

AIR FORCE

OFFICIAL SERVICE JOURNAL



OF THE U. S. ARMY AIR FORCES



MARCH 1943

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March Brief

HELICOPTER is not a coined word or a trade name. It is as much a part of aviation terminology as, let's say, monoplane or glider. And there are those who insist that the word helicopter will be a household favorite in the years to come.

Be that as it may, we support this month's cover picture with two articles and additional pictures of the Army Sikorsky Helicopter — described as "the Army's first practical and successful helicopter aircraft." The cover picture shows that craft standing still in mid-air to take on a passenger without landing.

Colonel H. F. Gregory of Wright Field will introduce you (on Page 6) to the Army Sikorsky Helicopter. Colonel Gregory, who acted as project officer for the development and procurement of this "flying windmill," reports on the results of more than ten months of testing the ship and takes you through the motions of flying it.

This wingless aircraft was delivered from the factory to Wright Field last May in what was a helicopter's first cross country flight in the Western Hemisphere. Not long after its completion C. L. Morris, the pilot, recorded the trip while its details were still fresh in his memory. Now, after ten months, his story can be told. The mile-by-mile narrative by Mr. Morris, full of sidelights and humor, starts on Page 7.

YOU MAY be surprised to hear that in place of radio equipment another seat has been wedged into the cockpit of the P-38, making it possible for this single-seater to serve as a transition trainer. The story of the conversion is told on Page 10 by Lieutenant John Truesdell of the Directorate of Flying Safety.

IF YOU'RE INTERESTED in a combat report on what it means to stay a jump ahead of the enemy we refer you to the article on Page 4. We've called it "What You See Won't Hurt You," and offer it as practical comment on the important aircraft recognition problem. The author is Lieutenant Charles W. Tribken, Jr., a 24-year-old fighter pilot who recently completed 200 operational hours with the Royal Air Force, first with an Eagle Squadron in Britain, then with an RAF unit in Africa. He flew late model P-40Es through the last big desert push against Rommel's forces. After a year and a half with the RAF, Lieutenant Tribken has just been transferred to the Army Air Forces. This is his first attempt at writing for publication and we don't mind saying we would be

happy to use more of the same caliber. That's an open invitation.

MOST OLD TIMERS have at one time or other toyed with the idea of a navigation system to end all navigation systems. The instrument labs at Wright Field are flooded with navigation inventions of all types, and welcomes more. The job, explains Colonel Thomas L. Thurlow, of Wright Field, "is to spot the phony systems and to encourage development of the ones that can be depended on to bring our planes home." Colonel Thurlow's article should help you recognize the phony and the good. It begins on Page 8.

MAJOR JOHN C. HENRY of the Air Transport Command, former Washington newspaperman and president of the White House Correspondent's Association, was stationed at the ATC base in West Africa where Brigadier General Patrick Hurley stopped overnight enroute to Russia on a special mission for President Roosevelt. At General Hurley's request, Major Henry joined the party—the first group of foreign observers permitted to view action on the Russian front. An account of their observations was written by Major Henry for AIR FORCE. It appears on Page 17.

FLIGHT CONTROL at first glance looks like a pretty ornery looking beast, writes Lieutenant Colonel George C. Price, Director of Flight Control for the Air Forces, but isn't such a bad critter once you get used to it. Colonel Price explains what he means in an article on Page 12.

THE SOLOMON ISLANDS haven't been an ideal spot for a lengthy canoe trip, but Lieutenant Wallace S. Dinn, Jr., a Southwest Pacific P-39 pilot, managed it all right. After bailing out of his crippled ship over the Solomons, Lieutenant Dinn, with some friendly natives, paddled to safety eight days later. Oh, yes, there was another passenger—a Jap pilot whom they captured enroute. Lieutenant Dinn tells about the experience on Page 23.

CARDBOARD SPLINTS? Yes, they form the basis for a novel combat first aid method originated by Major Walter J. Crawford, March Field, California, and outlined on Page 20 in an article by Sergeant Max Baird. Major Crawford is a flight surgeon on leave from the medical faculty of Tulane University. Sergeant Baird is a former Kansas City newspaperman and magazine writer.

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.

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CROSS COUNTRY

What Army Emergency Relief means to you; developments of the month within the Army Air Forces.

IT'S NOT just being away from home," a sergeant explained the other day. "A guy expects that in the Army. It's wondering whether the family is making out all right, and if they'll be taken care of if an emergency comes up."

For some time now we've been hearing about Army Emergency Relief. Radio programs, football games and stage shows, we've been told, are giving all or part of their take to the fund. Dollars, millions of them, have been pouring in. What happens to all that dough?

A man came to his local AER office and explained he had four sons in the Army. They had supported the family. Until their allotments arrived, he needed money to pay taxes, mortgages and interest on the home. Through AER a loan was granted, the house saved. The money was repaid when the allotment check arrived.

A wife with an Army husband in Australia had saved carefully for her baby, but gave birth to a son two months prematurely. It meant a lot of extra money for incubators, nurses, etc. The AER came quickly to the mother's aid, gave her a check for what she needed.

A young lieutenant with a wife and two children, who lived up to the limit of his salary, was suddenly ordered on a mission. The expenses would be at least a hundred bucks, and he didn't have it. The AER supplied him with the cash, and when he returned and collected his per diem, he repaid the loan.

A worried mother, with an eight-year-old daughter and an Army husband a long way from home, came to the AER for help. Dentist bills for the girl had piled up; gas and electric light bills had to be paid. She was getting behind and saw no way of catching up. The AER took all her bills, paid them and put some cash in her pocketbook to help her get a fresh start.

A private, called home when his wife gave birth to a child, had saved up \$200 for the event, estimated as enough to cover expenses. But there was trouble—a Caesarean, blood transfusions, plenty of complications. The \$200 didn't half cover the expense. The AER stepped in, gave the private the money needed for all the unexpected extras. He went back to camp a much happier guy, knowing AER was behind him. That's not speculation, either, for he wrote AER a letter of thanks and told them so.

Hundreds of similar cases could be cited. For Army Emergency Relief means just what it says—relief for military personnel and their dependents in an emergency—and it was set up at the instance of the Secretary of War for that purpose. Here's how it works:

If an Army man or his dependent needs money he can go to his nearest AER station and present his case. He fills out applications—this is still the Army and there's

sure to be paper work—and the case is investigated. If relief is granted, the applicant is given a loan, cash grant or relief in kind (food, clothing, etc.), depending on the nature of the case.

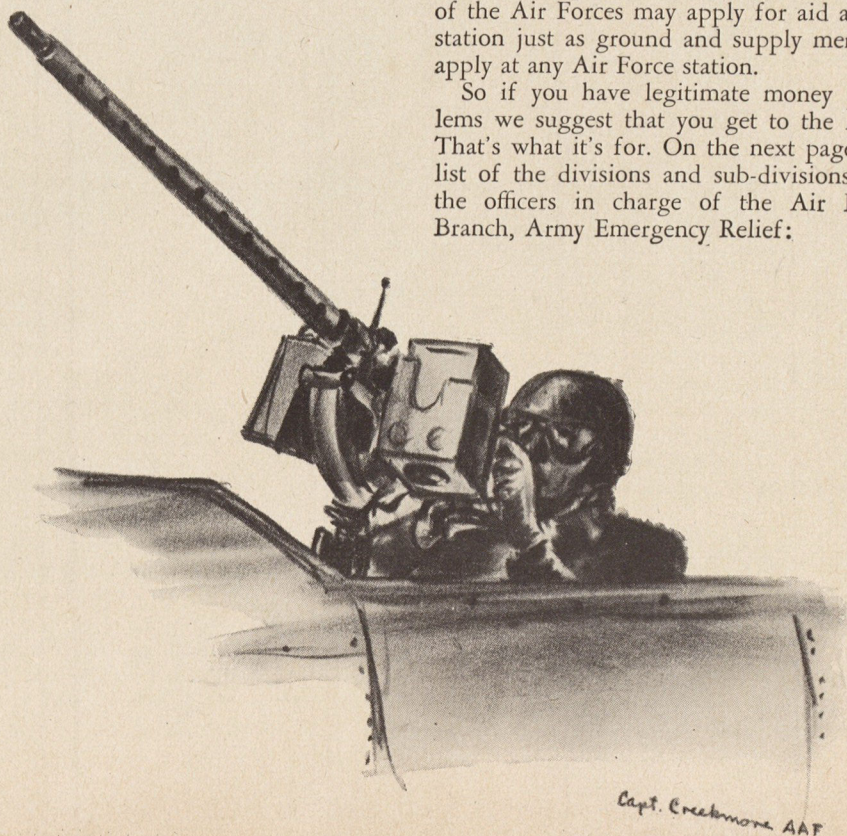
The AER works hand in glove with the American Red Cross; in fact, it was a grant of a million and a half dollars from the Red Cross that started the ball rolling. And now it is the Red Cross, through its field representatives, that investigates cases coming to the attention of the AER.

No funds are solicited by this outfit. It takes money donated through benefits and the like, but no contributions are asked for. The Red Cross is, in a sense, its sponsor and the Red Cross will undertake to make up any deficit.

Of approximately 400 AER stations in cities and stations throughout the country, the Army Air Forces operated 223 of them as of February 8.

But the Air Force branch of the AER is in no sense a separate organization. A member of the Air Forces may apply for aid at any station just as ground and supply men can apply at any Air Force station.

So if you have legitimate money problems we suggest that you get to the AER. That's what it's for. On the next page is a list of the divisions and sub-divisions and the officers in charge of the Air Force Branch, Army Emergency Relief:



Division

AER Officer

1st Air Force, Mitchel Field, N. Y. . . Major F. Cassidy
2nd Air Force, Spokane, Wash. . . . Capt. Jack Green
3rd Air Force, Tampa, Fla. . . . Colonel J. N. Douglas
4th Air Force, San Francisco, Cal. . . Capt. T. Kendall
Air Service Command, Patterson Field, Ohio,
Major Loren Robinson
Air Transport Command, Air Forces Annex
Nat. Airport, Gravelly Pt., Va. Capt. A. Goodman
Dist. of Columbia, 703 Maritime Bldg.,
Lieut. Col. Dudley S. Dean
Flying Training Command, T & P Bldg.,
Fort Worth, Texas. . . . Major Walter Dunham
Gulf Coast Sub-Div., Randolph Field, Tex.,
Major Henry Stein
Southeast Sub-Div., Maxwell Field, Ala.,
Captain F. C. Peck
West Coast Sub-Div., Santa Ana, Calif.,
Captain G. H. Teeple
Materiel Command, Wright Field, Dayton, O.,
Major John Masner
Tech'l Train'g Command, Knollwood Field, N. C.,
Major H. V. Carson
Sub-Div. No. 1, Greensboro, N. C.,
Lieut. John J. Gerlach
Sub-Div. No. 2, St. Louis, Mo. . . . Capt. E. R. Elbel
Sub-Div. No. 3, Tulsa, Okla. . . Capt. Earl Knighton
Sub-Div. No. 4, Denver, Colo. . . Capt. C. Goldsburly
Sub-Div. No. 5, Miami Beach, Fla. Lieut. C. Linden
Troop Carrier Command, Stout Field,
Indianapolis, Ind. . . Capt. O. L. Heath

AIR FORCES AID SOCIETY

THERE is, within the Air Forces, another agency called the Army Air Forces Aid Society. This is solely Air Force, and not an emergency fund. In fact, the fund will not be used until after the war. Then its function will be to assist Air Force personnel and their families in rehabilitating themselves in regard to education, employment, financial aid, etc.

The Aid Society is building up a trust fund from voluntary gifts and contributions which it is allowed to accept although no solicitation of funds can be made at the present time. A number of writers, for instance, have assigned their pay or royalties to the society.

A Memorial Division has been created within the Aid Society which makes it possible for those wishing to make a contribution in memory of a friend or relative to send a sum of money, in lieu of flowers, to the society's trust fund. Any gift, however small, may be sent to the Society, which in turn will forward a card, bearing the donor's name, to the bereaved widow or family, explaining that a sum (amount undisclosed) has been contributed to the trust fund in memory of the deceased friend. This memorial will be perpetuated on the official rolls of the Society. These contributions will become part of the fund established to aid and assist Air Forces personnel and their dependents in distress after the war is over.

Voluntary donations may be sent to the Army Air Forces Aid Society, Inc., Room 703 Maritime Building, Washington, D. C.

WEATHER TRAINING SCHOOL

THE Weather Training School of the Air Forces has been expanded and relocated at Grand Rapids, Michigan. Under jurisdiction of the Technical Training Command, the school was formerly operated on a smaller scale at Chanute Field, Illinois.

To qualify for the school students must

have completed two years of college training and at least one year of college physics. After nine months' training, students qualify for commissions as second lieutenants.

A new course, not before offered, will qualify a number of cadets as Aviation Meteorology Cadet Instructors, who will be assigned as second lieutenants to flying schools to instruct flying officers in meteorology.

NEW AIR FORCE AWARD

IT TAKES a lot of drivers and automotive mechanics to keep the expanding Air Forces going. And now this assignment has been recognized. A silver badge for vehicle drivers and mechanics is now in production and ready for distribution. Each qualified vehicle driver and mechanic in an or-

WAR DEPARTMENT

Men and Women of the Army of the United States:

Maintenance of trucks, tanks and all the vehicles of war at a high standard of performance is as important to the success of the Army as the physical fitness of its personnel.

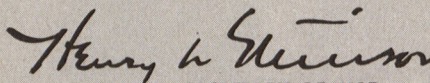
The Army supervises programs to insure the continuing health of its men and women. Maintenance of the same degree of perfection in vehicles depends squarely upon their crews.

Whether you are in a training camp in the United States or in the forward line of a combat area, "readiness for battle" must be the standard by which you judge the condition of this equipment which has been entrusted to your care.

The whole long chain of production and supply—from assembly at the factory to delivery on a distant shore—is severed if a vehicle's high perfection is permitted to deteriorate through lack of responsible care.

I call on every man and woman serving with the Army of the United States to unite in a campaign of preventive maintenance designed to abolish the menace of mechanical failures and to get the most from the fine machines which industry has provided.

This is your responsibility. I depend upon you to see it through.


SECRETARY OF WAR.

ganization of the Army Air Forces, who is regularly assigned to duty in the capacity of driver, assistant driver or automotive mechanic, will be awarded a badge with an appropriate bar indicating the specific individual qualifications.

To qualify for an award a driver must: (1) Pass aptitude test and standard driver's qualification tests (practical and written) as prescribed by FM-25-10 for wheeled vehicles or FM-17-5 for track-laying vehicles. (2) Perform duty for a minimum of three months as a driver or assistant driver of an Army vehicle without traffic violations and with an accident-free record and a rating of "excellent." (3) Be assigned to duty as a driver or assistant driver of a vehicle. (4) Have not had award revoked for cause dur-

ing the previous six months. To qualify for an award an automotive mechanic must: (1) Complete a standard vehicle mechanic's course with a rating of "skilled" or have sufficient previous experience as an automotive mechanic to justify a skilled rating. (2) Perform duty for a minimum of three months as an automotive mechanic, second echelon or higher, with a rating of "excellent." (3) Be assigned to duty as an automotive mechanic, second echelon or higher. (4) Have not had award revoked for cause during previous six months.

Distribution of awards will be in accordance with W. D. Circular 248.

MISSING PARACHUTE

BASE OPERATIONS at the New Orleans Army Air Base reports a parachute missing and requests that Air Force organizations inventory parachutes at their stations. If Type S-1 No. 39-2834 chute is located, it is requested that it be returned to the Sub-Depot Supply Officer, 48th Sub-Depot, Kelly Field, Texas.

FORBIDDEN FRUIT

IN THE December issue we devoted an article to the boys who insist on wearing military uniforms despite the fact they're not in the service. We've been asked to add that women—wives, sweethearts, mothers, sisters—are also offenders in their wearing of military insignia, and that Air Force wings and lapel buttons too often assume the status of fraternity pins.

It seems that the law applies to the ladies as well as the men in prescribing a fine up to \$300 and/or imprisonment for any person not an officer or enlisted man of the armed forces convicted of wearing the duly prescribed uniform "or any distinctive part of such uniform."

BOMBARDMENT ON DISPLAY

A PHOTOGRAPHIC EXHIBIT, graphically showing the devastation wrought by bombers of the Royal Air Force on industrial areas and transportation centers in Axis-controlled cities of Europe, has been on display recently at the War Department in Washington.

The scenes were recorded by RAF photo-reconnaissance planes, sometimes within a few hours after big raids. Shown in unusual detail is the devastation at Lubeck, Bremen and Osnabruck; the shambles left by block-busters and incendiaries at Wilhelmshaven, Dusseldorf and Cologne, and the damage done at several French and Italian ports.

Squadron Leader G. A. Morris, chief of photographic interpretation for the RAF Bomber Command, accompanied the exhibit to Washington. He explained that its primary purpose was to show the expediency of attacking production at its source, rather than waiting to destroy the weapons of war after they had reached the battlefronts.

—THE EDITOR.

AIR FORCE, March, 1943

LETTER HOME

By Captain Thomas G. Lanphier, Jr.

The writer of this letter is a member of an AAF fighter group in the New Caledonia area. His father is Lt. Col. Thomas G. Lanphier, Chief of the North American Theater for Air, Military Intelligence, G-2.

December, 1942.

Mother and Dad:

Still in the pink and finding the time passes quickly at last. Back in — after we'd attained a certain ability and experience we all felt we were marking time—and wasting time.

Up here we are doing what we've been trained all this while to do—and in the short week we've been here we've helped the cause no little. You're doubtless reading of our daily efforts in the line—I've gotten in fourteen hours of combat in the air—not all of that is fighting of course, most of it is getting to and fro. We are no longer outnumbered and poorly equipped—we're well set up and have lots of company.

It's the same old story it has been in other wars—some few of the lads have too much imagination and aren't of much use but the great majority go at it hell-for-leather, which is best. Our opposition can't seem to cope with aggression—we've been quite successful in bulling right into them and scattering them to the four winds.

Things are much better all around here—than they used to be. Living conditions are halfway decent and we get enough rest now that we aren't harassed the way they used to be here.

We are, of course, fighting a different sort of war than are the men in the trenches—and the effects (whatever they're supposed to be) of battle don't show on the pilots the way they do on the foot soldiers.

Our flying units are pretty much the same thing a fraternity house used to be—all young men, few of these the grim and "hard bitten" characters *Time* loves to depict. Most of the flyers here have been my cohorts, on and off, since we left the States—a lot of them I went to school with, back in training days.

We lose a boy now and then but it's rare that a pilot fails to get back to our base, even when shot down. Things move

pretty swiftly and we don't seem to feel the concern we might feel at other times—when one of them fails to return. Can't afford to, I guess.

The thing that impresses me is the way almost all of our pilots—the loud ones and the quiet ones, the hard ones and the soft ones—stick together when it gets rough upstairs. That's our saving factor and one the other people don't utilize very much. We stick together and work together and it pays dividends.

I've been flying in front of four and eight men on all my flights—I worried at first about the responsibility but things have worked out so that we've all come back from every flight—and did a lot of damage to the other team while at it—so I don't fret about it much anymore. I destroyed two planes on the ground the other day. They don't count on the "record" as victories—but they'll never fly again which is what counts. All the business about "how many Japs did so and so get"—is pretty much nonsense.

There are men here who'll have hundreds of hours in combat—good men, the best—who only have one or two Nip planes to their credit. But God only knows how many guns they've wiped out strafing, how many ships they've sunk dive bombing—how far and how well they've led their men out and back safely. Some seem to have the good fortune to find opposition and get a good crack at them—others fly for hours and never get a shot.

I, and the people with me, seem to have the knack of finding excitement—two of us have planes shot down to our credit and the whole outfit has played hell on several occasions with the Nip cause.

The types of flying and fighting we're doing are myriad—some of it things never dreamed of in training schools or home guard squadrons and a pilot girded for a flight is a sight to see. There is no distinguishing uniform—everyone wears what best suits him—but all wear enough to cover them from head to foot—tropical heat regardless—in case of fire.

A helmet and goggles, a radio headset, an oxygen mask, a throat mike, a life vest, a parachute (in which every kind of first aid and emergency ration is stored somehow), a hunting knife, a gun in a shoulder

strap (for comfort in the cramped cockpit), a watch, dog tags, heavy shoes, gloves, pockets full of miscellaneous items and coins (for largesse to natives; in case of emergency the natives will help unbelievably for a shilling or less).

My uniform aground is a fatigue hat—fatigue jacket and trousers and a canteen—we must drink close to a gallon of water per man per day. Baths are scarce but drinking water is everywhere—and has to be. Salt tablets every hour are routine—vitamin and atebine pills a daily dose and effective too. We all feel better here than we did in —, lassitude got us there soon after we arrived. Doing nothing, day after day—as we were there—is the hardest thing of all to endure.

We're actually "eager"—as they say here—and are going at the business hard and fast. I don't know how we'll feel a month from now—but along about then we should be pulling out for a rest (that's the policy here now)—so it shouldn't be bad.

If Charles gets down here he'll be in rare company—the marine pilots are really good—and fine fellows. They're deadly shots—they've had hours of practice the Army somehow hasn't managed to give its pilots. Most start off with a bang and keep it up—most Army pilots have to learn their shooting in combat. They catch on quickly, but they ought to have the practice before they get here—as do the Marines.

I expect a couple of turns up here—an interval of rest between them—and then home!!!! I don't imagine they'll let us stay in the States forever—when we *do* get home—but a few months is all any of us ask.

I sometimes wonder if people well established at home fully appreciate what they have. The one thing above all else that every man out here longs for—is a sight of home and the ones he loves.

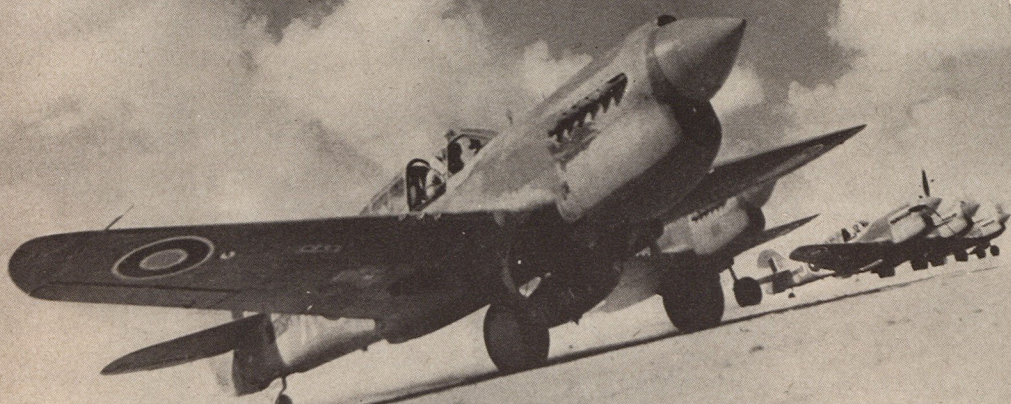
I feel, now, that I'm earning my chance to go home. However long they keep me here is all right—things are being accomplished here and there's a feeling of getting a job done throughout.

I want you all to know that I'm well and well fortified to fight my little corner of the war.

My love to you all.

Tom

WHAT YOU



The author of the accompanying article leaves his kite after a mission over El Alamein.

Combat horse sense from a P-40 pilot who fought with the RAF during the big push in North Africa.



HYPO SQUAD flew at 11,000 feet as high cover to Borax squadron, flying just below us with the Wing Commander leading. Dust and haze had made it thick all the way up to 10,000 feet and we felt better as we climbed to 15,000. Our silhouettes would not stand out so prominently against the soup below.

As we neared the bomb line five tiny dots suddenly broke the haze way off to our right. "Borax and Hypo Squadrons, five 109s at 3:00 o'clock below. Let's keep our eyes on them," called the Wing Commander. There was going to be trouble this trip, we thought; they're coming up too early. Oh well, easy come, easy go. Our

weaving changed from a regular pattern to a violent and shifty motion and we bit large washers out of our parachutes.

As the 109s climbed up and around in back of us they became more difficult to see. They changed from tiny black dots against the haze to tiny light blue specks, and then finally disappeared into the sun about 3,000 feet above. We knew of their presence there only from the occasional flash of the sun reflecting off their perspex.

"All right, boys, they're in the sun now. They'll be coming down. Hypo top cover. Be ready!"

We went on toward the target. They were there, we knew, even though we

couldn't see them. Just as we arrived at the motor transport concentration we were to bomb, five or six more tiny blue dots appeared overhead and down sun from us. They came in closer and we saw them dip their wings as they watched our movements.

"Ach, Herman," their leader was probably saying, "A Hurricane party! This will be easy meat. It is my turn first."

The Hun has taken a long while to realize the sting a P-40 carries. He comes down on what he thinks is a Hurricane and then when he gets shot down he swears it was a Spitfire that did it.

"There's five, six more above at 12:00 o'clock," says the Wing Commander.

AIR FORCE, March, 1943

SEE WON'T HURT YOU

By LIEUT. CHARLES W. TRIBKEN, JR.
U. S. ARMY AIR FORCES

"Hypo Squadron, stay above as top cover. Borax squadron peel off and bomb! Going down!"

We stayed above and watched the 109s more carefully than ever. As Borax squadron went down the 109s became more noticeably excited. Two of the down-sun party detached themselves and made a feint after the tail men of Borax as they were bombing.

"Two coming down on you, Borax green," said our squadron leader. "They're O.K.!" called the Wing C.O. who had already pulled out of his dive and was climbing back up to us. "Don't go after them!"

The other four that were down-sun started to come down on our top section.

Coming down on you Hypo top! Get ready! Turn about! And as they turned the other Huns came down from the sun. We in the bottom section had not turned, however, and we met them head-on. When they saw that we were prepared for them they continued straight down. Someone had put in a lucky burst and a 109 was trailing smoke. Everything was a shambles now. Just a cloud of aircraft whirling around. We in the top cover had jettisoned our bombs as we were attacked. The Wing Commander called, waggled his wings, and we re-formed and went home. We all had enjoyed it and no one had picked up a scratch.

That describes a more or less typical mission in the desert. It was moderately successful, because even though we were attacked we managed to get at least half our bombs on the objective and the other half might also have done a little damage. We were

not out to shoot down the enemy, but we had probably destroyed one with no loss to ourselves.

It might not sound very brave or daring, but from long experience we had found that the "brave and daring" man may be missing after a few shows. He runs off after the Hun and finds himself in a most embarrassing, out-numbered position, and if he does manage to return he is pretty well holed up and much less daring.

I have tried to illustrate what a show is like and what you may expect to see. The Hun is always 2,000 feet or so above. The German and Italian fighters can out-climb you. But they cannot out-dive or out-manuever the P-40. So you must make them fight where your superior characteristics will be put to use. Allied fighters depend on various types of defensive formations and have achieved great success with them.

PLEASE note that the entire success of this operation depended upon the fact that we saw and knew exactly what the Hun was doing all the time. If he had been able to catch us unawares, we would have been attacked and broken up with losses long before we reached our objective. However, he knew that we knew he was there and, as a result, we made him play his best strategy and still he failed. All because the Wing Commander and the squadron knew what was going on.

See him before he attacks! This cannot

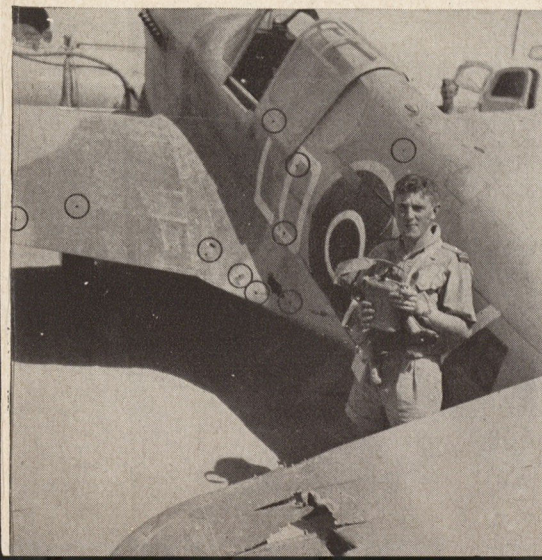
be stressed enough. The man who gets shot down is the man who goes out on mission after mission and sees nothing, or only half of what is going on. He leads a happy life because he never realizes his danger. Perhaps he's watching a good tank battle on the ground or a pretty peasant girl milking a cow (and she waved to him—how sweet). But he missed the fact that Emil and Heinrich and Ludwig are up above him arguing to beat hell as to who should have the first crack. (Emil has had first chance for two times running and it isn't fair.)

If he should be lucky and manage to get shot down on the right side of the lines he'll say, "Well, the first thing I knew there was some white stuff going past my wings and then I was on fire and so I jumped out. Can't I get a flying boot for that? I walked a mile before I was picked up." By this time his commanding officer is fuming to himself. ("Why the hell did you get shot down and why the hell did you bother to come back at all? Who can I push this guy onto?") But, being a kind hearted soul, he inquires to see if there isn't some scratch or a broken fingernail that the M.O. can use as an excuse to put our hero in the hospital for a month or so.

What are you going to see? Not a great deal. Four or five very tiny blue or black dots, in sort of a rough line astern or more probably (and you really shake when you see this) just as a flash in the area of the sun. They're up there and they see you! Recognize them as Huns even though you don't see their wing tips or tail or spinner. In Africa all Allied (Continued on Page 32)

PHOTOGRAPHS BY THE AUTHOR

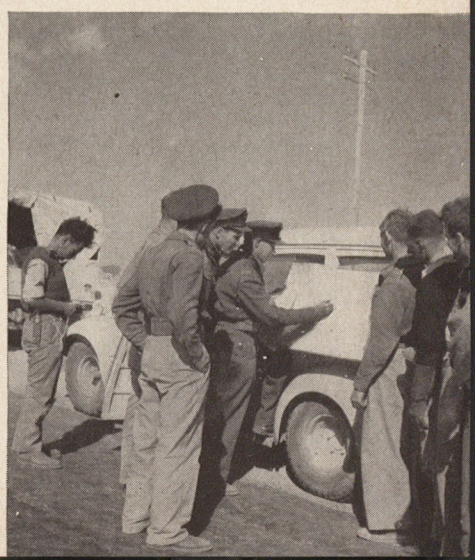
Even the Squadron Leader sometimes was caught unawares. Note the scars left by a 20 mm. cannon shell and machine gun bullets (holes circled).

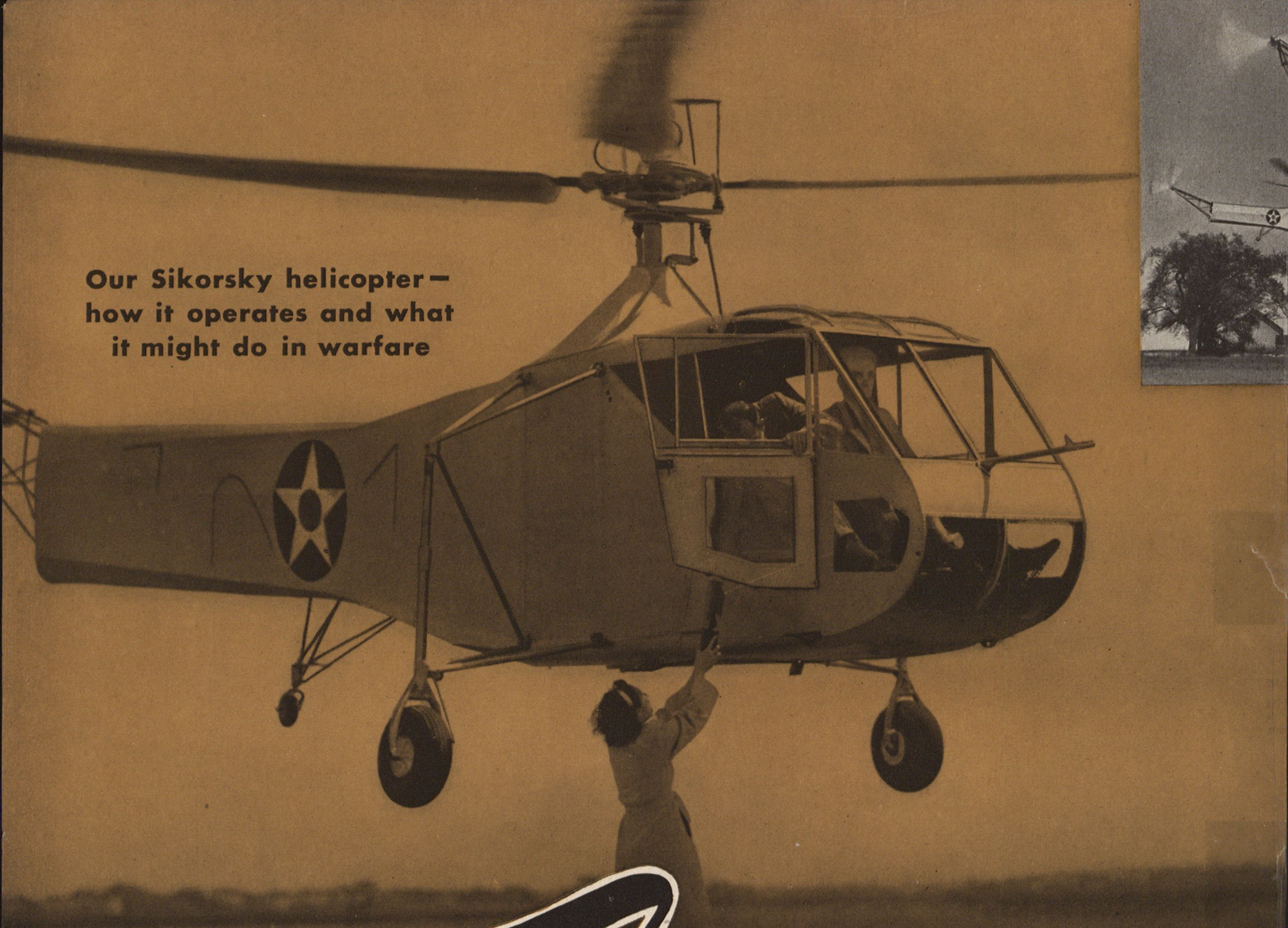


Inspecting a Stuka left behind by the retreating Germans. Such planes are used to bring up supplies from the rear.



An intelligence officer interviews a group of RAF fighter pilots who have just returned from a mission over enemy territory.





**Our Sikorsky helicopter—
how it operates and what
it might do in warfare**

THE ARMY'S *Flying* WINDMILL

By Colonel H. F. Gregory

WRIGHT FIELD

FLYING a designer's dream plane on its first flight is a thrill that only can be eclipsed by flying a designer's "freak", such as the Army's first successful helicopter, through its official flight tests.

It was the privilege of the author to act as project officer for the development and procurement of the Army's first practical and successful helicopter aircraft—a freak that may revolutionize design of the civilian "taxi-plane" of the future.

Nine months ago this wingless craft, after a cross-country flight from the Sikorsky plant at Stratford, Connecticut, parked itself in front of the Wright Field operations tower,

not on the line with other aircraft, but hanging 25 feet above the concrete apron. Then, upon receiving clearance to land, the Army Sikorsky Helicopter dropped gently—and vertically—to the ground.

Since that Sunday on May 18, 1942, the flying windmill has gone through eight months of flight testing, demonstration and pilot training at Wright Field. As a result, more of them are scheduled to be built for service testing under field conditions.

The helicopter has emerged from the experimental stage and is ready for the tests that may prove it to be capable of performing a great variety of military missions.

This new aircraft can't attain the speed of a P-47 and it can't carry the load of a Fortress or a Commando. But it can do many things that a liaison plane cannot do.

The helicopter will rise or descend vertically; it will fly forward, backward and sideways, it will spin around on its vertical axis like a top. It will hover motionless in the air at its vertical ceiling or a few feet above the ground; it will land on a platform 20 feet square.

During test flights, the helicopter time after time defied the impossible. In one cross-country trip the visibility dropped to less than one-half (Continued on Page 29)

DAWN OF A

New Era

The pilot's own story of the helicopter's first cross-country flight in the Western Hemisphere.

By C. L. MORRIS

ENGINEERING TEST PILOT, SIKORSKY AIRCRAFT DIVISION,
UNITED AIRCRAFT CORPORATION



The conventional model of the helicopter, piloted by its developer, flies low over a Connecticut meadow with the Army's new model in the background. Note that the Army version has an enclosed cockpit and fully-covered fuselage.



Completing the delivery of the Army's helicopter. Colonel Gregory, author of the article on the opposite page, greets Mr. Sikorsky at Wright Field. Mr. Orville Wright grins with approval. In the photo below, Mr. Sikorsky carries on a telephone conversation with the occupants of the helicopter while the aircraft hovers in the air.



THIS is the chronicle of a new era's birth. It was written in June, 1942, when comparatively few people knew the meaning of the word "helicopter." Many helicopters have been built, but none could be considered successful until 1937 when the craft designed by Professor Focke in Germany astounded the world by flying inside a crowded sports palace. Little has been heard of the German ship during the last three years, but in 1939 Igor Sikorsky, in the United States, undertook to develop a helicopter along quite different lines. In 1940 this craft was demonstrated publicly for the first time. In 1941 Mr. Sikorsky broke the official international endurance records for helicopters. Finally, in 1942, the first U. S. Army helicopter was delivered. This is the story of that delivery flight.

THE story begins on May 13, 1942, in a little triangular meadow close to the Sikorsky Aircraft factory in Stratford, Connecticut. It was a bright morning, slightly on the warm side, with a gentle spring breeze barely stirring the leaves of the stately elms that bordered the field. Grouped along the road were a couple of dozen workers from the plant. Their interest was focused on the aircraft in which I sat, making final arrangements to take off on the first cross-country helicopter flight in the Western Hemisphere, and the world's first delivery flight of a helicopter, as far as we know. It was a flight in which records were destined to be broken—but the records would not be recorded because we were forced to cloak this occasion in secrecy.

I sat inside the blunt-nosed cabin, reading the instruments that would tell me when all was ready, arranging maps and parachute harness, and watching the rotor flicking overhead in powerful rhythm.

Several of my friends drifted out of the crowd and stuck a farewell hand in the open window. Mr. Sikorsky stood nearby, nervously chewing at the corner of his mouth. His keen eyes flashed from under the familiar gray fedora as they searched every detail of the craft to detect any sign of flaw that might develop.

I knew on this May morning that his vision would be doubly sharp. Mr. Sikorsky was not wholly convinced of the wisdom of this flight; he felt that this "first-of-the-

type" should be handled with kid gloves and be delivered to Dayton by highway truck, thus eliminating the potential hazards of a cross-country flight in a totally novel type of aircraft that had had less than twenty flying hours since its wheels first left the ground.

It is understandable, therefore, that I experienced calm reassurance when Mr. Sikorsky walked quickly to the ship, thrust out his hand and said, "Well, Les, today you are making history!"

The engine labored and roared its crescendo as I pulled upward on the pitch control to rise off the ground. The ship lifted vertically to ten or fifteen feet; then I eased forward on the stick and we started off across the field. Sweeping in a gentle circle, we swooped low over the clump of upturned faces and waving hands—then on over the factory in an easy climb to 1,500 feet.

An automobile with a large yellow dot painted on its roof was already speeding out of the factory gate. That car was to be my shadow for five days. In it were Bob Labensky, the project engineer who had cast his lot with the penniless Sikorsky of nineteen years ago; Ralph Alex, his assistant, who had labored endless days and nights to bring this craft to flying condition; Adolph Plenefisch, shop foreman, who had all but lived with the Sikorsky helicopter since the first nerve-wracking flights in 1939; and Ed Beatty, transportation chief, who had elected himself to be the driver.

I quickly lost them in the elm-tunnels of Stratford, but my maps were marked with the exact route they would take, so I followed it closely, always ready to land in some little field beside the road should the slightest thing go wrong. They would see me as they drove by, and delays would be minimized.

Danbury came in sight a little behind schedule. I was flying at 2,000 feet now because the land was rising. At that altitude a moderate headwind was slowing my speed. Sixty miles an hour had been chosen as the best cruising air speed for the flight—easy on both ship and pilot. A fifteen-mile headwind made a big

(Continued on Page 38)

Checking and Double- Checking Navigation Devices



By Colonel Thomas L. Thurlow

ENGINEERING DIVISION, WRIGHT FIELD

PET devices, intended by their inventors to eliminate all mechanical and human errors in navigating the skyways, are sparking the research of the instrument laboratories at Wright Field.

Never satisfied with the "best," laboratory technicians continually examine and test each new device submitted, regardless of the experience of the inventor. Although hundreds are discarded, some few are proved practical by the triple-standard of accuracy, economy and speed of operation.

In this sifting process many superficially "perfect" devices turn out to be absolute duds for combat flying where the navigator must make his computations under extremely difficult conditions. Wright Field's job is to spot the phony systems and to encourage development of the ones that can be depended upon to bring our planes home.

Despite the intricacies of this mathematical science, it is encouraging to note that some of the most promising improve-

ments in devices to aid navigators are being submitted by non-navigators. Recently a synchronous ground speed meter was developed by an officer of the Medical Corps and, of the many hundreds that have been submitted, his is the only one that has proved to be novel in working principle.

As soon as installation of another device—which determines altitude above the terrain—is completed in more airplanes, the medico's synchronous ground speed meter will be put through the final tests that may prove it to be practical.

The mechanical devices for the reduction of observations comprise a group that primarily attracts the inventive prowess of non-navigators. Because only geometry and common sense are involved, the ambitious would-be navigators frequently slip into ruts that brand their instruments as "phonies."

The geometry of the inventor often breaks down in making computations; sometimes he founders on the problems of "scale";

invariably his enthusiasm for his own creation tempts him to make outlandish claims as to the speed and accuracy possible with the device.

Such people usually have just discovered navigation—yet, all of the devices they propose can be seen in any museum of astronomy.

What an amateur proposes as a new and original short-cut method often is found to be a system previously tried and rejected. Some of the new proposals are sound for training and for certain types of flying conditions. The only systems that can be adopted, however, are those that serve the navigator under all flight conditions, those that require less than four minutes of computation, and those that can be economically constructed, installed and maintained.

All devices using arcs to represent the various circles, celestial and terrestrial (involved in the reduction of sights), are essentially alike in principle. Such an instru-

ment is pictured on Page 33. The navigator tyro or old-timer, who has not toyed with the idea of designing and constructing a simpler and better device for the solution of the oft-met wind triangle, for the plotting of lines of position, or for the reduction of celestial observations, is indeed much harder to find than Diogenes' "Honest Man." In many cases, the navigator whittles his pet device from a sheet of celluloid or a piece of brass, convinced that his invention will end all navigation devices. He then begins his crusade to gather converts.

Despite the flood of such inventions, the Materiel Center at Wright Field welcomes the steady stream of proposals. Although hundreds of devices are screened, the value of the few devices that have practical features compensate many times over for the effort expended to uncover them. In addition to tangible developments, new ideas and new methods proposed serve as stimulants for the extensive research continually being carried out in the laboratories.

Navigation, as an ancient art, has attracted the attention and thought of countless thousands for centuries. Because the field has been so extensively exploited, innovations do not appear with great frequency. However, they appear. The Air Almanac is an outstanding example.

THE Air Almanac is believed to be one of the greatest contributions to navigation in several decades. It has transformed celestial navigation from a very painful art to a near painless one. It has popularized the lunar observation—rarely attempted before appearance of the publication. It has made the daylight fix by two bodies possible during those portions of the month when the moon is visible and well located.

Synchronous ground speed meters, which are proposed every week, may vary in external appearance but in principle they are as alike as peas in a pod. Yet, it took a non-navigator, the medical officer previously mentioned, to develop an instrument with a new working principle.

In the design of devices for the solution of the wind triangle, wind star problems, or of equipment for line of position or other plotting, there are few pitfalls to be encountered. Hence computers and plotting equipment of every conceivable type are submitted in astronomical numbers. The criteria for acceptance must be based upon many factors; for instance, the curves of cost vs. utility are of primary importance. More than 100,000 of the standard E-6B dead reckoning computers have been purchased and adopted for general use in the service and navigation schools. To change the type would involve a change in the navigation school curriculum, the junking of the present instrument, the writing of Specifications and Technical Orders covering the new device, the initiation of procurement of the new computer, and, most serious of all, a time delay of many months in getting the device into production and delivered to service units. Therefore, the new computer must be so completely su-

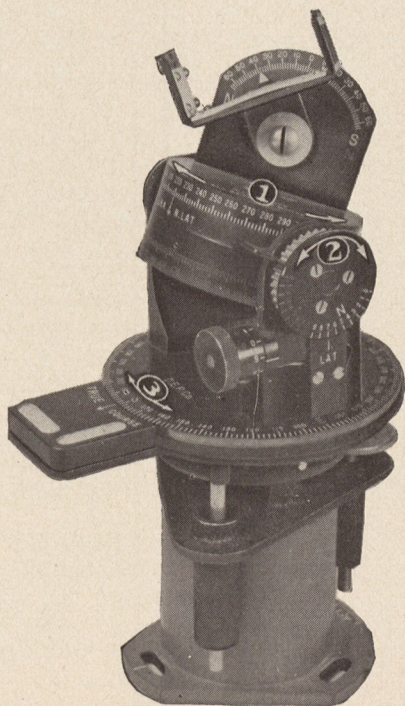
The trick devices get a thorough testing but almost all fall short of high Air Force standards.

prior to present equipment that it would render the device it supersedes obsolete before it could be adopted to replace the satisfactory computer already being used.

Inventors who develop drift and ground speed meters other than the visual type run into trouble in a big hurry. Two such types are the integrating accelerometer and those devices which attempt to utilize the vertical component of the earth's magnetic field.

To determine ground-speed and drift by integrating the horizontal accelerations encountered by an aircraft in flight, the inventor must succeed in construction of an accelerometer that will measure all accelerations, from the most minute to the most violent. To date none have been constructed. Accelerations must be measured with almost prohibitive exactness because the error in the final computation—ground speed—is cumulative. Since only horizontal accelerations can be used, the device also must be gyro-stabilized. However, when an acceleration occurs, the accelerometer becomes unbalanced and processes the gyro upon which it is mounted until the horizontal component is no longer being measured. In addition to the foregoing difficulties, accelerations must be integrated instantaneously—or with an invariable lag. Electric motors, watt-hour-meters and similar devices are impractical because of the inertia of their rotating parts. Assuming that all of the other difficulties can be overcome, how then is instantaneous continuous integrating to be accomplished?

AAF Type G-1 Astro-Compass



Many proposals have been submitted to determine ground speed by measuring the charge produced in a horizontal conductor moved through the earth's magnetic field (using the vertical component thereof). The theory is that "lines of force are cut and therefore a charge is produced in the conductor"; hence "measure the charge and there is the ground speed."

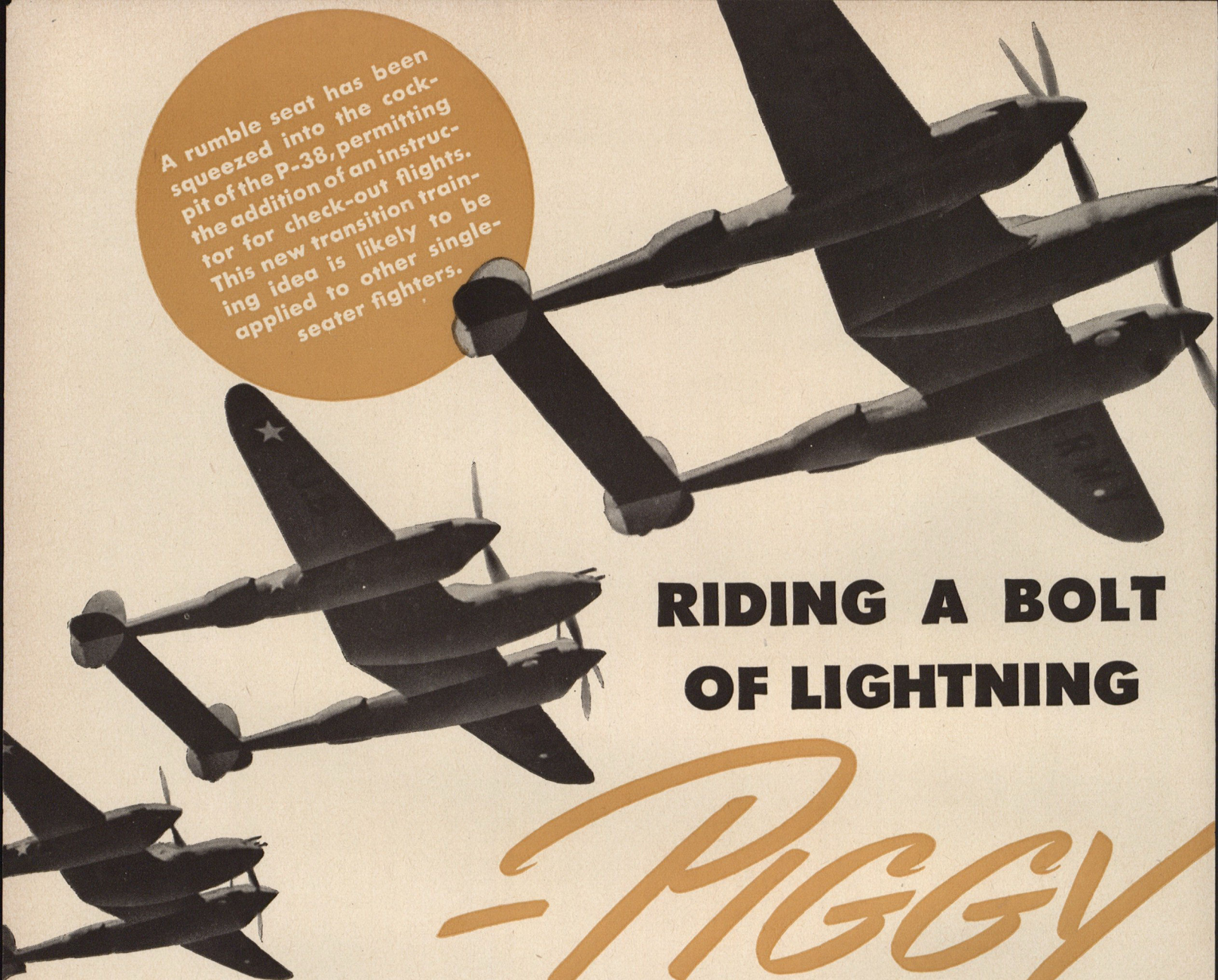
To astound the inventor of this type of ground speed device (and the reader alike), it can be stated that "there are no lines of force to cut." Such a statement deserves an explanation.

It is agreed that the earth's magnetic field in a small cube is uniform. Let it then be stated that the well-known "lines of force" do not exist at all but are used as a *convenient analogy* to show the "direction" or "flow" of a perfectly uniform magnetic field, and to offer an explanation of what happens when a conductor moves through it. Thus the earth's field is likened to a small cube of sea water which is entirely uniform but has a quality of "direction" which we indicate by "lines of force." Now, if no lines of force are cut, why then is a current induced in a loop rotated in the earth's field? The answer to this question conforms entirely to physical realities: "The current induced is due entirely to the *variation of the amount of flux* (with due regard to 'direction') enclosed by the loop, which variation results from the rotation of the loop." Thus, the induction is due to a *change in flux density* in the loop and not to the cutting of lines of force. Furthermore, since there is no alteration of flux density when a single conductor or a *non-rotating* loop is moved through a uniform field (such as the earth's), no charge or current is generated.

The lines-of-force advocate admits that no current is generated in a translated, non-rotating loop, maintaining that opposing e.m.f.'s counteract each other. His opponent argues that there is no change of flux density and hence no current generated. Both agree in regard to the final result in the case of the loop. They disagree in regard to the single conductor, one maintaining that a charge is developed and the other that one is not. When an attempt is made to measure the charge, the circuit is closed, the conductor becomes a loop and there is no current flow, as both contestants have agreed. Hence, no ground speed.

Perhaps some of the above argument is sacrilege. It illustrates, however, that the inventor proposing to use the earth's magnetic field must tread on solid ground as far as fundamental physical conceptions are concerned. In other types of non-visual ground speed meters the inventor is quite likely to find himself involved in a morass of mechanics. This is especially true when gyros are involved. Very frequently the designers of the "arc" group of instruments become so thoroughly involved in their celestial and terrestrial geometry and so confused thereby that they eventually claim a fix from one ob-

(Continued on Page 33)



A rumble seat has been squeezed into the cockpit of the P-38, permitting the addition of an instructor for check-out flights. This new transition training idea is likely to be applied to other single-seater fighters.

RIDING A BOLT OF LIGHTNING

PIGGY

By **LIEUT. JOHN TRUESDELL**

DIRECTORATE OF FLYING SAFETY

PIGGY-BACK riding in the speedy P-38 is the latest wrinkle being sponsored by the Directorate of Flying Safety for our air cadets.

The term piggy-back applies to a new two-seat arrangement in the small single-seat cockpit of the 38. With this conversion, the extra rider sits above and close behind the pilot and actually looks like he's riding piggy-back on the pilot's shoulders.

Take it from one who has had his first passenger piggy-back ride in a P-38—it really looks good. It's one thing to spend a day with the Lockheed engineers listening to performance data, but it's another thing to wedge into the capsule cockpit of the 38 with a headful of figures and to feel those figures with the seat of your pants.

This P-38 conversion, however, has earned its flying spurs for a far better reason than to prove that the ship is one of our

finest air weapons. Riding piggy-back with a pilot who fully understands and can demonstrate the abilities of this fast fighter, the cadet can learn more in an hour's ride than he might in months of experimenting while flying the P-38 solo. He actually has the composite of all the experiences of the Lockheed test pilots and test engineers who lived, dreamed and rode with the ship from the drawing board on up.

Soon the Air Forces will have a number of P-38 piggy-back conversions—first to check out flight instructors, and then for flight instructors to check out cadets before they graduate to this fighter.

In this piggy-back program for the P-38, and for other single seater fighters as well, the Directorate of Flying Safety sees not only the possibility of a speed-up in turning out the finest fighter pilots in the world, but a most effective psychological weapon

to combat the wild and wooly tales you sometimes hear about our new fighters.

This simple method of achieving pilot acquaintanceship with a single-seater plane had a very basic beginning. It all started one afternoon early last August when Milo Burcham, Chief Engineering Test Pilot at Lockheed, was removing the radio from the shelf behind the pilot's seat of a P-38.

Burcham decided a small to medium-sized man could conceivably wedge himself on that shelf, and he discussed its possibility with Rudy Thoren, Lockheed's Chief Flight Test Engineer. Now, Rudy is six feet two inches without stretching and for the first time in his life he regretted his height. At any rate, he and Milo soon were giving a careful eye to that small space in the P-38's cockpit designed for a radio rather than a rangy engineer.

Rudy made up his mind that if a road

AIR FORCE, March, 1943

map could fold so could he, and he was soon back at his drawing board designing a plywood seat and pocket-size desk; he managed to save enough cockpit space for all the known engineering instruments as well as several more that had been in the back of his mind for some time. Rudy was the first piggy-back passenger, with Milo putting the ship through every possible maneuver while this elongated flying engineer managed to divide his mental capabilities evenly between dozens of test instruments and keep his lunch inside him. This original trip evolved into daily flights and the highly guarded first piggy-back P-38 went to work as a complete flying engineering laboratory.

These sorties for aerodynamic science went on and up until finally Rudy and Milo were nipping along at well above 30,000 feet, recording new performance figures. This test pilot and engineer continued their flights until they knew the P-38 from A to Z.

The Directorate of Flying Safety entered the picture in the persons of Lieutenant Colonel Warren Carey, Commanding Officer of the Sixth Regional Safety Office, and Lieutenant Colonel Charles H. Hastings, Jr. Reluctant to share the credit for visualizing the possibilities of pilot indoctrination with the piggy-back P-38,

Colonels Carey and Hastings insist that the idea "simply evolved" between Lockheed's Milo Burcham, themselves and progressive Commanding Officers who were approached. The credit-reluctant Lockheed gang and the Air Force officers do agree that if it hadn't been for Major General Barney Giles, commanding the Fourth Air Force, piggy-back pilot training might be just another good idea that never saw the light of day.

JIMMIE MATTERN, another Lockheed Test Pilot, took General Giles and Brigadier General William E. Kepner for their first piggy-back ride.

"I didn't spare the Generals a thing," claims Jimmie. "We did loops, rolls, Immelmans, single engine rolls, single engine take-offs and landings, accelerated stalls, and all the other so-called 'unknowns' that had caused a lot of hangar talk about the ship's performance."

Jimmie points out that Milo Burcham and Rudy Thoren took their first ride in August, and by September the Army Air Forces was already busy converting some of its own equipment to piggy-back for use in building confidence and skill in new pilots.

Jimmie, who has flown his 10,000 hours under all conditions, in all kinds of airplanes, all over the world, says: "Trouble in a P-38 (or in any other ship) is usually

something that the pilot gets himself and his airplane into rather than the airplane getting the pilot into it." Jimmie claims that a lot of hangar hot air has sprung up about a single engine performance.

"The P-38 flies easily," he explains, "at better than 180 m.p.h. on one engine. That's faster than I ever flew in my first fifteen years of flying. On single engine the Army recommends an air speed of not less than 120 m.p.h. although actually, the ship will fly slower with complete safety."

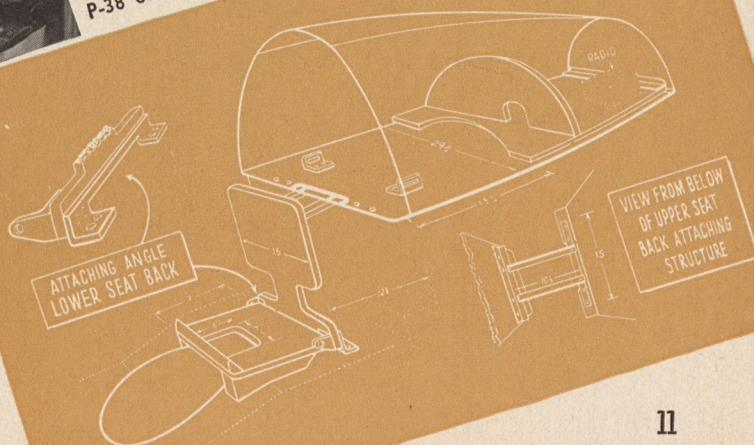
Jimmie continues that one of the main facts concerning single engine operation is *the importance of considering air speed above everything* in event of motor failure. Pilots with only single engine experience have a natural tendency to pour the coal into the live engine, when the first thought should be *to gain flying speed* by putting the nose down and maintaining directional control even if it means throttling back the remaining live motor. Then the usual single engine procedure is to be considered and quickly and coolly executed. Loss of directional control with a sudden increase on the power of the one remaining engine can "flip the ship on its back." Jimmie cautions, however, that a thorough knowledge of single engine procedure as outlined by your check list is far more important than vaguely knowing "what to do."

"If the cadet knows this, he is perfectly safe on one engine even at the critical take-off period. All this one-engine talk might seem superfluous because the ship is designed with two engines, but as long as they make motors, there will be occasional motor failures.

"The accelerated stall is another important lesson for the piggy-back pilot to demonstrate thoroughly. At high speeds it's possible to haul back on the stick, spill the air off the wings of the P-38, and achieve an accelerated stall. Once the pilot has his first easy lesson on recovery from these stalls (just ease off on the stick) and how to avoid them in the first place, another bit of hangar rumor goes into the scrap drive." ☆



Lockheed's Milo Burcham, chief engineering test pilot, and six-foot-two Rudy Thoren, chief flight test engineer, show how two big fellows fit into the converted P-38 cockpit. Below are details of the construction.



The Meaning of Flight Control

The director of a new unit in the Air Forces explains its operation and the effect it will have on pilots throughout the country.

By Lieut. Col. George C. Price

DIRECTOR OF FLIGHT CONTROL, ARMY AIR FORCES

IF there is one thing that makes a military pilot see red it is to tell him he is going to be controlled. True, he has been in the Army and knows all about having his time regimented. But most of us who learned our flying a few years back have been pretty much the boss of our own actions once we cleared a runway.

And now Army pilots are face to face with a new animal called Flight Control. At first glance it is a pretty ornery looking beast. When you have been flying everything with wings on it for a few years, you feel that about the last thing you need is more control—you may be right, too. No system of operation could be devised that would make allowances for all the degrees of experience and ability that we have in the Army Air Force today. But where there used to be a handful of pilots with a lot of experience and ability, there are now thousands of youngsters in the air with more guts than experience.

These youngsters represent the bulk of the Air Forces today, so once again the majority rules. Either that or you could expect to have a lot more airplanes cracking up in the cornfields of the country.

Actually, this thing we call Flight Control isn't such a bad critter once you get to know it. The older airline pilots squawked to high heaven when they were introduced to Flight Control, too, but there are very few of them who would care to be without it these days.

While details remain to be worked out, we can tell now about how the system is going to work and what it will do for you and me when we want to go from here to there.

The two places where Flight Control will be most obvious are in the operations offices and in flight on the airways.

As far as operations are concerned, Flight Control means only this. The Director of Flight Control will prescribe the procedures to be followed in operations offices and will operate an inspection service in line with those procedures.

In other words, it is our job to see that everything a pilot needs to plan his flight is on hand and easily available in every operations office, including maps, weather,

latest special notices to airmen and other information. It is our job to figure out what information should be there and then see that it is. Actually there won't be any considerable change in the forms you fill out or in the information you give. There will be no sudden turnover in what you have to do to get an operations clearance (Form 23).

What will happen is that the whole present procedure will be tightened up where the records and inspection show that looseness has caused accidents. The average pilot will be aware of the change only in that there will be more and better information available for him and he will be better equipped and informed for the mission ahead.

So far as Airways Traffic Control clearances are concerned, no changes of any kind are scheduled. You will get your clearance just as you do now. As now, you will report time-over at range stations along the way, but for the benefit of those who have been a little forgetful about these reports, it is going to be absolutely necessary to make them as scheduled.

Right here is where the biggest change comes in. Formerly you could report to range stations every five minutes for a thousand miles and suddenly find yourself at your destination with 200-foot ceiling and a quarter-mile visibility.

Surely, you could ask for weather and find out that ceiling was "Dog," visibility,

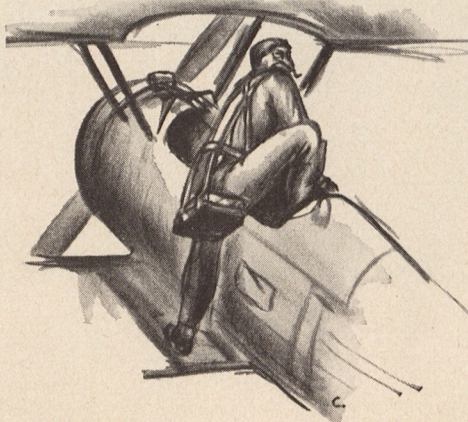
"Horse," and a few other barnyard varieties. But pilots are pilots and more often than not we let the weather take care of itself—pretty well convinced that we can take care of ourselves. Besides, it is too much trouble to try to figure out the code unless we are already in a pickle.


What happens under the new set-up is merely this: At each Airways Traffic Control center an officer of the Directorate of Flight Control will set up shop alongside regular A.T.C. men. When a military flight is cleared through his region, he will keep track of it. He will know every time you check in over a range station. He also will have all information available on the weather, and when it looks like trouble ahead, it is his job to let you know what to do about it.

In other words, he will be doing, in most cases, only what you would have done yourself if Adolf, Tojo, and old Benito hadn't made it necessary to talk about dogs and cats when what you really want is weather dope. In the good old days when you not only could ask for weather but could pick it up almost any time while in the air, you decided before you got in trouble whether you should sit down at the nearest open airport, turn around and go home or maybe try an alternate. With weather under a war-time hush-hush, Flight Control officers will do that job for you.

There is a lot of flying that must be done in this country under all kinds of conditions if the pilots we put in combat are going to be able to cope with conditions they are bound to meet. We know that. And the last thing we want is a bunch of namby-pambies flying around in military airplanes. On the other hand, a ship cracked up on this side of combat hasn't done anybody (except the enemy) one little bit of good.

There you have it—this thing called Flight Control. More standardized service at the operations office before you leave and somebody on the ground who wants to see you safely through while you're in the air. That is the guts of this whole program. It's got some teeth, but the basic principle is service to flying personnel—service to an Air Force that has got a tough job that must be done in a hurry. ★





WHAT KIND OF OFFICERS WILL THEY MAKE?

By Major W. R. Cunningham, Jr.

COMMANDANT OF CADETS, ADVANCED FLYING SCHOOL, FOSTER FIELD, TEXAS

Cadet training is a challenge to every instructor; discipline and morale are inseparable.

WITH the Army Air Forces turning out commissioned officers on a mass production basis largely through the graduation every few weeks of hundreds of cadets, the question of discipline during cadet status as opposed to morale during the same period, has created several schools of thought among staff officers responsible for their training and those in tactical units to whom they may be assigned after graduation. Poor discipline and lack of officer qualities in newly created officers sent to them by the training centers have caused the tactical leaders to feel that too many specks have been left in the apple before they get it for the final polish.

Of course, the well worn law of averages will reflect that out of any barrel the size of the Aviation Cadet group, there will always be specks and even a few completely rotten apples. These inevitably will slip through the system and past the final inspection, to turn up later in some tactical or

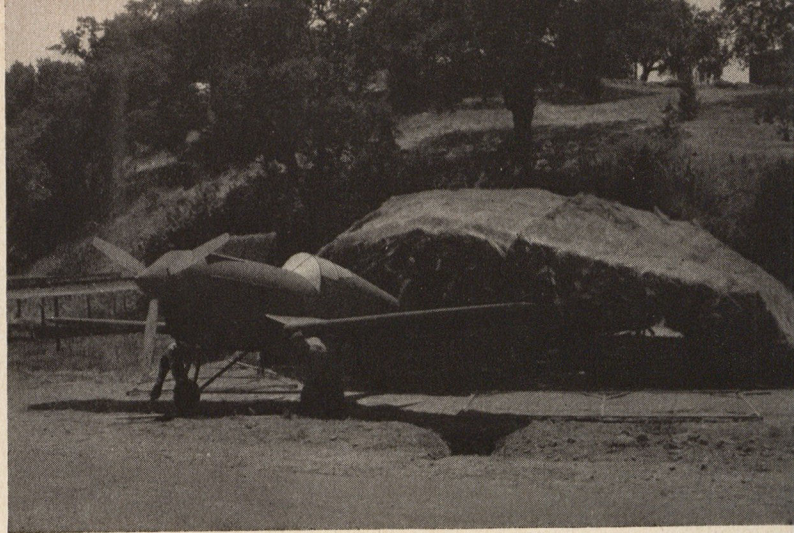
combat organization where they create the fear of infection from all others from their school in the minds of their new commanders. A general bad impression is very easy to win but very hard to lose. Every training establishment from preflight to advanced is aware of this fact and doing the best it can to turn over to the next succeeding phase a material that can be developed further into the type of finished product every commissioned officer is supposed to be. And, being aware that any bad impression made by a new officer as he steps out to play his more important role in the Army usually reflects back no farther than his advanced school, those responsible for that phase of training find themselves casting about deeper and deeper into the problem of the right way to handle these men in order to get the desired result.

Aviation cadets represent a highly intelligent group of physically perfect young men, most of whom haven't outgrown the clean, healthy and perfectly normal "orneriness" we secretly hope to find in our own young sons. Yet, in order to make him of any value as a member of this highly geared Air Forces team, he must be taught mental and physical control and

(Continued on Page 28)



From the front, this haystack blends naturally with the surrounding countryside—



But viewed from the rear, it becomes a hangar for a full-sized dummy of a P-40 fighter.

CAMOUFLAGE IS A

By LIEUT. GEORGE BRADSHAW

MUST!

IN combat zones, who should practice camouflage?

The answer to that is straight and simple: Everyone.

Successful concealment in the field becomes possible only when it ceases to be thought of as the business of a few experts, and becomes the personal and daily concern of every member of the Forces—from the front line to base camp.

What is camouflage?

Camouflage is any and every means of hiding or disguising yourself from your enemy; misleading him as to your position, strength and intention; confusing him so that he wastes his blows and falls into your ambush.

How can everyone practice camouflage?

By following the discipline set down by the camouflage officer.

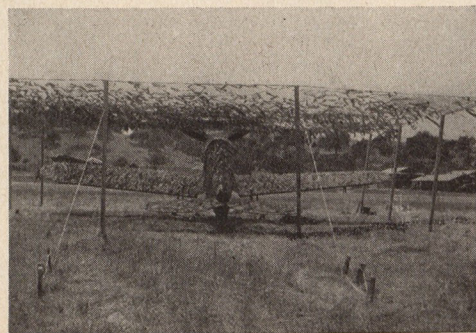
Every human activity, from planting beans to building a railroad, leaves a visible mark on the face of the earth. The marks left by an army are completely different from those left by a civilian population and if that were not so there would be no camouflage problem.

Therefore, the most important camouflage rule which *everyone* can obey is: *Do not make tracks.* Walk and drive within the limits staked off by the officer. It is obvious that if a position, no matter how cleverly concealed, has dozens of tracks leading up to it, the enemy will not long remain confused. A vital point will have one trail leading up to it and then going on to a logical junction, another road or

a house or a settlement. The man in the air, of course, is our chief enemy. The hills and valleys which hide opposing armies from each other at ground level mean nothing to the airman. To him our place and position are laid out as on a platter. For him we must practice mass confusion and concealment. It must always be remembered that no part of a country can easily be made safe from his eyes, his camera and his bombs.

Therefore, if we do not know how we look to an airman, we cannot well go about trying to deceive him. He can see us and the marks we make in all lights and at all angles. His photographs can be studied at leisure and with instruments so exact that a stereoscopic reading of a good pair of vertical photos would betray the presence of artificial overhead cover that can easily cheat the naked eye.

Flat-top camouflage cover makes this P-40 practically invisible from the air.



Suppose the enemy has photographed and detected a camouflaged position. What can he do about it?

Grant that he has a pinpoint map reference and a photograph of the target. Still, with all this information, he must detect his target with his eyes before he can even start preparation for bombing. What does that mean in the case of a ship at 10,000 feet flying at, say 250 miles an hour? It takes seconds from the time he thinks he has identified the target until the moment he is certain he has identified it. It takes more seconds from the moment he is certain of the target until the moment when he has made his calculations, set the course, adjusted his bombsights and pressed the button. And the bomb itself in its travel to earth moves forward a certain distance in hundreds of yards. All this time the ship has been going at 250 miles an hour. Therefore, to be sure of unloading his bombs on or near his target, the airman must correctly identify the target while he is somewhere between $3\frac{1}{2}$ to 5 miles away from it.

There has never been any contention that camouflage will in any way avoid attack on a position where objectives are known to exist by the enemy. But in such a case it does lessen the chance of precision bombing and, as a result, may assist in keeping an important work in action.

There is also this to remember: A well-camouflaged position is less likely to be photographed in the first place. Air observers, being human, are unable to concentrate keenly for long periods of time. In

general, they see those things which are easy to see and miss those which require an effort. Thus the most conspicuous things are those most often spotted by reconnaissance aircraft and consequently are the most photographed.

It is to be concluded, therefore, that weapons which camouflage must fight are the eye of the observer and the lens of the camera.

Camouflage should blend as nearly as possible with the colors of the surrounding position. However, it has been established—and there can be no question of this conclusion—that an observer at some thousands of feet is aware of an object by its lightness or darkness and not by its color.

It is of value, therefore, to know what makes objects light or dark. Color, of course, is partly responsible. Other things being equal, the brown loam of a freshly plowed field will look and photograph darker than the pale green of young sprouts. But if you take two surfaces of the same color, the factor which determines how light or how dark they look is their texture. Texture is the degree of smoothness or roughness of a surface and its consequent ability to cast a shadow on itself or its surroundings.

Take a surface that is perfectly smooth of any given color, say, green. The rays of

light which strike it are bounced off in parallel rays, like tennis balls from a concrete court. A high proportion of those rays enters the eye of our camera and an effect of lightness is produced.

Take another surface of exactly the same color, lighted in exactly the same way. Only this time it is an uneven, corrugated surface. The rays are bounced off at all angles, like tennis balls from a sheet of corrugated iron. A lower proportion of rays reaches the eye or lens and an effect of relative darkness is produced.

TAKE a third surface of the same color, lighted the same. This time the surface is a nap or texture, like grass or strands of burlap, each strand capable of throwing a shadow. Looking straight down, the airman sees all the shadows, whereas the man on the ground may not. The surface may look light at ground level but to the airman the napped or textured surface produces an effect of relatively great darkness.

Water is an exception to this rule. For a variety of reasons, depending upon local conditions, water may look and photograph blinding white or inky black.

This fact, too, should constantly be kept in mind: Seen from the air in full sunshine a natural shadow is almost invariably the darkest thing on earth. In addition, it is a

All AAF personnel should know and practice the art of concealment to baffle the enemy.

good working rule to accept that, whereas black paint will often look and photograph surprisingly light in tone, a real shadow always looks almost black.

A clear understanding of the importance of texture is indispensable to successful concealment in the field.

At March Field, California, the Army Air Forces now has in operation a school (formerly at Hamilton Field) which concentrates primarily on the problems which face the advanced units of the Air Forces. Hundreds of officers have already been graduated and other hundreds are now in training. These men are being assigned with combat units as camouflage officers; they will impress the personnel with whom they come in contact with the need and desirability of total cooperation in camouflage. (Continued on next page)

Camouflage For The Army Air Forces

BY BRIGADIER GENERAL S. C. GODFREY, U. S. A., AIR ENGINEER

THE Army Air Forces is becoming increasingly camouflage-conscious.

In our peacetime training and maneuvers, such things as dispersion, concealment and camouflage receive too little attention. They involve trouble and inconvenience, take time, require materials and add to the cost. It is much like digging trenches. Our Army doesn't do much trench digging in peacetime maneuvers but in war men dig in, and dig in furiously, rather than be killed.

So on the battlefield we sometimes learn—the hard way—that planes and facilities on an airdrome must be dispersed to minimize costly losses; that concealment is a most potent means of protection; that even an elementary knowledge of camouflage may save lives; that all these procedures are not merely defensive measures but have to do with deceiving the enemy and adding to our offensive power. It is well if we can learn these things before going into battle.

Camouflage is everybody's job. The Corps of Engineers is charged with the development of camouflage technique, the preparation of camouflage literature, the procurement of camouflage supplies, and assistance in training and practice of camouflage. Engineers in all echelons can assist with their technical knowledge and can do a certain amount of actual construction—but the practice of camouflage and camouflage discipline is the task of each unit, not just a specialist's job. The success in implementing a program of training and use must depend upon the interest of commanding officers and their vigorous action to assure attention to this subject.

There are many evidences of growing interest and proficiency in camouflage in the Army Air Forces. Our Camouflage School at March Field (which is integrated with the Camouflage School at Fort Belvoir, under the Chief of Engineers) has now graduated hundreds of Army Air Forces officers of all ranks who have learned something of sound technique during two weeks of in-

tensive courses. In each Air Force mobile school units have been organized to carry instructions to non-commissioned officers at home stations. Camouflage instruction is being included in most of the training activities of the Army Air Forces, including operational training. The Fighter Command School, at Orlando, has given it much attention, and full provision is being made for it in the plans for the Army Air Forces School of Applied Tactics. Air Service groups, with engineer assistance, have operated this past year from camouflaged bivouacs. Dummy airfields and dummy towns are in the picture. We now have two well-trained camouflage battalions, prepared to contribute to effective training at home or to serve overseas.

Some of these recent camouflage training activities are well described and pictured in Aviation Engineer Notes No. 10, prepared and published by this office in the Directorate of Base Services, and distributed to all Army Air Forces activities. These present a detailed picture and reflect the spirit, enthusiasm and effectiveness of some of these training activities.

Still more valuable will be the presentation, from time to time, of pictures of camouflage activities overseas. These come, as a rule, in fragmentary form, with here and there a striking example of how the skillful use of some local materials has aided effectively in concealment. An Engineer soldier who had helped to camouflage some anti-aircraft batteries in Hawaii was wounded and returned to the United States after December 7, 1941. It was his proud remark that "they hit our dummy guns, but they didn't hit the real ones!"

It is not my purpose to write here a technical article on camouflage. But I am interested that one of the staff of AIR FORCE, after visiting our Camouflage School, has prepared an article on camouflage and its importance as it appears to him. It is a good basic treatment of the subject, and should be of interest to many readers.

CAMOUFLAGE IS A MUST!

(Continued from Preceding Page)

On the east coast a similar course is given by the Chief of Engineers at Fort Belvoir, Virginia, for officers of both Air and Ground Forces.

The basic purpose of the instruction at Hamilton Field is to teach the men to use that uncommon attribute—common sense.

The course naturally includes all the fundamentals of camouflage, materials, organization, interpretation, requirements and so on. They are immediately indoctrinated with a principle which might well be applied to all branches: If a camouflage idea prevents the effective tactical use of a weapon or position, modify the camouflage idea. If an effective camouflage idea interferes with the administrative layout, change the administrative layout.

These men are put to work garnishing fish nets, the weaving of mats and screens. They are taught the operation of paint shops and the use of scrim, the draping of nets, the use of adhesives. They are taught the facts of dispersion, the uses to which everything from chicken feathers to local grasses can be put. The principal emphasis always is placed on how to use quickly and effectively the materials at hand.

Also—and this is certainly as important as anything else—they are shown the necessity of camouflage discipline.

As said before—and it cannot be too strongly emphasized—no matter how well concealed an object may be, its position will be instantly apparent if there are tracks and paths leading up to it and packed down areas around it. Thus, one of the most important functions for the camouflage officer is to see that the approaches to his objective do not have an extraordinary appearance. He must see that no impedimenta is ever out from cover or shadow. Standing grass, as pointed out, looks dark to the airman because he sees the shadow cast by each blade. When some of those blades of grass are laid flat by the feet of men or by rolling wheels or any other cause they cease to throw shadows and become smooth reflecting surfaces facing the sky. Therefore, they look and photograph light. Few people realize with what certainty this effect is produced. They think that one or two journeys across the grass on foot or with a truck cannot make all that difference.

It cannot be over-emphasized that the one camouflage effect to which everyone from cook to pilot must contribute is discipline.

Finally, of course, the object of the school is to indoctrinate Air Force personnel with the constant necessity of camouflage, to make clear that concealment is not hiding for hiding's sake. It is hiding in order to attack the enemy with more deadly effect.

Camouflage is just as surely an offensive operation as it is a defensive. There is no attack without materiel. ☆

Camouflage

DO'S and DONT'S

DO choose your position carefully. A proper "estimate of the situation" will make your work easier and avoid impossible camouflage problems.

DO avoid the skyline when concealing against observation from the ground.

DO make full use of natural cover. Utilize ditches, hedges, edges of woods, folds in the ground, etc.

DO avoid conspicuous landmarks. You don't want to be at a focal point of enemy attention.

DO keep in the shadow. The enemy can't see or take pictures in the shade.

DO remember that shadows move. Although shadows as a rule fall toward the North, their length and direction change throughout the day.

DO avoid regularities of line or spacing. Nature has no straight lines and the enemy is looking for unnatural signs.

DO garnish carefully. Natural garnishing must look NATURAL, so use material similar to that in the vicinity and support it as it would grow.

DO thin out garnishing at the edges. A regularly garnished net casts a regular shadow which is obviously out of place in the surroundings.

DO change dead vegetation. Forget and something (or somebody) will be dead.

DO keep turf or topsoil when digging in; use it to cover your spoil on the parapet.

DO make Bold pattern, in garnishing or painting. You can't see a two foot "break" in the outline from a distance of a mile.

DO "look before you leap." Plan and lay out your position in detail before moving in and trampling down promiscuously.

DO observe camouflage discipline in making a reconnaissance. Signs of activity before occupation are just as disastrous as signs afterward.

DO restrict movement when the enemy is observing. A moving object may attract attention.

DO take extra care when tired. Fatigue leads to carelessness.

DO work in the shade or at night. The enemy is looking for you at all times but his eyes are not as good as a cat. He can't hit what he can't see.

DO keep your flat tops "Flat." Sagging nets are worse than baggy knees.

DO use existing roads. Traffic here will not leave noticeable signs.

DON'T be careless and give away your buddies. They're depending on you just as you are on them.

DON'T look up at airplanes. The enemy is looking for you too and you're easier to hit than he is.

DON'T move unless you have to; then think first how you can move to cover most unobtrusively.

DON'T use artificial materials unless the natural cover is insufficient. Natural cover blends best with Nature.

DON'T be regular in your layout. Regularity is a military attribute and the enemy recognizes it as such.

DON'T take shortcuts over the open or step outside cover. Every time you put your foot down you attract forty-eight square inches of enemy attention.

DON'T walk around the outside of a net to fix the camouflage. Where you walk will be light in a photograph; the camouflage will be dark.

DON'T hide your installation and leave your spoil and belongings in the open. Remember the Ostrich.

DON'T let your flat tops sag. They will photograph like a wet blanket laid out on brushes and they are not a bit safer.

DON'T lower the sides of your camouflage. Your Commanding Officer cannot see what you are doing, but when the enemy sees the shadow thrown by those sides he will be even more severe.

DON'T hide under matted camouflage. It is as conspicuous as a bad haircut.

DON'T end a road at an installation or make a lot of trails to a position. Have you ever lost your way to a Canteen?

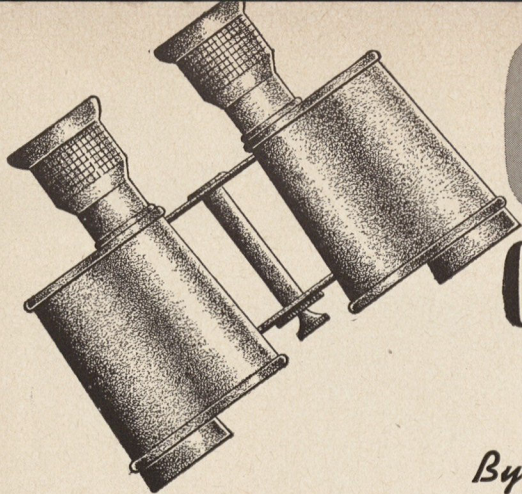
DON'T leave things near the edge of your camouflage. The edge of your camouflage isn't—and shouldn't be—opaque.

DON'T put up bad camouflage and think it's a magic veil. There aren't any in war.

DON'T crowd around an installation. Dispersion reduces the likelihood of conspicuous trampling.

DON'T clean up old position; it won't look natural to the enemy. If you're moving out, it will remain as a dummy; if you're moving in you don't want to change the appearance.

DON'T expose lights or make a great deal of smoke. The enemy is looking for such beacons.



Observations ON THE RUSSIAN FRONT

By Major John C. Henry

AIR TRANSPORT COMMAND

THREE American Army officers have been the first foreign observers to witness actual combat operations of the Soviet Army.

The group, headed by Brigadier General Patrick Hurley, former Secretary of War, visited the desperately contested Don-Stalingrad front early in December, traveling close behind a fast-moving Red Army as it sliced its way southward. Later, the same official group went into the Caucasus to another sector of this gigantic winter offensive operation.

Lieutenant Colonel Richard Park, Jr., assistant U. S. Military Attache at Moscow, was the second member of the American party. I was the third. General Hurley, visiting Moscow on a special assignment for President Roosevelt, arranged the trip to the fronts during a conference with Premier Stalin at the Kremlin.

For the actual entry into Soviet air, the Russian government added to our American crew a navigator and radio operator from their own Air Corps—essential assistance for the jump over the rugged Elburz Mountains and across the Caspian into territory where foreign planes without certain identification are shot down first and questions asked second.

And when it came time for us to leave Moscow for the journey into combat areas, we transferred into a Russian-built plane piloted by a 27-year-old Captain wearing two Red Army decorations for bomber and parachute service earlier in the war. Around us throughout our travels in the combat zones were fighter escorts, usually eight in number, and our altitude seldom exceeded 300 feet. More often it was 100 feet as we hedge-hopped over houses, hay-stacks and great forests of white birches that break the snow-covered steppes.

Neither section of our trip up to the fighting lines was a sight-seeing expedition; they were military reconnaissances in which every pertinent fact was laid out by the commanding generals of a great offensive operation for the critical scrutiny of the officers of an allied army. The cooperation in this respect could not have been more complete if we had been observers with our own forces.

A description of the Soviet offensive by a member of the first group of foreign observers to witness combat operations in Russia.

The campaign which we reviewed in the Stalingrad sector was painstakingly planned. Tactics which had worked well for the enemy were reviewed and transposed with modifications or improvements into the Soviet battle plan. Great dumps of supplies were established at the safest convenient points.

Every facility for transport of the day to day needs of an attacking army was pressed into service—aircraft, railroads, motor trucks, oxcarts and even sleighs. Manpower was assembled in generous quantities and the responsibility for leadership and execution placed in the hands of young officers whose knowledge of war had been gained in the field since June 1941.

For obvious reasons much that we saw and heard in this campaign must not be told publicly at this time. On the other hand, previous Soviet policy of permitting no foreign observers, either Allied or Neutral, has created great mystery around actual front line operations of the Red Army. The lifting of this veil in the case of the Don-Stalingrad offensive was a substantial gesture toward more complete American-Soviet cooperation and coordination of effort.

Briefly, the Soviet battle plan called for the drive of a spearhead army due southward from Serafimovich on the bank of the Don with a pivot at Kletzkaya and further advance southeastward to another crossing of the winding river. In the vicinity of the railroad line between Stalingrad and Kalach, junction was to be effected with two armies that had started westward from just south of Stalingrad and wheeled in a northerly direction for the closing of the pincers.

Protecting the spearhead army from the north was another army on its west flank, employing the River Chir as its front against

the Axis forces, and still another army on the east flank with the task of cleaning out all enemy forces within the Don elbow between Kletzkaya and Peskovatka.

Almost to the mile and to the minute this program was carried out. Although preliminary operations early in November had established the spearhead army at a good starting point between Serafimovich and Kletzkaya, the real push took place in a crowded four days late in the month.

When this 96-hour span was completed the toughest fighting division of the spearhead army had joined hands almost due west of Stalingrad with units from the two southern armies, the clean-up job inside the Don elbow had been done with merciless efficiency, the western flank seemed securely covered at the Chir, and roughly a score of enemy divisions were encircled between the Don and Volga Rivers.

Because of unfavorable flying weather, air strength had played a very small part in this offensive operation and we saw relatively little air action during our travels on either front.

It was emphasized, however, that Soviet air reconnaissance had done a magnificent job in supplying photographs and detailed information on enemy positions to the Red ground troops. At Kletzkaya, we were told that the Russian artillery knew the position of every Axis gun on the Don river heights and that the benefits of this knowledge were evident in the quick rout of the enemy batteries.

Conversely, the Soviet commanders told us that the surprise element had been complete in the preparation and launching of their offensive—largely because their fighters had driven off virtually every Axis reconnaissance plane before it could complete its mission. We saw numerous instances of this alertness by the Red fliers as they patrolled the skies over the combat sector.

Apparently outnumbered and aware of it, the Axis air force showed itself hardly at all except for somewhat desperate attempts to move supplies across the Russian ring into the area held by the encircled axis divisions. Several times we saw flights of Junkers transports (Continued on Page 37)

ON THE LINE



WHAT'S WRONG WITH THIS PICTURE?

Well, several things; eight to be exact. Or did we miss something?

Tech Sergeant Fred Kohlman and Sergeant Clarence Shwake suggested the boners pictured above. Staff Sergeant Francis Seitz posed *how not to do it*. All three are in Headquarters Squadron, Air Service Command, Patterson Field, Ohio.

"Our Mechs in the Army Air Forces are the best in the world," says Crew Chief Seitz, "but a few of the boys sometimes forget what they're taught—or are so busy they just get careless. You can spot the careless ones by their work and their results. Just watch!"

We did. What's wrong? Answers are on the opposite page.



DID YOU KNOW...

That Technical Orders should always be made easily available to the men of the air and ground crews whose duties require constant use and reference to them. See T. O. No. 00-25-3.

That the word RESTRICTED on Technical Orders does not restrict men on the line from reading and studying them daily. Rather, it means that because of the material contained, Technical Orders come under the classification of Restricted documents as defined in AR 380-5, and are for official use only. Use your T. O.s—but don't talk about them to unauthorized persons.

That the maintenance Inspection Record, Form 41B, is now provided with a pocket in which AAF Forms 60A, 60B and 61 will be carried. See T. O. 00-20A, Sect. 1, Para. d.

Thanks to Technical Sergeant E. R. Morris of Mitchel Field, New York, who sent in the following reminders:

TAGGING...

When disassembling airplane assemblies, engines or accessories, it's a good idea to tag each part when you take it off. This makes immediate identification easy and speeds up the job when replacing the parts.

CARBURETORS...

When removing carburetors, be sure to close the butterflies. Safelying them shut before removing the bolts prevents dropping nuts, bolts, washers and bits of safety wire into the blower.

DRIP PAN RACKS...

Vigilant care in keeping drip pans under airplanes while work is being performed, prevents grease and oil from getting on the hangar floor; it makes your job much easier in keeping the hangar clean and safe.

One squadron has built a drip pan rack (on the principle of a bicycle stand rack) which holds the pan vertically on their sides. Pans are put on the rack immediately after use. This allows the grease and oil to drain down into another pan (which is placed horizontally under the rack) and assures a supply of clean pans at all times. Also, it is easier to withdraw pans from this rack than to bend over and take them from a flat floor stack. The stand, which provides a separate slot for each pan, protects the edges and prevents them from getting bent out of shape.

LOOSE TOOLS...

A fighter pilot while recently doing a slow roll at 20,000 feet suddenly felt a sharp blow on his shin bone. Looking up, or rather down, for he was now upside down, he saw a large wrench sliding around the cockpit enclosure. The roll was completed—but cautiously—to keep the ominous wrench from hitting him again. Moral: Don't leave wrenches in the cockpit. Carrying your tools in a kit, rather than stuffing them in your pocket will make it easier to check them when each job is finished.

MULTIPLICATION...

About last month's item on not brush painting propellers, an engineering officer points out that an ounce of material on the tip of a propeller blade having a five foot radius ceases to weigh one ounce when centrifugal force is applied. At 1800 R.P.M.'s that ounce is multiplied by 5,536—making it 346 pounds to be exact. That's the reason for excessive engine vibration when paint is dabbed on promiscuously. See T. O. 07-1-1 for complete details on painting of propellers.

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

USE A PENCIL...

When marking bolt or stud heads, be sure to use a pencil rather than a file. The heads are finished with cadmium plate; a file scratch will open this protective covering and invite rust.

COTTON PLUGS...

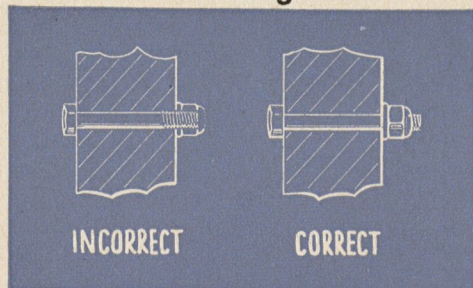
The problem of noise is treated lightly by most members of air crews. Too bad. Exhaustive experiments prove that persons continually subjected to noises of considerable intensity show a slow but steady loss in hearing ability. This leads, in certain cases, to deafness. Ground crew members who are daily in contact with the noise of motors show the same detrimental changes. Flight surgeons recommend the judicious use of cotton ear plugs.

MISTAKES ON OPPOSITE PAGE Reading from left to right

1. Wait a minute! You're likely to damage the trailing edge with the service hose; wing tanks should be serviced from the leading edge of the wing. And it's much easier to get the gas truck in front of the airplane. If de-icer boot is attached, protect it from the hose with sufficient padding. Reference: Common sense.
2. The tank is full, too full. Cut off the gas. You're creating another fire hazard. Reference: T.O. 06-5-1 and common sense.
3. And what's that static ground wire doing hanging loose? Quick, ground the hose! Reference: T.O. 06-5-1.
4. You should be holding the hose nozzle with your hand. Never let it hang there by itself; it may break off the filler neck on the tank. This bad practice, on tanks that have no filler necks, will result in damage to the tanks. Reference: T.O. 06-5-1.
5. Hey! No wonder you're having so much trouble; do one job at a time.
6. Get your left foot off the air scoop. Besides damaging the scoop, you're likely to fall off the wing and hurt yourself.
7. Better not use that screw driver to check the oil level. You're liable to drop it into the tank. Use the oil gauge prescribed for the aircraft you're servicing.
8. Why not use the proper crew chief stand instead of a ladder? And the ladder shouldn't be leaned against the leading edge without proper padding. How do we know it isn't padded? Because you've got it upside down. It's not only wrong—but definitely unsafe.

That's what Crew Chief Seitz meant about carelessness.

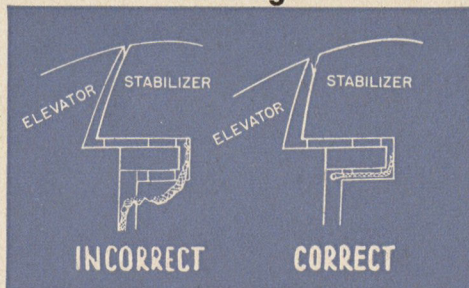
Self-Locking Nuts



INCORRECT: Bolt not completely through self-locking nut.

CORRECT: One to two threads should be showing beyond the nut for proper installation. See T.O. 04-1-13 for general instructions on use of self-locking nuts.

Bonding



INCORRECT: Excessive length will cause flexing, chafing and eventual breaking of the bond.

CORRECT: The bond is of sufficient length to allow full travel of the surface, and the ends are tinned. Broken and frayed bonding must be replaced as specified in T.O. No. 08-5-1.

Using Cardboard in Combat First Aid

By Sergeant Max Baird

MARCH FIELD, CALIFORNIA

IN Alaska not so long ago, a wounded man from a Liberator crew was carried into an Army hospital with a serious back injury—one of the most dangerous injuries of them all when the patient must be carried.

What kept this incident from being run of the mill was that the man was all trussed up in cardboard marked with strange diagrams and lines reading "Cut here for neck and back splint," "Out here for elbow splint," and similar hand-lettered inscriptions. The cardboard itself, however, still showed the origin of its former duty as the side of a packing box. The wounded man arrived in excellent condition, and the doctors gathered round with lifted eyebrows at this unorthodox, but plainly effective, procedure.

For the answer to that startling entrance into the Alaskan hospital we must hop southward some 3,000 miles to March Field, California.

Using a piece of common ordinary cardboard and a triangular cloth, Major Walter J. Crawford, Medical Corps, after more than a year of research and experimentation at March Field has perfected a revolutionary first aid technique which he has found to be the practical answer in battle.

From a section of corrugated cardboard only sixteen inches wide and thirty-two inches long and following the Crawford diagrams, even Joe Yardbird can quickly bind up an excellent elbow, ankle, leg,

The side of a packing box assumes a place of importance in a novel method of handling wounded personnel.

neck or back splint that will do the job. Coupled with the use of a cravat (No, Joe, not a necktie, just a medical lingo for a triangular cloth 51 inches at the base and 36 inches on each of the other two sides), these two easily provided articles form the basic ingredients for his recipe for a first aid kit that is capable of pressure-banding and splinting most injuries.

Major Crawford follows the old adage that one picture is worth ten thousand words. Also, somewhat like the character who operated the shell game at the county fair, he leaves nothing to chance and, like Gypsy Rose Lee, very little to the imagination.

Accordingly, every one of the heavy bombers in his Group takes off equipped with his additions to the standard aeronautical medical kit. These consist of five of his specially designed cardboard splints, three cravats, a tube of Butyn and Metaphen Jelly (for eye injuries and burns), four large safety pins, two poles eight feet long which are used to improvise a litter with flying jackets and one being utilized

for the carry through the bomb bay, and, finally, two blankets.

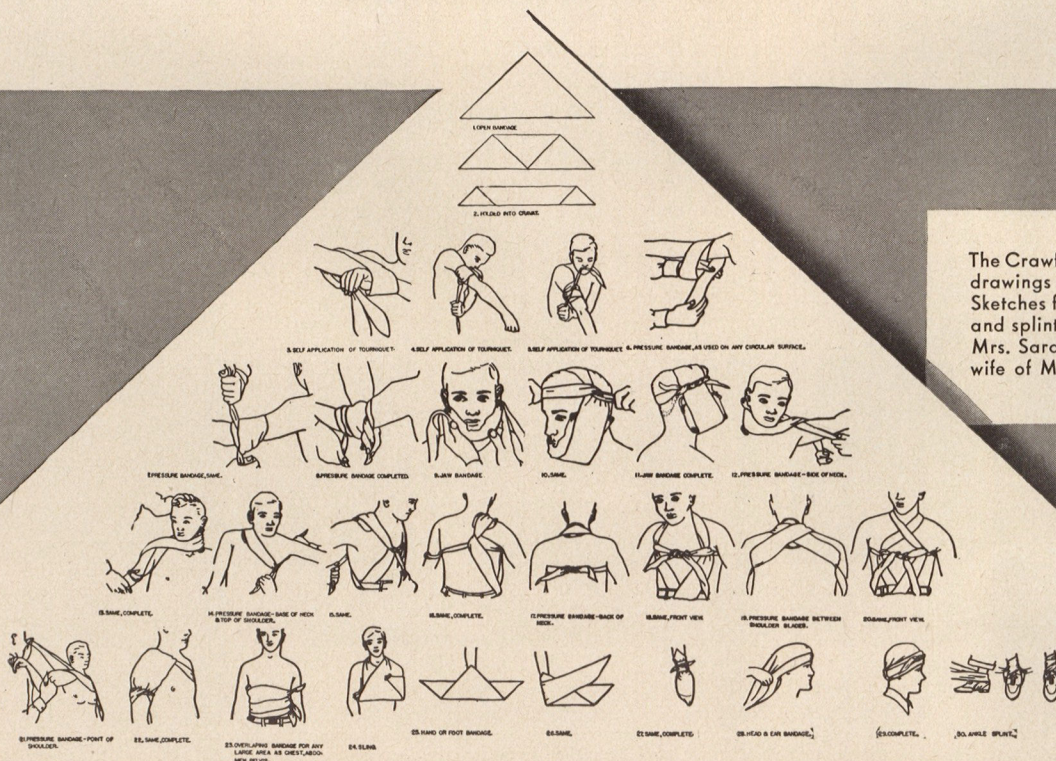
The Crawford cardboard splint is diagrammed with lines and printed directions indicating where to cut to make the required splint for the specific injury. It's as easy as "cutting on the dotted line" to open a box of breakfast cereal. On the lower half of the cardboard are drawings describing how to apply the different splints.

"This splint allows for splinting the elbow and forearm with a folded cardboard layer that provides diffuse, even pressure on the forearm while in a neutral position. The same cuts are made on the cardboard to make the ankle splint," Major Crawford says.

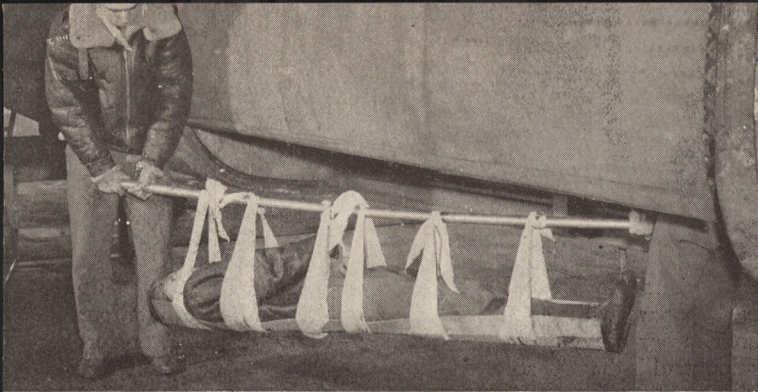
The cravat is also stamped with "profuse illustrations" showing how to use it for self-application of a tourniquet, its use for pressure bandages, and a self-operated pressure bandage for the side of the neck, by which the patient can increase or relax the pressure by lowering or raising his arm. The cravat can be laundered and reused.

On the back of the cardboard are detailed first aid instructions for shock, wounds and hemorrhages, fractures, burns, artificial respiration, and transportation of wounded. Listed also are the contents of the standard aeronautical medical kit and the additional articles carried under the Crawford system, plus the uses for each so that whoever is

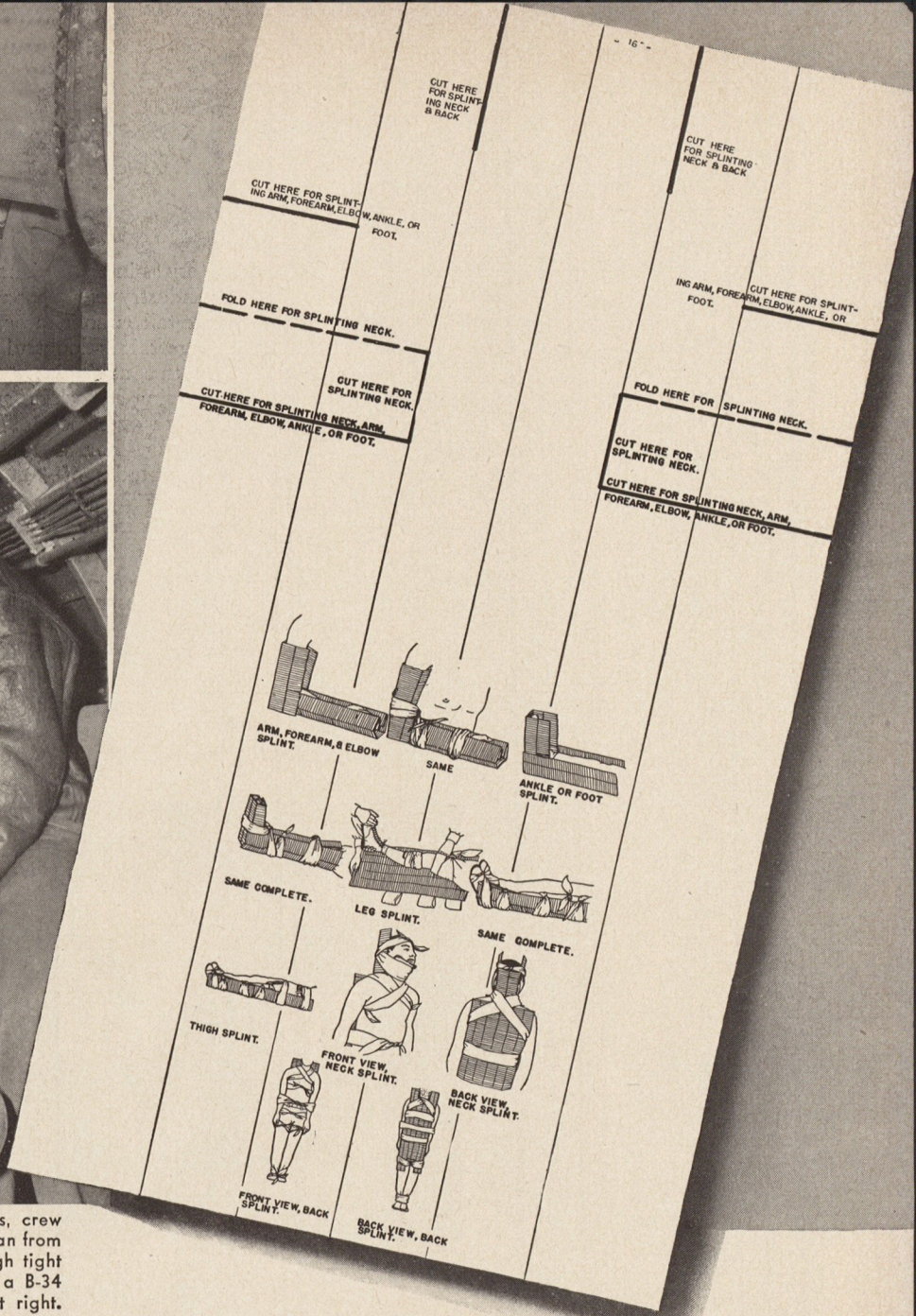
20



The Crawford cravat with drawings of first aid uses. Sketches for both cravats and splints were done by Mrs. Sarah P. Crawford, wife of Major Crawford.



Employing the Crawford cardboard splints and cloth cravats, crew members in the upper photo simulate removal of a wounded man from the bomb bay of a B-24. This method permits passage through tight squeezes such as the entrance to the pilot's compartment of a B-34 (lower photo). Front view of one of the splints is shown at right.



applying the first aid can determine at a glance just what he has to work with and what to do with each item. The splints can be (and have been for actual injuries) applied in two or three minutes in contrast to the fifteen or twenty minutes often consumed in using standard splints.

Major Crawford has had remarkable success with the system. "Enlisted men without previous experience have learned to apply all the procedures, pressure-bandages and splints in two hours," he declares.

Since all combat crew members fall within certain sizes he has found that the 16" x 32" dimensions for the cardboard splint "fits" his personnel. For units with men with a wider scale of physical proportions the splint, of course, can be made in correspondingly smaller or larger sizes.

His splints are applied with the clothes

left on the patient. Flying at high altitudes wounded men can not be undressed because of the cold. To permit access to the wounded area for bandaging without undressing the patient slits are cut in the flying clothes wherever necessary. In the case of burns he directs that the clothing also be left on because to rip the clothing from a burned area often tears away flesh and accentuates the danger.

Wounded men are removed from the bomber in a manner similar to the pole-carry of two hunters with a dead deer. The cardboard splints, two layers thick if necessary, are used to pad the man's body which is tied with cravats to the eight-foot poles for the carry through the bomb bay. This technique was developed by another flight surgeon, Colonel Clyde L. Brothers, surgeon of the Fourth Air Force, under whose super-

vision the entire system was worked out.

While most of his technique is original, Major Crawford naturally has called upon previous first aid systems to some extent. The most important contribution was supplied by Dr. Charles F. Sebastian of the Los Angeles Emergency Hospital.

The pressure-bandages which use cross pulls for vertical leverage and the neck and back splints shown are exactly as developed by Dr. Sebastian. The practice of putting a strip of gauze in the head of each safety pin so it can be found and removed quickly with a sharp jerk on the gauze, even in the dark, was also borrowed from Dr. Sebastian who modified it from a trick of British ambulance drivers. Major Crawford added the stunt of having a strip of green gauze to indicate morphine has been administered and red gauze to signify a tourniquet. ☆

Balancing the airman's gripe as a means of overcoming a serious problem in front line flying operations.

REPORTS coming from theaters of war have led to a revision of ideas about flyer fatigue. Anoxia has been mistakenly branded the bugbear of pilots as a major cause of pilot fatigue.

This idea now appears to have been an over-simplification that has resulted in much wasted effort in research on "ceiling" and the influences on it of drugs and hormones. Pilots are instructed to use oxygen above 10,000 feet: If they fail to do so and become fatigued because of chronic anoxia the remedy lies, not in pills, but in more thorough education and more comfortable oxygen equipment.

Acute anoxia is a serious problem and will remain so, even if perfect oxygen equipment is developed. In the emergencies of combat, occasional loss of oxygen supply at high altitude is inevitable. Here, too, there are better remedies than pills — improvement in both regular and emergency oxygen equipment and thorough drill in the use of such equipment.

It is now clear that fatigue as it is seen today in combat flyers is no simple state that can be described in terms of cause and effect. Rather, it is produced by the many unpleasant stimuli about which one is accustomed to gripe. So long as the flyer's gripes are balanced by successful missions, by a conviction that he has a role in winning the war, by good and frequent news from home, and by periods of rest and recreation, all is well. If not, all may be lost regardless of remedial measures.

What are these stimuli responsible for flyer fatigue? Some of them are peculiar to war and to the flyer's role in the war; others are essentially the same as those experienced by the wartime worker at home. Examples of the former class are:

Doubt as to whether the engineers and workers at home have given him the best equipment brains and brawn can produce.

Doubt as to whether the mission assigned him has a reasonable chance of success.

Will his gas supply carry him through?

Can he survive a crash landing at sea?

Even if he survives the crash landing, will he be rescued?

Has he and has each crew member done everything humanly possible to make the mission a success?

Will there be impartial recognition of his exploits? Or, will quitters be sent back to safe jobs and to superior ratings?

Some sources of irritation are as common among industrial workers as they are among flyers. Noise, vibration and glare may be as

wearing in a factory as in an airplane. However, no job in industry can compare with that of the side or tail gunner in our heavy bombardment aircraft. It is doubtful if there is a tougher job in this man's army than that of the soldier manning a machine gun in a —40 air blast at the open port of a B-17 as the plane is being "horsed around" in evasive tactics at altitudes of 30,000 feet and above.

Relations with one's immediate associates and with superiors in rank may be a source of satisfaction and of inspiration or of discontent and discouragement, whether in industry or in a combat squadron. Strong bonds become established between officers and men who have spent hundreds of hours in successful combat and in long-range flights far above land and sea. Such bonds help to carry men through periods of stress

Provide friendly, encouraging leadership. Insure impartial distribution of citations.

Provide the most attractive and comfortable quarters that the exigencies of war permit.

Provide the best food obtainable.

Provide medical care that is competent, kindly and sympathetic.

Provide opportunities for rest, for recreation and for sports with rapid evacuation of non-effectives to their homes.

Relieve combat crews after 100 to 125 hours of combat operational flying.

Relieve members of combat crews who show definite indications of approaching the war-weary stage.

Most of these principles are so well recognized and so generally practiced that no emphasis is necessary. One, however, which has been neglected is the need for providing active participation in sports.

Every squadron has an operations officer, an engineering officer and an oxygen officer. There also should be an athletics officer given the responsibility of obtaining sports equipment and facilities for organizing teams and for directing a sports program. Such a program not only would sustain morale but would make flyers more efficient. The man who is tough has the best chance of survival in an emergency, whether in a life raft, in a jungle or on a Greenland ice cap. Such a program of athletics has all the support from higher authority that is needed. This is found in AAF Regulation 50-14, dated August 15,

1942—one paragraph of which Regulation is so clear-cut and emphatic it is quoted here:

"7-d-3. Special emphasis will be placed on a physical training program for conditioning and the maintenance of proper condition of flying officer personnel. All such personnel below the rank of Colonel will participate in a minimum of five hours per week, distributed over a period of not less than three days per week, and when practicable as determined by the commanding officer, this time allotment will be regularly scheduled one hour per day six days per week."

One of the most powerful counter-irritants for offsetting fatigue comes in the form of good news from home. Letters, pictures, magazines, go far towards sustaining the soldier's morale. The full solution for this problem is not in the hands of the commanding officer: He depends on the folks at home to solve it for him by writing often and by sending pictures, home-town news, and newspapers. ☆

A New Aspect of FLYER FATIGUE

By Lieut. Col. David B. Dill

AERO-MEDICAL LABORATORY, WRIGHT FIELD

where training, self-sacrifice and team work are at a premium.

HOME conditions may add to or subtract from morale, whether the son is in a distant wartime factory or in far-off New Guinea. Dirt and disease may afflict not only the soldier but also the wartime worker far removed from home comforts. In fact, the soldier may well have better medical care than the civilian.

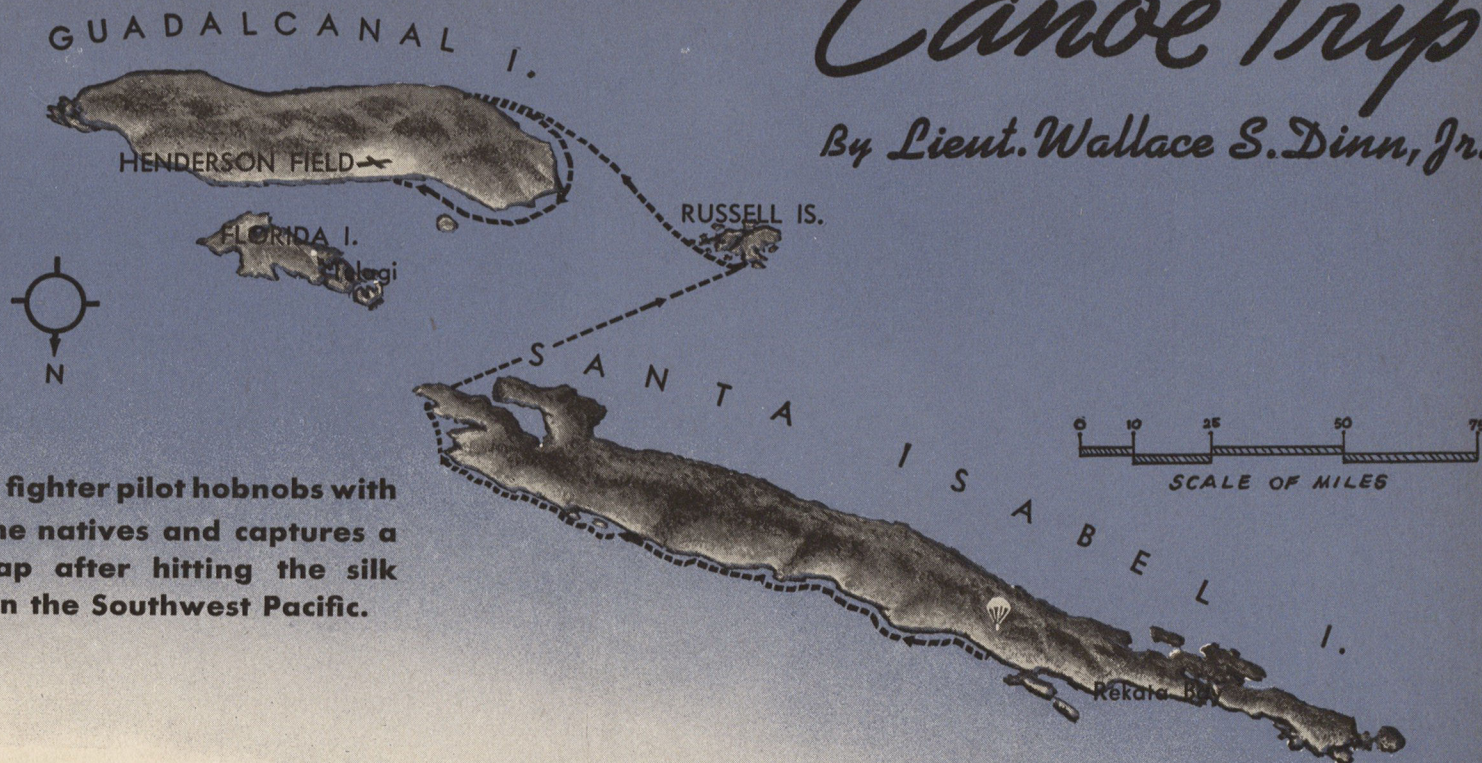
If irritants are too numerous and too distressing, fatigue results. The flyer does not rest well at night; his sleep is fitful and broken with nightmares. He awakens physically worn and mentally depressed. His spirit lags. He may fail in a mission easily accomplished by a fit and spirited flyer.

The wise commanding officer will heed the advice of his flight surgeon and by enforcement of simple principles will delay or even completely forestall the development of fatigue in the officers and men of his command. These principles are:

MY SOLOMONS

Canoe Trip

By Lieut. Wallace S. Dinn, Jr.



A fighter pilot hobnobs with the natives and captures a Jap after hitting the silk in the Southwest Pacific.

WE LEFT Henderson Field on Guadalcanal about seven o'clock on the morning of October 28 to attack the Japanese seaplane base at Rekata Bay, Santa Isabel Island, some 165 miles away. On the mission were four Navy SBDs, six Grummans and three P-39s.

Captain John W. Mitchell was leading Lieutenant Jacobson and me in the P-39s. Our mission was to fly cover for the SBDs, divebomb, strafe and, with the Grummans flown by Marines, cover the return of the SBDs.

There was an overcast ceiling at 2,500 feet, so we made our diving approach above the clouds. The SBDs dropped first and headed back. We dived immediately behind them with the Marine fighters.

After dropping our bombs, we proceeded to strafe the enemy floatplanes on the water and blast a few ground installations. Eight enemy planes were reported destroyed, but I saw only six of them get it. We experienced no enemy fire during several runs.

When we were pulling off the target for home, I spotted an enemy gasoline dump of about 1,500 gallons well-camouflaged on the beach. I called Captain Mitchell's attention to my discovery and he told me to return and strafe the dump if I had any ammunition left. My two right .30 caliber wing guns were still firing so I went down.

The first burst set a small blaze at one end of the dump. I pulled up and started down on the other end. As I dived I strafed the beach and got in an extra burst at the already damaged floatplanes.

I had to fly along sideways to keep the two live guns on the gasoline dump, and as I pulled up this time, I heard a close explosion and my right side went numb. This happened when I was about thirty feet off

the water and a hundred feet from the coconut trees along the shore. Smoke began filling my cockpit and I saw Prestone running in from the right side. Since I could move my arm without difficulty I figured I wasn't hit badly, if at all.

Immediately I chanelled left, away from the enemy. Smoke was boiling into the cockpit and my breathing was becoming increasingly difficult. The Prestone gauge was against the stop and the oil was heating up like the devil. I tried to call Captain Mitchell on the radio to give him my position because I knew I would have to bail out soon. I couldn't see any of our planes. When I received no answer, I knew my radio set had been disabled.

My burning ship struggled up to about 2,000 feet and I spotted two Marine fighters in front of me. I fired tracers in front of them to attract attention and immediately they turned. One chap, named Watkins, seeing me smoking, pulled up alongside.

My engine was pounding like hell and giving little power. Since it was low tide and there was a wide expanse of white sand down below, I started to crash-land but thought the better of it when I realized how near I was to the Jap seaplane base. So I figured I'd have a better chance of getting away if I bailed out.

I pulled the emergency door release, waved to Watkins and went over the side. I seemed to fall in a sort of forward position without tumbling. There was no sensation of falling. Probably I was too excited to notice.

Suddenly I realized there was something

else I should do—I pulled the ripcord. The ground was now coming up at an alarming rate and I began wondering how I would land. It was all over in a moment. I came down with a bit of a thud in a little clearing at the foot of a tree in which my chute had tangled. I cut my jungle pack free from my chute, cocked my .45 and started down the hillside.

The jungle was so thick I had a tough time making the beach although it was less than a mile away. I decided to visit a village I had seen from the air and began sneaking along the edge of the beach. The Japs were between five and ten miles away, I figured.

I was moving along trying to make as little noise as possible when an old native popped out of the bush ahead, squawked and ran. I followed him as best I could and he led me to a little village of five huts. No one was around.

A native finally came forward, after I had waited anxiously on the edge of the bush for some time, and asked if I were Japanese. I replied: "American," and he came forward, calling out the rest of the villagers.

After I told them I was a birdman, there was nothing too good for me.

One of the young men of the village, named Eric, could speak pidgin English, having attended a settlement mission school for three years. We hit it off in fine style.

It didn't take long to persuade Eric and several other natives to start with me in a small dugout canoe down the coast of Santa Isabel toward Tulagi, some 160 miles away. The first night out we stayed in the village

ILLUSTRATED BY
PAUL REED

of the headman of all the natives on Santa Isabel, a chap named Baku. There was the usual round of shaking hands with the entire population of the village. This I did from a position of importance on something of a throne set up on Baku's front porch.

After a dinner of taro (a Polynesian food plant similar to our elephant's-ear), pineapple and a vegetable that tasted like a yam, the chief — using Eric as an interpreter — asked about the war. In simple words I told the chief and the assembled natives of the United States and England, of Germany and Japan. The natives were greatly interested. In fact, my talk was repeated at least once a day as we continued the journey later and stopped for food at other villages.

BAKU furnished a twenty-foot war canoe and four paddlers, including Eric, and we started out before dawn of the following day. Paddling steadily, we traveled down lovely canals, broad lagoons filled with multi-colored fish and outside the reef into open water. Now and then Japanese reconnaissance planes would fly over and I would duck to the bottom of the canoe. The paddlers would cover me over with matting. This happened several times during the day. The natives would keep me advised whenever we neared a Jap-controlled island.

We were paddling at a rate of about three miles an hour and the first day out we must have stayed on the job for fifteen hours. Since the rainy season had begun we were soaked most of the time.

To pass the time, I taught the boys the tune to "You Are My Sunshine" and they seemed to get a great delight out of humming as I sang the words. (You should hear my voice!) We also sang "Jesus Loves Me," they carrying the lyrics most of the time in their native tongue. "Jesus Loves Me" was their favorite song — you might say, Number One on the Solomons Hit Parade. I learned the natives had been Christianized since 1914.

Several times during the day, we spotted crocodiles lying on logs along the shore and ahead of us in the channel. I fired at several to frighten them away. I had the only firearm in the party, the natives carrying only crude knives and fish spears.

We spent the night of October 29 on the beach and got an early start the next morning. Crocodiles and fish were everywhere. The natives told me two Japs had been in this locale several weeks before but the crocs had eaten them before the natives could assist them back to Rekata Bay.

At noon we spotted more natives on the beach and they told us of a Jap pilot on a little island about fifteen miles away. His Zero had been hit by one of our guns during an attack on Guadalcanal, but he had managed to keep his ship up for about 140 miles before coming down in the water near this island. He now was attempting to get the natives to escort him to Rekata Bay. We decided to capture him.

That night we paddled to another island about half a mile away from the one on which the Jap was located and made plans

to go after him the next morning. The Jap's island was very small and there was no cover. The only natives on it were four men, five women and several children.

Since he was reported armed with a pistol, we decided the best way to capture him would be to sneak over the next morning before breakfast and have three of the boys go on ahead just about the time he would be eating, with the other boy and myself following a few minutes later to help out if there should be any trouble.

The three who went ahead were instructed to grab him and his pistol when he placed it on the table to eat. They were successful, and by the time we arrived on the scene about three minutes later, the Jap was in the process of being trussed up. He immediately begged — or rather demanded — that I shoot him. And what's more he seemed to think me a weakling when I refused. He asked me why not and I told him he was going back and dig graves for other Japs killed on Guadalcanal.

We returned to the canoe and headed out again. I tied the Jap's hands with wet rope but didn't tie his feet since it was most uncomfortable in the small canoe.

That night we slept in the rain, if you can call it sleep. The native boys watched our prisoner until midnight and I watched him until dawn.

The next day we pushed on hard trying to make a little better time. And we did despite a heavy rain during the early afternoon. We had the evening meal on the beach before dark since we intended traveling late that night.

During the meal I chatted a bit with the Jap and began to feel a little sorry for him. In fact, gave him my last two cigarettes. He was soon to repay me — but not in kind.

About eight o'clock we began threading our way out through the reef in a driving rain and everyone was busy trying to keep the canoe upright until we reached smoother water — that is, everyone except the Jap. He suddenly tipped us over.

WE lost him as we scrambled for the shore about two hundred feet away. As soon as we made it to the beach, we gathered up our gear and began searching the jungle for our prisoner. After searching in vain for some time, I took one boy and set out for a village nearby, leaving the others to continue the search. They caught the Jap about three o'clock the next afternoon.

I decided right then to weaken him to a point where he wouldn't feel up to repeating his performance. We were faced with a sixty-mile paddle across open water from Santa Isabel Island to Florida Island and Tulagi, and I didn't like the prospect of his turning us over out there. The prisoner was put on a ration of one banana and a little sugar cane a day.

We stayed in the village that night and I learned some Japs were on a little island about two miles away. We became more cautious. The natives, meanwhile, had told me of a coast-watcher with a radio set located some distance down the beach so I decided

to take a chance and send a messenger down with a note to be sent to the Marine C. O. at Tulagi. The message read: "Safe here with prisoner. Request orders."

The messenger returned early the next morning (November 2) with the disappointing word that the radio set was out of order, and we made plans to travel across the open sea by canoe. We obtained the largest canoe available, a regular war craft about thirty feet long, with high-pointed bow and stern. I was given nine paddlers for the voyage. The natives figured it would take nearly thirty hours to cover the distance, so we planned to paddle to the tip of Santa Isabel that day, rest for a couple of hours and set out for Florida Island at night when the water would be fairly calm.

We reached the tip of the island by four o'clock in the afternoon and were having a bite to eat when a messenger came running up with word that a British boat was on the other side of the island. He said we could reach the boat — which would take us to Guadalcanal — in about an hour and a half by crossing the 2,000-foot mountain range which constitutes the backbone of Santa Isabel.

I WAS getting very weak by this time and as a result it took us almost three hours to negotiate the distance. Time after time, I had to stop and rest.

The Jap prisoner at first refused to walk at all. One of the boys had an old bayonet which I figured would provide the impetus for our obstinate traveler. The boy jabbed "Tojo" not too gently and the Nip let out a little yip. Just then three large white orchids fell from a tremendous tree under which we were standing at the moment. Mighty incongruous things happen out here.

We finally made it across the ridge and reached the beach, where we were able to obtain a small canoe in which we paddled about five miles along the shore to the British boat. This craft was about thirty feet long and had a top speed of six miles an hour.

We set out about ten o'clock that night for the Russell Islands to land supplies and pick up an SBD pilot and his gunner who had been forced down. We arrived about noon the following day (November 3) and remained until two o'clock the next morning. In the interim, we searched an adjoining island for three Japs the natives reported were stranded there. We failed to find the Japs but we destroyed their clothing and food.

From the Russells we chugged over to the back side of Guadalcanal to pick up another SBD pilot and a Marine fighter pilot. The former had been lost for twenty-eight days.

We finally made it back to the base late in the afternoon. I was fed up with water travel. Six days in canoes and two in a small boat made Henderson Field and its aircraft look like heaven to me.

Little the worse for wear, I was back in the air after a day's rest.

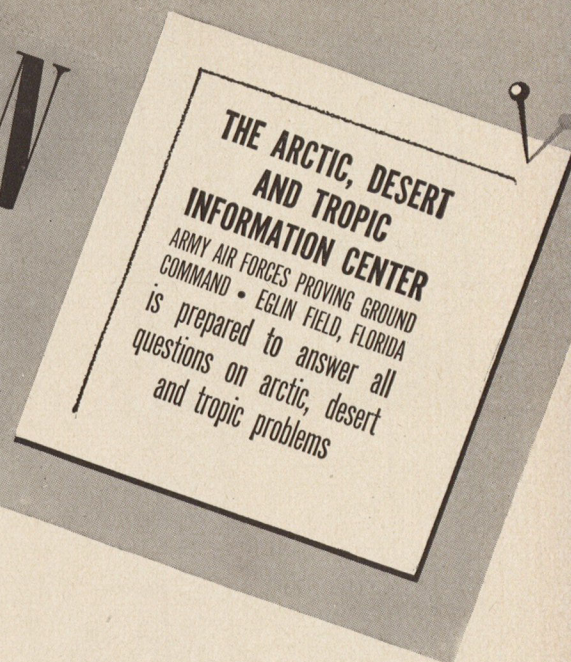
By the way, "Tojo" got his job digging graves. ☆

INFORMATION

- if you please !

By Lieut. Col. H. O. Russell

DIRECTOR, ARCTIC, DESERT AND TROPIC INFORMATION CENTER,
EGLIN FIELD, FLORIDA



GLOBAL war confronts us with a dual fight. Not only must we overcome the enemy, but we must also conquer the obstacles of climate and terrain and disease, and solve a host of unfamiliar problems in every corner of the earth.

To win wherever we fight—on the ground and in the air of the frigid arctic, the arid desert and the steamy tropics—we must first know what is in store for us. We must know the conditions that exist in every combat zone in which we operate. More than that, we must be prepared to cope with these conditions.

The collection, evaluation, preparation and dissemination of information on all problems arising out of arctic, desert and tropic operations is the job of the Arctic, Desert and Tropic Information Center (ADTIC). Its directive from the Commanding General of the Army Air Forces reads:

"There will be organized and operated by the Commanding General, Air Forces Proving Ground Command, at Eglin Field, Florida, an Information Center for the purpose of collecting, recording, coordinating, and preparing for publication pertinent data bearing upon the specialized operating conditions encountered by the Army Air Forces in conducting operations in arctic, desert and tropic areas."

The ADTIC was created solely to serve the Air Forces, to provide to its various commands information both of a general and specialized nature covering all phases of Air Force activities in arctic, desert and tropic areas. This takes in the operation and maintenance of all Army Air Forces equipment, including such problems as shelter, food, medicine, clothing, and the selection and care of personnel. Special emphasis is placed on studies to develop the best procedures for use in cases of forced landings, and to recommend emergency kits and survival methods for those forced down as well as procedures for secure crews. Other ac-

tivities include recommendations regarding manning tables and tables of basic allowances and recommendations for appropriate actions based upon research, findings and conclusions.

The ADTIC exists to furnish information requested by the divisions, directorates and commands of the Army Air Forces. It undertakes such special studies as may be directed by the Commanding General of the Army Air Forces. It is concerned with the collection and dissemination of all possible information on air operations under the peculiar conditions of the arctic, desert and tropics. This information is prepared for publication and dissemination to the service in the form of technical manuals, technical orders, training manuals and special studies.

THE reservoir of information available at the ADTIC is constantly supplemented by the activities of a large group of experts, information collectors, researchers, writers and special consultants. Nucleus of the organization are experts on the conditions in each zone. These constitute leading scientists, geographers, explorers and pilots who are authorities in their fields and qualified to evaluate both general and specialized information. They are assisted by a group of information collectors and reporters who gather data from every conceivable source. Information is gathered by various liaison officers from intelligence reports, from returned combat pilots, from the experience of our allies, from interviews with competent observers, and from a variety of publications. Consultants in all specialized fields are available for assistance on a multitude of problems. Leading research libraries and institutions, as well as industrial enterprises with world-wide interests, contribute relevant information drawn from their files.

The ADTIC is constantly working on problems and projects originated within its own organization, with a view toward immediate or future usefulness. But its major

function is to supply information on pressing current arctic, desert and tropic problems of the various Air Force units. Such requests are assigned to specialists in the field in which they fall. Under the supervision of the zone head, information is collected or drawn from ADTIC files. It is evaluated and coordinated by competent authorities and then placed in the hands of writers who shape its final form, either as a publication or a special study report.

The effectiveness of the ADTIC is in direct proportion to the use made of its services. It exists for the sole purpose of serving the Army Air Forces. It has the resources and the capacity to furnish information on every phase of Air Force operations, and it solicits the problems of all units which may either be operating or planning operations in arctic, desert, or tropic zones. Information on the aspects and prevention of frost-bite may be required. The ADTIC has the facts. Or you may want to know the problems and best solutions for the maintenance of aircraft under conditions of desert dust and sand. The ADTIC has the facts. Or you may want vital information on the procedure for survival for personnel forced down in the jungles or New Guinea, or on the Libyan Desert, or in the desolate wastes of Alaskan tundra. The ADTIC can and will help.

This, then, is the Arctic, Desert and Tropic Information Center. It has been established, and it works for you in the Army Air Forces—to help you understand what you will be up against in arctic, desert or tropic zones—to help you meet strange and difficult conditions, to help you win out over them, and to do your job safely and well. We urge you to make use of the ADTIC. It is ready and willing to serve you.

What's your AIR FORCE I.Q.?



1. As the bomber flies, it is approximately how far from London to Berlin?

- a. 570 miles
- b. 720 miles
- c. 805 miles
- d. 430 miles

2. The Fairchild AT-14 has

- a. Two radial air-cooled engines
- b. One radial air-cooled engine
- c. Two inline air-cooled engines
- d. Two inline liquid-cooled engines

3. What is a line squall?

- a. An argument on the line
- b. A slowly moving weather front
- c. Heavy storms, particularly in the summer
- d. An intense cold front accompanied by storms

4. The proper procedure for an emergency water landing is

- a. Gear up and no flaps
- b. Gear down and no flaps
- c. Gear up and flaps
- d. Gear down and flaps

5. Luke Field is located near

- a. St. Luke's, Arizona
- b. Amarillo, Texas
- c. Phoenix, Arizona
- d. Fort Worth, Texas

6. What is the equivalent Army rank to a Commander in the Navy?

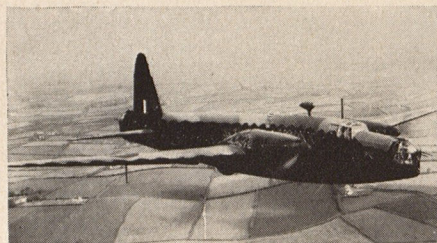
- a. Captain
- b. Colonel
- c. Lt. Colonel
- d. Brig. General

7. The tachometer indicates

- a. The temperature of the air around the engine
- b. Oil pressure in the lubricating system
- c. The revolution-per-minute of the engine
- d. The relative speed of two engines

8. The plane below is a

- a. Wellington
- b. Lancaster
- c. Liberator
- d. Blenheim



The puzzle department worked overtime to produce this month's collection of Quiz stumpers—so en garde! On the basis of five points for each question correctly answered, a score of 100 puts you at the head of the class; 90 is excellent; 80 good and 70 fair. You'll find the answers on Page 40.

9. The Messerschmitt 110 is a

- a. Single seat, two engine fighter
- b. Single seat, single engine fighter
- c. Two seat, two engine fighter
- d. Multi-place, four engine bomber

10. The identification letter "F" refers to a

- a. Photographic plane
- b. Observation plane
- c. Glider
- d. Autogiro

11. If a man becomes unconscious in flight due to a faulty oxygen supply, the best thing to do is shake him severely in an effort to revive him.

- a. True
- b. False

12. Casablanca is in Algeria?

- a. True
- b. False

13. Pyrotechnic signals make use of

- a. Smoke columns
- b. Flashlights
- c. Fireworks
- d. Cannons

14. Which of these is an adaptation of a slogan popular during the Spanish-American war?

- a. "Thumbs Up"
- b. "Keep 'em Flying"
- c. "Remember Pearl Harbor"
- d. "We Do Our Part"

15. Four minutes of time equals

- a. One degree of longitude
- b. One minute of longitude
- c. 15 degrees of longitude
- d. 360 degrees of longitude

16. The monthly bonus for paratroopers who do not otherwise receive flight pay is

- a. \$50 for officers; \$25 for enlisted men
- b. \$50 for both officers and enlisted men
- c. \$100 for officers; \$50 for enlisted men
- d. Fifty percent of base pay added

17. The expression "buzz the field" means

- a. To fly low over the field
- b. To contact the control tower
- c. To call the operations office
- d. To locate the field on the map

18. The newly adopted popular designation for the B-26 is the

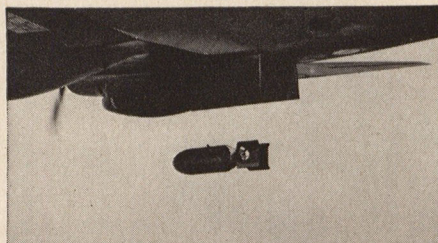
- a. Mitchell
- b. Liberator
- c. Marauder
- d. Havoc

19. What is the International Code for "all clear"?

- a. QQZ
- b. QQW
- c. QQQ
- d. QQS

20. This bomb being dropped below weighs

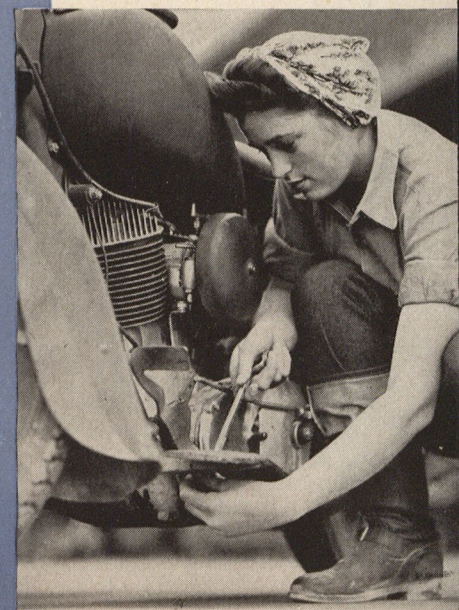
- a. 500 pounds
- b. 2,000 pounds
- c. 100 pounds
- d. 1,000 pounds



Gloria Jacobs, women's world pistol champion, has laid aside her revolver for the duration and now aims an electric drill at the Axis.

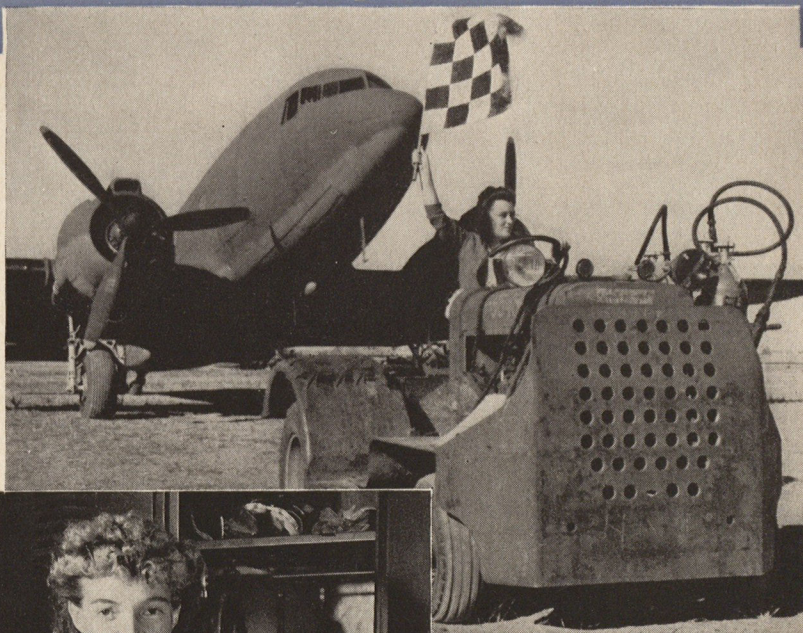


Dixie Hamill (below) has exchanged study of art for the study of motors at McClellan Field, Cal., where she specializes in motorcycle maintenance.



THE Feminine Front

COMING from the school room, home and the department store counter, women are daily releasing scores of men for combat service as they take over an ever increasing assortment of Air Forces jobs. Here some modern members of the "air sex" are shown performing vital tasks that range all the way from strenuous ground crew duties to actually taking ferry planes into the Air Force's own "wild blue yonder".



Hauling all types of planes to and from the line is just one of Evelyn Chisum's jobs at McClellan Field. She also stands by with fire extinguisher for emergencies and even removes wheel chocks for take-offs.

At Duncan Field, Texas, Mrs. Carrie Fuller and Mrs. Kathleen Birchfield carefully hang and air out a parachute before it is turned over to the riggers for packing. Moisture in the parachute might prevent its opening.



Geraldine B. Keyes, Alice H. Harris and Janet Walker are going aloft in an army transport to "get the feel" of flying. They are plane dispatchers, and issue flight sheets to transient pilots at the Sacramento Air Depot.



The responsibility of packing parachutes is entrusted to Barbara Towne, shown above at the New Castle (Del.) Army Air Base. Barbara is a WAF and holds a pilot's license.



Helen Richards is only twenty-one—but she already is a flying veteran with five years piloting ex-

perience. Helen, who is attached to the New Castle Air Base, is also the youngest member of the WAFS.



WHAT KIND OF OFFICERS?

(Continued from Page 13)

co-ordination of all these normal thoughts, inclinations and acts. This is necessary in order that a high and dependable degree of that "mental attitude and state of training which renders obedience instinctive under all conditions," known as discipline, may prevail in his character and future conduct.

IN order to attain this highly desired state, the individual responsible for the training at once runs afoul of that very thin dividing line between discipline and morale, beyond which one of these qualities may not advance without the weakening or destruction of the other. In my mind, the two are inseparable and of no value when divorced. The Army is spending millions in the study and service of "morale" and many times this expense and effort in some organization has been nullified by the improper application of training methods on the part of some officer with no conception whatever of individual or mass psychology or even the simple fundamentals of human understanding.

Let's start at the beginning with a cadet. He was a civilian or former soldier from either an average or above the average station in life and more often than otherwise just a student in school when he answered the call to arms and the urge to fly. He suddenly found himself in the midst of a wartime Army made up of other civilian, non-professional soldiers and officers together with the highly trained "regulars." He had heard that this same kind of Army learned from the last war that a more democratic policy and a closer relation between officers and men had made it then—and has made it now—the most efficient and loyal army, with the highest degree of morale of any armed force on earth. Yet, since he had become a cadet, it's quite possible that he had come all the way to the graduation ceremony without any personal evidence that such a condition even existed.

Discipline is probably the most important element in the training of any regimented mass of men who must function together or in co-ordination with other groups of men. Even the technical or professional use of their weapons or equipment is of little team value unless under the perfect control of discipline. The only problem in my mind, therefore, is the proper way to instill it in a group of men so that it becomes an integral part of their voluntary mental process rather than just a veneer worn for special occasions when some officer is present to use the authority rank gives him. All of which brings us to the question, and the answer, leadership. On this, and on this alone, depends the success of any military mission, either in training or actual combat.

There are few officers who can be strictly "iron pants" to the extent of being utterly devoid of human sympathy, a sense of humor, interest or pride and satisfaction in their men and ever command respect, loyalty or affection.

Any officer, by virtue of his rank, is in

position to impose his will on the men under him. Yet if abusing that authority is his only claim to the title, he is not the kind of officer this, or any other army needs, although he may rate himself a great disciplinarian.

Unless an officer, by his own ability, deportment, courage and fair dealing can command respect and loyalty in his men, he may look behind him some day in this war, when the going is tough, and find them all AWOL, except the few taking a bead on the back of his neck. And that kind of shooting is not the result of proper discipline.

When a cadet enters preflight he is starting from scratch in Army drill, customs, courtesies and other disciplinary phases of training. From there through his basic stage he must get it without relenting, so that it finally becomes a part of him. Even through these stages, however, a spade can be called a spade without hitting him over the head with it, and a command or a reprimand can be given in a strictly impersonal and military manner rather than with the tone or attitude of a personal insult. It is foolish and entirely unnecessary to treat them as children or some low form of animal life. Such only breeds resentment and antagonism in their minds to the point that any requirement you have of them must be demanded and enforced, whereas, with a different attitude it might be yours for the asking. I have had many tell me, after graduation, when discussing their training, that they have gone to the flying line day after day so mentally tense and upset from bitterness and resentment of personal treatment they were unable to relax enough in the cock-pit to get anything at all out of that period of training. I have had many also tell me that mine was the first "At Ease" to be given them regardless of how long they had been standing at "Attention" talking to an officer. Another expressed his appreciation of the fact that some officer had said, "Good morning," as he returned a salute. These are little things that I did not realize were of any importance. Yet having them called to my attention brings forth the unreasonable argument that so long as a man knows how and when to snap to "Attention" and does so, then an officer might well live up to his part of the procedure, which requires that no man be kept in that position any longer than necessary.

IN other words, a man's entry into the Army is the beginning of a two way obligation. His is to obey orders, accept any type of training or duty prescribed, keep himself clean and conduct himself in a manner reflecting credit to the service. The Army at the same time obligates itself to place that man in the charge of an officer qualified to clothe, train, and feed him; safeguard his health and personal welfare; administer and protect his military affairs and interests; advise him on personal problems, and by every means available keep him happy both on and off duty. If that officer falls down on any part of his obligation, he usually gets a reaction in kind as a reward.

There is another angle to the making of

a good officer, and that is the susceptibility of cadets to examples set by officers. Therefore, any officer concerned with their training should by his own appearance, manners and conduct, on or off duty, as well as the way he carries out his training function, stay acutely conscious of this fact at all times. I recently saw a Captain remain seated with his feet up on the top of his desk, collar open with tie slipped down, greet the Commanding Officer of the post in the presence of several cadets with a casual wave of the hand. If Army discipline irks them now, I'm sure they can hardly wait until they get commissioned so they can get as sloppy as that Captain was, particularly if he should happen to be any one of the "idols" which they each pick wherever they go.

WHEN cadets arrive at an advanced school they are on the last lap. If they haven't absorbed enough military training, other than flying and technical lessons, to qualify them as officers, then it is time the Army finds it out before they are commissioned. You can't possibly determine what a man has in the way of ability, force of character, sense of responsibility or initiative until you give him some responsibility and the chance to demonstrate those qualities and prove that he is capable of thinking and acting along the right lines for himself.

During this last advanced phase, flying and gunnery take up much of the cadet's time formerly spent at drill. It seems to me that in addition to perfecting his flying technique and teaching him to shoot, the cadet should also be directed toward that mental transition necessary to his changing from the status of an enlisted man to that of an officer. He knows by this time what the service requires and expects of him, and he knows the difference between right and wrong where his conduct is concerned. If he is not qualified at this stage to think and act like an officer and be given a chance to display initiative, sense of duty, honor and other characteristics we should know about, he won't be a few weeks from now. Pinning the bars on him won't automatically make an officer of him—he must do that for himself, mentally, and if he fails that test now, it will be much better than waiting until after he is commissioned.

He should be kept reminded that regardless of how high he might go in rank, he must still be governed by regulations and be subject to discipline in his duty and living. Still he must be made to feel that he is a human being whose feelings you consider and whose opinion on various matters you are interested in and value. A few extra personal courtesies, without even approaching the line of familiarity, go a long way in eliminating the low outlook on life and a possible inferiority complex they may have acquired along the line.

To sum it up, these boys have a big job to do and if, during their training we can let them know we are trying to turn out men in whom we have pride and confidence, it may help them to that very desirable estimate of themselves. ☆

AIR FORCE, March, 1943

ARMY'S FLYING WINDMILL

(Continued from Page 6)

mile and the ceiling to the tree-tops. It would, of course, have been possible to land at any time, but the pilot managed to get through by stopping in mid-air and then cautiously and slowly going around the wooded areas.

A great number of the landings and take-offs during the eight months of testing were made from a 20-foot square platform raised three feet above the ground.

The aircraft has hovered 20 feet above the earth while the observer climbed down a rope ladder to the ground and later climbed back to the ship. This foreshadows the practicability of landing or retrieving personnel in wooded or jungle country where even the helicopter could not land.

On low-pressure floats, the aircraft can land on any type of surface—on ground, water, marsh, snow or thin ice. Since it needs no prepared landing field, the helicopter may be able to provide excellent liaison and cooperation with ground forces. Because its forward speed can be reduced to zero, it can fly through visibility that is practically zero, literally feeling its way through the air by flying around trees and over buildings and hills. It also could be operated as an elevated observation platform for the direction of artillery fire, direct-line telephone conversation being practical if desired.

Despite its slow speeds, the helicopter probably would be less vulnerable to enemy attack than would a liaison plane because, having no wings, it is more difficult to see. Because it can hover stationary in the air, it also could be camouflaged to blend with ground colors. Nevertheless, such aircraft, lacking defensive armament, would not be expected to subject themselves to attack.

For night missions this aircraft would be a real threat in behind-the-line operation. The exhaust could be easily muffled; no propeller noises exist. It therefore could operate in almost complete silence.

Other operations that might be performed by a helicopter in combat areas include: the landing and rescue of agents at night in enemy territory, transport of personnel and critical material to inaccessible locations, rapid evacuation of wounded near the front lines, limited types of bombardment, photography, and the unreeling of communication wires over rugged terrain.

According to some authorities, the helicopter might operate from the decks of merchant vessels in convoy, searching out submarines and dropping depth charges directly on them when discovered.

Despite the successful experiments with the helicopter, there still remains a tendency to regard the aircraft as an interesting phenomenon of little practical utility. However, competent authorities believe that present knowledge is adequate to design and construct a successful helicopter of approximately 6,000-pound gross weight which could carry a useful load of nearly 50 percent of the gross weight. Although

high speed is not of first importance, it should exceed 100 m.p.h. Range, endurance and military load capacity would be ample for many missions—missions hitherto impossible or extremely dangerous because of the limitations of high-speed aircraft.

THIS FIRST AAF helicopter was manufactured by Vought-Sikorsky after many years of development and experimentation by civilian engineers of the manufacturer and engineers of the AAF Materiel Center.

It is a two-place cabin ship powered by a Warner 165 hp. engine. It has one main lifting rotor and a small vertical tail rotor with variable pitch blades that serves to correct the main rotor torque. The pitch control mechanism of this tail rotor is connected to the rudder pedals, which also gives directional control.

The pitch of the main rotor blades may be increased or decreased at will as they pass any desired point of rotation with a corresponding but opposite variation of pitch at 180 degrees. This is called "azimuthal" or "cyclic" pitch control, and by this means lateral and longitudinal control are obtained. This pitch control mechanism is actuated by the stick, which acts in flight much like a normal control stick connected

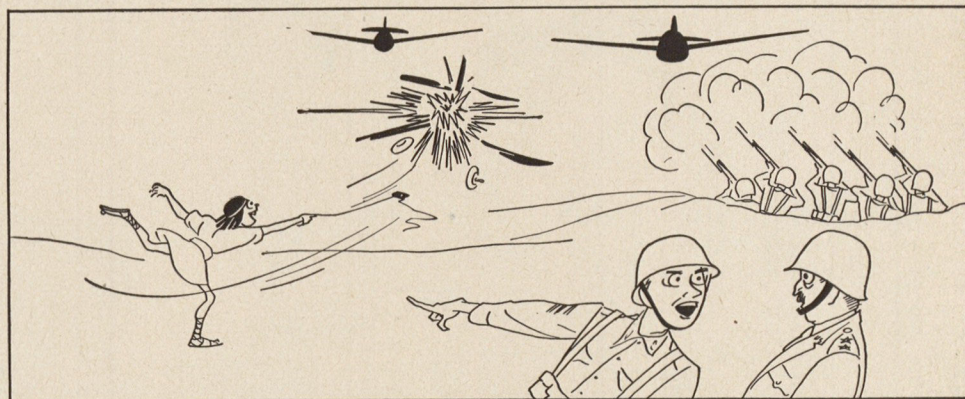
sity. Also, normal descent from altitude to near the ground is made without power and with the blades in auto-rotation. This point is stressed, for many ask "What happens in the event of engine failure?"

Perhaps it would be interesting to go through the motions of flying the ship.

With the rotor clutch disengaged and the rotor brake on, the engine is started in a normal manner. When ready to take off the rotor clutch is engaged with the main pitch control in low pitch position. The rotor blades are now turning and the stick and rudder held in neutral. The rotor is now brought up to desired r.p.m. and the pitch of the blades increased until the ship leaves the ground in vertical climb.

By slight adjustments of the controls the aircraft may be held stationary a few feet from the ground—or at its vertical ceiling—as long as desired. When forward flight is desired, the stick is pushed forward somewhat, the ship noses down slightly, picks up speed and commences to climb, since less power is required for level forward flight than for hovering.

Not only is it possible, but quite normal, to fly the ship backwards, sideways, or to revolve on the ship's vertical axis over a fixed spot. In flight, stick and rudder ope-



"He says his name's David—he's already brought down ten of 'em!"

—SLIP-STREAM

to aileron and elevator, except that in the case of the helicopter all controls are fully effective at zero forward speed.

Climb and descent are obtained by simultaneously increasing or decreasing the pitch of all main rotor blades, together with use of the throttle. This is termed "collective" pitch control. Since an increase of rotor pitch requires more horsepower to maintain the rotor at whatever r.p.m. is desired, there is a synchronizing mechanism that opens the throttle as the pitch is increased and thus maintains nearly constant engine and motor r.p.m. despite pitch changes.

Of course, there must be a clutch and transmission between engines and rotor, and also a "free-wheeling" device to permit blades to continue turning if the throttle is closed or the engine fails. In the event of engine failure, the helicopter becomes, in effect, an autogiro with all the slow landing characteristics of the autogiro. This is not theory. Not only has the helicopter purposely been landed without power, but there have been instances of actual engine stoppage where such landing was a neces-

rate much like those of a conventional "frozen wing" aircraft, except that they are quite sensitive and the tendency is to over-control. There is one difference, however; control over climb is a function of the main pitch control in conjunction with the throttle. This, at first, is confusing to the pilot accustomed to fixed-wing airplanes.

Through the many months of experimental flight testing, the Army Sikorsky Helicopter turned up only minor mechanical bugs, which is an unique record in the history of new-type aircraft. It had a motor failure in flight once, but it just windmilled down to the ground.

That's the way you bring it down: cut the motor and glide down like an autogiro. Forced landings are little different from normal autogiro landings. Normal helicopter landings, however, are made with power, the craft touching the ground so gently that even eggs are not broken. This actually was tried on one occasion by suspending a net with a dozen eggs below the helicopter. Not an egg was cracked on touching the ground. ☆



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

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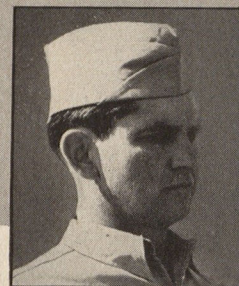
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SILVER STAR

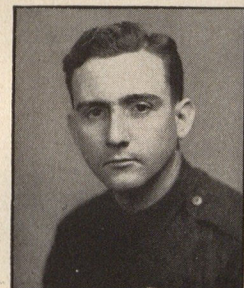
LIEUTENANT COLONELS: William Basye, James W. Twaddell. **MAJORS:** John H. Payne, R. V. Schwanbeck (Also Purple Heart). **CAPTAINS:** Bernice S. Barr, Paul I. Gunn, Ronald D. Hubbard (Also Oak Leaf Cluster), Clyde B. Kelsay, James R. Smith, John W. Wilkinson. **LIEUTENANTS:** Malcolm R. Anderson, Theodore Arter, III, Frank P. Bender, Raphael Bloch, Jr., Roscoe G. Booth, Joseph W. Brookhart, Olen C. Bryant, Chester H. Budz, Kenneth E. Burch, Claude N. Burcky, Morris C. Caldwell*, Darwin K. Carpenter, Edward J. Chudoba, John D. Crawford, Charles R. Crowell, John L. Dains (Also Purple Heart*), Harry W. Ebert, Jr. (Also Air Medal), David C. Everitt, Jr., Leslie W. Felling, John D. Feltham, Fred T. Burchner, David L. Gaede, Robert C. Gaskell, Balfour C. Gibson, Donald

*Posthumous

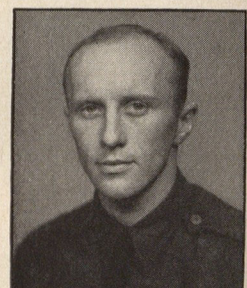
E. Good, Theodore S. Green (Also Oak Leaf Cluster to Silver Star and Purple Heart), Robert J. Haase, Dale E. Hanson, Gustave M. Heiss, Jr. (Also Oak Leaf Cluster), H. N. Henckell, Jr., James T. Holcomb, Allen V. Hopkins (Also Purple Heart), Kenneth F. Horner, Wallace J. Hoskyn*, Leonard S. Humiston, Sidney O. Ingram, Jr., Henry S. Iverson, William G. Ivey, Willie E. Jacobs, Clarence T. Johnson, Jr. (Also Oak Leaf Cluster), Robert T. Jones, Gus Kitchens, James P. Larronde, Richard R. Lehr, Yale H. Lewis, L. L. Limpach, Wade H. Lowry, James B. McAfee, Hugh Mahoney, James H. Mangan, Ray Melikian, Hiram A. Messmore (Also Purple Heart), Edward M. Miller*, Richard G. Miller, Robert C. Miller, John C. Minahan, John M. Moore, Wesley D. Morris, Harry L. Moy, Albert T. Nice (Also Oak Leaf Cluster), F. A. Norwood, Malcolm E. Peterson, Arthur J. Platt, Robert R. Rankin, Paul E. Ray, Philip D. Reece*, Ernest L. Reid, C. L. Richards (Also Purple Heart), W. H. Robert, Jr., E. W. Robinson, J. M. Rowland*, Adrian J. Sampeck, J. S. Säuber*, P. J. Scarboro, L. A. Schauer, J. R. Schrom, V. A. Schwab, Ralph L. Schmidt (Also Distinguished Flying Cross), R. A. Scurlock, W. E. Seamon, Jr. (Also Oak Leaf Cluster to Silver Star), William D. Sells, Steward E. Sewell, I. H. Shearer, Earl Sheggrud, Walter G. Shore (Also Oak Leaf Cluster to Silver Star), Cecil B. Smith, Marlin R. Smith, Richard Spotswood Smith, Vincent L. Snyder (Also Distinguished Flying Cross), Edward H. Steere, Jr., L. A. Stoddard, Maxwell D. Stone (Also Oak Leaf Cluster to Silver Star), George A. Stout, Coleman Stripling, Henry G. Swartz, Thomas P. Talley (Also Oak Leaf Cluster to Silver Star and Purple Heart), Paul R. Tarbutton, John R. Taylor, Albert Thom, W. P. Thorington, Clay Tice, Jr., R. G. Toler, E. C. Townsend, Clifton H. Troxell, G. A. Urich, Robert H. Vaught, Oliver B. Vodrey, Clyde H. Webb, Jr. (Also Oak Leaf Cluster to Silver Star*), Everett C.



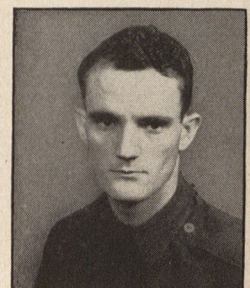
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Lieut. G. M. Heiss

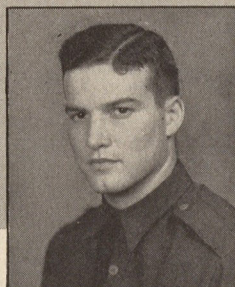


Lieut. C. B. Kelsey

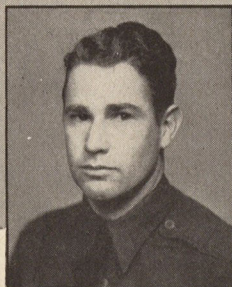
ROLL OF HONOR



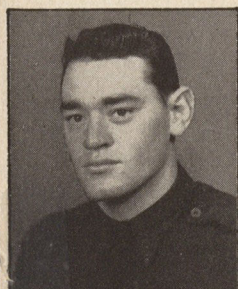
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Lieut. J. H. Disbro



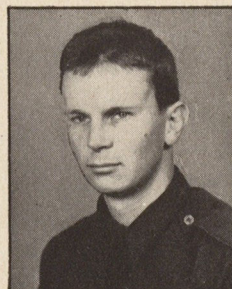
Lieut. F. B. Bender



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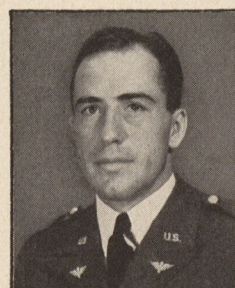
Capt. J. A. Glenn, Jr.



Lieut. D. C. Everitt



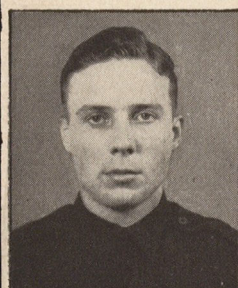
Lieut. U. P. Thorington



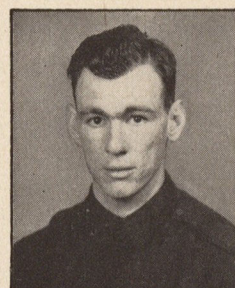
Capt. Samuel Maddux



Lieut. D. E. Good



Lieut. W. B. Drysdale



Lieut. Raphael Bloch



Sgt. J. D. Sullivan

Wessman, Marion L. Wheeler, Thomas R. White, John R. Wilcox, Paul I. Williams, P. LaF. Willis, Milton E. Wills, George H. Wilson, Robert R. Wilson, Edward R. Yerington, Lucian N. Youngblood, Richard E. Zahm, Frank W. Zatzke, Mitchell Zawisza. **MASTER SERGEANTS:** Elmer L. Dreirr, Anthony A. Kuzdrall, W. K. Sheffield. **FIRST SERGEANT:** Wilbur K. Hunt. **STAFF SERGEANTS:** Ralph Alexander, Vernon D. Berg, F. A. Bumgardner, Richard M. Cullison, Henry V. Earnest, Robert D. Fortier, Benjamin L. Hale, James W. Hanna, Sidney C. Howe, James H. Leaman, Noel W. Meek, James R. Milliren (Also Soldier's Medal), W. J. Mroczko, Ralph M. Pelkley, Averid F. Perkins, A. K. Santowski, H. F. Skelton, David A. Tunno (Also Soldier's Medal), Louis L. Walters, Lacey A. Whitley. **TECHNICAL SERGEANTS:** Robert L. Barlow, Glenn H. Carlsgaard, Julius G. Doka, Wilson Ford, Tommie T. Harris, Albert M. Hopkins, Robert J. Kastning, J. C. Komurke, W. W. MacConnell, Bonnie V. Nabors, Gust D. Portl (Also Air Medal), C. Racioppo, Ray S. Storey, Don Tennison. **SERGEANTS:** Michael G. Adamow, Roy E. Baker, Lavern E. Bechtel, Leslie R. Brown, Junia K. Bryning, Reuben A. Carr, James A. Carter (Also Purple Heart), Ralph W. Chorn, Robert A. Cothorn, Vernon O. Elder, Marshall J. Engstrom, Robert J. Forsyth, Robert W. Freeman, Edward Gosk, Kenneth A. Gradle (Also Oak Leaf Cluster), James L. Hickey, Gene E. Hickman* (Also Purple Heart*), Joseph M. Hines, Cyrus Foster Johnson, Jr. (Also Soldier's Medal), Harvey D. Joyner, Glenn C. Keclik, Donald L. Kerns, John Kominicki*, John E. Lang, William J. Law, Herbert M. Lenke, J. F. Marling, Albert C. Nichols, A. T. Patrick, A. H. Richardson, Buford D. Robin, David Runager, Joe C. Saia, Ralph Sam, R. W. Senteney, Jack D. Smith (Also Soldier's Medal), Jack H. Stull, R. E. Thornock, James H. Webb, H. C. Worden. **CORPORALS:** Gordon W. Barton, John J. Beatty (Also Soldier's Medal), Floyd R. Blair, Walter T. Buchanan, Donald V. Chapman*, James K. Connolly, Robert J. Coutre (Also Air Medal), Anthony Filippi, William C. Gregory, Leonard L. Hendry, James T. Hughes, Lawrence Johnson, Herbert L. Kerley, Albin F. Lenander, P. B. Lowrie, Robert McManman, Donald C. Meagher*, William H. Nichols, Harold L. Osgood, James R. Peterson, J. N. Powers, Edwin C. Smith, Abraham Tabakman, J. Trojanowski, Lewis E. Williams, Jr. **PRIVATES FIRST CLASS:** Edward C. Lohr, J. P. Miszczuk, L. Schleifer*, J. D. Thompson, E. F. Vernick, Benjamin J. Xerri, Alexander Zaretsky. **PRIVATES:** Robert S. Brown, E. L. Phillips (Also Purple Heart), H. J. Purdue, Alvin Troyer.

PURPLE HEART

COLONEL: Henry H. Reilly. **MAJORS:** Kenneth R. Kreps, Floyd W. Rogers. **CAPTAINS:** Louis Halperin, Sam Maddux, Jr., Carl E. Wuertele (Also Distinguished Flying Cross). **LIEUTENANTS:** G. C. Beale, Roy L. Callaway, John H. Dis-

(Continued on next page)

bro, Fred G. Henry, Rowland F. Holbert, J. A. McCullough, Lawrence R. Mesereau, J. C. Poire, Earl S. Ripley*, Robert P. Spreng*, Homer R. Taylor, T. E. Walker. **MASTER SERGEANTS:** Thomas L. Daly, Jack G. Evans, Ray A. Oliver (Also Distinguished Flying Cross), R. T. Ullrich. **FIRST SERGEANTS:** Edward J. Burns, Frank B. Helms, H. C. Sanders, C. A. VanWirt. **STAFF SERGEANTS:** Leonard C. Baker, James M. Barksdale*, Frank W. Bowen, John P. Butler, Erwin B. Casebolt, Frank J. Depolis*, George G. Dudley, Allen R. Durborow, Jr., A. A. Infantolino, I. A. Falkenburg, R. I. Gangursky, Joseph E. Good*, Joseph C. Herbert*, Charles W. Hodder, Ralph Kelly, Stuart E. Lamere, Edwin K. Lyle, Darrell W. Mintz, Cryial A. Moore, Roland L. Nuttall, Michael J. Pirga, H. T. Randall, A. B. Restivo, George Sallick, J. P. Seals, V. O. Schwartzkopf, James E. Swanson, Arnold M. Thompson, Joe O. Wright, Charles L. Zeiss. **TECHNICAL SERGEANTS:** S. A. Androkovich, John F. Bauer, John T. Benton, Daniel A. Dyer, Harold H. Gwynne, Alonzo J. Jones, James W. McAdams, Robert W. Ray, H. S. Simpers, C. E. Stinson, W. R. Towsley, James E. Young. **SERGEANTS:** Howard Baldwin, J. W. Bartee, Leonard Blackmon, William M. Bryant, Guy E. Clanton, Kenneth A. Cooper, Eugene C. Cox, Fred A. Dabney, Jr., James H. Derthick*, Jesse D. Gaines, H. L. Gilbreath, Edward J. Gudinas, Bruce T. Harlow, Charles R. Heinhorst, George Kissel, Thaddeus Kusior, Richard A. Larson, Robert L. Long, Owen E. Longest, Harry McHayes, James W. Miller, Jimmy D. Morris*, C. J. Nourot, Jr., Robert C. Owens, Howard S. Petersen, W. J. Price, Jr., Paul D. Reber, Jack A. Roberts, T. E. Roberts, G. R. Schmersahl*, R. O. Sherman*, Julius B. Sidak, Marion K. Smith, Joe B. Stanley, Robert K. Stone, C. F. Viebrock, Lester E. Wagaman, Charles E. Waite, Jr., Joe F. Wilson, T. A. Yarbrough, Lionel G. Young. **CORPORALS:** Donald D. Adams, Robert E. Bloom, Thomas E. Bradshaw, Malachy J. Cashen*, Shelly E. Cockroft, C. F. Currence, Jr., James F. Ewers, Alfred A. Fawe, Noah Frequez, Thomas D. Goodman, Edward L. Gummelt, Henry L. Hammond, Chester L. Hatcher, Vincent M. Horan*, Elbert E. Howell, Henry T. Kelly, Lester W. Klahn, Glen W. Lingle, John P. Loos, William F. Loranger, J. R. MacMillan, Raymond E. Miller, John G. Mitchell*, Leith C. Morgan, George W. Mosall, James I. Moyer, W. H. O'Brien, Jr., John E. Ochs, A. V. Prioreschi, James W. Pryor, R. G. Reddick, Norman A. Smith, Robert C. Smith, Jonah Steff, Edward J. Urbanski, J. L. Viers, M. S. Whimsett, L. R. Wilson, Sam H. Wilson, D. E. Wimbiscus. **PRIVATES FIRST CLASS:** Samuel E. Ashker, Fred F. Baker, Thomas E. Bellue, Theodore F. Byrd, Jr., Carlo A. Calemene, Arthur E. David, Joseph E. Demott, Carl Drechsler, S. H. Enchelmeyer, Vernon W. Evan, Edwin Frazier, Harold L. Henley, Lawrence B. Howland, George O. Jenkins, Russell J. Kawa, Donald A. Kern, Cecil E. King, John D. LeBlanc, Albert C. McCall, Jr., Karl O. Maser, Robert F. Nolan, Joseph A. Paradiso, M. M. Praniewicz, Ralph N. Rentz, E. B. Rodriguez, R. B. Rodriguez, A. J. Samuelovich, A. L. Sesody, A. Shullenbarger, N. J. Spallone, J. C. Stanfield, W. A. Stanley, H. E. Tholke, W. R. Thornhill, Paul N. Tomkins, Domenico A. Tussio, John Tyleshevski, C. L. Uhlenburg, Howard C. Ward, Edward M. White, Jack A. Williams, Arthur J. White. **PRIVATES:** Joseph Bush, Erwin E. Crocker, Sydney A. Davis, Harry O. Dodd, Richard S. Garrety, Walter J. Gese, John B. Hall, Turner G. Harrell, Harold H. Hawkins, Chesley A. Isaac, Clyde D. Johnson, Sherwood D. King, Pierre A. Kobylinski, John N. Krison, Ivan C. Lewis, L. G. Luckey, W. F. Lundgren, Merion L. Mason, R. R. Niedzwiecki, William H. Peterson, Robert L. Pickerel, M. L. Richardson, B. D. Sbraccia, George S. Snyder, H. M. Spickler, L. G. Strunk, Jr., R. H. Suffern, Hans S. Thon, D. E. Tobias, V. D. Tomlinson, R. L. Turnbull, Lumus E. Walker*, Frank L. Wallace, Allan J. Weber, Kenneth H. West, Lewis B. White, L. J. Wiedling, Vaughn E. Wolfe, Ralph W. Young, Jr., A. A. Zangari.

*Posthumous

DISTINGUISHED FLYING CROSS

LIEUTENANT COLONEL: Harry T. Eidson (Also Air Medal). **CAPTAIN:** Joseph H. Moore. **LIEUTENANTS:** William S. Barnes, Norman Davis, David C. Howard, C. J. Nielsen, A. M. Rulison*, B. J. Stone, Jr., W. E. Strathern. **MASTER SERGEANT:** Joseph G. Moran. **STAFF SERGEANTS:** John J. Hudjera, William C. Jones*, Leo J. Zulkowski. **TECHNICAL SERGEANT:** Frederic S. Moran. **SERGEANT:** J. D. Sullivan. **CORPORALS:** Presley C. Broussard, Leo P. Flowers. **PRIVATE FIRST CLASS:** J. E. Schoen.

SOLDIER'S MEDAL

LIEUTENANT COLONEL: Roscoe T. Nichols, Jr. **LIEUTENANTS:** Thomas J. Burke*, Sherman A. Copeland, Therman L. Patrick, Norman B. Willey. **FIRST SERGEANT:** Lloyd E. Swope. **STAFF SERGEANTS:** J. B. Bowers, Robert W. Gabriel. **TECHNICAL SERGEANTS:** M. C. Shelnett, Thomas P. Walsh. **SERGEANTS:** Clarence J. Cole, Acy B. Duhon, Gordon G. Farrell, Charles J. Hoffman, Harold J. Jackson, William A. Karges (Also Oak Leaf Cluster), John Klingenhage, Robert G. Lee, W. G. Richards, Henry E. Swartz, Harvey H. White, Lacy W. White, Jr. **CORPORALS:** Douglas H. Dickerson, Manuel D. Guerra, Lloyd N. Lovell, Don J. Spiers, Albert H. Squires, Earl Thalwitzer. **PRIVATES FIRST CLASS:** Frank Tino, Jr., Ray E. Wisdom. **PRIVATES:** C. D. Cooper, Murray N. Goldstein, Gordon Harrison, Harold V. Keahey, V. T. Pierrellee, Michael V. Repko, W. S. Smart, Charles M. Stewart, Orbin R. Truett, S. B. Ziolkko.

AIR MEDAL

COLONEL: S. J. Davis. **LIEUTENANT COLONEL:** Fred M. Dean. **MAJORS:** D. B. Avery, C. B. Collier, Glenn E. Hubbard, Claude Putnam, R. F. Rudell, C. F. Skannal, Harrison Reed Thyng (Also Oak Leaf Cluster to Air Medal), John W. Weltman, John O. Zahn. **CAPTAINS:** K. B. Benson, C. A. Christmas, L. F. Deegan, W. T. Duden, Thomas B. Fleming, Joseph A. Glenn, Jr., James Harman, Edward G. Johnson, George J. LaBranche, R. E. Lehr, W. M. Lively, F. H. McOlgin, F. J. Miller, Homer H. Noss, R. A. Nowotny, Joel A. Owens, Jr., F. L. Perrine, T. H. Runyon, W. A. Tesch, Kenneth D. Vandayburg, J. B. Wakefield, Victor Emanuel Walton, Darrell G. Welch, Charles E. Wilson. **LIEUTENANTS:** Lyle Albert Bean, Robert N. Chenoweth, W. B. Drysdale, David R. Everett, Elmer Hartman, William K. Hester, Earl W. Hille, Jr., Jack M. Ilfrey, Earl C. Kent, Stephen N. Krenytzyk, J. C. H. Lentz, William K. Long, R. W. McWherter, H. O. N. Mendenall, Howard Warren Millard, M. C. Morrison, R. D. Neale, Jr., Edward S. E. Newbury, Charles W. Oakley*, L. B. Page, James E. Pate, W. S. L. Pennington*, W. M. Pringle, Jr., Robert B. Riley, N. O. Roberts, George L. Ross, Richard H. Schoenberger, Joseph D. Shaffer, E. E. Shahan, Henry K. Smith, D. O. Starbuck, Roger F. Stemen, R. L. Stevens, J. A. Sullivan, Carlus Turner, E. F. Umphrey, Burton L. Weil, Norman L. Widen, Bill F. Williams, R. E. Williams, J. L. Wolford. **MASTER SERGEANT:** Joseph H. Sitlik. **STAFF SERGEANT:** Frank S. Tamsett. **SERGEANTS:** John Burger, Ira C. Robertson. **CORPORALS:** Jelacio M. Canapi, Robert W. Skarie. **PRIVATE:** James N. Thomas.

OAK LEAF CLUSTERS

BRIGADIER GENERAL: Caleb V. Haynes. **LIEUTENANT:** Cecil E. Gregg. **STAFF SERGEANT:** Douglas V. Radney. **SERGEANTS:** Lewis Coburn, Clevis Jones.

AMERICAN VOLUNTEER GROUP DISTINGUISHED FLYING CROSS

For gallantry in action while members of the now disbanded American Volunteer Group in China:

SQUADRON LEADERS: Robert Neale, John Van Kuren Newkirk*, Franklin Rector, Robert James Sandell*. **SQUADRON VICE-LEADERS:** Charles Rankin Bond, David L. Hill, Frank Schiel*. **FLIGHT LEADER:** R. L. Little*.

WHAT YOU SEE WON'T HURT

(Continued from Page 5)

planes have red noses, all Axis aircraft usually have white noses (although they might be yellow, too) and usually white wing tips. If you don't see these tiny objects first you probably won't see anything at all afterwards. But, if you have seen them, the next thing you'll view will be a streak or several streaks looking somewhat like a meteor traveling in the direction of the bombers (if you're acting as escort). Here you point your nose in the path ahead of this object and press the trigger at the same time, always looking behind, however, to make certain that a tiny spot has not suddenly become a very large white or yellow spinner with little flashes coming from it. If you find that the latter has occurred, you can do one of three things. First, and best, is to turn hard; second, to throw your stick and rudder into one corner (any one that suits you, but also hard); and third, if you are too terrified to perform either of these maneuvers, trim the ship in neutral, undo your safety harness and run-like mad around the cockpit calling for help on the radio. (In all fairness, I advise the last procedure only in cases of dire necessity, because it doesn't always work so well.)

Anyway, those are the principal sights you'll be seeing, but there are also a few more. For instance, you might see the little meteor disappear straight down and then suddenly find that an aircraft has been catapulted straight up into the air from the ground to the bombers. Another odd, but frequent occurrence is to have the dirty little dart emerge inverted. (His mother was scared by a tree sloth). The 109 functions perfectly upside down and the pilot only has to pull back on the stick to get away.

Don't depend on recognizing enemy aircraft by their crosses or faces alone. Learn the differences between the ME-109s E, F, and G, the FW-190, the Macchi and the others as regards their wing tips, tails, spinners, etc. Aside from the fact that your intelligence officer is always curious as to exactly what you were fighting (and can deduce much interesting information thereby), your No. 1 will dislike you lots if you confuse his tail with that of a 202 or such.

To sum up, first of all remember that you can always recognize the Hun by his position and actions in the sky. He has a more or less set pattern, as was illustrated at the beginning of this piece. In the second place, be able to recognize his plane so that if you should ever get a long enough glance at it you can tell the I.O. what it was. Finally, look before you press the trigger. Your own pursuit pilots usually get a little angry if you fire at them, but the bomber boys get hopping mad and might shoot you down. ☆

PICTURE CREDITS

6-7: Sikorsky Aircraft. 8-9: Wright Field, AAF and Life. 10-11: Lockheed-Vega Aircraft and Hans Groenhof. 34-35: Curtiss-Wright Corp. and Lockheed-Vega Aircraft. All other photographs secured through official Army Air Forces sources.

NAVIGATION

(Continued from Page 9)

servation for their instruments. Once this conviction is arrived at, there is no cure—it is invariably fatal. An instrument of this type is the Astro-Compass, shown in an accompanying photograph. It is used to try to explain away some of the confusion. Although such attempts at explanation seldom succeed fully, it may be of interest to follow the line of reasoning used.

The Astro-Compass is a simple equatorial telescope mounting, such as is seen in any observatory, in which a split-pupil collimator sight is substituted for the telescope. In principle the Astro-Compass is *exactly similar* to all "arc" reduction methods. Suppose the instrument is levelled and is oriented in azimuth by motion 3 (see illustration). Then, using the time selected for observation, extract the declination of the body to be sighted from the Almanac and set it on the instrument. The sight now can be pointed exactly at the selected body by motions 1 and 2. When the instrument is so sighted latitude can be read from the scale used in conjunction with motion 1 and LHA (and therefore longitude) from the scale used in conjunction with motion 2.

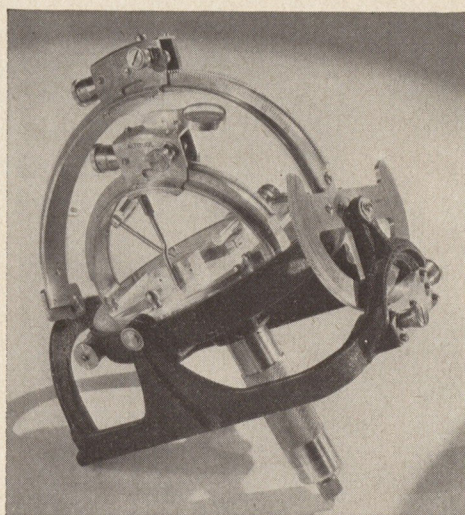
It must be noted carefully that *two* combinations of motions can be used to point the sight of the levelled instrument on any body in the sky. The two independent combinations of motion are 1 and 2, and 1 and 3. A combination of the motions 1, 2 and 3 can accomplish the same result. However, *if one of the three settings is in error, all are in error*. Therefore if the latitude and longitude are to be obtained from the instrument with reasonable and usable accuracy then the azimuth (motion 3) must first be set with reasonable accuracy (*true north* plus or minus 5 minutes of arc). The inability to achieve such accuracy in the azimuth setting is the one and only reason why latitude and longitude cannot be obtained from a single observation.

THE directness of reducing an observation by plotting it directly on a small sphere by means of a great circle "ruler" and a small circle, "compass" has appealed to a few people since time immemorial. These individuals founder on the question of "scale." They will go to great lengths to devise an assortment of micrometer and vernier scales and compasses to achieve the required accuracy when, in the final analysis, the accuracy obtainable is dependent on the visual acuity of the user. This type of instrument is a plotting device, pure and simple, just as is a drafting board, T-square triangle and ruler. The draftsman's accuracy depends not upon an assortment of verniers, micrometers and finely divided scales but upon his visual acuity, the sharpness of his pencil and his skill in using it. Increase the sharpness of his eyesight with a reading glass and his accuracy increases in proportion. The same applies to the "spherical draftsman" whose pencil line is from five to ten miles in width to begin with.

The "arc" and "sphere" machines are very conducive to an assortment of gymnastics when used in the air. Though the inventors of these machines invariably recommend the lap, the user generally winds up his problem with the instrument on a table and himself in a head-stand. Using the instrument in the laboratory and in the air is comparable to writing a letter in a study and in a typhoon. For instruction purposes, a system similar to this one recently was advocated by Yale University. It had been used as far back as 1934 in Air Corps Navigation Schools.

Navigators disagree as to the size of a sphere needed for acceptable accuracy, some claiming that only a five-foot sphere is necessary but others contending that a diameter of fifteen feet should be the minimum.

In spite of the drawbacks of the arc and sphere, they have some ardent supporters. Recently a well-meaning business men's publication levelled a scorching barrage of



AAF Type A-3 Line of Position Computer; too slow for standard use.

vicious invective at the American armed services for not going hook, line and sinker for the twelve-inch sphere of a civilian sportsman pilot. Although the particular device had been put through its tests seven years ago, the Materiel Center had invited the inventor to submit sample articles and cost quotations. Re-examination of a device previously abandoned is sometimes a waste of time and money—but the technicians of the Air Forces Instrument Laboratory constantly search for improvements, regardless of the ability of the inventor.

Other appealing graphical devices suffering from "scale" trouble, include the D'Ocaine Nomogram and the system of superimposed stereographic projections tangent at the equator. Fortunately, these are the products of astute students of navigation and have been presented not for actual air use but as interesting novelties.

Although it is impossible to revamp the navigation equipment and training of the Army Air Forces overnight, many 1942 developments are rapidly being adopted as standard procedure for combat navigation.

Plotting equipment essentially is of the conventional type of protractors, compasses, parallel rules and a scale adequate for all plotting purposes.

ALTHOUGH there are in existence many computers for the solution of the wind triangle and of speed-time-distance problems, the E-6B dead reckoning computer, which was adopted as standard equipment in 1939, is unquestionably one of the most versatile in the field. This computer has met universal favor among navigators and pilots who are required to perform routine dead reckoning problems.

The several systems and methods used by the Air Forces for the reduction of celestial observations are the Astrograph (adopted in 1942), the Star Altitude Curves (1937) and Hydrographic Office Publication 218 (1942), 214 (1937) and 211.

The Astrograph and the Star Altitude Curves are systems similar in principle. The advantages of speed and simplicity favor the Astrograph although the Star Altitude Curves have slight accuracy advantages.

Hydrographic Office Publications 218 and 214 are alike in principle and in accuracy. Since 218 is considerably faster and offers less chance to err because of its superior arrangement, it will completely replace 214. The Astrograph also will replace the Star Altitude Curves in Air Force navigation.

Hydrographic Office Publication 211 is retained for polar work, above latitudes of seventy degrees.

As a goal for inventors who are striving to improve the navigation systems of the Army Air Forces, the respective accuracies and times required for reduction of a two star fix in the several Air Force systems are as follows:

	Accuracy	Time of Reduction
Astrograph	±2 miles	1.5 min.
Star Curves	±1.5 miles	2.0 min.
HO 218	±0.5 mile	4.0 min.
HO 214	±0.5 mile	5.0 min.
HO 211	±0.5 mile	10.0 min.

The time required by mechanical devices for the reduction of a two body fix generally approximates ten minutes with an accuracy margin of from five to fifty miles.

Navigation systems, the same as airplane designs, are compromises. The devices and methods adopted by the Air Forces represent a compromise between accuracy and speed of reduction. Still, this compromise has not yet been matched by any of the hundreds of mechanical devices submitted.

Despite the unequalled practicability of the Air Force systems now in use, Wright Field continues to examine new devices and methods proposed by navigators and non-navigators, constantly striving to be of more assistance to the combat navigator who often must be a gunner, a radio man, a bombardier, or a co-pilot, in addition to his other duties.

Planes occasionally are lost by the human error of the navigator. Wright Field's objective is to develop devices and methods that will eliminate all possibility of human error. ☆

Technique

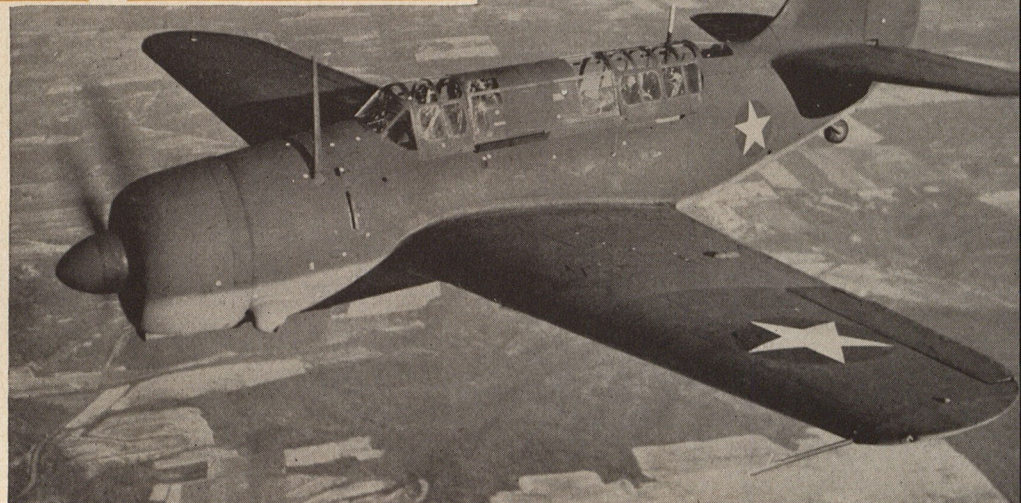
A Monthly Review of Technical
Developments in the Air Forces

TWO NEW WARPLANES

TWO NEW Army Air Forces planes have been announced: the Lockheed C-69, a four-engined high altitude transport, and the Curtiss A-25, an Army version of the Navy's famed Helldiver, recently voted the "world's best dive bomber" by British aviation experts.

The C-69, named the Constellation, is a big, long-range speedy airliner with a pressurized cabin for high-altitude flying. It is capable of carrying 55 passengers and a crew of nine from coast to coast in less than nine hours, or of flying a light tank and a complement of troops across the Pacific to Honolulu in twelve. Although one of the largest airplanes in the world, it uses but one gallon of gasoline per mile when fully loaded.

The new transport is powered by four Wright Cyclone 18-cylinder engines, of 2,000 horsepower each. It has tricycle landing gear, two separate superchargers to



Shown above during a test flight is the new Curtiss A-25 dive bomber. Christened the Helldiver, after its Navy counterpart, the A-25 has greater speed, range and striking power than any dive bomber now in action. The plane is already in production at Curtiss-Wright's Missouri factory.

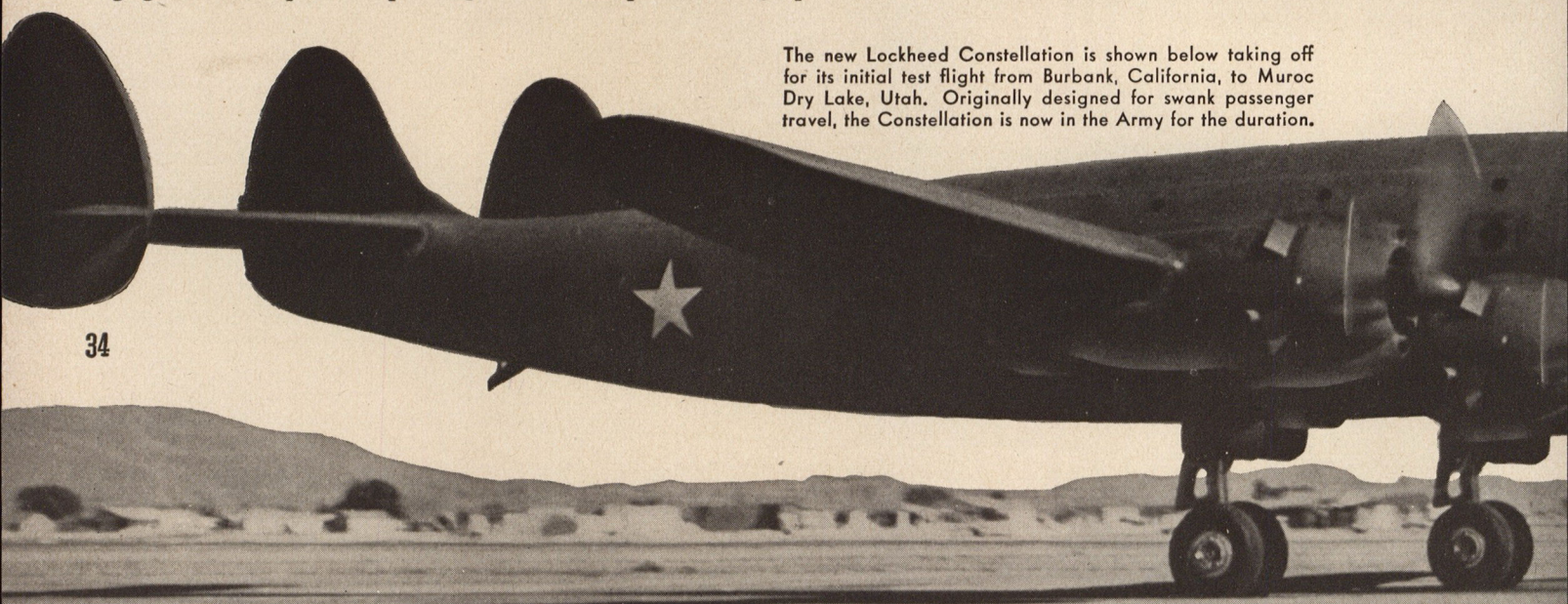
keep the sealed cabin comfortable at all altitudes, hot-wing de-icing and new-design streamlined nacelles that avoid compressibility shocks on the nose cowl.

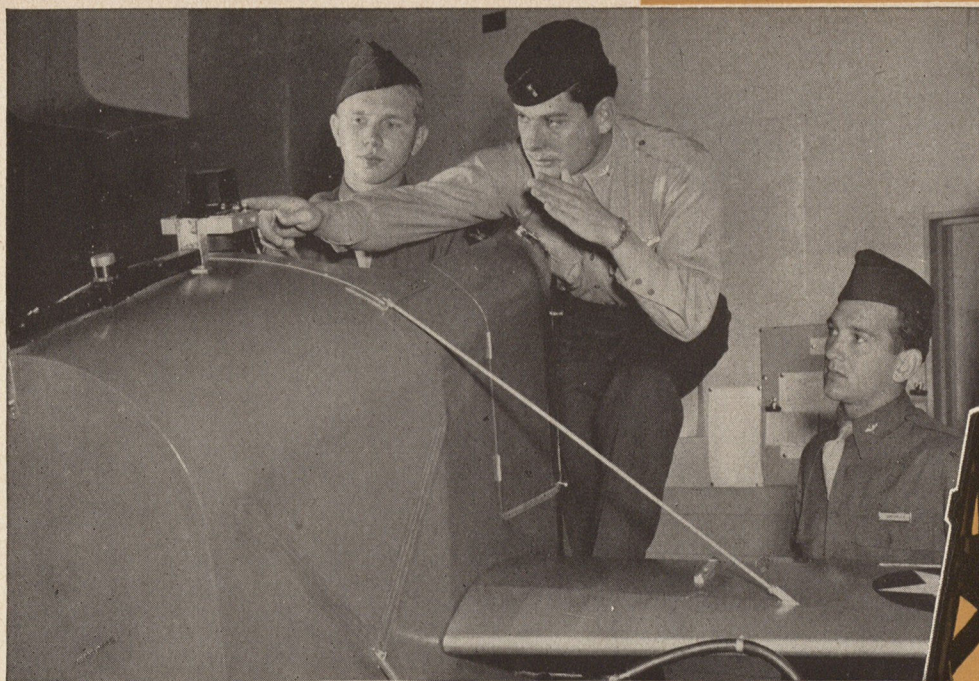
A distinguishing feature of the C-69 is its three vertical tail fins. These aid the pilot in controlling the plane at high speeds and enable it to fit in ordinary sized hangars. Each engine is an independent power source and can be completely replaced in 45 minutes. The wings are similar in design to those of the Lockheed P-38. The Air Forces will use the C-69 as both a troop transport and cargo plane.

The A-25 is a two-place, mid-wing dive bomber powered with a 1700 horsepower Wright Cyclone engine and equipped with a Curtiss electric propeller and retractable landing gear. The first A-25 was test flown sometime ago. It was presented formally to the Army at a special ceremony in the Curtiss Missouri plant, where Helldivers roll off a four-block-long assembly line.

The Army Helldiver design is very similar to the Navy design, and, with minor changes that can be made in the field, the planes can be used interchangeably by both services.

The new Lockheed Constellation is shown below taking off for its initial test flight from Burbank, California, to Muroc Dry Lake, Utah. Originally designed for swank passenger travel, the Constellation is now in the Army for the duration.





Lieutenant Paul Greene exhibits the fine points of aerial gunnery on a gun-equipped Link trainer.

Two New Gunnery Training Techniques

ALMOST every month the ingenuity of Air Force officers results in further aids to gunnery training. Two of the latest are at Foster Field, Texas: a skeet tower and a special BB gun mount for link trainers.

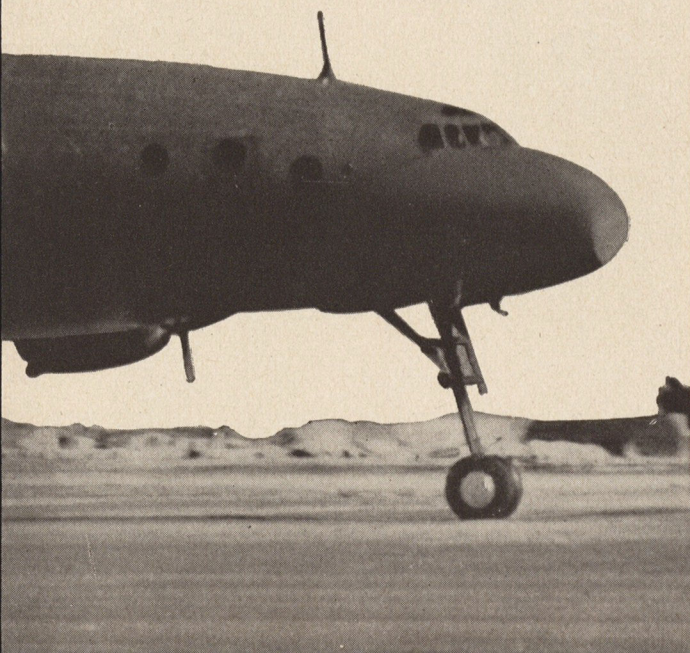
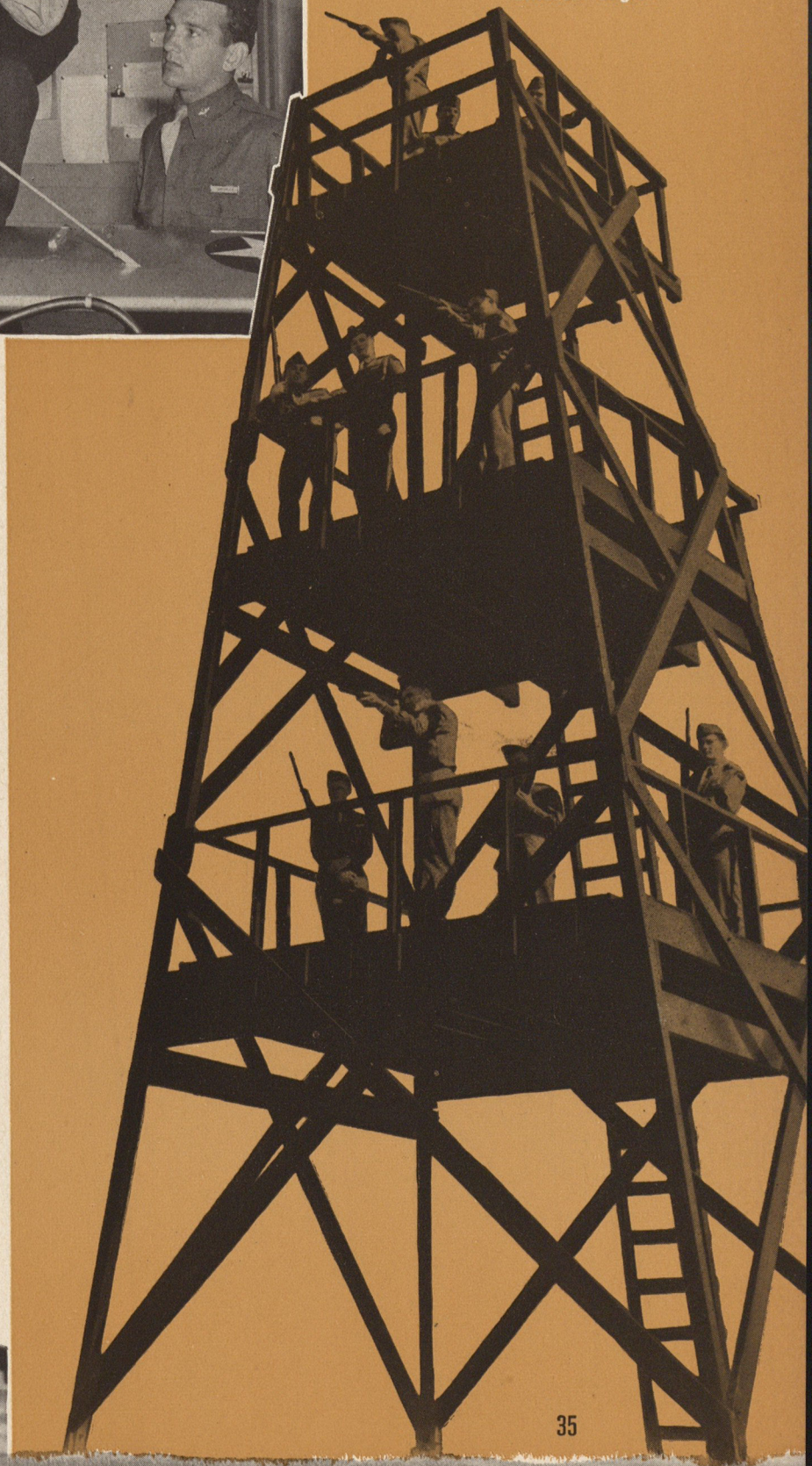
The purpose of the tower is to prepare prospective gunners for the many angles of fire they will encounter in modern bomber turrets. From platforms of ten, twenty and thirty feet students learn how to shoot down, as well as up, at fast-moving targets.

The BB gun mount uses to advantage the maneuverable cockpit frame of the link trainer. With it cadets learn to "lead" moving targets that are speeding around a circular track, thus acquiring firing practice without leaving the ground. The device is unusually valuable because it can realistically simulate aerial gunnery effects.

—Captain Malcolm B. Allen, Foster Field.

(Continued)

Gunnery students practice their all-important game of skeet from the 35-foot tower at Jackson Field. The various platform levels give gunners the "feel" of shooting from different angles.





New Flying "Hood" A Safety Factor

Turner Field, Georgia, has accomplished a revolution in the field of blind flying hoods.

Old-style hoods were made of heavy, black cloth. In side-by-side, multi-engine trainers such as those used at Turner, this had many disadvantages. The student, completely encased in the hood around the pilot's seat, could not see his instructor (in the co-pilot's seat) or the engine instruments on the instructor's side of the cockpit. The instructor, on the other hand, could not see his student or the flight instruments, and had no visibility out the left side of the plane.

Not only were these limitations inconvenient, they were dangerous in the busy air around a large training center such as Turner Field.

So tests were begun to locate a substitute for the ordinary black-cloth hood. One was

found. It is a ruby acetate filter that can be placed on windshields. When viewed through a pair of blue-green optical goggles this filter presents a solid black appearance, but when viewed with the naked eye it is perfectly transparent.

The results are excellent. With the new system the student wears goggles and the instructor does not. This gives the student an excellent view of all the instruments, the interior of the plane and the instructor, but prevents him from seeing outside the cockpit. The instructor, on the other hand, has a full view of outside traffic in addition to being able to watch the student and his handling of the flight instruments.

The use of the new filter and goggles has been so successful that 95 percent of all training planes at Turner are equipped with them.

Mobile Flood-Light

AN INEXPENSIVE but highly-efficient mobile floodlighting unit for auxiliary fields has been designed and constructed at Mather Field, California, by twenty-year-old Technical Sergeant James L. Hancock, working in conjunction with First Lieutenant Clyde C. Cramer of the Post Operations Office.

The new unit, which can be used as a substitute for both the regular J-3 and portable B-3A floodlighting systems, consists of a five-kilowatt motor generator mounted on a one-ton, two-wheel cargo trailer. A framework of two-by-six timbers on the rear end supports four light heads from the B-3A portable light. This frame may be tilted forward or backward to obtain different angles of field illumination, and the entire unit may be swung in a horizontal arc on the trailer wheels.



The picture above shows how Waco Flying School's portable control tower can be operated on auxiliary landing areas. It generates its own power, thus eliminating outside attachments, and can be transported by jeep.

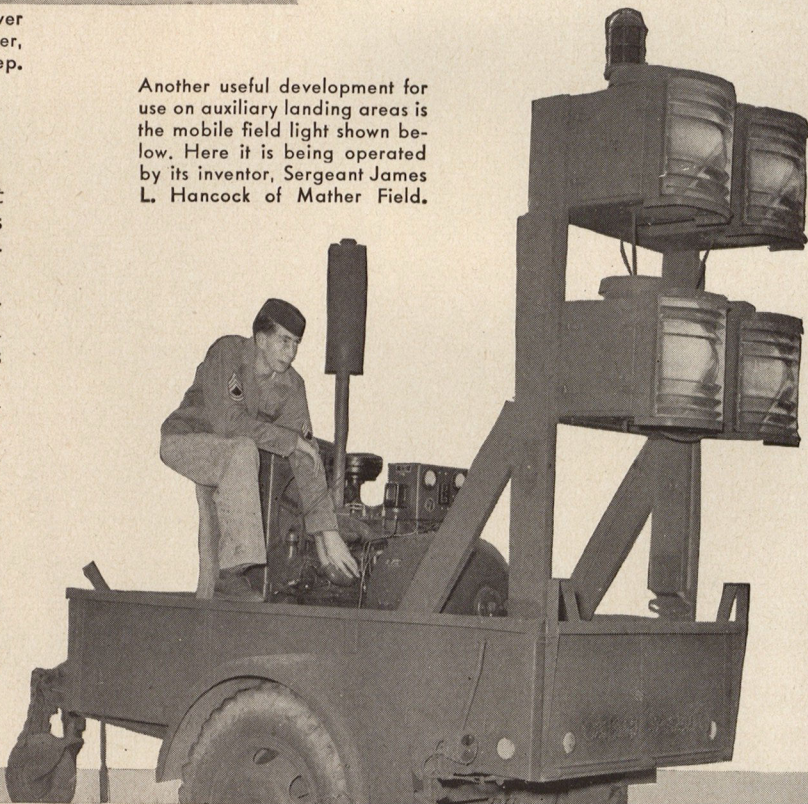
Portable Control Tower

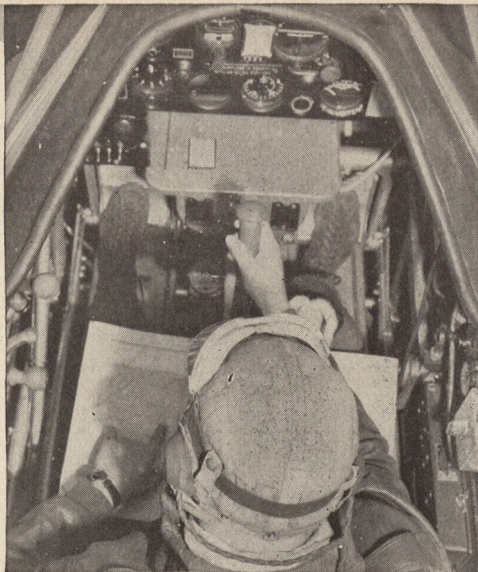
A MOBILE control unit, to do the job at auxiliary airfields that control towers normally do at completely-equipped bases, has been developed and put into operation at the Waco Army Flying School, Texas, by Technical Sergeant John T. Skinner.

Before the development of Sergeant Skinner's device "control planes" stationed on the ground had been used as control towers during night flying to transmit and receive messages from cadets in the ships aloft. After hours of radio work, batteries on these control planes often ran down so badly they wouldn't turn over the planes' engines. When this happened a spare battery — and a crew to install it — had to be brought from the home base, often miles away, before the "mekiwi" could be put back into commission.

The new mobile control board has ended all this. Now a complete communications system is brought right to the auxiliary field before operations start. It is transported on a jeep, can be dismounted by one man and placed in service anywhere within a matter of seconds. The complete equipment, plus a service battery and a spare, is mounted on a two-wheel chassis that can be easily moved about. No outside attachments are necessary.

Another useful development for use on auxiliary landing areas is the mobile field light shown below. Here it is being operated by its inventor, Sergeant James L. Hancock of Mather Field.





THERE IS MUCH MORE to the technique of flying than just knowing how to operate an airplane, as aviation cadets soon find out. For one thing, the finished pilot must know how to find his destination. The Randolph Field cadet above learns this all-important technique with the aid of a compass, a speedometer, a watch and a map. The compass tells him his direction, the speedometer tells him his speed, the watch tells him how long it should take him to reach his objective at a given speed, and the map provides him with check points to measure his progress.

One More Hoist

ANOTHER portable boom hoist for use with two and one-half ton government trucks, similar to that described in the January issue of *AIR FORCE*, was independently designed and built in the spring of 1941 at another Air Forces installation, according to information furnished by Colonel P. E. Ruestow of the Directorate of Base Services in Washington, and Colonel J. M. McCulloch, Assistant Commandant of the Air Service Command Base at Orlando, Florida.

Designer of the hoist was Captain E. D. Grana, then a master sergeant and foreman of the base engineering shops at Mitchel Field, New York.

Captain Grana's hoist was first used during the summer and fall of 1941. It received much favorable comment at that time because of its ability to perform most of the work of the standard Air Force wrecking truck, and because it could cross extremely light bridges that would not support the comparatively heavy weight of the standard wrecker.

Since then the boom has been used extensively by the 91st Service Group, and has accompanied several contingents of the Army Air Forces to Iceland. Recently it has been put into use by the 25th Service Group.

OBSERVATIONS

(Continued from Page 17)

moving through cloud banks and overcast toward this destination. Red anti-aircraft batteries nearest the front were charging a modest price for admission.

At the farthest point of our own advance we were stationed with the division that had effected the junction between the north and south Red forces and had then wheeled eastward to hammer at the entrapped Axis forces.

Veterans of fifteen months of steady fighting, for twelve days and nights in the forefront of this offensive, this division typified the best that could have been found in any army. Their morale was high. The men were getting two hot meals daily and a third hot or cold.

On the crests looking toward enemy positions they had dug a new line of trenches, deep and heated with open fires.

Their commander, a bullet-chested Georgian only 34 years old, had just been decorated and made a Major General. The division had been designated a Guard Division for its outstanding achievements. The staff averaged under 30 and their reception to General Hurley was on a most friendly and cooperative man-to-man basis. They were proud of their handiwork and eager to display its every detail to us.

In the path of this army that had carried the brunt of the offensive southward and eastward we found all the vestiges of violent conflict, of death with suffering, of defeat and victory.

Numerous trophy dumps were piled high with rifles, bayonets, boots, helmets. Dispersed in parks were captured artillery pieces, much of it modern Axis-made ordnance, tanks and tank destroyers. At two captured airfields were wrecks of some 60 Axis planes—Focke-Wulfs, Heinkels, Junkers and an occasional Messerschmitt.

At one of the fields, everything had been caught on the ground by a dawn attack of Red infantry, tanks and light artillery. Nearly a dozen of the enemy planes were taken undamaged, we were told, and a major of the Red Air Corps, wearing the insignia of a Hero of the Soviet Union, described with evident pleasure how he had flown one of the Focke-Wulfs over Rumanian positions for reconnaissance.

A great air battle evidently had taken place above the second field and for miles around were scattered the remains of fighters, most of them marked with the swastika.

Already in operation under Russian hands were dozens of sturdy Axis trucks, most of them almost new. Also salvaged were numerous mobile machine shops, ambulances and radio trucks.

During the second half of our reconnaissance—that, on the Caucasian front—testimony to the effectiveness of the Soviet's defending air strength was given us willingly by a half-dozen young Axis air force officers in a prison camp up the Caucasus valley. ☆

Going Places!



Like the men it serves, *AIR FORCE*, the official service journal of the Army Air Forces, has many places to go.

Because of the limited number printed monthly, we need your cooperation in getting each copy to as many readers as possible at your station.

Pass this copy of *AIR FORCE* on to the other men in your unit as soon as you've read it. You'll be helping us to get the service journal to all the men of the Army Air Forces—all over the world.



DAWN OF A NEW ERA

(Continued from Page 7)

difference—only 45 true ground speed. At this point I began to worry about the oil temperature. The day was hot and getting hotter, and the oil had been slowly warming up until it approached the danger zone. It passed 80 degrees (centigrade) and crept on up toward 85. I didn't like it, and I watched it so closely that it didn't occur to me until afterward that I was at that moment setting some sort of an unofficial record—flying a helicopter across a State boundary for the first time.

As Brewster drifted slowly by, I began to edge southward, because straight ahead, as far as my eye could see from 2,500 feet, there was an unbroken stretch of forest. The highway to the south at least offered promise of speedy assistance in case of trouble, so its winding ribbon became my temporary beacon.

The open fields of the Hudson Valley caught my shadow like a giant whirling spider far below. I began to drop down for the scheduled landing at New Hackensack, just outside Poughkeepsie. I was 35 minutes late, and it was pleasant to see George Lubben's shock of red hair come bounding from the hangar as I hove in sight. George was at this first stop to give the ship a thorough going over. As I came in range of the field he was talking by phone with the ground party who had gotten as far as Brewster and called to check progress.

On this first leg, besides crossing the State line, another record had been set, but not recorded so no official claim can be made for it: the national airline distance record for this type of craft was unofficially established at fifty miles (since no other helicopter in the Western Hemisphere had flown any appreciable distance before). We might also have claimed speed and altitude records, although three weeks earlier I had gone 82 miles an hour and climbed to 5,000 feet in this same ship.

OFF FROM New Hackensack, I swung north toward Albany, flying about 1,000 feet above the valley floor. As I circled Albany airport, I elected to land at the end of the line of parked airplanes with the nose of the ship practically against the fence—something no other aircraft would ever consider doing. Everyone rushed from the buildings, expecting me to pile up among the automobiles in the parking lot. But the landing was made (as they always were) without incident. As I walked toward the hangars, someone in the crowd grinned, "What are you trying to do—scare the hell out of us?"

Another airline distance record on this leg—78 miles.

From Albany to Utica was uneventful except for the pleasure of flying safely up the Mohawk Valley with the hills on either side often higher than the ship. I felt like the Wright brothers, looking down from my transparent perch above the house-tops.

Farm-yards full of chickens and animals

would suddenly become uninhabited as shelter was sought from this strange hawk—but the yards would quickly fill again as houses and barns ejected groups of human beings gaping skyward.

At Utica I drifted up sideways in front of the hangar and hung there stationary for a minute or so while mouths opened wide enough to land in. Then I slid over to the ramp and squatted down. The guard greeted me as I walked up to the office: "I don't believe what I saw just now. Of course, I realize this is a secret ship, but do you mind if I look again when you take off?"

World's endurance record for helicopters exceeded on this leg: 1 hour, 55 minutes (20 minutes longer than the existing record held by Mr. Sikorsky). Also, another four miles added to my previous airline distance record, bringing it to 82 miles.

Flight Summary

Five days; 761 airline miles; 16 separate flights; 16 hours, 10 minutes elapsed time; four States covered; first helicopter delivery flight completed; unofficial American airline distance record repeatedly established and exceeded, finally to remain at ninety-two airline miles; first interstate helicopter flights (unofficial); first interstate helicopter passenger flights (also unofficial); world endurance record for helicopters exceeded with the flight of one hour, fifty minutes (most regretfully unofficial).

It was a beautiful flight from Utica to Syracuse, marred only by my constant concern over the mounting oil temperature which now pushed close to 95 degrees. The sun was getting low in the west, the air was smooth, and a gentle tail wind puffed me on my way. I was fifteen minutes ahead of schedule as I came into the Syracuse airport and hovered in front of the hangar where I thought we were going to house the ship. Suddenly a guard burst around the corner to direct me where to go. He stopped and spread his eyes, his jaws and his feet simultaneously when he saw me awaiting instructions fifteen feet up in the air. Recovered from his shock and reassured by my grin, he signalled me down to the other end of the field, and then dog-trotted along the ramp with the helicopter's nose a few feet behind and above him.

This first day had gone on schedule. The helicopter had proved itself an airworthy vehicle, capable of rendering true transportation. It had travelled 260 miles in five hours and ten minutes without even beginning to approach its high speed. But a quick inspection of the ship at Syracuse revealed one difficulty in this particular craft that was to give us our share of worry in the weeks to come. The transmission was heating up badly. It seemed strange that we should create a totally novel aircraft and run into no particular structural, functional

or control problems—whereas a simple gear transmission, something that had been developed and used successfully in millions of applications during the last half century, was destined to hound our every move.

Off for Rochester the following morning, I kept the ground party and their yellow-spotted car in sight for several miles, but finally decided to cruise ahead at normal speed. It was a beautiful day, but the hot, calm air presaged thunderstorms. At the outskirts of Rochester, I noted that the main highway went straight ahead into the business district, while a small cross-road to the left led to the airport a few miles away. I lingered above the crossing, debating whether or not to hover there until our car came along and signal them the best route to take, but finally decided that in the interests of the over-heating transmission it would be best to go on to the port and check things over.

Above the field, I headed into the wind and slowly settled down facing the open hangar doors. Several men working inside ran for their lives, expecting a crash, but when they began to see that there was no danger they reappeared from behind airplane wings and packing boxes and watched the landing with unconcealed amazement. A guard came over and advised me to taxi up in front of the control tower at the other end of the hangar line. He didn't realize that in this strange craft a short flight was much more satisfactory than taxiing on the ground. His eyes popped open as I took off, still facing the hangar only a couple of hundred feet away, and buzzed along lazily, ten feet above the ramp and four feet above his own head.

The control tower was simply a square glassed-in box atop a fifty-foot skeleton tower out near the operations area. No ship may land without first receiving a green light signal from the control tower operator. It was fortunate indeed for me that my ship could hang motionless in the air, because when I whirled up in front of the tower and looked the operator in the face he was so astounded that he left me hovering there for the better part of a minute before he stopped rubbing his eyes. Then, with a broad grin, he flashed on the green light.

The transmission was still running pretty hot, so I decided to fly to Buffalo with the metal cowlings removed from the sides of the ship for more air circulation. Off again, with a headwind and a promise of thunderstorms, I stuck close to the ground party so that if an intermediate landing was required they would be able to check the gear case a few minutes after landing.

Down the highway we went together. I knew they were pushing along at good speed (they said later that it was often close to seventy-five) and I was hoping a State trooper would pull them over; it would have been fun to hover a few feet above them while he was bawling them out or giving them a ticket. No trooper showed up, however, so I had to content myself with flitting

ahead to each cross-road to make sure there was no converging traffic to cause danger—then signalling them to proceed without worry at the intersection.

As we approached Batavia, the sky to the west became darker, and an occasional streak of lightning sliced down through the black curtain a few miles away. I edged northerly for a time to see if I could get around the storm, but it was spreading out and cutting off my path. It looked pretty good to the south but I hesitated to get too far off course, particularly since I didn't know what sort of conditions prevailed behind the storm front. I finally decided to land and sit it out.

The car with its yellow dot had gotten itself misplaced somewhere in Batavia's traffic and I wasn't sure which of two parallel roads it would follow toward Buffalo. So I leisurely swung back and forth between the two roads, trying to spot my companions, keeping a weather-eye on the progress of the storm in the meantime, and picking out a likely-looking house with a telephone (I could see the lead-in lines from the road) where I could land and report my position. (With this aircraft the size of the available landing field or its surface conditions had no influence on where to land, the only factors being a comfortable house and a telephone.)

I failed to pick up the yellow dot on the highway. (They claimed I flew directly over them several times), and after five or ten minutes the storm was getting too close for comfort. I swung in, then, slowly over the predetermined spot—a nice green strip of grass about 75 feet wide between two ploughed gardens—near an old farm house.

As I came to a stop 25 feet above the green turf, the lack of power which was this particular craft's weak point became all too apparent. The "bottom" seemed to drop out of it, and in spite of all I could do the ship settled rapidly to earth. Future ships will have an excess of power to cope with such unfavorable conditions as the calm, humid air before a thunderstorm, but I spent a few uncomfortable seconds wondering about the safety of this experimental baby. (Bear in mind that the pilot's safety was never in jeopardy, because of the ship's unique ability to fly as slowly as desired and to land ver-

tically in any small spot.) A quick check of the ship showed it to be unscathed by its experience. The occupants of the houses appeared relieved to see signs of human life around the aircraft. They were only too glad to let me use their phone.

When the weather cleared and I was preparing to leave again, one of the farmers warned me quite persistently of a hidden ditch about 200 feet from the ship. I couldn't make him believe that I would take off straight up, so I finally quieted his fears by assuring him, with thanks, that I would be careful.

Another storm was skirted before Buffalo, but finally the airport loomed out of the haze. An airliner was about to land as I approached the control tower, and the man in the tower could not be expected to guess that this queer contrivance would not interfere in the slightest with the airliner's landing—so he gave me the red light. A short circle of the hangars brought me back over the tower a second time, and, although the airliner was already on the runway, the tower-man realized I saw him so he flashed a green signal for landing and left it up to me. I settled in slowly over the hangars while a sea of faces gaped upward. I purposely over-shot the edge of the ramp by twenty feet—and then backed up onto it. The ground party, on hand for the landing, drifted through the crowd and heard:

"I never thought I'd live to see one back up!"

DUE to a long string of thunderstorms between Buffalo and Cleveland, further flights were cancelled for the day and arrangements were made to store the ship, with armed guards standing by all night.

Next day the usual weather prevailed in the pocket below Buffalo—very smoky, hazy conditions cut visibility to less than a mile for a time—but I steered my course half by compass and half by highway because I wanted to be near the road that the ground party was following.

Once, as a towering radio mast loomed out of the murk, I became impressed with the value of an aircraft that could come to a complete stop in mid-air if necessary.

The lake shore finally came in view, and

I followed it without incident to the government's intermediate field at Dunkirk. The field was still wet from the storms the night before, and the attendant was dumbfounded when I hovered about until I found a high spot near the building where there were no puddles to step into.

The transmission was no better and no worse than before, and I decided I could take one of the ground party on the next flight. A flip of the coin chose Ralph Alex, and we were soon on our way to Erie. The clouds were still quite low and nasty looking. In any other aircraft I would have been uncomfortable.

It was on this flight, in the middle of a driving rainstorm, that a helicopter passenger was carried for the first time across a State line.

Erie at last. We hovered for a while in front of the hangar before landing—but we missed the best opportunity of the trip. One of Ralph's pet tricks was to jump out of the ship while it hung a few feet off the ground. Why didn't we think to have him do it here, and then inquire the way to the gas pump? As it was, we landed and I sidled over to the pump later.

Weather forecasts were bad. The high winds, upward of thirty to thirty-five miles per hour, we were not yet prepared to face, particularly if they were headwinds as promised. So we stowed away at Erie for the night.

The next day, we took off in the face of a twenty to twenty-five mile wind, because the forecast showed the probability of worse weather to come, and we had a good chance of avoiding it if we got on to Cleveland.

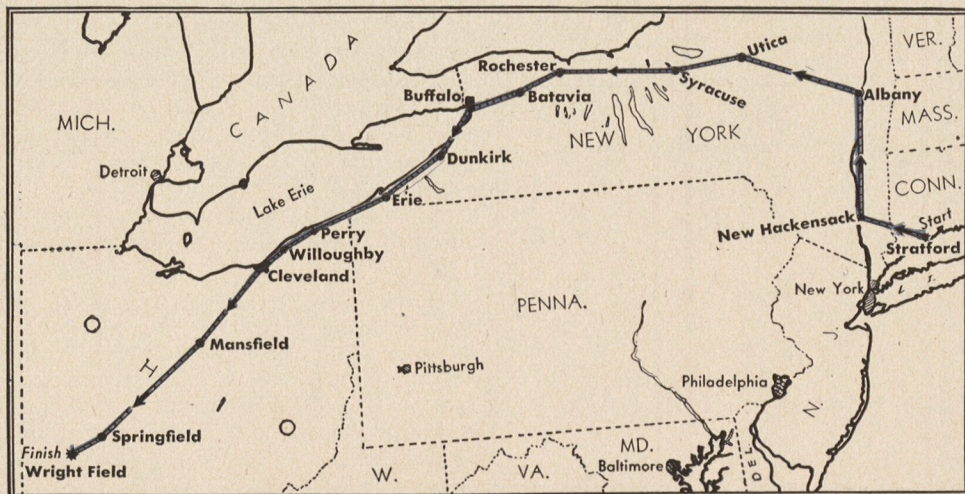
A few minutes out of Erie I realized that the transmission didn't sound the way it should, and, furthermore, I occasionally could feel through the rudder pedals a kind of catching as though small particles of matter were getting caught in the gear teeth. After a few minutes, it seemed the best policy to land and confer with the ground party.

When the ground party arrived, it was decided that Bob Labensky would make a short flight with me, and we would continue along the road until he had a chance to analyze the trouble. If it was serious, we would land again—if not, we would proceed to our next scheduled stop, Perry, Ohio.

Poor Bob. He was convinced the flight would be short, so he didn't bother to get the extra seat cushion out of the car. For one hour and twenty-five minutes he sat cramped up on a hard metal seat with the circulation cut off from both legs.

During this whole flight four ears were cocked for untoward noises—and none appeared. Analysis some time later led us to believe that the extra passenger weight was sufficient to change the loading on the transmission so that it performed satisfactorily. Actually, however, it was slowly chewing itself to pieces and had to be replaced shortly after arrival at Dayton.

This was the roughest leg of the entire trip. The wind was gusty, varying from twelve to twenty-nine miles an hour. It was



dead ahead, so I chose to fly close to the ground in order not to get into the stronger winds at higher altitudes which would slow us down considerably more. But close to the ground we got the full value of all ground "bumps." Whenever I would see a ravine ahead I would brace myself for the turbulence that was sure to be over it. Every patch of woods had its own air currents; and to the leeward of a town or village the air was extremely choppy.

Many times we would lose 75 to 100 feet of altitude in a down-gust—and we were only 300 feet above the ground most of the time. Once I watched the altimeter drop 180 of those precious 300 feet—and toward the end of the drop I began veering toward an open field, just in case it didn't stop.

But the ship behaved beautifully. It didn't pound and pitch. All it did was float up and down, and get kicked around sideways. There were no sudden shocks, and even when it yawed to one side or the other, it was not necessary to use rudder to straighten it out. Given a few seconds, it would come back by itself.

About the time Bob began to search his limbs for signs of gangrene, Perry airport came in sight, and a couple of minutes later he crumpled out of the ship, for all the world like a new-born calf just trying its legs for the first time.

No gas at Perry, but we still had enough in the tank to get to the small private field at Willoughby. One fellow said that when he saw the ship coming in, he dashed to get a movie camera from his car—but when he noticed the Army star on the fuselage, he promptly changed his mind. Such was the spirit of the flight.

Off on the last leg to Cleveland. Although the weather was a little better, this was a difficult section because I didn't want to fly over congested areas quite yet. A long sweeping circuit to the south carried me over the outskirts, but I had to use caution to keep from getting stuck in a bottle-neck of houses. Only once did I have a few uneasy moments when I had to follow a dual highway between two close-packed communities, where a forced landing, even on the highway might involve in trees and telephone wires.

But at last the Cleveland airport loomed ahead. Somewhere down there Mr. Sikorsky would be waiting. An airliner preceded me into the field, and I realized when I saw the green light from the control tower that they expected me to follow him in and land on the runway. But that was not the way of this craft; if I had landed out in the middle of the field, I would have had to take off again to get in to the hangars. My procedure was to fly down the hangar line until I discovered the one where storage had been arranged, and then land on the ramp in front of it.

As I meandered along in front of the hangars, fifty feet in the air, the green light still followed me. I could almost hear the fellow in the tower saying, "Get that—thing down!" He held the light until I got close to the tower, then finally gave up. I

hovered momentarily out in front of him, grinning to see what he would do. He was scratching his head—reached for the light again—thought better of it—and finally with both hands signalled me vigorously "down."

I laughed and continued my perambulations. In front of one hangar there appeared to be more commotion than usual, so I headed that way. There was our crowd—Plenefisch and Walsh, the hangar crew—and there, apart from the rest, stood Mr. Sikorsky. He waved happily, and beamed with a broad, almost childish smile. A space had been cleared between the ships parked on the ramp, and I settled easily into it.

The weatherman hadn't been very hopeful about the weather from Cleveland to Dayton, but it turned out to be a beautiful, warm Sunday morning with a gentle breeze and high puffs of clouds.

Mr. Sikorsky was to join me on the flight from Cleveland to Mansfield. We didn't want to have him repeat Bob's discomfort of the previous day, so we gave him a cushion.

After the take-off we hovered for a minute or two in front of the hangar, then turned and started south while the ground party in the car was still getting under way. When we were set on the course, I turned the controls over to Mr. Sikorsky.

It seemed strange for me to be telling Mr. Sikorsky anything about flying a helicopter, since he had made all the early flights with the original experimental model, and as a matter of fact, had taught me to fly it. The answer, of course, was that he had been too busy to spend much time at the controls of this later model.

He had only handled them for two or three minutes during one flight at the plant, but he quickly caught the feel of it—and from there to Mansfield I was simply the navigator.

Since he had never landed this ship, he

handed the controls back to me as we approached Mansfield airport. We landed close to the other ships and he stepped out.

After a moment, he walked back to me. "Les, how are you going to get the ship over to the gas pump?" I looked at the solid line of airplanes deployed between our craft and the pump.

"Well," I said, "if you will ask them to have someone hold the wings of the other ships, I'll fly over."

The clear space around the pump was about 75 feet square, and a quick jump was all that was necessary.

I took off alone for Springfield. It was the longest flight of the trip, 92 miles airline. The day was quite warm, and we were still not too sure of what was going on inside the transmission so we thought it best to have the ship as light as possible.

The miles slipped by uneventfully, and in due course the Springfield airport was below me. A small training ship had just landed as I came in over the edge of the field, and he began to taxi toward the hangar at the far end, unaware of my presence. So I slowed down and kept just behind him about five feet high as he bounced slowly along. When he reached the ramp, he turned to line up with the other ships and I saw him suddenly slam on his brakes and stop dead in his tracks.

While I waited for the ground party, an Army ship circled the port. It brought Lieutenant Colonel H. F. Gregory (now Colonel), who deserves more credit than anyone else outside our own small group for the creation of this craft.

The side cowlings which had been removed from around the gear case to give better cooling on the trip were buttoned on for the dress parade to Wright Field. Colonel Gregory phoned that we would be in at 3:40. The engine was started, and Mr. Sikorsky again took his seat alongside me.

Off we hopped, with Colonel Gregory not far behind in the Army ship, and Bob Labensky just behind him in a ship hurriedly chartered at the airport (for which the pilot wouldn't accept compensation).

In fifteen minutes Patterson Field was below us, and as we looked over the top of a low hill, Wright Field came into view.

"There it is, Les," shouted Mr. Sikorsky. His face twitched just a little and we exchanged another warm handshake.

A couple of minutes later we were circling the buildings. I couldn't resist the temptation to zoom low over the ramp, just to show that we had arrived. Then we circled back and hovered in the space that had been cleared for us a few feet in front of the operations office. Mr. Sikorsky waved joyfully to the sizeable welcoming group that had gathered.

The landing was made on a red-topped gasoline pit surrounded by airplanes of every description, from the mammoth B-19 bomber to the tiny little private airplanes that were being considered for various military missions, and Mr. Sikorsky stepped out, proud and happy at the successful completion of an epochal mission. ☆

ANSWERS

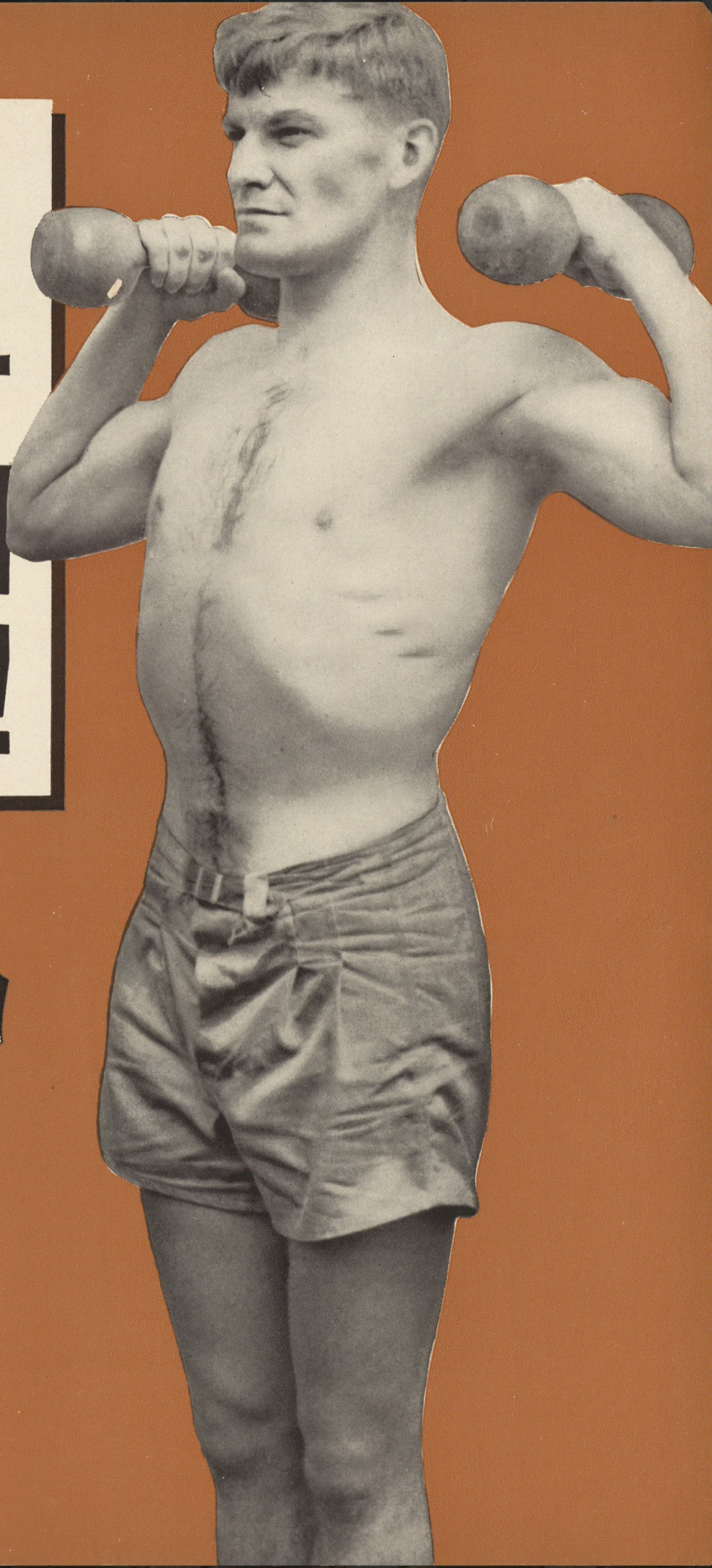
to Quiz on Page 26

1. (a) 570 miles
2. (c) Two inline air-cooled engines
3. (d) Intense cold front accompanied by storms
4. (a) Gear up and no flaps
5. (c) Phoenix, Arizona
6. (c) Lieutenant Colonel
7. (c) Revolutions-per-minute of the engine
8. (a) Wellington
9. (c) Two seat, two engine fighter
10. (a) Photographic plane
11. (b) False
12. (b) False. Casablanca is in French Morocco
13. (c) Fireworks
14. (c) "Remember Pearl Harbor" from "Remember the Maine"
15. (a) One degree of longitude.
16. (c) \$100 for officers; \$50 for enlisted men
17. (a) To fly low over the field
18. (c) Marauder
19. (a) QQQ
20. (b) 2,000 pounds

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**GET IN
SHAPE-
STAY IN
SHAPE!**

**Your *LIFE*
May Depend
On Your
Physical
Condition**





**BE CAREFUL
WHAT YOU
SAY!**

DANGER!

ARMY AIR BASE
STA-6

**BE CAREFUL
TO WHOM
YOU SAY IT!**

**THINK
BEFORE
YOU TALK!**