AIR FORCE

OFFICIAL SERVICE JOURNAL OF THE U. S. ARMY AIR FORCES

APRIL 1943

Vol. 26 No. 4

APRIL 1943

Contents

DEPARTMENTS

AIR FORCE

OFFICIAL SERVICE JOURNAL OF THE U. S. ARMY AIR FORCES

April Brief

A NEW DEPARTMENT, known as Training Aids, makes its initial appearance in AIR FORCE on Page 34 of this issue. It is a feature of the Training Aids Directorate (called TAD) of the Army Air Forces School of Applied Tactics at Orlando, Florida. All material for this department is prepared by the directorate.

The term "training aids" includes literature, training films, film strips, training posters, visual instruction material, recognition material and synthetic devices. You can get the whole story by reading the article "Streamlining AAF Training" in this month's department.

The important subject of aircraft recognition is discussed in the department's other leading article (Page 36), which explains the standardized system of teaching recognition (including recognition of surface craft and ground vehicles) recently approved for the Army Air Forces.

We are planning to introduce additional continuing features, sponsored and prepared by other units of the Air Forces, in subsequent issues of this service journal. Meanwhile, you may have more suggestions. If so, send them in.

P-38S are by now old favorites in the Southwest Pacific area. But there's a first for everything, and in this issue we are happy to document the 38s' first combat action in that theater.

Our coverage on the subject came about in this manner: Lieut. General George C. Kenney, commanding general of the Allied Air Forces in the Southwest Pacific area, sent a personal letter to General Arnold enclosing the reports of P-38 pilots who took on about 30 to 35 Jap fighters and bombers in their first time at bat.

You can see for yourself how the 38 boys made out by reading several of the reports, written a few minutes after landing, which appear on Page 4.

Just a hint of the results: "Right now the morale in that squadron is so high it almost scares you," wrote General Kenney to the Commanding General. Excerpts from his letter are printed along with the pilots' reports.

AIR DEFENSE of the United States brings into play the all-important but little-understood Aircraft Warning Service of the Army Air Forces. In an article on Page 15, Brig. General Gordon P. Saville, Director of Air Defense, tells about the inside workings of that unit. In explanation, General Saville presumes a mythical air attack on the Pacific Coast and describes the play by play behind-the-scenes action that takes place from the time enemy aircraft are first detected to the time our own fighter planes are guided by ground personnel to intercept the invaders.

ANTISUBMARINE WARFARE is generally recognized as a top priority problem of the allied nations. Two articles in this issue discuss the role of the Army Air Forces in combating the U-boat. The first, on Page 6, explains the functions and operations of the Army Air Forces Antisubmarine Command. It is written by Lieut. Colonel Clinton A. Burrows, assistant chief of staff, A-2, for the Command. In the second article, on Page 7, Captain Charles D. Frazer of the AIR FORCE staff describes a night mission hunting subs in a B-18 over the Caribbean.

AFTER BAILING OUT of a shot-up, gasless P-40, Lieutenant Clarence E. Sanford swam three miles and landed exhausted on a barren desert island off the northern tip of Australia. His equipment: one religious medallion, one ring, one pair of shorts.

The pilot's fight for survival on that small island is described on Page 10 in an article prepared by the Arctic, Desert and Tropic Information Center of Eglin Field, Florida. In addition, experts attached to the Information Center have analyzed the experience from the standpoint of solving the problems which confronted the pilot.

Lieutenant Sanford states today that if he had known then what he knows now much of his suffering, including eleven weeks in Australian hospitals after his rescue, could have been avoided. That's why we think this type of article pretty important for airmen.

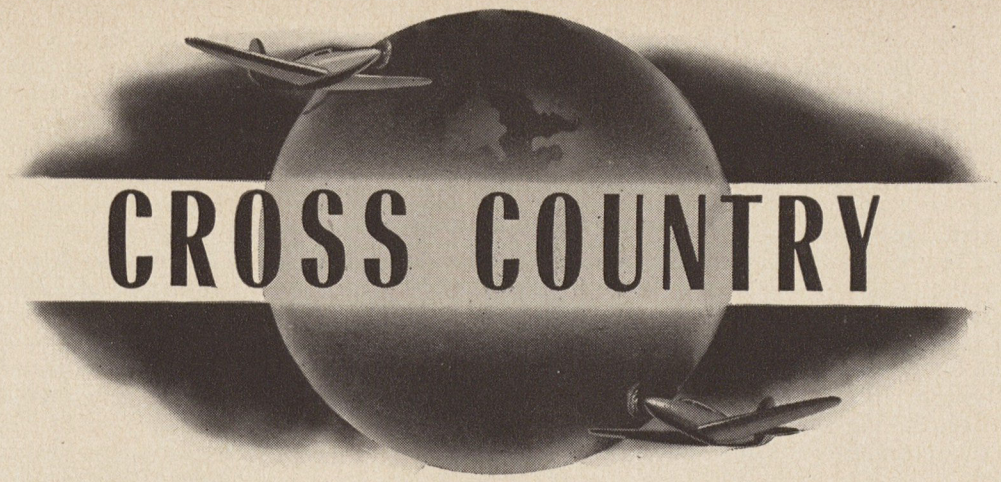
"CALLING DOCTOR KILDARE!" has become something of a password, so we thought it worth mentioning that the author of "Flying in the Cellar," on Page 12, wrote most of the original articles and supplied most of the research for the Doctor Kildare movie series during the last two years. He is Lieutenant Lawrence P. Bachmann, now attached to the Training Aids Directorate at the School of Applied Tactics, who started out to be a psychiatrist and landed in the motion picture business. In this issue Lieutenant Bachmann discusses what the Air Forces is doing to test your ability to take high altitude.

THE FRONT COVER picture this month is the work of Corporal Harry W. Lemmon of the photographic laboratory, Blackland Army Flying School, Waco, Texas.

AIR FORCE is primarily a medium for the exchange of ideas and information among Army Air Forces personnel. Opinions expressed by individual contributors do not necessarily express the official attitude of the Army Air Forces or the War Department.

FORMERLY THE AIR FORCES NEWS LETTER

AIR FORCE is printed monthly by authority of Army Air Forces Regulation No. 5-6, Sept. 6, 1942, and with the approval of the Bureau of the Budget, Executive Office of the President. AIR FORCE is published by the U. S. Army Air Forces at the AIR FORCE Editorial Office, 101 Park Ave., New York, N. Y., U. S. A.; Tel., MUrray Hill 5-1951; Teletype No. NY 1-2530; Director, Major James H. Straubel, A.C. Direct communication with this office has been authorized on matters of editorial content, circulation and distribution of AIR FORCE. Army field publications may reprint from AIR FORCE without permission.



CROSS COUNTRY

THE ARMY AIR FORCES got its fourth star last month.

Number Four went on the shoulders of the Old Man, and it shone all down the line—like wings on a new cadet.

Of course, to the thousands who have come into the Air Forces in these last busy months, he's always been The General. But to more than a few old timers he's still plain "Hap." To all of us he's the man who grew up with Army aviation and played a strong personal role in its development.

In the last year General Arnold has flown some 85,000 miles to keep in touch with his spreading organization. And we don't expect the weight of a fourth star to hold him down. We have a hunch those four stars will continue to show up on the flight line—whether it be in Texas, Tunisia or Tulagi.

In announcing the General's promotion the War Department commented:

"The growth of the Air Forces toward a strength of 1,500,000 officers and men, the responsibilities of General Arnold for the maintenance of our air forces fighting in many theatres and his position as a member of the United States Joint Chiefs of Staff made General Arnold's promotion necessary from a command standpoint and also as a recognition of outstanding accomplishments."

Officers and men of the Air Forces will go along with that. And we'll go further. We honor it as a reward for able, inspiring leadership, and as a symbol of the position air power holds in the military future of our country. And, with due modesty, each one of us—from C.O. to rawest recruit—feels as if he had received a personal pat on the back.

NEW CADET TRAINING PROGRAM

THE new aviation cadet procurement program includes several important changes in procedure for Air Forces enlisted men desiring to qualify for air crew cadet training.

In the first place, the more stringent Form 64 physical examination will replace the modified version of the Form 63 test formerly used. This means that the enlisted applicant will have to pass the tougher examination before being transferred from his present unit.

Then, too, except for a small percentage of applicants who are exceptionally well qualified from an educational standpoint, most of the successful enlisted applicants will be sent to one of a number of selected colleges throughout the country for "pre-aviation cadet training". This training will consist of 60 hours credit in each of five academic courses: modern history, English, geography and mathematics (through trigonometry), and 180 hours of physics. Additional courses will cover drill, military discipline, customs of the service, and physical education.

A third feature of the new plan, which differs somewhat from the old Air Forces system, is the increased responsibility of the company or organization commander to effect the release and transfer of enlisted men. Here, briefly, is the new procedure:

The enlisted man obtains a birth certificate and three letters of recommendation and asks his company commander for Application Form No. 60. (C.O.'s have been directed to have these forms available at all times.)

The completed application, the birth certificate and the letters of recommendation are turned over to the company commander, who then has the authority to indorse or reject the application. (Under the new regulations, rejection should not be forthcoming without due cause.)

With the necessary indorsement, plus the application, birth certificate and letters, the enlisted man is directed to the nearest cadet examining board for the aptitude test.

If he passes this test, the applicant is advised of the nearest physical examining board which he must visit for the Form 64 examination. He then returns to his company commander.

Within a few days the physical examination forms are forwarded to the original

Changes in Aviation Cadet qualifications for enlisted men; other developments of the month within the Army Air Forces.

board. If the applicant has passed the physical, this board sends the necessary papers, with a request for transfer to pre-aviation cadet training, to the Commanding General of the Service Command in which the applicant is stationed.

The Commanding General then will issue the necessary orders to effect the transfer; the applicant's papers will be forwarded to his organization commander. The latter will attach the papers to the soldier's service record, make other routine entries and turn the records over to the applicant, who by this time is under orders to be transferred for his new training.

Enlisted men in other arms and services of the Army of the United States also are eligible to apply for air crew cadet training under the new program. They should follow the same procedure outlined above.

AIRCRAFT WARNING SERVICE

WE may not all appreciate the fact that one of the Air Forces most important units is made up of some 1,500,000 civilian volunteers, attached to our Fighter Commands.

These volunteers are the backbone of our Aircraft Warning Service. Almost all of them serve as ground observers (they object to "aircraft spotters") in the Ground Observer Corps.

General Arnold recently stated: "The service rendered by ground observers in our system of national defense is frequently misunderstood and generally underestimated. They must all realize that their part is a *vital* one in the national defense."

Now and then an Air Forces unit gets an opportunity to appreciate in full the role being played by our ground observers. This was the case recently when ground observers saved a flight of nine fighter planes lost in bad weather over an isolated section of the Allegheny Mountains. *(Continued)*

Peculiar atmospheric conditions prevented the flight from maintaining radio contact with base. The flight could receive messages but couldn't send any. Ground observers in the area didn't know that, of course. All they knew was that planes were circling overhead. But continued and accurate reporting by several observers, whose reports were flashed back to an information center and charted on an operations board, led to only one conclusion: the planes were lost; something was wrong with their radio.

In the hope that the ships might still be able to receive messages, a controller at the information center radioed position on the pre-arranged frequency for that flight and gave instructions on how to proceed. Almost out of gas, the planes immediately straightened out their course. Shortly after, they all landed safely.

For the ground observers it was all in a day's work—the type of work being done on a 24-hour schedule at thousands of observation posts throughout the country. And sometimes the work is carried on despite hell and high snow. For example:

After heavy snow had made it impossible to commute to the Live Oak Mountain observation post in Oregon's Camas Valley, it looked very much as if the post would have to be abandoned. The ground observers held a meeting to find out.

"Not if I can help it," shouted a wiry little middle-aged woman. "If Jane will come with me, we'll go up there and live until the roads are clear again." Next day

the two women left with winter supplies to dig in at the lonely mountain shack. For 72 long days and nights they kept around-the-clock duty.

In all this time, not one plane flew over the post. Yet, this negative information, reported regularly by the two women, was just as important to the Air Forces as if there had been a flight every hour. That's a hint of the intricate mechanism behind our Aircraft Warning Service.

Insignia for Instructors

Gold wings sleeve insignia have been authorized for wear by flying instructors of the Army Air Forces during the time they are assigned to such duty. An instructor who has satisfactorily performed a total of six months' duty as flight instructor will be authorized to wear the insignia permanently. The gold wings, embroidered in silk, are two inches from tip to tip, of the same design as the Air Forces insignia, omitting the propeller.

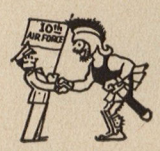
The insignia will be worn on the middle line of the outside half of the right sleeve of the service coat, four inches from the end of the sleeve.

Tenth Air Force

At bases in India and China, thousands of miles from its birthplace at Patterson Field, Ohio, the Tenth Air Force on February 12 celebrated its first birthday.

We have just received a summary of the Tenth's activities during its first twelve months, as it was presented that day by Brigadier General Clayton Bissell, commanding.

The Tenth is described as a melting pot of air personnel, with men of the basic organization and those who have since joined it from the States, fighting alongside men



who, before joining the Tenth, faced the enemy in the Philippines, Java and Australia, and in China with the American Volunteer Group, and men who were the first to bomb Tokyo.

As members of the Tenth Air Force, the summary reported, they achieved at least 165 confirmed victories in the air (presumably as of early February—Ed.), or an average of seven enemy planes destroyed for each one of their own lost. This included the destruction of many Jap bombers, against only three lost by the Tenth, according to the summary. Disregarding bomber losses, the score in China stands at eight victories over the enemy for each plane lost by the Tenth. Also reported was the destruction "of at least eight enemy planes on the ground for each tactical plane we have lost."

About bomber operations: "From our principal bases in India to our most routine targets exceeds the distance from British bases to Berlin. And again, we may enter modestly a claim unrivaled by any other combatant air force in any other theater. Our raids against enemy objectives in Bangkok, Thailand, represent the greatest distance flown from base to target by any bomber formation thus far in the war, in any theater at any time. For missions flown we believe we stand incomparable for the shipping losses we have inflicted on the enemy."

General Bissell called establishment of the air link to China over the Burma Road "one of the proudest chapters of the Tenth Air Force," explaining: "The operation of the India-China transport line is no longer a responsibility of the Tenth Air Force. Our present task is merely to protect it, but let it not be forgotten that the Tenth Air Force inaugurated that service, protected it from interruption, and for the best part of 1942 kept it operating through the monsoon and severe icing conditions which came with cold weather. That feat played a vital role in keeping China effectively in the war."

On the humanitarian side: "In our earliest days, when our serviceable equipment could be counted on the fingers of one hand, we answered an emergency call by our major ally in this theater for help by flying into Burma a battalion of fully-equipped troops. Returning, we rescued from the enemy over 400 women and children in combat bombers turned into transports. A few weeks later our new ferry command devoted its planes to a similar service, bringing out from northern Burma bases more than 3,600 refugees, plus more than 600 wounded Allied ground fighters . . . When Burma fell, large numbers of our Chinese allies were stranded in the jungle canyons in upper Burma. For weeks and months that brave band of allies, never giving up, were fed by Tenth Air Force planes, which literally reenacted the parable of the ravens feeding Elijah. Until they could find a way out of the mountains into Burma weeks later, food and medical supplies dropped by Tenth Air Force planes gave them strength to fight their way out, to face our common enemy once more in the future."

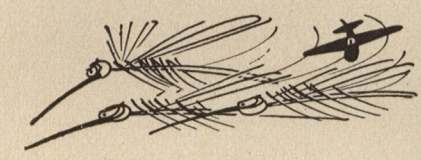
Legion of Merit

A new decoration, the Legion of Merit, is being awarded to members of the armed forces who, after September 8, 1939, shall have distinguished themselves by "exceptionally meritorious conduct in the performance of outstanding services where the service performed was not necessarily in a duty of great responsibility warranting the award of the Distinguished Service Medal."

Mosquito Patrol

With malaria a Number One health threat in the Caribbean area, a mosquito patrol has been established at Losey Field, Puerto Rico.

A belly tank from a P-39 has been attached to the underpart of the fuselage of an O-49 and equipped with a small pro-



peller. The tank is filled with a mixture of paris green and lime. This "ammunition" is sprayed on the fields and swamps surrounding the base.

The enemy (malarial mosquito) has a normal cruising range of about four miles, but with a tailwind he can fly twelve miles or more. So the patrol has to be quite extensive, especially in the direction of the prevailing winds.

We are told that the patrol is raising quite a bit of hell with the malarial mosquito pilots.

Bombardier-Navigator

The "bombardier-navigator" officer makes his appearance under a new training program for the Air Forces. Full training courses at both bombardier and navigator schools, plus five weeks of aerial gunnery, will hatch a large number of these combina-

tion crewmen who will be appointed flight officers or commissioned second lieutenants at the end of the first phase of their training. Those appointed flight officers will be commissioned second lieutenants upon successful completion of the second phase.

No economizing of personnel is involved. Under present plans, for instance, many heavy bombers now carrying both a bombardier and navigator will carry two combination bombardier-navigator officers. Object: to enable one officer to relieve the other in the event of fatigue or casualty on missions. Exception: navigators trained for the Air Transport Command.

You may be wondering what happens if, for instance, a student who has successfully completed his bombardier training subsequently washes out in navigation. The answer: he retains his status as bombardier.

Among My Souvenirs

DURING a recent broadcast of a War Department radio program short-waved to troops overseas, the announcer asked his front line audience to "tear off the top of a Jap Zero or German Stuka and send it in

with your request for musical numbers". It was meant just as a gag, of course, but the answers were exceptionally realistic.

From a lieutenant in the Southwest Pacific, with a request for "Concerto for a Trumpet" by Harry James' orchestra, came the tail piece of a Zero. And from two sergeants in North Africa who wanted "Somebody Else's Moon" and "Star Dust", came a rather bulky package with this note scribbled on the contents: "Regret Stukas and Zeros not available. Will this small piece of wing covering from a German troop carrying glider do just as well? If it isn't sufficient we will send a couple of Jerries."

Retribution

A FERRYING crew was flying a medium bomber south from the States. Since the beginning of the trip, the pilot's life had been one headache after another. The plane seemed to be a jinx job. There had been engine trouble, lay-overs, bad weather, bad landings, and what have you.

As they approached a Transport Command field in the Caribbean, it happened again. The wheels wouldn't come down. The pilot flew around and around trying to dump the gear, but no luck. Finally he gave up and came in for a belly landing.

The bomber slithered along the ground. Then, the final straw. The plane caught fire. Flames and smoke enveloped it.

A crash truck, streaking to the rescue, found the crew had cleared the ship without injury. The crew members huddled around watching the fire. All except the pilot. He stood apart from the rest. With a vengeful look on his face, he was busy throwing rocks at the burning ship.

Delayed Action

CREWMEN of a B-17 had a surprise recently while flying over a quiet sector of England when a 20 mm. shell exploded in the left horizontal stabilizer. They had reason to be surprised. There wasn't an enemy plane in sight.

After the big bomber had landed, Captain Henry J. Schmidt, an engineering officer with the Eighth Air Force, began investigating. He found that the B-17 had been carrying the shell around ever since it had attacked German installations in France some three weeks before. During that attack the shell had pierced the stabilizer without exploding. The hole it made was subsequently repaired, but without knowledge on anyone's part that the missile was still in the ship.

Notes on Leadership

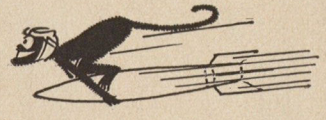
- ★ **Keep your mind open to new ideas.**
- ★ **Delay action when you are mad; don't hold grievances.**
- ★ **Obey orders without quibbling.**
- ★ **When you give orders, see that they are obeyed.**
- ★ **Get all you can out of your troops; get all you can for your troops.**
- ★ **Use velvet gloves on an iron hand; make each man believe he is the best.**
- ★ **Use only enough punishment to assure an offense won't be repeated.**
- ★ **Give loyalty to superiors; expect loyalty from juniors.**
- ★ **Remember, sins of omission are greater than sins of commission.**
- ★ **Give credit where credit is due. Don't grab credit for yourself. If your organization is good you will get credit for what your men do.**
- ★ **If you want to know about a man, ask his contemporaries.**
- ★ **Try a man by court martial only if you have to, then push it hard.**
- ★ **Set forth clearly the responsibility of every man.**
- ★ **Be positive, but don't bluff or threaten.**
- ★ **Know your men personally as far as possible, but don't enter factions.**
- ★ **Make each man in your organization feel that you are his best friend—because you are.**
- ★ **Give your own punishment; don't delegate it to staff officers, but insist on your subordinate commanders doing likewise.**
- ★ **Ride maintenance and pilotage.**
- ★ **Have an understudy for every job. Turn all jobs over to others and leave yourself free to supervise and inspect.**
- ★ **Assume that an officer does his duty but inspect, and then inspect again. See for yourself. Have an inspector on your staff. Insist on all your people making constant inspections.**

Combat Flight Patch

A RECTANGULAR patch of ultramarine blue cloth or other suitable material has been authorized as a background for the aviation badge to identify Air Forces personnel outside continental United States who are currently assigned to combat flight duty in a combat area. Qualified to wear the patch are personnel who hold effective aeronautical ratings or who are authorized to wear the aviation badge of air crew member. The patch is not a decoration or device designed for permanent wear on a uniform. When the individual ceases to serve on combat flight duty or when he leaves the combat area or theater to which assigned, the patch will be removed.

Bombs Away

A BOMBARDMENT squadron of the 9th Air Force in the Middle East has a monkey mascot named Eta. Eta has learned how to pull the handle marked "Salvo" on the B-24s with which the squadron is equipped. Eta's possessive master, Lieutenant Kenneth G. Hebert, says she has progressed quite



rapidly in her "basic training" although she is not permitted to pull the salvo handle when the bomb racks are loaded. Incidentally, Eta's name represents a contraction of the term "Estimated Time of Arrival".

Dance Floor Orders

A REPORTER on The Retake, weekly publication of the Air Forces First Motion Picture Unit, is credited with a daring exploit on the home front: invasion of a hostess' dressing room at a west coast USO center and capture of a "tactical" manual for USO girls.

The Retake reports that the captured document revealed the following questions which every USO girl must ask herself before going on dance floor duty with the G.I. wolf pack:

"1. Is your hair combed, make-up fresh, seams straight, slip O. K.?

"2. How about your posture—shoulders straight, tummy in, smile contagious?

"3. Can you go more than half way without being fresh or sarcastic?

"4. Is it the uniform or the man you're helping to entertain?

"5. Can you help make the party go when things are slow?

"6. Do you realize most of the fellows have girls back home? Enjoying your company for three dances does not mean they are seeking a permanent alliance for the duration."—THE EDITOR.

FROM A LETTER TO THE COMMANDING GENERAL

Dear General Arnold:

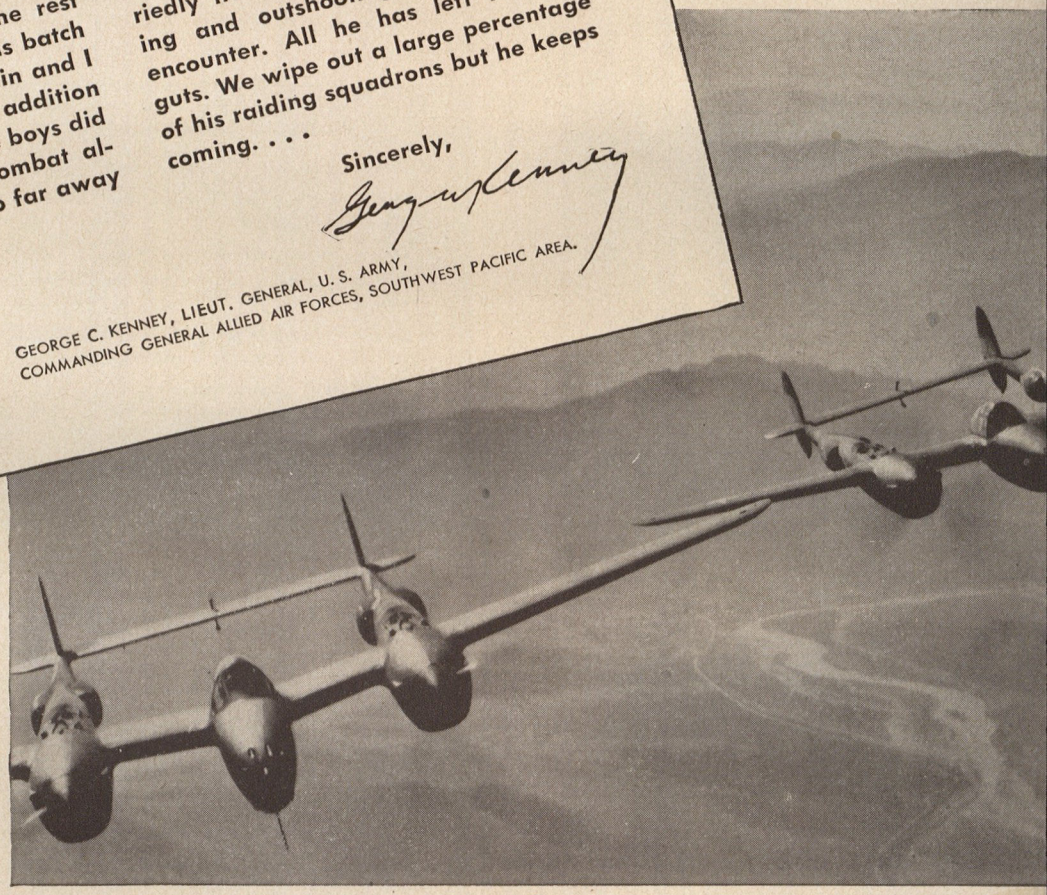
As a matter of interest I am enclosing the reports of the P-38 pilots who took on a collection of about 30 to 35 fighters and bombers a couple of weeks ago. This was the first time the P-38's had ever been in combat in this theater. An analysis of these pilots' reports, written a few minutes after landing, shows 12 definite, 3 probable, 1 possible and results unobserved in 6 cases. Final returns to date confirm 15. We had 12 P-38's in the show. One of them had a forced landing at — with a shot-up engine. The airplane is repairable. The rest came home. No casualties. This batch of Japs came from New Britain and I expect that some of them in addition to the 15 never got back. The boys did pretty well for their first combat although they opened fire too far away and did entirely too much dog-fighting. They learned a lot, however, and will do better next time. Right now the morale in that squadron is so high it almost scares you. . . .

The Jap weakness and our real hope for victory is in the air. His fleet and his army can hold their own in any league but he simply cannot train airmen to compare with ours in a hurry. His original highly trained crews were superb but they are dead. His new crews cannot fly in bad weather, his night efforts are piddling and his combat skill is low. Our hurriedly trained youngsters are outflying and outshooting him at every encounter. All he has left is sheer guts. We wipe out a large percentage of his raiding squadrons but he keeps coming. . . .

Sincerely,

George C. Kenney

GEORGE C. KENNEY, LIEUT. GENERAL, U. S. ARMY,
COMMANDING GENERAL ALLIED AIR FORCES, SOUTHWEST PACIFIC AREA.



Since full names were lacking, positive identification of the pilots who made these reports could not be obtained at press time.—ED.

"I SAW HIM CRASH . . ."

Arrived Buna 1200, 21,000 feet. At 1205 saw aircraft 2:00 o'clock, low. Flight went into circling dive to right. Japs were about fifteen Zeros flying in two ship elements with no particular element formation. I kept my element (second) about 500 feet above the first element and followed. As we approached Japs, my wing man passed me and joined first element. At this time, our first three ships attacked Zeros and I dove on one Zero directly below me and to my left. I fired a twenty degree deflection shot from his left near quarter at a range of 300 yards, closing to thirty yards. His engine began smoking heavily from the cowling, the smoke completely blanketing the cockpit. The aircraft went into a vertical dive off his left wing, and I saw him crash into the ocean.

I then climbed to about 11,000 feet getting snap deflection shots at three more Zeros on my way; results not certain, but I believe I got hits on one. At this time, I saw a Zero crossing me 1,000 feet below and slightly to my right. I dove on him and he pulled around to the right, passing me going in the opposite direction.

When I looked around I found five Zeros on my tail. I nosed over into a seventy degree dive and found my left engine cut. During this dive I sighted two "Val" dive bombers. The rear "Val" turned off to the right so I opened on the leading "Val" at extreme range and fired until my guns stopped. I saw my explosive bullets striking both wings and the fuselage, and pieces flew off the wings; smoke also came from the wings. The "Val" did not alter course, but went into shallow dive gradually increasing to fifty degrees. Heavy smoke was then coming from the fuselage. I did not see him strike the water.

My plane was tending to nose up and would not indicate over 175 mph., so I went to—and managed to land. My nose-wheel door was shot up and the nose-wheel would not come down and I nosed over on landing. I found one 20 mm. hole in the horizontal stabilizer just inside the left rudder, one .30 caliber machine gun hole in the leading edge of my right wing, and one .30 caliber machine gun hole through the front end of the nose-wheel door, cutting it loose, also one .30 caliber machine gun hole through the left flaps beside and behind the cockpit.

Battle Reports

from P-38 pilots in the Southwest Pacific

"Bomber blew up . . ."

Direct to Buna, arrived 1205, 21,000 feet. Wewoka called 27 Zeros. Saw seven or eight "Val" dive bombers, seven to nine Zeros (Mitsubishi). Dive bombers low, Zeros above 2,000 to 3,000 feet; dive bombers about 4,000 feet. Bombed area old Buna Strip and went down on water to northeast.

Flight dove on a Zero. I dropped my belly-tank, took pass at Zeros without firing, dove away from four Zeros which jumped my tail, taking shot at Zero on way down without result. Reversed direction in dive, took shot at one dive bomber near Buna, missed.

Turned left; out at sea at 500 feet. Saw dive bomber. Fired at range of 350 yards, long burst; dive bomber blew up, result direct hit cannon, crashed in water.

Turned toward shore. Zero passed in front of me. I fired very short burst 50 yards. Zero crashed in water.

Zeros on my tail, so I headed out to sea. Three dive bombers ahead of me; right dive bomber pulled off to right. Zeros still behind me, so took short burst at center dive bomber without observed results.

Made shallow turn to right, found one lone dive bomber, took pass; out of ammunition, went home. Combat lasted 1210 to 1218.

"A large splash . . ."

Hood Point 1140. Identified four B-26s, 5,000 feet. Four "F's" to Buna 1150, arrived —1210, 17,000 feet. Wewoka advised 26 Zeros 17,000 feet. Could not locate, climbed to 2,000 feet.

Wewoka advised two Zeros strafing——. Went down to 5,000 feet; could not locate. Climbed to 10,000 just north Buna, saw three Zeros low, dove on them from their front left quarter; Zeros turned into me, causing me to overshoot first two. Right Zero turned to right, left to left; center Zero did slow roll. Followed one which turned to his right, who continued evasive turns and rolls while diving slightly. I fired two bursts at 300 yards from his right rear quarter, and second burst entered cockpit. His plane dove into water in straight-ahead dive.

I continued my turn to right and saw one P-40 fighting one Zero. Zero broke away and turned toward Zero. P-40 and I both fired, saw bullets strike Zero, passed over it and did not sight it again, but I looked back and saw a large splash in the water.

I continued inland above and received order to return to base about 1250, landed 1315. Combat from 1220 to 1230. I did not see any Zeros fire at all.

"Burst into flames . . ."

Arrived——1220. Wewoka advised two Zeros strafing——. I was at 20,000 feet and due to cloud formation did not want to go down until positive no ships covering strafers. Flying under a cloud formation at 20,000 feet, chasing unidentified aircraft toward ——, we were jumped by four Zeros from the clouds. My second element turned to the left and dove. My wing man shot a Zero off my tail.

The second fleet of six Zeros jumped my tail. Number two Zero overshot and I got him as we went by. He burst into flames after a long burst, starting at 100 yards, and continuing until I had to break away to avoid collision. He crashed in the water. I saw another aircraft crash at the same time.

I continued my dive, turned to left, made a couple of turns trying to join my wing man. A Zero came across me, rolled away in front of me and down; I rolled with him, took shot but did not observe result. My second element and another aircraft chased this Zero inland with me following from 2,000 to 3,000 feet above, both ships firing. I saw an explosive shell hit in tail section. Directly after, pilot and ship went into nose-dive from 5,000 feet and crashed two miles south of ——.

There were at least 30 enemy aircraft visible during the initial contact. I do not know if they were joined by more ships later. My wing man, and my leader (second element) had become separated from us during the melee. I tried to reform the flight over—— but Lieutenant —— was only one to join me to come home.

After first burst, my right engine would not pull over 30 inches manifold pressure. Lieutenant —— and I returned 1250, landed 1315. Combat lasted from 1225 to 1240. I identified only Zeros but I believe there were Mitsubishi Zeros there. I saw no dive bombers. Aircraft had brown camouflage with silver bellies.

"No smoke, no fragments . . ."

Buna 1150, 22,000 feet. Wewoka advised two Zeros over ——. Went toward —— and saw seven aircraft low (7,000), identified as P-40s; followed above them.

I dove on flight of four "Oscars" which were off to right of main group. Observed total of 20 to 30; believe all "Oscars"; all dark brown paint, red circle both wings and fuselage, of

(Continued on Page 38)

AIR FORCES

Antisub COMMAND

By Lt. Col. C. A. Burrows

ASSISTANT CHIEF OF STAFF, A-2

Brig. Gen. Westside T. Larson congratulates Captain John Shaw and his fellow crew-members of the plane "Tidewater Tillie" for sinking an Axis sub. At right, Sergts. Jack Weems, Luther Williams and Don Everhart load an anti-sub ship with a depth bomb—at an air base "somewhere in England".

A new component of the Army Air Forces organized to combat the U-boat menace.

PROMINENT in the United Nations' program to control and eliminate submarine activity is a recently announced component of the Army Air Forces—the Antisubmarine Command.

This command is the only unit of the AAF within United States continental limits having a major operational mission, or "shooting job". Its crews patrol all coastal waters and escort merchant ships hundreds of miles out into the sea. In the offensive against U-boats they are not only prime attackers but serve as the eyes and ears for American surface vessels.

Squadrons of the Antisubmarine Command also operate overseas—in any part of the world where enemy subs may be found.

Since this work calls for specialized combat crew training, the command has a school at an Eastern sea coast base and supervises all training in such warfare. Brigadier General Westside T. Larson is commanding general of the Antisubmarine Command, directly responsible to Lieutenant General Henry H. Arnold, Commanding General of the Army Air Forces.

Destroying enemy submarines from the air by land-based planes is definitely a development of this war. The job itself is not very spectacular. Tedious patrol, conducted for long hours, is the main work of antisubmarine squadrons, with occasional bursts of fast and furious action in which a plane has only 30 to 60 seconds to accomplish the sinking of a sub.

However, unspectacular though it may be, the tracking and sinking of U-boats by Army bombers has, through increased perfection of attack, become a vital factor in the combined offensive against the enemy's undersea craft.

Origin of the command dates back to the beginning of the war. On December 8, 1941, the First Bomber Command began operations with the Navy against enemy submarines off the Eastern coast. A few months later, operational control of the First Bomber Command was placed under the Navy's Eastern Sea Frontier and Gulf Sea Frontier.

IN THE four months following Pearl Harbor the I Bomber Command and Naval aircraft cooperated with ships to protect unescorted merchant vessels from submarine attacks off our Eastern coast. Finally, in April, 1942, the Navy started escorting coastal convoys, with air escorts continuing. Meanwhile, air operations continued to expand and, in October, 1942, the Antisubmarine Command was formed with the First Bomber Command as a nucleus. The new and enlarged organization was prepared to operate on a world-wide scale.

Within the Command there are a number of Wings, which, for the purpose of receiving complete intelligence and operational data, coordinate their patrol area. At present, planes of the Antisubmarine Command are coordinated with the antisubmarine operations of the Eastern Sea Frontier, the Gulf Sea Frontier and the British Coastal Command. Other wings of an enlarged Antisubmarine Command carry the fight to U-boats wherever they can be found in the world.

The job of tracking and locating subs is a slow task. Sightings from many sources are compiled to give a complete picture of the submarine menace.

Patrols in an area of more than a million square miles are directed from control rooms in New York, Miami and overseas centers. In these rooms large staffs of Army, Navy and Allied communication experts, plotters and intelligence officers receive and evaluate reports of U-boats sighted. Here controllers give the quick orders which send aircraft and naval vessels to the attack.

Sometimes messages announcing sightings prove to be duds. *(Continued on Page 28)*

THIS IS THE AR

Night Mission OVER THE CARIBBEAN

By Captain Charles D. Frazer

Hunting submarines off Latin America in a B-18 is hard, tricky, relentless work.

OUR B-18 is in a long turning dive toward the sea.

Twelve hundred feet . . . now 700 . . . 300 . . . 100. In a final rush the bomber levels off at 50 feet and hurls her bulk across the surface like a gallant old cavalry horse making a charge.

There may be a sub ahead. We don't know. Dusk has settled on the Caribbean, merging water and sky into a gray, shapeless mass.

Suddenly, the interphone crackles. It's the bombardier.

"I see something, Lieutenant, dead ahead."

The pilot steadies the ship, then shouts the order: "Bomb bay doors—open."

There's a creaking in the belly of the fuselage. And now we all can see something—something dark and indistinct and apparently motionless on the water.

Once again the bombardier cuts in. This time his voice is dead with disappointment.

"Too bad, Lieutenant. Only a schooner."

The B-18 lifts her nose, starts a climbing turn. A few stars have come out. They seem to spin round in the plexiglas ceiling of the cockpit. At a higher, safer altitude we circle and fly over the vessel, now clearly visible below. Since there's nothing suspicious about it, we resume the original course. Better luck next time; the night's still young.

This mission began, actually, at 1645 in the afternoon from the base of an Antisubmarine Command bombardment squadron attached to the Antilles Air Task Force. The base is many miles from headquarters. A few barracks, a runway, a control tower—that's about all. Hidden in thick jungle, the base is raw and rough and damp. Bugs and mosquitos are a constant diversion, malaria and dysentery a constant threat, snakes abundant and varied.

But this is a key airfield of the Caribbean Sea Frontier, which—except for part of a shipping lane to the far north—is the most active submarine area in the Atlantic Ocean. Here a Joint Army-Navy Command works ceaselessly to control the raids on vital merchant shipping.

THE crew on this night mission is made up of First Lieutenant Lionel J. Cormier, pilot; Second Lieutenant Roger T. Shaw, copilot; Second Lieutenant Peter J. Stampon, navigator; Sergeant Hal B. Page, bombardier; Corporal Ralph Bush, radio operator; and Pfc. Allen Guthrie.

After an early dinner, we assemble at 1715 in the Operations Control Room for briefing.

A blue steel board flanks one side of the room. On it is charted the position of surface ships, the probable positions of submarines, the position of both Army and Navy aircraft out on missions, and a maze of airplane courses, or tracks. These tracks are established hours ahead by Group Headquarters and transmitted to this base.

"You will fly the Nan mission."

First Lieutenant Charles Havens, S-2 of the squadron, indicates the course on the board. It is a point-to-point-and-return, first northwest, then practically due west.

"This is a preliminary sweep," Havens continues. "A convoy of ships is due into this part of our area. You will sweep it clear tonight, and Navy PBYs will provide cover until the convoy is through.

"There's a German submarine somewhere in this vicinity." He points to a far-off section of the Caribbean where it was last seen. "It's reported to be 200 feet long, with the conning tower in the middle.

"This is the only one we feel certain is in the area. Another was reported—here—by a transport plane but Headquarters has no supporting data on it.

"Two or three other subs, however, may be on their way up from the coast of South America to intercept the convoy. We know they were operating down there just a few days ago because one convoy lost some ships."

Havens hands our navigator a map and begins to give more technical instructions.

"There are no vessels patrolling your area tonight. But an American submarine is anchored off a harbor—here. Don't drop anything on that.

"As you know, French or Spanish ships

MY, DAVY JONES

occasionally go through your area. It's particularly important to report their courses.

"The weather should be good. There are clouds over this island but the Mike mission ahead of you reports high ceiling or none at all at sea. With a full moon, your visibility should be excellent.

"Recognition signals will be good 'til eight o'clock tonight (midnight Greenwich time, by which all operations are gauged). Weather signals are good 'til one o'clock.

"Let us hear from you, of course, if anything unusual happens. Otherwise, maintain radio silence at all times. If you have to break it, break in code only."

After one or two questions by Lieutenant Cormier, the briefing is over. It is 1740. We leave the operations barrack, drive in a staff car along a road lined with tall grass to a cleared patch where our B-18 is dispersed.

Cormier, a young, heavy-set chap from New Bedford, Massachusetts, turns and grins. "I hope you're not superstitious." He nods toward the nose of the plane. Her nickname is "Friday The 13th."

Each crew member is dressed in a coverall and wears a pistol, a long knife and a canteen. If you're forced down in this jungle, it is no cinch to get out. One plane, some months ago, crashed only a few miles to the east and it took twenty days for troops to reach the spot on foot through swamp, trees, vines and bush.

Our parachutes have emergency supplies packed in the seats and the airplane itself carries equipment against a landing at sea. There are two rubber rafts containing rations and radio sets which automatically can send SOS messages. To one of the rafts is roped a five-gallon wood keg of water.

The plane is further equipped with a Tommy gun, a hatchet and a supply of smoke bombs.

These smoke bombs may be especially useful. Should we find and attack a sub, one of the bombs can be dropped to serve as a marker while we turn. Or, if we think our navigation is off, we can drop a smoke bomb and get a drift reading.

The loading for submarines consists of heavy depth charges slung in the bomb racks. One will do the business, if the hit is close enough but they carry plenty for a pattern if necessary.

Boarding the plane, Cormier says: "Remember, if we have to make a water landing for any reason, get in the back of the ship and brace yourselves." Our Mae Wests are strapped on.

The engines are switched on, warmed awhile. Then, at a "clear" from the tower, we roll onto the road, taxi along, and finally stop at the foot of the runway. This runway is well concealed between sugar cane paddies on either side. From the ground, you couldn't see it fifty yards away.

Rev the engines now. It's 1758 and we're scheduled to be off within two minutes.

From the tower: "O.K. You're clear to Number One."

"Roger, thank you."

Heavy yet somehow graceful and responsive, our B-18 gathers speed, takes off smoothly, gains altitude, and makes an easy bank to the left.

Darkness comes quickly in the tropics. The sun is sinking red into the sea ahead and already lights are showing in native shacks behind us.

We switch our earphones from R1 to the interphone connection and a voice inquires:

"Bombardier to pilot. What does your altimeter read, Lieutenant?"

After he gets the reading, there's a pause, then:

"What's your airspeed?"

"120."

"Roger, thank you."

LEAVING the jungle and sugar fields and swamp, we are out over water now, passing west of the harbor where the American submarine is anchored. Several merchant vessels are also in the harbor, and many of them obviously will not sail for awhile. Battered and damaged, some of them listing, they have been hauled in for repairs. Nazi subs are tough down here.

Barely half an hour from the base we made that first run on the schooner—and had our first disappointment. You really wouldn't expect to discover a sub so close. But there's no telling. Enemy sub commanders are audacious and tricky. They always get within 1,000 yards of their quarry and have even been known to surface in the middle of a convoy, sending out their torpedoes and shells in all directions at point-blank range.

Following that run on the schooner, we regain altitude and fly at 1,200 feet.

Stampon, the navigator, comes up from the bombardier's cabin to squint through the driftometer. Since there is virtually no wind, the copilot accuses him of looking for mermaids. Why not? Nice night for it.

The pilot glances out his window at the port engine. The exhaust flame is a bright blue. "Blue coal"—too rich a mixture. He adjusts it until the flame is the reddish-orange of a lean mixture. Down in the Caribbean, where there's a shortage of many things, you have to conserve gas.

The automatic pilot is switched on and we drone along our track, peering out the cockpit windows, scrutinizing constantly the dark gray surface below. Ahead, about fifteen degrees to the left, is a rain squall, a rather lively one. There's another further off to the right. They can nearly always be seen in this climate.

Presently the pilot's gaze fixes on the north. A tiny light is twinking at what appears to be horizon level.

"We'll go up and take a look."

The bomber turns slowly. There should be no lights, of course. Ships in this area do not carry them, nor do aircraft. Except for the instrument panel, our plane is as dark as the sky around us.

This light might be a rescue party at work or something else extraordinary. On and on we fly, but seem to get no nearer. That light's a hell of a distance away and the crew, discussing it on the interphone, decides that it must come from an island fifty miles off. This turns out to be the case. After a little, we can see the deep shadow of land.

Since this investigation has taken us some distance from our prescribed track, the navigator is busy with charts and graphs. He will plot a new course from this point.

"O.K., Lieutenant, you can change course any time now," he says, and gives us a new compass direction. Friday The 13th swings gently and heads west. We will fly for nearly two hours on this track.

Anti-submarine work by this Bombardment Group is offensive warfare. This is quite different from the defensive tactics employed elsewhere—that is, day-after-day patrol of specified areas.

Colonel Charles A. Born, commanding the group, believes that the true function of aircraft is to attack submarines before they can do any damage. His intelligence staff at headquarters closely analyzes sub operations both in and outside the area, and predicts future operations.

On the basis of known and predicted data, Colonel Born's staff—in collaboration with the Navy—schedules missions according to where subs are expected to be. Squadrons of the Group provide coverage for convoys passing through, naturally, but more often their missions are to seek, find and bomb. If and when four-engine planes become available, Colonel Born hopes to send them ranging far into the mid-Atlantic to intercept the Nazis before they can reach the Caribbean.

Headquarters of the Caribbean Sea Frontier plots its information on a master board far more complex than those at operational bases. Working in a Joint Control Room, Army and Navy officers pool their data, chart positions of all ships and aircraft in that entire section of the Atlantic.

Every reported submarine has a designation. Every attack on a vessel is charted, as is every sighting or attack on a sub, the location of wreck survivors, the location of torpedoed ships, the estimated past course of a submarine and its possible future courses.

Through such intelligence as this, the Control Room establishes complete coordination between Army and Navy aircraft, and between all aircraft and surface patrol vessels.

But submarine control remains a most difficult problem. The odds are heavily on the enemy's side.

Night air operations are effective only when the moon provides some measure of visibility. On bad nights, aircraft are confined to the actual coverage of convoys.

It is hard to hit a sub. Air attacks depend largely on surprise and generally the enemy can see you before you see him, no doubt aided by special aircraft detecting equipment. He can crash-dive in about thirty seconds, leaving only a swirl on the water. You can drop your depth charges ahead of the swirl but he may have turned right or left

ILLUSTRATED BY
CAPTAIN RAYMOND CREEKMORE

as he dove. Rarely can you tell whether you hit him. Oil may appear on the surface; he may have shot it up himself. Debris may appear. But subs have been known to carry debris to shoot up, merely to mislead attackers. The German being what he is, it is not beyond reason to suppose that survivors have been sent up to the surface for the same reason.

Contrary to opinion, submarines do not have to come up each night to recharge their batteries (although this must be done frequently), nor do they require mother submarines. An ordinary sub can carry fuel for three months' operation, ample for voyages back and forth to the French coast.

The B-18s of the Group attack usually from about 50 feet, using no bombsight whatever or only a simple strip of adhesive tape across the nose panel.

But it is not frequent that a crew has a chance to sight and attack a U-boat. The crew of Friday The 13th had made an attack two weeks before our flight—doing certain damage yet not scoring a "kill". Since then, they hadn't even glimpsed one.

The time is 1925—we still have an hour to go in this direction.

Cormier turns the stick over to Lieutenant Shaw, copilot, and hunches through to the rear of the plane. Soon, there are sharp cracks just behind the starboard engine. A machine gun. Back there, to relieve the monotony, the pilot is practicing. As he fires at the ocean, you watch the fiery tracers as they seem to curve downward until they plink into the water.

After what seems an endless flight, the navigator announces that we have reached our destination point. It is 2030 and we're two and a half hours from the base. Friday The 13th makes a ninety-degree turn to the south.

WHILE the copilot flies, Cormier sets his face toward the moon to scan carefully every square mile of that silver water. Occasionally the sheen is broken by the shadow of a cloud but otherwise—nothing.

Soon we make another turn and are on the track home. We will cover virtually the same route. Ahead of us, the Mike mission is flying a box-like course and later missions will have still different tracks, so by morning the whole area will be chequered.

Off to our right is a flat, bald island. There's nothing on it except herds of goats. Every so often, however, a plane will make an emergency landing there. Flying low over it, shining our spotlight, we find nothing.

Below, on the water, is a slender, wavering line. Down in the bombardier's compartment, Sergeant Page explains it. "That's oil. The wake of a ship. It may stay on the surface for days or even weeks."

After many missions of this kind, he knows the habits of submarines intimately and tells about them.

"The best time to catch one is when he's refilling his torpedo tubes. He can't dive until his tubes are closed and that gives you a little bulge on him. If he's only charging batteries, he can crash-dive on you."

It has to be really fast work, then?

"Yes, *sir*. To be sure of a kill, you've got to drop a charge on him within 30 seconds after he starts to crash-dive. It has to explode within fifteen feet. Otherwise, all you get is a probable.

"And it's next to impossible to surprise a sub. They're smart, these Germans. When you see one, you got no time to lose."

Our plane has been droning on mile after mile. Suddenly Page claps a hand to his earphone, stiffens and peers eagerly ahead.

"We've got a target," he whispers.

WE do not have to be told. Friday The 13th has gone into a dive—steep and aggressive. The water rushes up at us, nearer, nearer, right into our faces, until at last the pilot pulls out and we find ourselves a bare twenty feet above the surface. Our altimeter, set at fifty feet, reads less than zero.

We have turned right toward the darkness outside the moonpath. Page pulls a switch to open the bomb bay doors, another to unlock the racks. Maybe, just maybe, we're in luck.

There—something dark on the water, directly ahead at our eye level. We're rushing toward it. The Sergeant's hand grasps a lever, ready . . .

Oh, hell.

"Another schooner, Lieutenant," Page cries into the mouthpiece.

We're still walloping along toward the schooner and the top of its masts are higher than we are. Had it been a sub, we'd have been right on the button. Nice flying.

Our plane pulls away to the right, banks and climbs, circles, returns for a closer investigation. Same old story—nothing suspicious. Disgruntled, we head for home, still an hour or so away.

Approaching an island base and a harbor, we see flares rising into the sky. It's the American submarine, taking no chance of an attack from us. Don't worry, Captain, we know about you.

Soon we're nearing our own field. The runway lights go on and we call the tower. Our radio fails just as we are about to land but that's all right. Old Friday The 13th puts her wheels down exactly at 2300.

Lieutenant Cormier and his crew will be out again tomorrow night or the following morning. Submarine control is a high priority problem, equipment is limited, and crews here are flying 100 to 120 hours a month.

Old Friday The 13th taxis back to its dispersal point. All tenseness gone, crew members kid each other like a winning football team in the shower room.

A tractor comes out to meet us, draws us backward into the "hardstand", the engines are cut and we climb out, glad for the chance to stretch.

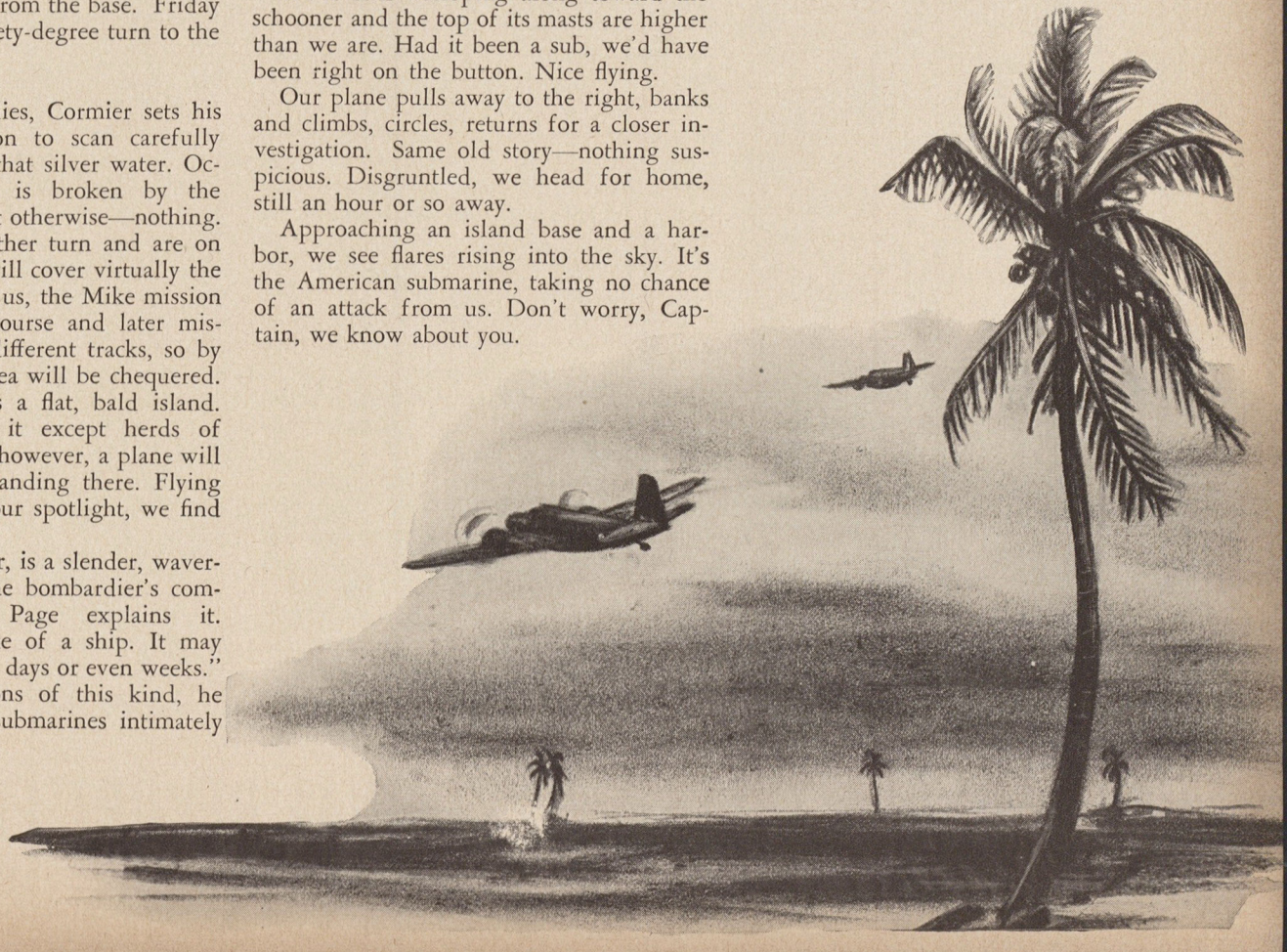
Back in Operations, Lieutenant Havens questions us about the flight and makes notes of every detail. The crew answers with the glib cheeriness of men who know they've done a job well.

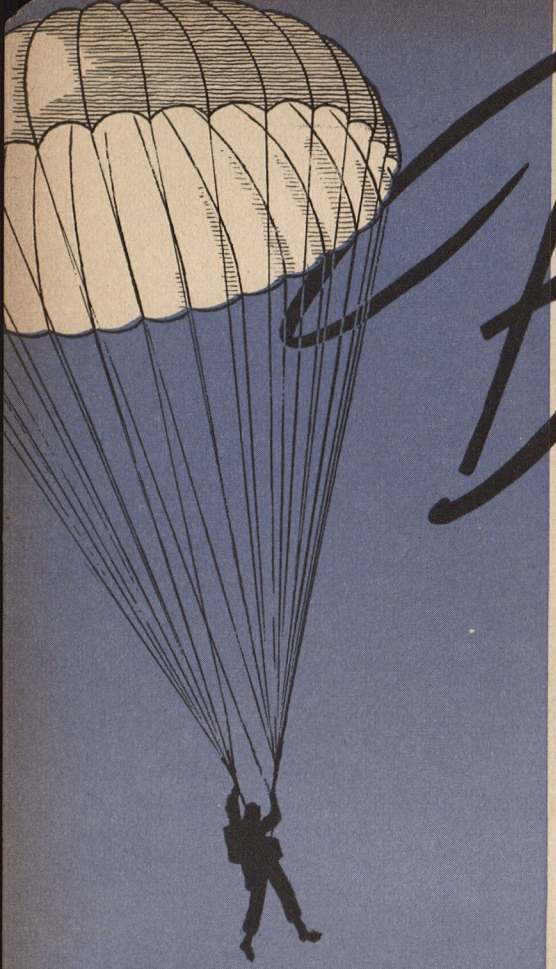
"You couldn't have swept the area better with a broom."

Shaw, the copilot, grins and says, "We sorta picked your teeth with the masts of that schooner, didn't we?"

Soon the mission is completely over. We have done what we could for the convoy, perhaps kept a couple of subs down, at least. Tomorrow the PBYs will take over.

We can't go to bed yet, naturally. Everyone has to have a coke in the club and talk a while. But it breaks up around midnight. Tomorrow is another day. ☆





Bail-Out OFF AUSTRALIA

There are lessons for every airman in this fighter pilot's story of survival

THIS is the story of Lieutenant Clarence E. Sanford, pilot of a fighter group operating with an advanced echelon off the northern tip of Australia.

On the fourteenth of March, 1942, Lieutenant Sanford, on an interception mission with three other American P-40s, encountered twelve Zeros and ten Jap bombers. Six Zeros were downed in the melee. Sanford, who accounted for two, chose to chase one of the bombers.

His P-40 was pretty badly shot up. The only instruments he had left were his airspeed, altimeter and compass; the canopy was gone, and Sanford himself had caught a grazing foot wound. The remaining Zeros caught him at 15,000 feet and mauled him further. He got away from them through a 1,500 foot overcast, but when he pulled back up to 9,000 feet, his wheels were down, the hydraulic system shot up, and the right wing heavy. Altogether, his P-40 was in a very decrepit state. He headed south and west, and just as his fuel gave out, he saw land.

Sanford bailed out over water at about five in the afternoon, three miles from shore, carrying only his jungle pack. He got out of his chute fifteen feet before he hit the water. To his dismay, his Mae West failed him. He got rid of it, and discarded his shirt, shoes, and sox. The jungle kit got waterlogged quickly as he swam. He discarded it as useless, salvaging only the machete. But the machete impeded his swimming. It began to weigh a ton and to assume the proportions of a fire-axe. He tried holding it between his teeth, but it cut his mouth. Finally, in desperation, he let it go, and struck out in earnest for the distant land. Luckily, the offshore tide was slack and, with the last strength remaining in him, he stumbled up on the beach and promptly fainted.

Sanford came to before dark. The prospect was bleak and terrifying. He found himself on a sandy, barren island he judged to be about five miles long and two miles wide. Frantically taking stock of the situation, he found himself appallingly defenseless. Inventory: one religious medallion, one ring, one pair of shorts and a shocked Sanford inside them. Exhaustion mercifully blotted out the prospect in sleep on the beach.

HE awoke in a blazing sun. He was hungry and thirsty. He hunted for food. He caught sight of a "dingo" (native dog) but couldn't get near it. Finally, he found some shrub roots with nodules on them. They were soft to the bite, proved edible. There were some leaves, too, which he nibbled. He found he could get water by scraping the sand some hundred yards from the shore. The water seeped up. It was brackish, but it was free from sea salt. All this time the sun blazed. Sanford estimated the temperature at well over 125°F. There was no shelter, no shade. He began to burn painfully. The symptoms of sunstroke came on. Late that afternoon, in a mental bout with fantastic colored images, he lost consciousness.

This time, he was awakened by a sensation of the presence of life near him. Three Caledon Bay headmen stood their distance, eyeing him intently. One held a spear in readiness.

"Are you Jap?" came the query from

A PERSONAL EXPERIENCE COMBAT REPORT FROM THE

the spearman, using three of his twelve words of Pidgin English. Sanford shook his head violently in the negative.

"English?"

Sanford replied: "American."

They didn't seem to understand. Sanford pointed vaguely to suggest that he came from far away. He wasn't doing too well. Suddenly, the spearman pointed to the medallion and asked: "Jesus?" Sanford nodded "Yes." There was a prolonged pow-wow among the three natives. They came closer. Sanford, lying there, scratched a rough outline of Australia in the sand and asked them in sign language to point out his position. They seemed to understand and pointed it out.

Finally they seemed to reach an agreement. They carried the helpless Sanford away from the beach, dug a hole in the sand, laid him in it, and covered him with leaves and branches. Then they brought him turtle eggs to suck, and fish which they speared ingeniously in the surf and cooked in a fire started in boy-scout wood-spindle fashion. Sanford didn't eat much. One of the eggs was bad. Finally, the natives covered him with sand as dusk fell. He couldn't sleep. He was scared. He had feverish visions of a cannibal feast. He could see the waiting pot.

In the morning, he felt stronger and started to hike with the natives to the end of the island. The hot rocks burned his bare feet. His sunburn broke into blisters. The three natives talked about a "missionary" and pointed toward the mainland. They came to a dugout canoe drawn up on the beach. There was another long pow-wow which left Sanford apprehensive. It turned out the Caledons were waiting for the tide. Finally, late in the afternoon, they set out in the canoe across five miles of water toward the mainland. They sat close to the water and schools of sharks bumped the frail craft. Sanford didn't like it at all.

They got to the mainland all right. They left the canoe on the beach and struck out along the shore on foot. Sanford got woozy again and rested. The natives brought him water. His sunburn was torturing. Open wounds began to appear. He struggled into the sea-water at intervals for temporary relief. The Caledons didn't seem to understand sunburn.

Sanford doesn't remember, but he thinks they spent the night on the beach. In the morning, they resumed the trek again. His feet were terribly swollen. The skin cracked open. Wantjuik, the spearman, removed his own loinknot, tore it into strips, and with some green bark made mocassins for Sanford's feet. That helped. They hiked on. They ate more turtle eggs and raw fish. They drank brackish water seeping up from the scraped sand.

Sanford was still apprehensive, felt he was being spared only to become cannibal bait. He armed himself with a jagged piece of coral. Wantjuik sensed his fear. He took the coral out of Sanford's hand, had another pow-wow with his buddies, and suddenly all three broke into the hymnal strains of "Don't pass me by" sung in native Kopapingo. Sanford couldn't appreciate the humor of the situation. But he began to feel reassured. Physically, he was deteriorating rapidly. His sunburn was excruciatingly painful; his tongue had begun to swell; his liver had gone bad, and the symptoms of yellow jaundice were setting in; he was feverish. When he cried out in pain the Caledons laughed aloud. They couldn't understand it.

The trek to the mission covered 50 terrible miles, alternately along the beach and back into the bush when steep cliffs intervened. Sanford gave out completely some five miles outside the mission station. Wantjuik picked him up and carried him in. One of the Caledons went ahead bringing the news. The missionary came out to meet Sanford, bringing bully beef and water. The pilot was put to bed, suffering from jaundice, fever, sunburn, and shock.

The experience related in this article is one of the many gathered by the Arctic, Desert, and Tropic Information Center at Eglin Field, Florida. It is the function of this organization to prepare and disseminate information on all aspects of Air Force operations (maintenance, health, shelter, clothing, etc.) in non-temperate zones. Information on forced landing procedures and survival is a major interest of the Center. All Air Force units are invited to request such information from the Arctic, Desert, and Tropic Information Center.

The missionary called Darwin on his pedal wireless, and did what he could for Sanford. The three natives were rewarded with tobacco and a bolt of cloth. They felt kinglike and were local heroes. Later, Sanford learned that they had seen him bail out and regarded his descent as a major miracle. They frequented Sanford's island for one or two days each six or seven months on hunting expeditions, and their presence was Sanford's great luck. They had been educated at the mission, knew a little about Australian geography, knew about the war and hated the Japs (who annoyed Caledon women on their local pearl-fishing expeditions).

After a week and a half, Sanford was transferred by mission boat 350 miles up the coast to Millingimbi, the main mission station in the region. He stayed there for five days and grew steadily worse. The missionary wirelessed to Darwin, describing his critical condition. A Hudson bomber flew out and brought Sanford back to Darwin—just in time to catch a strong Jap bombing raid. It proved almost the last straw when a bomb fell just a few yards from where Sanford lay. Finally, however, he was transported to Brisbane where he spent eleven weeks in various hospitals. Several months later, and apparently none the worse for wear, Sanford came home to the States.

His story holds a significant moral for every combat crewman. Sanford now states that if he knew when these events transpired what he knows today, much of his suffering could have been avoided. His native resourcefulness and his great good luck were the sole factors in his survival.

In examining Sanford's experience, these vital facts stand out:

1. Before you set out on a given mission, check your emergency equipment. If Sanford had checked his CO_2 bottles, his Mae West wouldn't have failed him. Also, if he had considered the possibility of bailing out over water, he would have carried a flotation-type emergency kit. If Sanford had carried a map of the region in his plane and had oriented himself during the flight, he would have had an idea of his position—an important factor in survival.

2. Stay calm when you are face-to-face with a forced landing or bail-out emergency. Weigh the factors. Don't get frantic. If you know what you're doing, you can survive even under the most discouraging circumstances.

3. Knowledge of the terrain and conditions under which you are operating is all-important. It prevents hysteria and panic. It's insurance for survival. Sanford would have been helped measurably if he had known more about the natives and their language; if he had possessed a practical working knowledge of the edible plant and animal life of the region, and if he had known how to obtain and use them. He learned the facts when he watched the Caledons. Sanford had no grasp of the terrible effect of the sun on the exposed body. He could see no way of escaping the sun once his clothing was gone. There was no shade anywhere. Yet there was a way—the natives showed him how to dig himself into the sand and to cover himself with brush. Today, Sanford declares that if he had possessed this knowledge, he would have had the utmost confidence in his ability to survive for months if necessary on his desolate island. ☆

ARCTIC, DESERT AND TROPIC INFORMATION CENTER

Flying IN THE CELLAR

By Lieut. Lawrence P. Bachmann

DIRECTORATE OF TRAINING AIDS
SCHOOL OF APPLIED TACTICS, ORLANDO, FLORIDA

THE other day seven of us were up to 38,000 feet for three hours.

We didn't go anywhere and didn't see anything. We didn't have to wear winter flying suits and took no parachutes along. We were on a flight in a portable decompression chamber, or, as someone described it, "We went cellar flying."

We were at 38,000 feet, all right. We were up there just as surely as any crew flying that high ever was there. If you don't believe it, try cellar flying. When you get to 38,000 feet take off your oxygen mask. Chances are you'll remain conscious just fifteen seconds.

Flying in the basement is not being done to amuse or keep busy the scientists and research men. There is a definite tactical reason why every man on flying status must be tested for his ability to take high altitudes.

Everyone knows the advantages of an airplane with high ceiling. We know how high our planes can go. We have tested them. But we don't know how high the men who fly the planes can go. And that is what we are finding out.

It would not only be stupid, but criminal to send a man to 38,000 feet without knowing whether he could stand such a height. We can provide him with the best oxygen equipment available and everything else. But that is not enough. The final answer lies in the man himself, in his body—can he take high altitude?

THERE are several large decompression chambers at centrally located places, but valuable training time would be lost if men had to travel to and from these points.

Portable decompression chambers were developed several years ago. At this moment trucks pulling trailers which resemble a cross between a small gasoline tank and a cement mixer are rolling up to our airfields all over the world to test flying personnel for high altitude work.

Let's do some basement flying. It is dark outside when we report to the officer in charge of the chamber. We fill out cards, leaving blank the space provided for symptoms until the end of the flight. Then we are carefully fitted with oxygen masks.

"Just cover the end of the hose connection with your hand," advises the officer. "Breathe in. If the mask has no leaks, it will collapse around the sides of your face."

The outside door of the chamber swings open heavily and silently, like the entrance to a bank vault. Seven men come out. Their oxygen masks are taken from them by other members of the crew. The masks will be sterilized for the next group.

"All right. You're up now," says the officer. "Lieutenant Smith is going with you. He is your flight officer."

Lieutenant Smith grins and leads the way. He's built like a football coach's dream of an All-American guard.

Starting up the steps, we have to shout loudly through the mask to make him hear.

"No, we don't stop running the cham-

A mission may depend on your ability to take high altitude. Here's how that ability is tested.

ber," the lieutenant replies to a question. "It goes twenty-four hours a day except when we're traveling to the next field."

We enter a small anteroom or chamber large enough for two people. Then through another open door and into the large working chamber. It is about ten feet long, seven feet wide, and six feet, two inches high. Two benches run along the length, facing each other. Above the benches, attached to the wall, are the oxygen lines with outlets and regulators.

"Take any seat," says Lieutenant Smith. "Three on each side. Hook the hose connection into an outlet and you're all set."

THE flight officer sits perpendicular to the two long benches, facing the door. Now he puts on his mask and tests the microphone. He is the only one equipped to talk to the outside. Conversation is carried on through a loud-speaker system.

There is a heavy thud and a metallic clang. The door is shut. From the distance the sounds are repeated. The other door between the lock and the outside is closed.

"Are you all ready, sir?" The voice is metallic and hollow through the loud-speaker.

The flight officer looks at the six of us. We nod in turn. Nothing can be heard but the slight suction of the regulator each time we inhale.

"Take her up!"

"Three thousand feet, sir—6,000 feet—9,000 feet—." The voice drones every minute.

We sit on the benches facing each other, saying nothing.

"Thirty-eight thousand feet, sir. We're leveling off. Everything okay?"

Again Lieutenant Smith looks questioningly at the six of us.

"Everything's all right. Keep us at 38,000 feet. We'll be here three hours. You might as well make yourselves comfortable."

This last is for us. It's getting warm. I take off my shirt and open a magazine and begin to read. It's a pretty good murder mystery. Imagine reading a murder mystery at 38,000 feet, wearing an undershirt!

"That second man on your right, sir!"

My head snaps up. The voice over the loud speaker is urgent.

"Are you all right?"

The tall man on my right with hair the color of straw points to his knee. Quickly a pad and pencil are passed to him. He writes. I watch the marks on the page turn into words.

"My knee is beginning to hurt. I'll be all right," it reads.

It is passed on to the flight officer.

"Better be sure," he says. "You've got bends. Sometimes the pain increases very quickly."

The man shrugs. His nose and mouth are covered but there is no reason for him to speak. His blue eyes are expressive above the gray of the oxygen mask.

"Don't take any chances," the flight officer says. "It's nothing against you if you develop bends at this altitude. We'll take you down. Just be thankful you learned you were susceptible to bends here, in a decompression chamber, instead of at 38,000 feet when you were flying a mission and altitude was your protection from the enemy."

The pages of my magazine flutter unheeded. We are all watching. Beads of sweat are coming to the blonde man's forehead.

"Shall we take you down, sir, to 27,000 and get him out through the lock?"

The face of the chief operator peers through the heavy glass of the porthole like an anxious fish in an aquarium.

"Take us down!"

The blonde boy shakes his head but there is relief in his eyes.

"Keep swallowing," the flight officer says. "Swallowing will equalize the pressure in your inner ear as the altitude changes."

I swallow. The hiss of air entering the chamber gets dimmer. It feels as if someone is stuffing invisible cotton into my ears. I swallow again. The cotton is gone. The sounds are no longer muffled.

"Twenty-eight thousand feet, sir," says the voice from outside.

There is a hollow ring of steel against steel. The heavy door directly opposite the flight officer slowly swings open. The lock man comes in. A long tube connects his oxygen mask with the regulator in the lock.

"Take the walk-around bottle," says the flight officer.

The small fat cylinder is passed to the man next to me. It is surprisingly light.

"There's enough oxygen in it for eight to ten minutes. Take a deep breath. Hold it!"

The lock man separates the hose of the mask from the regulator and connects it to the walk-around bottle. It is done quicker than it takes to tell about it.

"Breathe now," says the flight officer. "You'll feel fine as soon as you get down to ground level. Bends rarely last long below 25,000 feet."

The two men walk into the lock, the small anteroom that separates the working chamber from the outside. The door closes.

"Shall I take you up, sir?"

The chief operator never takes his face out of the porthole. On the other side we see another face. It is the observer. He, too, continually has us under surveillance.

"Take us up to 38,000 feet again."

Our ears adjust themselves easier going up than coming down. I return to my reading. So far in the book, only one person has been murdered and the blurb says that there are three more to go. Dimly we can hear the door open that connects the lock with the outside. The blonde man with bends and the lock man are down.

"Two and a half hours to go, sir. Everythink okay?"

The flight officer is the only one not reading. Again he looks questioningly at us.

"Everything's okay."

AND there we stay for three hours. And there others of you will stay for three hours—if you don't develop areoembolism or bends and have to be taken down in the lock.

There is nothing dangerous or difficult about it. It is a fine place to catch up on reading, for it is completely comfortable. But it is more than just a strange method the C. O. has thought up to keep you busy for three hours. On the results of this test run at high altitude may well depend your

Portable decompression chambers mounted on trailers can be taken right to the front-line airfields to test flying personnel for high altitude operations.

What's your AIR FORCE I.Q.?

Get your sights on these questions and fire, scoring 5 for each correct answer. Ninety points is a direct hit; 80 a near miss; 70 is certain damage and 60 is close. Incidentally, send in your suggestions for quiz questions, with the correct answers. We'll give full credit for all contributions. Answers to this month's teaser on Page 33.

1. Tulagi is located in

a. The northern part of Japan
b. The Solomons
c. Southern Russia
d. Off the tip of Alaska

2. There are four major classifications of aerial bombs. Three are listed here. Add the fourth.

a. Demolition
b. Incendiary
c. Chemical
d. ?

3. At high altitudes, where the temperature is low, the speed of sound

a. Increases
b. Decreases
c. Remains the same
d. Disappears

4. The flight recording instrument called the "crab" is used on a

a. Helicopter
b. Glider
c. Link Trainer
d. AT-6

5. How many AAF planes now in production have four-bladed propellers?

a. 3 b. 1 c. 2 d. 4

6. In Air Forces slang, a cadet who is told to "grab a brace"

a. Lies down on his bunk
b. Stands at parade rest
c. Grabs a pair of suspenders
d. Pops to an exaggerated position of attention

7. The German Messerschmitt 109 F is a

a. Twin engine single-place fighter
b. Twin engine light bomber
c. Single engine, two-place fighter
d. Single engine, one-place fighter

8. When the bombardier, talking to the pilot over the intercom, says "Roger" he means

a. Message received—will reply
b. Okay or message received
c. Bombs away
d. Scram or let's get home

9. How many AAF fighter planes now in production have tricycle landing gears?

a. 1 c. 3
b. 4 d. 2

10. Westover Field is located nearest to

a. El Paso, Texas
b. Chicopee Falls, Mass.
c. Salt Lake City, Utah
d. Rome, New York

11. When greeting a lady, it is preferable for an officer to

a. Tip his cap
b. Bow from the waist
c. Give a soft salute
d. Nod a greeting

12. What are the doldrums?

a. Drums from which fuel is doled out
b. A belt of calm moist air centered near the equator
c. Low cloud hazes over central Europe
d. A belt of cold dry Arctic air

13. When an officer enters the mess hall, an enlisted man should

a. Rise
b. Continue to eat unless addressed
c. Salute
d. Say hello

14. How many General Orders are there for guard duty?

a. 9 b. 14 c. 12 d. 11

15. Emergency life rafts are inflated with

a. Carbon monoxide
b. Carbon dioxide
c. Sulphur Trioxide
d. Carbon Tetrachloride

16. The YAK-1 is

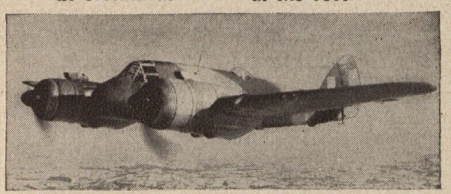
a. An Eskimo canoe used by our Alaskan forces
b. A pre-historic animal
c. A Russian fighter plane
d. A Jap dive bomber

17. The Chief of the Air Staff is

a. Maj. Gen. G. E. Stratemeyer
b. Maj. Gen. W. R. Weaver
c. Maj. Gen. B. K. Yount
d. Maj. Gen. O. P. Echols

18. Identify the plane below:

a. Mosquito bomber
b. Stormavik
c. Bristol Beaufighter
d. Me-109F



life, the lives of other crew members and the successful completion of your mission.

How are bends caused? Something happened to me on that flight that illustrates how bends or aeroembolism is caused.

I forgot to take my wrist watch off before entering the chamber. At 8,000 feet there was a tiny pop and then a tinkle. The crystal had blown off my watch. I have a waterproof, hence airtight, watch. After winding it that day, I screwed the stem down. It meant that the air inside the watch was at ground level atmospheric pressure. When we went up, the air outside was at a lesser pressure than the air inside the watch. As we went higher, the pressure outside became less, which meant that the air locked in the watch had a greater pressure and greater force. By the laws of physics, this air demanded that the pressure be equalized. It equalized—at the expense of my buying a new crystal. This, however, will not happen to an ordinary watch for they are not airtight.

In the human body, the gases or air adjust themselves to changes in pressure. Nitrogen is a gas which makes up about four-fifths of the atmosphere. At sea level it goes into the tissues. Since it is not used by the body, it stays there. When you go up high, the pressure of gases, including nitrogen, inside the body is greater than the outside pressure.

These gases force themselves out of the body tissues and form bubbles in much the same manner that bubbles rise to the surface when the top is removed from a bottle of pop. Sometimes these bubbles cannot get out. They become lodged in the body. It is this painful occurrence that is called aeroembolism or bends.

By some peculiar physiological quirk, some bodies can adjust themselves without any trouble to such a rapid change in altitude. Others cannot, and may develop marked symptoms as low as 26,000 feet. It is for this reason that this program is under way to find out which airmen can stand high altitudes and which cannot.

How can you avoid "bends"? As has been stated, some people have a marked intolerance for higher altitudes. Their systems do not permit the pressure to equalize in their bodies. This condition seems to be due to individual physiological differences, although some of it is obviously dependent upon age and weight.

There is little that can be done about the former except that it is worth noting that some men up to the age of thirty-five can take 38,000 feet for three hours if they are in good physical condition, while some of twenty-one cannot take 32,000 feet if they are ten to fifteen pounds overweight. The deduction is obvious.

You may not be able to take high altitude, but the chances are that you can take it if you keep yourself in good condition. It is *your* responsibility to keep yourself in that physical condition which will permit you to fulfil your missions at all times, for on you alone may some day depend the outcome of what may prove to be more than just a mission. And you cannot fail. ☆

OUR AIR DEFENSE NETWORK

By Brig. General Gordon P. Saville

DIRECTOR OF AIR DEFENSE

The vast operations behind our Aircraft Warning Service—what happens before our fighter planes take to the air and how they are guided to intercept the enemy.

OUR raid on Japan a year ago this month was successful—in fact could only have been attempted—because we knew the enemy's air raid warning system had loopholes through which our planes could and did reach their objectives.

France lost most of her planes on the ground because her warning service was inadequate.

In February of last year at Port Darwin, Australia, American fighters had no warning until Japanese planes appeared overhead; consequently severe damage was inflicted and eight of ten P-40s shot down.

Take away the Army Air Forces' Aircraft Warning Service in this country and in any of the combat zones in which it operates and we might well have another Pearl Harbor or Manila.

In the last twelve months we have developed an Aircraft Warning System operating with an efficiency permitting a performance something like this: Let any enemy plane approach either coast and the Army can have fighter planes in the air within a few minutes after the approaching aircraft have been reported.

To protect our vast coastlines from probable attack *without* a smoothly operating aircraft warning service would take more than all the planes and landing fields we're now using in all theaters of operation. And even then it would be almost impossible to guarantee any real measure of protection.

It has been estimated that one plane on "ground alert" through an adequate warning system is worth more than sixteen planes in the air on "search patrol." The other fifteen planes and their crews can be released to carry the offensive to the enemy in Europe, Africa, the Aleutians, the Southwest Pacific.

The words "forewarned is forearmed" never had greater significance than at this moment. In today's war seconds count. And an alarm system that is built on split-second timing means the complete dove-tailing of many organizations—the Air Forces and its fighter units, the Navy, the Signal Corps and its vital communications network, anti-aircraft artillery, the CAA and other civilian government agencies—and the cooperation of thousands of individuals, both civilian and military.

The Aircraft Warning Service is the spinal cord which activates these groups. None can function until the AWS tells them to.

But it's not only a *warning* system. It goes farther than that, for it is charged also with the vital task of *guiding* the fighter planes: it tells them where to go to effect an interception at our advantage, helps them with the fighting job when they get there, and leads them safely back to base. At the same time, the system is used to instruct personnel for actual combat training by reporting aircraft movements during "trial" interceptions.

The exact operation of this tightly woven network and many of the devices which make that operation successful are closely guarded secrets. But the system can be outlined in general terms. Let us assume that a flight of Japanese bombers is speeding toward our shores to deliver a paralyzing blow on a strategic target a hundred miles inland somewhere in the Pacific northwest.

WHEN it comes, this bombing party will be met by a reception line it hadn't counted on. There will be no Pearl Harbor. There cannot be, for this is what will happen:

First, the long arms of our radio locators will pick up this flight while it is still miles out at sea. These detectors, carefully located so that the radii of their "sweep" overlap, literally are the "ears" of the Air Forces. The "reflections" coming from them can be translated in terms of the altitude and speed of the approaching planes. Long before it reaches our shores, the Jap flight could be intercepted by fighter craft of our own forces in sufficient strength to smash it or send it running for cover. But remember, 150 miles out might be only thirty minutes by bomber.

So let us continue the assumption and pretend that some of these enemy planes blast their way through our fighters and continue to head inland—or let us pretend that the flight approached under cover of "radio silence" by means of aircraft carrier, or by submarine. And suppose, therefore, that the enemy flight is so close to shore that the interception is too late to keep the flight over the sea. Suppose it actually hits the coast and disperses. What then? The sky is a wonderful place in which to hide, and you can't stretch barrage balloons over 2,500 miles of Pacific coastline. Besides, only one plane with a well-placed bomb load could do the trick on our mythical target.

It is at this point that the "eyes" of the Air Forces have their inning, and the Ground Observer Corps swings into action. On all coasts, and for an undisclosed distance inland, thousands of observation posts dot the map. They are only a few miles apart and are so placed that their fields of vision overlap, making it virtually impossible for a plane to fly unreported.

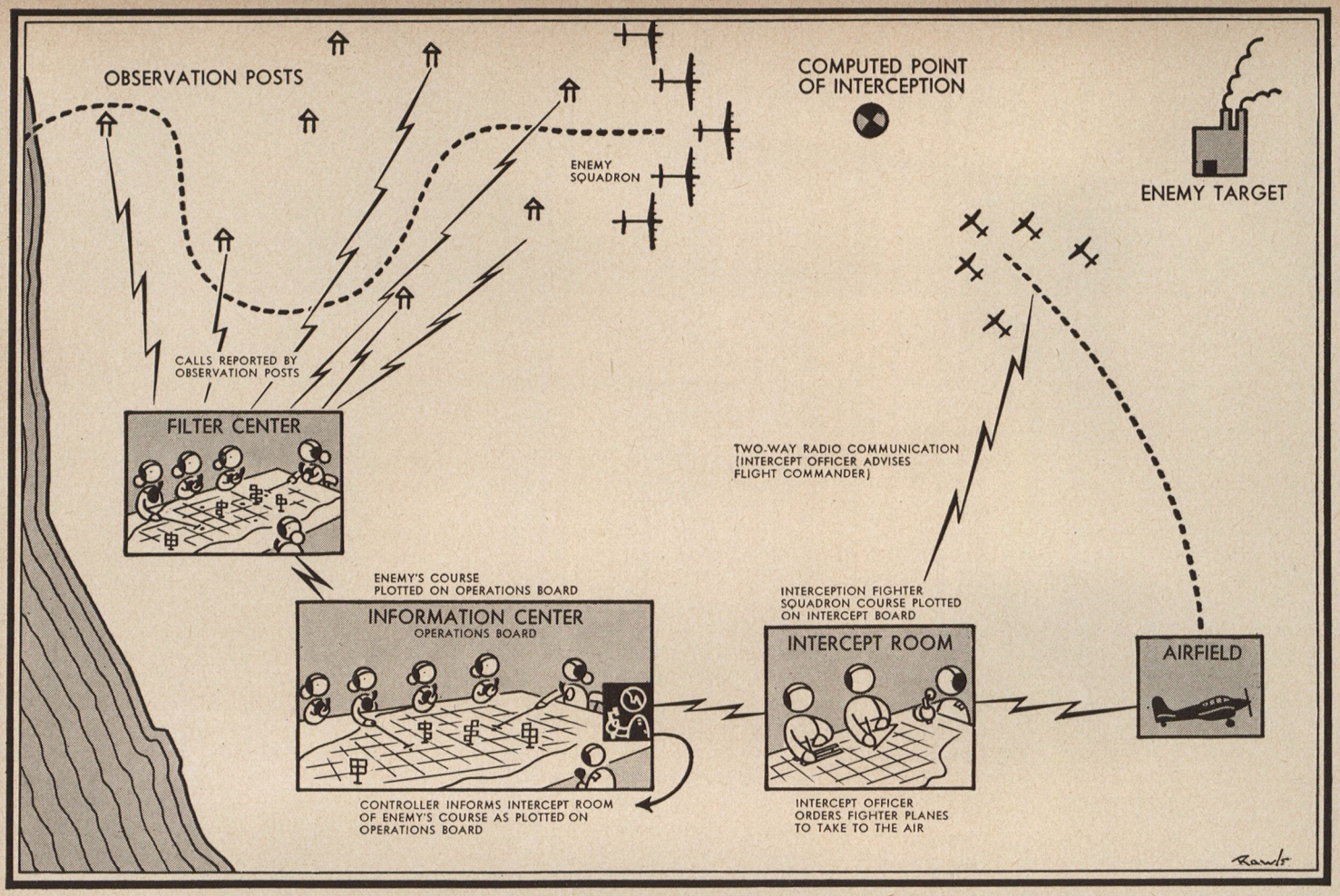
One and a half million civilian volunteer observers man the posts on a 24-hour basis and report by telephone—or by means of radio in isolated cases—any plane seen or heard at any time of day or night. Within seconds from the time their flash call is placed, the mythical flight in question has been either identified or marked unknown. If it's the latter, fighter squadrons have been notified to take the air.

That's our answer in a nutshell to any enemy plane that invades our shores.

Back of this apparently simple game of remote-control tag lies an intricate and complex organization representing months of careful planning and execution. A good aircraft warning system is made up of four components—*detection, reporting, evaluation,* and *dissemination.* So far we have dealt with only the first of these—the eyes and ears. We have assumed that an enemy flight invaded our shores and that we intercepted it. In between these two operations plenty of activity has been going on.

Somewhere between Seattle and Portland some of the planes of our mythical enemy flight pass over an observation post. To the two observers on the post, they are just planes at this point, for it's not the observer's job to decide whether they are friendly or unfriendly. As soon as one of the observers spots the planes, he lifts his post phone and says "Army Flash." The operator, having first checked the station from which the call is coming, gives the call precedence over all others and connects the observer to his nearest filter center. There the call is taken by one of several women "plotters," all of whom are volunteers working for the Air Forces.

The observer reports only non-technical facts: "Army flash..four..bi..high..seen ..5 TOM 89..NW..3..SE"—which means that he has seen four bi-motored



Details of how controlled interception guides our fighter planes.

planes flying high three miles northwest of his post headed southeast. In a matter of seconds, this call—and preceding calls from a string of observation posts reporting these planes—is plotted on the filter board.

Arrows placed flat on the board beside the "target-stand"—representing a definite flight—show the direction of the flight, which of course may change from moment to moment. At a regularly timed interval, the color of the arrows is changed, making it easy to compute the speed of the planes in question. The exact distance between the posts of course is known, also the exact minutes or seconds between ground observer calls. By clocking the target at half-minute intervals and allowing roughly two miles a minute for trainers, three miles a minute for bombers, and over four miles for fighters, you can determine the type of ships they are.

Now the "filtered" information is ready to go over leased "hot" telephone wires to the Army Information Center. "Tellers" report the movement of all targets on the filter board to the operations room in the Information Center. This room is the nerve center of the whole AWS. Into it comes the sifted and corrected information boiled down from several filter centers. Here, and here only, the decisions are made that will send up fighter aircraft against the enemy planes. It is here that the call goes out to antiaircraft units, to the FCC to silence the broadcasting stations, and to the Civil Air Raid Warning Control Centers. It is here that the two final steps of our program are completed: *evaluation* of the information reported, and *dissemination* of it.

We will look carefully at an operations board, for the principles employed here are the same as those in operation in an active air defense program in every combat zone where we have bases and planes in action—in Africa, in the Pacific and in the Aleutians, as well as in the continental United States. It is a system that will render unlikely a repetition of the tragedies of Clark Field, of Nichols Field, of Hickam.

THE operations board is like the filter board only larger, for it includes all the filter areas of an Air Defense Wing. Here other plotters—also volunteer workers—receive information, this time from the filter boards, and plot duplicate records of the flight of our enemy ships. But at this moment we still don't know whether they are friendly or hostile. Also in the operations room is the "seaward" board in a vertical position along the one wall, on which all flights approaching from the sea are plotted.

Key men in the defensive phase of combat operations sit along a gallery overlooking the boards. Their names are not known. Theirs is an anonymous behind-the-scenes job, but they may hold in their hands the fate of thousands. In this gallery, every minute of the day and night, are representatives of the Army, Navy and CAA. Since all airplane flights today are scheduled and the proposed route of each plane's flight is reported and approved before a flyer can take off, these men know ahead of time every friendly ship that is going to be in the air, at what time and where.

It was only about ninety seconds ago that the flight of enemy ships first seen over the observation posts was reported to the operations room and a target-stand representing it is now on the board. The raid clerk, also a civilian volunteer, spots this new flight, picks up her telephone, cuts into a conference circuit which automatically connects her with all three liaison men, and queries them in turn on the identity of the flight. Each man checks the approved flight records for the day. The Naval officer says they are not his planes. So does the CAA representative. The Army officer also disclaims the flight.

This is the moment. Things happen now. A red "X" goes up on top of the target, and now it's the Controller's turn. The show is his and he works rapidly. Until a plane is positively identified as friendly it is assumed to be hostile. The Controller acts for the Commanding Officer of the Wing and the responsibility is his to get the fighter squadrons into the air. He turns to the pursuit officer beside him. "Get 'em" he says simply.

Alongside the Controller are two boards —a weather board listing latest meterological conditions and a "status" board which

shows the availability, position and condition of all our fighter squadrons in that region. Out on field "Y", planes from the "Blue" squadron are warmed up, their pilots ready at a moment's notice to take to the air. The pursuit officer, who has all this information before him, notifies the Commanding Officer of that field: "Flight 2, Blue squadron.....climb 15,000.....fly vector one..eight..eight..scramble."

The Controller meanwhile has notified other key persons on the gallery: The anti-aircraft artillery officer keeps in constant touch over his own direct wires with the AA units, but he doesn't give them the word to shoot until the Controller says OK; those fighter planes must be out of the way first. Barrage balloons go up, searchlights pierce the blackness. The CAA representative has ordered all civilian craft grounded. Ground force officers are notified. The Civil Air Raid Warning officer orders a blackout. (Or if all this takes place in a combat zone, a similar warning goes out to all ground units and other installations.)

MEANWHILE, what is happening to our Blue squadron? The enemy flight has changed its course, according to the observers' report. So the Blue squadron will have to be notified. Once the planes are in the air, the intercept officer keeps in constant touch by very high frequency radio with his pursuit flight and can guide the planes to be the exact point of contact with the enemy where it will be to our advantage. The enemy's course is charted on the operations board and also on an intercept board for tactical purposes. The movements of the Blue squadron, at precisely the same moment, also are charted on the intercept board, around which officers consult the compass rose, measure distances and air speeds, make computations with lightning speed, and tell the flight commander up above exactly how many degrees to vary his course to effect an interception. When the flight commander tells the intercept officer that contact has been made, the latter is then satisfied—and not until then—that the Aircraft Warning Service has done its job.

One glance at the accompanying chart will illustrate the necessity of constant and accurate detection and reporting if a warning service is to be successful. Remove the eyes and ears of the Air Forces and the whole system collapses. The importance of the far-flung civilian Ground Observer Corps cannot be emphasized too strongly. Because of it, a great network of activity is set into motion long before our planes are ever notified to leave the ground. Because of it, pilots do not have to risk lives or planes unnecessarily.

Last summer, the Army Air Forces assumed complete control of the ground observer organizations and welcomed as a vital and official part of its personnel the 1,500,000 civilian volunteers who keep the posts going. The job they are doing is of such importance that if they were suddenly to be withdrawn soldiers would have to man the posts themselves. On one coast alone this would require two entire divisions.

The Corps fortunately is no respecter of personalities, the chief requisites for a good observer being patience, ability to stand some amount of hardship, on-the-job training, and an overwhelming desire to serve with and for the men in the Army Air Forces and their country. There can be no selfish motives connected with being a volunteer observer, for these people have taken upon themselves one of the most thankless jobs in the nation. They do not wear uniforms, nor tin hats, nor any other characteristic insignia in public, and they are specifically asked not to talk about their work. The duties of a ground observer are often inconvenient, sometimes physically uncomfortable, almost never glamorous.

Yet collectively they are writing one of the greatest and most exciting chapters in the history of the Air Forces. They are writing it from the top of a windswept mountain in Oregon, from a fog-shrouded hillside in San Mateo, from a rocky cliff in Maine, from a lonesome desert watch near Yuma, from a pine forest in North Carolina, from under scorching suns in Imperial Valley, from the top of a Manhattan skyscraper, from the village church steeple.

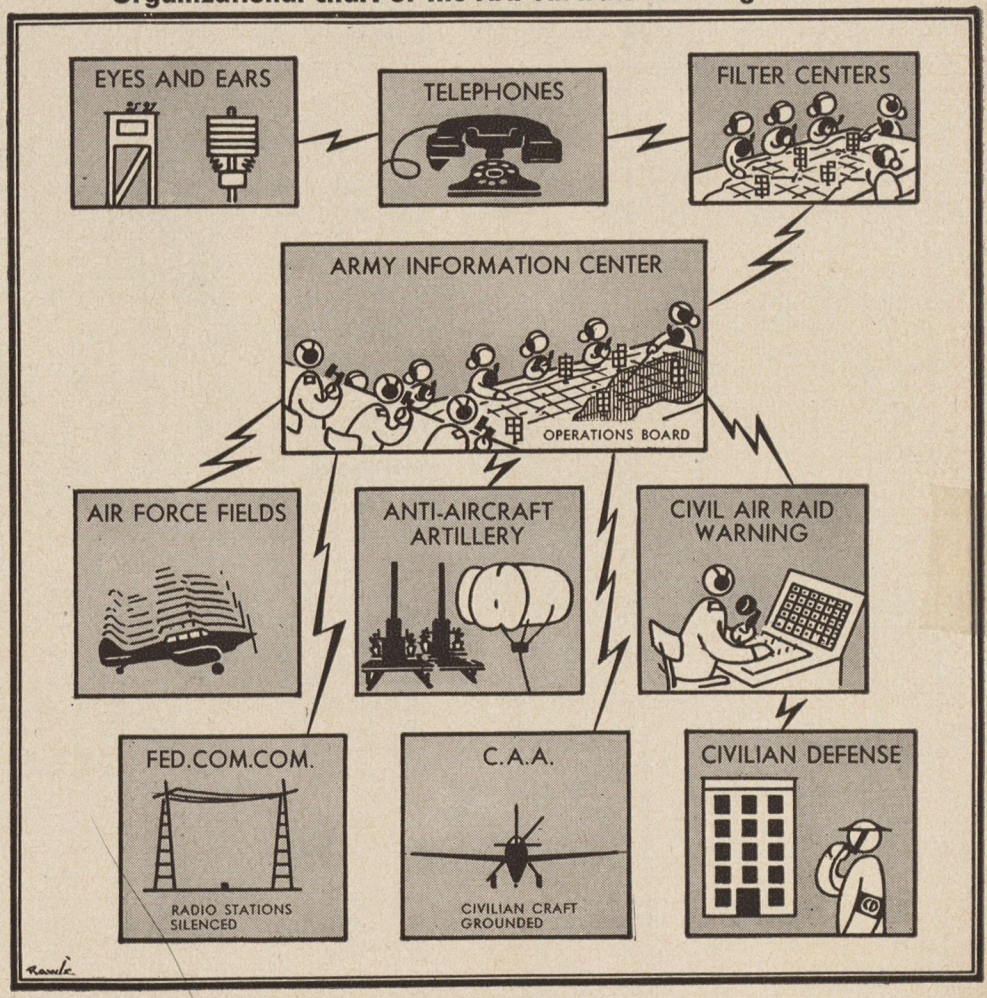
They may report 100 planes in one hour; they may report none in a whole year's time. They may report a submarine off-shore, or a lost plane circling in a blinding fog. They may report a forest fire, or an object being dropped by a parachute. And in a high moment unsurpassed for sheer drama, they may report, as indeed they did, a strange, small black plane dropping an incendiary bomb in the vast lonely wilds of an Oregon forest. Or maybe they'll report a flock of geese "Northeast, flying 'very high.'"

Stories from the First Fighter Command on the east coast, from the Third on the Gulf coast, from the Fourth on the west coast pour into this office praising the gallantry, the sacrifices, the enduring patience in the face of great odds, the amazing and almost incredible performances of the scattered members of this unique body.

Stories of mothers, fathers of sons in the service, stories of housewives, teachers, bricklayers, doctors, Broadway actresses, artists, mechanics, movie stars. Stories of Joe and Bill and Mary Ellen and Mrs. Brown and Mr. Stevens down the street.

Around the clock—day after day—night after night—in calm and storm—every day, war is a reality to the men and the women, to the civilian volunteers and the military personnel of the Aircraft Warning Service. The stakes are high. There can be no time out, no relaxation from this watch to meet the ever-present threat of attack by a desperate enemy. Whether it's on the "deck" of an operations room, the catwalk of a remote observation post, or the "ready" room of a fighter squadron, the deadly seriousness of the whole undertaking means but one thing: We are ready. ☆

Organizational chart of the AAF Aircraft Warning Service.



A monthly record of decorations awarded to personnel of the Army Air Forces.

DISTINGUISHED SERVICE CROSS

CAPTAIN John G. Evans. **LIEUTENANT** Joseph A. Beck. **TECHNICAL SERGEANT** Guy K. Dozier (Also Oak Leaf Cluster to Distinguished Service Cross and Oak Leaf Cluster to Silver Star).

DISTINGUISHED SERVICE MEDAL

BRIGADIER GENERALS: Asa N. Duncan*, Alfred J. Lyon*.

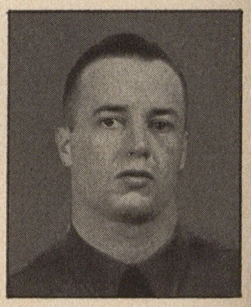
SILVER STAR

LIEUTENANT COLONELS: Herbert Morgan, Clinton Vincent. **MAJORS:** Paul F. Davis, Walter Y. Lucas (Also Distinguished Flying Cross). **CAPTAINS:** George A. Carter, Horace E. Crouch, Jack D. Dale, Herbert L. Egenes, F. C. Hallor, Sam R. Oglesby, Frank R. Royal (Also Oak Leaf Cluster to Silver Star), N. S. Saliba. **LIEUTENANTS:** William B. Adams, James A. Anderson, Charles O. Brown, Jr., Frank M. Burton, Clayton J. Campbell, Jackson B. Clayton, James R. Copeland, Walter B. Decker, Theodore P. Deffner, Ernest M. Duckworth, James I. Easter, Joseph W. Ferguson, Luther G. Fisher, Donald L. Geror, John M. Hill, Arthur J. Hobday, W. Humrichouse, Jean D. Jackson*, Grady H. Jones, Glade Jorgensen, John J. Keeter, Jr., Claude V. Leffingwell, Thornton H. Lewis, Robert E. Longstreth, Harold C. McAuliff, E. E. McRoberts, J. M. Moore, Jr., S. M. Nanney, Horace E. Perry, Lamar C. Peterson, R. L. Rhoades, John E. Roesch, F. R. Schmidt, Walter L. Shea, Emanuel Snitkin (Also Oak Leaf Cluster to Silver Star), Glenn W. Sorensen, D. S. Stauffer, F. E. Timlin, Peter L. Vlahakes, Eugene A. Wahl, Ralph K. Watts, Jeffery O. Wellborn, Howard B. West, Donald M. Wilder, Raymond H. Wilkins, Roger H. Williams, Bennett G. Wilson, John Zarlengo. **MASTER SERGEANTS:** Firman S. Adams (Also Purple Heart), Henry A. Hartman, Joe J. Mullenix. **TECHNICAL SERGEANTS:** Louis M. Blackwell, Marvin L. Breeding (Also Purple Heart), Thomas J. Chapman, Joseph E. Farmer (Also Purple Heart), Harold Fitzgerald, Leonard M. Fox, Ledford L. Hicks, Albert D. Johnson, Kenneth Lawton, Robert B. Martin, J. P. Pendleton, John A. Potters* (Also Purple Heart*), William Prince, D. E. Slayton, Lawton L. Tabor, A. C. Townsend, William G. Weiss, Roy J. Wilhite. **STAFF SERGEANTS:** Claudie F. Anglin, Henry R. Ballentine, Lee A. Benbrooks, Nicholas T. Brozack, John W. Bruce, Morris A. Cannon, Jack W. Coleman*, John A. Cook, Irving Cutler, Robert J. Dunn, Jr., Albert S. Fisher, John C. Haddow, Robert W. Halliday, Dudley D. Handord, Jr., James E. Houchins*, Grover L. Knox, Felix H. Larronds, J. H. Londgren, C. R. Middaugh, John Nappi, W. J. Pananes, W. E. Portzline, George Scherba, Howard A. Tanner, Roy R. Taylor, Leo Wheatley, Douglas H. Williams. **SERGEANTS:** Harley S. Baird, Sheldon D. Beaton, E. J. Bornhiemer, John Brewer, Joseph J. Brust, William L. Burt, Bernard Carroll, Philip H. Childs, Norman L. Davignon, Ray L. Draper, Jack O. Ehrke, H. F. Elsasser, H. C. Fishencord, Frank Frucci, Joseph A. Gauthier, John P. Gaydos, Robert J. Haessly, Alvin L. Hartman (Also Purple Heart) Eric B. Ives, Wayne E. Johnson, John E. Kaminska, Lewis H. Keightley*, Wilmer L. Kidd, James M. Kokales, Donald J. Kundinger, Allan W. Larocque, John H. Laurie, Paul R. Lennon, Irving W. Lnenicka, W. E. Lyndley, Dallis W. McGill, Donald S. Mackay, Robert C. Mongrain, F. L. Newland, R. H. Newman (Also Purple Heart), Robert K. Palmer, Harold W. Peel, Art P. Phillips, F. W. Plunkett, Meddie N. Poirier, Stanley Poplaski, William E. Rembt, M. B. Russell, George Ryan, Jr., C. E. Salmon, Jr., Matt Schu, D. H. Simpson, Earl W. Snyder*, Raymond Sousa, Albert St. Jean, G. C. Stevens, Robert B. Sylvester, John F. Szymonik, J. H. Thompson, Raymond E. Transon, D. R. Vance, James R. Weed, Edward F. Weingard. **CORPORALS:** Willett T. Allen, Donald C. Bargdill,

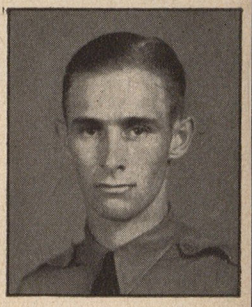
* Posthumous.

Sgt. Roy R. Taylor

Capt. A. H. Anders



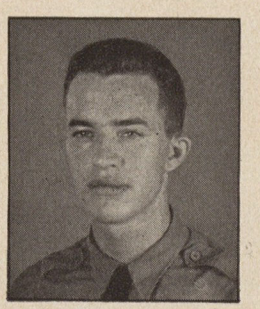
Major C. E. Griffith



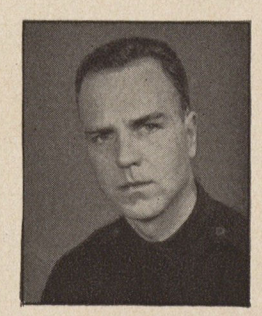
Lieut. Ralph K. Watts

ROLL OF HONOR

Maj. Gen. F. Bradley

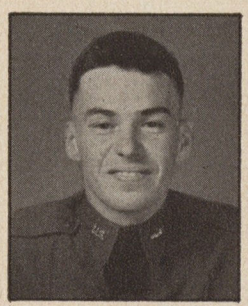


Lieut. C. O. Brown

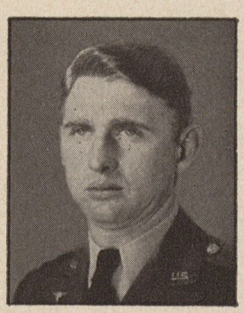


Capt. Albert S. Aiken

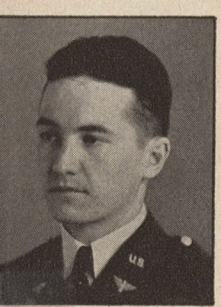
Capt. Arthur T. Rice



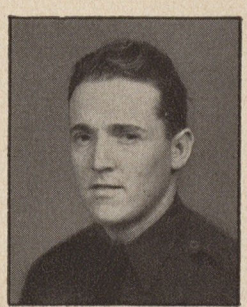
Lieut. D. C. Hawley



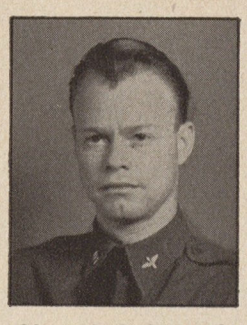
Major John K. Carr



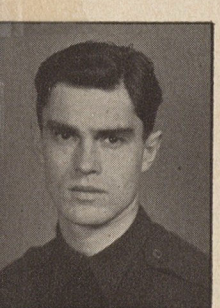
Capt. G. Cherymisin



Capt. Fred Eaton, Jr.



Lieut. G. A. Simeral



Lieut. F. E. Timlin

Lieut. John Zarlengo

Corp. Frank L. Melo

William C. Benn, Russell F. Boudria, John B. Boyle, Jr., Wayman E. Curry, George Cuzzone, James V. Dixon, Ralph C. Fritz*, Robert L. Fuller, James L. Gamble, John Gregal, Lowell K. Hammond, Philip E. Holmgren, Donald Jauhlainen, S. J. Jones, Robert J. Knapp, Melvin Lomax, R. E. McClure, Robert L. Moore, Herbert E. Mutz, J. J. O'Brien, R. F. Penzenik, Donald Perry, E. M. Schaeffer, Jr., V. A. Stewart, Maurice A. Thomas, J. M. Thompson, Jr., Herbert W. Triplett, Richard M. Wallace, Therman L. Wolfe. **PRIVATES FIRST CLASS:** Floyd Barbour, W. W. Merithew, Frank Parisi, Marx E. Roberts, W. E. Saboid, William A. Takala, E. VanEvery, H. M. Wheatley, Jr. **PRIVATES:** Joseph A. Barker, Joseph N. Budde, Kenneth D. Dake, Arnold E. Klimpel, Boyd H. Parker.

OAK LEAF CLUSTER

To Silver Star

CAPTAINS: Frederic C. Eaton, Jr., Bruce H. Bennett. **LIEUTENANTS:** Donald J. Green, Ernest L. Reid, Coleman Stripling, Paul I. Williams. **MASTER SERGEANT** Ralph J. Stiles. **TECHNICAL SERGEANT** Charles C. Schierholz. **STAFF SERGEANT** William V. Koon. **CORPORAL** James C. Underwood.

PURPLE HEART

MAJORS: Frank P. Bostrom, Ivan C. DuBois, W. A. Fairfield. **CAPTAINS:** A. L. Fangman, James G. Kandaras (Also Air Medal), R. A. Redburn, Martin R. Walsh, Thomas K. Winburn, William G. Workman. **LIEUTENANTS:** Donald E. Andersen, Edward S. Ashley, George E. Boyd, John G. Brennan, Albert M. Buck, Howard F. Cooper, Gerald T. Dix, Roy W. Evans, James A. Hilton (Also Air Medal), Arthur E. Hoffman, Jack P. Hopkins, Dave H. Hoyer, Earl R. Kingsley, John C. Lynch, Lyn Parker, Jr., Theodore I. Pascoe, James H. Reilly, Frederick C. Roberts, J. F. Segrest, Jr., F. D. Stanton, Harold M. Stearns, Robert L. Stimson, Meech Tasquah, Hugh J. Toland, William R. Walker, Jr., T. G. Wuerple*. **MASTER SERGEANTS:** Francis J. Donahue, Melvin L. Hall, L. B. Pouncey, George B. Sparks. **TECHNICAL SERGEANTS:** Elmer Anderson, George H. Bengal, Norman L. Cates, Homer E. Ferris*, Melvin F. Hooper, Samuel Langer, Melvin E. Owens, Aden L. Simons, David Suppes, Jr., William B. Wherry. **STAFF SERGEANTS:** Robert H. Baldwin, Sam K. Bourne, Tony Bruce, Charles B. Cameron, Eilert H. Cremer, W. R. Crutchfield, Salem M. Drake, George T. Dwyre, James S. Everett*, Paul B. Free*, K. W. Gatewood, John J. Gogoj, Benjamin Gordon, James E. Guthrie, Theodore V. Hobbie, Edward J. Kozloski, John W. Lynch, John J. Meehan, William W. Neal, Lincoln T. O'Connel, Forest A. Oltman, John A. Price*, P. J. Scheidt, L. B. Velarde. **SERGEANTS:** John Banco, Hurian H. Beauman*, Roy G. Brewer, Robert A. Carey, Raymond J. Collins, L. H. Cooper, *(Continued on Page 38)*

With the "tri-metrogon" camera, involving three ingeniously synchronized mechanisms, a single plane can photograph 8,000 square miles of terrain per hour.

Camera Scouts

-INTRODUCING OUR PHOTOGRAPHY DIRECTORATE

By Captain Milton R. Krims

DIRECTORATE OF PHOTOGRAPHY

How the Air Forces bring information back alive — on celluloid — for fighting a war.

IT IS said that an army moves on its belly. And somehow it is taken for granted this army knows exactly where to go—like a hungry boy following the scent of hot doughnuts. But there are no happy scents to follow in war, no succulent sign posts; the way is too often difficult and obscure, with no one knowing exactly where it leads. If an army would go in the right direction it must have clear, sharp, knowing eyes.

We are familiar with the heroic and almost legendary figure who rides or runs far ahead of armies, sprawls on his stomach to peer furtively from behind a tree—often with one hand shading his eyes from the blinding sun—and then dashes wildly back to headquarters to make his report.

Times have changed. Scouting is no longer as simple as that. It is accomplished by airplanes and skilled pilots, by maps and charts and cameras and by technicians with the minds of scientists and the dexterity of supercraftsmen. And all because the modern scout not only sees but makes a film record of what he sees.

The Directorate of Photography, Maps and Charts actually came into being in the spring of 1942. But the First Photographic Squadron of the Army Air Forces and its future was still ahead. Its first job was nothing more or less than to chart the entire Western Hemisphere from the air.

By the old method, aerial pictures were taken with the camera pointed vertically or obliquely towards the earth. These oblique negatives were later processed by a large and complicated machine called a restitutional printer. To do the hemisphere job this way would have required more film than existed in the world, not to mention men, cameras and planes.

Minton W. Kaye was in charge of the First Photographic Squadron. He was a Major then, recently promoted and fresh from an assignment in Hawaii. But he knew photography and all those who had to do with it. He knew he must find some new method which would be economical in time, men and equipment. He also knew that the Alaskan Branch of the Geological Survey had perfected an oblique method of plotting; that is, a method by which topographical information could by mechanical means be taken off a photograph which was not pointed directly at the earth. The survey had worked out this method in Alaska because it had no air pictures and therefore no alternative. Colonel Bagley, now retired, had developed the Alaskan method. Major Kaye gathered in another Alaskan specialist, Gerald Fitzgerald, and, with the help of the First Mapping Group and others, finally emerged with the system of "tri-metrogon" charting which solved the problem.

"Tri-metrogon" simply means "wide angle, horizon to horizon". With a tri-metrogon camera you can cover eight times the area in a single flight that you could with the old style vertical photography setup.

The world in a can

The photograph from a tri-metrogon camera covers twice as many miles as you are thousands of feet high; that is, if you are at 20,000 feet, your picture covers a forty-mile area. One plane can photograph 8,000 square miles of terrain per hour. The plane travels 200 mph at 20,000 feet, and there are forty seconds between exposures.

After processing, the photographs are given to compilation units, who solve the problem of restitution by graphical means. This is a long and extremely complicated process and is done—actually—with mirrors. And not only mirrors, but pins, mechano sets, glass, string, lights and good eyes and steady hands.

The Air Forces got the charts it wanted, and also found itself with a new directorate on its rapidly growing hands—the Directorate of Photography, Maps and Charts. Minton W. Kaye naturally became its Director and in due time a full Colonel.

AND that's only the start of the story.

The growth of the Directorate of Photography, Maps and Charts has kept pace with the growth of the Army Air Forces. It has become a vast organization spread out all over the world. It has never stopped taking pictures, and, what is perhaps as important, it has never stopped looking for new ways to take them. The modern, fast moving mechanized army demands equally modern, fast action scouting. It wants information right now. Colonel Kaye and the Directorate organized to give it that information.

It would be over-simplification to say that the Directorate's work is divided into two parts—preparation and operation. Preparation in itself involves diverse and complex operation. It all grows from a simple sentence in a directive which reads: "Advises the Commanding General, Army Air Forces, his staff and the Directorates thereunder on matters pertaining to photographs, maps and charts."

Broken down into terms of hard work, it means that the Directorate studies and creates photographic and charting programs, priorities and requirements; researches the capabilities of photographic aviation and

possibilities of development; establishes tactical and technical photographic and photogrammetric doctrine.

To accomplish these varied missions, laboratories and schools and personnel and equipment are required. And the information thus gathered must be transmitted to the men who will make operational use of it. That means more laboratories and schools and personnel. Since the Directorate determines photographic policy, it must now establish facility, direct procurement and supply methods for equipment and personnel of operational units.

The personnel of the Photographic Reconnaissance Operational Training Unit of the Army Air Base at Colorado Springs numbered exactly zero less than a year ago. In fact, there just wasn't any such unit. Today some 5,000 to 6,000 men are in training and many squadrons have already been turned out for overseas duty.

Once there was only one type of camera for taking aerial pictures for mapping. Now there are three cameras ingeniously synchronized to work together, a slightly fantastic contraption that takes a quick look from horizon to horizon and pops a picture of what it sees. And that also is being improved. In this constant search for improvement nothing seems unreasonable. A map is no good unless there is some kind of control point or "fix" on the ground to identify its location. Naturally, the precise latitude and longitude of the "fix" must be determined to give aerial photographs something they can be "hung on to."

The method generally used to establish control points has been a triangulation network supplemented with traverse loops, but since it was too expensive in time, men and equipment, it was abandoned and consideration given to astronomical solutions.

THE beauty of astronomical fixes is that stations may be established separately, and are not dependent on other points (as is the case with the triangulation system). For this Colonel Kaye turned to the prismatic Astrolabe, an ingenious instrument of French origin.

The Astrolabe is nothing new, it was used by navigators as far back as Columbus' time. Then it was, in effect, simply a notched stick, which was held up toward the horizon. The lower notch was squared on the horizon, the upper on the North Star. If the North Star was below the notch, you were sailing too far south, if above, too far north.

The prismatic Astrolabe was somewhat more complex than a notched stick, and there were difficulties about it. In the first place there were practically none of them, and no more to be had. France had fallen. So an American instrument, the Equi-Angulator, was developed. It is much the same type of thing, but has higher power magnification and other refinements. It's a potent gadget—with four of them, for instance, an area as large as Brazil can be covered.

And, there was still more need for more speed. It is not possible, for instance, to take one observation at night. Astrolabe parties are flown in, camp made, the instrument set up, then a long night's watch has to be maintained, a great deal of computation done, then camp broken, and a flight made to the next station. A slow process when hundreds of fixes have to be made.

Lieutenant Oren Haglund says "so long" to the men he trained in the art of self defense as they depart for overseas duty as part of Captain Knox Manning's first motion picture unit. This is the first unit of its type to depart for a theater of operations.

So men went to work on a Zenith camera, an instrument which will point straight up to the stars to take Zenith photographs at the stations. This means that a picture may be taken at the precise moment some easily identified "fix" such as a network of roads is visible—an obvious advantage, for it will require no time at all to set the camera up and get the photograph. Thus a number of photographs may be taken in one night.

The Zenith photographs will be developed in the field to be sure they are valid, then shipped to Washington where astronomers will identify the stars and plot the exact latitude and longitude of the ground spot. So it goes, on and on, with men with wings and ribbons on their chests casually using scientific terminology profound enough to confuse even the enemy.

And finally out of all this preparation comes operation. The function of the scout is still the same. He gathers information to be used by higher authority for strategic and tactical purposes. So now the men go into the air, well trained technicians, knowing all there is to know about their equipment and the duties they must perform with it.

The Directorate gathers two kinds of information. One kind has to do with charting and wings. Here the scout takes wings, flies over both friendly and enemy terrain, observes and records the facts of war. Mapping photography is done for charting purposes. Reconnaissance photography is done for intelligence use. These photo squadrons fly the fastest planes, meet the same dangers as other squadrons. The only thing that sets them a little apart is that they have nothing to shoot with except cameras.

Then there is the Motion Picture Division. This is charged with telling the story of the Army Air Forces. The story of men and equipment. Its Combat Camera Units shoot filmic reports for the Commanding General, the staff, the several commands and for Public Relations releases to the public. The tactical and technical information thus gathered is used in the making of flying training films produced by its First Motion Picture Unit in California.

All in all, it's a big and varied job and, what is most interesting, its single overall objective is to provide information and provide it as quickly as humanly possible.

It's a big story. The rest will have to be told in subsequent issues. It must be told because there is one more factor that makes the Directorate rather unique: it feels it is in business to serve and it wants everyone to know how to put it to work. It has no secrets except from the enemy. ☆

PICTURE CREDITS

First Cover: Blackland Army Flying School, Waco, Texas. 6: U. S. Army Signal Corps. 14: British Ministry of Information. 22: First Motion Picture Unit, Culver City, Cal. 24-25: Gowen Field, Idaho. 26: Wright Field, Ohio. 31: McGraw-Hill. 34-35-36-37: AAF School of Applied Tactics, Orlando, Fla. Third and Fourth Covers: AIR FORCE Staff Photographer. All other photographs secured through official Army Air Forces sources.

Life Raft SOS

WHEN an airplane makes a crash landing at sea hereafter its crew will have a much better chance of being rescued promptly, without being forced to drift around for long periods minus food and water.

Aircraft equipped with life rafts, will carry as part of their standard equipment a portable hand generator radio set. This emergency device, complete with antenna and other accessories, will communicate a distress signal for considerable distances.

This radio set was developed in the Aircraft Radio Laboratory at Wright Field, with the Air Forces, Signal Corps and manufacturer cooperating in its production. Basically it is an improved and modified version of similar German and English equipment which has summoned help for many crews in the choppy waters of the English Channel.

Use of the emergency set, as taught at Gowen Field, Idaho, Operation Training Unit radio school, is simple, for the device is so designed that men with or without radio experience can operate it.

Suppose a crew is forced down at sea. At an altitude of 300 to 500 feet above the water, two buoyant bags of equipment are tossed out of the ship. An automatically-opening parachute carries them down. The bags, painted a vivid yellow so they can be easily discerned, contain a waterproof transmitter, a simple box kite, two deflated balloons and a hydrogen generator can.

After a crew has boarded their self-inflating life raft, they would retrieve the radio set and put it in working order.

Given a wind of seven to fifty miles per hour, an antenna coiled within the transmitter is attached to the box kite which is sent up to about 300 feet. While the kite acts as a distress signal, its main purpose is to carry the antenna aloft.

If there is no wind, the two balloons are inflated from a tube of the hydrogen generator can which forms hydrogen by being lowered slowly into salt water.

It is not necessary to know code. A hand crank on the set generates power and the instrument automatically grinds out SOS messages on 500 kilocycles, the international distress frequency. If the crash landing has been made in the North Sea, where the distress signal is AA, the operator of the set merely flips a switch to emit that message.

The set, which also has a manual sending key, will send for more than 200 miles during the day and much farther at night.

A portable radio device makes early rescue possible for survivors of forced landings at sea.

Naturally it provides a beam which will guide searching planes to the raft; once the radio compass of the rescue plane "homes" on the wave, the pilot can ride the signal right to the lost boat.

If the rescuer approaches at night the raft's crew can switch from the radio signal to a blinker light signal, which blinks out an automatic SOS.

The transmitter itself is equipped with wide webbing straps to secure it in position between the legs of the operator. Power is watched and adjusted by an indicator lamp. When the lamp is brilliantly lighted, the transmitter is yelling for help.

Since all ocean-going vessels of all nationalities are required to maintain watch on the distress frequency, the chances of rescue are greatly increased even though no warships or planes are in the vicinity. There's no receiving equipment, so the crew will just have to wait and see what happens.

Flyers familiar with this new equipment believe it will do much to eliminate the danger of drifting for days in remote sea areas, and regard it as a long step forward in assuring the safe return of distressed Army Air Forces crews.—**Captain E. L. Davis, Gowen Field, Idaho.**

Pre-Rotation of Tires

Life tests recently were completed on 300 airplane tires to determine how they are destroyed in service. For the record, not one tire failed or wore out because of frictional wear occurring when the stationary tire was forced from zero miles per hour to approximately eighty miles per hour during the fraction of a second when wheels initially touch the ground in landing.

In explanation, Materiel Center engineers at Wright Field point out that most airplane tires fail from blowouts, severe bruises and cuts, bead separation, and so forth. Those tires that do not fail from the above causes wear out at the shoulder—where the weight of the plane and effects of braking are borne. *(Continued on Next Page)*

(Continued from Preceding Page)

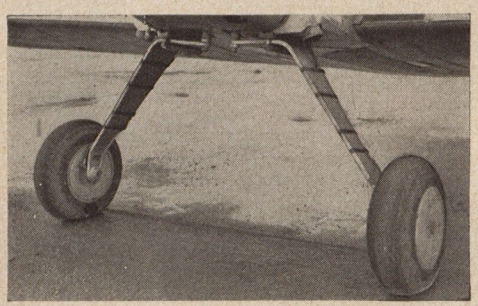
Wear from initial contact with the ground in landing occurs at the center of the tire, and this has proved to be so slight that it does not affect its service life.

For large tires, such as the eight-foot B-19 tires, pre-rotation conceivably could reduce drag forces and permit lightening of the landing gear struts. However, the weight and space requirements of most pre-rotating devices have been too great to be of practicable value.

Leaf Spring Landing Gear

A racing plane piloted by Steve Wittman, veteran racer of Oshkosh, Wisconsin, gave the Army the idea for a new type of leaf spring landing gear for PT-13 and PT-17 training planes.

The new landing gear has been drop-tested, flight-tested, and approved by the Army Air Forces Materiel Center at Wright Field, and will be installed on 25 training planes for further testing. Although, after looking at the accompanying photograph, it might be suspected that a plane using this kind of landing gear would bounce right back into the sky upon being landed, quite



Close-up of leaf spring landing gear.

the opposite is true. For when the machine hits the ground, the spring gear spreads out and each wheel serves to dampen the rebound.

Wright Field pilots who have tested the spring gear claim that it is superior in every way to landing gear used currently on planes of this type. It shows its mettle particularly in fast taxiing turns. It is softer in taxiing and less stiff when dropped in for a hard landing. There is no rebound tendency when the plane is landed on hard, dry surfaces, and even when landings are made on wet grass or ice, the rebound is negligible. In take-offs there is no apparent difference from the conventional gear installations.

The simplicity of the spring gear makes it easy to manufacture. Made from flat, non-critical steel plate stock cut to shape, drilled, and bent to form, it is cheaper to construct than the present strut and saves many hours of production time. Large-scale production is only a 60-day problem.

BB Counter

A device which automatically counts the BB's fired in a Link Trainer has been invented by M/S Melvin Wolfe, of Moore Field, Texas. (See above.)

The usual round of fire in Link Trainer shooting consists of 100 BB's, and that number must be exact in order to determine the percentage of hits scored. Heretofore, the 50,000 pellets used a day had to be counted by hand—and that's a powerful lot of counting.

Sgt. Wolfe took a solenoid from a salvaged machine gun, a vibrator motor from a Link Trainer, part of the control cable shafts from a cracked-up plane, and a couple of odd pieces from the scrap pile. He put them together, made a couple of adjustments, and the result was a BB counter which counts exactly 100 BB's, no more and no less, and drops them into a container.

The gadget consists of a tin box stilted on four springs. In the bottom of the box there's a hole just big enough to let one BB fall through at a time and under this hole, a small grease cup is suspended on a long shaft. When exactly 100 BB's fall into the cup, it turns over; the BB's drop into a container below.

Temperature-Proof Oil

Lubricating greases have won battles for the Russians and lost them for the Nazis. Intensive work on the processing of petroleum products by the oil industry in cooperation with Wright Field has made it possible to keep American planes in the air whether the temperature be 70 degrees F. below zero or 120 degrees above. It will no longer be necessary to change the oil in the hydraulic system to suit atmospheric temperatures.

Portable Arctic Shelter

To facilitate engine maintenance in sub-zero climates, a light-weight insulated "Arctic" maintenance shelter has been developed by the Miscellaneous Equipment Laboratory at Wright Field.

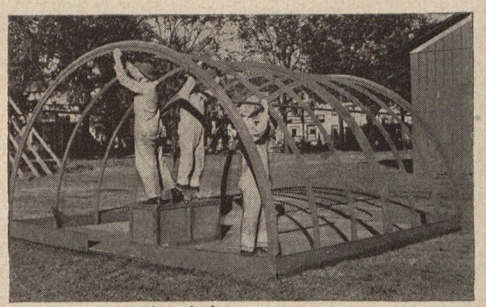
The shelter is constructed of plywood frames and specially-treated fabric covers filled with glass fiber insulating materials.

The entire unit can be flown to isolated operational bases where as few as two men can erect the shop on any hard surface, including packed snow or ice.

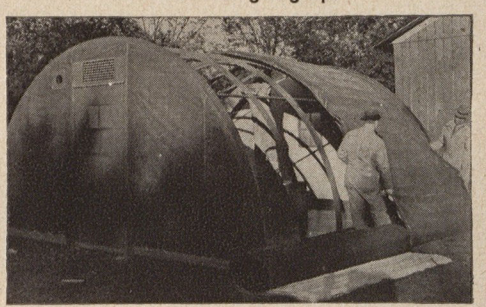
With the new shelter, maintenance crews at advanced bases can make repairs, check equipment and conduct major overhauls on engines under indoor conditions that are second only to permanent shop facilities.

The heaviest of aircraft maintenance machines can be mounted on the insulated flooring of the shelter, which has an interior large enough to accommodate a four-man crew working on an engine.

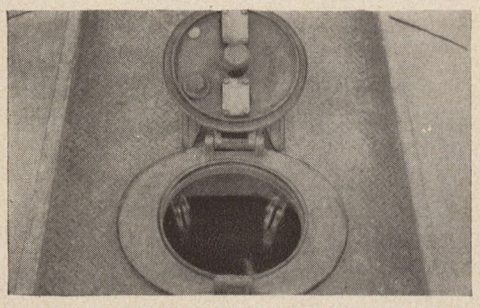
Floor space of the shelter measures 16 by 16 feet, yet it can be packed into a space 5 by 5 by 6 feet. The rounded top tends to prevent accumulation of snow and minimizes the effect of wind on the shelter.

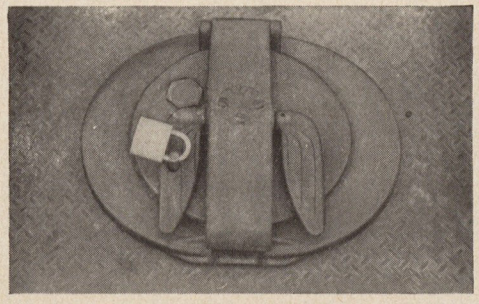


The shelter going up.



Above: Canvas covers the framework.
Below: Ready for occupancy.





At left is the storage hatch open; at right, closed, showing the tamper-proof lock.

Tamper-Proof Fuel Lock

The inexpensive and effective locking device pictured above makes it difficult to tamper with aviation gasoline in mobile fuel units at Pendleton Field, Oregon. Designed by Line Chief, Master Sergeant Sylvan V. Vick of Monroe, Louisiana, the lock may be installed on tank hatches quickly and at small cost. A padlock hooked through a stud riveted to the hatch cover anchors the "butterfly". The cover is held down tightly at all times as it does not unseat until the butterfly has been turned back fully.

But this isn't the first time one of M/Sgt. Vick's ideas has been put to practical use. As far back as 1937-1938, when he was employed by a manufacturer of heavy road grading equipment at Peoria, Illinois (Le Tourneau Co.), he devised a method of applying increased pressure to bulldozer blades—an idea which is helping men in the AAF clear and level airfields now in some of the remotest spots on the earth.

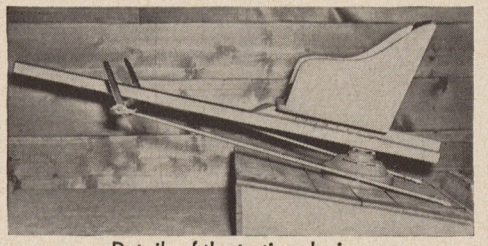
At Pendleton Field, M/Sgt. Vick has developed in his spare time a number of other mechanical improvements which have been adopted and placed in regular use. A hydraulics test bench incorporating a multiple manifold to plug in various sizes of tubing has proved a time saver. The bench likewise includes an expander-tube type hydraulic brake tester of his own design.

Before enlisting October 4, 1940, he had been a mechanic, "catskinner", shovel operator, machinist and welder, as well as shop superintendent of a bridge construction company in Portland, Oregon. The Army first sent him to one of its technical training schools for airplane mechanics.

Later his skill in finding the right way to do a job led to his selection as one of a special school group that suggested improvements in camouflage technique at Fort Dix, New Jersey. And his knowledge of just about every nut and bolt on the Mitchell B-25 resulted in an assignment travelling for the North American Aviation Company, supervising maintenance and overhaul of B-25's at a number of fields.

Rudder Reflex Indicator

Shown below is a device to develop the rudder reflexes of pilot trainees. It simulates, on the ground, the rudder characteristics of a plane in the stall position and the rudder action of a plane during a ground roll. Due to its inherent instability, the operator is required to react immediately with proper rudder action in order to keep the machine on its proper heading. The



Details of the testing device.

photograph shows the machine in its basic form, rigged to simulate a stall condition. The finished product is equipped with a fuselage, has a dummy stick installed, and is rigged for braking action.

Since little study time is given a student to develop his ground reactions in comparison with the time afforded him to develop his reactions in the air, a device was needed to help in the development of the reflxes so that the student would automatically perform the proper rudder action. After considerable experimentation, Major W. I. Fernald, 5th Army Air Force Flying Training Detachment, Hemet, California, designed what he has called the Fernald Reaction Time Indicator. The basic patent is held by Major C. C. Mosley, former employer of Major Fernald.

After sufficient practice on the machine, some students who have never been in the air before are able to execute the entire take-off without assistance. In addition to the machine's value in developing reflexes, it is also used as a means of classifying Aviation Cadet candidates. After a reasonable length of time, those candidates who are unable to control the machine are invariably very slow in reacting to phases of flight involving the use of other controls.

Bombardment Observation Trainer

Out of the Photographic Section of the Roswell Army Flying School, Roswell, New Mexico, one of the bombardier schools of the AAF Flying Training Command, has come a device which is claimed as a valuable training aid to aerial photographers who accompany planes on practice bombing missions. The gadget was fashioned from wood scrap, two pieces of tin, a flashlight, and four incandescent bulbs by Lieutenant David Dunn and Sergeant Roy Holloway after weeks of patient experimenting.

Although daytime estimation of bomb hits is usually a simple matter for the experienced spotter, night performance is sometimes comparable to flying blind and accuracy is the result of many hours of experience in the air.

Sergeant Holloway reasoned that an indoor bombing range should offer all the training advantages of the conventional outdoor type, and, in addition, aid in the improvement of the spotters' aerial operations.

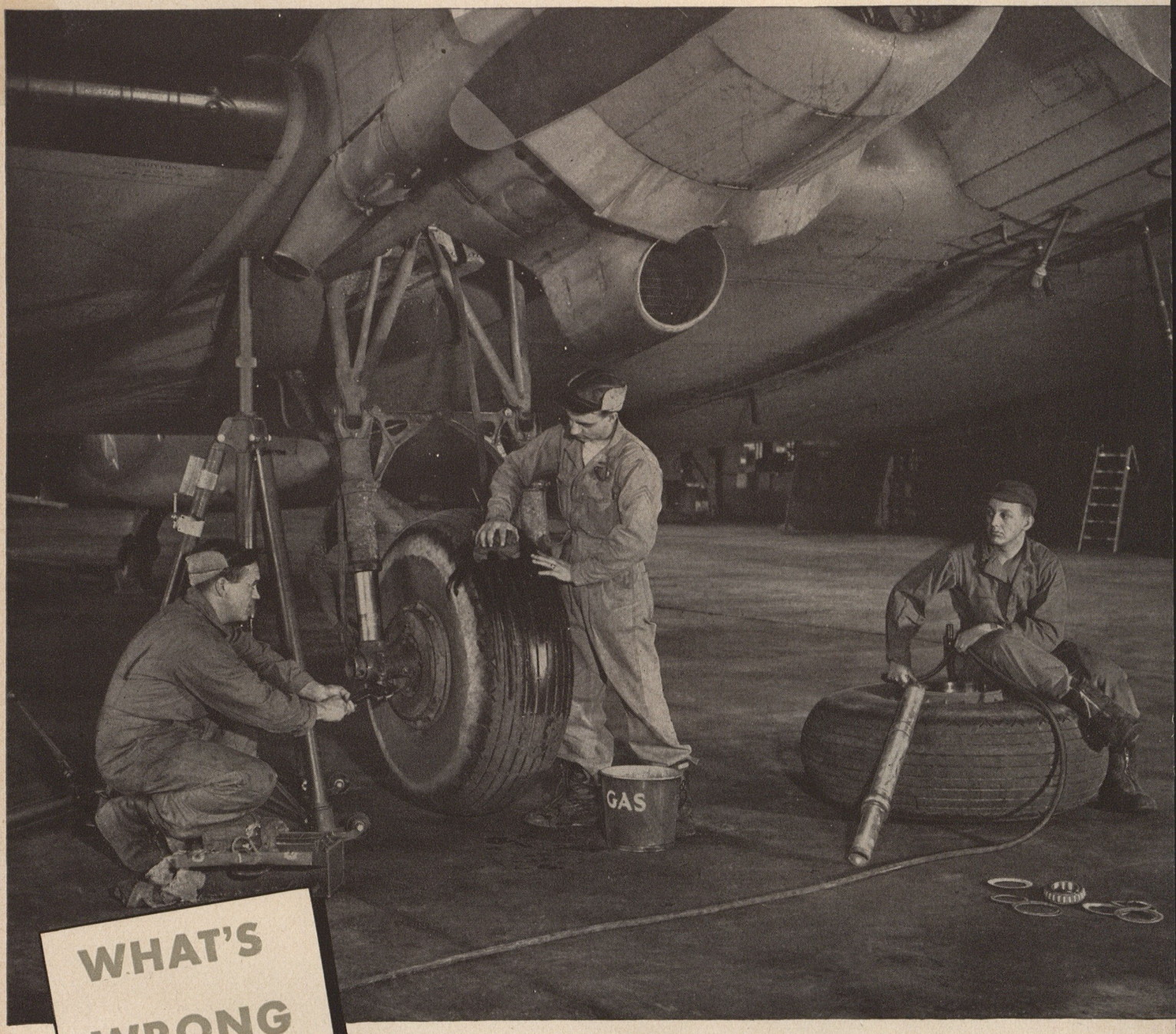
Accordingly, he went about setting up a night target which would be an exact replica of the target seen by the bombing crew from aloft at night. He drilled holes in a section of wooden paneling, 52 inches square, in the form of a target-cross, and then drew lines joining "one o'clock" and "seven o'clock," "two" and "eight," and so on. Along these lines, additional holes were drilled at scaled distances from the center and marked: 300 yards at "one o'clock," 200 yards at "two o'clock," etc.

Holloway then took two oblong pieces of tin, which were shaped in the form of a trough, and attached them to the back of the paneling over the target-cross by means of tape. The tin merely acted as a shade or reflector for the light bulbs, which were inserted in the tin to illumine the target. When the bulbs were illuminated, the night target was completed.

Pieces of tissue paper were pasted over the holes drilled to scale across the face of the panel-target. The holes simulate bomb-craters. When a flashlight glows from behind the paper for a period of two-and-a-half seconds, it resembles the flash of a struck bomb.

The sergeant next constructed a movable eye-piece through which the photographer peers at the target, and visualizes it as an objective 12,000 feet below the photo patch of a bombing plane. The eye-piece may be moved forward or backward, increasing or decreasing the altitude. Since the bomb-burst holes are numbered, and a chart reveals the exact location of the hole, grading the accuracy of the observer is a matter of seconds.

ON THE LINE



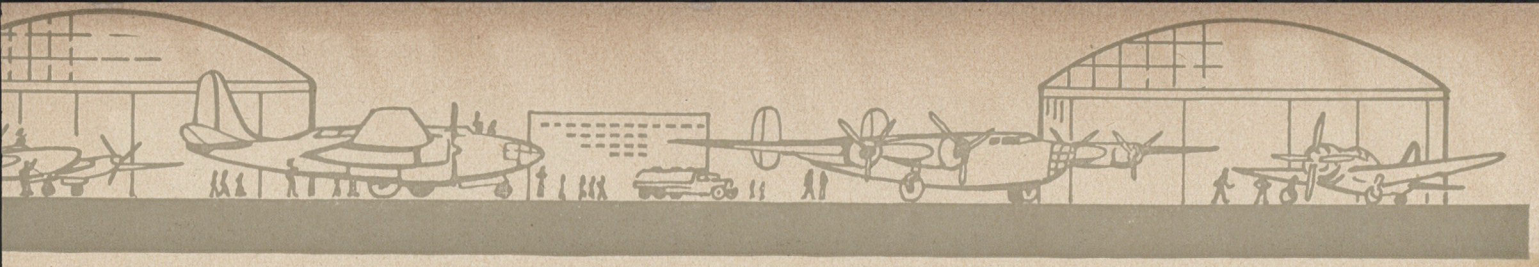
WHAT'S WRONG WITH THIS PICTURE?

Here we go again, boys!

The boners pictured here were picked and posed by (left to right) Sergeant C. P. Putman, Technical Sergeant H. W. Stitt and Corporal W. A. Ryan, of Patterson Field, Ohio.

"Mistakes like these may seem funny in a picture," said Crew Chief Stitt, "but they're mighty serious ON THE LINE. Such maintenance boners can do a lot of damage to equipment and injure personnel."

Crew Chief Stitt picked eight maintenance boners here. Do you see them all? Answers on opposite page!



A monthly roundup and exchange of hints for mechs — some old, some new — in the interest of better maintenance.

Do You Know . . .

That airplane maintenance forms are provided for your use when accomplishing any of the required periodic inspections. One master set of the applicable maintenance instruction forms "will be maintained," according to T. O. No. 00-20A, "for EACH AIRPLANE in the back of the form 41B." This includes the following forms:

Preflights and Daily Inspection
25 Hour Inspections
50 Hour Inspections
100 Hour Subsequent Inspections
At Engine Change Inspections
25 Hour After Engine Change Inspection.

A Pertinent Question . . .

One staff sergeant writes in: "Whenever I finish working on a ship, I ask myself: *'Would you fly it that way?'* If the answer is yes, I get a good night's sleep."

Dirt

It's an old saying ON THE LINE that a clean airplane is a good airplane. This applies as well to the inside of the fuselage. Loose objects such as fire extinguishers, soda pop bottles, tools, etc., can cause fouling of the controls as well as injury to personnel. Incidentally, dirt has been known to blow up and get into the pilot's eyes, making it impossible to make an immediate landing.

Conduit Knurled Nuts

Watch electrical conduit knurled nuts that may become loose at a connection. Vibration will wear the insulation from the primary, or any other hot wire, causing a short which can bring about motor, radio or instrument failure.

Mech-Fatigue . . .

You've heard of pilot fatigue but you've probably never stopped to think that long, grueling stretches on the job make you subject to MECH-FATIGUE.

Mech-fatigue—which is the mental or physical let-down from overwork or strain —can result in carelessness, forgetfulness and inaccuracy. Watch yourself on the long work stretches; ask for a break if you feel it coming on. Talk to your line chief; he'll know you're not just goldbricking.

Adequate rest, food, recreation and exercise will help you keep yourself in perfect physical condition and ward off mech-fatigue.

Have It Treated . . .

With medical service available twenty-four hours a day, why wait to have cuts, sprains, and bruises treated? Five minutes spent at the first aid station may mean the difference between a permanently stiff finger and a useful hand.

Pitot Tube Covers

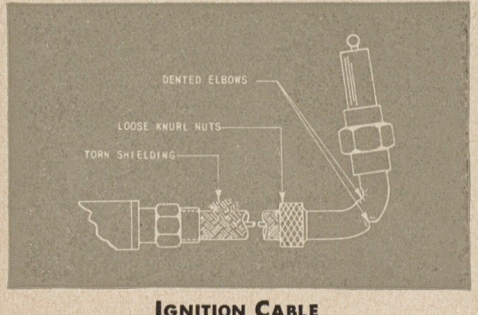
This one happened recently. A B-24 pilot starting down the runway, had gained speed and was just ready to take off when, to his amazement, a glance at the air speed indicator revealed that it registered zero. He applied the brakes, trying to stop before using up all the runway. Luckily for the pilot and his crew, he stopped in a very convenient mud puddle without much damage to the plane. . . . It seems that someone had simply forgotten to remove the pitot cover. T. O. No. 00-20-A, stresses the importance of this inspection.

Watch Yourself . .

Don't make a heavy lift with your knees straight and rigid. Strains may be avoided by bending the knees. Be sure you are physically capable of making the lift before you attempt to do so. Be sure of your footing.

Emergency Escape Equipment

Maintenance of emergency escape equipment is very important. Be sure that emergency escape doors are properly safetyfied and that safety locks are in good working condition and are not corroded. See AAF Regulation 55-2.

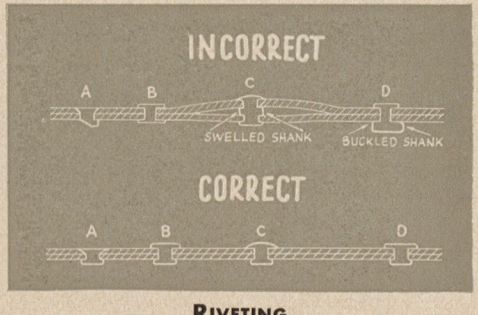


Ignition Cable

Particular attention is called to the damaged elbow in the drawing above. When tightening the elbow nut, the elbow must be held in the opposite direction to avoid squeezing the ignition cable. If thus damaged, the spark occurs at the break instead of at the spark plug. When this condition is noted, cable must be replaced.

Torn shielding causes radio interference. Minor damage can be corrected by silver soldering but if the break is bad cable should be replaced.

The knurl nut should be checked and tightened if necessary.



Riveting

INCORRECT: (A) Unsteady bucking bar; (B) Rivet driven excessively; (C) Separation of sheets; (D) Excessive shank length. These mistakes will cause failure of parts involved.

CORRECT: (A) Bucking bar held firmly; (B) Rivet driven properly; (C) Creeping and distortion of the sheet has been prevented by use of clamps; (D) The upset end of the undriven rivet measured approximately 1½ times the diameter of the rivet from the surface of the material being riveted. Reference: U. S. Army Air Corps Standards Book.

MISTAKES ON OPPOSITE PAGE

Reading from left to right

1. Be careful; that jack pump should be on the wing jack assembly. It's a double hazard on the floor. Someone may trip over it and get hurt, and the shut-off valve, if stepped on and opened, will release the pressure and allow the jack to drop.

2. That knurled safety nut on the jack should be screwed down to the proper position. That's why it's there.

3. If you'd only watch what you're doing, you'd realize that it's bad practice to use a pipe wrench on the oleo strut hex nut. Use the proper socket or box wrench which is listed in T. O. No. 00-30-45.

4. Wait a minute, you in the center! Gasoline in an open container is not permitted inside a hangar; furthermore, carbon-tetrachloride is a much safer solvent to use in the removal of oil and grease from rubber tires. And don't forget that all volatile fluids used for cleaning must be stored and used from safety type containers, according to T. O. No. 01-1-1.

5. It's bad practice to lean the axle on a tire, or anything else for that matter. If it falls, the bushing will be scarred and the axle knocked out of line. The axle should be laid on a bench or flat on the floor and protected by rags.

6. And those roller bearings shouldn't be laying on the floor. They'll collect grit and dirt and will require rewashing to prevent later malfunctioning. Bearings should be protected by rags or placed in a clean container.

7. You on the tire: You should be watching what you're doing, and you SHOULDN'T be sitting on the tire while inflating it. Believe it or not, tires can and have exploded—with serious injury to personnel.

8. And why take unnecessary chances by inflating the tire under a jacked-up plane? There's no rationing of safe hangar space yet.

ANTI-SUB COMMAND

(Continued from Page 6)

However, the Navy and the Antisubmarine Command are careful to evaluate a message before wasting manpower and equipment on what might prove to be a wild goose chase.

The Antisubmarine Command and the Navy are cautious in their evaluation of successful attacks. Pilots say that, to convince their superiors, a plane crew must bring back the U-boat captain's cap.

A squadron of the Command did comply with this rigid test, producing not only a cap, but an enemy U-boat captain himself. Somewhat bedraggled, he was nevertheless convincing evidence. The captain and some of his German crew had escaped in rubber life boats from a submarine bombed by an Antisubmarine Command plane. They floated a couple of days until rescued by American surface craft.

So effective was the bombing from the air of this U-boat, that it was only a matter of minutes before she filled and sank. The Army bomber crew, witnessing the plight of the enemy men on the surface of the water, dropped lifesaving equipment. Two days elapsed before the Germans could be rescued, near death from exposure, by Coast Guardsmen.

Experience has shown that submarine crews fear aircraft. They will take their chances maneuvering with surface craft, but duck under water if they see an airplane in time. And they generally stay under if they know airplanes are in the vicinity.

However, on rare occasions aircraft are fired upon by the guns of the U-boats who then submerge after the plane has passed overhead—if the plane hasn't already done the submerging job. Probably, that captured U-boat captain failed to avoid destruction of his craft from the air because he lacked sufficient time to dive.

THE tough aspect of submarine fighting is the flying day-after-day, in all kinds of weather and over wide stretches of cold, treacherous water. The strain of this sort of work is hard to measure. One pilot has said: "I have more than once found myself making a sudden steep bank out at sea, under the impression that I was avoiding a mountain." Another declares: "One of my friends, shortly before he went on leave, swore he saw a man riding a motorcycle 450 miles off the coast."

The uncertainty of the outcome of an attack is well illustrated by the experience of an Antisubmarine Squadron bombing crew over the Bay of Biscay. A surfaced submarine was sighted by a member of the crew of a Liberator bomber piloted by 1st Lieutenant Walter Thorne of Marietta, Ohio.

As the plane approached for the bomb run, the U-boat started to crash-dive. However, before it disappeared from view, 1st Lieutenant Brent F. Walker of Jefferson City, Mo., attacked with machine gun fire. The approach on the first run was made from the stern of the submarine. Three depth bombs exploded approximately fifty, thirty and sixteen feet from the stern, while others straddled the conning tower.

Private R. R. Williamson of Austin, Texas, reported seeing a part of the U-boat in the explosion geyser and fired another burst of machine gun fire into it. On a second run, Lieutenant Thorne saw an oil patch, 200 yards wide, spreading from a geyser-like center.

First Lieutenant Irving T. Colburn of Chicago was bombardier. Other crew members included co-pilot James Anderson of Austin, Texas; Staff Sergeant George Fowler of Spartanburg, S. C.; Staff Sergeant Hollander of Indiana, and Technical Sergeants Engles of Hazelton, Pa., L. T. Figg of Crew, Va., and J. Briston of Evansville, Indiana. The Army Air Forces has given credit to the crew for the destruction of this enemy submarine.

In other cases, bodies from inside the submarine have been seen coming to the surface. There is little doubt in those instances that the submarine was destroyed. Often, submarine crews have been rescued from the sea.

Rescues at sea have been effected for victims of lost merchant ships through patrol activities of the Antisubmarine Command. When a storm lashed the waters off Cape Hatteras recently, the 31 members of the crew of a merchant vessel were forced to take to a single lifeboat.

An Antisubmarine Command plane on routine patrol spotted the small craft, which was bobbing helplessly in the mountainous seas. The airplane was piloted by Lieutenant Norman E. Purdy of Hamilton, Ohio, who radioed for aid. A second plane went out, piloted by Lieutenant Ford A. Trotter, Jr., of Luverne, Ala. Emergency equipment, including food, water, clothing and blankets was dropped from the second aircraft.

The Navy sent out a Catalina patrol bomber under the command of Lieutenant Commander Delos C. Wait of Eldorado, Ark., which also dropped emergency equipment. Meanwhile, the Eastern Sea Frontier Command, which had been coordinating the Army and Navy air action at the scene, now sent a fourth plane—a Coast Guard Hall patrol bomber—to scout for aid.

Lieutenant-pilot Edwin B. Ing of Elizabeth, N. J., searched the area and found, about fifteen miles away from the lifeboat, a freighter. By blinker signal he told the plight of the 31 sailors in the small boat and then led the vessel to the spot. All 31 men were rescued.

While rescues of this type are only a by-product of the primary missions of sinking submarines, yet they are an important factor in saving human lives.

Ordinarily, the average air crew untrained in spotting an object in the water will miss seeing something actually on the surface. This happens for a number of reasons. It may be because of the manner in which the surface is scanned, or because of a type of eye fatigue that fails to see what is in the field of vision, or because what is seen fails to register on the consciousness of the person making the observation.

In order to reduce to a minimum these and other factors that tended to make submarine bombing from aircraft in the early days an extremely hazardous undertaking, the Antisubmarine Command has set up a special training program. The proper method of scanning the horizon, the correct manner of dropping bombs and other instruction in tactics and technique are taught by a squadron skilled in the business of tracking down subs.

WHEN the Antisubmarine Command receives pilots, co-pilots, navigators, bombadiers, radio operators, gunners and engineers from Army Air Force Schools, they are immediately given this additional training. From this schooling a new type of combat crew is created which is highly skilled in "giving the business" to enemy U-boats.

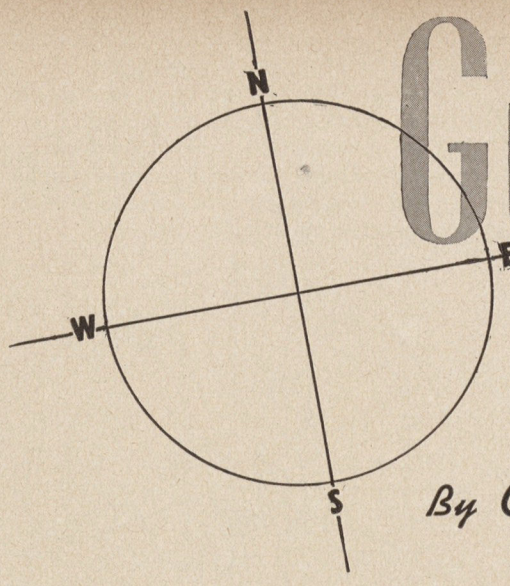
The German Navy has declared that it is turning out submarines faster than the sea and air forces of the United Nations can destroy them. However, as new air crews are trained and turned out for battle, the destruction rate of U-boats will undoubtedly have the Axis singing a different tune.

Submarine warfare may be at a turning point. The Antisubmarine Command, in coordination with the Navy and Allied aircraft, is beginning to take the offensive. In addition, the campaigns in Africa and Russia may force U-boats to accept the defensive because of the impelling need for the enemy to interfere with the supply lines. Enemy submarines may no longer be free to go marauding after merchant shipping whenever it is within the range of underwater craft. They may be forced to concentrate their efforts on interference with convoys to Russia, Africa and England. This is an advantage to the Allies—they know where to expect the enemy.

The effect of Antisubmarine Command and Navy operations, at the moment, has been to eliminate enemy U-boats from American coast areas. Thus, the loss of coastal ships and crews due to enemy action has been reduced almost to the zero point.

Close cooperation has been carried on with the British Coastal Command which has the same functions as the Army Air Forces Antisubmarine Command. In a survey published by the New York Times of the two years of operations, the Coastal Command report stated that it escorted 4,947 merchant convoys, attacked 587 U-boats and flew some 55,000,000 miles.

While the record of the Antisubmarine Command does not yet approach that of the sub-sinking component of the Royal Air Force, millions of miles have already been flown and numerous U-boats have been attacked in the short period since its inception. ☆



Guides for Global War

II - Map Projections

By Captain F. I. Burnham

MAPS AND REPRODUCTION UNIT, A-2

IF a pilot could fly high enough and had glasses of sufficient power, he would see the earth's horizon as an arc of a circle.

The portraying of land and water forms on this huge globe has been a problem of major concern to the cartographer for centuries. Airmen observe an indication of this problem when they look down from a plane. Below, the earth's pattern is in proper proportion, but toward the horizon objects become more and more distorted.

If our maps could be drawn on spheres or globes, or, in the case of a small area, even on a segment of a globe, we could then produce maps or charts in their proper relation and proportionate size without difficulty. Unfortunately, however, we must necessarily resort to the use of flat maps to show the spherical surface of the earth.

The problems involved in effecting this transition should be thoroughly understood by the airman. Not only is it well for flyers to know the historical development of the charts they have to work with, but also it is always possible that navigational charts and maps may be lost on a mission. In such a case, knowledge of the fundamentals of map projections will enable a pilot or navigator to make independent judgment concerning the value of local charts which he may be forced to use for the successful completion of the mission. By general usage, the globe has been divided into sections called degrees. First, we have an imaginary line circling the globe equidistant between the two poles, known as the equator. Then, each of the resulting globe halves is divided by ninety other lines parallel to the equator. The lines represent parallels or latitudes.

Basic knowledge for every airman on the methods used to chart the earth.

The globe next is divided into 360 degrees normal to the equator—180 degrees east and 180 degrees west—by lines representing meridians or longitudes. The prime meridian or point of longitude now in general acceptance is Greenwich (London).

GEOGRAPHERS and cartographers in years gone by used a grid system, starting at the western edge of the known world and numbering the grid in one direction only. (A projection or grid is an orderly system of parallels and meridians on which a map can be plotted.) On most maps an island of the Canary group known as Ferro was the starting point. Some European maps still use Ferro for the prime meridian.

In determining longitude from foreign maps it is necessary to determine the location of the prime meridian since there are many maps published that use a prime meridian other than Greenwich. Generally, the odd meridians are the capitals of countries, as in the case of the Paris meridian used in many maps. In the early days of our republic, our maps were published with the meridian of Washington as the prime.

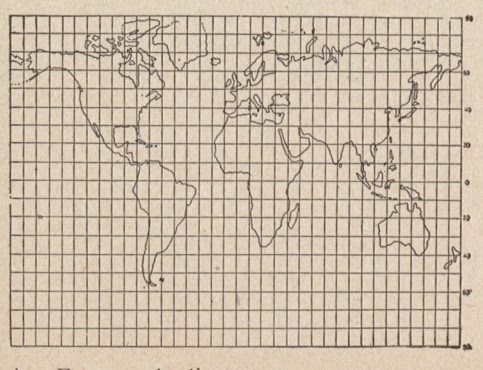
The problem of plotting the characteristics of this earth-globe on a plane surface lies in projecting the relationships of this imaginary grid on the sphere to a like grid on a plane with the least amount of distortion.

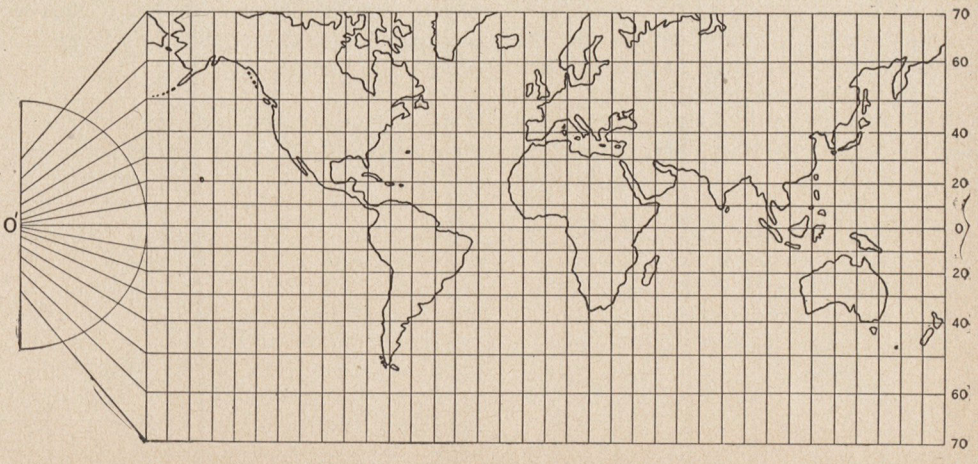
Projection systems may be divided into three general classifications: cylindrical, conical and azimuthal.

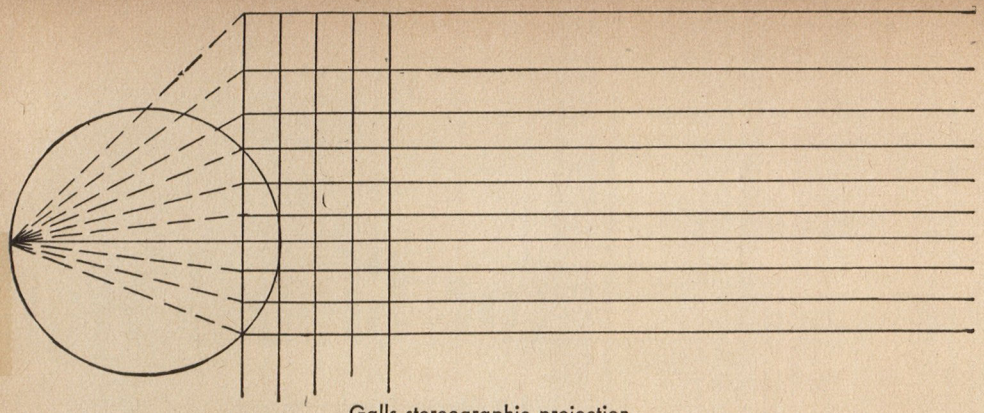
The cylindrical projection is the simplest of the three. It shows the globe as it if were plotted on a cylinder and then flattened out. The cylindrical class may be illustrated by the simplest of all projections, in which the grid is a rectangle with all parallels and meridians spread equally and are represented as straight lines.

One of the best examples of the cylindrical projection is the one devised by Mercator in 1569 and which still bears his name. Like the rectangular projection for

Below is shown a map of the World in cylindrical projection, and at the right is Mercator's version, one of the most familiar of all charts in use today.







Galls stereographic projection.

a world map, the meridians are spaced off true to scale at the equator but in latitude the distance increases from the equator. The error in measurement of distance also is exaggerated. The scale of the Mercator map at sixty degrees latitude is two times that at the equator. As the distance increases away from the equator—say, to the eighty-degree parallel—the scale is increased to six times that of the equator. It is obvious, therefore, that the poles are unplottable on this type of map.

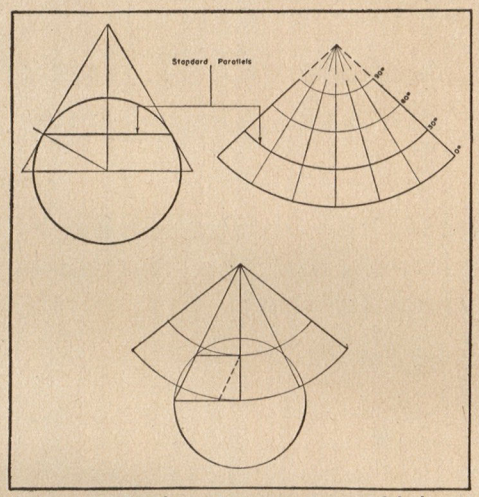
An example of the misconceptions possible from this type of projection is illustrated in the belief of many people that Greenland is about as large as South America. On an equal area map, wherein Greenland is shown in its proper relation, it is about the size of Alaska.

A MERCATOR chart is used primarily in plotting courses for navigational purposes. It is one of the most familiar of all charts in use today. Practically all the coastal waters of all lands have been shown on this type of map for many years for use by our merchant marine, navy and private boat owners. With the new importance of air travel, much, if not all, of the land area is being mapped on this type of chart.

Galls stereographic projection also comes within the cylindrical class. This projection is comparable to the Mercator except that distortions are not so pronounced in the higher latitudes. This is due to the projection being constructed by assuming that the cylinder is only as large as the 45th parallels. These parallels being true to scale, those north and south are increasingly exaggerated, and the scale toward the equator is reduced.

Projections of the conical class, like the cylindrical, are devised in such a way that it is possible to develop the plane by "unrolling" it. Only in this case the developed cone will have curved lines of latitude when unrolled and generally straight lines of longitude.

The conic projection is formed by projecting the surface of the globe upon a cone tangent to the chosen latitude. Exaggeration is apparent in both directions from the tangent parallel. An improvement may be noted in a conic projection with two tangent parallels, in which case a portion of the globe must necessarily be eliminated.



At top is a simple conic projection, and below is a conic projection with two standard parallels.

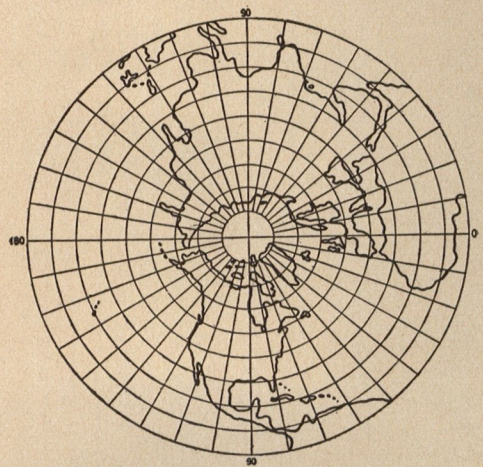
By using a combination of cones, a so-called polyconic projection is arrived at, with less distortion in scale. As in the Galls projection, the scale distortion is exaggerated above and below the standard parallels and is slightly compressed between them.

Conic and polyconic maps have their particular uses in the political maps of small areas and portions of the earth's surface. A good example would be a map of Asia with the least amount of distortion throughout the area. A choice of the conic projection with two standard parallels at 12-58 degrees will fill this requirement. Maps on a polyconic projection are usually set maps of an area at a scale that is impractical to show on one or two joining sheets. They are generally compiled and drawn as individual sheets or maps independently of any other sheet or map adjacent to or part of the completed set. The U. S. Geological Survey topographic sheets are plotted on the polyconic projection.

THE azimuthal class includes projections on a simple plane. Three of the important azimuthal projections are based on perspective, or on the different positions of the eye in relation to the plane upon which the global network is to be developed. In the gnomonic projection the focal point is in the center of the globe. For a stereographic projection, the perspective lies in the antipode, while the focus for the orthographic projection has infinite distance, the projection lines being parallel.

Two other important azimuthal projections, equidistant and equal area, are developed by arithmetical processes.

Probably the best example of the azimuthal charts are shown in the polar projection in which it is desired to show the areas around the poles—or the orthographic maps to show the earth as a whole with the appearance of its being a globe.

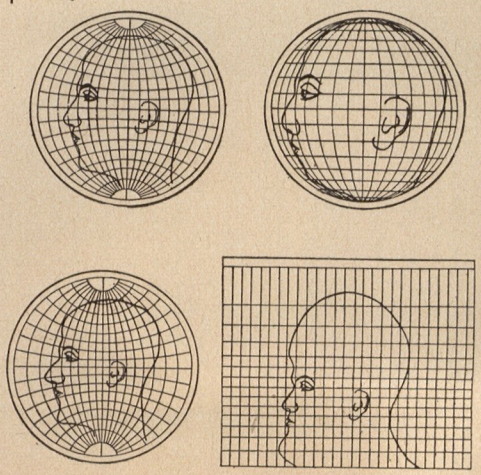


Azimuthal equidistant polar projection.

In explaining the foregoing examples of types and kinds of projections only the principal, and generally, the simpler forms have been used. With these fundamental types as a base, there have been hundreds of different variations of projections invented or designed—some practical and some freaks that could not be used except under exceptional circumstances.

Let us look at some of the exaggerations that are an inherent part of all projections. If we draw a man's head on a globular projection and then carefully plot this head on other projections we see some amusing, if not revealing distortions. This does not mean that the projection on which the head was originally drawn is the best but shows that the distortion is real and not fancied. If the head were drawn on any other projection the results would be equally amusing. The illustration below should show you what we mean. ☆

Below are examples of distortions inherent in all projections. Top left is a head drawn on a globular projection; top right is the same head plotted on an orthographic projection; bottom left, a stereographic version, and bottom right, a Mercator projection.



COMPRESSIBILITY

By Colonel Ben S. Kelsey

PRODUCTION DIVISION, WRIGHT FIELD

Analyzing wave formations in relation to their effects on high speed flight.

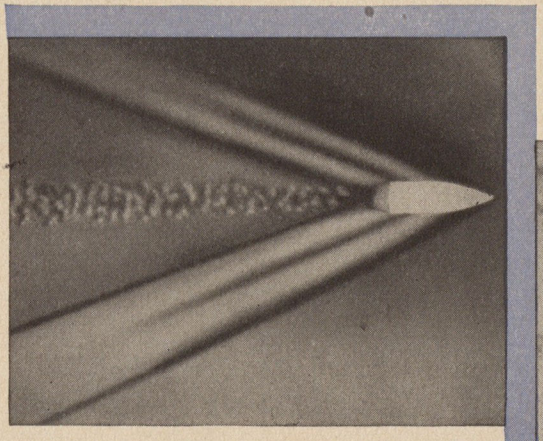
BEATING compressibility would be much easier if we knew more about it and its effect on airplanes. Our aeronautical information, to date, peters out just short of the speeds and the conditions where compressibility becomes vitally important.

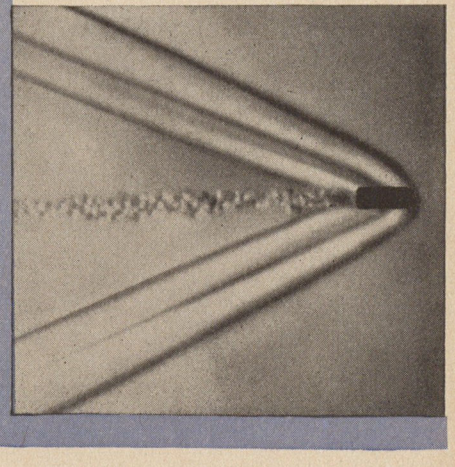
It is true that fluid mechanics, physics and mathematics all can furnish a great deal of helpful information on the nature of pressure waves or surface waves in a fluid, but this information has yet to be applied specifically to aircraft problems. As a result, there is at present a big gap in our knowledge, filled largely with ignorance or guessing on the subject. Much of design is educated guessing anyway, so this is perfectly justified for the moment, but it doesn't help the pilot or engineer a great deal. He inevitably winds up with a hopeless sort of feeling when faced with all the problems now lumped under "compressibility".

It is apparent that beating this phenomenon will be a long struggle, and it is doubtful that any simple solution will permit immediate progress into the "supersonic" region, or even into the region of speed closely approaching that of sound.

In military terms, the first phase of the compressibility struggle will be the reduction of outposts one by one, moving the limits of the region in which we can safely operate farther and farther toward the major obstacle which is now located close to the speed of sound (i.e. speeds approximating 500 to 700 mph.). We are now in that step by step phase. Yet, there are examples of "raids" in the form of high speed dives across the barrier into the supersonic region. These "raids", however are still of an exploratory nature and they give little promise of either safe or continued operation in that region until a great deal more knowledge of the region's character has been obtained.

There appear to be two basic compressibility effects applicable to aircraft. The first develops because the air has to accelerate, speed-up and slow down again to get around objects moving through it. This speeding up of the air particles relative to those farther away and undisturbed goes hand in hand with the reduction in pressure from which we get the major portion of our lift force. This speed-up is a very real factor and adds to local velocities over the skin; these velocities may actually be anywhere from 1¼ to 2 times the average air speed. This means that in some spots on the aircraft speeds are reached which are very close to that of sound, although the airplane itself may be moving at a very much lower average velocity. Thus, the beginnings of compressibility become apparent at Mach numbers of .5, which is 50 percent the speed of sound, and the worst effects are apparently impossible to delay beyond about 85 percent of the speed of sound, or Mach numbers of .85.





These Schlieren photographs show (at left) the flow produced by a sharp-nosed projectile as compared with that (below) produced by a blunt-nosed projectile—both proceeding at a supersonic velocity.

The second compressibility effect applying to aircraft is the typical super-sonic condition in which "bow waves" are actually formed because the initial point of the disturbance (i.e. the entering edge of a wing, nose of a bullet, nose of an airplane or even a break in a contour like the windshield or air scoop) is moving faster than the compression wave which it creates. Then, instead of a smooth fairly gentle wave-front or a succession of wave-fronts moving out head with low intensity, capable of being absorbed by the air particles, we have the object literally tearing through the wave-front and creating a Vee shaped wedge of added pressure with no warning proceeding. This, of course, is the familiar Vee shaped "bow wave" on boats in water or on bullets moving at very high speeds. It can be illustrated by dragging a stick through the water, first at speeds lower than the slight ripples that radiate from it, and then by moving the stick faster.

It is difficult to describe or visualize a "shock wave" forming on an airplane, particularly when it occurs apparently well back on the surface, and apparently without having anything to do with any nose condition. This can be due to the local speeding up of the air over the surface so that when "compressibility speeds" are reached there is no real entering edge. When this occurs there isn't a "bow wave" as such, but there is certainly a disturbance. The disturbance has been called "compressibility burble", which may describe the situation better than the term "shock wave".

One way of visualizing this wave standing out at quite a steep angle from the surface is to imagine a screen or grating having fairly close mesh near the surface and a wider mesh as it gets farther away. Obviously, the more violent the effect, the closer the mesh and the farther it extends from the source of trouble. The shock wave, or compressibility burble, apparently affects the air through which it passes about the way a screen would. It drags along a certain amount of air and causes relatively turbulent flow behind. There is a great deal of energy lost in heating up the air and disturbing it as well as in dragging some of it along.

It is obvious that with the approach of these compressibility effects the drag will

rise sharply. In fact, the only data obtained to date on airplanes would indicate that drag values go out of sight at some speed slightly above 80 percent that of sound. Running out of airplane knowledge, we can jump to bullet data, and here it is found that drag characteristics have been determined for much higher speeds.

In bullets, for instance, the drag at a velocity of between 80 to 90 percent that of sound starts up in the same fashion as in aircraft. It is possible, however, with modification of nose shapes, to control this rise so it not only levels off at a drag co-efficient about twice that when it flew out of hand, but the drag co-efficient actually drops back as speeds are raised to about three times that of sound; and the drag co-efficient eventually reaches values not very much more than when it started its sudden climb. The drag co-efficient multiplied by the functions of speed and size in the normal manner give the actual drag in pounds, which obviously increases as the speed increases. We can design for the actual drag and provide power on a reasonable basis, provided the co-efficient doesn't fly out of hand and leave us faced with unlimited drag and power requirements at some stage along the way.

Since we all tend to believe only what we see, wave formation and travel in air seem too abstract to be real. Perhaps we can revert to another type of wave formation about which we know a good deal more and which, in addition, we can see. The surface waves on water for instance, have considerable similarity to the waves about which we are concerned in airplanes.

IF you have ever noticed the water level change in a canal when a boat goes through, it is easy to see that water has to flow past the boat at a very rapid rate in order to fill up the hole caused by the plunger effect of the boat moving between the canal banks. The force that pushes the water back into place is obviously gravity. That is, the boat simply lifts up a hill of water ahead of it, and, when this hill is steep enough, the water runs back between the boat and the canal banks fast enough to match the boat's speed and fill out the hole. It is fairly obvious that a stable condition will exist where the height of the hill is just enough to maintain a steady flow past the boat. Thus, the faster the boat moves, the faster the water has to run and the steeper the hill has to be. One can see the local speeding up of the water by the side, and, if the boat moves at a higher speed, the water will have to run at a faster rate. In other words, the water will have to pick up more acceleration and lose it again in order to get by the boat in the shorter period of time available. If the boat is wider or more blunt nosed it is also apparent that the water has to run faster, too, and needs a steeper hill or a bigger wave than it does for a slim, sharp boat at the same speed. If the boat is operated in open water, the wave effect is again the same, although perhaps less obvious since the canal banks are now replaced by the indefinite mass of water.

The tendency for water to arrive at a uniform level provides an elastic force that varies as the water is raised or lowered. The disturbance of the water level could be considered actually a difference in "pressure" level since gravity or the weight of the water is creating the "pressure" which causes the flow.

Imagine, for the moment, a situation where the particles of a fluid are small elastic golf balls. Moving an object in the center of a mass of golf balls, we could expect that the elasticity of the balls acting together would accommodate for the pressure changes necessary to keep a certain pressure level along the surface of the object. In other words, instead of using gravity as the force providing the hill which causes the flow of the fluid, we would have a pressure hill created where the difference in pressure would cause the same sort of flow.

THE situation is not very different from that of the boat in the canal. That is, at low speeds the change in pressure along the surface and the differences in pressure between the region close to the airplane and that some distance from it is sufficient to maintain smooth flow—to give and take as necessary to fit the passage of the plane. The greater the curvature of the airplane wing, or fuselage, whatever it may be, the greater the speed-up necessary to get around and, consequently, the lower the pressure at the surface at that point.

Since this pressure hill depends upon how fast particles close to the object have to move, it is obvious that moving the object very rapidly will produce considerable speed-up, even though the displacement or curvature is relatively small. Here again, a steep pressure hill may be created by reason of the high speed of the object regardless of how gentle its curves. As far as the golf balls are concerned, this is all very well provided the required change in pressure and motion is slow enough so that they can squeeze up and stretch out and speed up or slow down and pass this load on to their fellows in the time available. It is fairly obvious that there is some limiting condition where the time is so short or the blow so hard that the little particles close to the object run out of elastic ability, and, taking up only a part of the load, pass most of it on as a shock to the next layer, which in turn acts like a lot of ball bearings and pass on the major shock. This continues so that the impulse travels on out for some distance as almost a complete shock to each successive layer.

Since the speed at which this shock travels is a function of the elastic ability of the particles of the fluid, it should be possible to determine its value by knowing something of its elastic properties. We find, actually, that the speed at which some such wave or impulse would travel (for instance, the speed of a sound wave) can be calculated actually in terms of the elasticity of the material with which we are concerned. Thus, the speed of sound in air, roughly 760 mph. at ground level, represents an elastic limit for air, beyond which any requirement for change in the air particles is obviously accompanied by a shock impulse with its attendant wave pattern and travel. In passing, it appears that one can almost guess that the colder the air or the golf balls get, the less will be their elasticity and therefore the lower will be the speed at which this shock will travel.

As an object goes through the air, shoving it around, the bigger the displacement, and the lower the speed at which a critical condition is reached where the change required of an individual particle becomes faster than its ability to accommodate and transmit this change smoothly to the surrounding air.

IN other words, the steeper the pressure hill which we try to maintain, the lower the speed which we can fly and still maintain flow and smooth contact with the surface and within the elastic limits of the air.

Obviously, at bullet speeds well above that of sound, regardless of pressure hills or pressure gradients, there will be an entrance shock which will vary in intensity only with the size of the nose or the sharpness of the nose. We would therefore expect that in order to keep down the area of the shock, the leading edge should be as sharp as possible.

It will thus be seen that the amount and rate of displacement, the amount of local speed-up and the critical speed at which some shock or compressibility effect takes place, are all inextricably tied up. There are obviously two remedies for the situation: one, reducing the pressure hill slope required so that the speed may be higher before reaching the critical point; and the second, actually designing to fit the wave characteristics. The first postpones but does not remedy the condition, although it may also reduce the intensity of the trouble when it comes.

In boat design, the wave drag of a hull is not only a function of the speed and the weight of water, tied up with the gravity hill, but also one of length of the boat. In other words, the boat must fit the wave pattern which it creates. For this reason there will be a number of speeds which a given length or size of hull of a given shape will fit the complex wave structure to give lower drags than at the speeds in between; if the speed increases for a given length, the drag finally goes up to staggering values.

In other words, even when we can design to fit the wave pattern we reach a critical speed for any given size of boat beyond which it is practically impossible to drive the hull. If a small boat is towed behind a large steamer which has a much higher critical speed, the little boat may be swamped or may become completely unstable or actually plunge under water simply because of its inability to fit the waves it creates. If, however, instead of using a hull

which obtains its support by displacement, we use a hull which upon reaching a certain speed climbs out of the water and planes, a complete new field is opened where waves are formed, but they have much less effect on the boat's performance. The transition, however, it not necessarily smooth, as anyone knows who has ridden in a racing hydroplane or even a flying boat getting up on the step and coming back down.

Perhaps there is some clue to aeronautical problems in this, now that we are reaching speeds where waves are formed. We are vitally concerned with reducing the intensity of such waves, but we have not yet started to design for actual wave conditions. It is probable that we can design aircraft for wave conditions in which we either fit the aircraft to the waves, or in which we make waves and then build aircraft which will operate without being too badly affected by such waves.

Applying all this to the present airplane, it can be readily seen that today's problem is one of avoiding steep pressure gradients or pressure hills so that the limiting velocities for wave formation are as high as possible. Sharp entrances and thin sections may not be the answer since the transition from one point to another along the surface may be too abrupt for good characteristics, and obviously a sharp point is good only for exact head-on motion. A moderately rounded entrance will give the best compromise, but the curvature immediately back of the entrance must have a very gradual change in curvature. During the transition period, at speeds close to but below that of sound, there will be little to choose from in the build-up of drag between various entrances and curvatures, but if the air is displaced too roughly the effects will be felt earlier. At speeds definitely around that of sound or above, the effect of easy entrances and gentle changes is very pronounced. ☆

This is the third in a series of articles on compressibility. In a later issue, the phenomenon as it applies to aircraft will be discussed.

ANSWERS
to Quiz on Page 14

1. (b.) The Solomons. 2. (d.) Fragmentation. 3. (b.) The speed of sound, which is 1,090 feet per second standard air, decreases with a drop in temperature. 4. (c.) Link Trainer. 5. (c.) Two planes, the B-26 and the P-47. 6. (d.) Pops to an exaggerated position of attention. 7. (d.) Single engine, one-place fighter. 8. (b.) Okay or message received. 9 (d.) Two planes, the P-38 and the P-39. 10 (b.) Chicopee Falls, Mass. 11. (c.) Give a soft salute. 12. (b.) A belt of calm moist air centered near the equator. 13. (b.) Continue to eat unless addressed. 14. (d.) Eleven. 15. (b.) Carbon dioxide. 16. (c.) A Russian fighter plane. 17. (a.) Maj. Gen. G. E. Stratemeyer. Maj. Gen. Weaver is head of the Technical Training Command, Maj. Gen. Yount, The Flying Training Command and Maj. Gen. Echols, The Materiel Command. 18. (c.) Bristol Beaufighter.

STREAMLINING AAF TRAINING

By Captain Purnell H. Gould

SCHOOL OF APPLIED TACTICS, ORLANDO, FLORIDA

MOST officers and enlisted men of the Army Air Forces have used in one form or another the services of TAD (Training Aids Directorate), which is part of the new School of Applied Tactics at Orlando, Florida. But it is quite likely that many do not know the extent of the job this organization is doing under the Air Forces' policy of streamlining its training.

In a global war it's learn and live.

Good soldiers must be students in this war which is being fought on more far-flung battle fronts than any previous struggle and with equipment employed in ways often only dreamed of heretofore. This is true in all Army ranks from general to private and in all branches, but nowhere more than in the Army Air Forces.

All who wear the wings and propeller of the Air Forces spend a large part of their time in school. Students and even instructors must learn a lot in a very little time. To help them is the major job of TAD.

TAD is responsible for coordination and approval of the field and technical manuals and other training literature used as texts, for training films, film strips, training posters, visual instructional material, recognition material, and synthetic devices required by organizations of the Air Forces.

Naturally, TAD doesn't initiate and produce all this material itself. Decentralization in the Air Forces has been approved so that each command may develop its own training aids if it can and wishes to do so. But AAF Regulation No. 50-19 provides that TAD will approve and coordinate the development, production, distribution and use of all training aids, and will eliminate duplication of effort in their production among Air Force organizations.

Combat efficiency, the ultimate test of all armies and of their field units, is largely determined by training. In a war which will not wait, practical aids to speed up the training process are vital. These aids range from the simplest gadgets to the most complex mechanical devices, from brief training circulars to detailed technical manuals, from film strips of a few frames to training films of several reels. Available aids are listed in Field Manual 21-6 and in catalogues distributed by TAD. Many of the most valuable and interesting training aids have been placed in classified categories and, hence, cannot be described here.

To supply such aids, TAD has been staffed by experienced officer and civilian personnel. TAD officers who came from civilian life were writers, film production chiefs, newspapermen, artists, engineers, lawyers, educators, research experts, and others skilled in allied fields. In addition, there was a nucleus of training literature officers who came from the Air Corps Tactical School and the Directorate of Individual Training.

It is of incidental interest that TAD has been the continuing thread connecting the present School of Applied Tactics with the earlier tactical schools at Maxwell Field and Langley Field in the years following World War I.

TAD is now operating with several divisions, among which are Training Films & Film Strips, Recognition, Synthetic Training Devices, Training Literature, and Research and Library.

(Continued on Next Page)

GET 'EM AND USE 'EM!

To facilitate the production and distribution of training aids, TAD recently sent liaison officers to the Headquarters of the Flying Training Command, Technical Training Command, Air Service Command, Material Command, and the four Air Forces in the continental United States.

The procedure to follow in obtaining training aids already prepared or in initiating new projects varies with the types of aids desired. The methods, listed according to types, follow:

Recognition Materials

Army Air Forces activities within the continental United States desiring recognition materials, should communicate directly with the Commandant, Army Air Forces School of Applied Tactics, attention: Training Aids Directorate. Inquiries concerning materials supplied automatically should be directed as above. Projectors, lens, slides, screens and printed material for flash recognition courses are being distributed to trained instructors. Also available are sets of plastic and cardboard models of friendly and enemy aircraft, and sets of silhouette posters.

Synthetic Training Devices

Requests for synthetic training devices already developed, or copies of the new Army Air Forces Synthetic Device Catalogue should be referred to:

Commandant, Army Air Forces School of Applied Tactics, Orlando, Florida. Attention: Training Aids Directorate.

Developments may be undertaken locally for minor projects. Projects requiring extensive mechanical and technical development will be referred by TAD to the Materiel Command or other agencies.

Training Films and Film Strips

Instructors requiring Training Films and Film Strips will find titles listed in the Army Air Forces Training Film and Film Catalogue published in February, 1943. Training film libraries are maintained throughout the Army Air Forces.

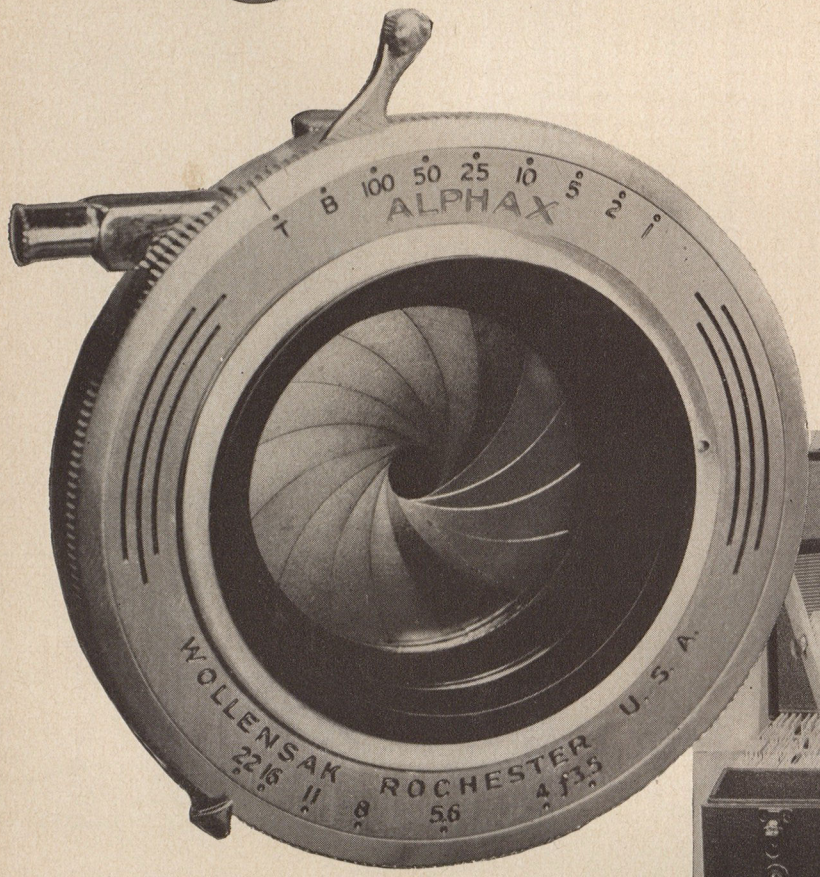
To initiate new Training Film and Film Strip Projects, request should be submitted to TAD, AAFSAT, through the Directorate's liaison officers. Enough information should be given with the suggested title to permit comparison with materials already in preparation, to avoid duplications.

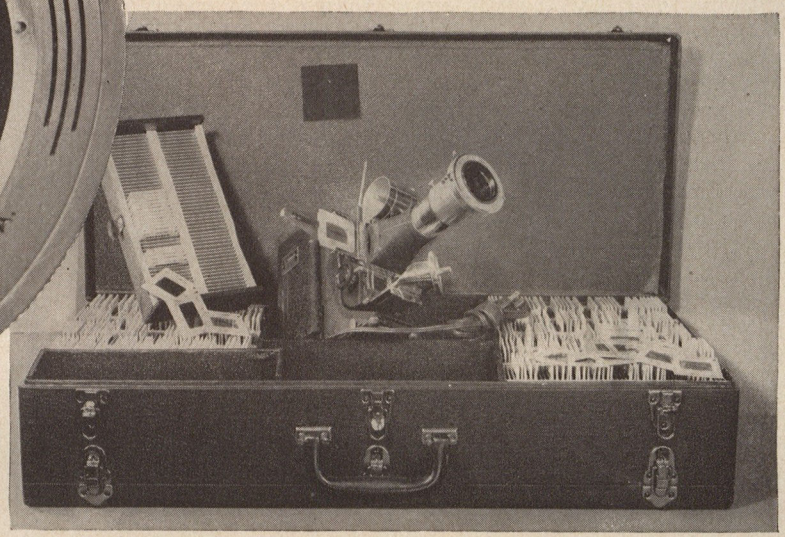
Training Literature

Requests for new training literature, or revision of any existing training literature (War Department publications), should be submitted to TAD, Army Air Forces School of Applied Tactics, through the directorate's liaison offices. To expedite action, it is desirable that a rough draft of the new training literature proposed, or the revision suggested, accompany the request.

War Department publications can be obtained through the usual distribution channels from the Adjutant General's Office. Troop School course materials and extension courses are requested directly from TAD, AAFSAT. Information on other Air Forces' Training Literature may also be procured from this office.

SEEING MORE IN LESS TIME





Through the camera's eye at Orlando comes an effective technique for teaching aircraft recognition. At right is equipment used by instructors employing the new flash method.

By COLONEL LAWRENCE J. CARR
SCHOOL OF APPLIED TACTICS, ORLANDO, FLORIDA

THE best trained pilots and gunners flying the best planes and firing the best guns will not win air battles or support ground troops or defend our installations against attack unless their efforts are used against the enemy.

This war has taught us that many valuable aircraft and the lives of fine pilots have been lost because there has been too much tendency to shoot at anything and everything which comes within the sights of air and anti-aircraft guns, and to worry later about what was hit. Thus, the need for instant and accurate recognition ability among our pilots, gunners, bombardiers, navigators and much of our A-2 personnel.

Until recently there had not been in the Air Forces an interesting and effective system of teaching recognition. There were numerous methods used, but they were mostly haphazard and uninteresting. Now a standardized system has been approved by our Commanding General and is being initiated throughout the Army Air Forces.

A school for instructors has been operating at the Army Air Forces School of Applied Tactics, Orlando, Florida, and graduates of this course have been sent to installations of the Air Forces. Their mission is to teach the instructors who will teach students in this country and personnel now on duty in the theaters of operations.

The Army Air Forces Method of Recognition Training now being used has been devised in conjunction with the United States Navy and personnel of the British Army. It is a definite, precise and stimulating method of aircraft recognition. Original steps in developing it were taken by the United States Navy in conjunction with the Psychology Department of Ohio State University headed by Dr. Samuel Renshaw. Dr. Renshaw had been conducting many experiments in the study of perception of form. His method was developed originally to increase the rate of reading, and Dr. Renshaw, realizing the importance of his research to the Armed Forces, offered his system to the United States Navy. The Navy made a thorough investigation of the Renshaw System to the extent of trying it out in pre-flight schools. They made an actual check on the effectiveness of the training by having students from the Renshaw training classes identify planes flying in various positions and altitudes. The training was found to be more than 80 percent effective and was adopted as the Navy recognition system. The Army Air Forces has taken the Navy course, incorporated suggestions by the British and applied certain practical considerations into the adoption of the present system.

The objectives of the new course of instruction are: first, to identify aircraft, surface craft and ground vehicles quickly and accurately; second, to count quickly the number of objects in a field of view to an accuracy of close approximation; and third, to improve the general effectiveness of vision.

IT must be emphasized that this training is for the development of a special skill, and that this skill reaches beyond purely informational type of identification training. The latter teaches some identification by the use of photographs and silhouettes, but gives the student insufficient skill in recognition.

The act of spotting and distinguishing between enemy or friendly objects is no longer referred to as identification, which might be loosely described as putting together in one's mind the various parts of an object to discover its identity. This spotting and distinguishing is known as recog-

nition—that form of memory in which the subject instinctively feels that a present object has been known before. Of course, identification is a vital part of recognition training, but knowledge of identification characteristics without the visual alertness to use it is of little value. The Army Air Forces program recognizes this and directs attention to the general improvement of visual acuity; that is, ability to see more effectively in shorter time.

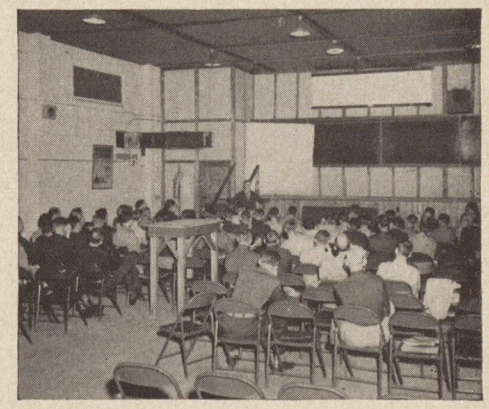
The first objective of the course, the recognition of aircraft and other items, is accomplished through the use of projected images flashed on the screen at split second intervals, varying from three seconds to $\frac{1}{75}$th of a second, depending on the object presented and the progress of the class. This forces the student to see the image as a whole rather than as a series of parts to be analyzed individually. Stress is constantly placed on viewing objects as unified, integrated entities. In the case of each item, the rapid recognition training is preceded by a short instructional period in which the identification characteristics of each item (plane, ship or tank) are presented by a verbal introduction following a standardized procedure and under definite set conditions.

The second objective of the course, quickly estimating a number of objects, is accomplished by the use of projected images showing the objects in varying numbers and concentrations. These are also flashed on a screen at split-second intervals, forcing the student to estimate the number of objects shown. This ability is definitely a skill and can be developed only through continual practice.

The third objective, improvement of the general effectiveness of vision, is the basis of the entire course. It creates in the student an alertness born of ability and confidence. Practice in seeing digits is used to increase the span of vision. It has been found that training in seeing timed exposures under set conditions produces greater results than continued exposures. In other words, you can actually see more in less time. The set condition is the preparation of the student for the appearance of the image, which produces a psychological effort on his part to see accurately and quickly. Hereafter this reaction will be automatic.

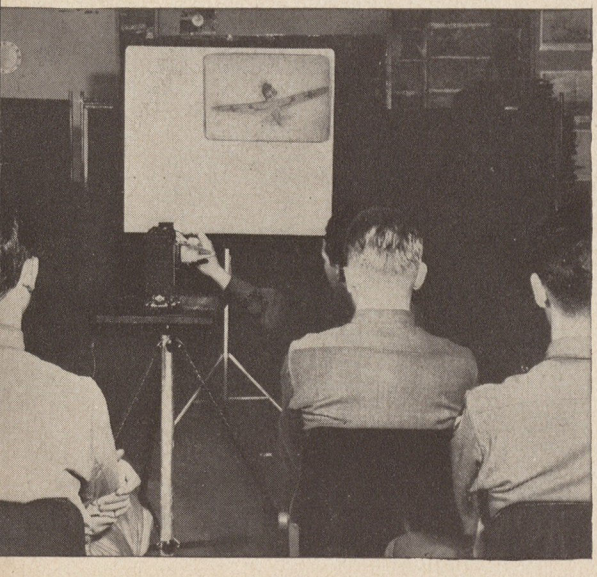
THIS method of teaching is very effective in keeping interest. Recognition becomes a game and a contest. Students take pride in increased ability to recognize types at high speed. In fact, during the classes at the School of Applied Tactics, students were found to be making bets on their ability to spot planes at $\frac{1}{100}$th of a second. They were found also to be very eager to operate the projector while their fellow students did the spotting. These were the same students who a few weeks before felt maligned when informed of their assignment to identification which to their mind was a dull subject. This flash method of recognition, by eliminating the boredom attached to previous methods of teaching, will be welcomed by instructors, students and operational heads alike.

The Air Forces Method is not a short cut to recognition but a means of acquiring greater proficiency in recognition if properly carried out. The more time that can be devoted to recognition training under this method, the more proficient will be the student. Any time that can be allotted to recognition training, no matter how short, can be utilized; but the number of objects learned and the proficiency acquired will depend upon the time available for training.



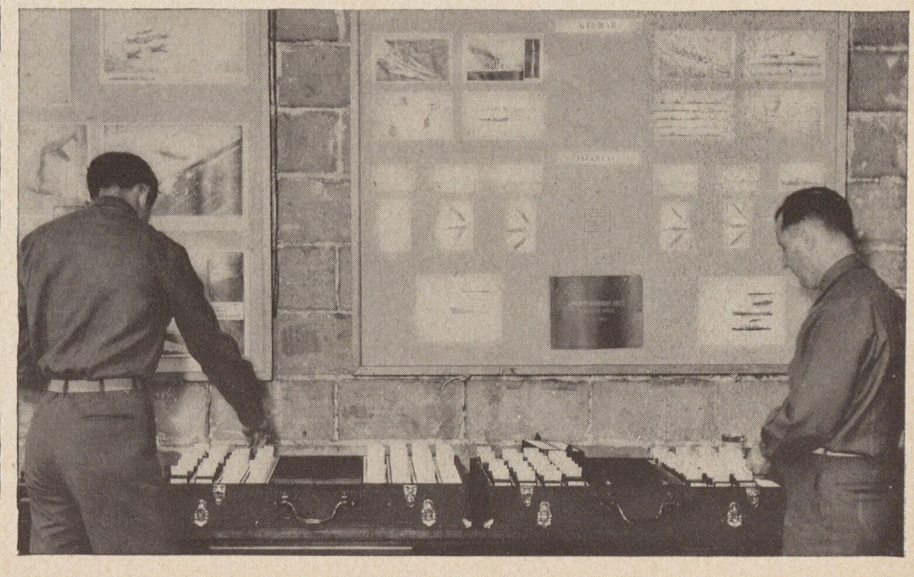
Instructors learning to instruct.

There is no substitute for study, and in order to recognize aircraft a student must be thoroughly acquainted with each type. To supplement slides and all visual presentations, models, posters and manuals will be distributed. A recognition manual prepared in conjunction with the Navy covering aircraft, ships and ground vehicles, is now on the press. This manual will contain photographs and silhouettes of aircraft in flight covering the operational types of friendly and enemy aircraft, together with a brief description of pertinent facts on each plane. This recognition manual, which will be kept current along with all other equipment necessary for the teaching of this course, will be coordinated by the Training Aids Directorate, a part of the Army Air Forces School of Applied Tactics, Orlando, Florida. ☆



Whatizit . . . at 1/100th of a second?

Each slot holds the photo negative of a warplane.



BATTLE REPORTS

(Continued from Page 5)

roughly four ship elements, all elements flying ships in trail. I got shot at one "Oscar" but did not observe results; pulled up to left, saw one P-38 going down with three Japs on his tail. I came down on them, fired at last "Oscar", firing from 300 yards until I went over him. Side of fuselage behind his cockpit blew away.

When I pulled up after second "Oscar" in this group, fired short burst from 300 yards and broke away because another ship on my tail. I pulled up to the right and as I climbed, got shot at flight of three passing overhead from range of 150 yards. Results unobserved. Fell off on left wing and dove on two below so I changed to lead ship, fired long burst from 200 yards, followed him as he dove. He dove into water—no smoke, no fragments.

I was out of ammunition so came home. Landed 1230, got new ship, returned; no sightings, returned to field. Landed 1315.

"SPUN INTO WATER . . ."

To —— on intercept, identified four B-26s to —— and arrived 1155, 18,000 feet to 15,000 feet. Saw aircraft to left, chased, identified as P-40s. Back to ——, circled, saw aircraft over short at ——. Three Zeros 5,000 feet. My flight position. Zeros broke formation, right ship peeled off to right, center ship rolled, left ship peeled off to left and down; I followed left ship in turning dive. I fired long continuous burst at range of about 500 yards closing in to 50 yards. Zeros left tail assembly came off as he pulled out of dive, and he spun into water one-half mile offshore. I pulled up, couldn't find my flight so joined up with another flight. Patrolled; flight ordered home 1255, landed 1320. No damage to my plane; combat lasted from 1210 to 1215.

"OBSERVED AN EXPLOSION . . ."

Arrived Buna 1210, 18,000 feet. Saw three Japs about two miles south Buna, altitude unknown. Flight made circling dive to right, approached "Oscars" from their right near quarter. I did not fire on first diving pass, but I pulled out just below level of "Oscars" and fired at one ship just below me and 300 yards ahead. I got in five short bursts. He turned to right and as I passed he went into a fifty degree dive and disappeared. I turned to right and climbed to evade another "Oscar" which was diving at me. After this, I saw no more enemy ships within range. I circled, started after two aircraft which turned out to be P-40s; chased two more, also P-40s, and then came home alone after Wewoka ordered all fighters home. Left Buna 1200, landed 1330. Combat lasted from 1215 to 1245. I observed an explosion at the place the "Oscar" I fired at was diving toward about half way between the ocean and the west end of the Old Buna Strip, and request investigation to confirm a probable victory. ☆

Roll of Honor

(Continued from Page 19)

Robert G. Crouse, James M. Davenport, Mathias E. Donart, Claude J. Fraley, Joseph A. Gerchow, Clifton W. Groeiz, Clark D. Hagan, Loys C. Hedglin, Duncan Hunter, Thomas Irwin, Felix J. Lukosus, Pell R. Mann, James S. Minnich, Roth J. Narramore, Thomas J. Price, N. H. Salles, John Sloboda, H. E. Swinney, John M. Westhaver. **CORPORALS:** Frank R. Basa, Harold W. Borgelt, Robert P. Buss*, Frank G. Chaplick, Hubert W. Crowell*, James T. English, John J. Felder, Carl W. Fuller, Edward W. Harbaugh, Frank L. Melo, F. D. Montgomery, George H. Nelson, Roy T. Pope, Hodges K. Rigdon, S. L. Taylor, Henry L. Walters, Charles P. Zuercher. **PRIVATES FIRST CLASS:** William G. Creech*, Noel E. Durbin, Virgil A. Green, Frederick R. Jones, Ewald A. Koch, W. G. McInnis, H. C. Rainey, N. J. Salloum, W. Silverwatch, Kenneth E. Strong, A. T. Travaline, A. N. Zeock, Jr. **PRIVATES:** George O. Bushey, Spencer L. Davis, James E. Dinagen, Kenneth A. Fuller, Cleason S. Hamm, Phelps W. King, George G. Leslie*.

DISTINGUISHED FLYING CROSS

MAJOR GENERAL Follett Bradley. **BRIGADIER GENERAL** Laverne G. Saunders. **COLONEL** Robert L. Scott, Jr. (Also Air Medal). **MAJORS:** Algene E. Key, Ernest R. Manierre, Eugene A. Romig, Jack A. Wilson. **CAPTAINS:** William R. Calhoun, Jr., Harold N. Chaffin, Frank M. Fazio, Arthur T. Rice, Meryl M. Smith. **LIEUTENANTS:** Arthur L. Burger, George F. Callahan, William E. Carlson, Justus A. Emens, Walter Holmes, Jr., Henry D. Hudson, Harry J. Kane, Lynn A. Murray, Robert D. Shaw, Thomas A. Shumaker (Also Air Medal), Richard F. Starks. **STAFF SERGEANT** Adolph Buda. **SERGEANT** Robert H. Sangster, Jr. (Also Oak Leaf Cluster to Distinguished Flying Cross). **CORPORALS:** George E. Bellamy, William C. Myers.

SOLDIERS' MEDAL

WARRANT OFFICER James C. Woodyard. **MASTER SERGEANT** Ronald W. Barksdale. **CORPORAL** Steve J. Aramian. **PRIVATES:** Phillip DeLuca, Robert D. Elbert, Harry W. Estes, Bernard W. Nelson, Anthony P. Parks, Harold C. Sumpter*.

AIR MEDAL

MAJORS: John K. Carr, James K. Dowling, Charles E. Griffith, Paul J. Long, Edgar A. Romberg. **CAPTAINS:** Albert Shelton Aiken, Abram H. Anders, Gerald L. Cherymisin, Leo G. Clarke, Jr., Oscar C. Cone, Charles W. Dean, C. A. Gibson, Jr., Frank A. Hill, John B. Holst, Everett W. Holstrom, Robert J. Hoss, Donald L. Marshall, Robert I. Paullin, Francis B. Rang, James William Sibert. **LIEUTENANTS:** Jerome H. Adler, William J. Anderson, Victor H. Bartholomei, Richard C. Browning, William J. Crumm, Thomas K. Dickenson, George B. Doan, Daniel Charles Hawley, George A. Simeral. **MASTER SERGEANTS:** Frederick W. Blanchard, Edwin F. Rhodes, Robert A. Richardson. **TECHNICAL SERGEANTS:** George P. Dannenhauer, Steve Fedinick, Daniel Goldstein, George R. Hammond, Eugene L. Lowe, Robert E. Marer (Also Oak Leaf Cluster to Air Medal), John A. Oshman, William D. Olmstead, Eugene J. Remmell (Also Oak Leaf Cluster to Air Medal). **STAFF SERGEANTS:** Joseph J. Benkovic, Maurice G. Cecchini, Charles E. Holt, Floyd F. Julian, Andrew Markel, Steven Perri (Also Oak Leaf Cluster to Air Medal), Robert F. Ransdell, John Timar, Oscar D. Wells, Jr. **SERGEANTS:** William W. Barsh, Fred J. Best, Robert A. Block, Norman R. Brandt, Anton J. Budgen, Joseph J. Byrne, Frank J. Consiglio, Frank A. Coretto, Kenneth A. Daugherty, Richard Q. Flint, Kermit E. Gregory, Svend J. W. Hanson, Edgar A. Hasting, Charles A. Horton, Bernard Karasin, Wilbur W. Mayhew, Jr., Frank J. Mickus, Robert K. Rusie, Frank Souza, Adolph A. Tylka, Phineas Y. Wharf, Leslie D. Willard, Robert P. Wysong. **PRIVATE FIRST CLASS** Matthew P. Brazil. **PRIVATES:** Wilbert H. Elliott, Louis Kirkpatrick, Vincent O. McMahon, Jr.

* Posthumous.

How to Keep Well in the MIDDLE EASTERN THEATER

Brigadier General David N. W. Grant
THE AIR SURGEON

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

THE following article is the fourth of a series on health conditions in the various theaters of operations.—THE EDITOR.

THE LEVANT, frequently called "The Near East" or "Middle East", is made up of the Moslem countries of Southwestern Asia that border, for the most part, on the Eastern Mediterranean Sea, the Red Sea, and the Persian Gulf. Although it is one of the oldest inhabited regions of the world, it is still a primitive land when judged by American standards. There are several modern cities along the Mediterranean quite similar to American cities, but the great majority of the towns and villages are exactly as they were in Biblical times.

The inhabited areas are found where the most water is available, such as along the eastern Mediterranean seaboard, in the river valleys and in the Lebanon Mountains. The greater part of the area is arid desert land, not great sandy wastes like the Sahara in Africa but flinty, harsh, monotonous desert, covered only with a thin scrubby vegetation.

The fact that the majority of the people live along water courses indicates the important role that water plays in their lives. However, they have little regard for the purity of water. American troops, who have been taught the importance of chlorinating or boiling water before using it, will be shocked to see natives take water for drinking purposes from open ditches running through the middle of the streets. Except for water treated under the supervision of Army personnel, the water in this area must always be considered potentially contaminated with various organisms capable of causing such diseases as typhoid fever, dysentery, schistosomiasis and, perhaps, cholera.

The principal health problems for troops in this area will have to do with the procurement and the use of water. All personnel going to the Levant should know one or two emergency methods of purifying drinking water (FM 21-10).

A man can get along on one quart of water a day for four or five days without any serious consequences if he knows how to husband it. There are a few tricks that will help conserve water when the amount is limited. Drink water only in small amounts and drink it slowly, for when it is consumed rapidly it is lost in the form of excessive perspiration. Small sips swished around in the mouth will alleviate the first craving for water. Chewing gum will also suppress the desire to drink. However, chewing tobacco or smoking have the opposite effect. Unless absolutely necessary, do not allow yourself to become so warm that you perspire profusely.

DURING the summer months the climate throughout this entire area, with the exception of mountain regions, is torrid. Sun stroke and heat exhaustion will therefore be common, unless special precautions are taken to avert them. Every man should know the early signs of these conditions, for it is easy to prevent them if recognized early.

Impending sun stroke is signaled by headaches, dizziness, irritability, dry, hot skin, and the seeing of objects such as red and purple spots before the eyes. Sun stroke victims run a high fever and unless immediate steps are taken to reduce the fever death may occur. The victim should be placed in the shade when possible, his clothes removed, and water given him slowly in small quantities. Sponge the body with water, but do not dry it, for evaporation is a means of cooling. These people should always be taken to a medical officer as rapidly as possible.

Muscular cramps and pale, moist, cool skin are signs of heat exhaustion. The victim becomes dizzy and not infrequently vomits; his pulse is weak; the pupils of his eyes dilate, and his respiration is shallow. Men suffering from heat exhaustion are in need of salt, which should be given in large quantities dissolved in small amounts of fluid, such as water, tea or coffee.

One of the most important disease problems in the Levant is malaria. Although a great part of the country is desert, malaria accounts for a large proportion of all deaths. Malaria-carrying mosquitoes are found wherever there is water, along the sea coasts, in the river valleys, about the lakes, and even at desert oases and waterholes. In parts of Palestine attempts have been made to eradicate mosquitoes. However, throughout the Levant troops should always be aware of the existing danger and govern themselves accordingly. Stay indoors after dark, or if you must go out at night, wear long trousers tucked into boots or leggins, and long sleeved shirts. Use mosquito repellents, headnets, gloves and mosquito boots. If buildings are not well screened be sure that you always sleep under a mosquito net. Avoid native towns where infected inhabitants act as reservoirs of the disease. These villages are usually infested with mosquitoes.

Although yellow fever has never occurred in this area, the yellow fever mosquito is very common and transmits Dengue, or Breakbone fever to man. Dengue is not a fatal disease but is very incapacitating and painful. The presence of this dangerous mosquito is of considerable importance. Strict regulations with regards to Air Corps fumigation and vaccination of all personnel are a result of its prevalence.

Except for the European communities of Palestine and the few Westernized Moslems, the majority of the people have little interest in personal cleanliness. Many of them have scabies and are infested with lice. Because typhus fever and louse-borne relapsing fever are not uncommon, especially during the winter months, it is important to avoid native homes, dirty natives in bazaars, association with individuals who may be infested with lice. Shawls, rugs and clothing, purchased at native bazaars, or

picked up in native homes must be considered as lice bearing.

Due to the scarcity of water, it may be difficult to bathe frequently. However, regular bathing, if no more than a sponge bath, is essential. The skin folds, between the toes, in the crotch, and armpits must be kept clean in order to avoid fungus infections, such as dhobie itch and athlete's foot. After bathing, all parts of the body should be thoroughly dried and dusted with powder, such as the army issue foot powder, and clean dry clothing put on when possible. Do not use another person's towel or allow him to use yours.

Bathe whenever you can, but remember that the streams, irrigation ditches and ponds along the coasts and great river valleys are contaminated with the flukes—blood worms—that cause schistosomiasis, a very serious disease of the bladder and bowel. It is not safe to swim or even wade in water that contains these flukes. Be sure that water has been examined by Medical Department personnel and declared safe before swimming, bathing or wading. Sea bathing close to shore, where there are no sharks, but away from the outlets of rivers, is safe, as is water that has been placed in confined spaces and allowed to stand for from 48 to 72 hours.

TAKE a page from the old cavalrymen's rule book and shave only in the evening for the sun and wind burn a freshly-shaven face.

Flies will be very obnoxious pests in all of the Moslem countries. Few precautions are taken to see that human excrement and garbage—fly-breeding material—are properly disposed of. Not infrequently streets, and even homes, are soiled. This will be immediately evident to all newcomers, for the stench that is found in most Moslem towns is one not to be forgotten. The fact that flies can transmit typhoid fever, bacillary, dysentery and cholera, makes them doubly important. The first two diseases are always present in the Levant, and just because a native can drink water from a ditch that acts both as a water main and a sewer, without particular harm to himself, does not mean that you can. Your typhoid fever shots protect you to a reasonable degree against this disease, but the number of bacteria that might be taken in in one small sip of polluted water might be capable of overcoming your immunity. Then, too, it protects you only against typhoid and not against the other intestinal diseases. There is little cholera in the Levant at the present time. However, the constant immigration of Moslem pilgrims to Mecca from those parts of the world where cholera is endemic makes it a potential threat.

The natives also have the unsanitary customs of fertilizing fruit and vegetable gardens with human waste, and of irrigating and washing fruits and vegetables with sewage water. This, of course, means that these foods can be contaminated with dangerous bacteria. To be sure they are safe, they should be dipped in boiling water for a few minutes before being peeled. Potassium permanganate solution is not satisfactory unless the fruit or vegetable is allowed to soak in it for a minimum of four or five hours. All foods, other than thick-skinned fruits, should be thoroughly cooked. The best safeguard is to eat only at the Army post, even when on leave, or in European restaurants that have been inspected and approved by an American medical officer. By all means, do not buy food from a street vendor.

Milk should always be boiled, for pasteurization is only employed in the modern Jewish communities and a great majority of the dairy animals have tuberculosis and undulant fever. Because food spoils rapidly in this area, it is necessary to carry such staple food as concentrated rations, canned fruit juices, crackers and thick-skinned fruits on an operational flight.

Sand fly fever is a disease very much like dhengue in that it is rarely fatal but very painful. The troublesome little fly that causes this disease is found throughout the Levant. There are many ticks in this region that carry the tick-borne type of relapsing fever. During the last war a large epidemic of tick-borne relapsing fever appeared amongst people who had been living in caves, a frequent habitat of ticks. Some ticks in this area also carry a disease somewhat similar to but milder than our own Rocky Mountain fever — Fieve-boutenneuse. When operating in tick-infested country the body should be gone over thoroughly at least four times a day to be sure that no ticks have been picked up. A tick should never be yanked off, but should be removed with forceps or, if they are not available, by wrapping a piece of paper or cloth about the tick before gently pulling it off. A drop of kerosene on a tick will make him release his hold promptly, or, if nothing better is available, you can prod him with a lighted cigarette butt.

There are many dangerous snakes in this area, such as the black cobra, and pit vipers. To avoid being bitten, examine clothing and shoes before getting dressed, for on cool nights snakes like to get in warm places. Always be careful to look in cupboards, drawers, and other dark places before reaching into them with your hand. Before getting out of bed at night turn on the flashlight to make sure that there are no snakes on the floor. Wear boots when required to walk in snake infested areas and avoid careless touching of trees and shrubs. Do not lie down in the grass until you are sure that there are no snakes about.

IF bitten by a snake, immediately apply a tourniquet above the bite. Do not become excited, and, above all, do not take any alcoholic drinks. A snake-bite patient should not be allowed to exert himself but should be removed to a medical officer as rapidly as possible. If a medical officer is not available, whether or not the bite is on a part of the body where a tourniquet can be used, a cross incision, one-half by one-half inch, should be made over each fang mark and preferably one to connect the two fang punctures. The cut must be deep enough, one-fourth to one-half inch, to insure free bleeding. Suction must then be applied for short intervals for at least one-half hour. This may be applied by the mouth, or by heating a bottle and placing its mouth tightly over the wound. The cooling of the bottle will produce considerable suction (FM 21-10). If possible, kill the snake and take it to the medical officer for inspection, so that he will know what anti-venom to use.

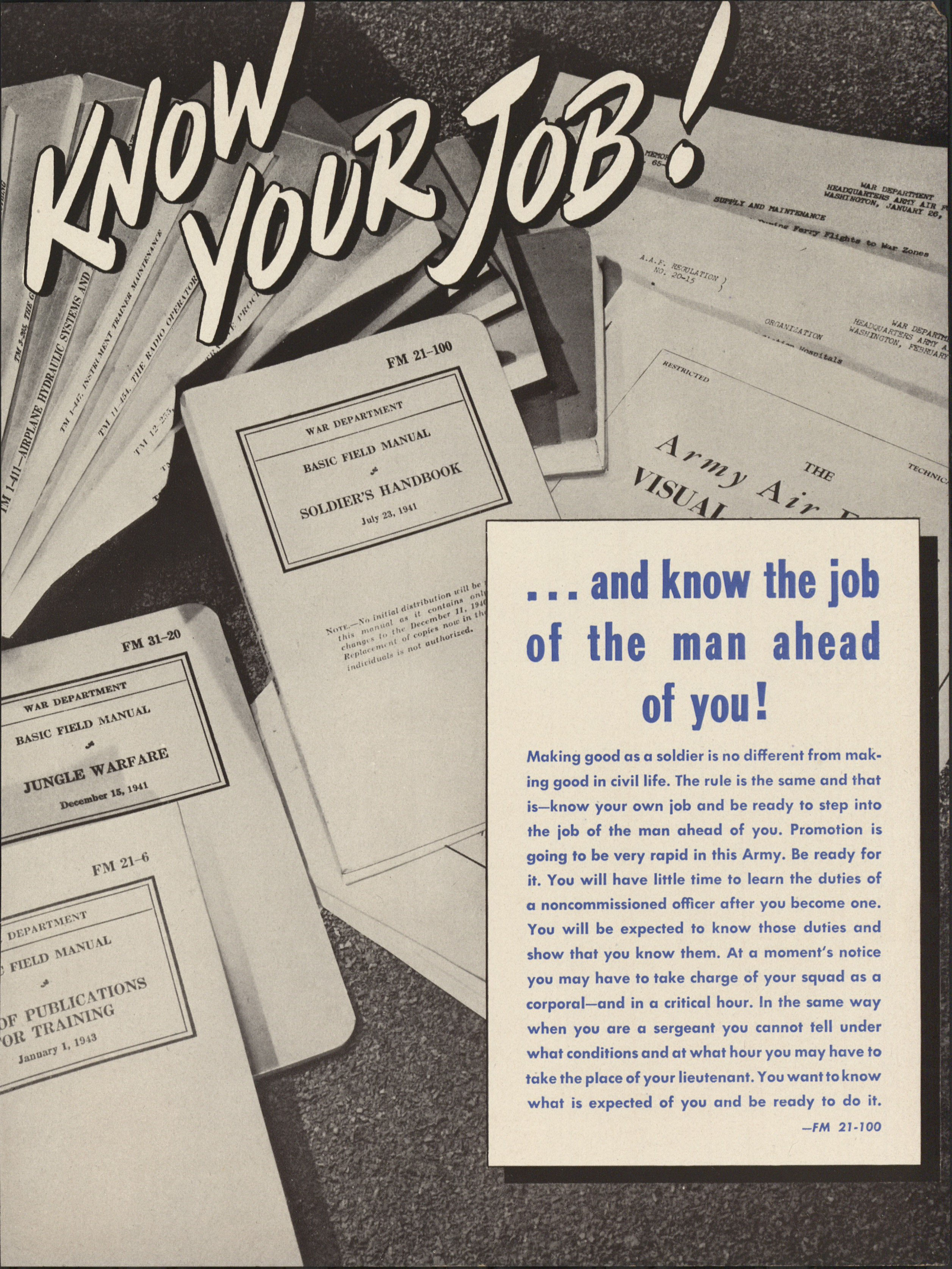
The differences between ground and air temperatures during the summer months, when temperatures of 100 degrees or more are frequently reported on the ground, while temperatures of 40 or 50 degrees occur at relatively low altitudes, make an additional problem for the flyer. Unless he is careful to arrange his flying equipment so that varying degrees of warmth may be added as he ascends, he will become chilled and may develop a cold or even pneumonia. Precautions must be taken to avoid sunburn, for in this latitude serious burns may be acquired after relatively short exposure. The glare of reflected light from the desert and mechanical irritation produced by wind and blowing sand makes it necessary for all personnel to wear protective goggles.

If forced to travel on foot across the desert avoid doing so during the heat of the day, but travel only at night or in the early morning and late afternoon. Avoid unnecessary steps before setting out for a new objective. Be sure you are properly oriented and that your course follows the easiest route. Travel light, take only such things as water, food, compass and gun, first-aid kit, sun glasses, a knife and some cloth, such as a piece of parachute silk, to be used as a sun shade during the heat of the day.

Minor wounds, such as cuts and abrasions, become infected easily and not infrequently develop into seriously disabling injuries so that immediate first aid treatment should be applied to all cuts, burns, abrasions and insect bites—no matter how small. Desert sores and other painful skin ulcers will be avoided if proper attention is given to all minor injuries.

Venereal diseases are common throughout this area, especially in the towns along the sea coast and in larger cities.

Usually, professional prostitutes live in segregated districts. However, all women who can be "picked up" must be considered in the same category as professional prostitutes, and furthermore, they will all be infected with one or more of the common venereal diseases: syphilis, gonorrhea and chancroid. The customs of the country and the religious beliefs of the Moslems forbids the association of their women with members of the Christian faiths. To violate these customs is to invite the most severe type of reprisal from the Moslem men—even to the point of emasculation of the offender. ☆



. . . and know the job of the man ahead of you!

Making good as a soldier is no different from making good in civil life. The rule is the same and that is—know your own job and be ready to step into the job of the man ahead of you. Promotion is going to be very rapid in this Army. Be ready for it. You will have little time to learn the duties of a noncommissioned officer after you become one. You will be expected to know those duties and show that you know them. At a moment's notice you may have to take charge of your squad as a corporal—and in a critical hour. In the same way when you are a sergeant you cannot tell under what conditions and at what hour you may have to take the place of your lieutenant. You want to know what is expected of you and be ready to do it.

—FM 21-100

We Who Are Leaving Say...