Flying Safety

HEADQUARTERS UNITED STATES AIR FORCE • RESTRICTED

MARCH 1949

SHARE YOUR IDEAS

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

★

OUTSTANDING AIRMEN

Every example of pilot error resulting in an accident is reported in one publication or another. But numerous examples of outstanding feats of airmanship often go unmentioned. Commanders and flying safety officers are invited to tell the editors of FLYING SAFETY about such flights. Whenever superior airmanship, piloting or maintenance saves an airplane or crew from disaster, we want to publish the story to the entire U. S. Air Force. The personnel concerned deserve a "well done" on these pages.

FLYING SAFETY

Volume 5 No. 3 **March 1949**

Editor
CAPT. HOMER P. ANDERSEN

Associate Editor
1ST LT. HAL J. BASHAM

Art Editor
CAPT. WILLIAM M. METTLER

Associate Editor
CAPT. JOHN J. HERBERT

Research Editor
1ST LT. RODGER W. LITTLE

CONTENTS

FLYING SAFETY is published monthly by the Department of the Air Force, Flying Safety Division, Office of The Air Inspector, % Inspector General, First Region, Langley Air Force Base, Virginia, with the approval of the Bureau of the Budget, Executive Office of the President of the United States.

Direct communication is authorized with the Editor (AF Letter 62-8 dated 15 August 1947).

OUR GREATEST LOSSES

THIS, AND the next eight pages of this issue of FLYING SAFETY are devoted to aircraft accidents occurring during approach and landings. More than half of all the accidents in the Air Force occur during this phase of flight.

This huge slice of the accident pie is composed of several ingredients. The five most important are pilot error, maintenance error, materiel failure, inadequate training or supervision and poor ground control. The first four stories in this magazine present a picture of the part these "accident causes" play in contributing to the total of lives and equipment lost annually in approach and landing accidents.

As always, "pilot error" tops the list of accident causes. Month after month, about 40 per cent of approach and landing accidents involve errors committed by a pilot. If you are a pilot, this is your cue. The odds are better than two to one that if you are going to have an accident, it will happen to you while you are making an approach or landing rather than during any other phase of flight. If an accident happens to you on approach and landing, the odds are that it will be your fault. This is not conjecture, but fact based on cold statistics. Be advised accordingly and look to your technique on approaches and landings.

Groundloops and wheels-up landings run a pretty close race in accounting for nearly half of all approach and landing accidents.

Maintenance errors and materiel failure are involved in the next greatest portion of USAF aircraft accidents. Landing gear troubles, because of faulty maintenance, continue to show the most need for correction. In all, errors of maintenance personnel account for four per cent of the fatal landing accidents while 14 per cent of them involve materiel failure. Often, the natural tendency is to place the blame on an inanimate piece of equipment. A piece of equipment fails because it was misused, not properly maintained and inspected, or because humans had designed it wrong in the first place.

It you are a supervisor in charge of training, operations, a control tower, a weather station, or otherwise in a position to instruct or advise pilots — you are involved in nearly eight per cent of all approach and landing accidents. Your greatest opportunity to reduce such accidents is by thorough supervision of aircrew training and operations.

Approach and landing accidents challenge the Air Force. When more than 1,000 airplanes are wrecked or damaged in the short space of 12 months because of such accidents, they must be considered our greatest foe. If in war the enemy picked off 1,000 of our best aircrews and planes as they came in for landings, every defensive measure known would be brought into action to halt such losses.

What are you doing about it at your base?

THE NUMBER

PILOT ERROR is the most predominant cause factor in final approach and landing accidents. Pilots sometimes have a tendency to feel that the "pilot error" tag is overworked, that "pilot error" is placed on too many accidents. Let's review several recent accidents involving pilot error which occurred during final approaches and landings. You judge whether the accidents are pilot error or not.

Take the case of an F-80 pilot who, in violation of Air Force Regulation 55-13, gained considerable altitude in his peeloff and failed to observe another F-80 which was flying the prescribed pattern. The hot-rock F-80 pilot landed on top of the other F-80 which had made the last turn at 800 feet, 1000 feet from the end of the runway.

How do you score that one?

Here is another approach and landing accident. Just prior to touchdown with his F-51 in a three-point attitude, a pilot decided to go around. He applied 62 inches of manifold pressure with one rapid movement of the throttle. He went around all right, around the longitudinal axis of the aircraft, landing in an inverted position. For several months everyone called that character baldy.

How about that one?

Now take the case of a B-29 pilot who had a habit of aiming "just" short of the runway, relying on the airplane's ability to float up to the numbers on the strip. One night this pilot flew a B-29 that wouldn't float at maximum gross weight. The B-29 slid up to the runway sans the main gear.

In contrast with the B-29 pilot who aimed short and hit his mark, there is the case of the B-26 pilot who obviously aimed only at the county in

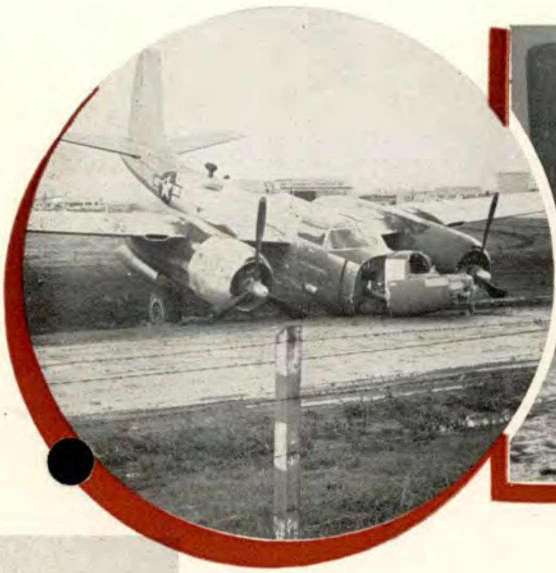
ONE SLOT - - - -

which the airfield was located. After floating several hundred yards past an intersection located halfway down the runway, the pilot made no attempt to go around but attempted to stop 33,000 pounds in 1600 feet. Can't be done, you say? He proved it couldn't. Wouldn't you score that one as pilot error?

Another B-26 pilot rounded out to land in the first third of the runway. He didn't overshoot or undershoot — he landed on the side of the runway. He missed the first dozen or so runway lights but made up for that by wading through the next 12. With a runway 150 feet wide, you figure out why this pilot found it necessary to land with his wheel six inches in from the right side of the runway. Pilot error? What else!

For several years T-6 groundloops caused by pilot error have occurred with regularity. Relaxing control, landing in a crab, using brakes excessively, adding too little or too much power, and many other causes have become stock phrases on accident reports. It stands to reason that if you land a T-6 straight ahead and keep rolling straight ahead, you cannot groundloop. Therefore, discounting groundloop accidents caused by materiel failure, you will have to admit that the analyst who codes accident reports is not too far off when he tacks a big pilot error next to the pilot's name on a report of a groundloop. Usually it is when a pilot feels that he has a landing in the bag that he winds up holding it.

So long as pilots continue to relax their vigilance, neglect their proficiency and fail to comply with regulations designed to increase their proficiency, "pilot error" will continue to occupy the number one slot on the list of causes of accidents.



- - - MAINTENANCE ERRORS

MAINTENANCE ERRORS and materiel failures often are not detected until a pilot attempts to land. Then it is too late and the plane is committed to an accident.

The accidents described here are not out of the ordinary. They helped to make up the 14 per cent of landing accidents caused by materiel failure and the four per cent caused by maintenance errors in the past year.

Because of dirt, old grease and metal filings on the locking pins, the left landing gear of a T-6 collapsed after landing. The gear dropped into down position but the lock pin did not go into place. The pilot had operated the landing gear overtravel control to check down and locked. When the plane was hoisted for a check after the accident, it was found that about 100 pounds pressure had to be applied to the gear handle before the pin could be forced through the accumulated filth and grime into locked position.

Some people think the old gag about leaving a loose monkey wrench in an airplane has been told too many times. But all too often the same type of carelessness causes an accident. Picture the situation of the T-6 pilot who thought he had the landing gear down. He landed, and after a roll of about 700 feet the right gear collapsed. When the plane was jacked up it was found that the landing gear handle could not be moved into the overtravel position. The reason: the lock pin was jammed in the retract position by a two-cell G.I. flashlight. The batteries were three years old and the metal case of the flashlight was rusty, indicating that this plane had been flying with the flashlight in the wing for a considerable period of time.

While landing gear malfunctions are most prominent, power plant and fuel line troubles account for the next big slice of the landing accidents. Illustrative of this type of accident is the one where an F-47 pilot retarded his throttle before lowering

AND MATERIEL FAILURES - - -

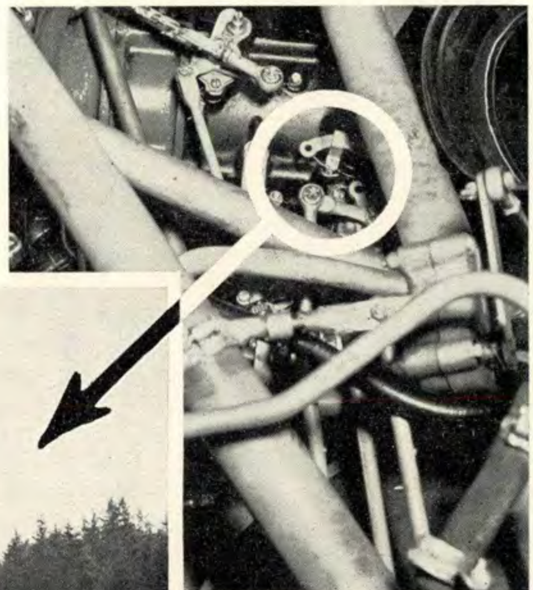
the landing gear. When he again applied throttle to hold traffic pattern altitude, there was no response from the engine. It continued to idle. Unable to reach the runway, he picked the best area on the ground, retracted the gear, and bellied the fighter in. The plane was wrecked and the pilot injured.

What happened to the engine that it didn't respond? Ask the maintenance people who had not properly secured and saftied the throttle linkage rod assembly after an engine change. This part became disconnected from the bell crank assembly while the throttle was in retarded position.

A loose connection can be a great hazard, especially when it is in a fuel line. One pilot detected strong gas fumes on a local flight and returned to the field for an emergency landing. Witnesses noted a vapor trail coming from the left wing root of the distressed F-51, and as the plane rounded out for touchdown, flames were seen coming from the engine. As the plane touched down, the fire became more intense. The landing was tail high and the prop struck the runway about 50 feet from touchdown. The plane veered right, losing the right main gear, went off the runway and through a ditch, shearing the left gear. The pilot was rescued but was severely burned. Blinded by the flames he had been unable to control the plane on its landing roll.

A loose connection of the left wing fuel supply line resulted in the fuel leak. It's a bit obvious what accident investigators recommended to stop this type accident — inclusion of a fuel line inspection in pre-flight and daily inspection.

Most final approach and landing accidents involving maintenance errors and materiel failures could have been prevented on the ground before the plane took off, through thorough inspections and proper mechanical attention.



- - - - - - - - - - - - - - COST OF INADE

WHEN A pilot neglects his responsibility for keeping himself well trained and efficient, and supervisors fail to note his disregard of proficiency requirements, somebody always gets killed. Frequently the list of dead and injured includes people whose only sin was hitching a ride with a pilot who was supposed to be competent.

You're about to read of a C-47 flight that took four people to their deaths, left 13 with major injuries and four with minor injuries; a flight that would never have been allowed to begin if flying proficiency regulations had been observed.

The C-47 took off from a southwestern airbase on a VFR clearance to a base in the central United States. Over his destination the pilot was advised the weather had dropped below landing minimums as a result of local fog. Flight Service advised him to land at a nearby base which was still clear, but the pilot declined to land, requesting a clearance to his home base. The clearance was refused because the pilot had reported insufficient fuel to make the flight. Flight Service again recommended a landing at the nearby base which was still clear. Again the pilot declined, requesting a clearance to another station which was somewhat closer to his home station.

The pilot was cleared to the base he requested because the weather sequence reported three miles visibility with no change forecast although there was no temperature-dewpoint spread. When the pilot arrived over his destination, the weather was down to one-quarter mile visibility with fog and haze making an indefinite ceiling. The pilot reported he had one hour of fuel or less and elected to make a GCA approach although the field was below GCA minimums.

A normal GCA pattern was flown except that the pilot did not acknowledge all instructions immediately. About two miles from touchdown the plane was 75 feet below the glide path. The pilot corrected to 50 feet below the glide path, held his correction briefly, then went further below the glide path and off the GCA scope.

The plane crashed into a building, which fortunately was empty, at a point 3400 feet short of the GCA touchdown point, 150 feet below the glide path and 125 feet right of the centerline. Survivors reported seeing a row of street lights below the plane just before the crash.

The pilot, copilot, engineer and one passenger were killed, and all the other passengers were injured.

The wreckage did not burn, and fuel recovered from the left wing tanks which were intact and the right wing tanks which were ruptured, indicated the plane had approximately one hour and 40 minutes fuel remaining at the time of the crash.

The pilot's lack of judgment and poor technique were the immediate causes of the accident. He failed to take Flight Service's advice to land while he could, he failed to figure his fuel consumption and remaining fuel correctly, and he failed to

follow GCA instructions implicitly on his final approach. But behind these immediate causes of the accident is the underlying cause — the failure of this pilot and copilot to meet the minimum flight requirements set forth by Air Force regulations.

This pilot had been issued a white card, and according to the letter of the law should have been proficient in GCA landings. His Form 5 showed two GCA approaches made in a link trainer on 15 April and one GCA approach under the hood in a C-47 on 15 April. When his white card was issued on 15 April, he had a total of three GCA approaches. On 16 April he logged two more link trainer GCA approaches.

For the six months preceding the date of the accident the pilot's Form 5 showed no instrument time. In the 41 hours preceding the accident the pilot flew 25 hours, including two hours and 30 minutes logged as hood time.

The copilot's record is even more interesting. He was a senior pilot, but held no instrument rating and had no record of GCA approaches. His total flying time for the nine months preceding the cross-country flight which ended in the crash was three hours of copilot time. He had been on grounded or restricted flying status until three days before taking off as copilot on the trip which ended in his death.

Those are the proficiency qualifications which were considered adequate for these pilots to make a cross-country trip and to fly through weather and to carry passengers — a pilot who had flown no instruments for six months and had made one GCA approach in an airplane, a copilot who had flown only three hours total in nine months and that as copilot.

The third paragraph of 60-2 states, "Commanding officers are hereby directly charged with the responsibility for issuing the necessary orders and for proper supervision to insure that all individuals on flying status when assigned or attached to their command for flying maintain their flying proficiency and demonstrate their ability to perform satisfactorily the flying missions assigned in the type of aircraft involved."

Time and again it has been demonstrated that instrument flying proficiency is maintained solely by regular and frequent practice. At most Air Force stations monthly instrument and night flying requirements are required in order to insure that pilots maintain their proficiency.

This is a sound policy, and when pilots contrive to ignore it and fail to fly on instruments and at night frequently, they are placing in jeopardy not only their own lives but the lives of people who may have occasion to fly with them. If all pilots took the minimum flight requirements as lightly as the pilot of this airplane, the results to the Air Force might well be chaotic.

How do you stand on *your* proficiency requirements.

GROUND CONTROL -

Accidents caused by inadequate control over aircraft approaching for or in the final stages of landing make up another large slice of the pie. Accidents continue to occur which show that direction and control of planes and of vehicles on the ground do not receive sufficient attention, especially at night and during periods of reduced ceilings and visibilities.

Let's review the case of the C-54 crew which was led right into an accident because of inadequate and incorrect control from the ground.

This C-54 had been cleared to the tower and was approaching the low cone still under IFR conditions, so the pilot contacted the tower for permission to make a straight-in approach.

The tower gave him clearance for the straight-in and asked him to advise when he was over the low cone. Everything was going along nicely until the tower operator called the pilot of the C-54 to get the altitude of the cloud bases.

A reply came back from the C-54 that they were at 900 feet and expected to break clear at about 700 feet. The tower acknowledged this but did *not* inform the C-54 crew that the previously reported ceiling was M 300 feet overcast.

Why the tower operator bothered the crew at that time when the pilot and copilot were concerned with the safety of their letdown, and why the tower operator failed to give the earlier report on the overcast is anybody's guess.

Within a minute after this transmission the plane crashed into the tree tops near the range station. The C-54 was wrecked and the crew of three killed. Apparently the pilot saw the trees just before the impact because the plane crashed in a tail-low attitude.

Although IFR weather conditions existed, GCA was not in operation. The new regulation directing GCA to be operative during IFR conditions had not yet reached this unit. It arrived one day later.

The pilot should have observed the minimum IFR altitude requirements. However, the investigation report noted that the pilot may have misunderstood the tower's transmission and sought to determine the base of the clouds immediately rather than waiting until he passed the low cone in his normal let-down procedure.

Tower operators should be warned to keep unnecessary calls to a minimum when pilots are busy with a range letdown as they can be very disconcerting. Pilots should be encouraged to give voluntarily the report on ceiling and visibility after they land.

Now, take the case of the C-45 and B-25 which tangled on the hot runway. A C-45 pilot had made three unsuccessful attempts to land at an Air Force base using GCA before he successfully completed his fourth attempt about midnight. He was advised by the tower to make a left turn off the runway followed by another left turn which would bring him up to the operations parking ramp.

Visibility was very poor, it was dark, and things were made even worse by the heavy rain. An alert jeep was dispatched out to the runway to find the wandering C-45. The jeep driver couldn't find the C-45 on the taxiway it should have been on.

The jeep driver finally saw the C-45 after it had

- - - NECESSITY PLUS

been taxied back down the active runway and parked on the taxiway opposite the GCA unit.

In the meantime, GCA was bringing another airplane around the pattern to land. When the B-25 was five miles out on final approach, GCA contacted the tower for clearance for the B-25.

The tower called the C-45 pilot and asked him if he was clear, but did not advise him of the landing B-25. He replied in the affirmative. This was was the third time he had replied that he was clear of the hot runway.

Immediately, the tower gave GCA permission to land the B-25. Meanwhile, the jeep had rushed on around the taxistrip trying to get the C-45 which was parked alongside the active runway at the intersection of the taxistrip and the runway.

All the crash equipment was standing by the runway because the C-45 had previously declared an emergency landing because of only 30 minutes of fuel remaining.

The jeep threaded its way through the crash trucks and just as it was about midway across the active runway, the NCO in the jeep spied the B-25 touching down *without* landing lights on. The jeep driver hastily executed a 180 and drove off into the grass alongside the now very hot runway.

It is quite possible that the C-45 mistook this 180 degree turn of the "follow me" jeep for his cue and he taxied out into the path of the landing B-25.

The C-45's cockpit was chopped open, wings torn off, and it caught fire. Of the six aboard, two were killed, three received major injuries, and one escaped with minor injuries.

Only one man aboard the B-25 was injured. His chute harness caught in the structure of the B-25 as he attempted to jump while the plane was still skidding, and he was dragged along.

The B-25 pilot claimed he became contact at 200 to 300 feet and he didn't use landing lights because of glare reflection.

This fatal accident due to a lack of adequate ground control during inclement weather should serve as a warning to all stations, especially those employing GCA. Any one of three things could have prevented this accident: The tower could have advised the C-45 pilot that the B-25 was landing. No pilot would venture onto a hot runway in the face of such a warning. The tower could have advised the alert crew on the squawk box to watch out for the approaching B-25 in which case the driver would not have been surprised by it. The tower could have advised the jeep driver at the last minute by radio had the jeep contained operating radio equipment.

The many facilities controlling air and ground traffic by means of MEW, approach control, GCA plus alert jeeps should be funneled into one central control room. This single control should be commanded by a rated officer qualified to insure safe traffic control on and above the airdrome in all types of weather.

Pending perfection of radar-television ground traffic control, a positive means of removing aircraft from an active runway must be developed, giving positive control of taxiing aircraft and permitting safe clearance for succeeding landing aircraft.

DIT DAH FADING OUT

By **COLONEL S. A. MUNDELL**
Air Force Member, Air Navigation Development Board

WHAT WOULD you say if I told you that within five years it is probable that all the four-course low frequency ranges would be torn down? That there are new devices on the way, among them the omni-range, with its associated distance measuring equipment and course computer, which will revolutionize radio navigation in the near future? To those acquainted with the present system, the two preceding statements may seem rather broad and overwhelming in their content. However, the new equipment and procedures described below indicate that a new day is dawning in air navigation.

Under the system now in use, the pilot files a clearance, is eventually cleared and takes off. Once he is airborne, he has his normal flight instruments plus certain navigational aids; specifically, the four-course low frequency ranges, range receiver, ADF, marker receiver, and VHF command set. Almost as soon as he puts these aids to use he encounters some of the multiple difficulties that haunt the present system:

He finds that it is sometimes hard to tune in the station he wants because of interference from another station. If he hits bad weather, he may hear static build up to such a point that even though he may have finally identified his station he can no longer hear it.

The weather may also have caused his ADF needle to wander and he no longer knows in what direction the station is. If such is the case, when the weather clears and he is able to tune in the next range, he may find that he has wandered from his course a little. Thus orientation is called for. About this time, as if he didn't have enough troubles, ATC calls and wants to know where he is and when they may expect him over the next check point.

The low frequency band is right where the static seems to be the worst, and it is over crowded. Just before the war, the CAA realized this and embarked on a VHF range program in conjunction with the services and the commercial airlines.

However, the war interrupted the airway work, but laboratory people went right on working on the problem in their spare time. With more planes flying, the problem had become worse instead of better. Finally, someone came up with an idea — there must be some way of knowing which way to fly to get to a station when it was tuned in, rather than flying around looking for a leg to intersect. A number of ideas were tried and finally the VOR (VHF omnidirectional range) was born.

Maybe a little description of it and its associated receiver wouldn't be out of order. The range itself has five loop antennas, the center one of which transmits voice and a reference signal. This reference signal transmitted by the center antenna and a rotating field transmitted by the other four antennas are combined in the receiver to determine the heading to the station. In effect this provides 360 courses to the station. The airborne receiver tunes from 108.1 mcs. to 132 mcs. in order to receive localizers, ranges and towers. The visual indications are presented on either two or three dials, the Air Force preferring the two-dial installation. The equipment is used somewhat as follows: the set is tuned by means of a tuning head something like the one shown in Figure I. The big knob tunes the set in megacycles and the little one sets the tenths of megacycles.

All that is necessary to tune in a station is to check the frequency on the "facilities chart," turn the two knobs until that frequency is shown in the window. How do you know you have the right one? Two ways—first, the range itself talks. It says, "This is Atlanta VHF omni-range," or sends out an identifying tone signal. Second, both the receiver and the range are crystal controlled. This means that if the charts say that Montgomery range is 112.3 and 112.3 appears in the tuning window, Montgomery is the range that you are hearing and seeing.

Now for what you see and how you see it. There are two indicators, one called the radio magnetic indicator or RMI. It looks a lot like the common ADF indicator (Figure II) but is actually different. First, the compass card moves. It is driven by the fluxgate compass so that the aircraft heading always appears under the lubber line at the top of the indicator. Next, it has two needles, one of which can be used as an ADF needle if desired, and the other which is driven by the omni-receiver (ARN-14). When a station is tuned in, the omni needle points to the station just like the present ADF needle does, but under the end of the needle on the compass rose appears the heading necessary to fly to get there. If a normal "into the needle" turn is made, both the needle and the dial rotate until the heading and needle point to the lubber line at the top of the indicator. So much for getting headed toward the station. Now suppose we want to hold that course, or to fly any other course we desire to the station. Comes the second indicator.

This second indicator (Figure III) is a combination of the cross-pointer meter, the marker beacon light, a knob, a course dial set by the knob, a "to and from" indicator and a heading needle. To use this indicator, suppose that the RMI says that in order to get to the station we should fly a heading of 310 degrees. The knob is turned until 310 degrees appears on the dial, and the "to and from" indicator shows "To." If the vertical needle on the cross-pointer is kept centered, we will fly a track of 310 degrees to the station. Notice that I said track. It is a track regardless of crosswind since the course has been established by the range itself on the ground. After flying for a time, the crab angle can be determined, if desired, by reading the amount that the RMI has changed from the 310-degree track being flown.

I haven't mentioned the heading needle yet. It is used in holding or intercepting the desired range or localizer course. To illustrate this, when we first tuned in the range the RMI said that it was 310 degrees to the station, so we turned to 310 degrees. Now, the course indicator is set to 310 degrees. In the meantime, we have been flying along and perhaps are not on the 310-degree radial. The heading needle is centered on its dial showing that we are flying 310 degrees; however, the cross-pointer needle is off to the left. How do we center it? Just turn so that the heading needle and the vertical needle come together. Hold this course until the vertical needle begins to move, then start a turn back toward the center of the dial so that both needles move together. When they both get back to center, stop the turn and you're on course.

The same procedure is followed in intercepting a localizer. Tune it in, set up the inbound course, turn to bring the two needles together, and as soon as the vertical one begins to move, turn so that

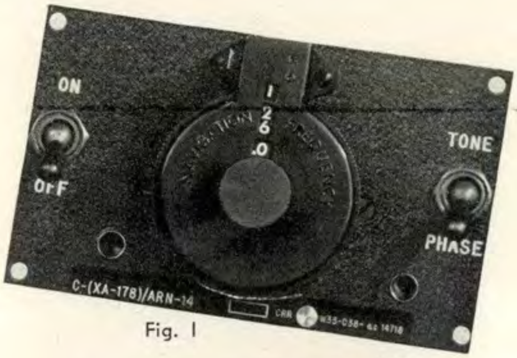


Fig. I


Fig. II

Fig. III

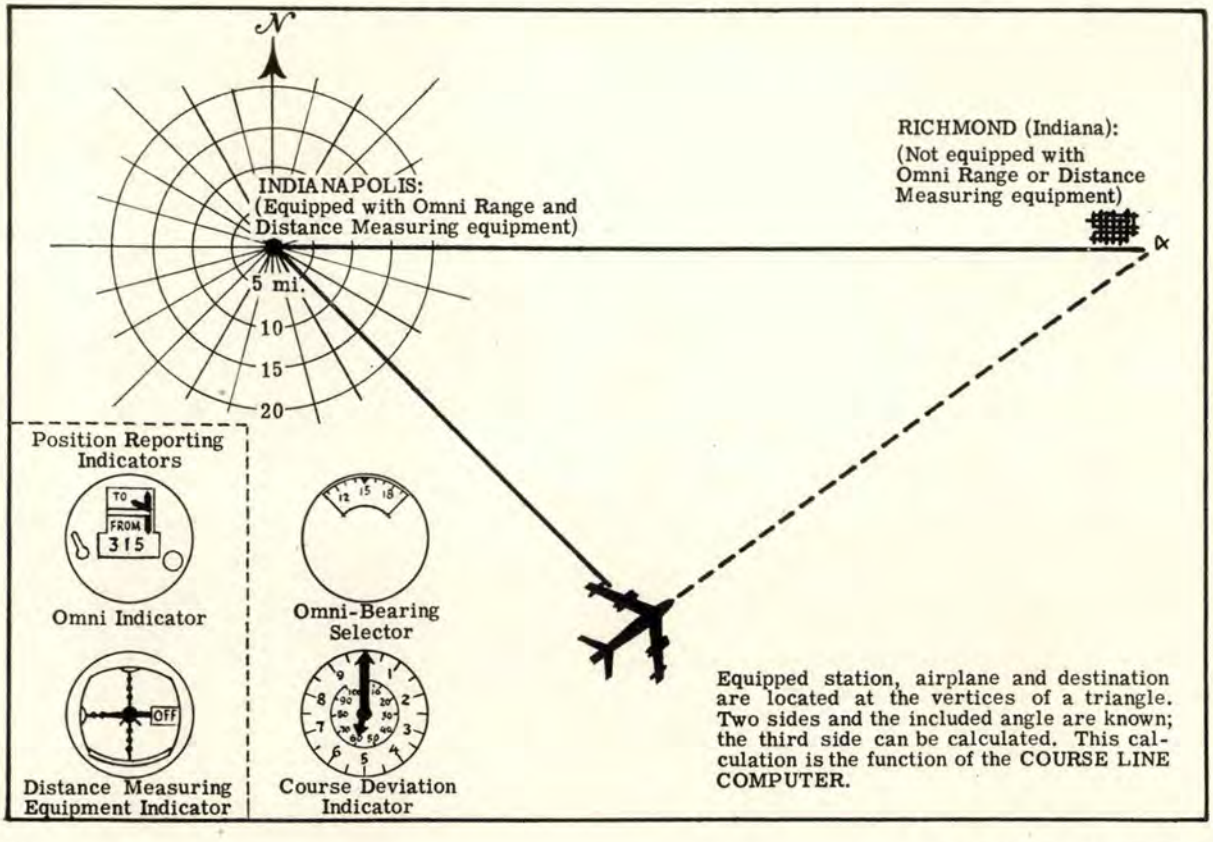
Fig. IV

both of them are brought back to the center and you're on course. When holding, set up the inbound heading. Of course, you already have that since you are approaching the range. When the cone is reached, turn until the heading needle reads 45 degrees right, fly the required 40 seconds, turn back to the left until the heading needle points straight down, pass the cone, fly out the two or three minutes, turn until the needle says 45 degrees left, fly 40 seconds, turn back right until the needle comes back around to the top of the dial again, and you're back on course inbound. Lots easier than doing mental gymnastics trying to figure out what courses to fly.

Someone else came up with the idea that another thing a pilot might like to know was how far from the range he was when he tuned it in. So was born the distance measuring equipment, or DME. This is a pulse or radar device which presents its information on a dial somewhat like the altimeter. However, exact presentation has not been fully decided upon yet. It may look like the present altimeter in which the big hand will rotate once for every 10 miles and the little hand once for 100 miles. Another approach is to have the 10-mile intervals shown on a veeder counter with the hand still going around once for each 10 miles.

Added to this string of developments is another gadget. Suppose, equipped with the omni-receiver and the DME, you wanted to make a flight direct and not airways. Normally you must fly from range to range until you get there. However, when this new gadget, the computer (Figure IV), is set up properly, it is as though the ranges had been picked up from their physical locations and put where you wished they were. It works like this. With a protractor scale, the angle, from north, and the distance from a range to a point along your route are measured. The figures, azimuth and distance, are put into the computer and the knob is turned to compute. All the gages then read to your check point, just as though the ground installation had been picked up physically and moved over there. This same thing can lead you directly to an airfield. The nearest range would be checked and the computer would figure how to make it look as though the range were installed at the field.

It is planned that the navigation equipment, omni-DME, glide path, computer and so on, be combined into one box. That box will also provide



Equipped station, airplane and destination are located at the vertices of a triangle. Two sides and the included angle are known; the third side can be calculated. This calculation is the function of the COURSE LINE COMPUTER.

voice communications and a picture of the traffic in the vicinity of the aircraft. At present the CAA has or is planning for the installation of some 400 VOR stations. The Air Force is purchasing 90 VOR's, while the Navy intends to install 50.

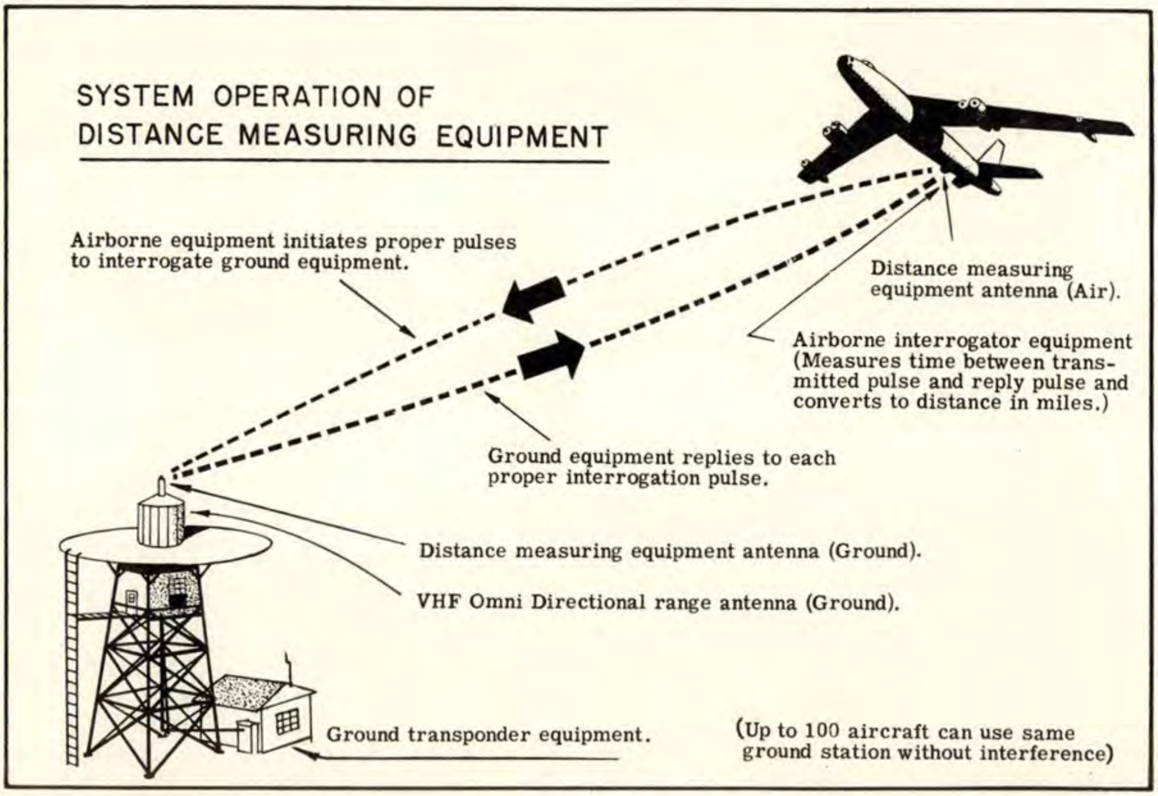
The pilot will not be the only one to benefit from the advent of VOR. For the ground control men continually harassed by a never-ending stream of traffic, the further development of VOR plus the use of a little system known as "Flow Control" may seem like a gift from the heavens.

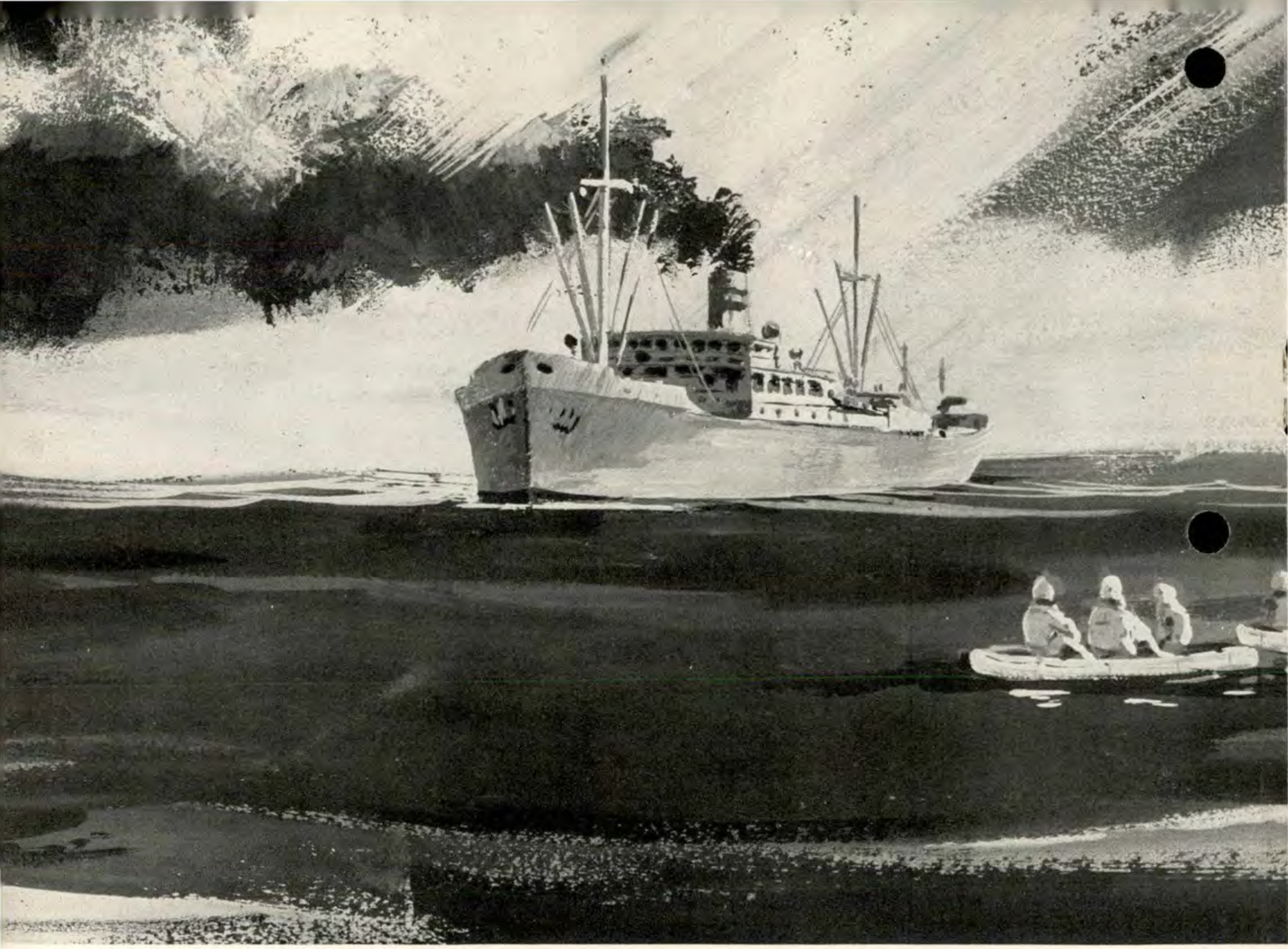
"Flow Control" works like this. Suppose you file a clearance from your base to your destination. A call to your destination is made asking for a landing time as calculated from your clearance—takeoff time, time en route, etc. However, suppose your destination replies, "No, we can't let you land at 1300, but we can let you land at 1330. Recommend that takeoff time be delayed 30 minutes." Wouldn't that be a considerable improvement? You could have another cup of coffee while waiting the 30 minutes, then taxi out, take off and go in and land when you arrived without having to sit on the end of the runway waiting to be cleared and then having to hold when you arrived.

At present, ATC in its constant surveillance of the airways is faced with many problems over which it has little or no control. ATC has no way of telling how many people may decide to go to the same place at the same time, and many times pilots don't report or have calculated their ETA's wrong. The only check ATC has is pilot reports over the various reporting points. These reports are sometimes correct and sometimes guesses for it is hard to say exactly when you'll be over the next check point, especially if you don't know exactly where you are and how long it will take you to get from there to the next check point.

As I have pointed out, with the coming of the VOR and DME, the pilot will always be able to know his location and thus be able to help ATC a great deal. Radar at the airports will also assist them greatly. However, in order to expedite traffic and help eliminate our fussing, the establishment of flow control and the equipment necessary to implement it will help both the pilots and controllers.

With the installation of this new equipment already begun, it is now only a question of time, and very little of that, until air navigation will have truly entered on a new and golden era.





WHAT COULD YOU expect in the way of assistance from a merchant vessel if you were forced to ditch your plane at sea? Because ocean crossings by aircraft already exceed 200,000 per year and are on the increase, the United States Coast Guard has devised a manual of INSTRUCTIONS FOR RESCUE OF DISTRESSED AIRCRAFT PERSONNEL AT SEA which is being distributed to all merchant vessel commanders as part of a coordinated plan to spread a rescue network across the waters over which American planes fly.

In order that pilots may be familiar with a merchant commander's understanding of his problems in case he is forced to ditch at sea, FLYING SAFETY reproduces here in somewhat abbreviated form the instructions which all merchant vessel commanders are receiving.

Finding the Aircraft

1. Establish firm communications. You can use *any* frequency in distress cases.

2. Transmit on a frequency between 200 and 1750 Kcs for the plane to home to you. If you cannot be sure the plane knows what frequency you will use to home him in, *use 500 Kcs.* If you can, use a frequency liable to less interference. Make your frequency so the plane is sure he is homing on the right ship. Make twenty-second dashes. EXAMPLE: "AUOD------------------AUOD------------------AUOD."

3. Track the distressed plane with your own DF if possible. If he cannot transmit on a frequency within your DF band ask him to hook his Gibson Girl to his antenna and crank. (Many aircraft cannot transmit below 2900 Kcs.) If you get

MARINE ASSISTANCE TO DISTRESSED AIRCRAFT

bearings, send him frequent vectors (bearings from him to you) for comparison with his own. Mark each one either true or magnetic. EXAMPLE: "VECTOR 284 TRUE 141OZ."

4. Get the distressed plane in your radar screen when and if you can and hold him.

5. Get his LORAN readings and plot his track as practicable.

6. Long before you estimate he will see you, make black smoke in the day time, or rotate a powerful searchlight around the sky at night.

7. Always keep in mind that with each engine he loses, he loses a generator too. As his batteries go down he may hear you after he can't transmit. Transmit to him blind if necessary until you're *sure* he can't read you.

8. Head on an intercepting course for him from the first distress signal. He may not be able to reach you. *UNLESS* you are proceeding into appreciable worse seas and he states he is sure he can reach you. If you know the seas are much easier an hour or so steaming from your position, ask the distressed pilot if he desires you to proceed to the area of the easier landing condition.

Assisting the Distressed Aircraft to Land

1. Give him the force and direction of the surface wind. Use degrees and knots and the word "From." EXAMPLE: "SURFACE WIND FROM 149 TRUE 15 KNOTS" *NOT* "Wind South Southeast three quarters East force four," which doesn't tell a pilot quickly and for sure either the approximate direction of the wind or its velocity.

2. Describe the sea conditions as clearly and accurately as possible. EXAMPLE: "LONG SWELL FROM 286 TRUE FIVE FEET HIGH FIVE

HUNDRED FEET BETWEEN CRESTS MOVING AT THIRTY KNOTS or STEEP WIND DRIVEN SEA FROM NORTH TRUE FOUR FEET HIGH EIGHTY FEET BETWEEN CRESTS MOVING AT TWELVE KNOTS." (Throw over a box and clock the time between passage of two successive swells under it. Five times the square of this time in seconds equals roughly the distance in feet between crests; three times the time in seconds equals roughly the speed of the swell in knots. Use the same formula for the wind driven sea. Estimate sea or swell height—trough to crest—carefully by eye.)

3. Circle with hard-over rudder at high speed. After completing three or four circles the area inside the ship's turning circle should be considerably smoother than the area outside. Continue the circle until the plane has landed unless the pilot asks you to stop or take some particular heading. Use oil with judgment. Cold bunker or diesel oil should not create a fire hazard but it is sometimes almost useless. It is most worthwhile for easing a short hard wind driven sea. Your turning circle creates an area big enough for a good ditching; the plane should travel less than a thousand feet after hitting the water. A smart pilot will elect to land with the most formidable sea on his beam and with some wind ahead if possible.

4. *Night Conditions.* — After proceeding as above, attempt to mark the circle at four equi-distant points with floating lights if possible. The weather marker should be pitched off the fantail and the leeward one from the bow to allow for drift. Try to put these lights down as shortly before the landing as possible to minimize their drifting away or going out. Ask the pilot if he wants the searchlight for landing. If he says "Yes," maneuver into position to throw the beam on the water so it hits the plane about one point on the starboard quarter as he lands. The pilot sits on the left-hand side of the cockpit and this way he is not blinded. Don't point the searchlight at the plane's cockpit (bow) until the plane is on the water. The effort should be to illuminate the sea for landing without blinding the pilot. The light should come from abaft the plane's beam.

5. Use lots of lookouts. Try to have a responsible lookout kept over each boat and each raft while it is in the water. Have spare lookouts ready to assist if people in the water get scattered and to relieve difficult stations.

6. Have a boat ready to go over the side *quickly*. Work as fast as you can. The weak or injured are likely to die from exposure. Man the boat with a smart crew. Use a lively pulling boat or a smart handling power boat if possible.

7. The area of the landing should be buoyed to fix a central point for a search if some persons are thought to be lost in the vicinity.

8. Rescue or cargo nets should be rigged over the side and if available, volunteers should be ready to go over the side on safety lines to help survivors to and up the nets. Boats may be swamped or smashed against the side in a sea, or rattled survivors may try to swim to the ship.

9. Care should be taken not to maneuver the ship into a position where the plane and ship will drift together. Check relative drift carefully and approach the plane from a bearing that will assure no closing on the plane when the ship has no way on. This cannot be emphasized too much. Planes are very fragile and a ship or ship's boat drifting into one in a sea may open compartments that are contributing substantial buoyancy and cause the wreck to sink very quickly. It is important to remember that the plane is drifting faster when plane and ship are on separate wind lines. When the ship gets the plane close in her lee she blankets the wind from the plane and closes on her very fast. Many planes have been severely damaged this way and rescue efforts blocked or greatly complicated.

10. The number of people in the plane should have been ascertained before she went into the water and all should be accounted for before search and rescue operations are abandoned. An apparently drowned man floating in his life preserver can sometimes be resuscitated.

Closing the Search

1. When you are content that all hands are accounted for or beyond chance of rescue, send a message to the U. S. Coast Guard with an unequivocal statement to that effect so that planes and ships that are racing to assist or preparing for searches on the morrow may be released.

ED. NOTE:—"The Merchant Ship in Search and Rescue," by Commander D. B. MacDiarmid, USCG, appearing in the February issue of *Proceedings of the Merchant Marine Council,* published at 1300 E. St., N. W., Washington, D. C., has full details of marine assistance to distressed aircraft.

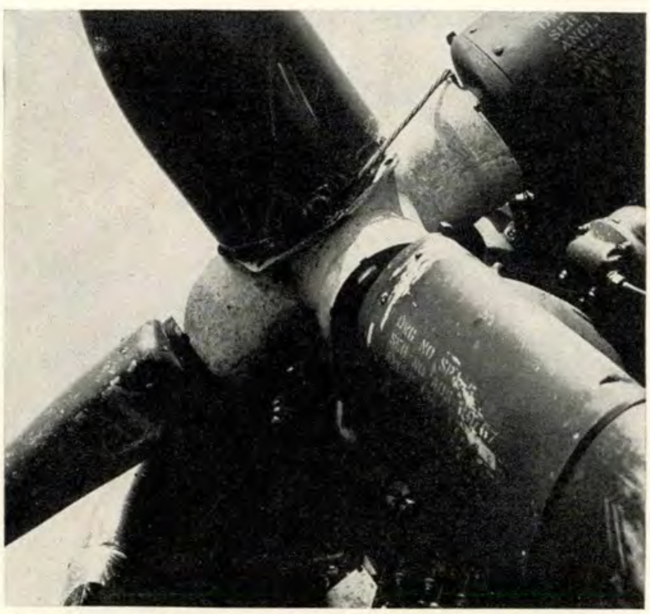
Violation!

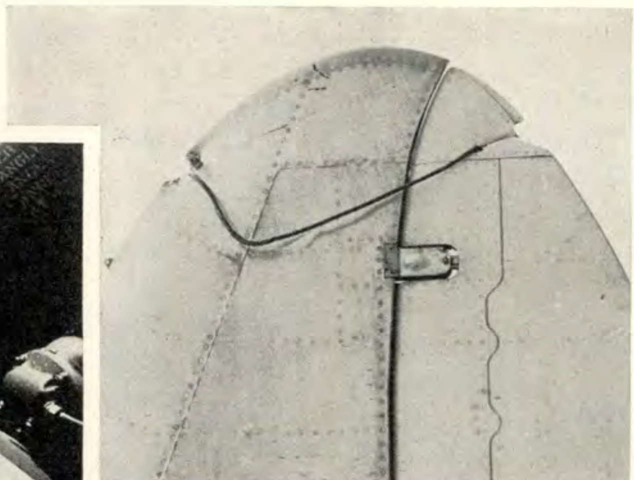
An F-47 pilot took off with a wingman to practice formation flying. While cruising along at 1500 feet the flight leader decided to check the altitude of a farmyard. He did and in so doing removed a cable running between two buildings. This, of course, provoked the farmer. Unknown to the pilot, the farmer's peepers checked out at 20-20. The man of the soil cranked his phone and gave the number of the airplane to the operations officer at the local air base. This was not necessary, however, because the wire cutter taxied up in front of operations just as the operations officer put the phone down.

The prop dome looked very much like a fishing reel. The engine was damaged by the whirling tip of the cable. All four cuffs on the prop were split and will have to be replaced. The right and left sides of the cowl were bent beyond economical unbending. The right horizontal stabilizer, the vertical stabilizer and the rudder were slashed, but good.

It didn't take the commanding general long to make a temporary foot "soldat" out of that pilot pending action for violation of AF Reg. 60-16.

At his trial the pilot called in everyone except his mother and the farmer as character witnesses. One of his superior officers said he would fight to get him and another said he would prefer him to most, but all this won't help the F-47 pilot fight off his bill collectors since his bank account will be lacking $100 per month for the next six months.





I was lucky . . .

By CAPT. JOHN J. WALSH
Hq. Air Training Command
Barksdale AFB, La.

PARAGRAPH 4, SPECIAL ORDER No. 57, will always be cherished in my memory. It sent me from a wartime redistribution center to a pilot training school as a potential instructor. As I walked through the front gate at that twin-engine advanced flying school, I felt that "here is the big chance for the Training Command to pick up the know-how of flying the B-25." Having flown a tour in 25's overseas, I was eager to pass on my unlimited knowledge to the cadets at this particular school.

After getting squared away I was informed that I would have to take a standardization check ride. Just a formality, I figured, so I ambled down to the standardization board and told them I was ready any time they were. What a jolt that turned out to be! When the check pilot demonstrated slow flying at 90 mph to me—who had never gotten below 150 on the final approach—I was ready to bail out. When he feathered one engine at 90 mph, during the slow flying demonstration, I was sure I had waited too long to jump. The next thing he did was stall the airplane—on purpose! I had stalled them before, but it was usually about 10 feet above a runway. He continued demonstrating to me what the B-25 could do, and after about an hour we landed. I was ready to scout up some orders that would get me to a nice, quiet distribution center from which I could pull a few strings to get back to that nice, quiet group overseas. That ride really scared me, and when I say scare I mean it in more ways than one. To illustrate this point, I'll have to go back a few years.

I was graduated from a single-engine advanced training school, after which I spent three months in a fighter O.T.U. The high losses of bomber pilots at that time prompted some Air Force wheel to transplant every embryo fighter pilot into the bomber training program, so off I went to a B-25 O.T.U. Arriving during the middle of the ground school course and being a single-engine graduate, I was put on the shelf to become a co-pilot on one of the crews which would go overseas in a few months. Every opportunity that I had, I flew in the B-25 as copilot and tried to get myself familiar enough with the airplane. After 40 hours of right-seat time, I got checked out. We went through a rather "accelerated" training program in one week. For example, we found that if we salvoed practice bombs at the rate of 10 bombs to the clip, we could wind up our bombing training in one day.

We flew the southern route across. If I live to be 108 I'll never forget the day we took off from Natal to fly the south Atlantic. I remember calling out to the fire guard and yelling "clear right." As I said it, the left prop started turning over. Maybe it's just as well that the left engine started. If it had been the right one, we would have sliced the fire guard in two because the throttles were wide open and the brakes were not set. Nothing like being well trained and prepared for a 1750-mile jaunt across that water. G. A. (guardian angel) must have got time and a half for overtime on that trip.

One day overseas after I had been checked out as first pilot I was flying a mission with three of the boys who had come across with me. Just as we turned in off the Adriatic, one of my engines just upped and died. We were flying in the second element of a 36-plane formation and while I was making eeny, meeny, miney, moe with the feathering

NOT SMART

buttons I yawed 360 degrees through the rest of the formation. They wondered if I was having trouble.

My method for determining which engine was dead was simply to push either button and if all went quiet I would know that I had feathered the wrong engine. Luckily, the engine noise continued to tickle my eardrums so I knew that my procedure had worked. My luck held for the rest of the tour. That should give you a fairly good idea of how well prepared I was to show the cadets the light at my new found home.

I took a check ride with the same boy who had given me the demonstration ride and failed it miserably. It didn't take him long to decide that I was potential timber for a double dose at the Central Instructor School.

When I finished the standardized instructor's course at the Central Instructor School, it occurred to me that many of my unlucky buddies overseas who would never return might well have been classmates of mine at that instructor's school if they had had the standardized training which I had just received. Brother, I was sold.

I started instructing and I suppose I made the same mistakes that any greenhorn will make on a new job. However, I pushed standardization to the hilt. After about 18 months of instructing, I found myself a member of the station standardization board.

I found that many returning pilots were in the same boat that I had been in when I returned from overseas. And the thought occurs to me now that there still are pilots flying and having pilot error accidents which could be eliminated if a standardized checkout system was initiated and conducted by only the highest qualified personnel. At the end of the war, it being impractical to send the entire group of 800 pilots who hit our field to the Central Instructor School, we set up a transition school patterned after the C.I.S. The standardization board gave all the final checks. The objective of the local school was to bring all "behind the line" pilots up to the proficiency level of the instructor pilots who were flying in the cadet program.

As members of the board, we were directed by the CO of the base to send every pilot who could not cut the mustard back to school for further training. As soon as the bulk of the pilots at this station had completed the local course of instruction, it became our job to insure, by frequent standardization checks, that these pilots were maintaining their proficiency. We had five board members. We each flew two checks in the morning, and two checks in the afternoon. That made a total of 20 checks a day. I'll give you a clue—it didn't take long to go through those 800 pilots. With this setup, each pilot was checked about every two months. Sometimes we would find a pilot who had become rusty and we would have to give him a little dual in order to bring his proficiency back to that demanded by the base commander.

This system of standardization, administered by well-trained and experienced check pilots, was credited for the low accident rate consistently attained at this particular station, even during the transition from wartime to peacetime.

This system had teeth in it. If a pilot did not prove his ability in all phases of flight, including single-engine operation, single-engine landings, single-engine go-arounds, stalls, short field landings and takeoffs, no flap landings, emergency procedures, and demonstrate a thorough knowledge of the three types of aircraft flown at this station, he was not permitted to fly as first pilot.

AF Regulation 60-2 directs commanders of units actively involved in flying activities to insure that pilots assigned are proficient in all phases of operation of the aircraft assigned. The old boy we worked for must have foreseen the publication of AF Regulation 60-2 because he put teeth in his checkout requirements years before the regulation was ever published.

MEDICAL SAFETY

TAXI ACCIDENTS BY NONFLYING PERSONNEL

RECENTLY ONE OF THE civilian airlines made a study of the number of accidents caused by the taxiing of aircraft by nonflying personnel. The officials of this company decided that the occurrence of any of these accidents was an unnecessary expense and instituted physical examination requirements with particular attention to the examination of the eyes. It was found that some individuals lacked considerably in visual accuity, power of convergence, power of accommodation, and depth perception as required by some truck driver tests.

We have been asked whether we had any specific physical requirements for nonflying personnel who might be required to taxi an airplane. The answer at the present time is "no."

With regard to examinations of enlisted air crew members, paragraph 12c of AR 40-110, dated 12 December 1944, states as follows: "Enlisted men on flying status as air crew members (combat or noncombat) who do not hold an aeronautical rating will be examined when necessary in accordance with regulations as prescribed herein for rated personnel. The findings of these examinations need not be entered on the WD AGO Form 64, but the results of the physical examination will be made known to appropriate authorities by the accomplishment of a certificate indicating the physical qualifications for flying duty of the individual concerned. The physical examination with respect to the eye and ear will not be more rigid than that established by Army-Air Force directives concerning the crew training. Appropriate remarks concerning the individual's physical status will be made on the individual's Air Crew Member Physical Record Card (AF Form 206). Enlisted air crew members on flying status will receive a complete physical examination for flying within each 12-month period."

From this regulation it can be seen that an attempt has been made to have enlisted crew members on flying status submit to a suitable physical examination when necessary and at least once each 12-month period in order to qualify for certain duties. However, it is not necessary to be placed on flying status in order to taxi a military aircraft. The most common procedure that we have noted thus far is as follows. The airman first must prove to the flight and line chiefs that he is technically qualified to taxi an aircraft. After these approvals are obtained, the airman is given a check ride in taxiing by the engineering officer to determine the airman's ability to taxi that particular aircraft. These tests are accomplished, in most instances, during daylight hours. One such check ride may or may not be considered sufficient. No physical examination of any sort is required.

Many commanding officers are not requiring enlisted men on flying status to check with the flight surgeon for the necessary physical examination. Remember now, it is not the responsibility of the flight surgeon to track down these people.

It seems perfectly obvious to most that as careful a check should be made on individuals required to taxi military aircraft as that commonly required by practically all bases for drivers of military vehicles.

Our figures reveal that during the fiscal year 1948 there were 363 taxi accidents by nonflying personnel in the USAF and 45 in the Air National Guard. Now this does not mean that we have that number of people who cannot see, but it does mean that we should investigate more thoroughly. It would seem advisable for unit CO's to get together with their flight surgeons for some simple program aimed at the elimination of those physically incapable of handling such duties as the taxiing of military aircraft since physical handicaps have been proved conclusively to be a main cause factor in taxi accidents.

WELL DONE

TO

1ST LT. WILLIAM W. GRIFFITH

Waco AFB, Texas

YOU ARE AN INSTRUCTOR in a T-6 with an aviation cadet. You are in the practice area, 10 miles north of the field at an altitude of 6000 feet, engaged in aerobatics when your plane's engine suffers complete loss of power. What do you do? Here's what one pilot did—a job Well Done!

It happened 20 October 1948 when 1st Lt. William W. Griffith and Aviation Cadet H. E. Mulholland took off in a T-6 from Waco AFB, Texas on a routine training flight to practice aerobatics.

After 30 minutes of air work in the practice area 10 miles north of the field while at approximately 6000 feet altitude, the engine missed with a momentary loss of power. The student immediately inquired of Lt. Griffith if he should apply carburetor heat and was instructed to do so. At that time the odor of smoke was noticed in the cockpits. Lt. Griffith checked the oil gage and found the pressure at zero. He asked Cadet Mulholland about the cylinder head temperature and was informed that it was on the high side against the peg.

At this point the engine suffered complete loss of power. Lt. Griffith immediately took over the controls and started a turn toward the field. He retarded the throttle, moved the mixture control to full rich, switched gas tanks, and tried the wobble pump, none of which caused the engine to respond.

Presented thus with a forced landing, Lt. Griffith placed the propellor in high pitch and established a glide towards the airfield. Cadet Mulholland was instructed to tighten his safety belt, lock his shoulder harness, make sure that the cuffs and neck of his flying suit were buttoned, check the cockpit for any loose articles which might fly around in the case of a crash landing, and to be especially observant for any signs that would indicate fire in the engine section. The tower was notified and requested to alert the crash facilities on the airfield.

During the descent towards the field another complete check of all accessories and controls was conducted, but no combination produced any indication of power and the oil pressure remained at zero.

Lt. Griffith, estimating his altitude to be sufficient and in proximity to the airfield, elected to make a gear-down landing. The accuracy and skill of the landing could only portray the high level of experience and sound judgment displayed by the individual in accomplishing this commendable feat of airmanship. Lt. Griffith's calm accurate appraisal of the emergency, his thorough safety precaution steps, and demonstration of superior flying ability turned what could have been at least a major accident into a minor incident.

The engine of the aircraft flown by Lt. Griffith, upon examination after removal, revealed that the scavenger oil pump was locked by a piece of metal evidently allowed to drop into the oil by internal failure of the engine.

1st Lt. William W. Griffith and A/C H. E. Mullholland

THE PILOT ALONE CANCELS IFR PLAN

The regional offices of CAA have recommended that the procedure which permits an air traffic controller to authorize a VFR approach in a traffic clearance be deleted from the Federal Airways Manual of Operations (ANC). Several of the regions have already taken action to eliminate the authorization of VFR approaches. Present regulations make it very clear that a pilot may cancel his IFR flight plan providing he is VFR.

Air Traffic Control is no longer required to authorize a VFR approach. A pilot who decides he can proceed VFR to the airport of destination may do so by canceling his IFR flight plan in accordance with par. 60.111 of Civil Air Regulations.

Control personnel should be cautioned against accepting a pilot's report that he is "VFR" as meaning that he is canceling his IFR flight plan; a definite statement of cancelation must be received.

The phrase "cancel (identification) IFR flight plan" is recommended for use by pilots. Pilots are also advised that acknowledgment of the receipt of the message "cancel (identification) IFR flight plan" by the ground radio station will constitute notification to Air Traffic Control as required by CAR 60.111, and that since Air Traffic Control cannot approve or disapprove such action, no other reply should be expected.

JET ENGINE DANGER AREA

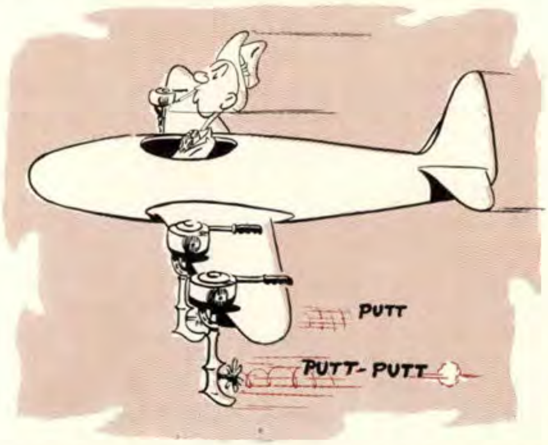
Tests to determine how near a person can safely approach the intake of a jet plane have been conducted recently at the Naval Air Test Center, Patuxent River, Md.

A lieutenant of the Navy Medical Service Corps, with safety lines attached to his body, approached

the nose of an FJ-1 Fury—engine running at full speed. It was found that a cautious person can approach within two or three feet of the nose without being drawn in by the powerful intake. The danger area was determined to be less off to each side of the nose.

The air velocity reaches 38 knots at a little more than two feet distance in front of the plane. Three feet away, the velocity drops to 15 knots, and to five knots at four feet distance. Similar findings occurred with the use of a dummy figure the size and weight of a man.

Twin-jets with their smaller intakes, and types of jet aircraft other than the FJ-1 used in the experiment, would have varying danger areas.



FOUR ENGINES FOR THE PRIVATE FLIER

A five-place, pusher-type airplane powered by four 85-hp Continental engines has been developed for the private flier. A four-engine airplane was designed to eliminate forced landings, which often occur with single-engine aircraft. The Starflight, as it is named, will fly very well on two of its four engines whenever necessary. It has a simple instrument panel for normal flight and also a full panel for instrument flying. At the flight tests, CAA officials present were impressed by the plane, and stated it was "a new conception in light aircraft."

ZERO READER

The Sperry Zero Reader is an instrument which provides the pilot with composite information during instrument landing approaches and in regular flight, and tells him what to do about his position rather than where he is and in what attitude. In 78 instrument approaches, both simulated and actual, with the zero reader at airports across the country, each approach brought the airplane into proper alignment for landing. The instrument looks very much like a conventional cross pointer indicator, but the face of the instrument is spherical and the needles are shaped to follow the curvature of the face.

Some of the advantages are: the pilot receives the benefit of a single instrument which provides him with a composite reading of the five separate flight conditions; he gains the advantage of being able to "practice approaches" during all flight operations since the approach instrument can also be used in level flight; anticipation required by use of the conventional cross pointer indicator is eliminated since the inherent characteristics of the zero reader enable it to do the anticipating; and smooth bracketing of the localizer and glide-path range is assured without pilot effort since the instrument anticipates the aircraft's approach to the range and signals the pilot his position before he overshoots.

During normal flight operation the heading selector, an auxiliary unit, may be set to any desired compass heading and from then on the vertical needle will use this reference and provide the pilot with indications of the plane's position relative to it.

INADVERTENT RETARDING

Several recent F-80 accidents have revealed that fire occurred when the throttle was advanced for taxiing or go-around. The trouble seems to lie in the F-80 fuel control lever assembly. It was found that if the throttle was retarded with a slight outward pressure it would clear the detent notch and slide into the fuel cut-off position without touching either side of the slot. Until modification of this assembly, F-80 pilots should be advised of this inadvertent retarding of the throttle to cut-off position.

AIR BASE OBSTRUCTION CHARTS

According to recent information, the Pacific Air Command is producing "Air Base Obstruction Charts" for air bases under its jurisdiction. Each chart is in actuality a plan view of the field which clearly indicates portions of the air base unsafe for use. It also indicates all marked and unmarked obstructions which constitute a hazard to the operation of aircraft. Operations personnel, airdrome officers and tower operators will be briefed on daily air base conditions prior to duty. The safety information will also be given to pilots requesting clearance during flight briefing with actual reference to the Air Base Obstruction Chart. This is a good example of supervisory precaution projected toward the elimination of accidents during ground operation.

Flying Safety BRIEFS . . .

1,050 HOURS WITHOUT ENGINE CHANGE

The five-man maintenance crew of the Alaskan Air Command's 10th Rescue B-17, "The Rocket," have ample reason to be proud of their charge and themselves. These five men, S/Sgt. Hugo A. Anderson, Eagle Bend, Minn., S/Sgt. T. P. Saunders, Burgaw, N. C., S/Sgt. G. G. Stephenson, Ashland, Wisc., S/Sgt. D. K. Ramsay, Haxtun, Colo., and S/Sgt. Sidney S. Gash, Breuard, N. C., through careful, exact maintenance and constant check have brought "The Rocket" through 1,050 hours of flying time with the original four engines. This remarkable record has been performed mostly outdoors in the Alaskan winter and summer seasons. Maintenance performed out-of-doors in Arctic winter is no pleasant prospect under any conditions, and when haste is necessary, it the aircraft is needed for a search or rescue mission, this task is even more unpleasant.

The feat of these five men is underscored in that Alaskan winter flying is much harder on aircraft than the more temperate climes of the United States, thus causing added stress and wear on planes flying in the Arctic. Broken oil and fuel lines, tires frozen flat on the bottom and greater wear on engines due to cold starts must be controlled.

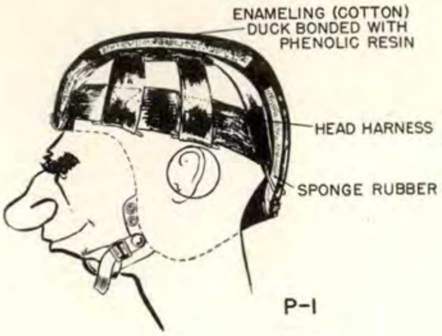
"The Rocket" was a comparative fledgling when assigned to the 10th Rescue Squadron in May 1947, with a total of 91:12 hours. During the accumulation of hours and crewed by the five sergeants, "The Rocket" played a prominent part in many of the 10th Rescue Squadron's mercy and evacuation missions. This B-17 also participated in the supply drops to the Washburn Expedition on Mt. McKinley.

"The Rocket" (No. 44-83787) is used by 10th Rescue Squadron for long-range search missions. The 10th Rescue Squadron is the pioneer in Arctic glider-snatch technique and is the first to make a practice drop and snatch on the ice of the Arctic ocean. This was undertaken last year 250 miles north of Point Barrow. Demonstrating its skill, the 10th Rescue Squadron recently sent a C-54 and glider to a spot west of Dawson, Yukon Territory, to rescue crew members of a downed C-47. The drop and snatch were successful and three hours after rescue the C-47 crew was back in warm quarters.

S/Sgt. G. G. Stephenson inspects engine after 1050 hours.

Alaskan maintenance, S/Sgts. H. A. Anderson & T. P.Saunders.

KEEP YOUR HEAD



The 'New Look' in chapeaux is receiving a lot of attention from USAF fighter pilots this spring. The 'Hats,' in the form of protective helmets, are an important part of life insurance to safety-conscious pilots who handle high-speed aircraft.

Current 'best-seller' in this spring's hat brigade is the P-1, a tough, lightweight outer shell of enameled duck bonded with phenolic resin and lined with sponge rubber at the pressure points. The shell is fitted to the head by means of an adjustable sling suspension of cotton webbing which fits all head sizes and shapes.

The P-1 is the result of the combined best features of 32 other types of headgear which went through the test 'mill' at AMC's Aero-Medical Lab. Although it weighs only two pounds, the helmet offers more protection than any other helmet presently available and will withstand 64 foot-pounds of energy without rupture, twice the energy of any other commercial design.

Although USAF officials considered the P-1 protective helmet the best in use today, they are still searching for headgear that will meet the specialized requirements of present day high-speed flying. These requirements include protection against buffeting, loss of canopy, encountering low-velocity missiles during combat, and crashes. Rigid laboratory and service tests to which the P-1 has been subjected indicate that it offers excellent protection against buffeting and crash injuries, and in several serious crashes has been credited with saving the lives of the pilots.

However, there are still a few wrinkles yet to be ironed out in the development of a good protective headgear. The main deficit against all helmets presently on the market is that they will likely blow off in bailouts at 400-mile speeds and above due to the large surface area. Since oxygen equipment is attached directly to the helmets, this equipment is subject to loss during high-speed bailouts.

To protect against the hazard of loss of oxygen equipment at altitude, AMC's Aero-Medical Lab is now redesigning the P-1 helmet. Larger in size, the new helmet will be used as a protective outer shell which may be released in the event of high-speed bailouts. Communications and oxygen equipment in the new model will be fitted to the standard lightweight cloth or leather under-helmet so that oxygen will be retained in high-speed bailouts.

Work is also under way to design a helmet that will be even more effective in absorbing maximum acceleration within the helmet when struck a severe blow without breaking the pilot's neck or causing brain concussions.

In addition to shell strength and shock-absorbing cushioning, other factors important in helmet design are weight, fit, noise reduction, ventilation, comfort and appearance. The Aero-Medical Lab is endeavoring to combine the maximum of each of these qualities into one helmet which will give maximum protection to the men piloting high-speed planes.

Maj. Richard L. Johnson, jet speedster, models helmet.

C-45 CRUISE CONTROL

By MAJOR CLARENCE W. PORTER
Headquarters Air Materiel Command
Wright-Patterson AFB, Ohio

IN PRESENTING this account of a non-stop flight from Los Angeles to Fort Worth in a C-45, it should be pointed out first of all that the flight in itself was not an attempt to establish a particular achievement of maximum range. The flight is used only as an illustration of applied practices and planning that should go into any flight. Granted that the preflight planning and the progress curve is a more vigorous analysis than an average crew would care to make, it should be readily apparent that the pertinent facts shown by each curve are necessary for every flight.

The flight planning was based primarily on the data found in the Flight Operating Handbook for the C-45. The power settings, time, airspeeds and fuel flows are substantially as found in the charts, the only deviation being the optimism with which we undertook the flight caused by our previous experience with the charts.

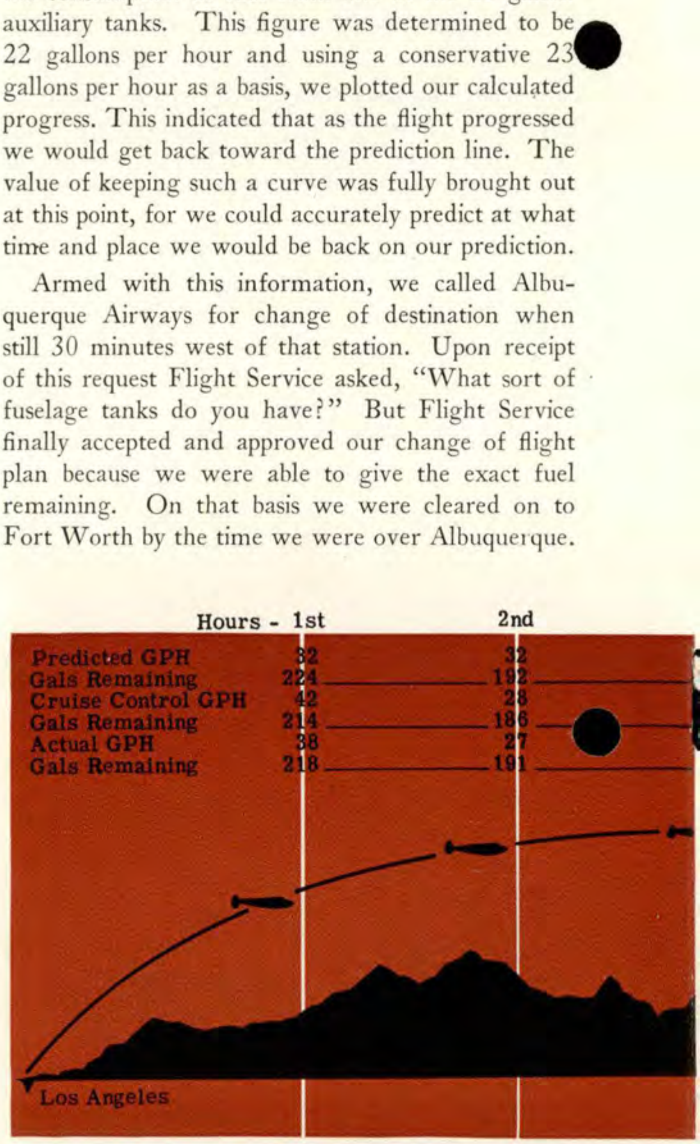
The full story is this. A very close check was made on several previous flights to determine fuel consumption, and at each power setting that was checked it was found the fuel flow shown in the chart could be easily obtained and in most cases improved. Out of curiosity we were investigating range capabilities of that particular aircraft and it occurred to us that the trip from Los Angeles to Fort Worth would be easily attainable. It was this belief that led to planning the flight.

In drawing up the prediction curve, an average of 32 gallons per hour was used for fuel flow. As previously mentioned, this was known to be a conservative figure and that fact along with our computed helping winds overshadowed any alarm we may have had. We had a nose tank in this particular C-45.

Since an instrument flight plan was necessary due to local weather conditions at Los Angeles, we were forced to clear only to Albuquerque initially, with a view toward changing our destination in flight if it became possible to do so. The fact that the actual fuel consumed in climb ran above the prediction is accounted for by an instrument takeoff and climb procedure. This, of course, immediately placed us above the predicted curve for the flight. (See chart.)

After we climbd to an altitude of 10,000 feet, an accurate check of fuel flow was made by timing the consumption of fuel from one of the 25-gallon auxiliary tanks. This figure was determined to be 22 gallons per hour and using a conservative 23 gallons per hour as a basis, we plotted our calculated progress. This indicated that as the flight progressed we would get back toward the prediction line. The value of keeping such a curve was fully brought out at this point, for we could accurately predict at what time and place we would be back on our prediction.

Armed with this information, we called Albuquerque Airways for change of destination when still 30 minutes west of that station. Upon receipt of this request Flight Service asked, "What sort of fuselage tanks do you have?" But Flight Service finally accepted and approved our change of flight plan because we were able to give the exact fuel remaining. On that basis we were cleared on to Fort Worth by the time we were over Albuquerque.



The remainder of the flight progressed according to plan and our calculated reserve remaining was 14 gallons. From several liquidometer readings an estimated reserve of 48 gallons appeared likely. By actual measurement, 39 gallons of fuel remained on landing which can be accounted for by the conservative fuel flow used for calculations and fuel saved in letdown.

A check of the time curve shows a total elapsed time of eight hours and 15 minutes, an average ground speed of 156 mph. True airspeed averaged about 143, giving an average tailwind effect of only 13 mph.

One of the most obvious errors normally made in the C-45 type aircraft is faulty leaning procedure. The procedure used for this flight was one of leaning for an rpm drop and leaning by cylinder head temperature. An rpm drop at normal settings is difficult to discern, but with care and caution the procedure is sound.

Best power conditions will result when cylinder head temperatures are maximum. For economical cruise condition the mixture should be further leaned until a slight drop in cylinder head temperature results. This is what we did during this flight.

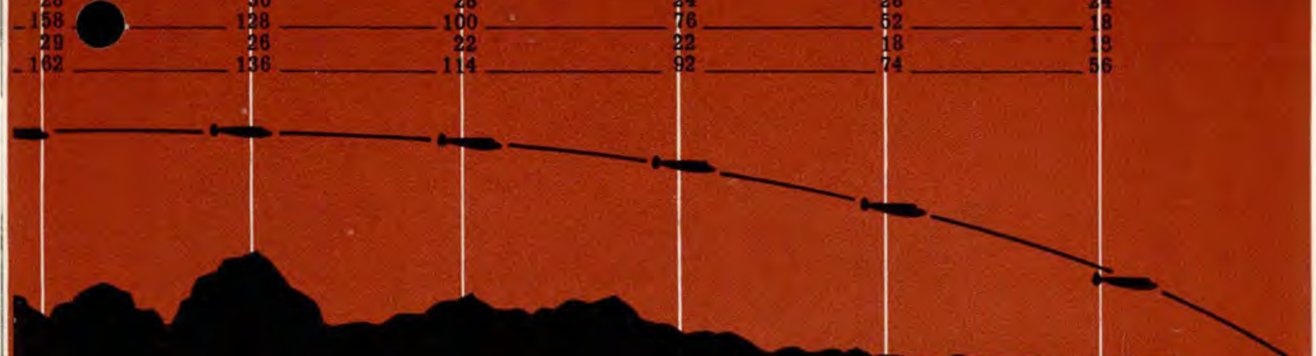
It was rather confusing to operations personnel at Fort Worth when we landed as they had been carrying us as a C-54 instead of a C-45.

Another time we were confused with a C-54 was on a flight from Spokane via Airways to Denver. Our initial clearance was VFR but upon encountering weather en route we asked for a change of flight plan and got it—18,000 feet! Finally we finagled an altitude of 13,000 feet and proceeded on with ATC and Flight Service complaining about a "C-54" refusing to fly at 18,000 feet.

Upon landing at Denver, we approached the crew chief, who was rather confused by this nonstop hop, and stated that we thought the plane would need approximately 201 gallons when refueled. We also asked him to check the gas meter when he refueled so that we could check our predictions with actual fact. The next morning the chief informed us that he had put 203 gallons in the tanks, but stated that it was quite possible that we were right as a few gallons may have been spilled!

As mentioned earlier, we were not trying to get into the headlines either by our feats or by crashing, but merely trying to stress cruise control and really plan our flights accordingly. It is far too often that cruise control is associated only with long-range missions. It is true that every consideration is being given to range extension and that efficient operation is the immediate solution to the problem. However, cruise control in itself is applicable to every condition of flight from maximum range to maximum speed.

Cruise control is efficient operation of the airplane-engine combination and is as much a part of flying as navigation. Intelligent use of such procedures can mean much to the Air Force and its flying members in the saving of lives and aircraft and an increased percentage of successful missions.



LETTERS TO THE EDITOR

DEAR EDITOR:

I have been conscientiously using a pilot's checklist for operating a B-26 type airplane. During starting procedure and while performing the pre-flight check, it is necessary to have the shoulder harness in the unlocked position. Invariably after takeoff I discover that I forgot to tighten the shoulder harness by means of the lock release lever.

I suggest that an addition be made to the BEFORE TAKEOFF and to the BEFORE LANDING sections of the checklist that will remind the pilot to lock the shoulder harness.

ALFRED KAUFMAN, *Major, USAF*

Most fliers think a perfect checklist has not yet been printed. The problem is where to stop. Some argue for more simplicity while others urge the inclusion of every item which might contribute to an accident if overlooked. It seems that the most popular trend is to include only the "killer" items, that is, functions which if neglected could very easily result in a fatal accident. —Ed.

★

DEAR EDITOR:

I would like to express a few comments concerning your article in the January 1949 issue entitled, "The Mike Takes Over."

You state, "The pilot made a visual inspection of his T-6 prior to takeoff. Everything was secure in the rear cockpit including the safety belt and microphone." I suggest that the foregoing sentence be changed to read: "Everything was secure in the rear cockpit *except* the stick."

Unless operational procedures for the T-6 have changed considerably I suggest a small order of "skunk cabbage" for the pilot instead of "orchids," since there is an SOP which requires the pilot, prior to solo flight in a T-6, to remove the stick in the rear cockpit and stow it. This SOP was intended, I believe, to prevent occurrences such as described in your article and was always a pertinent part of the pre-flight check.

I could be wrong but I say that it shouldn't have happened.

LAWRENCE B. REED, *Captain, USAF*

In this case the stick in the rear cockpit was not the removable type, but was securely bolted.—Ed.

★

DEAR EDITOR:

Each issue of FLYING SAFETY Magazine is eagerly read by all pilots, operations and engineering personnel, and continuing use is made of the material contained in the various weather and instrument articles in our instrument training program. In connection with this, many of the questions contained in the "Safety Quiz" have been incorporated in test quizzes given in this program.

DAVID W. ALLERDICE, *Lt. Colonel*
Air Force NGUS
Indiana Air National Guard

SAFETY QUIZ

1. Heading is 100°
   Radio Compass Needle reads 75°
   Bearing to Station = ?
   Bearing from Station =?

2. Heading is 100°
   RC Needle reads 270°
   Bearing to Station = ?
   Bearing from Station = ?

3. Heading is 270°
   RC Needle reads 100°
   Bearing to Station = ?

4. Heading is 100°
   Radio Compass Needle reads 90°
   The heading is flown for 3 minutes and the relative bearing increases by 20°. Bearing to Station = ? Minutes to Station = ? What Quadrant are you in? (Circle one) NE, NW, SW, SE

5. Heading is 100°
   You are on a wingtip null. The relative bearing decreases 30° in two minutes. The station is—on the right? on the left? (Circle one) Bearing to Station? Time to Station?

6. You are tracking inbound to the station. You desire to make good a course of 100°. Your present heading is 100°. Your relative bearing is 20°. You make a 40° correction toward course. What will the radio compass needle read when you are on course?

7. You are tracking outbound from the station. Your Radio Compass needle reads 200°. You make a 40° correction toward course. What will your Radio Compass needle read when you are on course?

•

(1) Bearing to Station = 175, Bearing from Station = 355; (2) Bearing to Station = 10, Bearing from Station = 190; (3) Bearing to Station = 10; (4) Bearing to Station = 210; Minutes to Station = 9, Quadrant = NE; (5) The station is on the left, Bearing to Station = 340, Time to Station = 4; (6) 320°; (7) 220°.

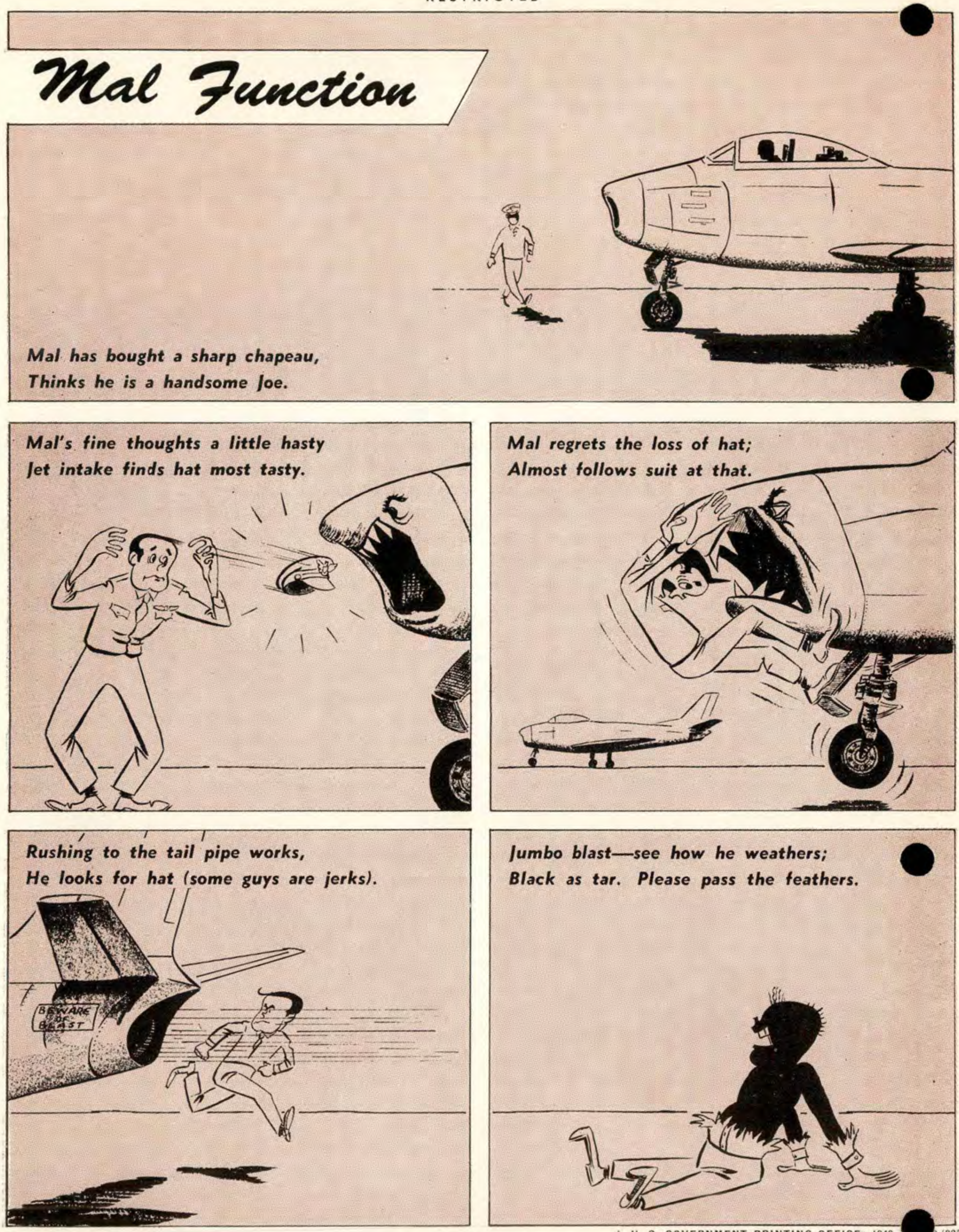
WHY?

THE PILOT OF THIS F-82, on his first solo flight, made a sharp tactical peeloff at approximately 1000 feet over the landing runway. His entire pattern was tight.

While just off the end of the runway in use, and while still in the turn in a partially stalled attitude, the left wing and the left landing gear struck the paved surface of the overrun.

The F-82 bounced and veered to the right. Power was applied and the pilot started around. At 200 feet and over the far end of the runway, the pilot started a turn to the left with wheels and flaps down. The left turn became tighter and the accompanying picture shows the results. The pilot was dragged out with major injuries before the burning plane became too hot.

Why the absence of close supervision? An experienced, rated officer was not in the control tower during this solo checkout flight. Why was the sharp tactical approach permitted when AF Regulation 55-13 specifically requires that the peeloff will be executed *without* gain in altitude and that the last turn onto final approach will be completed at a safe altitude and not less than 1000 feet horizontally from the approach end of the runway? Why?



☆ U. S. GOVERNMENT PRINTING OFFICE: 1949— 0/925