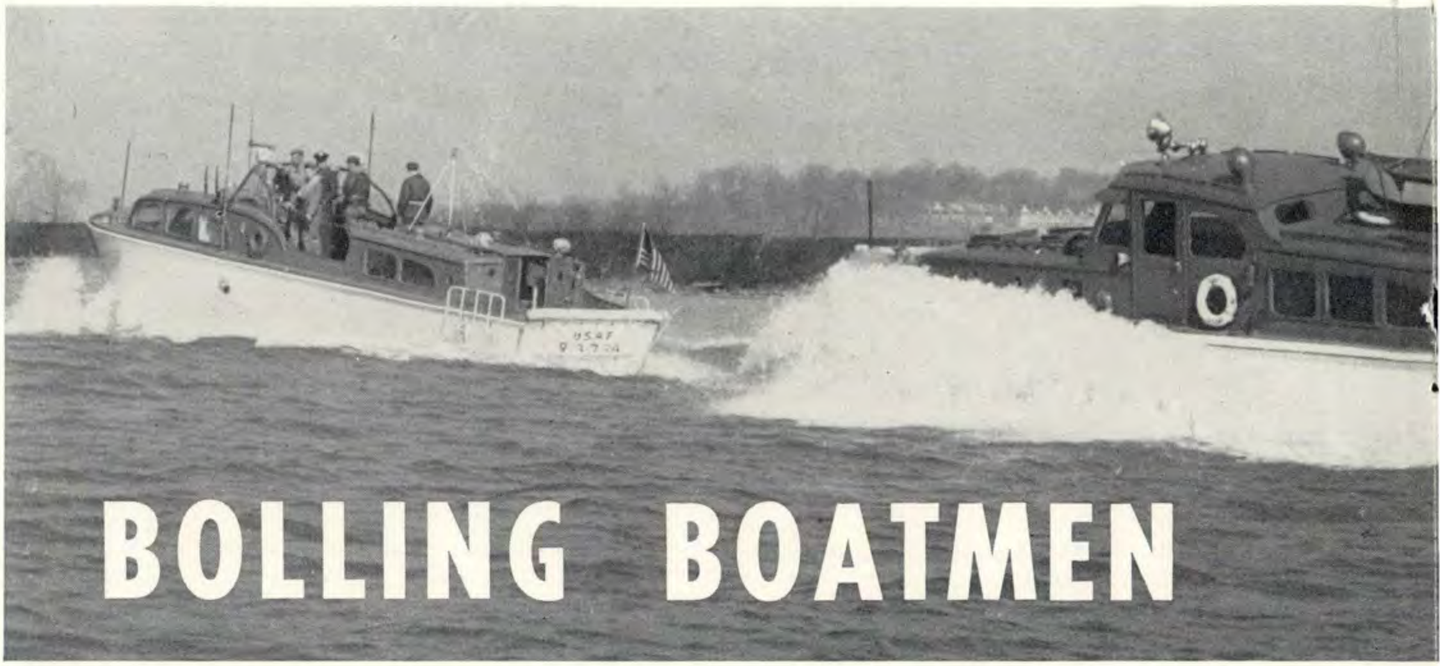
It is a command responsibility to implement the directives for the care, maintenance, inspection and proper use of oxygen masks and other oxygen equipment. It is your responsibility to obey these directives. Your oxygen mask and system is your life line. If it is not perfect, have it repaired or replaced. If you can't do this, turn in an Unsatisfactory Report.

• • •

In planning a high altitude flight it is necessary that you know your fuel supply and how to use it to accomplish the mission. This demands thorough training in the operation of the type and model aircraft, and in navigation. Before takeoff, you always check the aircraft for structural integrity and the engines for functional efficiency. Shouldn't you check your oxygen equipment with even more care? Your oxygen to you is what fuel is to the aircraft.

At high altitudes if your fuel supply is exhausted you still have a good chance for a dead stick landing without danger to yourself. If your oxygen supply is exhausted at high altitudes your chances of making a good healthy landing are poor, especially in jets.

Be oxygen smart! You'll live longer if you are.



BOLLING BOATMEN

ONE OF THE less glamorous duties of the 21st Rescue Boat Flight is that of running a commuter's service for Air Force personnel between Bolling Air Force Base and the river entrance to the Pentagon Building. But the important mission of the unit is that of life-saving. These are the men who are entrusted with the task of conducting water rescue work for any unfortunates who may be aboard an airplane which crashes into the Potomac while attempting a takeoff or landing at any of the three airfields situated along the river bank just south of the nation's Capital.

Perhaps the most outstanding example of the work this unit has done occurred a couple of years ago when an airliner crashed into the river while making an instrument approach to the National Airport just across the river from Bolling. The night was cold, it was December, and a foggy mist restricted visibility. The first intimation of disaster was a "roar and crashing noise" which suddenly rent the silence of the night.

A sergeant who was on duty at the boat station immediately reported the sound to the officer in charge and without waiting for a formal report of a crash, three rescue craft were dispatched to investigate. Navigating mainly by sound, the rescue boats reached the scene of the crash in time to save 19 of the 22 people aboard the plane. The other three persons were beyond saving, having been injured fatally in the crash.

The Air Force hopes that future operations of the 21st Boat Rescue Flight are limited to running passengers back and forth across the river, but if they are needed for the more serious type of business—well, they're ready.

Ready for rescue are the USAF "sailors" who man the fast and well-equipped rescue boats at Bolling AFB. Above, a tower observer will maintain radio contact with a rescue boat roaring out to the scene of a simulated crash in the Potomac. At the "crash" site, an aircrew member is picked off a floating wing and loaded aboard the rescue craft for first aid treatment.

(Photos courtesy *Washington Star*)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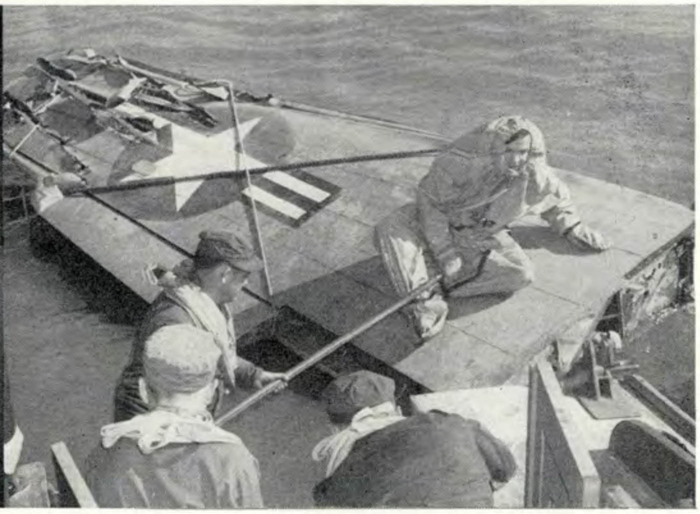


from MPH to KNOTS

The Air Force Goes Nautical Next Month; You Can Make The Changeover A Smooth One By Learning About The Knot And Nautical Mile Now.

SEVERAL YEARS AGO, six to be exact, many pilots grumbled loud and long when the Air Force came out with the word that the use of miles and miles per hour in denoting distances and speeds would be abandoned. When it was disclosed that nautical miles and knots would replace the old, familiar terms, the grumbles became even louder and were mixed with such typical comments as, "Now they want me to be a sailor," or, "Why didn't I join the Navy?" Actually, there was no thought of conforming to marine customs when the decision was made to take up the traditionally nautical units of measure. And you'd be surprised how many Air Force pilots and navigators were already working with the nautical mile and knots even before 1946.

For long flights over unfamiliar territory or over water where there are no checkpoints, it isn't easy to determine how many miles you have traveled or how many miles per hour you have averaged. Using standard navigational techniques, however, it is not too difficult to determine position, and from that, how many nautical miles have gone by the way. This, of course, can very simply be translated to knots. Much of our present day concept of the use of Air Power is based on long flights over water and little known territory where the navigator is heavily relied upon to determine position. Using the statute mile as a basis for measurement under this global concept would require that all initial calculations, which are more easily made in nautical miles, be converted to miles before being put to use.

Since there is no reason for making this conversion other than to put the unit of measurement into terms with which the average American is more familiar, why do it? And that is just the attitude taken by those planners back in 1946 when the decision was made to adopt the nautical mile. It's just as easy to plan flights and fly them. There is no difference in the way the airplane must be handled and controlled.

On 1 July, next month, the nautical system will go into effect throughout the United States. It will apply to civilian flyers such as airline pilots, as well as to the Air Force. The obvious effect will be to standardize terminology among all flyers, civil, Navy, Marine and Air Force. When a ground radio station gives the winds aloft, every pilot will know that those winds are in knots, regardless of whether the radio station is CAA, Navy, or Air Force. Likewise when a pilot reports to a ground station that he is a certain distance from a check-point, that ground operator will know that the distance is in nautical miles.

Actually, outside of a slight re-educating of pilots, there should be only one difficulty connected with the changeover. That is in the fact that our older airplanes still have the airspeed indicator graduated in statute miles. Planes produced since 1946, which includes most of our operational types, have been equipped with airspeed indicators calibrated in knots. So, as time goes by, more and more Air Force planes will show speed in knots, and the problem of converting miles per hour to knots will gradually become less and less of a problem.

Other equipment besides airspeed indicators is affected. Such items as weather observation recorders and search radar are now being graduated in nautical miles, too.

Specifically, there are several ways in which all pilots will be affected. None of them require any great amount of effort on the pilot's part, but most will demand some changes in the way he has been doing certain things. Here are some of the major points of difference:

PREFLIGHT PLANNING: On his clearance form for cross-country flights, the pilot will have to state his airspeed in knots rather than miles per hour as in the past. To the pilot who flies planes equipped with airspeed indicators calibrated in knots this presents no problem. Rather, it will simplify the procedure for him. However, the pilot of an older airplane will have to do a little calculating unless he has a computer handy. To determine his airspeed in knots, he will have to multiply his miles per hour speed by the conversion factor 0.868. The chart which accompanies this article will help, however it is an abbreviated one. Perhaps it would be of value to each pilot to develop and carry with him a more complete chart covering particularly the speed ranges of the airplanes he flies. Such a chart should also include the lower ranges in which surface winds and winds aloft commonly fall, for quick reference until he begins to think in terms of knots and nautical miles. (Most circular type computers, however, will provide the conversion very readily.) Base operations officers could ease the problem by developing such charts which could be displayed prominently in the operations office.

RADIO FACILITY CHARTS: Distances between compulsory reporting points will be shown in nautical miles in the Radio Facility Charts. This will pose difficulties for the pilot who insists upon doing his calculating in the statute mile. The solution, of course, is to do all planning, preflight or in-flight, in terms of the nautical mile.

NOTAMS: When Notices to Airmen refer to distances or speeds, as they often do, knots and nautical miles will be used as the unit of measure.

RADIO CONTACTS: All wind velocities, surface or aloft, will be given in knots. When a pilot changes his flight plan in flight, his airspeed must be given in knots, also. In all contacts with radio range stations or control towers involving distances or speeds, distances will be in nautical miles and speeds in knots.

For the ordinary pilot, providing he accepts the nautical mile system of measure completely and makes an honest effort, there should be no great problem. It's simply a matter of changing a medium of measure. Anyone can do that.

CONVERSION CHART

NAUTICAL MILES (Knots)	STATUTE MILES (MPH)	KILOMETERS (KMH)
5	5.8	9.3
10	11.5	18.5
15	17.3	27.8
20	23	37
25	29	46.4
30	34.5	55.6
50	58	93
75	86	138
100	115	185
125	144	231
150	172	278
175	203	324
200	230	371
250	288	464
300	346	556
350	402	648
400	460	742
450	518	834
500	576	928
550	634	1020
600	692	1112
650	748	1205
700	806	1298

(These figures are approximate.)

FROM ABLE TO ALFA

Now in use at all CAA communications centers, stations and towers is a new phonetic alphabet. Effective 1 July, the new alphabet will also be used by the Air Force. You can save a lot of time and trouble by learning it now.

A—Alfa	J—Juliet	S—Sierra
B—Bravo	K—Kilo	T—Tango
C—Coca	L—Lima	U—Union
D—Delta	M—Metro	V—Victor
E—Echo	N—Nectar	W—Whiskey
F—Foxtrot	O—Oscar	X—Extra
G—Golf	P—Papa	Y—Yankee
H—Hotel	Q—Quebec	Z—Zula
I—India	R—Romeo	

ENGINE OUT!

THE PILOT of a single-engine airplane is never left long in doubt as to what has happened when the engine quits. The plane rapidly begins to assume certain features of a rock. Likewise, the pilot of a twin-engine plane has little difficulty in establishing the fact that an engine has been lost.

But what happens when the driver of a four-engine plane, say a B-29, loses an engine? Often it becomes apparent immediately just what has happened. But at times it isn't at all obvious and the pilot's only indications that something is amiss are that the airplane seems to want to slow down and that there is a certain feeling in the pit of the stomach.

A windmilling engine can produce every indication that it is developing power, and if no torque meters are installed, the pilot has difficulty in recognizing that he has encountered a sudden failure. A windmilling propeller will keep the RPM up and the heat of compression within the cylinder will prevent the cylinder head temperature from falling rapidly. On engines not equipped with turbo-superchargers, the manifold pressure will remain where it was. On turbo-supercharged engines, the manifold pressure will drop to the value which the mechanical supercharger can maintain. This can be well above atmospheric, depending upon the blower ratio of the engine and the specific conditions existing. In addition, the fuel pressure will remain constant and the fuel flow will not change unless the manifold pressure is changed.

A recent fatal B-29 accident stemmed from this set of circumstances. Near the completion of a mission when the plane was 16 miles from base at 1500 feet, the pilot's attention was drawn to fluid on the No. 4 nacelle. He believed it was fuel and feathered the No. 4 propeller with no further delay. The engineer then went on to complete the feathering procedure.

When Nos. 1, 2 and 3 props were advanced the pilot noted that No. 1 was indicating 2200 RPM instead of the 2400 on the other two. Use of the toggle switch did not increase the RPM. Witnesses saw the plane on a wide base leg at 800 feet in a very nose-high attitude. Ten degrees of flaps were extended at the time. As the pilot made the turn onto final, he was heard to remark by radio that he was losing No. 1 engine.

When the turn was completed, the gear was started down — the plane was about two miles from the field. Almost immediately the bomber started to settle rapidly, still in a nose-high attitude, but with the wings level. The settling continued and the plane crashed, short of the runway.

Analysis of the surviving crew-members' testimony indicated that after No. 4 was feathered it was discovered that No. 1 engine would produce only 32 inches Hg and 2200 RPM compared with 42 inches and 2400 RPM on Nos. 2 and 3 engines. The crew thought they were encountering prop governor head trouble in No. 1. They did not notice whether or not the prop governor limit lights came on as they used the toggle switch in their efforts to increase the speed of No. 1 to 2400. The engineer did not notice anything out of the ordinary on the panel.

During the descent to traffic altitude there was no evidence of further malfunction other than that the plane was hard to control and required much movement of the control column. At the time the landing pattern was entered it became apparent that level flight could not be maintained without sacrificing remaining airspeed above the stall. Some time during this period, the copilot selected 10° of flaps. The airspeed at the time the gear was lowered on final was 140 MPH, and as the gear came down, the rate of descent increased noticeably.

The B-29 struck the ground—wings level—in full stall. The gross weight at the time was about 108,000 pounds. With this gross weight, the airplane should have remained airborne if there had been partial power on No. 1 engine. The fact that altitude could not be maintained led to the belief that No. 1 was windmilling. Examination of No. 1 propeller hub revealed that the blades were against the low pitch or high RPM stops.

A test flight flown by investigators clearly verified this theory. It also showed that a normal descent such as the plane was making into the landing pattern would have further disguised the power loss in No. 1. The crew apparently considered the climb power on Nos. 2 and 3 and the indicated partial power in No. 1 as ample power to reach the airport. It was not until the gear was lowered that it was realized that the plane was in a forced descent. By that time it was too late to change the conditions and the accident was inevitable.

Identification of a windmilling engine on an aircraft not equipped with torque meters is not always easy. If a dead engine is suspected and all engine instrument indications are normal, the following checks will help to determine which engine is windmilling:

- Rapid changes of throttle position will produce an RPM surge on each engine that is running. (Be careful not to exceed BMEP limits on the good engines.)
- Retard throttles individually. If the engine has been producing power, a yaw will be evident. If the engine is windmilling and the throttle is retarded, there should be no yaw of the plane.
- A trim change is apparent on four-engine aircraft if an outboard engine is windmilling, but may not be evident if an inboard engine is windmilling.
- Request the flight engineer to check carefully the position of each engine control to make sure some control was not inadvertently moved incorrectly.

There are many tricks of the trade in this flying business. Some apply to all types of airplanes. But there are a lot more tricks which apply to one type of airplane which can only be learned by flying that airplane and by an all-out effort to know all there is to know about it. That's one sure way to a longer life.

SHORT SHOTS

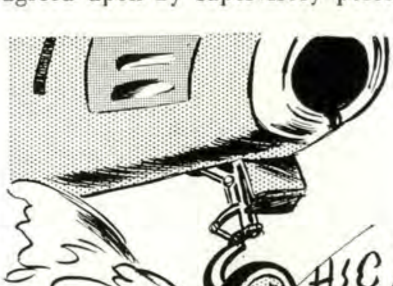
COCKED NOSEGEAR

After taking off on a gunnery mission recently, an F-86 pilot of the 63rd Fighter-Interceptor Squadron at Oscoda AFB, retracted his gear and found that his red gear warning light did not go out. Another pilot advised him that his nosegear was partially extended.

The landing gear was then fully extended and visual checks indicated the nose wheel to be cocked 80 to 90 degrees to the right. All efforts to align the nose wheel while airborne were unsuccessful.

The pilot was then advised by the scheduling officer over the squadron operations radio to remain airborne and a fire truck would be dispatched to wet down a strip of the active runway prior to landing. This decision was prompted by the article "Mother of Invention," page 28 of FLYING SAFETY Magazine, March, 1952.

However, a new innovation was agreed upon by supervisory personnel which proved highly effective and is worthy of publicity to other units operating F-86 aircraft. The new twist consisted of laying a strip of aerofoam, instead of water, about three to four feet in width on the runway. The foam laying was started about 2500 feet from the landing end of the runway and was approximately 2000 to 2500 feet in length.



The pilot of the emergency aircraft then made a normal landing, holding the nose wheel off until he reached the starting point of the foam strip. When the nose wheel was touched down gently, the aircraft continued straight ahead with no tendency to swerve.

The pilot stated later that the aircraft was easy to control and the nose wheel skidded in the foam so smoothly that there was only a very slight occasional vibration to indicate the cocked condition.

When the aircraft had slowed to between 50 and 60 knots the nose wheel aligned itself and a normal stop was made with no damage to the plane. An 8000-foot runway was available for the landing. Considering the distance the nose wheel skidded before aligning itself, it is very possible that the nose strut would have broken if it had been landed on the bare concrete runway.

Later investigation revealed that the cause of the difficulty was failure of the nose gear rotating lever assembly.

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HEFOR

One day some months ago, a pilot of the 35th Fighter Interceptor Wing, serving in FEAF, had to crash land his F-80 because of electrical failure. This alone is not an isolated case, but there is more to it. The pilot was flying in a formation at the time and when his electrical system failed, he had no radio contact with his leader and therefore could not inform him of the difficulty.

The pilots in the squadron put their heads together after the accident, concluded that the accident itself could have been avoided if the leader had realized the man's troubles, and promptly devised a signalling system to indicate various types of failures. They dubbed the system HEFOR, which simply is a combination of the first letters of the systems which most often fail. These systems are hydraulic, electrical, fuel, oxygen and radio.

The signals developed are very simple: for hydraulic failure, hold

up one finger; for electrical failure, two fingers, etc. To eliminate confusion between the HEFOR signals and those to indicate a radio channel change, the HEFOR signals are repeated three times. This signalling system can be varied, of course, but the end result is to advise the leader of the difficulty, and to hold down radio chatter. It's easy to see where the latter could prove quite valuable in an operational area.

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INCIDENTS PRECEDE ACCIDENTS

Although incident reports have never been officially required in the Air Force, their value can be tremendous in the accident-prevention program. As a rule incidents that are not accidents will precede an accident caused by, say, a poor design feature. A recent C-97 accident caused by inadvertent reversal of one propeller shortly after takeoff is an excellent example.

When Flight Safety Research investigators completed their work after the accident, they were asked by local pilots for their conclusions. When the pilots were told that the throttle had been pulled past the IDLE position, over the stop into REVERSE PITCH position by mistake, one of the group made the statement that the same thing had happened to him while taxiing. And, without doubt, it had happened to others. Of course, now the stop is being modified to preclude another accident from the same cause, but it took a fatal accident to bring about a change. It would have been infinitely better if the pilot or pilots who had noticed the ease with which the throttle rode over the stop, had taken the time to report the incidents before an accident occurred. A crew's lives would have been spared.

Any pilot can pull a boner; all pilots are human. But when several pilots make the same mistake with the same piece of equipment, it is no longer a boner, it is faulty design.

A second story applies. After an F-89 accident which occurred when the right landing gear did not extend before landing, although the cockpit indicators said it was down, it was found that a near-accident had occurred apparently from the same cause. In the first case the pilot had been quick enough to sense the settling after touchdown and make a go-around, and no report was made.

The UR, though it is most commonly associated with reporting materiel failures, is also a medium to report faulty design and procedures —in short, anything that is unsatisfactory. Use it.

Another way you can help in this matter is to send an informal "incident report" to the Editor, FLYING SAFETY Magazine. We would be happy to receive them. If the incident this brings to your mind is embarrassing to you, sign your letter with an X and keep intact your good reputation. We do not care to whom it happened, just that it did happen.

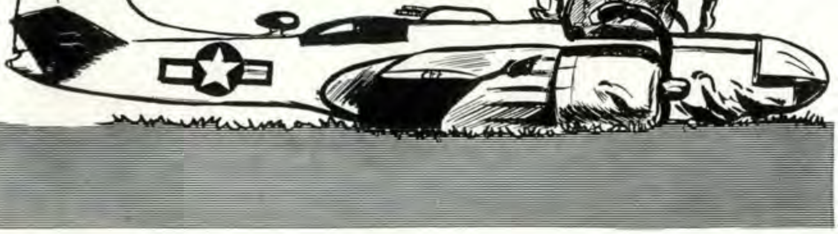
Use of either or both of these mediums will point out to the Air Force definite dangerous trends before they become costly accident trends.

SPOTTING CRASHES

You are the pilot of an aircraft cruising along at 10,000 indicated over mountainous terrain when a crewman informs you that he has spotted a crashed plane. You circle back and scan the area and sure enough, there is a plane down there. You want to report it. Do you know how? If you aren't sure just how to send the report or to whom it goes, do you know where to look to find the proper reporting procedure?

Remember, lives may depend on how fast the Air Rescue Service people can get to the scene. Equally important to the Air Rescue Service, is reasonable assurance that the crash you are reporting is a recent one and not wreckage from an old crash previously located.

An ARS unit at a far northern base received a report that an aircraft had been sighted on the ground near an identifying landmark. A check with the crash locator charts in ARS Operations showed that the reported aircraft was in the same general area as a crash that had occurred in 1947.



An extensive communications check disclosed that no Canadian, civilian or USAF planes were missing, overdue or scheduled to fly over that area. But, since the reporting aircraft failed to give comprehensive information as to the downed plane's type, markings or number and did not pinpoint its location closely, an ARS SB-17 was dispatched to investigate the report. The only wreckage spotted was that of the plane previously plotted on the crash locator chart.

Searches of this kind besides being obviously a waste of time and expensive can be downright dangerous.

ARS pilots often are forced to fly in extremely marginal weather conditions on search missions and naturally take a dim view of risking their lives because someone didn't know the proper reporting procedure.

To get back to the pilot who has located a crash, he can find the correct reporting procedure in the Flight Information Manual under Search and Rescue and should determine and act on the following information:

- Determine if crash is marked with a yellow cross; if so, crash has already been reported and identified.
- Determine, if possible, type and number of aircraft and whether there is evidence of survivors.
- Fix, as accurately as possible, the exact location of crash.
- Transmit information to nearest CAA or other appropriate radio facility.
- Immediately after landing make a complete report, giving full information concerning the crash. If necessary, the report may be made by long distance collect telephone to the nearest CAA, AF or Coast Guard installation.

THE CHECK PILOT

THE manner in which many pilots, particularly recallees, are being checked out in aircraft in which they are then considered current is a matter of growing concern to the USAF. Too many pilots, after checkout, are not fully familiar with the aircraft and have received little or no instruction in it to insure proficiency. Far too often the only concern of the IP on the check-ride is to determine whether or not the plane can be gotten off the ground and back down again.

A pilot's qualifications for a given type aircraft may not even be considered. If he has been recently recalled, he may have flown only occasionally or not at all during the past five or six years; if he is a single-engine man he may be totally unfamiliar with twin or multi-engine procedures, and if he is a twin or multi-engine pilot he will be equally at sea in a fighter aircraft.

If he fails to receive competent instruction in emergency procedures, especially all single engine operations, the newly checked out pilot presents a hazard not only to himself but to any passengers he may be carrying. Even worse, competent instruction may not be available to him even if he requests it, as an increasing number of pilots are being placed on orders as IP's without a check being made as to their qualifications as instructors.

In many cases, of course, selection of instructor pilots is done strictly "by the book" and the result is a healthy situation with competent men doing competent jobs. But look at what happened not long ago. A student aircraft commander got into a situation which he could not control and the airplane crashed with fatal results to a couple of passengers. The fact that an instructor pilot was riding in the right hand seat makes this rather difficult to understand on the surface. But investigation showed the IP had been assigned to instructional duties without any check being made on his abilities for that job.

The primary responsibility for accidents of this type rests with the supervisory personnel who do not make certain that assigned IP's are capable of performing their duties satisfactorily. Laxity on the part of base and wing commanders and operations personnel always must result in accidents eventually. Let's take a look at what is becoming an all too typical checkout procedure.

The pilot in question, recently recalled, takes a ride in a B-25. He likes the aircraft and decides to check out in it. He reasons that since the B-25 is now being used to train cadets it must be fairly simple to operate. True, most of his time was spent in four engine stuff but a few hours of familiarization will suffice to straighten him out.

First, he gets a questionnaire and fills it out, using the handbook to supply the answers. Next, he calls a chum of his, who is assigned as an IP in B-25's at his base and explains that he has some time in a '25 and desires to check out in it. The old pal comes down to the line and they look the plane over in a perfunctory sort of way, crank up and get into the blue.

After getting airborne they settle down to a little straight and level, and incidentally, look over the area for the best spot to use on future fishing expeditions. After picking the most promising stream, they climb up and run through a few stalls. Next, they drop down into the pattern while the IP demonstrates his prowess at greasing one in. The demonstration is a success, the IP relinquishes the controls to the tyro again, who proceeds to shoot a landing best described as "not too bad." Final item is a feathering procedure, accomplished by the IP, and the checkout is complete.

Exaggerated? Not a bit; it actually happens. In the case of our boy the inevitable happened shortly after his check. He was told to ferry a B-25 to another base. En route his oil temperature fell off to zero, but with considerable assistance from the crew chief he finally got the engine feathered. He undershot on final approach, applied power, lost directional control and splashed all over the field.

The primary cause of the accident is, of course, pilot error. But underlying his obvious inability to cope with the situation is the fact that he was checked out regardless of whether or not he could fly that particular type of plane, capably. An irresponsible IP and a lax policy in assigning IP's contributed just as greatly to the crash as his poor pilot technique.

Needless accidents of this kind are bound to continue until each unit in the Air Force tightens up checkout regulations and assures that only fully qualified pilots are assigned as IP's in its aircraft.

THE Flight LEADER

ONE of the basic premises of present day aerial warfare is teamwork. The modern fighter pilot functions as part of a team; a team in a close personal sense. The safety and performance of this team, or more properly, of this flight depends on the support each member gives it and on the overall ability of the flight leader. It is up to him to analyze what his wingmen are capable of and to get maximum efficiency for his flight within their capabilities, while taking care not to exceed their individual limitations.

The responsibility of the flight leader can best be pointed up by showing what happens when he is guilty of poor planning and judgment.

Four F-51's became lost while on a navigational training flight; the flight leader was forced to crash land in an alfalfa field while the remainder of the flight barely made the home base. Investigation revealed that the flight had been briefed to use relatively high power settings for the non-stop flight. Fuel consumption charts showed that this model of the F-51 had insufficient range to make the trip direct even at reduced power settings but that the flight leader had depended on a forecast 40 MPH tailwind.

Only one aircraft, a wingman's, had low frequency radio equipment for radio range work and it was not utilized, even after the flight became lost. At the three-quarter point of the cross-country, the flight passed over an Air Force Base but the flight leader, in spite of low fuel, elected to continue. His lack of planning and poor judgment resulted in one crash and three near misses.

Another crash, attributable to negligence on the part of a flight leader, involved a mid-air collision between two F-51's. Both aircraft were piloted by veteran fighter pilots but the wingman had had a total of only nine hours flying in the last three months and only three hours in the last month, none of which was formation.

The accident occurred while the aircraft were making several rapid turns in show formation. The wingman hit the flight leader's plane and severed the tail. The flight leader was able to bail out as his plane plummeted into a residential area and the wingman was able to make a belly landing on a frozen lake.

Board findings showed that the flight leader did not properly check the position of all aircraft in his flight prior to turning, that he did not properly brief his wingman and that he did not determine the qualifications of his wingman before the flight.

In another accident two F-51's were damaged beyond economical repair when the number four man in a flight over-ran the number three man after landing. The wing of the last plane slid up the fuselage, bounced off the pilot's armor plating and smashed back down on the canopy. By some miracle, neither pilot was hurt.

The flight leader had cleared from the last point of departure knowing that he could not make the destination before dark. He had been informed that number four's radio was out and was aware that none of the aircraft were properly equipped with lights. None of the flight had been checked out in this model of the F-51 and the pilot who had the accident was not checked out for night flying. They had not been properly briefed on landing procedure from formation as the third man landed on the wrong side of the runway and was slow in clearing it.

Primary blame for the accident was placed upon the flight leader for his failure to check the flight's qualifications and for his poor planning in continuing the flight after dark without necessary equipment.

A flight leader who fails to recognize and accept his responsibilities may "get away with it" once or even twice in training. In combat operations, he won't. The purpose in flying by flights is the control, the mutual protection and the increased fire power which results. These advantages can be completely nullified by irresponsible flight leaders. The accidents and near accidents which occur in training because of poor flight leadership should call for drastic action. There would be no second chance if enemy guns could take advantage of such mistakes.

CROSS FEED

A BOUQUET AND A SUGGESTION: Your magazine is an excellent, well prepared and useful publication. However, I feel that perhaps the program on flight safety regarding conventional engine propeller driven aircraft is being slowly but surely erased from the realms of our scope. I have in my command the majority of pilots who do not fly jets and it is becoming increasingly difficult to maintain the interest of those pilots.

I sincerely believe a few articles on B-29 operation would be useful. At the present time, we seem to be in an era of accidents of B-29 takeoffs, but I personally feel that the majority of the causes can be pin-pointed to improper pilot technique and emergency procedures. Perhaps a few articles and words of comment on the phase of takeoff would be of interest and particular value, especially to the men of Bomber Command under Far East Air Forces.

Again I wish to express an opinion of satisfaction in your work. You are to be commended for a program of unending devotion to a justifiable cause.

—Capt. P. C. Kenyon,
Chief, Flight Safety
314th Air Div., APO 710
PM., San Francisco

Suggestions for articles are always welcome. Does anyone else have a good subject to suggest?—Ed.

CARBURETOR HEAT — There has been considerable discussion at this base concerning the use of carburetor heat on C-47 aircraft. Most of the assigned pilots are of the opinion that carburetor heat should be applied only after an indication of carburetor icing is observed, and that it is better to use carburetor anti-icing fluid rather than carburetor heat when taking off in severe icing conditions.

However, one of our pilots quotes a high ranking MATS official to the effect that carburetor heat should be applied whenever the carburetor temperature drops below zero degrees Centrigrade. He reasons that carburetor heat does not decrease the power at a given manifold pressure and RPM, but affects only the total power available. He maintains that if the carburetor temperature is kept above 15° C., there is no possibility of ice formation, and that it is safer to apply carburetor heat for takeoff than to use carburetor anti-icing fluid.

I would appreciate any information you might be able to give me on this subject, as I feel that the points in question involved safety factors of importance in instrument flying.

—Maj. Verden McQueen
Hq. Sqdn., 7503d ASW
APO 147, PM, N. Y., N. Y.

For a clear discussion of this subject see T. O. 01-40-ND-1, Sec. VI, 1 b.—Ed.

COCKED NOSE WHEEL—On 21 March 1952, an aircraft assigned to this organization was involved in a near accident due to a cocked nose wheel. Information gained from the March issue of FLYING SAFETY was utilized in avoiding a possible major accident.

This is one case where you can be sure that an article printed in FLYING SAFETY prevented an aircraft accident and saved the Air Force thousands of dollars.

—Capt. Morris B. Pitts
63d Ftr-Int. Squadron
Oscoda AFB, Michigan

See page 20 for a report of this incident.—Ed.

LISTEN AND LEARN—I'd like to take this opportunity to relate an incident in which a Flying Safety lecture figured directly in the saving of two lives recently. On 18 March 1952, the 84th Fighter-Interceptor Squadron of the 4702nd Defense Wing at Hamilton AFB, Calif., received a Ground Training talk on bailout procedures. At 0009 hours the following morning, Capt. Craig Keller and Lt. Ted Yaroch of the 84th were involved in an accident in their F-89 Scorpion fighter-interceptor aircraft. They both accredited their safety to what they had learned the previous afternoon at the Ground Training talk.

As Captain Keller was taking off he was informed by the tower that his plane was on fire. Captain Keller said that an explosion took place in the aft section of the aircraft, so he realized it would be necessary to bail out. He notified his observer, Lt. Yaroch, of his decision to bail out, then he jettisoned the canopy and started the F-89 in a climb to lose airspeed and gain altitude. After waiting sufficient time for Lt. Yaroch to bail out, Capt. Keller ejected himself from the burning plane.

Both officers landed safely, but Keller learned later that Lt. Yaroch was unable to eject himself so was forced to climb over the side of the aircraft. It is believed that Capt. Keller's use of the ejection seat was the first successful bail out by this means from any F-89.

I believe this emphasizes strikingly the part Flying Safety lectures may play in saving lives. I'd like to stress forcefully to all flying personnel to Listen! and Learn!, for you never know when a Flying Safety lecture may save a life—and it may be your own!

—Capt. Vincent J. Clarke
FSO, 84th F-I Sqdn.
Hamilton AFB, Calif.

THE "WELL DONE"—An incident occurred here recently which I believe could be used in the Well Done section of FLYING SAFETY. Inclosed is a narrative of the incident, involving 2nd Lt. Stuart L. Brown, Jr., and two photographs, one of the Lieutenant and one of the tail section of his F-80. Major Abrey C. Moulton, Flying Safety Officer, suggested that this material be forwarded to you.

—1st Lt. Grover D. Nobles, Jr.
P.I.O. Nellis AFB, Nevada

The "Well Done" is on page 25; for the photo of the tail section after Lt. Brown landed, see below.—Ed.

USELESS CHUTE—It was recently noted here that a pilot of this command who was wearing a back type parachute had the chest strap through the "D" ring. Further investigation showed that with this

type of parachute, the snap end of the chest strap could accidentally go through the "D" ring.

The parachute would be useless with the chest strap secured in this manner.

—1st Lt. Hillman C. Tebbs
86th Fighter-Bomber Wing
APO 65, PM., N. Y.

JET GUARDS—I am presently stationed in the United Kingdom with MATS. During the past month I had the occasion to visit Prestwick Airport, Scotland, where I happened to observe mechanics ground-checking an RAF jet fighter, a Glouster Meteor. To prevent injury to maintenance personnel during ground runup, I noticed that a simple steel safety guard was installed over the front of the air intake.

—Maj. Edgar A. Robinson
Atl. Div., MATS

WATCH THAT W

Inaccurate weather forecasts CAN cause accidents . . .

but usually good judgment by the pilot can save the day.

WHEN IN DOUBT, go Item Fox Roger. Remember, that weatherman who is briefing you usually has only station sequence reports and forecasts to use as a guide. Unless he has received pilot reports of weather conditions en route he doesn't know just what conditions may exist between the reporting stations, and being only human his forecast might be wrong.

Okay, so an IFR clearance is more trouble and it may take a little longer to get where you are going, but the point is, you'll get there. Maybe waiting for that ATC clearance will mean a cold dinner and a warm reception from the better half, but it might also make the difference between walking back or no dinner and no reception at all.

A survey of accidents for the last two years in which weather was a factor show that too many pilots still are filing VFR when the safe bet would be to go IFR. Others are flying into instrument weather on VFR clearances.

In the final analysis, the decision rests with the man in the cockpit. If, in his opinion, the information he has received indicates that conditions will be marginal he should plan his flight accordingly. True, the information given the pilot may be wrong but it is still his responsibility to use the good judgment needed to stay within regulations and maintain safe flight.

A T-7 crash resulting in the death of two pilots and total loss of the aircraft illustrates just what can happen in marginal weather on a VFR clearance. As the take-off was to be made from a civilian field, Flight Service was contacted for a weather briefing and clearance. The weather was VFR with a forecast of 2000 feet MSL, visibility variable three to five miles in rain. This meant an altitude about 1500 feet above the terrain could be maintained. The flight was at night and the route crossed mountainous terrain. The ceiling over the mountains was forecast to be 4500 feet, which allowed a 2000-foot clearance, with light to moderate rain. Destination was clear at time of take-off and remained clear throughout the night. The pilot could have filed IFR and later changed to VFR if he so desired. Instead he elected to try it VFR, encountered ceilings and visibilities below those given him at the weather briefing and tried to get through by going under the overcast. Result: collision with a mountain.

It is true that the weather was incorrectly forecast for this flight. But the pilot was told it was marginal and final decision as to filing the clearance was left to his discretion. Finally, if he had obeyed regulations and either made a 180-degree turn upon encountering the instrument weather or stayed in the clear and changed to an IFR clearance he would have made it. Chalk up another one to broken regulations and poor judgment.

Another flight ended with the crew of a cargo plane qualifying for the Caterpillar Club after they ran out of fuel while on instruments. This pilot cleared VFR, on the basis of a current sequence report, but did change to IFR after running into instrument weather. However, he didn't bother to plan on the possibility of severe thunderstorms which were reported to be in the vicinity of his home station. When 20 miles out, he found a hole, let down and tried to sneak in under a low overcast. Unfortunately the stuff kept dropping, helped by heavy rain.

After two passes in what he imagined to be the general direction of the field he decided that perhaps an instrument approach was in order. By this time the clouds were on the deck and he was unable to get into the field. So much time was consumed in milling around the area and in attempting to get in, that insufficient fuel remained for the plane to reach an alternate. The only choice left was a bailout.

In this case also, the weather was far worse than predicted but if the pilot had kept his IFR clearance he could have attempted a standard instrument letdown and approach and if unsuccessful would have had enough fuel to get to another field.

The form five of a veteran fighter pilot was permanently closed after another crash, under similar circumstances. In this instance, the weather deteriorated rapidly from a forecast high overcast of 10,000 feet to a much lower ceiling accompanied by rain. The pilot cleared VFR and as the aircraft was not equipped for an instrument flight it was vital that he stay clear of bad weather. Instead, eather

Good flight planning reflects good weather judgment; and a survey of weather accidents has shown that many pilots file VFR when it should be IFR.

he climbed over the overcast, arrived at his destination and informed the tower he could not make a letdown. He was then cleared 500 feet on top to another base still reporting clear weather. Evidence from residents in the locale of the crash revealed that severe snowstorms had occurred intermittently during the day, particularly around the estimated time of the accident. The pilot attempted a bail-out which was unsuccessful. The Accident Investigating Board was of the opinion that the parachute canopy fouled on the aircraft when the pilot attempted to abandon the plane. The chute would not have been necessary if good judgment had been used.

A final example of the tragic results of attempting to fly contact under IFR conditions can be portrayed in the crash of a C-47 trying to land at a base with a ceiling below minimums. The flight was changed to IFR approximately halfway to the destination. At the time of the change the pilot was notified of the weather at his destination which was below published minimums for that base. Neither GCA or ILAS was available, a fact that the pilot knew. He continued on his original flight plan however and informed the tower he was making a letdown on the range. He was informed that the field was below minimums but stated that he would come in anyway.

He broke out approximately 200 feet above the ground, told the tower to change the high frequency light to another runway and made a steep turn to line up with the new runway. He was flying in a light drizzle and rain which reduced the visibility to less than $\frac{3}{4}$ of a mile. He failed to get lined up properly and in attempting to correct, he dragged a wingtip, stalled out and landed very hard, nose first. Pilot and copilot sustained major injuries and the airplane was washed out. Chalk up another one to broken regulations.

In all four of the cases cited above, the weather was forecast incorrectly, but in all four cases the pilot had an opportunity to use good judgment and failed to do so. Far too often the weatherman is blamed for trouble that could have been avoided if the pilot had exercised proper judgment and had utilized his own knowledge of the weather and the regulations made for his protection.

All this doesn't mean the weather forecaster is never at fault. He is, sometimes with hair-raising results. The pilot, in planning a flight, should weigh all the facts which he got in the briefing, together with the information available to him in the weather station. But, if his flight planning is based on false or incorrect information, sometimes no amount of care will help him. He has had it.

Poor forecasting caused one F-51 pilot to spend about 15 hours in a cold, wet swamp. He cleared for a short flight with both his destination and alternate reported open and forecast to improve. Arriving over his destination he had to hold for more than an hour. By the time he was cleared for an approach, the field had dropped below his minimums and his alternate was reported closed. He requested and received a change in alternate but upon reaching this base, where the forecast had been for 8000 feet, he found it, too, had dropped below minimums immediately prior to his arrival. He received permission to make an approach at his own discretion as he now had insufficient fuel to go elsewhere. Several passes were made at the field. On the last one, the plane was still in the soup at 200 feet above field elevation and the approach was unsuccessful. Finally the pilot was advised to climb out on the range and bail out. The jump was successful and the pilot spent the remainder of the night wallowing around in the swamp. Score this one to poor forecasting.

Fortunately, cases of this kind are the exception. A pilot usually has a chance to alter his flight plan while en route to allow for incorrect forecasting. It's up to him to display the good judgment necessary to recognize when his flight plan should be changed to IFR or when a 180° turn is the order of the day.

THE IDEAL *Forecaster*

STRAIGHT TALK TO WEATHER FORECASTERS FROM ONE OF THEIR OWN

By Maj. Robert A. Taylor
20th Weather Squadron

MOST OF US are familiar with the concept of the ideal, which places before us as we go about our daily duties a mark of excellence toward which we may strive. Like all such models of perfection, the designation of "the ideal forecaster" is one toward which most of us move throughout our weather careers without ever pretending to have achieved it.

In an attempt to put meat on the bare bones of the picture of an "ideal forecaster," an informal survey of pilots and navigators was conducted recently throughout Japan, during which many Air Weather Service "customers" were asked what attributes they hoped to find in a forecaster.

Listen to what a First Lieutenant with comparatively few flying hours had to say: "When I walk into a weather station, I expect the forecaster to stop whatever he's doing and help me. Too often, however, I have to tap him on the shoulder to let him know I'm there. Those maps he draws may be important, but I feel they are drawn to help him brief me and are of secondary importance.

"I am also impressed one way or the other by a forecaster's appearance. I feel that if a man is neat in appearance, he is also neat and sincere in his duties. This may not be entirely true, but I haven't been out of cadets very long and the possession of a neat appearance is still an important factor in my personal analysis of other people."

That's straight and sensible talk for a pilot with very little flying experience but more than his share of common sense. How do you rate with the Lieutenant? Do you hop off your forecaster's stool to serve him, or does he have to tap your shoulder? Are your shoes shined? Is your hair neatly trimmed and your uniform clean and pressed?

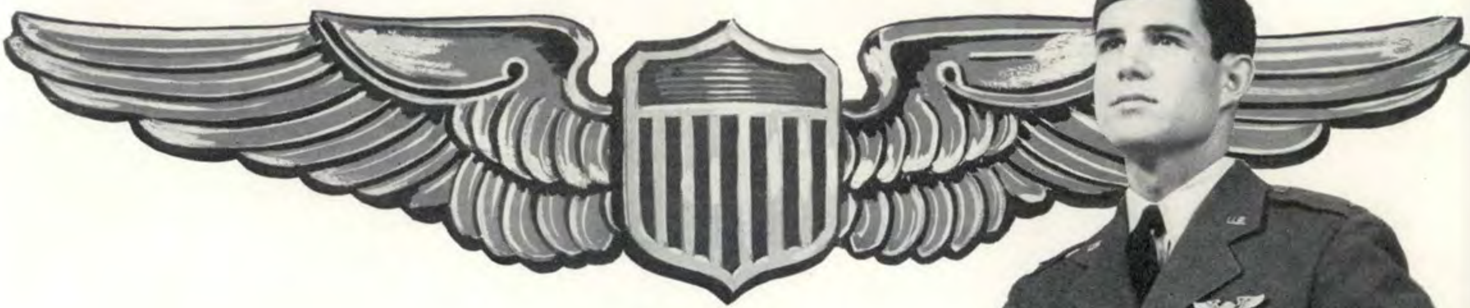
Now let's hear from a full Colonel who graduated from flying school back in the 1930s: "Who do your forecasters think they're kidding? For the large part, they are sequence readers. When I enter a weather station to be briefed for a flight to another base, I often have my intelligence insulted by a forecaster who reads the sequence and tells me what the weather at my destination is at the present time. If that's forecasting, I've been laboring under a misapprehension for a number of years.

"Of interest to me, and to other pilots I am sure, is the weather we will be finding along the flight route. I can read the forecast code for my destination as well as the forecaster, but what I want to know is the conditions between me at takeoff point and my destination. Should I file IFR or VFR for the flight? Terminal conditions alone won't tell me this. I can't tell you how much pleasure I derive from a forecaster who can give me a complete weather briefing rather than one who is a single sequence reader."

Mighty strong words, Colonel, but in many cases very true. What sort of impression would you leave with the Colonel? Would you give him a complete route forecast or a terminal sequence report?

The "ideal forecaster" possesses a composite of all the qualities which our "customers" consider to be desirable. The Lieutenant and the Colonel represent differing points of view, but in the final analysis, their remarks serve only to point up what most of us already know—that the "ideal forecaster" must be, and must appear to be, capable of presenting a clear, accurate and timely forecast of weather along the route and at the times in question. As we come close to this goal, so do we approach the ideal.

To Men With Wings



THE security of our country depends in large part upon you. The people depend upon you to help protect them from any aggressor whether he strikes through the air, on land, or by sea. Briefly, the mission of the Air Force is to protect the United States, its people, and the interests of those people.

There are many things you can do in the interest of furthering this mission. All of them come under the heading of knowing your business. Actually, your business is two-fold. You are a member of a distinguished service, and you are a member of a flying crew. To be successful in one of these businesses you have to be successful in the other.

The trust of the American public is not to be taken lightly. You know what it takes to fulfill that trust.

It's up to you.

★ LOOK SMART

★ THINK SMART

★ FLY SMART

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