AIR FORCE

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

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Contents

General Chennault's Fight Talk to His New Pilots 6
Our "Flight Strips"—Their Use in War and Peace 8
A B-24 Gets Action Aplenty in a Raid on Bizerte 11
The Story of a Bomber Pilot's Survival in New Guinea 12
War in the Aleutians: Fighting Weather and Japs 14
Building a Chinese Air Force in the Arizona Desert 16
What Every Pilot Should Know About Traffic Control 22
Blasting the Japs on Nauru — A Story in Pictures 24
How to Keep Well in the Indian Theatre of Operations 27
Profile of a CO Whose Toughness Paid Dividends 29
Pacific Raids With B-26s — Why the Japs Don't Like Them 30
Broadening the Scope of Third-Dimensional Photography 32
A Production Line Method for Aircraft Maintenance 36
Supplying Troops From the Sky With Cargo Parachutes 38
New Developments in Clothing For War in the Air 40

DEPARTMENTS

Cross Country . . 1 On the Line 34
Technique . . . . . 18 Roll of Honor . . . 42
Air Force Quiz . . 26 Training Aids . . . 46
Snow, Sand and Sarongs . . . 4

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August Brief

ONE OF THE FIRST assignments for new pilots of the 14th Air Force in China is a talk with their Commanding General, Major General Claire L. Chennault. An article on what he tells them has been written for AIR FORCE by General Chennault and it appears on Page 6 of this issue. General Chennault has been fighting the Japanese air force since 1937 — as aviation advisor to the Chinese government, organizer and commander of the American Volunteer Group, chief of the China Air Task Force and CG of the 14th.

"FLIGHT STRIPS," the Army Air Forces' practical solution to the landing area problem, have become a definite factor in wartime operations. Long regarded as the "father of the 'Flight Strips' program," Colonel Stedman Shumway Hanks has taken a leading role in the development of the projects which have been set up not only in more than a dozen States but up along the vital Alcan Highway to Alaska. On Page 8 Colonel Hanks presents a progress report on the wartime significance of "Flight Strips" and explores several post-war considerations.

IF YOU'VE ever wondered what would happen to you if your bomber exploded in mid-air over enemy territory, you might be interested in the story on Page 12 which relates the experiences of Captain Frank P. Bender who had just that happen to him over Buna when that section of New Guinea was in Jap hands. His trying ordeal in reaching his base makes Captain Bender's survival story not only spectacular but highly informative. Captain Bender, who is now A-3 of a Bombardment Wing at Drew Field, Tampa, Fla., saw action in the Philippines and Java as well as in New Guinea.

TWO OFFICERS and two enlisted men recently returned from the Aleutians have given Herbert Ringold of the AIR FORCE staff a graphic description of what it means to fight Japs and weather in the northern theatre. Their story appears on Page 14.

THE AIRWAYS TRAFFIC CONTROL organization, key to the network of airways leading pilots safely "on course" throughout the United States, has never been clearly understood by many of our airmen. With this in mind, Lieut. Colonel George C. Price, chief of staff, Flight Control Command, has written an article for AIR FORCE on the organization of Airways Traffic Control, how it works and the plans underway for the future. Colonel Price's article appears on Page 22.

ONE OF THE MOST devastating raids yet made on a vital Japanese industry by AAF bombers was that which blasted enemy phosphate plants on Nauru Island in mid-April. A picture story of the raid, which was led by Major General Willis H. Hale, Commanding General of the 7th Air Force, is presented on Pages 24 and 25. The *front cover* this month shows an important step in the preparation for this raid.

THE JAPS don't like our B-26s and Major Dill B. Ellis tells why in his story on Page 30. Major Ellis returned to the United States recently after flying numerous missions against Jap installations as CO of a B-26 squadron in the South Pacific.

EVEN in the first World War, an important intelligence factor in determining enemy positions and mapping new advances was the use of third-dimensional photography by means of the stereoscope. The latest development in the field of third-dimensional photography and interpretation is the Vectograph, which permits entire groups to view pictures and mosaics of enemy territory simply by using polarized spectacles. Lieutenant Colonel M. E. Parks describes this new method and its many military uses in the article on Page 32. Colonel Parks is a technical advisor on techniques of photogrammetry and photographic equipment and development at Headquarters.

YOUR AIR FORCE this month has had a shave. The margins have been reduced and the format trimmed to afford readers more type and illustrative matter per square inch and, at the same time, conserve the paper required for each page of the publication. This trimming is accompanied by an increase in pages—from forty to forty-eight—to permit your service journal to keep pace with the expanding activities of the Army Air Forces. The increase in pages also is in keeping with numerous requests from readers for a larger publication.

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CROSS COUNTRY

The manpower conservation program, and other developments of the month within the Army Air Forces.

ARE general service men at your station being used in post headquarters work, as runners and messengers, on orderly room clerical detail, for policing grounds and buildings, as motor vehicle drivers and maintenance men, as officers' mess attendants?

Official reports indicate that a large percentage of the housekeeping and service jobs at Air Forces installations in this country can be done by personnel other than those classified for general service duty—limited-service officers and enlisted men, WAACs and civilian women, and male civilians over military age or those permanently deferred.

How many officers and enlisted men in the Army Air Forces are engaged in unnecessary jobs at stations within the continental limits? How many are performing duties for which they are not suited? How many units are overstaffed for the particular job they are performing? How can officers and men in such jobs and units be made available for transfer?

The answers to these questions, and others like them, are now being developed. The heat, we are told, is definitely on. In brief, a manpower conservation program is under way in the Air Forces.

The program is being directed by the newly created Manpower Division, which operates under the Chief of Management Control at Headquarters. The program in the Air Forces is part of a general War Department effort, supervised by the War Department Manpower Board, to put the right man in the right job and accomplish a reduction in military personnel engaged in non-combatant activities.

Here's a statement from the AAF Manpower Division:

"The job is two-fold: to eliminate excess manpower—both military and civilian—at continental installations; and to fill as many of the remaining jobs as possible with limited service men, WAACs and civilian women, and overage or permanently deferred males."

Obviously, a small Headquarters unit like the Manpower Division can't carry out the entire manpower conservation program in all commands of the Air Forces. Its main job is to aid in initiating studies in the commands, generally monitor the manpower surveys, analyze results and make recommendations. Surveys at selected stations will result in the establishment of ground rules, yardsticks and standards for the over-all program.

Where possible, "Exact Manning Tables" will be employed as a basis for personnel requests in place of Tables of Organization. Adoption of an Exact Manning Table means a complete and objective survey of an installation to determine the exact number of personnel required, rather than the allotments of personnel by squadrons or other group units.

Other factors involved include the elimination of unnecessary and/or duplicating reports, elimination of non-essential and the curtailment of over-expanded activities, and simplification of administrative practices and procedures.

Another Chute Missing

Base Operations, Army Air Forces Proving Ground, Eglin Field, Florida, reports a missing parachute, Type S-1, No. 42-63129. If you locate it, please return the chute to Base Operations at Eglin.

Hangar of Fame

A letter from First Lieutenant L. A. Hamilton, Tactical Officer of the Aviation Cadet Detachment at Brooks Field, Texas, tells of a special use at his station for the AIR FORCE "Roll of Honor." A "Hangar of Fame" is kept at that advanced flying school, listing all its graduates who have been decorated. So far, he writes, sixty names have been gleaned for the Brooks Field "Hangar of Fame" since AIR FORCE began its "Roll of Honor" feature. This is one convenient method by which training schools can keep track of their alumni who distinguish themselves in combat.

"As Time Goes By"

A Hollywood "idea" man suddenly found himself in the Army, stationed as a private at a West Coast base. It wasn't long before he had developed what he thought to be the answer to the Army's prayer. The next step, of course, was to

Precision Bombing

get the idea before proper authority. Laboriously he sold his brainchild through channels. Then the great day arrived and he was standing before the Colonel, a tough old compaigner. Our hero, using his best Hollywood technique, employed "terrific," "stupendous" and "colossal" with abandon. The Colonel sat unmoved. Finally, his presentation over, the Private paused for breath. It was the Colonel's move. Said he: "That idea has merit, young man. Come back and see me in six months." The Private didn't blink an eyelash. With military precision he raised his arm and stared at his wrist. "Shall we synchronize our watches, Sir?" he asked.

Mullet Key

Perhaps the most bombed and strafed group of men in the continental United States is a detachment of Army Air Forces personnel on Mullet Key, Florida.

Mullet Key lies about thirty miles off Tampa. A strip of sand, palms and beach about three miles long, it is used as a bombardment and ground strafing range. Virtually 24 hours a day, medium bombers from MacDill Field and Sarasota and fighters from the 3rd Fighter Command at Drew Field raid this peaceful island, while on a tall flagpole a red-orange flag, hung below the stars and stripes, warns ships in the vicinity to keep well away from there.

The detachment is from the 97th Aviation Squadron at MacDill Field. It is under the command of First Lieutenant R. G. Gilliland. The last we heard there were two white soldiers—Privates First Class Robert Koch of the Medical Detachment, Base Hospital, and James Manwell, a mechanic—all the rest, Negro troops.

This detachment maintains the range, keeps and reports scores from spotting towers, repairs the bulls-eye panel targets which line the beach, operates the radio, and performs other duties of a regular post. Retreat is an impressive little scene.

Facilities of the island consist of only three or four white clapboard buildings and a dock. However, the unit boasts the "smallest PX in the Army"—a large packing case with a lock on it, from which toilet articles and other supplies are sold. It does a business of about $150 a month.

None of the soldiers has ever been hit, although Lieutenant Gilliland admits that "some of the flyers are a little wild." They "can scare you a little, but never hit real close."

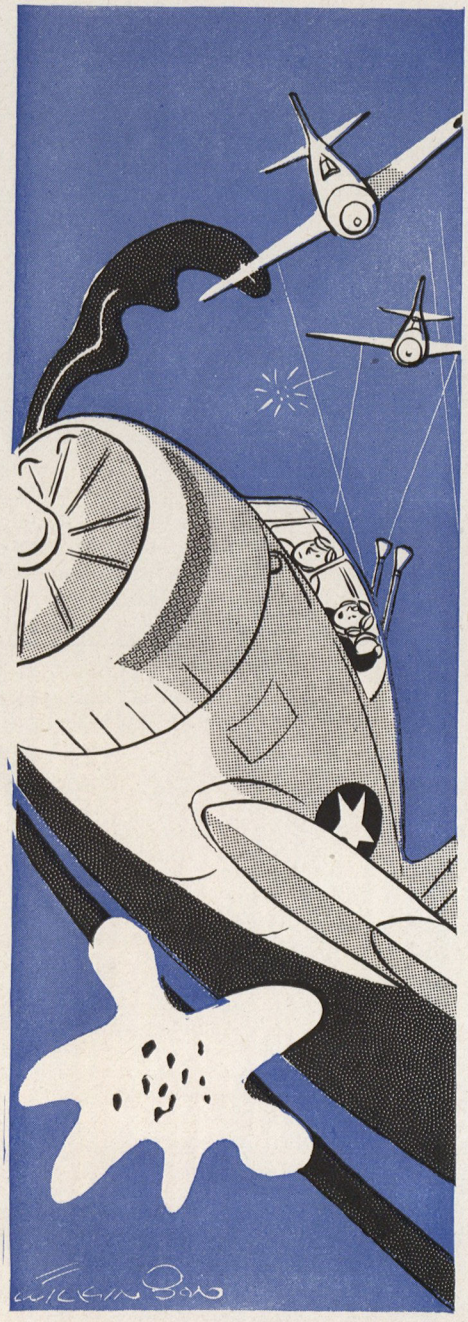
Morale on the key is as high as you'll find anywhere. For example, while the men can have frequent two-day passes into MacDill and Tampa, they practically never take them, even when urged by Lieutenant Gilliland, and their only worry is that they'll be transferred. The reason —swimming, fishing, volleyball and soft ball are all good on this clean white strip of sand and the weather is pleasant. The food is said to be absolutely tops. And the job is an important one in a country that is depending heavily on its ability to train first-rate combat airmen in a minimum of time.

Automatic Navigator

An automatic navigator that will make practically all computations for the navigator—thereby greatly simplifying dead reckoning and eliminating some instruments—is one of the latest products off the Wright Field engineering line.

Three indicators on the device continuously give air mileage, latitude and longitude. Having set the mileage meter at zero at the start of a mission, the navigator has only to take off readings during the flight to stay on course.

An averaging sextant further aids the navigator in establishing his position by celestial observation. It will record and average 100 readings of stars and planets in two minutes, virtually eliminating chance error due to speed, vibration and rough air. With the astrograph, the aerial navigator can fix his position on a chart (using the sextant readings) in one and one-half minutes.



"Scare me — I've got hiccups!"
– FRITZ WILKINSON

Doctors of Bombardiering

From the Midland Army Flying School come reports of the outstanding success achieved by former college profs and public school teachers, who were rounded up to staff the ground school classes at this bombardier "college" when instructors were needed in a hurry. These trained teachers, beyond the age of maximum combat efficiency, offered a double solution—not only could they cut the mustard from the teaching angle, but also their utilization relieved younger men for flight instruction and combat duty.

In finding a direct connection between a schoolmaster and a blockbuster, their previous unfamiliarity with bombardiering did not hamper them in the least, so we hear. It was a neat jump—from music, economics, history and chemistry to theory of bombing, fuses, analysis of results and automatic pilot operation. Of course, the teachers first went through the entire bombardiers' course, including the actual bombing of targets on the practice range.

The teachers are said to have found no important differences between instructing aviation cadets and college students, except that they say the cadets are more eager to learn and discipline is more rigid.

One exception. A former University of Wisconsin prof confesses, "We miss the co-eds."

Mix-up in Phoenix

It is told around Phoenix how Chinese cadets who came to Arizona for flight training earlier in the war unwittingly threw a scare into the citizenry. The first time the Chinese students went into the air and used their radios, they began to talk to each other over the interplane sets. Naturally, they spoke Chinese. When it was heard on the airwaves by civilian stations and others around Phoenix, it very nearly caused an alert in the city against what many thought to be a Jap invasion.

Pilot's Ten Commandments

In the columns of "The Flyer," publication of the Reno, Nevada, Army Air Base, we found "A Pilot's Ten Commandments." Here they are:

1. Seat thyself well upon thy fifth vertebra, leaving not thy fingerprints on the

controls, and chewing not on thy fingernails.

2. Know thy instruments, for they are the true and appointed prophets.

3. Follow the indications of thy instruments, and verily the airplane will follow along, even as the tail follows the sheep.

4. Do not stick out thy neck a foot; stay within the confines of thy ability, and thou shalt live to a happy old age.

5. Know the appointed words and approved methods; so if thy neck drapeth out thou shalt be able even unto thyself to place same in its proper place, upon thy shoulders.

6. Follow thy radio beam; for their ways are the happy ways and will lead to the promised land-ing.

7. Listen carefully, yea verily, to the signal impinging on thy eardrum, for sometimes they seem to have the tongues of snakes and will cross up thy orientation, to the sad state to where thou must ask Heaven itself for guidance.

8. Assume not, neither shalt thou guess, that thy position is such, but prove to thine own satisfaction such is the case.

9. Boast not, neither brag; for surely Old Devil Overcast shalt write such words in his book, and thou shalt, some day, be called for an accounting.

10. Trust not thy seat (of thy pants) but follow thy instruments; read and truly interpret the word as given from thine instrument board; know that the responsibility lieth not with the hand that rocks the control column, but in the mind that directs the hand, and thou shalt be blessed with a long and happy life.

Ceiling Zero Minus

Sailors in the Army are nothing new. The Army operates many kinds of boats for one purpose or another and they are manned by Army personnel.

But under-sea divers in the Air Forces are rare. So far as we know, there are only six of them. They are under the command of a Navy warrant officer but are personnel of the First Proving Ground Torpedo Squadron at Eglin Field, Florida, where medium bomber crews are trained in the technique of torpedo attack.

It is the function of these divers, who have full under-sea equipment and a special boat of their own, to go out to sea during practice runs, mark the places where the torpedoes sank, and later retrieve them.

Damn the Torpedoes . . .

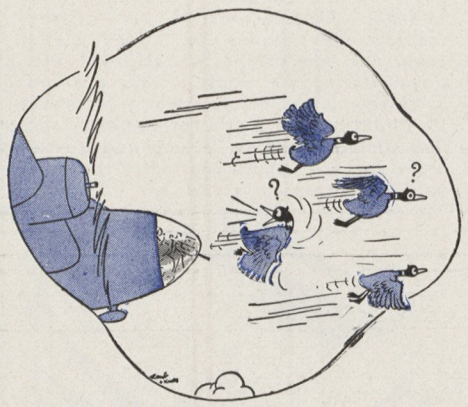
Back in the April issue we carried an article by Captain Charles D. Frazer, entitled "Night Mission Over the Caribbean," in which the author described a submarine hunt in a B-18. At one point, quoting the bombardier of that plane, the article states:

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

We're indebted to Captain Ray D. Tarbuck, U. S. Navy, Naval Liaison Officer at the AAF Navigation School, Selman Field, Alabama, for checking that statement. Writes Captain Tarbuck:

"In the Department of Naval Forces and Operations at Selman Field the students learn that submarines do not come to the surface at all to refill torpedo tubes, because it is accomplished by breech loading within the vessel. We also teach that torpedo tubes open or closed cannot deter diving since the interlocks make it impossible to open both ends of the tube at the same time."

A checkup reveals the point in question to be worthy of further discussion. Based on information received from AAF Antisubmarine Command Headquarters, our reference to the filling of torpedo tubes is open to misinterpretation since there are two procedures involved in this connection: First, the actual filling of the tubes; secondly, the loading of the torpedo room with torpedoes from the deck container after the torpedoes in the room have been utilized in attacks at sea.



"Scram, boys—I heard him say he's going to feather his props!"

—CPL. PAUL J. KAATZ

The Command informs us:

"The description of operation concerning interlocking of chambers and loading within the vessel concerns only the single operation of loading the tubes. But when the torpedoes are used up within the room itself, then the only place remaining to obtain more projectiles is from the deck container where spare torpedoes are kept. To reach the deck container it is necessary for the submarine to surface completely; the hatch on the deck must be opened and a hatch in the pressure hull directly beneath the deck hatch must be opened also. Cranes are wheeled into position for removing the deck torpedoes to the torpedo room immediately below. It is believed that this operation requires about two to four hours in a Nazi submarine. But, this operation is performed only once during an entire voyage lasting sometimes two to three months. Battery charging is almost a daily occurrence under average conditions. Of course, if a sub is caught with its hatches down, so to speak, the time taken to batten the hatches is many minutes before a dive is possible. Hence, in this instance of opening the hatches once in two or three months' time, the sub is caught at greater disadvantage than during the battery-charging operation, which is much more frequent."

From this we conclude that there would have been no chance for misinterpretation had the bombardier's statement been: "The best time to catch one (a submarine) is when he's filling his *torpedo room*. He can't dive until his *hatches on the deck* are closed and that gives you a little bulge on him. If he's only charging his batteries he can crash-dive on you."

Blackout

As this story has it, the co-pilot of a transport was making his virgin trip over a northern run. Suddenly, at 18,000 feet, he realized that his vision was getting blurred. He had but one thought—anoxia! The co-pilot hurriedly checked his mask. No leaks. He checked the regulator. It was okay. But still it grew darker. Frantically he turned to the pilot, and found him totally undisturbed. When our co-pilot felt himself about to blackout completely he prepared to gasp into the intercom for help. But before he got the chance he heard the flight engineer's voice come in: "Damn, this is the first total eclipse I ever saw!"

A Bombardier Says

Now and then, everything on a bombing mission goes along as nice as pie until it's time for "Bombs away" and then—no bombs drop out.

Technical Sergeant John O'Brien, a veteran B-26 bombardier with more than twenty combat missions over the hottest spots in the Southwest Pacific to his credit, follows up that comment with a few others.

He feels that if a bombardier wants to make sure his bombs are dropped correctly, he should first make sure they are loaded correctly. He admits that sometimes it is impractical to watch personally the bombs being loaded into the rack, since this is often done while the mission is being briefed. But whenever possible, the bombardier should be on hand for this operation and not only know what is being done but exactly *how* as well. Before loading, the bomb rack should be run through two or three times to see if it is functioning properly. The bombs, he says, are ultimately the bombardier's responsibility and he should know everything there is to know about them. In this knowledge he includes the setting of the fuse and the ability to change the setting of the fuse in flight, because occasionally the original target, which

TIPS FROM THE ARCTIC DESERT AND TROPIC INFORMATION CENTER

PHANTOM ICE. Alaskan flyers have reported several cases of wing-icing in apparently clear air. Theoretically, this isn't possible since visible moisture in the form of subcooled water must be present to form wing-ice. AAF pilots encountering a condition producing wing-ice in apparently clear air are requested to report the following details to the nearest weather office: (a) condition of the sky; (b) temperature; (c) altitude; (d) looking at the sun—ice crystals or halo or both.

ARAB APPEAL. ***"Blood chits" are now carried by our pilots on all missions over North Africa. These are written in three languages and are intended to secure the friendship and the aid of the Arabs. They're as good as money because the natives can cash them in as a reward for helping our airmen to safety.***

KITCHEN SINK. American airmen in the Pacific area have found a fascinating study in bits of shrapnel picked up after a Jap raid. Some of the fragments are easily recognized as American in origin — nuts, bolts, scissors from a well-known sewing-machine maker, pieces of farm machinery, even two first-class radiator caps. The boys are looking for the radiators in the next raid.

JACK SPRATT. ***In Arctic regions, you can literally "eat yourself to death." There are numerous entries in the North country log about men who've eaten hare to bursting and yet lost weight day after day. Hares have little fat content, and fat is a vital part of the Arctic menu. If you're ever faced with a forced hare diet, be sure to garnish your banquet with seal or walrus blubber (or any other similarly delightful fat equivalent).***

FICKLE STORMS. ***In the Bismarck Sea engagement, the Nips had counted on an overcast similar to that which permitted the Gneisenau and Scharnhorst to escape through the English Channel. They expected an existing tropical disturbance to afford cloud cover for operations for at least five days. During the nights of March 2 and 3, however, the storm suddenly reversed its direction and made the armada look like sitting duckpins. Flying and bombing weather is at its best after the passage of a tropical storm.***

JEEP JAUNTS. The inventor of the jeep must be pop-eyed by now at the legends and deeds of his famous brainchild. But this latest one tops them all. New pastime for the boys in North Africa is shagging gazelles in a jeep, thereby solving the fresh-meat shortage and proving that the age-old saying "as swift as a gazelle" just means second gear as far as a jeep is concerned.

DID YOU KNOW . . . ***that a plane flown continuously on a course of N. 45° E. (true bearing) from New York, will eventually arrive at the North Pole . . . that Fairbanks, Alaska, is equidistant from Washington, D. C., Tokyo, and Murmansk, Russia . . . that the lowest temperatures ever recorded have been found south of the Arctic Circle?***

DESERT STATIC. To overcome the hazards of static electricity under desert operating conditions, the nose wheels of the P-38 and P-39 and the tail wheels of the P-47 and P-35 are now equipped with static inductive tires having a graphite base. These tires do away with individual conductor wires. After the war, they might be made available to college boys parked in Lovers' Lane on moonlit nights.

The Arctic, Desert and Tropic Information Center welcomes contributions from all Army personnel with knowledge of the non-temperate theatres of operation. Submit to: Arctic, Desert and Tropic Information Center, Eglin Field, Fla.

called for a setting of ten seconds delay, will be closed up and another, requiring an instantaneous setting, will present itself.

O'Brien also warns against careless handling of the bombsight, which can't be tossed around like a football. An accurate time check should also be kept and the bombsight sent into a depot when the time is up. A bombardier should develop skill in adjusting quickly to new altitudes and in instantly setting up different dropping angles in addition to knowing sight settings so well he can make a set without constantly referring to his bomb book.

Finally, O'Brien advises bombardiers in medium bombardment outfits not to get itchy fingers just before the run starts. Wait until the pilot calls "level and on course," then go to work, says he.

A "HERO" COMES HOME

Everyone expects modesty in a returning hero. When the home-town folks turn out in celebration, a hero is supposed to blush and stammer, reluctant to admit his bravery and exploits. That's why they wouldn't believe Private First Class Ora G. McClain.

Private McClain, after a knee operation that had no more to do with combat than a game of golf, received a two months' furlough early in March and departed for his home town of Greenville, Ohio. Wearing the red, white and blue ribbon, indicative of foreign service in the Western Hemisphere, and hobbling on crutches, he soon found himself the center of attention.

They stared pop-eyed as he got on the train for St. Louis. Beautiful girls and motherly women found excuses to engage him in conversation. The men regarded him with envy and admiration.

Private McClain tried to disillusion them but couldn't get to first base. After all, wasn't he an overseas veteran? Yes, he was, with a ribbon to prove it. And those crutches! He looked just the type—self-conscious in civilized surroundings after those days and nights of bitter struggle with a knife in his teeth and a bullet in his leg, cooly facing a cruel, ruthless, cunning, relentless enemy.

"But I tell you I wasn't in action," pleaded McClain. "I haven't been within five thousand miles of an enemy bullet. The reason I'm wearing these crutches is that I had to have an operation on my knee. It was a busted cartilage."

"A cartridge! A cartridge! You hear that, folks?" cried an excited man. "He was hit in the knee by a cartridge."

"No, no," said the embarrassed private. "It was a cartilage. It got floating around and giving me trouble so the medicos cut the knee open so I could have it dug out."

"It happened in a dugout," said someone in the rear of the crowd. "Must

have been a shell fragment. Got one in the elbow myself at Chateau Thierry."

"Please, please, don't misunderstand," begged McClain. "I don't want anyone to think I'm a hero when I'm not. I haven't seen a minute of action yet."

To complicate matters, a Marine, loaded down with a Japanese rifle and helmet, got aboard and immediately came over to visit, further convincing everyone in the car that the trophies actually had been captured by our Private McClain.

And so, on and on it went until they reached St. Louis. In the crowded Union Station there, police and gate guards cleared a path through which the discomfited AAF soldier hobbled in triumph. Servicemen and civilians alike stepped aside, and from all around came cheers and benedictions.

"God bless you, son," "Hip, hip hooray," and "We'll blow those monkey-faced Japs into smithereens," were some of the shouted messages. But by this time he had given up trying not to be a hero. He found it easier just to relax. So he bowed, smiled and waved in all directions to the roaring delight of the throng.

But finally he found someone to believe him. It was when he reached home. His wife. But of course she probably thinks he's a hero anyway. (Our thanks for this one to Captain Richard D. Grant, 6th Air Force.)

Good News for Prospective Fathers

The Children's Bureau of the United States Department of Labor is making grants to public health agencies of the various States in order to provide medical, nursing and maternal and infant hospitalization for the wives and children (under one year of age) of enlisted men of the seventh through the fourth grades, irrespective of legal residence or financial status.

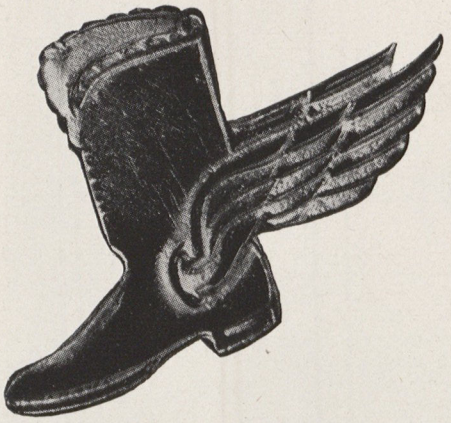
Application forms may be obtained from State and local health agencies, home service of local Red Cross chapters, prenatal clinics, other community agencies and physicians. The form must be signed by the enlisted man's wife and by her attending physician. It is necessary that the husband's Army serial number is included.

Club Notes

Our editor in charge of the Keeping-Track-of-New-Clubs Department comes forward with fraternity news. Recently organized in North Africa among airmen is the "Point Snorkers." This new society imitates to a certain extent the "Short Snorters" in the use of a membership card, but instead of a dollar bill the "Point Snorkers" carry a five-franc Algerian note. It is furnished by the candidate for membership himself, after he has proved his eligibility by growing a mustache which points toward his ears. Once a member, a snorker cannot remove the lip adornment unless by order of higher command or upon return to the States.

Failure to produce his membership card when asked to do so by a brother snorker results in the careless member forking over five francs to all members in the immediate vicinity.

Our editor in charge of the KTONCD passes on the further tidbit that a snorker's mustache must be of such dimensions



Emblem of the "Goldfish Club" (below) is worn by RAFers who've had to swim for their lives. "Late Arrivals Club" members display the boot above, signifying they have returned to base on foot from a mission.

that it can be clearly seen from a distance of 100 feet. Major Charles R. Greening is Chief Doozer and other charter members, all members of a medium bombardment group, are Majors Farrell L. Bowen and Marius P. Hanford, First Lieutenants Lee E. Romine, Jack E. Ryan, William R. Kemp, John E. McClure and George Beall, Master Sergeant James J. Flanagan, Technical Sergeant Harvey J. Belser, Staff Sergeants Ferdinand A. Watson, Jr., Maurice A. Davis and Herbert L. Sanders, and Sergeant Philip C. Croyle.

Then we have club news from the RAF. Newest with them, we hear, is the "Goldfish Club," made up of those who have had to swim for their lives or put in "dinghy hours," as they say. This outfit has a fancy badge, portraying a white-winged goldfish on a black background skipping over two blue waves. It's worn over the right pocket of the battle dress or under the lapel of the regular blouse —like a detective's badge. The first member to bring the smart emblem of this quaint society to this side of the pond was Flight Lieutenant Johnny Tett, RCAF navigator attached to the RAF, who recently returned from two years' overseas service. He also holds membership in the ancient "Caterpillar Club" and the newer "Late Arrivals Club," to which membership is gained by returning on foot to base from a mission. The winged boot of the "Late Arrivals Club" and the emblem of the Goldfish Club are pictured here.

College Credits Explained

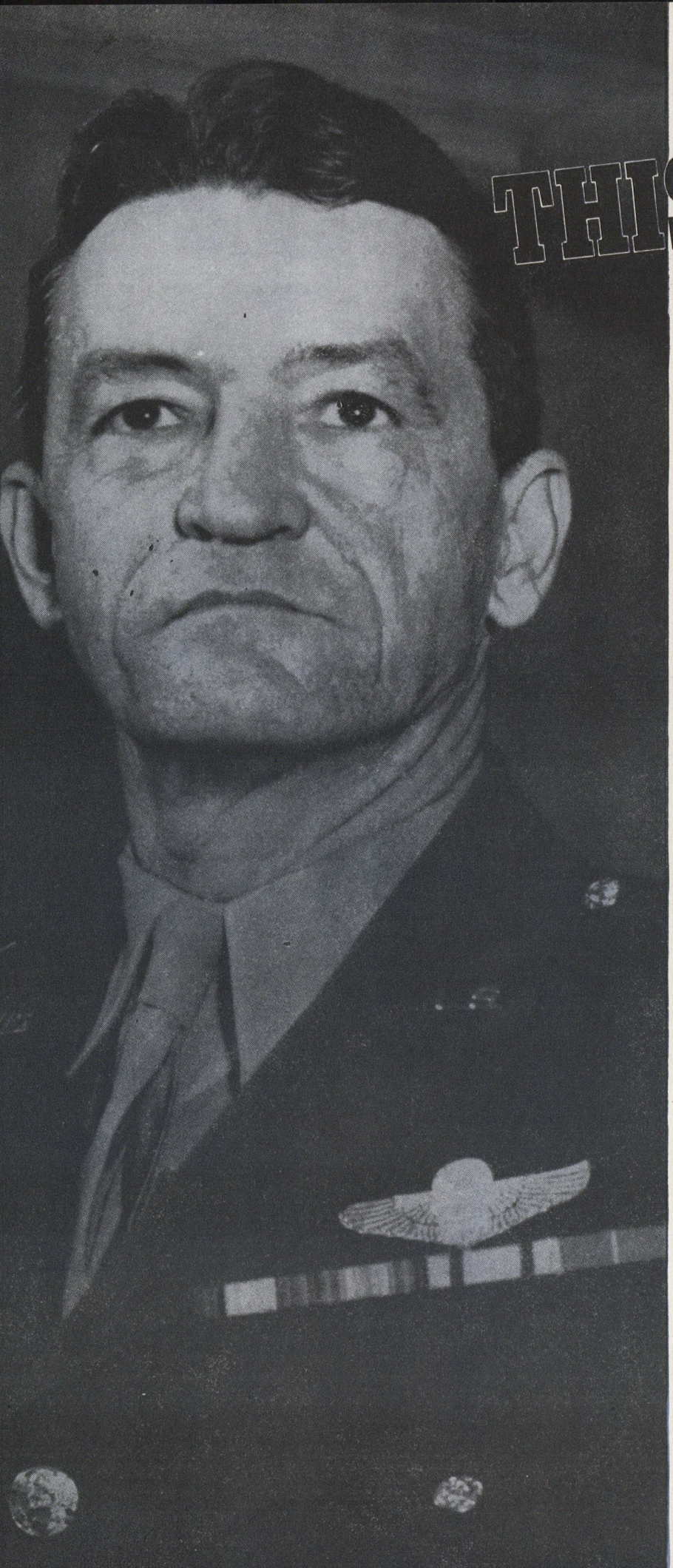
If you go back to school or college when the war is over, you can receive full academic credit for educational work taken while in the Army.

Upon completion of a correspondence course with the United States Armed Forces Institute, the Registrar will have a record of your achievement. If you finish a training course at a training school, your record can also be placed on file with the Institute. And if you enroll in a voluntary, off-duty class, you can take a special examination and have the results placed on record. The Institute will send your entire record to any school, college or employer requesting it.

For enlisted men who do not take advantage of the Institute's educational services, an opportunity is offered to take an educational maturity test. This is a survey of your general knowledge, designed to discover what you have learned during your military service which may be of value in formal school work. These tests will be administered upon request, the results recorded with the Institute, and reported to schools and colleges as evidence of educational maturity. This evidence will serve as a basis for assignment of academic credit.

The tests for use at the high school level will consist of comprehensive objective examinations in each of five major fields of educational development, including correctness and effectiveness of expression and the ability to interpret reading materials in the social studies, or the natural sciences or literature. A test of general mathematical ability will also be given.

A similar but more difficult range of tests will be established by their tryout with groups of high school seniors and college freshmen. Separate standards will be fixed for schools in different geographical regions and of different types and sizes.—The Editor.



THIS IS OUR

(An early assignment for new pilots of the 14th Air Force in China is a talk with their commander, General Chennault. Here, in part, is what he tells them.)

FLYING in China is different from anything you have ever done. Your training has been good, but you have a lot more to learn. It will take at least another twenty to thirty hours in the air out here before you are ready to fly missions.

Your first problem is to learn how to find your way around China. Getting lost over China is a simple matter. Most terrain patterns look alike. It is almost impossible to tell one valley or mountain range from another. Rivers, terraced rice paddies and villages all look alike. There are few landmarks and fewer names on Chinese maps that can be readily recognized. Roads and railroads are scarce.

Weather changes rapidly and violently. You can seldom fly for 100 miles without encountering a weather change. Under these conditions pilotage is almost impossible. Much of your flying will be on instruments, and you must rely entirely on radio and compass for navigation.

If you get lost don't waste gas flying a straight course. The minute you get into trouble circle for five minutes. We have a radio reporting net that will pick you up and give you a course to the nearest base. This net extends throughout China and also gives us weather reports and air raid warnings. The Chinese people have been well trained in the operation of the net. It has functioned well for several years. When you get into trouble you can depend on it.

Scores of our planes have been guided safely home by the net. Many of our men who have been forced down have been found by operators of the system. If you make a forced landing, don't wander away from your plane. The net will report your landing and dispatch friendly Chinese to find you.

In combat you are part of a team. Never forget that. Teamwork is the basis of all our tactics and one of the principal reasons for our low losses. Our fighter tactics are based on the fact that two planes working together are more effective than three or four planes fighting as individuals. My men have fought against odds of five and ten to one with these tactics and won consistently with small losses. They have been proved in battle and the Japanese don't like them.

Our bombing missions call for even more teamwork, precision and air disci-

BATTLE PLAN

By Maj. Gen. Claire L. Chennault

COMMANDING GENERAL, 14TH AIR FORCE

pline. Day bombers never go out without fighter escort. We have worked out a system of escorting bombers that makes it impossible for Jap fighters to get at our bombers without first tangling with our fighters. This gives our bombardiers the time and security for deliberate and accurate runs over the target. As a result, our targets take a beating and we seldom lose a bomber.

You must use the strong points of your equipment and deny the enemy the advantages of his equipment. Each type of plane has its strong points and weaknesses. The pilot who can turn his advantages against the enemy's weakness will win every time. You can count on a higher top speed, faster dive and superior firepower. Japanese planes have a faster rate of climb, higher ceiling and shorter radius of turn.

Japanese fighter planes were built for turning combats. If they can get you into their kind of fight they are deadly. Use your superior speed and faster dive to make a pass at your opponent, get in a quick burst and then break away. You have the edge in that kind of combat. All your advantages are brought to bear on the Japanese deficiencies. Never get into a long continued turning combat.

You need to sharpen your shooting eye. Nobody ever gets too good at gunnery. The more Japs you get with your first bursts, the fewer are left to jump you. Accurate gunnery saves ammunition. Your plane carries a limited number of bullets. There is nothing worse than finding yourself in a fight with empty guns.

You will face Japanese pilots superbly trained in mechanical flying. They have been drilled for hundreds of hours in flying precise formations and rehearsing set tactics for each situation they may encounter. Japanese pilots fly by the book. They have plenty of guts but lack initiative and judgment.

They go into battle with a set tactical plan and they stick to it. Their bombers will fly a tight formation through the toughest pursuit as precisely as though they were in an air show over Tokyo. Their pursuits always pull the same tricks. God help the American pilot who tries to fight them according to their plans.

The object of our tactics is to break their formations and make them fight according to our style. Once the Japanese pilot is forced to deviate from his plan, he is in trouble. They lack the ability to improvise and react instinctively to new situations. Their rigid air discipline can be used as a strong weapon against them.

The Japanese pilots you will face over China are only slightly less skilled than those we fought two years ago. The Japanese seem to have speeded up their training program to meet the demands of combat. As a result, their newer pilots lack the polish of the older China veterans.

All Japanese pilots are good gunners. They use deflection shots almost exclusively. However, their guns don't have the range or destructive power of American aerial guns. The Japanese 20 mm aerial cannon is heavier than any of the guns we carry out here, but it lacks the range of our .50-caliber machine guns due to a low muzzle velocity. Japanese aerial armament is generally not effective at a range of over 200 yards.

Japanese planes are still made from good materials, but the workmanship is not up to the standard of the materials. The light materials that give enemy planes their maneuverability also make them hard to maintain. The light parts won't stand repairs. Even slight damage will put a plane out of commission. They don't hold up under heavy fire.

Our planes can take a beating and still be patched up to fly and fight again. Many times the ruggedness of our airplanes was all that kept us in the fight.

China has been at war for six years and Chinese pilots have been in the battle from the beginning. Some of these veterans will be fighting with you in American planes. Other Chinese pilots have received the same training in American flying schools as you did. They are good pilots and do their job well in battle.

In the early days of the Sino-Japanese war the Chinese pilots fought Japanese bombers to a standstill as long as their planes lasted. Over Nanking in 1937, they shot down 42 bombers in two weeks while losing only six of their own planes. They forced the Japs to try night bombing and then, with only a week's training in night flying, they went up as night fighters and stopped the new Japanese assaults. One Chinese pilot got three bombers on his first two night flights on consecutive nights.

Chinese pilots were the first to fly over Japan and the first to raid Formosa. They did that in 1938 with Martin B-10 bombers. Chinese pilots have plenty of nerve and are superior to the Japanese in individual combat. They have better judgment and headwork in rapidly changing situations. The Japanese are better in formation work.

Six years of invasion have sowed bitter seeds of hate in China. The Chinese will never stop fighting until the Japanese are driven from Chinese soil. One of the reasons for China's resistance to the Japanese lies in the fact that every Chinese has something he considers worth fighting for. Even the poorest coolies with only a dirt mud hut will fight to keep it. You can never conquer a nation like that.

And that's something for you to remember. ☆

Somewhere in China, Lt. Col. Herbert Morgan, Major Gen. Claire L. Chennault, Col. Robert L. Scott, Jr., and Col. William E. Basve (left to right) go over plans for a bombing raid in a last-minute field conference.

"FLIGHT STRIPS"

FOR WAR AND PEACE

By Colonel Stedman Shumway Hanks

PROJECT OFFICER FOR 'FLIGHT STRIPS,' ARMY AIR FORCES

A NUMBER of unassuming but important patches of concrete have appeared since the start of the war in the countrysides of more than a dozen States and up along the Alcan Highway to Alaska.

These are "Flight Strips"—the Army Air Forces practicable and workable solution to the problem of developing properly located and adequately maintained landing areas.

The "Flight Strip" program has definitely progressed beyond the experimental stage. I state that with meaning. It has been my good fortune to act as Project Officer for the program since its birth and to have followed it closely, step by step—or inch by inch—ever since. So often have I discussed it in the future tense that it is a pleasure to report on actual accomplishments and on what experience has shown regarding future possibilities.

Now it can be reported that the "Flight Strip" program has surpassed our fondest expectations. Moreover, I have reason to believe that it will prove to be one of aviation's most far-sighted developments.

First and foremost is the wartime utility of "Flight Strips" in this country. "Flight Strips" today are being used by the Army Air Forces in several aspects of flight training, in tactical operations including the dispersal of military aircraft, in anti-submarine work, in the ferrying of aircraft and the transport of cargo. They have proved suitable for glider operations. They will be used as auxiliary fields in connection with the standardized control of military aircraft. And they have a special role in the air defense plans for this country.

All this is in addition to the use of "Flight Strips" as emergency fields. That the "Strips" are attaining our original objectives is evident from the reports being received.

Even before they were finished, at every "Flight Strip" site on the West Coast and in the Middle West where it was possible to land on a shoulder, planes came down on the "Strips" when it was impossible for them to reach their objectives because of bad weather or lack of fuel. The planes included a P-38 in Oregon, a Navy single-seater in Arizona, a Douglas transport in California. More than once our "Strips" have prevented bail-outs.

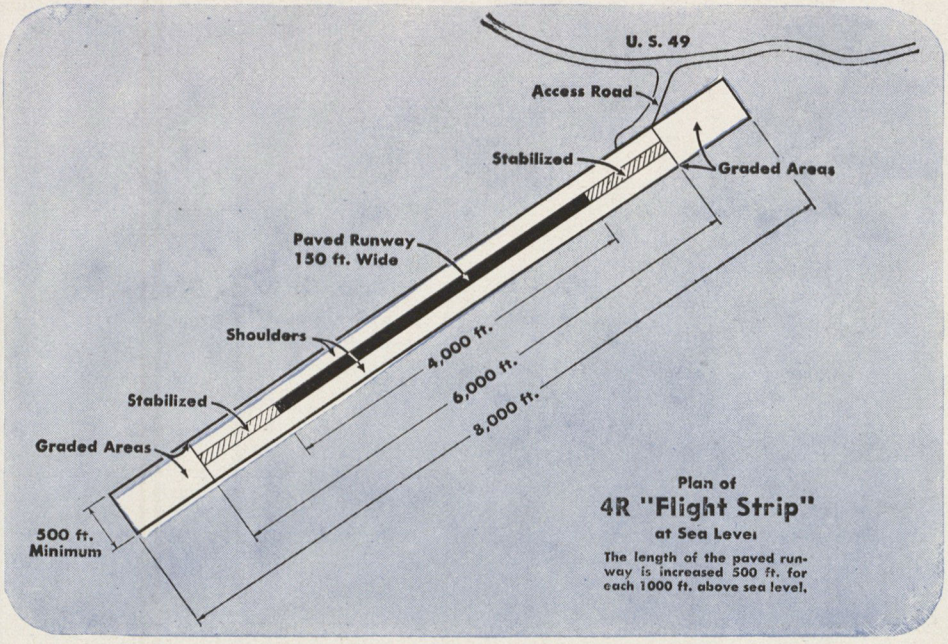
Dozens of emergency landings have since been made on finished "Flight Strips." The case of the B-25 that encountered storms while flying up the East Coast was typical. The pilot was headed for Langley Field, Virginia, but an extremely low ceiling shut him out from that airport. The home field at Dover,

Delaware, was also closed in. The pilot found that a 500-foot ceiling existed over a Virginia "Flight Strip," and brought the plane safely in to this landing area.

Perhaps the best working example of wartime use of "Flight Strips" can be found along the Alcan Highway to Alaska, under an agreement between the governments of the United States and Canada.

"Flight Strips" have for several months been in use along the Alcan Highway, and the entire "Flight Strip" program for the Highway is just about completed. They form the first chain of international landing areas.

Because of the precedent that has been established, and because the program as it applies to the Alcan Highway illustrates the newest development in "Flight Strips," it might be well to go into some detail on this phase of the operations. To begin with, it is essential to understand some of the background.



How these new type landing areas have gone to war, in this country and along the Highway to Alaska; and some post-war considerations.

THE Alcan Highway, basically, was developed as an overland route to link aircraft landing areas and not, as is generally supposed, an out-and-out truck supply route. The need for a series of landing areas from the United States to Alaska was realized years ago, and by no one more definitely than by General Arnold, our Commanding General, who in 1934 led a flight of B-10 bombers to Alaska.

General Arnold thought in terms of "Flight Strips" and instructed me to explore the possibilities of placing such "Strips" in Canada. But the Canadian government, which governed selection of the highway route, preferred to select sites for airports and to develop existing airports and build others instead of "Flight Strips." Finally the Corps of Engineers was instructed by the President to connect the Canadian airports by a road so supplies and equipment could be sent along the route.

At this point it might be well to mention the unheralded but important place aircraft and airmen have played in the construction of the road itself. Under the pressure of speed, normal road-location procedure—thorough ground reconnaissance and elaborate survey and staking work—generally had to be dispensed with. The use of aerial photographs proved to be the answer. Also, pontoon-equipped observation planes proved to be ideally suited for the early reconnaissance work.

Due to the difficulty of making surveys and locating the route, airplanes flew engineers, supplies and equipment ahead of the actual road construction. Camps were set up and the engineers began building trails in both directions. By establishing such camps by airplane along the proposed route, it was possible for construction parties to begin building the highway at many different points along the route. In all cases, the camps were supplied by plane with food, personnel and mail and miscellaneous equipment.

Then, too, the airplane was essential in case of emergency. Last fall, for instance, along the Alcan route an enlisted man had a ruptured appendix. With all other transportation facilities closed out by weather, there was no way of saving his life except by flying in medical aid. Two Army doctors were flown in to a nearby "Flight Strip." Trucks on the road lighted up the "Strip" so the pilot could land. The doctors performed the operation, the man's life was saved, and the pilot flew the doctors back to their base.

But, you may ask, what about the Canadian airports? Well, first of all, the airports are located near towns which were built up from old trading posts. Not so with the "Flight Strips," for weather and terrain are our first considerations, and vital considerations along the Alaskan route. For instance, the weather at a certain important airport along the route is very uncertain. Conditions change rapidly. If this port is closed due to zero-zero visibility, as it often is, there is a "Flight Strip" along the Highway to the north and south. A pilot can locate both these "Strips" by following the Highway. Also, the "Flight Strips" have been laid out so they can be enlarged at any time to meet our expanding requirements. This is not always true of the airports, which were originally built to handle light planes of the pioneering "bush" pilots.

Because an adequate communications service is essential for the route, the U. S. Signal Corps, at our request, has built such a communications line. It includes repeater stations and a TWX system. Then the Army Air Forces Weather Service established weather observation stations and weather forecasting stations along the route. These stations and the communications lines are coordinated with the "Flight Strips." As a pilot flies over a "Flight Strip" he can receive by short-wave radio a complete weather report, which is sent over the TWX system on the Highway for the entire route.

THE mere fact that a highway, easily discernible from the air, runs from this country to Alaska has given confidence to inexperienced personnel flying the route and has proved to have a marked effect on the morale of ferrying personnel. Markers are being constructed on the ground along the Highway route. In case pilots should get too far to the left or right of the Highway, these markers are easily visible from a distance.

Air Transport Command pilots of the Alaskan Wing now flying the northern hop use the "Flight Strips" Alcan Highway Map. This map shows them where the "Flight Strips" are located, in rela tion to airports, where the weather stations are, and other important landmarks easily discernible for contact flying.

Shelters have been built at each "Flight Strip" along the route. These shelters house approximately eight men. A stove, kindling wood, axe and other emergency equipment are always available in the shelter, as is the telephone connecting the "Strip" with the nearest repeater station communications system.

There is bound to be considerable difficulty with sickness and emergency situations among the personnel operating the Highway. "Flight Strips" will keep the rest camps and other sections of the High-

way in immediate contact with the larger bases or command headquarters. When sections of the road are unusable at certain times of the year due to bridges being washed out and the like, "Flight Strips" will play another important role.

"Flight Strips," by the way, are shown on all aeronautical charts by a special symbol. Two windsocks are on each "Strip" and in many cases these socks are lighted. The runway is always built in the direction of the prevailing wind.

All "Flight Strips" located on a civil airway become staging fields or auxiliary landing areas on a regular Air Transport route. Those located off civil air routes are being developed so they can be used for training without interfering with ordinary commercial or military air traffic.

All "Flight Strips" have been constructed at the request of a commanding general of one of the Army Air Forces commands and authorized by the Air Staff.

In establishing a "Flight Strip," every effort is made to obtain all available information regarding meteorological conditions in the areas being considered. In addition, local farmers are interviewed for further information regarding the peculiar characteristics of the location. Surveys must be made of at least 150 sites to be assured of obtaining fifty suitable locations.

Because many of the present Army air bases are former airports, there are various limitations to extending runways on these fields. This is due to the surrounding terrain and buildings and the proximity of the fields to cities. In many cases the cost of improving existing airports, compared to the cost of building "Flight Strips," is prohibitive.

IN one of the defense commands where it is difficult to obtain sites for airfields, several "Flight Strips" are being used as sub-bases. This means that housing facilities have been erected near the "Flight Strip" area for troops. In another section of the country, approximately eight "Flight Strips" have been assigned to different Army air bases as auxiliary fields for helping the training program. The "Strips," however, remain as part of the highway system.

One air force in this country is making first and second phase stations at some "Flight Strips" for heavy bombardment aircraft to step up the training program. Reports from overseas indicate that aircraft in the various theatres of operation must frequently use landing areas where only one runway is available. Training officers are of the opinion that if pilots have been given some training on a single runway type of landing area before receiving orders for overseas duty that they are better prepared for conditions in the combat zones.

Another air force is using three "Flight Strips" for tactical operations for fighter aircraft and two "Strips" for medium bombardment aircraft.

Approximately six "Flight Strips" in one of the training commands are being lighted. This is being done by the installation of portable lighting equipment. If these "Strips" prove satisfactory in the first and second phases of training, some of them may be used as third phase stations.

The "Flight Strip" principle has been used in several overseas theatres, where their use as auxiliary landing areas and dispersion points for military aircraft has been of great strategic value.

Since the "Strips" are large and can be used by any type of plane, we are frequently asked what will prevent enemy aircraft from using these landing areas in the event of an invasion. Some "Flight Strips" are camouflaged; others are not. If a "Strip" is within a certain distance of coastlines or the Gulf of Mexico and is used regularly by our military forces, it may be camouflaged or toned down. But the point is that all "Flight Strips" must be protected, either by local civilian guards arranged for through the local communities, by the Public Roads Administration of the Federal Works Agency, or through the Office of the Provost Marshal. It may take troops and they may have to have anti-aircraft guns. The defensive strength of "Flight Strips" lies in the fact that we can have many "Strips" for use in case one of them is taken by the enemy. If the enemy takes an airport, the entire combat force is made useless.

NO attempt has been made in the development of "Flight Strips" to use these landing areas as a basis for the construction of more elaborate installations. In fact, the desire to develop the "Strips" into conventional airports has been resisted in order that the value of "Flight Strips," as such, may be determined by use of these facilities as originally planned. It has been found, however, that certain "Flight Strips" possess operational characteristics which warrant continued tactical use. In these instances, housing and technical facilities have been constructed on land adjacent to the "Strips."

A final wartime consideration is the fact that less than one percent of critical items have been used in the development of all "Flight Strips" to date. This is due to the fact that the policy of using local material has been clearly established.

In addition to their wartime use, "Flight Strips" promise to play a major role in domestic post-war aviation. I will not go into that discussion at length because right now we have a war to win. But in passing I submit these few, briefly expressed thoughts.

The location of airports has paralleled the location of cities, and cities were built irrespective of weather or terrain—as they apply to aviation. Many of these airports are not only unequipped to accommodate the aircraft of the future, but cannot be expanded to handle such aircraft. We know that airports in our large cities are often closed in by purely local conditions, principally fog and smoke. We also know you can build just so many airports in a given city and that an airport can take care of just so much traffic. Assuming a substantial increase in air traffic, we can appreciate the need for auxiliary airfields outside the city belt dominated by fog, smoke and congestion. Finally, for areas not near cities, we know that the cost of constructing and maintaining the huge airports needed to handle our future planes is likely to prohibit the expansion of air traffic on a substantial scale off the established air routes.

"Flight Strips" can be built almost anywhere space is available, without regard to cities. Weather and terrain are first

(Continued on Page 48)

THESE 'FLIGHT STRIPS'

DEFINITION

A "Flight Strip" is an area of land with clear approaches, located as a part of a highway right-of-way or adjacent to a public highway on public land, for use as an auxiliary landing area for aircraft. (Note: The highway itself is not used for the landing and take-off of aircraft.)

PROCEDURE

"Flight Strips" are authorized by an Act of Congress and constructed by Public Roads Administration in strategical areas designated by the Army Air Forces. They are maintained by State Highway Departments following completion.

TYPES

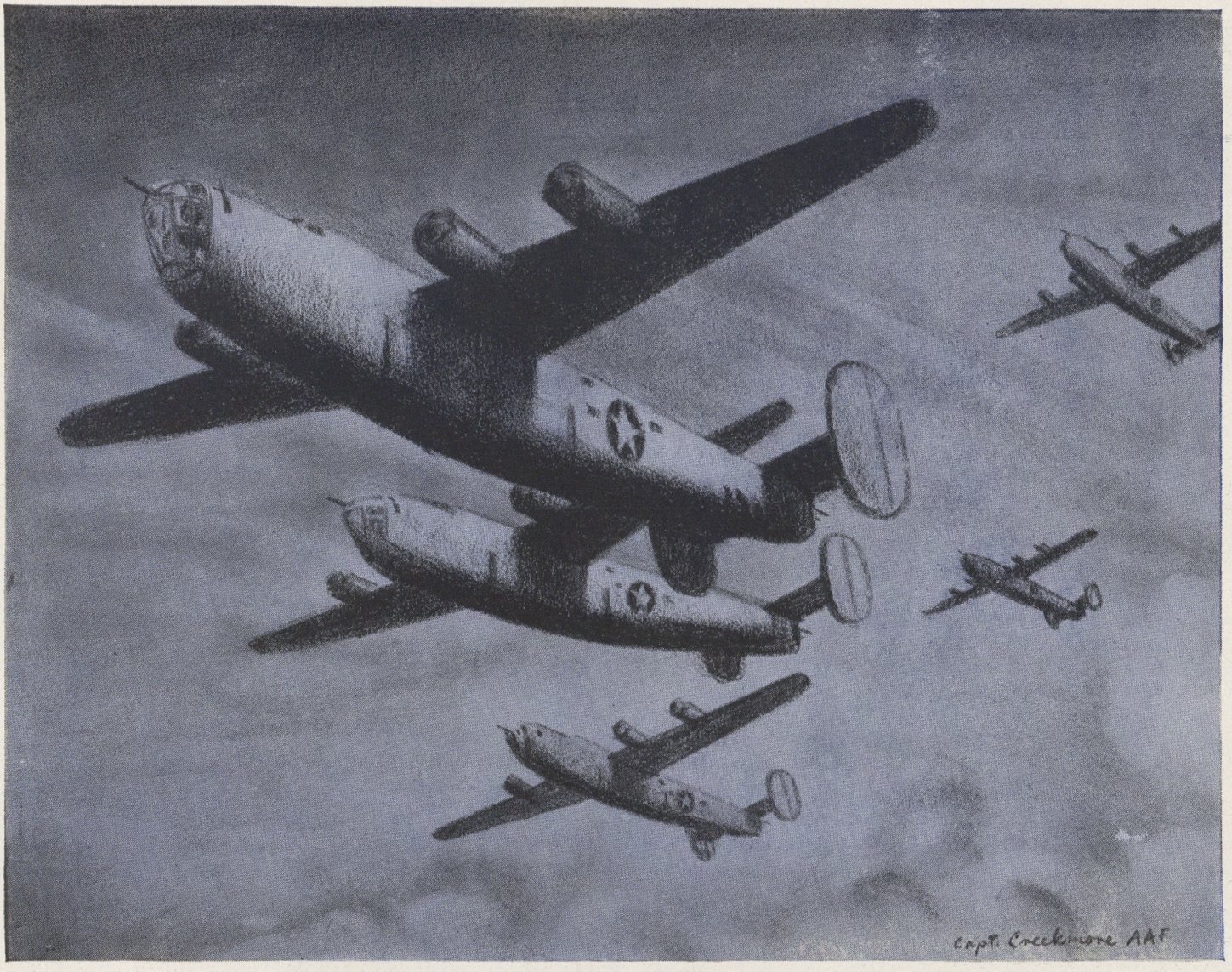
To facilitate the design, construction and description of the paved runway sections on "Flight Strips," the following lengths, widths and other design criteria have been adopted:

a. The 4R30 "Flight Strip" is for use by tactical airplanes, including medium bombardment airplanes. This type is satisfactory for use by most transport airplanes. The paved section of the runway is 150′ in width by 4,000′ in length, corrected for altitude, and designed for a gross load of 30,000 pounds.

b. The 5R74 "Flight Strip" is for use by heavy bombardment airplanes, including the B-17 and B-24. The paved section of the runway is 150′ in width by 5,000′ in length, corrected for altitude, and designed for a gross load of 74,000 pounds.

c. The 6R120 "Flight Strip" is for use by heavier airplanes than any now in operation. The paved section is 150′ in width by 6,000′ in length, corrected for altitude, and designed for a gross load of 120,000 pounds.

d. The 8R120 "Flight Strip" is used for instrument landing operations. The paved section is 150′ or more in width by 8,000′ in length, corrected for altitude and designed for a gross load of 120,000 pounds or more.



HELL OVER BIZERTE

By Lieutenant H. M. Locker

A co-pilot's story of blood and bullets in a B-24 during a bombing raid in North Africa

It was the day after Christmas. . . . We took our regular place, number three in the last element of the formation, and off to Bizerte we went. We flew east past docks south of the town just far enough to miss the flak.

Swinging north and back west for our run on the target we could see the flak hopping all around the planes in the first element. I knew it would get worse as element after element of three ships came up to the bomb release line. And our B-24 was the last of the group.

Every plane was leaving a beautiful vapor trail to guide the flak and fighters to us. Now we were in the stuff. It was bursting all around in those greasy black puffs. Many times the ship bounced from an explosion. Someone in the rear called out, "We're hit," but no difference could be felt on the controls, and Harry Lawrence and I were busy. It was time for the bombs to go. We were loaded with six one-thousand-pounders. I watched the bomb release light blink six times.

I turned then for a look at Tom Borders, flying number two in the Birmingham Blitzkrieg, to see his bombs go. I've always had a mania for watching those beautiful golden eggs come sliding out. This time I wish I had curbed my curiosity, for just as my eyes found him there was a blinding flash and the loudest explosion I've ever heard. I saw the tail of Tom's ship fly backward; then down toward the ground five miles below. It was the only visible piece of the ten-man crew and airplane. A direct flak hit in his bomb bay had set off three tons of TNT. When the flash and smoke cleared there just wasn't anything left.

But right now we were having our own troubles. I remember saying, "Poor boys, God bless them," and, in the same instant I saw our right wing tip curl up. About three feet had been broken off by the explosion. Number three and number four engines were just starting to burn. The rest of the formation turned north to avoid the flak, but we were too busy to turn and began to fall back fast.

Right down flak alley we flew. The constantly

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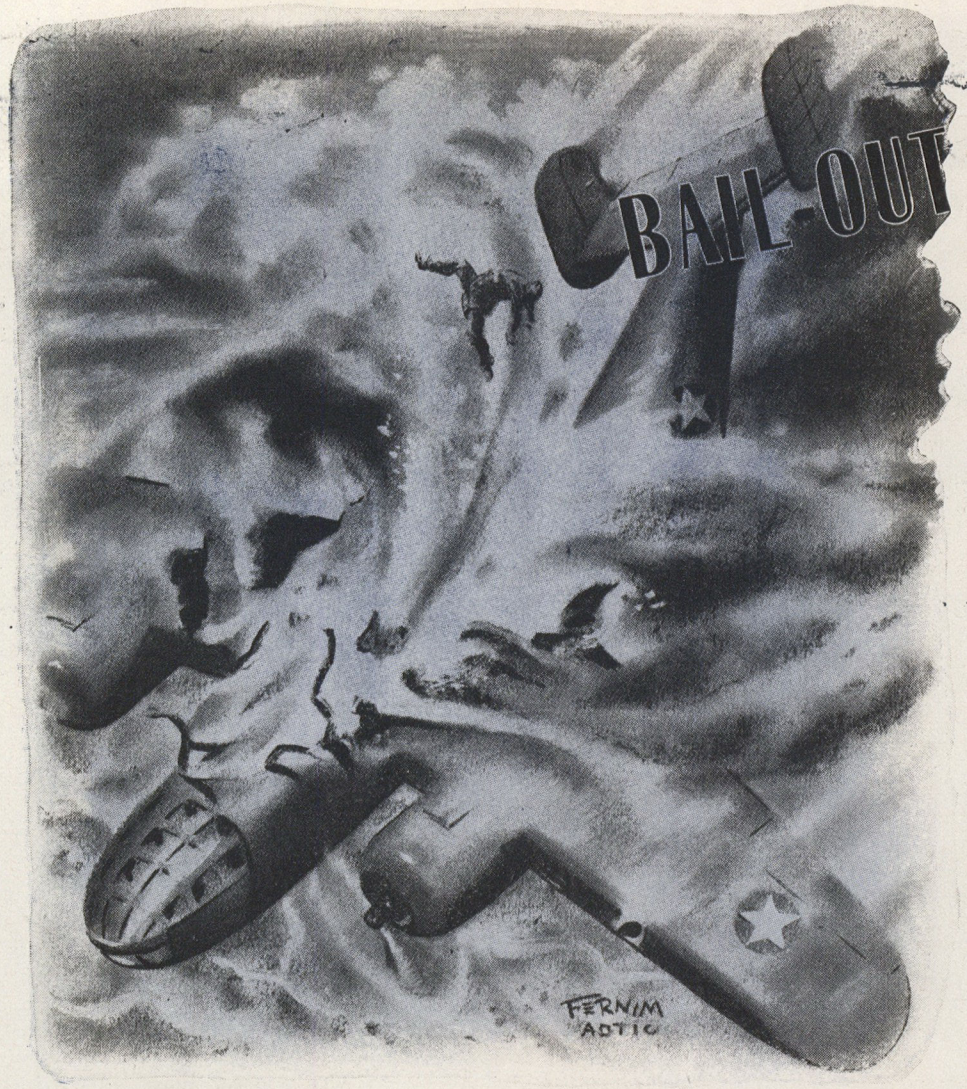


OVER BUNA

A bomber pilot's story of survival in New Guinea.

Prepared by the Arctic, Desert and Tropic Information Center

THE flight of five B-25s scrambled off the Port Moresby strip for an egg-laying jaunt over the Jap shipping roost at Gasmata in New Britain. The date was July 26, 1942. The time: early morning.

They never reached the target area. Twenty Zeros jumped them at 12,000 feet over Buna, swarming in from every direction.

Captain Frank P. Bender saw four Zeros go down, saw one of the B-25s hit, felt his own ship shiver under a sudden blow, sensed shrapnel ripping into his left leg. The nose of his plane dropped. The wheel snapped back into his lap. With control cables dangling uselessly, the ship went into a steep glide.

Bender ordered his crew to hit the silk. The two rear gunners got out. Then the ship caught fire. The co-pilot started for the escape hatch. Bender, looking back, saw him reach into the flames for the release—and miss it, saw him sucked into a blazing hell. Flaming fabric peeled off the control surfaces. The ship went into a spin, hopelessly out of control. Bender, wedged helplessly in the cockpit, waited for the end.

The rest isn't clear. There was an explosion—perhaps the gas, perhaps the bombs or the oxygen. Bender came to, at what he thinks was about 3,000 feet—thrown clear of the ship. His eyes were fixed on an enormous object under his left armpit. He pulled it. The chute opened.

There was pain in his right knee, gashed somehow when he parted company with the ship. It didn't much matter just then. In the distance he saw the wreckage of the plane. Below him ran a stream, bordering a native garden; he could tell by the clearing and the isolated trees in the center. It looked good. He landed in a young tree on the edge of the stream; and when it broke under his weight, he slid to the ground, wrenching his back.

Bender crawled on to the jungle earth, dazed, his leg bleeding heavily. He had come down six miles from Buna. The time was 0900. He looked over the clearing. He knew there were natives about, for he could see their machetes lying around. Apparently, they had run off in terror.

As he sat there waiting, he got out his jungle kit and took inventory. Except for the bleeding mess of his right knee and the shrapnel wound on his left foot, he was all there. He still had his pistol, and his G.I. boots were on his feet. He sat there waiting.

Twenty minutes went by. He knew the natives were near for he could smell the rancid coconut oil they smeared over their bodies. He began to shout "Tabada!"—Motuan for "white friend." A child scampered out of the bush, then another. Hesitantly at first, then with growing confidence. Then came the adults, filtering back into the clearing from which they had fled. Bender began to win them over. He held out his insignia, his wings and bars. That did the trick. Some of the natives reached for them, some went back into the bush to summon others.

A LEADER came forward, the proud possessor of a few words of English. Bender came through with a little Motuan, a little English, a great deal of arm-waving, and turned on what he hoped was a winning smile. He asked to be carried to the nea est mission, motioning down the paths radiating from the clearing. The natives finally understood. But first they helped Bender reach the scene of his plane's wreckage. There he found the bodies of his bombardier and engineer, thrown clear of the smashed nose. The evidence seemed to indicate they had been killed in the air. He gave instructions to the natives for the burial. Before they left the scene, Bender ground his sulfanilimide tablets into a powder and dusted it into his wounds, using the gauze bandages from his kit. The shrapnel wound healed in time. But the gash in his knee became worse. He couldn't walk.

The natives then carried him towards the mission, arriving there at 1500. Bender found the native residents in a state of apprehension, fearful that Jap patrols might come in momentarily. The missionaries offered to hide him. Then they told him that one of his gunners had just passed through, on his way to join an Australian who knew the country and the language, and who had headed out earlier for the Owen Stanley range and Port Moresby. Bender decided to push on.

The natives built a litter for him, supported by poles. Eight natives volunteered to carry. Four of them supported the litter; two went ahead with poles, one

on each side, separating the dense foliage as they went, while the other two, up front, hacked away a path with their machetes.

As they went along, the little caravan began to grow as if by magic, until groups of twenty to fifty natives trailed along with it, from village to village. The women followed their men, carrying food and smoldering bits of coal-embers for fire-making. Children tagged along. The strange procession made its unhurried way through the bush.

On the night of the first day Bender caught up with the Australian and Staff Sergeant A.M. Thompson, the gunner, and they joined the caravan. (The other gunner apparently was captured.) The Australian produced some tobacco, and natives were paid, each with a precious half-strip—the best currency in New Guinea.

The next morning the trek began in earnest—a harrowing, humid journey of ninety terrible miles through New Guinea swamp and over the rugged Owen Stanley range to Port Moresby. The trip was destined to take three weeks.

A kind of shuttle service was set up, from village to village. The caravan would start with a fresh set of bearers at 0600 each morning and stop for the day at about 1700. The next day, a new shift would take over.

Because the Japs were reported at Kokoda, the party detoured widely, twisting through the dense growth. They averaged four and a half to five miles each day. Every foot of the going was wet, wet underfoot and wet dripping from the jungle bush. The natives fed Bender at the stops. They gave him stewed pumpkin. He hated it. But he ate for fear he might offend the bearers and the rest of the native entourage. He drank the water from the quick-running mountain streams. At first he used his iodine for purification, but as the wound on his knee grew steadily worse, he saved the iodine for dressings. He cut pieces of his parachute for bandaging and gave other pieces to the natives who prized them. He had taken his quinine regularly from the time he hit the ground, and the symptoms of malaria lay dormant (a malaria bout came three weeks later, at Port Moresby).

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

On they went. The wet was depressing, uncomfortable, maddening at times. The swaying of the litter was irritating. Often the bearers would run the litter into a tree where the going was rough, and Bender would cry out with pain. The natives laughed at him. They couldn't understand the white man's reaction to pain. They just went on creeping, slipping, parting the bush leisurely, ambling on childlike, singing, yodelling, yelling as they walked. The native stench steamed up from the wet. It tried Bender's nerves. At times his impatience taxed all his control. His fingers itched for his pistol. But he endured. He understood the futility of driving the bearers. Anger was useless, even dangerous. He lay in the litter, day after day, his leg wound festering dangerously, and losing weight (from 150 pounds to 105 pounds in three weeks).

As they crawled on he watched the natives live off the land. They caught birds and ate them; they cooked bananas and pumpkins, and ate coconuts; they used the jungle vines for ropes, improvised all the means for existence as they went along. It went on and on, all wet, all swaying, all pain.

Late in August the long nightmare ended. Bender entered Port Moresby. He lay for three days in a hospital bed, wondering why it didn't sway. White man's food seemed a miraculous manna to him. It was a wonderful new world. On the third day he was flown to Townsville, in Australia, and hospitalized there for three months. On the first of November, 1942, he was back on American soil again.

Today, Bender (now a Major) reviewing his experience, has this advice to pass on to airmen operating in the Southwest Pacific area:

1. The natives are the surest means through which you can survive and reach safety. In more than ninety percent of the bail-outs and forced landings in this area, natives have played the most important single role in rescue. Appreciate this fact. Here's what you can do.

a. Learn something about the natives in the area in (Continued on Page 48)

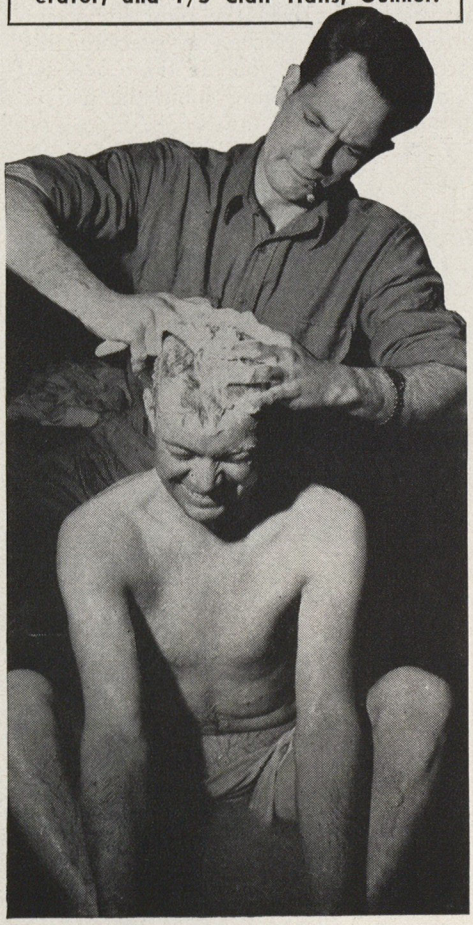
UP WHERE THE SOUP BEGINS

When the rain stops and the wind dies down, mud takes over.

AS TOLD TO

Herbert Ringold

By Lieut. William J. Wheeler, Pilot; Lieut. Graham S. Campbell, Navigator; M/S Norman C. Threewitt, Radio Operator; and T/S Clair Hails, Gunner.



Hair must be washed no matter where you are, and it's a strictly mutual arrangement.

ALL we know about the Spring push up in the Aleutians is what we have read in the papers. We were on duty in that fog-drenched island chain for about a year, but unfortunately we returned before the current hunting season started. However, our gang did a lot of softening up preparatory to the recent action.

We fought the weather more than we did the Japs. *Snafu* must have originated as a description of the Aleutian weather.

First, there was the fog. Aleutian fog has been described as the kind of weather you can cut with a knife. Don't believe it. There isn't a knife made that can go through that stuff. But, seriously, we were only ten miles from a man-sized mountain for three months before we ever saw the damn thing. We got used to not seeing the sky. When you returned from a mission, your report would invariably begin: "Well, I was flying along in the soup—."

Then there was the wind. Up there you could see the wind blowing from two different directions at the same time. That's the truth. And although it's hard to believe, we often had more than 100-mile-an-hour winds. One day the weather report read "110-mile-an-hour winds—and strong gusts!" We had to tie down the B-17s and B-24s most of the time Either we would attach a 55-gallon water tank to each wing, or sink a steel bar or wooden plank into the snow, tie a rope around it and attach it to both ends of the ship. Even with that we had trouble. One day it took Captain Hetrick four hours to get to his target—and seven hours to get back.

And the rain. Did you ever see it rain up? It does at Umnak. When that wind decides to blow upward, everything goes with it, including the falling rain. But plenty of it came down. For days our airfield looked like a lake, with the ball turrets of the 17s all the way under water.

YES, and it gets sort of cold up that way, too. In some parts of inland Alaska it gets down to eighty degrees below zero. So at Umnak we were practically sweating with our 35 below. But your Uncle Sam is on the beam with his clothing. A standard gag concerned the polar bear that put on one of our parkas and died of the heat. And at times it really got up to decent temperatures. For a while, it was warm enough to play baseball and volleyball on Umnak.

To top it off we had williwaws. A williwaw is the result of strong winds building up on one side of an island, passing over the island, and pushing all its strength downward on the other side. You just don't fly through a williwaw. They can usually be found on the lee side of the islands, so stay away.

After a while you get used to the weather. But it's harder to get used to the waiting. You spend half your life waiting for the weather to open so you can do some flying. Fighting the Japs wasn't bad at all—it was the sitting

Four Aleutian veterans sing a tune of "Hang your hat on a drift meter and get down near the water."

around waiting for the chance to fight. Sometimes we'd be only twenty minutes from our target and wait for weeks to get to it. No single factor had a greater effect on the men. We used to stay in bed so long that we had a tournament to select the "sack" champion. A fellow named Hanson copped the honors with 26 hours in bed at one stretch. When it looked like the weather might clear, we maintained a constant alert status. That meant that the entire crew, except the pilot and navigator, had to stay in the ship from morning 'til night.

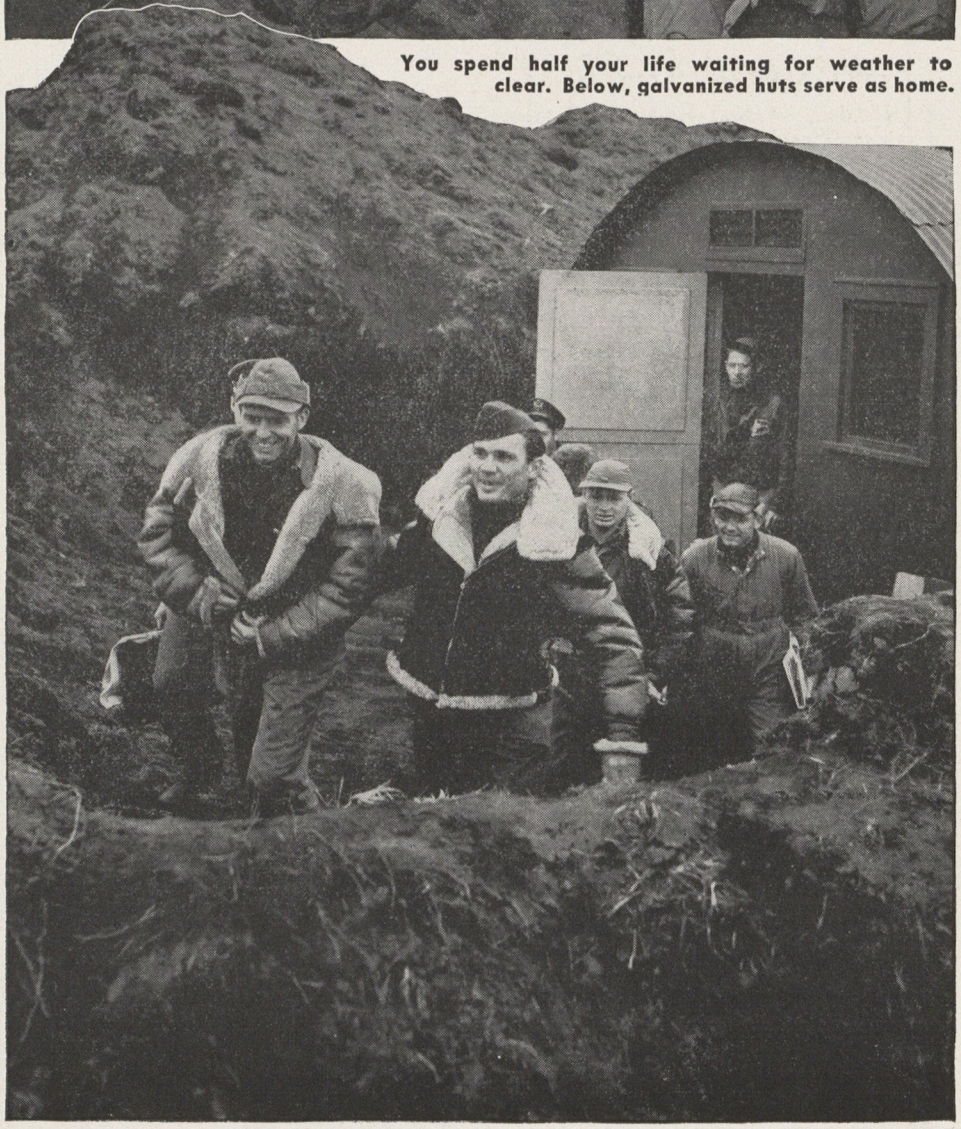
When the weather became clear enough for us to see our hands in front of our eyes, we knew there was some flying to be done. Then we'd go out on the "milk run." These were the weather flights we made to send meteorological reports back to the base every thirty minutes. We called them the "milk runs" because they were so damned monotonous. It wasn't uncommon to be flying through the soup on such runs and report back "Weather unflyable." That's how crazy it all was.

Don't think there wasn't action. Our bases up there were so close to the Japs that we didn't need a lot of flying weather to get in some bombing. When we were there, the Japs didn't have much in the way of an air force. We never saw their regular bombers. Most of the time we ran into the float type Zeros, some with bombs attached to their wings, although they didn't do much bombing this way.

Those Japs really can fly their planes. Don't let anyone fool you about that. The pilots they had up there were plenty cagey. They often turned their ships upside down to shoot at us. A Jap would come out of the clouds on his belly and start firing, make a pass and dive away, then corkscrew up for a thousand feet, shooting all the way. Once we were about 2,000 feet over Kiska harbor heading for the main Jap camp when a float type Zero took off into the wind, looped around, and fired at us on his belly. But no cigars.

While they didn't have a strong air force, the Nips must have had every ack-ack gun that's ever been manufactured. The sky was actually black—real black—from the stuff they were squirting at us. And the falling shrapnel sounded like hail on a tin roof. On one mission a gunner reported that the ack-ack was fairly light—he only saw a hundred bursts above him. And the Japs were very accurate with those guns.

Our boys got around, though. Hell, after sitting on our rear ends for so long, a little thing like some ack-ack wasn't going to prevent us from getting our regular exercise. (Continued on Page 45)



You spend half your life waiting for weather to clear. Below, galvanized huts serve as home.

CHINA'S CADETS

By Captain Charles D. Frazer

"OUR ancestors came downstream ages ago to settle China's great coastal cities. Now, because of a war we did not want, a war that was pressed upon us, we have had to carry those cities upstream."

Cadet Shah thought a minute.

"One of our philosophers once said that China, as a nation, did not fight enough. Perhaps he was correct. We do not like to fight. But we have learned and some day we will move our cities back."

This young cadet referred, of course, to the migration inland achieved by some 50,000,000 of his countrymen, a mass exodus—perhaps the largest in history—during which the gallant Chinese, following the Yangtze, carried on their backs more than 600 factories from one city alone, dragged boilers fifteen feet in diameter up the steep and cragged hills of Chungking, and so stripped the metal from the city of Hankow, for example, that not even the heavy sewer plates of its streets were left to the pillaging Japanese.

Cadet Shah is 24. His breeding and intelligence and crisp military bearing are such that you would single him out in any group of men. He has been in the war for six years, was a lieutenant in two other branches of China's armed forces and as a tank commander took part in the famous Battle of Kwang-Si Province before coming to America as an aviation cadet.

Shah it not his real name. Japanese reprisals being what they are, there is danger in names. But, more important, Shah would shrink from personal publicity. Like all his fellow cadets, he has an honest modesty that is compelling. He consents to an interview only because his background and attitude toward the war fairly represent those of hundreds of Chinese now in flight training under the auspices of the Army Air Forces at various bases in the Southwest.

WHETHER they are to be fighter or bomber pilots, the training given these men is identical with that given our own students. They fly the same planes, study the same manuals.

Generally speaking, their aptitude is about the same. They do, however, have their own mental approach to the war itself—an approach conditioned by years of struggle with inadequate weapons against a vicious and powerful enemy.

Shah was born in a coastal town, he tells you proudly, in the native province of Generalissimo Chiang Kai-Shek. He had primary education in Peking before going to Shanghai, where he attended high school and began his college course.

Stocky, of middle height and athletic build, Shah played basketball and soccer—both popular sports in China because so many can participate at such little cost. Mostly, however, he played tennis and badminton in Shanghai's clubs, where he met many British and Americans.

"Then, in 1937, when a sophomore in college, I joined the infantry," Cadet Shah explains in precise and cultured English, "and remained in that service, as first lieutenant, until August, 1938. My early preference was the Air Force but my teachers dissuaded me on the ground that I was an only son.

"While I followed this advice, I did not feel well suited to the infantry. So in 1938 I gave up my commission to become a cadet in the Army's Academy for Mechanized Forces.

"Normally, it takes a year and a half of study to be commissioned as a tank commander but in January, 1940—just before we were to graduate the Battle of Kwang-Si Province entered a serious stage, so we were released before actual graduation to take our places as second lieutenants with the 5th Army."

After five months of see-saw fighting for control of this province, the Japanese forces withdrew. During this period,

A group of Chinese pilots gets instructions from Major Hubert Zemke, translated by Lieut. W. S. Hsu.

Chinese cadets train on AAF flying lines for the day when they will move to the attack.

Shah commanded a tank in several important drives and is understandably proud of the fact that "the whole province is still clear of the enemy right now."

Shah later served as an instructor and worked with Allied advisors in the perfection of intelligence operations, the development of plans, and the like. He was promoted to first lieutenant but preferred combat service and felt that his best chance of obtaining it was as an Air Force pilot.

THE transfer was not easy; in China the Air Force is independent of the Army. But at last he obtained permission from his superiors and gave up his commission to start aerial training in March, 1941.

It was in October of that year that arrangements were made to train many Chinese air cadets in this country.

There were two principal reasons behind this. First, China had so meager a supply of aircraft and gasoline that the training of flyers was severely limited. It was far more economical to bring men here than to ship necessary planes and supplies to China. Second, many of the Chinese fields available for the purpose were unsatisfactory. The Japanese had occupied much of the country. Some of the training fields still left to the Chinese were within Japanese bomber range, and this interfered disastrously with training operations. Some were located high in the mountains, as much as 7,000 feet up, a difficult altitude at which to start inexperienced men.

Cadet Shah was in the basic phase of training when he was selected to come to the United States. Before his group could leave, the Japanese had attacked Pearl Harbor and thereby cut off the normal method of travel to this country.

The cadets had to wait. "That was heartbreaking," Shah recalls. But at last they left China in March, 1942. They flew to India, then traveled by ship to New York and finally reached Arizona.

Shah, in May of this year, was nearing completion of his advanced twin-engine training in AT-9s and was looking forward to O.T.U., with a preference for the B-25 bomber.

Why did he choose bombardment?

"I might have preferred to be a fighter pilot," Shah admitted. "It is, I think, a more interesting type of flying and offers a better opportunity for personally shooting down enemy planes, which of course satisfies the desire for revenge. But if we all took that view, China would have no bomber pilots. And training for bombardment will be the most difficult kind for China to achieve by itself."

This statement points up what is perhaps the most notable characteristic of Chinese cadets—their selflessness. The war to them is purely a cause. Their own personal futures, their lives, mean nothing. Talk to Chinese students and you will find them courteous, cheerful, studious, thoroughly disciplined and mentally concentrated upon one thing—combat.

"We have shut our minds against our homes," explains Shah, "because many of us come from cities and provinces now occupied by the enemy. We do not correspond very much, if at all, with relatives still living in occupied areas, for it is through the mails that the Japanese trace people whom they mark for reprisal. Many men have asked their parents to forget them completely. Our one aim must be to save China."

Col. C. J. Kanaga, Director of Training for the Chinese in the United States was attached to the American Embassy at Peking for four years and is exceptionally fluent in the Chinese language. He has nothing but praise for the Chinese as students of military aviation.

"The men we train are picked men," says Col. Kanaga. "Virtually all have had military academy training and have been commissioned in other branches of the armed forces before signing up as cadets. Most have had combat experience.

"THEY receive here the same training given any American boy. Primary, basic, advanced single — or twin-engine, and twelve weeks of O.T.U., generally in P-40s or B-25s.

"But along with their flight work, the Chinese have the dual responsibility of learning some English. Our policy in this respect is to teach them in daily English classes only such words, phrases and sentences as will help them learn to fly. These lessons parallel their training. For example, when a cadet begins work in a Link Trainer, his English lessons will be descriptions of how the Link operates."

Some of the cadets, like Shah, speak our language perfectly, having learned it in China. Others pick up enough for ordinary purposes. Conversely, their American flying instructors absorb some of the Chinese language. But heretofore, interpreters have been relied on for conversation between instructor and student.

"This has presented difficulties," Col. Kanaga points out, "because it prevents an instructor from correcting his cadet at the time a mistake is made. He must do it later through an interpreter. But an interpreter is not a flyer and, therefore, much is lost in the transition. The answer will be, I think, to keep some of the outstanding Chinese cadets in this country to serve as instructors in future."

An understandable yet bothersome complication of the language problem is the need for the Chinese to learn the slang of our flying lines. For instance, a student must not only recognize the meaning of "advance the throttle," let us say, but must also understand five or six of the common slang expressions used by American pilots and instructors to indicate the same operation.

Most of the training of Chinese cadets is taking place in Arizona and New Mexico, with large detachments at Luke Field, Williams, Thunderbird and Roswell, among others. These detachments, while under direct U. S. Army Air Forces supervision, have officers and enlisted men of their own.

The bulk is pilot training, naturally. Elimination is low—less than ten percent —partly because much of the elimination of unsuited cadets takes place back in China in elementary flight tests. Those men who are eliminated in this country go to other schools in the Army Air Forces, to study armament, perhaps, or observation or maintenance—some phase of military aviation which will make them valuable on their return to China.

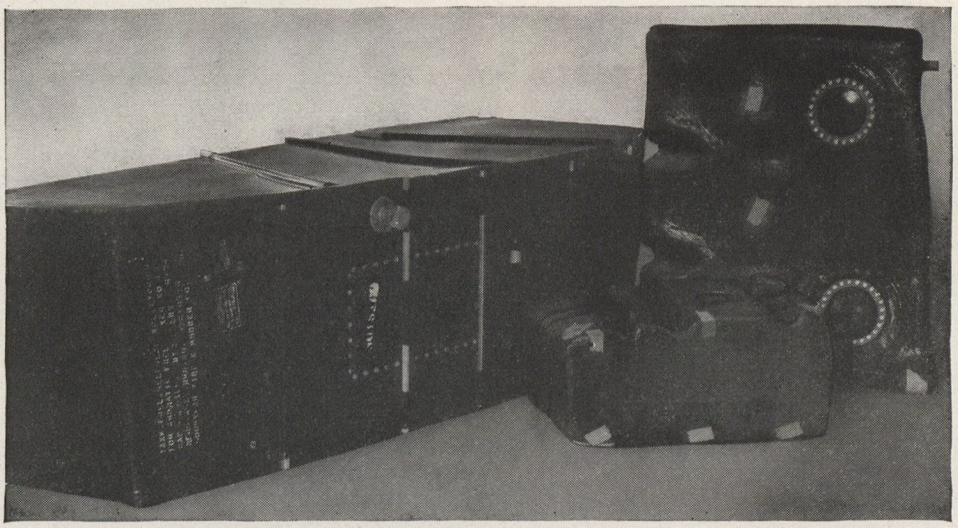
"As pilots they are earnest, studious and very capable," says Col. Kanaga. "Some men, of course, just can't get the hang of it. I remember one boy who invariably got lost on cross-country flights; he had forced landings all over Arizona, yet never so much as scratched a wing-tip. But for the most part they are good all-round flyers—'on the ball' as the instructors say."

The cadets themselves have a consuming and common urge to have our people know how much they like us and the country, and how much they appreciate the chance to train here. They are filled with wonderment at some of the things they have seen.

CADET SHAH was astonished at Arizona.

"Geography is one of my enthusiasms," he says, "and I had read a great deal about the United States. My books had informed me that Arizona was a desert country. But here we have found these wonderful irrigated valleys, with rich farms and ranches and fine cities. I know parts of China which should be like this some day."

Nobody who has met and talked with Chinese cadets could possibly question the sincere friendliness of these wartime visitors. It is a unique and warming experience to attend one of their early morning classes and to see the cadets, in trim, orderly ranks, dressed in American uniforms with the gold-and-blue shoulder patch of the Chinese Air Force, start their day by singing with a gusto rarely found anywhere the song of the AAF—"Off we go, into the wild blue yonder. . . ." ☆



Above are some typical fuel cells. Note that all fittings are covered with masking tape. Inspection doors are safety wired and cells are properly stenciled for identification.

Self-Sealing Cells

By LIEUTENANT C. G. WYMAN and J. E. NAGLE
PATTERSON FIELD, OHIO

A self-sealing fuel cell is a gasoline container constructed by building up several layers of natural and synthetic rubber.

The bullet-sealing quality of the self-sealing fuel cell is based upon the chemical principles that synthetic rubber is gasoline resistant and natural rubber is not. By control and manipulation of these factors the self-sealing cell has been developed into an efficient and practical component of combat aircraft.

Many types and varieties of fuel cell constructions are now used in service aircraft but all constructions depend upon these primary chemical principles.

Basically every self-sealing fuel cell is constituted of three parts: the inner-liner, the sealant and the retainer or cover, sometimes called the outer-liner. The average cell contains from five to seven layers of material but these layers may all be classified under one of the three basic parts.

The inner-liner is the first or interior layer. This is a synthetic rubber sheet. It is the gasoline resistant quality of this layer that allows gasoline to be contained in the fuel cell without causing deterioration or damage to the cell. Obviously, no fuel can be manufactured without a gasoline resistant inner-liner.

The sealant is the second or middle layer of material. This is a sheet, or series of sheets, of natural rubber. The sealant may be made of one or more of several types of natural rubber, generally sponge, coagulated latex or semi-vulcanized rubber compound. As the name implies, the sealant is the material which reacts with gasoline to close the puncture resulting from bullet penetration.

The retainer or cover is the outer or exterior layer. Its primary purpose is to lend strength and protection. Various types of material have been used for the retainer in past constructions. Prominent among these were leather, vulcanized rubber, fabric and rubber-impregnated tire-cording. The latter is now being used exclusively in standard AAF-approved construction.

Basically, the function of the self-sealing fuel cell is this: Upon penetration by a projectile or other object, gasoline seeps through the damaged area of the inner-liner and comes in contact with the natural rubber sealant causing the rubber to swell to many times its normal proportions. This swelling reaction closes the puncture prohibiting further gasoline leakage.

The introduction of special blends of fuel into service-type aircraft has presented a variety of difficult problems which have been overcome. However, there are many self-sealing fuel cells which were manufactured prior to the use of such fuels and these cells require additional treatment.

All self-sealing fuel cells now being used by the AAF are built with an inner-liner of one of these four materials: buna, neoprene, thiokol or royalin.

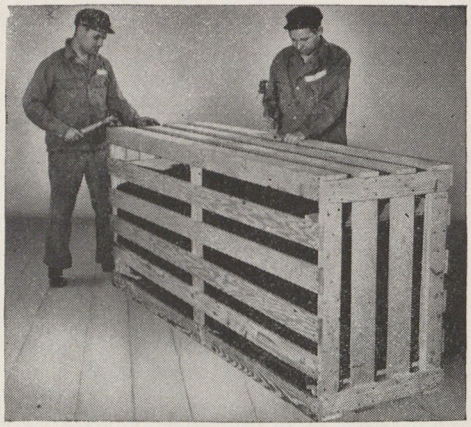
Buna synthetic rubber is resistant to special fuels insofar as actual disintegration is concerned. However, buna, by itself, is not resistant to special fuels insofar as dispersion through the liner and into the sealant rubber is concerned. Buna fuel cells now under construction contain a synthetic dam or barrier between the liner material and the natural rubber sealant. This barrier is very effective in stopping the dispersion of fuels. Buna-lined fuel cells which contain a synthetic barrier do not need to be treated in any way for special blends of fuel. All buna-lined fuel cells which do not contain a synthetic barrier must be slushed with Fuller's Slushing Compound TL-284 (AAF Specifications 3595) which is the *only* slushing compound approved by the AAF. Ethyl acetate, which is the basic solvent for Fuller's Slushing Compound, is detrimental to buna synthetic rubber, so buna lined cells should not be slushed unless required by above classification.

Neoprene synthetic rubber is not resistant to special fuels and will deteriorate when in contact with them. Therefore, it is imperative that all neoprene-lined fuel cells be flushed with Fuller's Slushing Compound TL-284 (AAF Specification 3595).

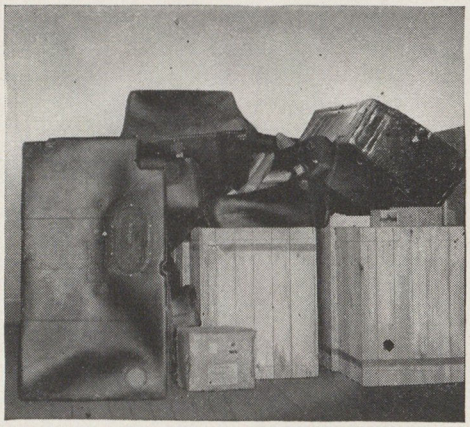
Thiokol synthetic rubber is resistant to all blends of fuel. None of the special blends will disintegrate or disperse through this type of liner. Thus, thiokol-lined cells need not be slushed under any circumstances, nor should they be because the ethyl acetate solvent contained in Fuller's Slushing Compound TL-284 is detrimental to thiokol synthetic rubber.

Royalin plastic, which acts in the same manner as thiokol synthetic rubber, is resistant both to disintegration and dispersion by blends of fuel. Ethyl acetate is also detrimental to royalin-lined fuel cells, which also should never be slushed.

Below is a deteriorated fuel cell. Extreme care must be exercised in re-fueling in order that no gasoline is allowed to spill or overflow on the exterior. The exterior of many fuel cells is not gasoline resistant and disintegration from contact with gasoline may cause future failure of the cell.



RIGHT. Fuel cells which are to be shipped or stored should be crated as shown. Remember never to stack crated fuel cells so high that the bottom one is under pressure. Crate all cells so that the fittings are secured and the cell does not sag. If possible, store and ship them in their original containers. Privates Matthew Bodamer (left) and Cecil Allen of Patterson Field are shown doing a proper crating job.



WRONG. Never stack uncrated fuel cells. Uncrated cells should be given an individual space, placed on their widest surface and supported from the interior so they do not sag under their own weight. Never store fuel cells without properly crating them. Great harm is done to fuel cells by any change from their original shape, as collapsing, warping, bending or twisting.

Inspection alone is not sufficient to distinguish between the various types of cells or to determine if slushing is required. The type of cell at hand may be determined only by reference to T.O. 03-10-26, which lists the construction numbers stenciled on each tank and describes the type of cell by these numbers.

Because of current discrepancies in the information previously supplied to AAF activities, a number of self-sealing fuel cells have been unnecessarily treated for resistance to special blends. Extreme caution should be exercised in the use of thiokol or royalin-lined cells which have been slushed, since it is difficult to determine the extent of damage by the ethyl acetate solvent to the liner.

Moreover, it is inadvisable to attempt to remove the slushing compound from these cells due to the fact that ethyl acetate is also the cleaning solvent that would be required to remove it. Use of this solvent in removing the slushing compound would only cause further damage to the seams and the fuel cell lining. Do not reslush fuel cells. The original slushing is considered satisfactory throughout the life of the cell.

One of the chief causes of fuel-cell failure in the past has been the disintegration of the retainer or covering of the fuel cells caused by gasoline coming in contact with the exterior of the cells.

The covering of all fuel cells now in production is being coated with buna synthetic rubber, or with a resistant lacquer to prevent deterioration caused by spillage of gasoline. But those of previous construction are not protected for spillage in any way and will disintegrate rapidly when repeatedly splashed with gasoline. The buna-coated exterior of present production cells will remedy this situation to some extent. However, because no synthetic barrier is provided under the Buna coating for the exterior covering, gasoline of certain blends eventually will penetrate into the natural rubber layers. Therefore, extreme care should be taken in all cases to avoid spillage of gasoline on the exterior surface of all fuel cells.

The main cause, however, of fuel cell failures—both in the past and at present—may be traced to faulty and careless installation and removal methods. Particularly is this true in cases concerning aircraft whose fuel cells are of the so-called collapsible type.

By the very nature of its construction, the self-sealing fuel cell is injured by any alteration of the cell from its original shape, collapsing, warping, bending or twisting. In some cases, of course, there is no alternative and collapsing the cell becomes a necessary evil. Many types of aircraft now incorporating self-sealing fuel cells were not designed originally for these cells and, as a result, cells must be installed and removed under undesirable conditions.

In view of these facts, it is extremely important that all fuel cell installation and removal work be placed in the hands of competent, trained men who understand the care which is necessary in the handling of self-sealing fuel cells. An inexperienced crew should never be allowed to install or remove fuel cells unless the job is done under the guidance of capable and conscientious supervisors.

The Maintenance Division of the Air Service Command has established a unit of trained fuel-cell experts to assist in all maintenance and repair problems on self-sealing fuel cells which arise within the AAF. Any questions or comments on fuel-cell problems should be addressed to the Commanding General, Air Service Command, Patterson Field, Fairfield, Ohio, directed to the attention of the Chief, Maintenance Division.

Boot Starter

The Bungee starter, as used by the AAF Flying Training Detachment, Ocala, Florida, consists of a boot, shock cord and rope handles. The boot, six by nine inches tapered to a point like a rounded "V" is made from two pieces of 3/8 inch belting riveted together. To this is attached at the point of the "V" five feet of 5/8 inch manila rope, then an eight-foot length of 5/8 inch elastic shock cord. Two four-foot manila ropes go at the end for gripping pieces. To operate, the engine is primed by turning the propeller by hand, then the boot is placed over the end of the blade on the far side and needed tension is gained by two men pulling slowly, as shown in the accompanying photograph. The propeller can now be started with only a slight lift from a third man. As the propeller whirls the boot flies off. — **Flying Training Detachment, Ocala, Florida.**

The Bungee Starter in action.

Flashlight Guides Night Parachute Deliveries

To provide a means of speedy identification of aerial delivery containers dropped during night operations, the Materiel Command has developed a new type of identification lamp assembly.

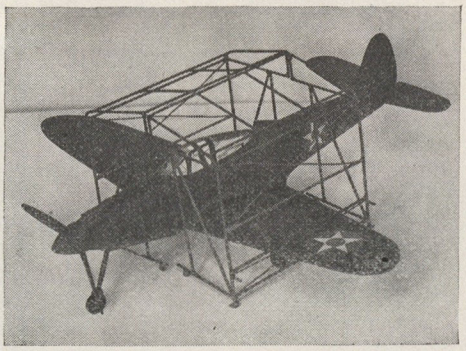
It resembles the ordinary flashlight but is made of plastic and has a light bulb at each end. Colored plastic caps of blue-green, red or yellow can be snapped over the bulb so that types of aerial delivery loads can be easily identified by means of the different colors. The cylinder holds three flashlight batteries.

On the outside of the lamp are two loops for attaching the lamp to the delivery containers. A spring contact switch on the exterior of the lamp is equipped with a fibre separator so that the switch is kept open except when the lamp is actually in use. The assembly is so arranged that when the load is dropped a cord attached to the parachute line withdraws the fibre separator from the switch and the light is automatically turned on when the parachute opens.

The weight of the lamp, except for batteries, is 5.6 ozs. (*Technique Continude*)

TECHNIQUE

(Continued from Page 19)

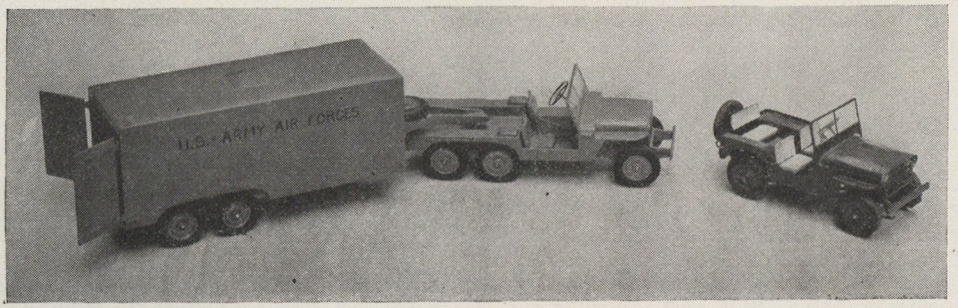


Model of a special repair scaffold.

bombers as though it were lifting a sack of wheat.

Other models include latest type fighter planes, bombers and cargo carriers, each with movable controls, instrument panels in the cockpits and hollow cabins which permit arrangement of cargo inside the planes; jeeps, peeps and a truck with three gasoline carriers attached; a small glass-enclosed portable machine shop, canvas-covered engine repair housings, a cargo truck, and a long heavy trailer much like a flatcar, a current development and only recently produced a full-sized model.

Because the models to be of value must be precision perfect, they sometimes require as long as two or three weeks to build. On such projects involving trucks and other mobile units, even the engines and metal chassis are built to exact scale.



Even extra heavy equipment is duplicated.

Designing With Models

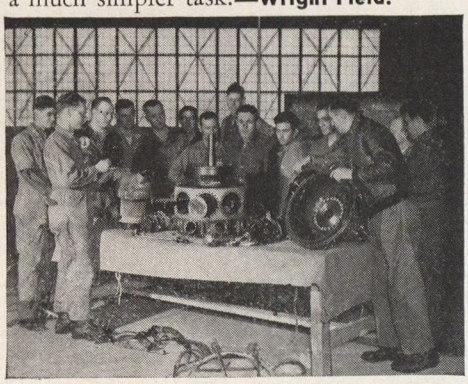
Tiny models are dictating the designs for various types of maintenance equipment, small service trucks, portable repair shops, bomb cradles and other miscellaneous field devices used by the AAF. The miniature planes, trucks, gasoline storage tanks, portable houses and other airborne equipment, all precision-built to one-thirtieth exact scale, are daily saving the government thousands of dollars in its never-ending task of finding the best possible equipment for our combat Air Forces.

"Building the models first," one engineer explains, "makes it possible to study desirable shapes and sizes for the large equipment without going into the tremendous cost involved in the building of full-sized products."

The plant for the construction of these models is a small workshop in the big Miscellaneous Equipment Unit of the Materiel Command at Wright Field, where the models are scaled down by draftsmen from full-sized blueprints furnished by various manufacturers and then built of wood and metal. They range in size from a tiny one-inch bomb cradle to a three-foot scale model of a four-engine bomber complete with retractable landing gear.

One of the most delicate models is a six-wheel truck-trailer combination so complete in detail that the truck even has a tiny rear view mirror. Another intricate model comprising hundreds of small parts is a replica of a huge crane whose real life version is used to haul around 25-ton

Models of special scaffolds used in repairing various parts of aircraft have been especially valuable. These framework devices, simple in construction, have been manipulated into various positions on the model planes just as the large repair stands would be on regular aircraft, and the results have given engineers knowledge enabling them to build super-structures that make repairing a combat plane a much simpler task.—**Wright Field.**



Training continues behind the front lines.

Tech School in Combat Zone

One of the few (possibly the only) AAF technical schools in a foreign theatre or combat zone was established several months ago along the North Atlantic Route by a ferrying squadron of the Air Transport Command to take worthwhile advantage of the enforced inactivity due to weather conditions.

Sixty-five enlisted men have already benefited from instruction received in the school, which was organized at the suggestion of enlisted personnel and through the cooperation of the commanding officers and top-rated N.C.O.s.

The program covers studies of aircraft engines, general airplane maintenance and engine maintenance, serves as a refresher course for older men and develops skilled mechanics out of the basics.

Since its beginning the course of instruction gradually has been expanded to include a study of steps necessary to complete a successful 25- and 50-hour inspection, the use of tugs and heavy tractor equipment, operation of wing jacks for four-engined planes, and instruction on instruments and electrical systems. Schedules are arranged to enable men on night shifts to participate. In addition to technical phases, one hour daily is devoted to the study of manuals and T.O.s.

Credit for organization of the school goes largely to First Sergeant Roland F. Grisson, Master Sergeants George Gromoshak and William H. Kelly, Staff Sergeants John Ramsey and Arnold King, and Sergeant Joseph Verdun. They also served as instructors. Lieutenant Wilber Hamstreet, Squadron C.O., and Lieutenant Charles D. Horvath, adjutant, gave full approval and assistance.—**Air Transport Command.**

High Altitude Brushes

An intensive five months' research program stimulated by complaints that brushes on generators and engines were wearing out within two or three hours on planes flying at extremely high altitudes has resulted in the development of new brushes with an effective high altitude life of from 40 to 150 hours.

Two B-17s, assigned to the project at Wright Field, rolled up a total of 500 hours of comprehensive testing in 107 flights, after it was determined in earlier experiments that brushes operated satisfactorily in high altitude test chambers but wore out after a few hours of actual operation above 25,000 feet.

The Engineering Division called in electrical technicians from all manufacturers capable of supplying materials, motors and generators, and in October of last year began a series of high altitude test flights in rarefied atmosphere above 30,000 feet.

One of the B-17s was converted into a flying electrical laboratory. Panels of testing instruments, installations of generators and motors for tests under observation, temperature recording gauges, and many electrical recording devices were mounted in the radio compartment and in the bomb bay.

Flight after flight was conducted, those over 30,000 feet usually of three hours' duration. Civilians and officers spent

their days "upstairs" testing new materials and new designs, recording instrument readings of the hundreds of variants of the flights, and observing how generators and motors survived under increasingly heavy electrical loads. In the evenings all observations and readings were reviewed and worn-out materials were thoroughly examined and tested.

It was discovered in the early stages of these tests that motor and generator parts were wearing out at high altitudes because of friction resulting from a lack of lubrication. This factor was not present at lower altitudes, because while the air at high altitudes is almost absolutely dry, that at lower altitudes contains sufficient moisture to serve as a lubricant for the brushes.

Before a satisfactory brush had been developed, 27 different brushes were tested, not including those which were proved unsatisfactory in laboratory and high altitude chamber tests.

Flight tests were completed in March with the perfection of brushes capable of operating from 40 to 150 hours efficiently and continuously under heavier-than-normal loads at altitudes above 30,000 feet. This development assures a constant supply of electrical current to operate guns, turrets, automatic pilot, props, radio and other equipment in aircraft at high altitudes. **— Lieutenant Robert V. Guelich, Wright Field.**

Swapping Engines

A shortage of R1820-51 engines made it necessary at Hendricks Field, Florida, to modify B-17Bs to permit use of R1820-65 engines. This tricky problem was solved by Glenwood A. Schaefer, 25-year-old civilian employee at the 95th Air Service Command Sub-Depot.

Here's his solution, reached after days of studying the standard Boeing cowl flap assembly:

An Adel type G-9744 cowl flap selector valve was installed on the cockpit sidewall, to the co-pilot's right, forward of the thermo-couple selector switch.

Pressure and return lines were connected from the selector valve to the hydraulic system. To control the time required for opening or closing the flaps, the pressure line was passed through a variable restrictor valve before connecting to the selector valve.

Eclipse Type A-13 supercharger regulators, which operate from engine oil pressure, were installed in place of the original Type A-7 regulators which operate from the hydraulic system. The hydraulic lines running from the bomb bay to the outboard nacelles for operating the original supercharge regulators were used for operation of the cowl flaps on the outboard engines by capping the Tee fittings where the inboard regulator lines connected. This resulted in one continuous line from the bomb bay to the outboard nacelles.

Lines were then installed from the bomb bay ends of the former supercharger regulator lines to the selector valve and from the nacelle ends to the cowl flap cylinders.

These installations provided a complete system for fluid to pass from the pressure system, through the restrictor valve, to the selector valve, thence to the bomb bay, through the former supercharger regulator lines to the cowl flap actuating cylinder. The fluid displaced by the movement of the piston in the cylinder, passed through the other former regulator line into the bomb bay, forward to the selector valve, then through the line connecting the selector valve to the return line from the brake system, and into the hydraulic reservoir.

New lines were then installed connecting the selector valve to the inboard engine cowl flap actuating cylinders. This completed the installation.

With this new cowl flap arrangement, each flap is operated independently and may be locked in any position. The operation may be accomplished either when the engine-driven pumps are supplying the system with pressure, or when the emergency hand-pump is used.

Through Schaefer's development, modification of B-17Bs at Hendricks Field has been expedited considerably and the operation of the modified Bs has proven more satisfactory. **— Private Charles M. Watt, Air Service Command.**

Link Spin-Delay Mechanism

An attachment for Link Trainers which permits instruction on instrument take-offs is the invention of Technical Sergeant Sherman A. Holbert, Moody Field, Ga.

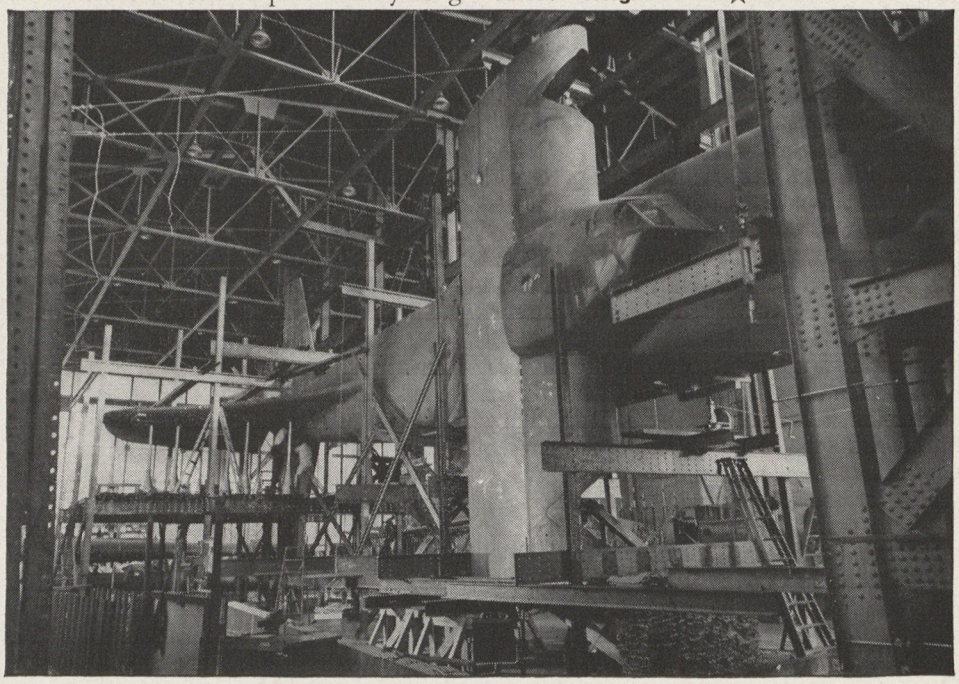
Heretofore, it was necessary for the instructor to bring the Link out of a spin when it was first started before the student could take over the controls, which meant that the student assumed control of the trainer after it was in full "flight." By the use of Technical Sergeant Holbert's invention, the student is in full control from the time the trainer is started. He can simulate taxiing on the ground and perform a complete instrument take-off.

The attachment is essentially a complex three-way valve which regulates the vacuum applied to both the spin-actuating system of the trainer and the instrument assembly. The key to the successful operation of the unit is the use of an electromagnetic latching device which locks the valve in place at the critical time.**—Public Relations Office, Moody Field.**

Progress Through Destruction

Engineers and static test workmen listen anxiously for that first crack, the first sign of weakness, as the tail of the C-76 below is piled higher and higher with bags of shot in Wright Field's Static Test Laboratory, where planes are destroyed in the interest of safety and progress in AAF aircraft. The actual breaking of the plane under the test load is preceded by long periods of mathematical calculations and careful arrangement of the plane or parts for testing.

Giant jacks and cranes hoist planes into testing positions on girder platforms. Shot bags, lead bars, or sand bags are used to simulate actual load conditions of the aircraft in flight. Only after such planes survive these tests, among others, are they adopted for general use by the AAF.**—Wright Field.** ☆



YOUR FRIEND AIRWAYS TRAFFIC CONTROL

By Lieut. Colonel George C. Price
CHIEF OF STAFF, FLIGHT CONTROL COMMAND

IN the sky over America there is a network of airways that will lead the pilot safely "on course" through soupy darkness to almost any destination he may choose. Proprietor of the network is the Civil Aeronautics Administration which operates and maintains the more than 330 range stations, radio aids, light beacons, and emergency fields and the 23 Airways Traffic Control Centers necessary to the smooth functioning of the system.

Although the Airways were a creation of pilots, by pilots and for pilots, there are many who fly these skyways for months and even years without a clear understanding of the Airways Traffic Control organization and how it works.

Here is a play by play description of some of the facts every pilot must keep in mind as he proceeds on an airways flight.

Suppose you are about to take off from Chicago for Patterson Field, Ohio. You've checked the weather, the notices to airmen, and completed Form 23. Your Form 23 specifies a flight along the airways on contact flight rules and you know that your flight plan has been sent to the Chicago Airways Traffic Control Center for transmission to your destination.

It is important for you to know also that this flight will not be posted on the flight progress boards in the Control Center. The Center pays no attention to CFR flights unless bad weather or other trouble develops in your line of flight. You are flying contact and whether on or off the airways you are expected to fly at the proper altitudes for your heading and keep your eyes peeled for traffic en route.

You take off from Chicago in weather that looks good, meanwhile wondering a little about a front that the weather officer warned you about. Sure enough, the front starts muddying the atmosphere across your line of flight as you proceed toward Goshen, Indiana, and you wish you had filed an instrument flight plan while you were still in Chicago.

The weather won't let you proceed CFR. What can you do now? You can turn around and go back, land at the nearest airport with suitable minimums, or file an instrument flight plan. Since you are a qualified instrument pilot and want to get where you started for, you choose to request an instrument flight clearance.

You tune in on the Goshen Radio Range ahead, well in advance of your arrival over that point. You don't wait until you are over or past the range because radio conversations take time and you don't want to be past the station and out of radio touch with it before your conversation is completed.

What every pilot should know about America's protective flight network.

Goshen Radio jots down your request for an instrument clearance and asks you to wait. Why must you wait? Because a local range station cannot clear you for an airways flight. It serves only as a "go-between" for messages from pilot to the ATC Center and back. The only organization that can give you a clearance is the Center that has jurisdiction over the airways along which you propose to fly, in your case, the Chicago Center.

HERE'S what happens during the minute or two that elapses while you are waiting for a reply. The Goshen Range station operator calls Chicago by interphone and quickly gives the Chicago Center your instrument flight plan. This, of course, tells your position, the time, your present and proposed altitude, your cruising speed, your destination, your estimated time of arrival, etc.

It is also important that you give your proposed route of flight so there will be no mistake as to the exact set of airways you intend to fly.

What happens in the Chicago Center? With a copy of your flight plan in his hand, a traffic controller steps to the flight progress boards in the Center. Here on large boards are posted all instrument flight plans that have been cleared in the area controlled by that center. These boards carry the name of every range station in the area. Under each range station there is a strip of paper representing each airplane expected to report over that station—a strip identifying the airplane and giving all necessary information, including the flight altitude reserved for the flight and the time when your "report over" is expected.

A quick glance at the flight strips under the range station you have named in your flight plan shows the Chicago Center operator that all is clear for your flight. He calls Goshen and Goshen calls you, giving you your clearance to proceed at 5,000 feet and asking you to report north of the Fort Wayne Range for further clearance.

With a sigh of relief you begin your ascent to the 5,000 foot level with complete assurance that you won't cross propellers with other aircraft as you go up and that the 5,000 foot level is reserved for your exclusive use. On instrument flight more than at any other time pilots dislike the company of other aircraft.

All's well. You are sailing along a skyroad all your own toward Fort Wayne. Meanwhile, the Chicago Airways Traffic Control Center has teletyped your flight plan to the Cincinnati Center.

Why were you asked to report over Fort Wayne for further clearance? Because a few minutes out of Fort Wayne you reach the boundary of the Chicago Control Area and enter the Cincinnati Area. The Cincinnati Center may want to move you to a different altitude. As a matter of fact, they do. When you report over Fort Wayne Range, you are instructed to ascend to 7,000 feet five minutes south of the Fort Wayne Range Station and to report when you reach 7,000. You know immediately that the Cincinnati operator sees on his flight progress board that you are getting too close to some other aircraft at the 5,000 foot level. He's pushing you up a couple of thousand

feet to increase this distance. That operator doesn't want to answer all the questions he'd be asked if your plane and another one both tried to occupy the same space at the same time. His job is to keep you well separated and he's on the job every minute.

As soon as you reach 7,000 feet, you report this fact back to Fort Wayne Radio and are instructed to report again ten minutes out from the Patterson Range Station. Fort Wayne radio notifies the Cincinnati Center that you are at the 7,000 foot level and the Cincinnati operator stops worrying about you.

ALL information concerning your flight is immediately relayed to the center that has you under its control so that the Flight Progress Board will show your exact position. When a plane fails to complete a contact within a reasonable period after its estimated time over a given range station, the Airways Traffic Control Center starts worrying.

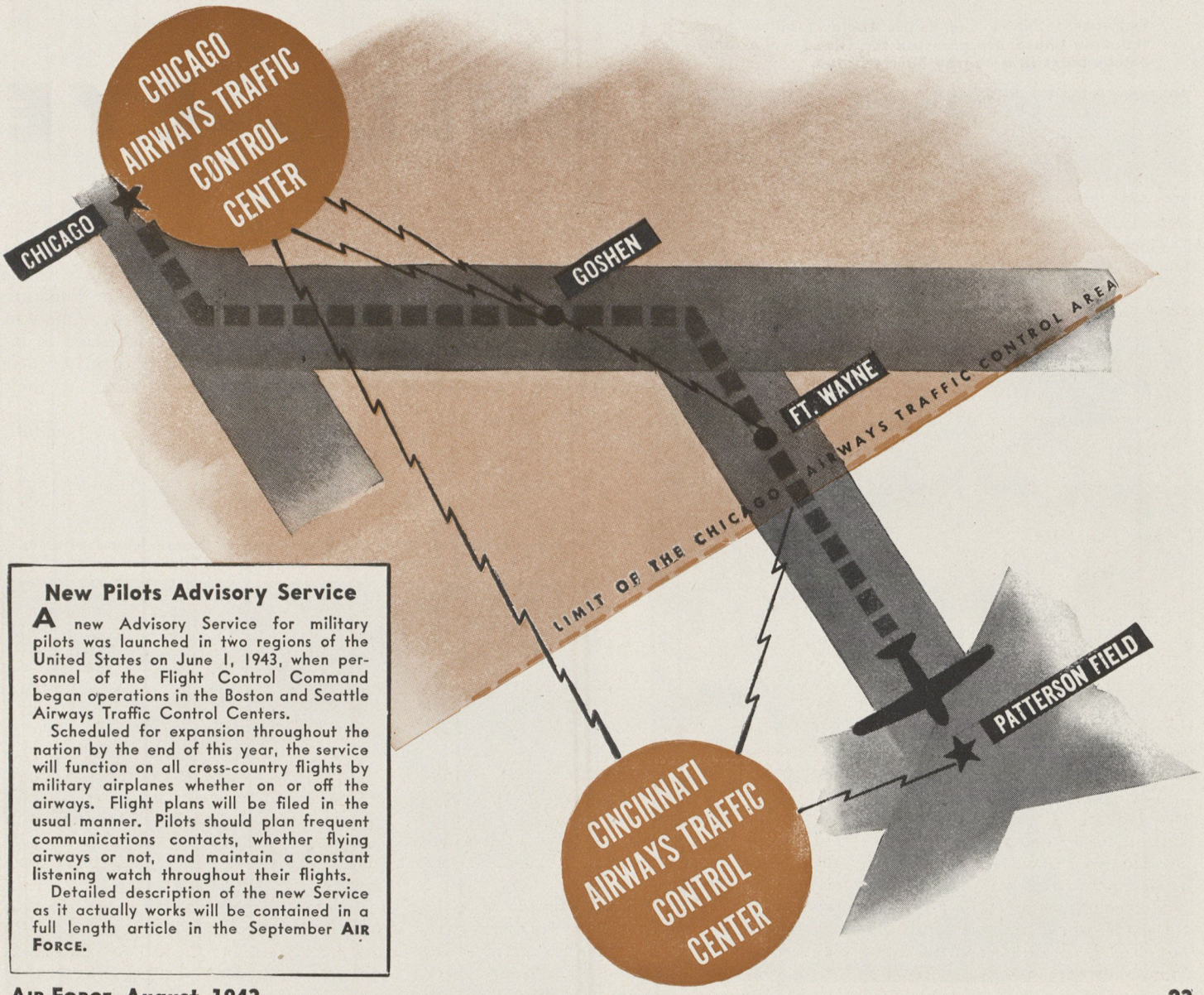
Something must be wrong with the pilot, the radio or the airplane. After a time, a general alarm will be broadcast.

You continue on your flight; ten minutes out you contact the Patterson Range Station. You are notified that ATC wants you to climb to 8,000 feet now and hold on the southeast leg of the Patterson Range. Why, you probably are asking? Because just prior to your arrival six other airplanes arrived in quick succession over the Patterson Range Station and are stacked up at successive 1,000 foot altitudes starting at 2,000 feet. ATC is putting you up on top to wait your turn to come down. As the plane at 2,000 feet is cleared to the Patterson Field tower to land, the planes above are given instructions in succession to descend 1,000 feet. Thus one by one each plane is lowered through the pattern and brought safely into Patterson Field. Your trip on an instrument flight plan from Goshen to Patterson Field is safely completed.

In the Cincinnati Center the picture of the stackup over Patterson Range was clearly shown on the flight progress board. Each change of altitude is noted for each plane on its individual flight progress strip. ATC knows a lot more about what's going on around you than you do. As each aircraft lands, Patterson Field notifies Cincinnati ATC, which teletypes or interphones the arrival message back to pilot's point of departure.

This streamlined, expertly operated system of Airways Traffic Control is a product of some of America's best aviation minds. Installed and operated by the Civil Aeronautics Authority, it has provided America with the finest network of skyways and navigational aids to be found any place in the world. The average controller feels the tremendous responsibility involved in maintaining safe separation of aircraft that are flying the airways in instrument conditions. The whole plan is one of service that will provide aid and security to all who use the airways.

You, as a pilot, can best do your part by planning your flights carefully, reporting faithfully, and obeying instructions to the letter. ☆



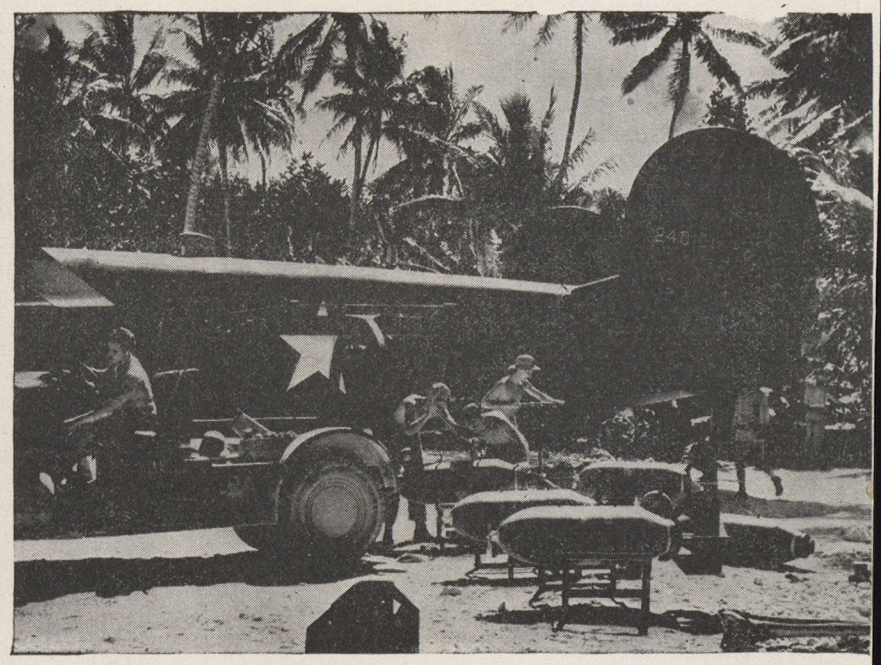
New Pilots Advisory Service

A new Advisory Service for military pilots was launched in two regions of the United States on June 1, 1943, when personnel of the Flight Control Command began operations in the Boston and Seattle Airways Traffic Control Centers.

Scheduled for expansion throughout the nation by the end of this year, the service will function on all cross-country flights by military airplanes whether on or off the airways. Flight plans will be filed in the usual manner. Pilots should plan frequent communications contacts, whether flying airways or not, and maintain a constant listening watch throughout their flights.

Detailed description of the new Service as it actually works will be contained in a full length article in the September AIR FORCE.

Final Check. After their briefing, these airmen take a last minute stereoscopic squint at photographs of their assigned targets on Nauru.



Crating Eggs. These 1000-pounders were among the tons of bombs the B-24s unloaded over the enemy's island industrial center.

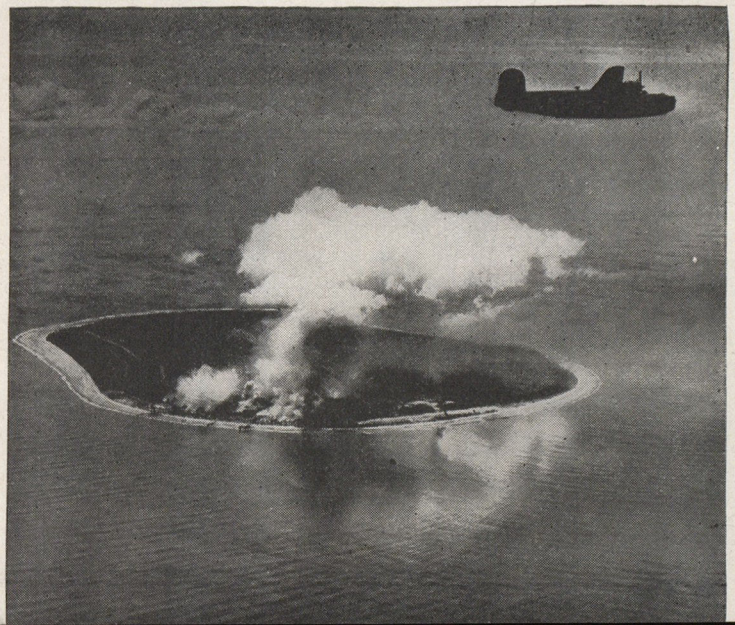
Fireworks. Smoke and debris (below) billow from the main phosphate plant on the island while other bombs burst in a nearby housing area.

BULL'S-EYE

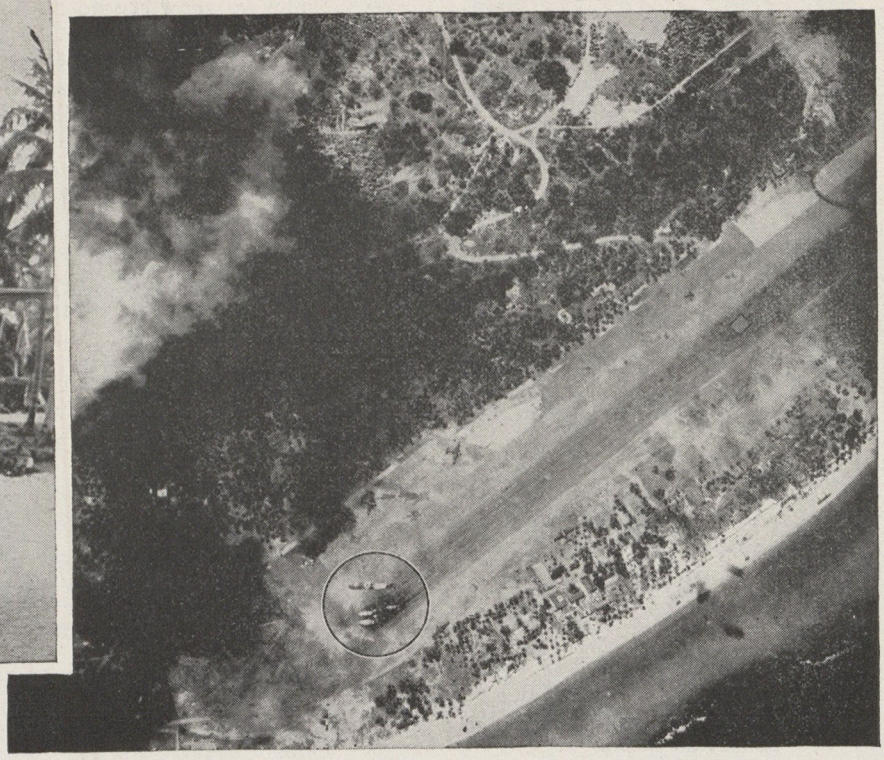
One of the most stinging blows yet delivered by American heavy bombers against the enemy in the Pacific came in mid-April when a large force of B-24s blasted the huge Jap phosphate works on the circular island of Nauru (circumference: ten miles) in the Gilbert Island group. The raid was carried out from Funafuti, largest of the Ellice Islands, which was occupied by American forces several weeks earlier. The Liberators were subjected to intense anti-aircraft fire and fighter opposition but they made their bombing runs "down the groove" and returned safely to their base. From five to seven attacking Zeros were shot down.

The Japs retaliated the following day with a raid on Funafuti, but the damage and casualties were small compared to the destruction on Nauru. ☆

Homeward Bound. With the plant area of Nauru Island aflame, the B-24s head for their base on Funafuti—mission successful.



ZERO MEDICINE. Armament crews see that the nose turret of a Liberator is well loaded with ammunition before the bombers take off.



FIRST LICKS. An early target was the Jap airfield to hamper fighter interception. Note burning planes.

BOMBING

HERE'S HOW. Crew members relax around the intelligence officer to report just how it was done.

SHOW'S OVER. Ground crews stand by to count the returning bombers, as the first of the raiders settled to the runway on Funafuti.

What's your AIR FORCE I.Q.?

A Colonel we know scored 85 points in this month's AIR FORCE Quiz, which puts him near the head of the class. Credit yourself 5 points for each correct answer and see if you ring the bell with a perfect 100; make a near miss with 90; rock the target with 80; get a passing nod with 70 or wash out with 60 or less. Answers on Page 48.

1. *How many of the following colors appear on the American Defense ribbon?*
   a. Yellow c. White
   b. Red d. Blue

2. *A Peashooter is the name often given*
   a. A .30 caliber machine gun
   b. A tail gunner
   c. A fighter plane
   d. An armament specialist

3. *Can you fill in the missing words of the Air Corps Song*
   "Off we go, into the wild blue yonder, climbing high into the sun.
   Here they come ....
   ....
   At 'em boys, give 'er the gun—give 'er the gun."

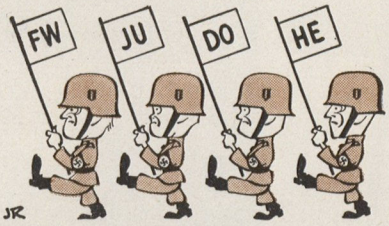
4. *The astral hatch of an airplane is commonly used by the*
   a. Navigator c. Radio man
   b. Pilot d. Bombardier

5. *The expression, "leading an airplane" is most closely associated with*
   a. Taxiing c. Piloting a trainer
   b. Landing d. Aerial gunnery

6. *A chandelle is*
   a. The right nacelle of airplane
   b. The lighting system in the fuselage
   c. An external bomb rack
   d. A maneuver in flight

7. *Don't look now! Is the Air Corps insignia on an officer's shirt collar worn on his left or right side?*

8. *What German airplanes do the following abbreviations designate?*
   (One wrong is all wrong)
   a. FW c. DO
   b. JU d. HE



9. *The angle of climb of an airplane is controlled by the*
   a. Elevators c. Rudder
   b. Ailerons d. Fin

10. *GI is the proper abbreviation for*
    a. Government Inspection
    b. Government Index
    c. Government Installation
    d. Government Issue

11. *Where does the accent fall on the word "materiel"?*
    a. Matériel c. Materiél
    b. Máteriel d. Materíel

12. *When halting a squad marching at quick time, on which foot should the command of execution, HALT, be given?*
    a. Left foot
    b. Right foot
    c. Either foot

13. *There are four forces which act on an airplane in flight. Can you fill in the missing one?*
    a. Weight c. Thrust
    b. Lift d. .....

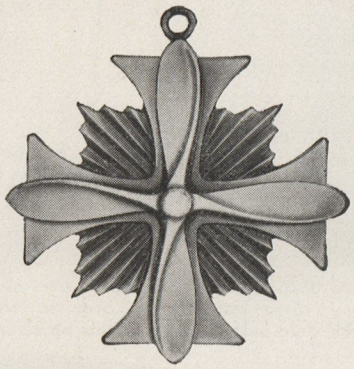
14. *Army Emergency Relief is available to*
    a. Officers only
    b. Enlisted men only and their dependents
    c. Sergeants only
    d. All members of the Army and their dependents

15. *Does the stem of a Major's oak leaf insignia properly point toward or away from his neck?*

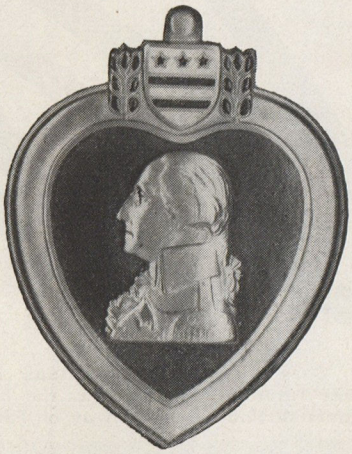
16. *3:30 p.m. regular time is the equivalent of ..... Army time?*

17. *Which is the Army Air Forces' heaviest single-engine fighter plane?*

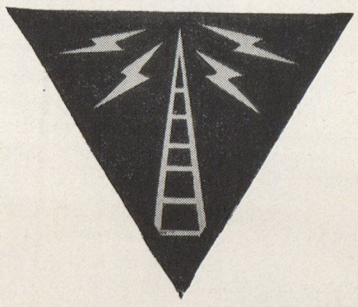
18. *Identify this medal*



19. *Identify this medal*



20. *Is this Technical Specialist's sleeve patch for Armament, Engineering, Communications or Photography?*



How to Keep Well in the INDIAN THEATRE

Brigadier General David N. W. Grant
THE AIR SURGEON

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

The following is another in a series of articles on health conditions in the various theatres of operations.—THE EDITOR.

INDIA is a strange and colorful land. The customs, dress, language, religious beliefs and mode of life bear little resemblance to anything American. Although in the European section of some of India's larger cities and in the homes of the more wealthy Indians, conditions may resemble those in the United States, constant care should be exercised to avoid exposure to health hazards.

The native quarters of town and rural districts in India are very much as they were hundreds of years ago. There are no safe public water works, sewage is disposed of by the easiest and most convenient means, and foods are rarely inspected to make sure that they are safe.

Over one-fifth the world's population lives in India, an area a little more than one-half the size of the United States.

Practically every disease known to man occurs in this country. Because the uninformed is always likely to meet with trouble, the recognition of the dangers that exist in India is of utmost importance to American troops. Modern military medicine, especially military hygiene and sanitation, has been developed to protect the soldier, no matter what conditions he may be forced to face. If the individual soldier knows what to expect, has a fundamental knowledge of how to take care of himself, and practices ordinary cleanliness and common sense he is able to maintain his efficiency as a fighting man and avoid becoming a casualty due to disease.

Although disease conditions vary somewhat in different parts of India, malaria, "dysentery," the fungus diseases, venereal diseases and snake bite present grave military medical problems throughout the country.

A conservative estimate has been made that 1,000,000 of the 389,000,000 Indians die of malaria alone each year. This staggering figure indicates its great importance in medical considerations. While the disease is most commonly contracted in the lowlands, where frequently 100 percent of the people have malaria, it is not infrequently encountered in the hill districts.

Every precaution must be taken to avoid this disease because troops suffering from malaria can not be effective as a fighting force. Each man should have a thorough knowledge of the methods of protection against mosquitoes, not only from the malarial type but from all others, for dengue and filariasis, both mosquito-borne diseases, also occur in India. Since it is impossible for anyone other than a trained Medical Department officer to differentiate between disease-carrying mosquitoes and the purely pestiferous types, they should all be considered dangerous.

Although the malaria mosquito usually bites at night, it may be encountered during the day in dense jungles or shaded mountain valleys. When it is necessary to go out-of-doors at night or to operate in a mosquito-infested region at any time, remember to wear long-sleeved shirts buttoned to the neck, long trousers tucked into boots, head nets and gloves. Each soldier should know the value of his mosquito net, how to use it and how to care for it. He should consider it an essential piece of his equipment and should keep it available at all times.

In many parts of India the medical officer will recommend the suppressive or prophylactic treatment of malaria with either quinine or atabrine. This treatment does not prevent malaria in the true sense and consequently can not take the place of the external precautions. However, it does suppress the symptoms of malaria and thus allows a man to carry on until the military tactical situation permits hospitalization. When suppressive quinine or atabrine treatment is once instituted, directions must be followed explicitly or it may do more harm than good. "Dysentery" is a term used in its broadest sense when applying it to India. Actually the term intestinal disease is more appropriate, because typhoid fever and para-typhoid fever are extremely prevalent as are both amebic and bacillary dysentery. Cholera is another disease that falls in this group of intestinal diseases and commonly occurs as an epidemic, usually during the rainy season from June to October.

All of these intestinal diseases are diseases of filth. They can be transmitted by flies, through water or food, or by physical contact. They can be prevented if the usual sanitary precautions, observed by any clean individual, are carefully followed. The Indian people have little knowledge of, and even more important, less regard for modern sanitation. Garbage and human wastes are deposited in the streets, in the fields and along the banks of streams. Flies are abundant. They breed in waste and, since there is no screening, they have easy access to the kitchen. Streams are contaminated and foods are soiled. Consequently, you must always be on guard. Water should be boiled or chlorinated. Do not trust to luck, drink only water that has been treated by proper Army personnel. Be sure that the kitchens where your food is prepared and the places where you eat are free of flies.

Since treated water may not be available at times in India, every soldier operating in this area should know one or more methods of purifying water (FM 21-10). If he has no chlorine or iodine he should always remember that boiling water is one of the easiest and surest methods of purifying it.

Because the rate of exchange is favorable and wages are so low in this part of the world, Americans frequently hire native boys to cook, run their errands, do the laundry and perform other menial tasks. These boys may appear clean and

may be intelligent. However, do not trust their knowledge of sanitation and hygiene, for their customs usually are the same as their forefathers. Personally supervise everything they do until you have thoroughly trained them. See that a medical officer examines them and says that they are not infected with a communicable disease. Make certain that they wash their hands with soap and water whenever they are soiled. See that they prepare your food exactly as the Army prescribes. And above all, be sure that the supplies that they purchase for you are safe.

Native fruits and vegetables are dangerous. The safest rule is to eat only thoroughly cooked foods. Soaking fruits or vegetables in potassium permanganate solution is not satisfactory unless they are soaked for four or five hours. The very few dairy products existing in this area are not safe to eat. Raw or dried fresh water fish, crabs and crawfish, as well as the water chestnut, should not be eaten unless they are thoroughly and carefully cooked. They transmit the dangerous lung fluke.

One should never walk about barefoot in India. Fungus diseases, such as athlete's foot and dhobie itch, are very prevalent. They are seldom fatal but they can cripple a man and make him a liability to a fighting team. These diseases are easily prevented by bathing frequently and keeping as dry as possible. Dry all parts of the body thoroughly with your own towel, not with a towel that has been used by someone else. Be especially careful to dry between the toes, in the groin and under the arms. Dusting the body with powder, such as Army issue foot powder, and changing to dry clothing as often as possible are additional methods of preventing these diseases. During the "rains," even though precipitation is not continuous, the humidity makes it very difficult to stay dry. This calls for extra precautions.

Fungus diseases can be transmitted easily from one individual to another when the clothing of a man suffering from a fungus infection is washed with the clothing of others. It is best to do your own laundry or to see that mixed clothes are boiled.

Because of the difficulty in keeping dry, minor wounds such as leech and insect bites, scratches, cuts and burns which would be considered trivial at home, become easily infected. No matter how slight a wound appears to be, it should always be thoroughly cleansed and treated with an antiseptic.

The jungle country of India is inhabited by many animals and insects that may be dangerous to man. Although most of them will go to great lengths to avoid man, they may become dangerous when threatened. The buffalo and bear are perhaps the most dangerous animals to be encountered. The buffalo has been known to attack man without provocation. If large cow-like tracks are seen on the trail, move warily, try to avoid attention if a herd is sighted, and prepare to climb a tree if attack seems imminent. Curiosity may draw a tiger or elephant to a camping place so it is well to keep a fire burning all night. Animals are not likely to investigate a mosquito net closely because of the human scent and fear of a trap, adding value to this flimsy protection. Elephants show their presence by the damage done to the forest. If a clearing shows signs of these animals do not make camp, because you may be taking over a regular resting place for a herd. When shot, all animals should be regarded as dangerous until they display no further signs of life.

Several types of crocodiles are found in the Ganges system of rivers and along the east coast of India, and sharks abound along the entire coast line, so it is necessary to exercise caution when swimming in strange waters. Scorpions, spiders and centipedes are common in India. The sting of some of these pests, although practically never fatal to an adult, is extremely painful and may prove incapacitating. Ants, hornets, wasps, mites and the small stingless sweat-bee are annoying

pests. There are two types of leeches to watch out for in India, the large, dark horse leech in fresh water, and the small, red jungle leech on shrubs and jungle grass. Although leech bites are not dangerous, they frequently become infected and lead to painful chronic ulcers. A leech should not be pulled off the skin. They can be easily removed by touching them with a lighted cigarette or prodding them with a knife. The natives of this part of the world frequently remove leeches by touching them with a small sack of moist salt which they carry tied to the end of a stick.

Ticks are not uncommon especially in the jungle areas. One variety of tick carries a disease somewhat like our Rocky Mountain spotted fever, known as "Indian Tick-Typhus." When traveling through tick-infested country, tuck your trousers in your boots, and do not lie down in the grass unless absolutely necessary. Remove your clothing two or three times a day and search the body thoroughly for ticks. Never remove a tick with your bare fingers. Place a piece of paper or cloth about the tick before touching it, or remove it the same way as a leech—with a knife or a lighted cigarette.

India reputedly has more deaths from snake bite than any other country in the world. Poisonous snakes frequently live close to human habitations which they visit at night in search of food. Since on cool nights snakes like to get into warm places such as shoes and clothing, all clothing and shoes should be carefully examined in the morning before getting dressed. Before getting out of bed at night turn on a flashlight to make sure that there are no snakes on the floor. Always look in cupboards, drawers and other dark places before reaching in with your hand.

If bitten by a snake, the patient should be kept quiet and medical attention obtained as quickly as possible. Do not give the patient a drink of whisky or other alcoholic beverage, and do not permit him to exert himself. Follow the procedure set forth in paragraph 128, FM 21-10. Start the treatment immediately. If the bite is on an arm or leg, apply a tourniquet just above the bite. This tourniquet can be made from a neck tie, handkerchief, bandage, piece of string or vine. A cross incision, one-half by one-half inch, should be made over each fang puncture. These cuts should be from one-quarter to one-half inch deep. Suction should then be applied for at least 30 minutes. This may be done by either sucking with the mouth or by heating a bottle and applying its mouth tightly over the wound. When the bottle cools, considerable suction will be produced. If any cracks or sores are present on the lips or inside the mouth, place a small square of rubber over the wound and suck on it to avoid having the snake's venom come in contact with the mouth.

Every type of venereal disease is present in India. Syphilis, gonorrhea and chancroid are especially prevalent. Professional prostitutes are nearly always infected with one of these diseases. The great majority of clandestine pick-ups are also likely to be carriers. The soldier who has been exposed to these diseases should go immediately to the nearest Army prophylactic station or, if one is not available, use a chemical prophylactic kit. Mechanical prophylaxis should always be used.

Leprosy is widespread in India but it is not as easily contracted as many people believe. Avoid actual physical contact with a leper and there is no danger of getting this disease.

Trachoma, a very serious disease that leads to blindness, is common in all parts of the country. This is a disease of filth, and may be avoided by refraining from rubbing the eyes with soiled fingers. It can be transmitted from one person to another by means of a common face towel. ☆

"IRON ASS" ... was the name

By
Captain B. W. Crandell
EIGHTH AIR FORCE

THEY used to think their C.O. was a slave-driver, a hard, unyielding, unsympathetic man. "Iron-ass" was the name.

There were other descriptions, too, of this B-17 group commander during those two sweltering months back in the States when he was whipping his combat crews into shape.

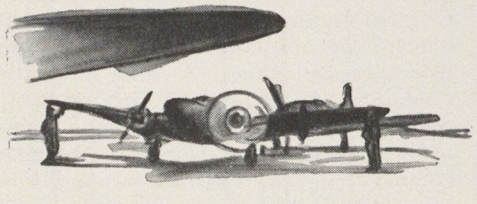
But here at a bomber station "somewhere in England" the same men call him "absolutely the best C.O. in the Army."

The story of the transition is an interesting one. It was a transition not of the C.O. but of his men.

They know him as the rare paradox of a commanding officer who almost never talks while he's working. But, when he does take a long puff on his cigar and opens his mouth, he's to the point; he has the final answer and only answer, because it has been thoroughly thought out.

This characteristic brevity, and the restrictions he slapped on them when he was desperately attempting to get them trained for combat, resulted in the "iron-ass" reputation right off the bat. They had their reasons for calling him that; he had his for being that way.

When he first took command of the Group it had four battered B-17s, a few experienced pilots, almost no experienced navigators, bombardiers, radio men or



gunners. And only two months to prepare for the "major league." The first thing was to get the airplanes and crews working on a 24-hour schedule, squeezing every minute of training time into them that was humanly possible.

They didn't like it then. It was no gentleman's way to go to war. They cursed and sweat, then cursed some more. But they flew, far into the night—bombing practice, gunnery, navigation, formations and the myriad things a group must know before tackling the Luftwaffe. Their C.O. drove them, day after day, for two months.

He kept it up when they arrived in England, restricting everyone to camp for three weeks. It was the only recourse. A mountain of work lay ahead and it had to be done immediately. British radio procedure, aids to navigation, aircraft recognition, more gunnery and bombing practice, and a hundred other necessary items.

It was his theme of "work and more work" that he promised would pay dividends. And it did.

On the first five of the Group's missions not a Fortress was lost. The Commanding Officer went on them all, taking over different positions in the crew. Once he was pilot, another time co-pilot, and on one raid he was in the top turret manning a pair of caliber fifties. He made it his job to understand the problems of each man he ordered into combat.

Among other things, he taught them a new formation. It was born in a bit of psychology.

He ordered up the Group on a training flight one day and, before the pilots knew that they were participating in an important experiment, they were obeying directions coming over the radio.

"In a little closer, Martini—stay at that height, Pyle—put your squadron higher and to the right, McGehee—get more space between elements, Preston . . ."

It went off smoothly, the C.O. reports, but adds that he doesn't think it would have been smooth if he had told them before hand that they were going to try something new and difficult.

The experiment proved that Fortresses could fly the formation, which on paper seemed to him the best defense against enemy fighters. Although he claims the formation is "nothing new—just an adaptation of the old stagger formation—" it has achieved new results for high-altitude warfare in this theatre of operations.

The Group has suffered the comparatively low loss of thirteen airplanes on 25 missions including the March 31 raid, and two of the Forts lost to enemy fighters were first forced to drop out of formation because of mechanical trouble.

Along with this tight defense, the C.O. drills the gunners to start shooting at enemy fighters, if possible, before they dive in to attack at close range. It has the same effect as a boxer's left jab. Popping away at the Focke-Wulfs and Messerschmitts while they're waiting for a break keeps them off balance.

"I don't care how few fighters you knock down," he reassures them. "Keep them away from the formation."

The Group is proud of coming home with few claims. For their C.O. continually tells them that their primary purpose in the war is to pick up a load of bombs and drop them on the target. This indoctrination has had other results, too.

The Group has had fewer "abortive" aircraft—those Fortresses which take off but return to home base without dropping their bombs. There always are good reasons for "abortives," but the men have better reasons for hitting their mark.

New adaptations of this tight, deadly formation to meet new enemy tactics, are continually changing the original pattern.

"We've got to keep a step ahead of the Luftwaffe," he says in one of his rare moments when he expresses the obvious.

Although policy now is against commanders going on all missions, he always goes when a new target, or new risks, are involved. The first raid on Germany, for instance—

(Continued on Page 44)

WE INTRODUCED THE JAPS TO THE B-26

By Major Dill B. Ellis

OUR flight of five B-26s was on a mission to bomb a Jap airdrome at Lae. We went in at 1,500 feet, laid our bombs in the dispersal bays alongside the runway, swung out over the harbor and were suddenly jumped by fifteen or twenty Zeros.

One of our planes was badly hit and it "went in." The remaining four of us poured on all the coal we could and kept low over the water. Soon I felt my own ship, which was the lead plane, swerve heavily. The pilot of a plane behind me radioed that my right wing was afire. A 20 mm cannon shell had put a hole in the wing that you could have stuck a boot through. But we were still flying and the flame in the gas tank soon went out.

Just then our navigator, Lieutenant Leon Kallina, tapped me on the shoulder. I presume he was going to tell me about that right wing. Before he could speak he fell and I sent Lieutenant B. B. Moore, my co-pilot, back to find out what had happened. Kallina was dead. A machine gun bullet had gone right up through his chest as he stood behind me.

By the time the co-pilot returned to his seat, a Jap fighter had attacked from the front and riddled the nose of our ship. Our bombardier, Lieutenant R. E. Falls, had been seriously hit. Falls, however, was still able to stay on his guns and he got the Jap fighter. That was a satisfaction, believe me.

Some of our other planes were also having a bad time. A ship flown by Captain J. C. O'Donnell had probably suffered most, with one engine completely knocked out. The Japs, realizing he was crippled, swarmed around him like bees. But his tail gunner was a very cool customer named Corporal Henderson who knew a couple of tricks himself.

Henderson, pretending his guns were

"The B-26 is every inch a warplane," says this combat pilot, who tells why the Japs think so too.

jammed, openly invited a rear attack. Every time a Jap fighter accepted the invitation, Henderson would get him with a quick burst. He brought down three Zeros this way while the plane was flying along on one engine.

The Zeros chased us 100 to 125 miles down the coast before they turned back. We still had to cross the Owen Stanley Mountains to reach our base at Port Moresby and this, in itself, was a problem.

There was one short-cut but it was through a high pass in the mountain range and it seemed unlikely that O'Donnell's ship—with one engine gone—could make the altitude. On the other hand, I had a badly wounded man aboard and my gas was going fast.

I gave orders for the other three ships to stick together and fly back to Moresby by way of a low pass further along the range, while I took the short-cut.

HERE we got into more trouble. Two Zeros that had been on a raid against Moresby were using that high pass themselves and jumped my ship. As luck would have it, not a single man of our crew was on his guns at the moment. They were all in the tail, taking care of the wounded bombardier.

I didn't know this, of course, and turned right into those two Zeros. They didn't know it, either, and broke away without firing at us. We returned to Moresby without further incident and a little while later were joined by the other three crews. All our planes were badly shot up—it was a day when you thanked Heaven for self-sealers—and we had lost one ship. But we had brought down either seven or eight Zeros.

This was typical of the many active days our medium bombardment group wrote into its record of operations. This happened to be on May 28, 1942, but it was only one of the many calls we paid on Lae, Rabaul and Salamaua.

We had set out from the United States in February. Our B-26s were transported by ship part way across the Pacific and flown from there, island by island, to Australia. The group began operations in April.

We were stationed at Townsville, running most of our missions from Port Moresby. The airfield at Moresby was pretty rough in those days. The runway was made of dirt and gravel and had a slant to it. You took off downhill and landed uphill. And, since it was being pounded rather regularly by the Japs, you had to be careful of the soft spots—the places where bomb craters and shell holes had been filled in. However, it was 4,700 feet long, which gave us plenty of room and later the runway was leveled and equipped with a mat.

All our crews had had a lot of time in B-26s, particularly during the Louisiana maneuvers, and our ground men had learned how to maintain the ships under difficult circumstances in those same maneuvers. This helped enormously and was one of the reasons, I am sure, why our group had relatively low losses.

During the first eight months of our operations we flew always without fighter protection. In addition to the raids against Rabaul (although this was later abandoned as too long a mission for efficient use of medium bombers), Lae and Salamaua, our group took part in the Milne Bay and Coral Sea actions, and was very active throughout the whole Buna campaign. From the time that Jap ships unloaded troops on Papua until, months later, they were driven back across the Owen Stanley Range and finally eliminated from the whole area, we were busy attacking ships, storehouses, ground troop concentrations, the airdrome at Buna and other medium bomber targets. Sometimes we flew two missions a day.

In the course of these and other operations our group shot down more enemy aircraft than any other medium bomb group in the Army and now stands, I believe, either third or fourth among all bomb groups in this respect.

Our early success against Jap fighters was due in some measure to the fact that they had never seen B-26s before.

It's a tough ship to be introduced to, even though the planes we had were not nearly as heavily-gunned as the current model. The Japs had quite a time deciding upon the best approach.

Jap fighters experimented diligently in their attacks upon us until they found what they evidently believed was an advantageous approach, which thereafter they adhered to religiously.

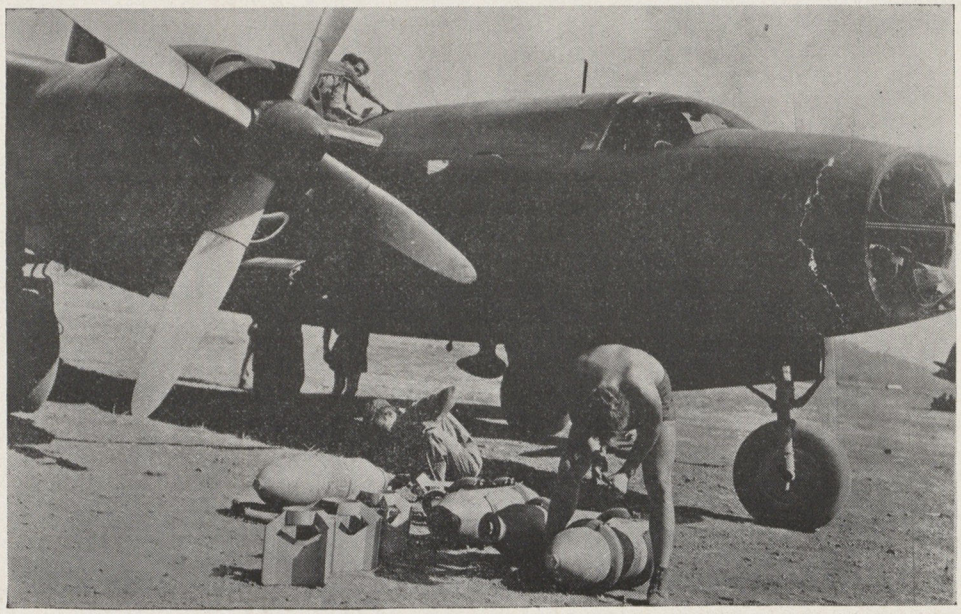
They *always* continued to show us plenty of respect, however, and with good reason.

The B-26 is every inch a warplane. It has speed, heavy armament and sturdiness.

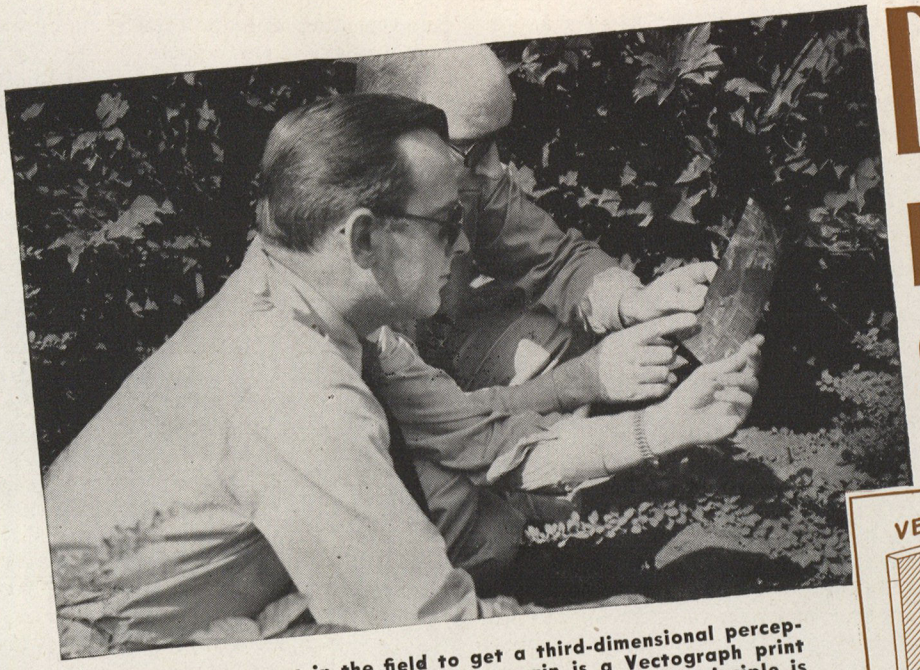
Speed, of course, is a great virtue. While in a long chase Zeros will frequently be able to make several attacks, there are many occasions when this is not the case. I remember a day when I was jumped by seven enemy fighters and they had time only to make one pass before I found cloud cover and got away. This speed—together with the fact that the plane is so maneuverable that it can be handled like a pursuit ship in many respects—is a tremendous asset in combat.

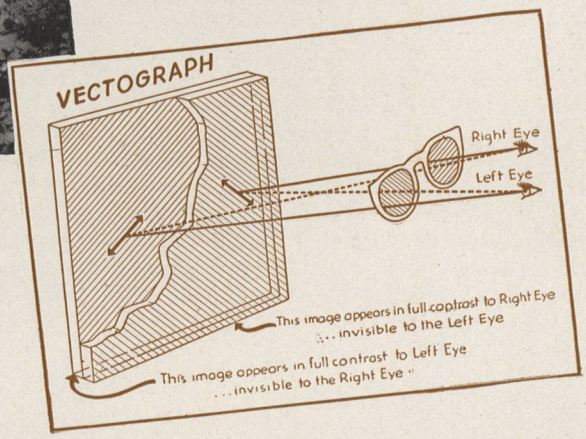
And so is the ship's strength. It will take a terrific beating and generally get you home somehow, unless you yourself are put out of commission. Even then, there's still a chance. The crew of a plane in our group once was severely shot up while attacking a Japanese ship. Both pilot and co-pilot were disabled by gun fire, one being unable to use his legs, the other unable to use his arms. By working together, however, they brought in the plane for as nice a landing as you'd ever want to see. ☆

Loading a B-26 at a Port Moresby base prior to a raid on New Guinea was a scene that was often duplicated in the author's squadron.



DEPTH PERCEPTION SIMPLIFIED





All you need out in the field to get a third-dimensional perception of a reproduction of enemy terrain is a Vectograph print and a pair of polarized spectacles. The Vectograph principle is illustrated in the figure at right. Light polarizers in the print and spectacles, crossing at right angles, give the double-image Vectograph the effect of depth.

By Lieutenant Colonel M. E. Parks

HEADQUARTERS, ARMY AIR FORCES

CREW members of a bombardment group gather in the briefing room. The briefing officer snaps out the lights and flashes a lantern slide on the screen. The slide shows a piece of enemy terrain, but it has the typical hazy appearance of a double exposure and, with the naked eye, it is somewhat difficult to identify. The men in the room then put on what appear to be ordinary dark sunglasses and the reproduction comes to life. The picture actually takes on *depth*. That tree-bordered stream snaking across the terrain shows up, not as a stream, but as flat paint disguising an enemy airfield. Strictly a camouflage job. And that patch of woods. More camouflage. The trees slope upward in tell-tale humps that mean not woods at all but a couple of camouflaged hangars. Now the crew has its target.

Three-dimensional pictures of this type are now being made by Air Force photographic units. They are called Vectographs. Aside from their double image appearance without the glasses, they look and handle much like ordinary photographs and are just about as convenient to use. As projection slides they can be viewed by an entire group with the aid of only simple Polaroid Three-Dimensional Picture spectacles. Even handier, Vectographs can be made up as prints to be held in the hand, hung on the wall or mounted in book form for detailed study.

The three-dimensional picture principle is not new. In the first World War photo intelligence officers used three-dimensional methods on aerial photos to dig out information that could not be obtained from ordinary flat pictures. But the job required the use of two paper prints, a stereoscope made up of mirrors or lenses and a work table, and the employment of considerable patience and even greater skill. The stereoscope still represents the best method of obtaining quick three-dimensional views of aerial photos but expert handling remains a prerequisite.

What is new about the Vectograph is that it provides an easy way for non-experts to benefit from three-dimensional views and permits mass reproduction of such pictures for new and important uses.

THE Vectograph also affords a much larger view than the stereoscope. In addition, photo labs may piece together any number of these separate area views into a "model" of hundreds of square miles of territory to serve as quick substitutes for maps or to show information that maps cannot present. These big Vectographs can be studied by a number of people at once, whereas the stereoscope is strictly a one-man show.

This new method is now an established service in the AAF, the Navy, Marine Corps and the RAF. Air and ground force groups in the South Pacific, the Aleutians, Africa and Britain are having them made up by photo units already trained and equipped to do the job.

The Vectograph employs a simple principle. By placing your hand over one eye and looking around, you can see that it takes two eyes to get a true three-dimensional view. For the same reason, it takes two different pictures—one for the right eye and one for the left eye of the observer—taken from two different focal points, to make a three-dimensional picture. Furthermore, your eyes have to pick up these two different images at the same time and see them as if they were in the same place. They must be shown so that the right eye sees only the right-eye image and the left eye only the left-eye image, while the brain fuses the two into a single three-dimensional picture.

With the Vectograph, the two images required for the three-dimensional picture occupy the same piece of the special Vectograph sheet, one image right over the other, without interfering with each other when viewed through polarizing spectacles.

This can be accomplished because the Vectograph image is rendered in terms of "degree of polarization" rather than in pigment, dye or silver particles.

The Vectograph sheet has two sides, both actively engaged in the job. The printing solution converts the film surfaces into light polarizers, which behave as if they were made of optical slots. Light is blocked by a pair of polarizers whose slots cross at right angles with resultant blackness. On the other hand, light is passed most easily by a pair of polarizers with parallel slots. As a polarizer, each face of the Vectograph film acts as a set of optical slots. The viewing spectacles contain polarizing eyepieces. In combination, the spectacles and the polarizing Vectograph images create and control the pattern of blacks, whites and grays which the eyes see. To separate the pictures, one for each eye, the optical slots of the two Vectograph polarizing images cross at right angles; the lenses of the viewers are similarly arranged. Each eye is matched up with its corresponding image.

Without the glasses, the Vectograph print, held in your hand or projected on a screen, looks like a fuzzy double-exposure. With them, the two images on the sheet are unscrambled so that each eye gets its own perfect image to look at and combine with the other into the single depth view.

Pictures of machinery, guns and other training subjects may be made with a special double camera taking the two views at once, or a regular camera, such as the Speed Graphic, taking one picture from one point and moving sideways a few inches before snapping the other.

The Vectograph with its polarizer principle was invented by Edwin H. Land, president and director of research of Polaroid Corporation, working with Joseph Mahler, a specialist in methods of

The scope of photo interpretation has been broadened by this new third-dimensional technique

three-dimensional presentation. The process was announced late in 1939 and quickly developed into practical form for war use with the encouragement of the AAF and other branches of the service.

A first-quality clothes wringer is the most elaborate piece of special equipment used in making Vectographs.

The process starts with a pair of stereoscopic negatives obtained by any of the usual methods. Here aerial photography has a great advantage over visual observation. A pair of photographs made with standard sixty percent overlap gives the effect of spreading the eyes as far as the camera stations are apart, greatly heightening the scale of relief. Terrain that looks perfectly flat to an aerial observer appears in full relief in the Vectograph.

ANY of the standard aerial cameras can be used, and there is no special trick in taking the pictures. The aerial photographer simply follows the regular rules for making reconnaissance strips.

He prints the negatives photographically on Eastman Washoff Relief Film, the same film used for making color prints, and then soaks them briefly in a special printing solution, inserts the Vectograph sheet and runs the sandwich through the wringer. The images begin to appear and, in less than a minute, they are complete. He next strips off the relief films from the Vectograph and sets them to soak for the next print. (The process is detailed in T.O. 10-25-23.)

Selected AAF photographers take only a week's post-graduate course to add Vectography to their regular bag of tricks.

After two practice runs through the process, they are usually able to start with a pair of negatives and turn out a print, dried and trimmed, in about thirty minutes. Succeeding copies take about one man-minute apiece. The process can be carried out in any place that can be darkened—the Air Force standard trailer, a blacked-out truck body, any base or field photographic unit. Service personnel already have been turning out Vectographs of satisfactory quality under field conditions in the combat theatre.

Although new uses for Vectographs will arise from time to time, their principal military value may be summed up as follows:

Briefing combat teams, such as bomber crews, assault parties, landmining groups, engineers, air support groups, ship-to-shore artillery units and parachute troops.

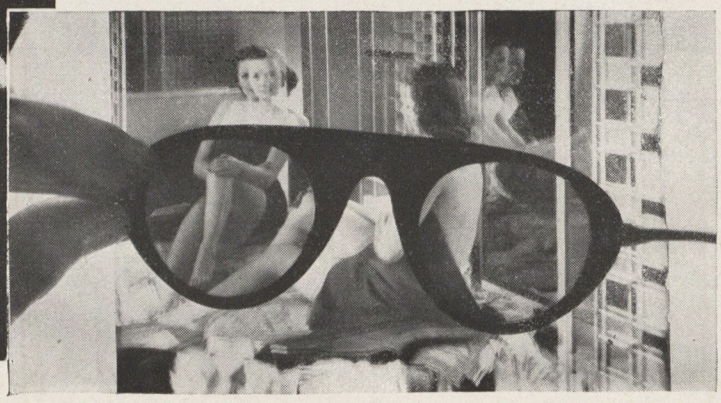
Staff work—for tactical planning over unmapped or sketchily-mapped territory.

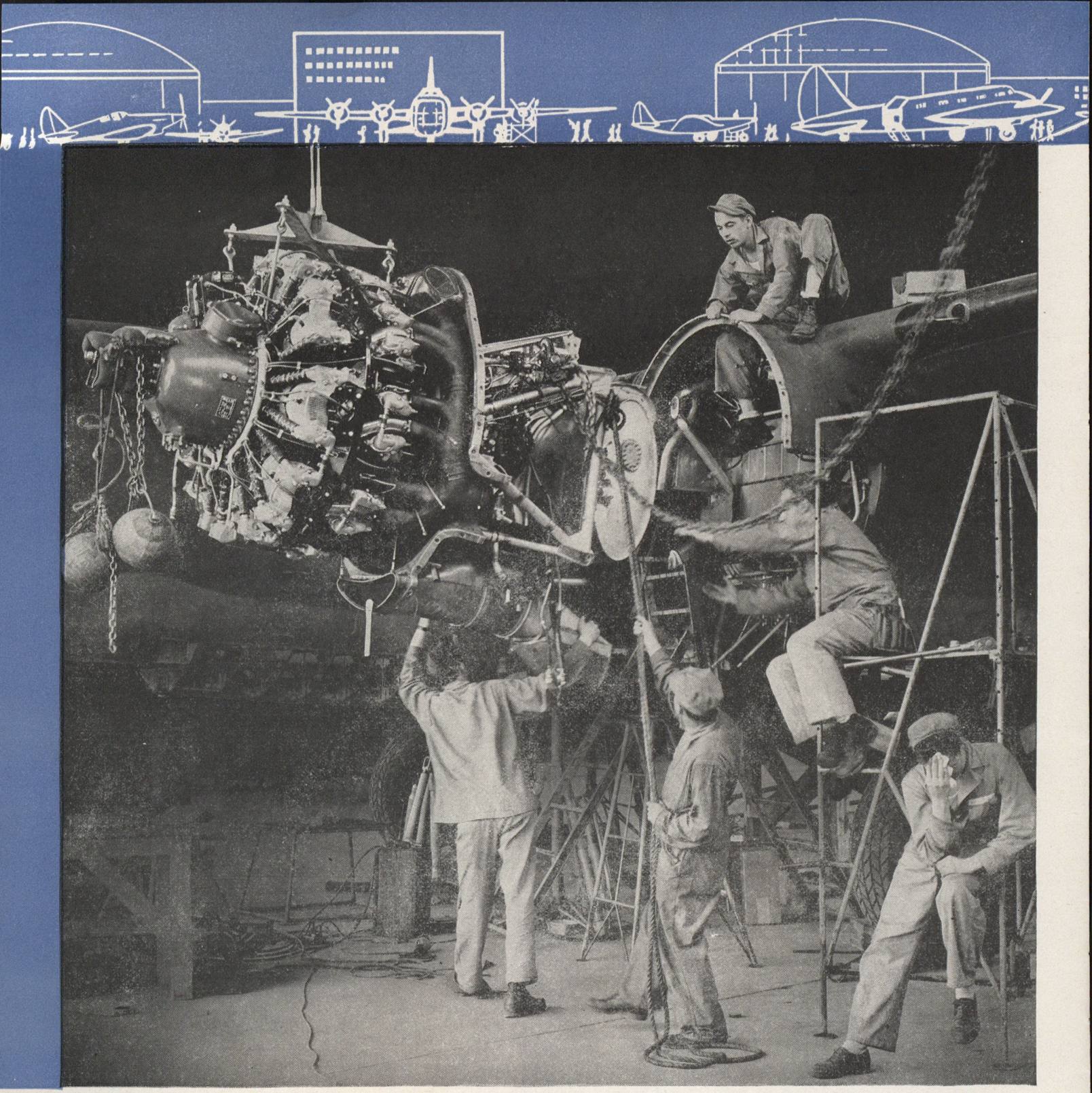
Intelligence reports—for conveying intelligence information to field officers who need not be equipped with stereoscopes in order to be thoroughly familiar with the location and appearance of enemy supply depots, dumps, road crossings, bridges, communication bottlenecks, fortifications, the effects of bombing and shellfire, disposition of enemy artillery and desirable target objectives.

Training large classes of student mechanics, gunners, navigators, pilots and other personnel who must assimilate a lot of information rapidly on subjects and devices that are difficult to understand from a flat picture. ☆

Here's how a Vectograph slide of a target area may be viewed through third-dimensional glasses by a number of people at the same time.

There's only one girl in this picture. It's the Vectograph, plus a couple of mirrors, one on the right and one in front of the girl, that has you seeing double or triple or quadruple. This is a photograph of a Vectograph print, with its hazy, double-exposure appearance to the naked eye. Through the Vectograph spectacles held over the print, you will note that the legs and arms of the mirrored image at the left appear smooth and in focus, while the shoulders and face do not. Similarly, the panel back of the girl at the right shows up single in the right lens of the spectacles and double outside. You actually are seeing a different picture through each of the lenses. If you had the opportunity to look through these glasses at the Vectograph print, the combination of the two images, one seen by each eye, would produce the third-dimensional effect. And it isn't bad, either.





WHAT'S WRONG WITH THIS PICTURE?

H'M. Better ask what's right about it.

We might more appropriately use the title "How NOT To Change An Airplane Engine." Nine specific mistakes in the picture, listed on the opposite page, were pointed out for us by Private First Class Alfred Purinton, who is the mech tugging on the rope. Did he miss any?

This example of how not to change an engine was posed in the interest of better maintenance practices by men of the Air Service Command. They are members of the 88th Repair Squadron of the Fairfield, Ohio, Air Depot, Control Area Command. Left to right, they are, Private Frank De Chirico, Privates First Class Purinton, Ruben Wetherell and William Wharton; astride the nacelle is Private First Class Noah Reese.

ON THE LINE

Mistakes on Opposite Page

Reading from left to right

1. Just notice, will you, how all those scattered tools and unnecessary equipment clutter up the mechs' working space. This greatly interferes with efficiency in maintenance procedure and creates many hazards to safety.

2. Weights on the prop shaft should not be used (unless a sling isn't available). Two weights do not hold the engine in correct position for installation, yet a third weight might distort the prop shaft. A sling is the thing. Reference: T.O. 02-10GA-2.

3. Sooner or later someone of you five mechs is going to be looking high and low for that ratchet wrench. See it? It's there in the oil cooler air scoop. Every tool in its proper place is readily located —no time ON THE LINE for a game of "hide the wrench." The same thing applies to the rod in the aperture of the leading edge of the left wing.

4. Never, never, stand under an engine. There is not written guarantee that an engine won't drop from its hoist.

5. The engine mounting bolts are in backwards, fellows. You'll find out you can't install an engine this way. Reference: T.O. 01-1-58.

6. What is this anyway, tug of war? You, pulling at the rope, you're wasting manpower. The chain attached to the engine mount is another superfluous operation. Both mistakes should be eliminated by using the sling already mentioned. Never use a heavy chain for guidance because of the danger of smashing tubing, conduit and junction boxes. Also, the chain might swing backwards and puncture the tank; more important—if it falls, it might kill a mech.

7. Hey, you up on the nacelle. You're about to commit four unpardonable boners. You're swinging foot can rupture the fluid lines. When the engine fits into place your leg will be mashed between the tank and the firewall. You might kick that block off the wing with your left foot. The fingers of both your hands are in a swell position to be smashed.

8. The maintenance stand on the right is improperly placed. It should be closer to the plane to provide safety for that mech reaching toward the engine.

9. Look out for that ratchet wrench just ready to drop off the maintenance stand. And it's right in line to fall on the head of your buddy.

P.S. You might conclude that the dejected mech with his handkerchief to his head is deploring the messy job in this picture. But it's even more serious. He's a victim of the August heat, largely because he forgets to take those salt tablets and plenty of water. But we won't count this one against you.

Taxi Accidents . . .

Many taxi accidents are caused by improper care and checking of brakes. On inspection of several airplanes that were damaged in taxi accidents recently, one was found to have an 0.110 inch clearance in the brakes. While taxiing another of the airplanes the accident officer found that the right brake failed twice during a test involving about twenty stops and turns. One failure is one too many. Brake clearances should be checked every fifty hours and the system kept free of air.

And don't forget that airplanes should not be taxied from the maintenance line. Push or tow them into the clear before starting the engines for taxiing.

Pick Ups . . .

At a southern airbase, an inspection disclosed enough nails, screws, and other assorted bits of metal lying loose on the flight line to give any salvage drive a substantial boost. Damage to tires and tubes of airplanes taxied over an improperly policed area may have dangerous after-effects. Lives of pilot and crew may be jeopardized. Would you feel your feet were safe from cuts if you walked barefoot around your apron and runways at night?

In the Cockpit . . .

Remember that placards placed in cockpits calling the pilot's attention to important information are useless unless he can *read* them. If the signs are badly defaced or deteriorated, see that they are replaced by new ones.

Check This . . .

Learn the location of the main fuel line strainers on gasoline servicing trailers. Have the proper dust cap on fuel servicing nozzles. And is data of inspections stenciled on the side of the trailer?

It Happened in San Juan . . .

Not so long ago on the tropical island of Barbuda in the Antilles, a British pilot made a forced landing. Ingenuity of three AAF men enabled him to take off again in short order.

First Lieutenant Daniel R. Kelly, Technical Sergeant George L. Hilton and Private Ralph W. Alford neared the scene of the wreck with an Army crash boat.

A monthly maintenance roundup prepared in collaboration with the Air Service Command and the Technical Inspection Division, Office of the Air Inspector.

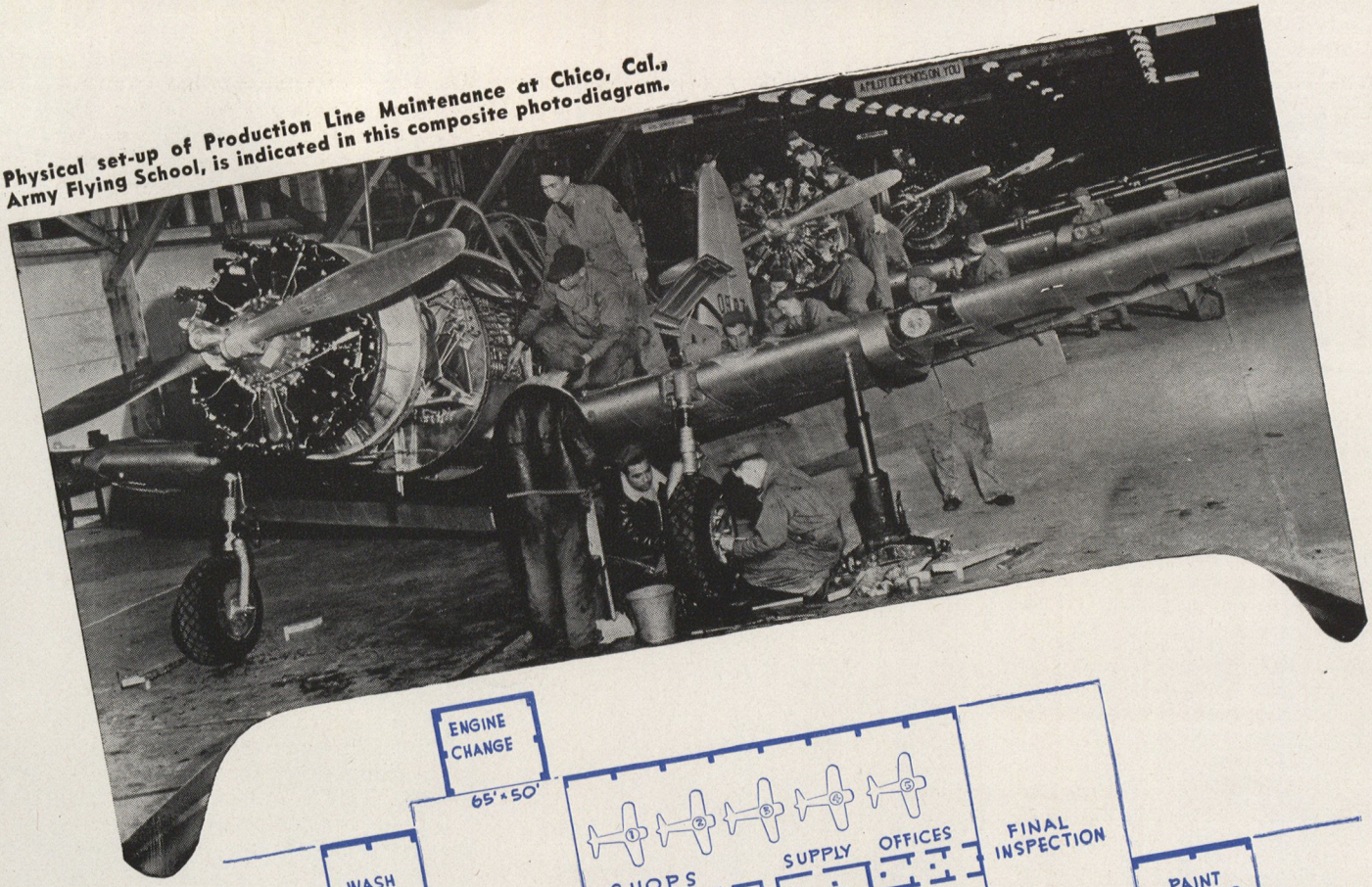
Despite bad weather they wound through dangerous reefs, followed a narrow jungle path and found the uninjured pilot.

Without facilities of a modern depot and machine shop, the men foraged a propeller and carburetor from a small plane. They spliced front and rear struts with an oar from the crash boat, using tent pegs and screws from the boat's supply. A bent eye-bolt on the rear spar was straightened after it was heated over a small gas stove.

The job was accomplished in three days. The Britisher unhesitatingly climbed into his plane and flew it to an air base where full repairs were made. ☆

It isn't often that a sergeant pins the gold bars of a second lieutenant and the silver wings of an AAF flying officer on a newly graduated aviation cadet, but Second Lieutenant John Adams was proud to have Sergeant Harold M. Adams do the honors when he was commissioned at ceremonies at Luke Field, Arizona, Army Advanced Flying School.

The reason — Sergeant Adams is Lieutenant Adams' father, and a mech ON THE LINE in that same squadron where the Lieutenant was trained.



Physical set-up of Production Line Maintenance at Chico, Cal., Army Flying School, is indicated in this composite photo-diagram.

PRODUCTION LINE MAINTENANCE

By Lieut. Colonel Charles E. Cox

AAFWCTC, SANTA ANA, CALIFORNIA

ONE of the major factors in the air crew training record of the Army Air Forces has been Production Line Maintenance, originated last fall by the AAF West Coast Training Center and now being adapted for use at every basic, advanced and specialized flying school in the Flying Training Command.

PLM makes maximum use of every available technician and, at the same time, educates the new mechanic with the greatest possible speed. Its installation has invariably resulted in reduced man hours per inspection, higher percentage of airplanes in commission and, above all, better maintained equipment.

Production line maintenance is not an innovation; it's an evolution born of necessity. The accompanying administrative chart gives the organization breakdown for accomplishing all 50-hour and 100-hour inspections, utilizing the highest type specialists procurable at a post. The importance of maintenance is indicated by the contemplated creation of the position of Director of Maintenance, or at least an S-4 Officer who teams up with the Director of Training. Under him come administrative personnel, hangar chief, specialty shop crews, engine change crew, and so on. A station operating 150 airplanes will have a PLM organization approximating 150 men, one-third of whom are apprentice trainees. Trained men are procured by the assignment of detachments from all school squadrons to accomplish the organization total.

Airplanes up for 50-hour or 100-hour inspection are delivered to the uncowl apron by the school squadron. Primary inspection for such apparent faults as oil leaks is made as the uncowl crew removes cowling, inspection plates and batteries, drains oil pump and cleans strainers. These parts and the airplane then move forward to the rack where the wash crew takes over. Fifteen minutes on the wash rack and the plane moves on to inspection. Cowling goes into a portable dolly which rolls to sheet metal shop for repair. Inspectors fill out worksheets, itemizing operations in addition to normal inspections found and reported by the school squadron. On 100-hour inspections the radio crew removes the set and the equipment goes to the radio shop.

The chart gives the organization breakdown from this point forward. The work stations are each manned by one staff sergeant, one sergeant, one corporal, one private first class and four students.

From four to six stations may be designated for a given job. Completion of work at Station 1 is followed by the manual movement of the airplane to Station 2 and so on to 3, 4 and 5. Each

Streamlining the aircraft maintenance program in the AAF to reduce inspection man hours, speed the education of new mechanics and keep a greater percentage of planes in the air.

station records the time required to complete each operation. Specialty shops and engine change have crews comparable to the respective stations, although a variable is encountered here in that propellers and welding (brackets, minor work, etc.) do not require the same number of specialists as radio and sheet metal. Students are also assigned to the specialty shops. Most of them are recruits having had civil experience in such work. At the last station, the airplane receives the final check, followed by base technical inspection. Pre-flight check and return to flying status follow.

Some advanced flying schools use a three-shift operation. Basic schools accomplish night maintenance with a combination double and staggered shift. Airplanes are received for inspection at 1730 o'clock. The first shift, all but station work crews, is on from 1700 until 0030 o'clock, and the second shift from 0015 until 0800 o'clock, or completion of work. This permits an overlap at midnight and a welcome hot meal.

Work-station crews report successively at 1800, 1900, 2000 o'clock and so on, and remain until their work is accomplished. Since planes are not available until the end of the day's flying and since they require time to wash and move through the line, the reason for staggering of hours is obvious. One swing shift per line, capable of accomplishing any work, is always available to permit one 24-hour pass per week for each man. If final inspection should determine that the wheel and brake crew, released from duty prior to the final inspection, has failed in any particular, this crew is returned to the hangar to accomplish the correction. No stoppage of the production line is permitted by the need for sub-depot work or lack of parts. No specialty shop tasks are undertaken that slow the line.

Supply becomes the master issuing agency and reduces squadron technical supply to a bare minimum. Supply personnel are on duty 24 hours a day to stock up during the day and to issue at night when PLM is in active operation.

Students and one experienced man move from station to station weekly and are graded by the station leader. These grades accompany the trainees upon his return to his squadron. During inclement weather, additional training is given by assigning trainees to read technical orders under the guidance of an experienced man. The operation demands complete cooperation among school squadrons, sub-depot and the PLM organization. Sub-depot commanders recognize that the system will relieve them of small odd jobs, permitting full effort on T.O. compliance, accident repair and depot inspection repairs. Personnel on PLM must be relieved from special duty during work hours.

There must be cooperation on promotions. Weekly meetings between squadron officers and PLM officers are held to review engineering standards and division of work.

Importance of school squadrons is not reduced by installation of this system. They concentrate on daily and 25-hour inspections, clean canopies and cockpits, and do all the miscellaneous tasks that make up efficient service to the pilot. Furthermore, as students and trained personnel are all rotated through PLM, the activity becomes a community effort. The squadrons all participate, all profit.

Prior to PLM, airplanes at times were grounded for lack of parts when the needed item was actually in the supply section of another squadron. Under a Director of Maintenance, the cause for grounding any plane is investigated immediately. Fat and lean extremes, such as one squadron with a Kerrick cleaner and five others with none, is remedied by assignment of the cleaner to PLM, where all airplanes are washed every fifty hours. The station breakdown of work is continually subject to improvement. Men with some statistical training, whether or not they have had aeronautical background, study parts exchange, movement of men and equipment, and utilization of critical tools by all shifts on the relay race principle. Their recommendations are saving plenty of time and paper work.

With reference to the physical set-up chart, the 130 by 160-foot building is a departure from the standard hangar in that it is specifically designed to *maintain* airplanes, and not just to house them. Supply, shops, power, light and air lines are centrally located to reduce movement. Work benches are placed along the center aisle. Lights on counterbalances are designed to fit the needs of individual work stations.

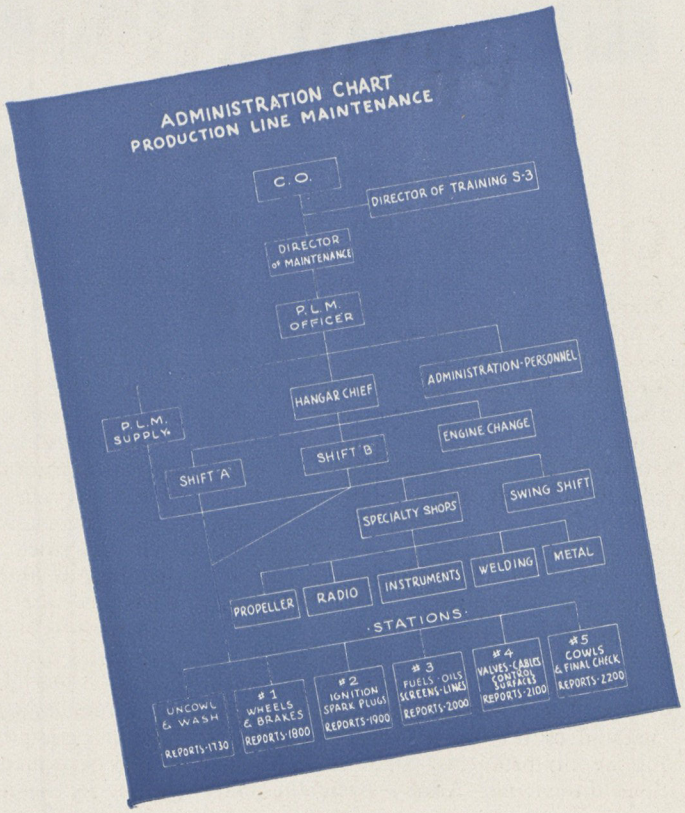
The Corps of Engineers has estimated cost of the building along at $42,000, compared to $62,000 for the smallest standard hangar, the 80-by-120-foot OBH 2. The building "fits" a unit of 150 airplanes as standard equipment, in much the same way as a tool kit and motor cover go with one plane.

Each post PLM is a production line of students. Training of maintenance and engineering personnel and the accomplishing of inspections can function on the same primary-basic-advanced basis and with the same centralized supervision as pilot training.

Excerpts taken at random from stations' reports on production maintenance best summarize the record to date:

"Trains better mechanics in a shorter time."
"Greatly reduces inspection and engine change man hours."
"Prolongs airplane life and increases time between overhauls."
"Releases more airplanes to flying department, permitting the station to operate with fewer ships."
"Reduces number of airplanes grounded during day because of small defects."
"Anticipates parts needed in advance."
"Gives planes better appearance."
"Maintains airplanes better."

As one Director of Training put it, "It's a swell feeling to know that all our airplanes are being inspected by the best men we've got." ☆



CARGO FROM THE SKY

By Theodore A. Berchtold

WRIGHT FIELD

CARGO parachutes, varying in diameter from doll-like two and one-half-foot chutes for dropping messages to giant 48-foot nylon or rayon chutes capable of dropping 3,000-pound loads, provide part of the Army's answer to the problem of supplying ground troops with equipment and materiel.

Developed in the Equipment Laboratory at Wright Field, cargo parachutes are being used by the Army Air Forces in increasing proportions in areas where dropping supplies from the skies is the quickest and most practical method of licking the supply problem.

Although the Army's parachutes vary in size, the 24-foot chute has become the most widely known because of its all-round usefulness. This parachute can drop loads up to 300 pounds and may be used for both cargo and personnel. Formerly made of cotton, this chute is now manufactured chiefly of rayon with a resultant increase in strength.

The 48-foot chutes, the Army's largest, are utilized for dropping such equipment as the heavy iron matting used for building emergency runways, land-mines, demolition equipment, mortars and other heavy war materiel. These chutes are released by the Army's heavy bombers.

A 12-foot parachute for dropping sea-rescue kits is one of the latest types developed by the Army. This chute is used to drop supplies to crash survivors at sea until such time as planes can be dispatched to rescue the men.

To enable ground troops to identify the parachutes when they land, variously colored canopies are used, each color representing a certain kind of cargo or equipment item. A parachute with a red canopy, for example, might indicate that a machine gun will be found inside the delivery container; a green chute might identify its load as a piece of demolition equipment, and so on. Just to keep the

Parachutes for everything from a bottle of medicine to steel runway matting are providing a big answer to the supply problem in this war

enemy guessing in case it discovers what the color combinations mean, the combinations are changed from time to time.

Although cargo parachutes have only recently been brought to wide public attention, their origin is not a development of the current war. They were first used by the French in 1918 when French flyers dropped supplies to troops along the Belgian border. Since this development occurred during the closing days of World War I, little more was done in the development until the present war when military experts again saw the possibilities of using parachutes for cargo purposes.

To the parachute research experts at Wright Field, cargo chutes, from a technical point of view, are no different than chutes used for dropping personnel. Basically, whether the parachute has attached a human being or a freight cargo is of little difference for the problem is simply one of dropping a "dead load." Obviously, safety factors are vastly more important in the one type of chute than in the other, but the theory lying behind parachutes of definite sizes to carry definite weight loads remains the same.

Aerial delivery containers, in which the dropped supplies and equipment are packed, have been standardized as the results of experiments conducted at Wright Field. There are now two general types of container. The first is a cardboard box, with fabric covering, which can be used to drop anything from bulky metal objects to delicate instruments. It is an all-purpose container. The second type is a cotton blanket roll, eighteen inches in diameter and five feet in length. Packed in this roll are such items as guns, mortars, ammunition and other materiel.

The smallest chutes—those two and one-half feet in diameter—are of great value in dropping sustenance kits, messages and other small items not exceeding one pound in weight.

So that ground forces may quickly identify parachutes dropped during night operations, special lamp assemblies resembling flashlights are attached to the aerial containers. These lamps, which have bulbs at both ends, are fitted with colored plastic caps so that the nature of cargo released can be identified easily by means of the colored lights.

Cargo parachutes have been used largely in low altitude operations to permit accuracy in dropping the supplies. A cargo chute can be released from 100 to 150 feet above the ground since it will inflate in one and a half seconds.

Research experts are now tackling the problem of high altitude dropping, but so far no satisfactory timing device has been developed to assure the loads reaching their ground destinations with accuracy. There is a vast difference in releasing a bomb at high altitude and sending a cargo parachute earthward from a similar height. To find a satisfactory solution, parachute workers are now experimenting with a number of automatic timers and they believe that in the near future chutes may be released from high altitudes with almost the accuracy of bombs.

"We're getting ideas every day from all over the country on parachute improvements," declares J. J. Maskey, chief of the parachute unit of the Equipment Laboratory at Wright Field. "The idea of using paper for parachutes is particularly popular. We have been working with paper chutes for ten years, but none of them developed to date are entirely satisfactory, due chiefly to the fact that paper has a habit of splintering."

Pneumatic parachutes are also widespread in the minds of the country's amateur scientists, largely because they involve the possibility of controlling the rate of descent. As a parachute, however, a balloon is impractical, for its bulk is excessive, to say nothing of the complications involved in the design of a suitable inflation system.

As to the ultimate weight loads that will be released by means of cargo parachutes, the answer lies in the question of how much weight the planes can carry. Parachutes can drop anything that a plane can carry and unload in flight. It will be up to the aeronautical experts of the future to provide the final answer. ☆

The A-4 delivery container consists of two general purpose cases with cargo parachute on top.

This is the type of container used to drop ammunition by means of the cargo parachute.

Fashions FOR AIR WAR

By

Private
D. J. INGELLS

WRIGHT FIELD

SEVERAL weeks ago a little group of huddled figures sat in a cold, tank-like chamber at Wright Field, analyzing a galaxy of quivering dials and instruments between short gasps of oxygen. Grotesque-looking behind their goggles, oxygen masks and helmets, they were testing the Army's latest electrically-heated clothing for combat pilots, who fight in the great new battlefield eight miles above the earth where frost-bite is as dangerous as an enemy bullet.

Inside the chamber the temperature dropped to sixty degrees below zero, as cold as the coldest Arctic freezes. The men moved about, changed chairs, scribbled brief notes on little paper pads and talked with each other as though they were in a warm parlor. They played poker, dealing from the deck with gloved hands warmed by a maze of tiny wires. They ate from a tray of sandwiches with quick, choppy bites not daring to expose their lips. They drank hot cups of coffee because water froze in their cups before they could pour it.

For eight long hours they sat inside this huge ice box, which you might compare with the one in your kitchen except that it can be made five times as cold. This was the longest test of its kind on record and the new equipment proved so effective that engineers and designers now are developing the garments in quantity.

Today there are four general types of flying suits being adopted for our airmen: the electrically-heated light-weight flying suit, the multiple type suit consisting of several layers of garments piled one upon another, shearling or Alpaca lined two-piece suits, and feather-lined, quilted flotation suits. These are the best latest types and already they are proving satisfactory under flying conditions.

Each of these garments is the outgrowth of a particular problem. When machine guns began to bristle from our big bombers, it was learned that a man of normal size clothed in a heavy, bulky flying suit couldn't climb into the new ball turrets. On long flights pilots and co-pilots who had to sit in one position for long hours complained they suffered from the extreme cold. More recently, the men who fly our planes in African skies have found themselves in a peculiar position. On the ground, temperatures are reasonably moderate, yet when they climb rapidly into the sky thermometers drop sharply to sub-zero. To remedy these demanding situations something had to be done quickly. Engineers turned to the electric suit.

IN general terms the electrically-heated flying suit is a regulation pilot's combat uniform of light weight material. A series of little flexible wires inside its lining supply it with artificial heat. The principle is the same as that employed in the heated blanket which you use on cold nights. Instead of connecting into a wall socket, the pilot plugs into a circuit that gets its current from the main generator unit on a bomber or fighter. Wires are connected with a rheostat which regulates the heat as desired according to the varying altitudes.

The suit is three-piece with jacket, trousers and coveralls. The latter slips over the other clothes. Also included are electrically-heated leather gloves and light-weight felt shoes worn with a pair of wool socks. Pilots say the shoes are the most comfortable they have ever worn.

Under actual tests, such as that conducted in the cold room at Wright Field, these new suits have proven they are serviceable in temperatures as low as sixty degrees below zero. Earlier types using the same principle are worn by our pilots even now in the combat zones. But the new types are now being manufactured in considerable numbers and soon will be available. The chief advantage of the electric suit is that it retains warmth longer than the other types.

THIS solved only one problem. There were many others. Our hemisphere defense plans, long before December 7, 1941, included outlying bases which stretched from ice-capped Greenland to the warm waters of the Caribbean. Where it is coldest and the wind howls the loudest, American flyers and their ground crews have made their new homes. For more than two and a half years they have lived in the sub-zero world where the nights are six months long and almost daily the snow whips up a blizzard like the one you see once a year along Michigan Avenue in Chicago.

"We need a combination-type suit," wrote one pilot from an advanced Arctic base. "Give us something that we can wear on the ground in temperatures around zero and, at the same time, make it an outfit that we can put on with considerable comfort up in the air when it gets minus fifty degrees Fahrenheit."

Air Forces "tailors" were momentarily stumped until they hit upon a simple idea that is proving to be just what was needed—two complete uniforms, one to fit over the other when the mercury begins to drop. Around this common-sense principle, much the same as that which tells you to wear your overcoat on a cold day, the Army has created its present day combination suits for our airmen. Actually the new uniform is two layers of clothing each of which can be worn separately as a full uniform.

Under actual cold conditions, experiments have revealed that this type of uniform is warmer than the heavy wool-lined suits which are almost universally standard today. Experts point to the fact that the "dead air" between layers of clothing acts as an efficient insulator in helping to keep them warm. If you need proof try out the old axiom that several light blankets are warmer than one heavy quilt.

This multiple suit, as it is called, consists of an Alpaca fur-lined jacket, with an outer material of smooth, satin finish, which has been acclaimed for its wind resistance. (The Alpaca is a small South American animal, whose fur is being shipped to this country in large quantities under Lend-Lease.) Some jackets are lined with shearling wool or piling.

Combination multi-layer suit with two uniforms and vest fitting on top of one another.

Trousers are also lined with the same material. Both jacket and trousers have large pockets, a feature deemed essential after long study. The reasoning is based on the fact that airmen are constantly complaining they have no place to put small articles which they are required to carry with them to and from their planes.

Wearing only this inner uniform, the pilot can be comfortable in temperatures that range from thirty above to zero. It weighs only about eight or nine pounds and can be worn almost anywhere—in club room or at the base theater. However, when the temperatures run to extreme lows, another uniform is donned over this base suit.

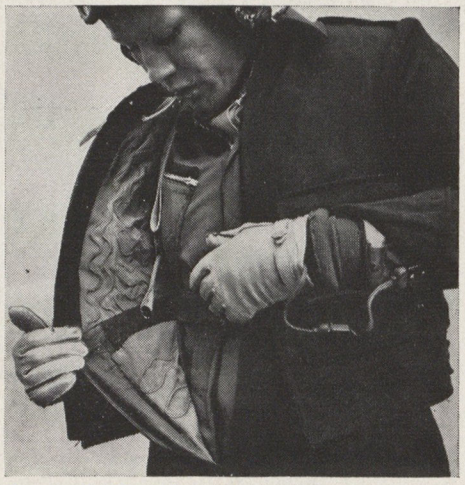
The outer garment, consisting of jacket and trousers, leaves plenty of room for the "dead air" to circulate between the layers of clothes. Made of rough tackle cloth that is wind resistant the jacket has a large Alpaca fur collar which can be converted into a parka-type hood. Trousers held up by large suspenders serve as coveralls and are worn over the base uniform. An Alpaca fur-lined vest is also worn between the base garment and the tacklecloth outer gear where temperatures drop to extreme cold.

PRESCRIBED with the multiple type suit are rubber-soled canvas boots with a design similar to the Mukluk, which for years has been worn by the Eskimo. Experts have learned it is the warmest footwear to be worn in the Arctic. Now it is proving to be the most efficient for retaining warmth at high altitudes.

New improvements have also been made in the sheep shearling suit, worn today by most of our Air Forces personnel in the continental United States where temperatures seldom drop to extreme sub-zero levels. Briefly, the new shearling suit, consisting of jacket and trousers, is lighter and more flexible than those formerly in use. In addition, the process once used in treating the skin chemically to give it longer wear has been eliminated because it had a tendency to crack the leather and make the suits stiff.

The new shearling-lined suits will withstand temperatures down to forty or fifty degrees below zero. Their principal shortcoming is that they do not retain the heat as long as the multiple-type or electrically-heated suits. Then, too, they are rather bulky, but engineers are developing new designs to remedy this.

Latest development in new suits for our aviators is the down and "chicken feather" flotation suit. Although the down feather suits have been in use for years in Alaska, only recently have engineers turned to the chicken-feather suit now in production. Chicken feathers were found to add bouyancy to the down suit and, at the same time, preserve the warmth characteristics which had made



Network of wiring shown in lining of the suit. Note the electrically heated gloves.

it so well suited for the Arctic regions. The new model has proved especially effective for pilots who are forced to make long over-water flights.

At Wright Field one day, Captain J. R. Schenck of the Equipment Laboratory donned one of the suits and remained in water for several hours without sinking. Finally, he was pushed under but the floating qualities of the suit brought him back to the surface immediately.

The flotation suit is a two-piece garment—trousers and jacket—with a parka-type hood. The outer material is a heavy, wind-breaker, waterproofed cloth. The jacket and trousers resemble a piece of quilting, lined with chicken feathers and with a cover over it. The new types eliminate the bulky appearance of the original suits and give them flexibility.

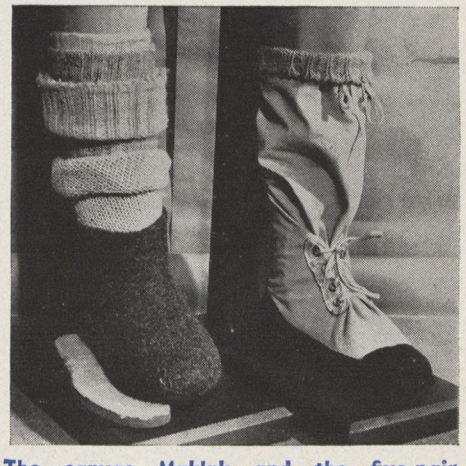
Designing auxiliary equipment, such as helmets, gloves and boots, has always been a major problem and new developments are continuously in the works. The latest pilot's helmet is a leather, chamois-lined headgear which has built into it earphones, clamps for holding the oxygen mask and a microphone. It is designed to fit with any mask including those used by the British, Russians and Canadians. Experiments also are being made on fur caps which may be worn by flyers in the Arctic regions. These new designs are based on the old coonskin caps worn by Daniel Boone and other famous American backwoodsmen. The few which have been ordered are now being worn by pilots in combat zones under severe flying conditions. Reports indicate they may be adopted as part of a pilot's cold weather equipment. Other experiments are being conducted on a large bullet-proof combat helmet, a metal headpiece which looks like the ordinary football helmet.

GLOVES, too, have been a constant problem. Already in use are the electrically-heated gloves, the lamb-lined, one-fingered mittens of horsehide with fur lining, and the layer-type combination gloves designed on the same principle as the multiple suit.

The combination glove is the answer to frequent complaints received from mechs working in the Arctic who have been leaving pieces of skin on metal aircraft parts when they attempted to pull their fingers loose. This rayon glove, light and skin-fitting, has greatly increased the efficiency of the mechanics. Two pairs are worn for warmth.

These developments at the Equipment Laboratory at Wright Field have produced many innovations in commercial clothing as well—new type belts, zippers, parkas, scarfs, leggings, shoes and other every-day accessories which have added greatly to the working efficiency of commercial products. Many technicians in Wright laboratories hold patents on products purchased daily in the department stores of the country.

Such is the story of the Army Air Forces effort to combat the cold of the high-altitudes. It is a never ending story for tests go on night and day, hour after hour. But of more importance is the fact that these advances in clothing for the airman are helping in no small way to win the war in the skies. ☆



The canvas Mukluk and the five-pair "Arctic sock assembly" worn under boot.

A MONTHLY RECORD OF DECORATIONS AWARDED TO PERSONNEL OF THE ARMY AIR FORCES

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SILVER STAR

BRIGADIER GENERAL: James Pratt Hodges. **COLONEL:** Curtis Le May. **MAJORS:** Levi R. Chase, Jr., Donald P. Hall, John B. Holst. **CAPTAINS:** Wilbur B. Beezley, John W. Chiles, Charles H. Giddings (With Oak Leaf Cluster), Coleman Hinton*, Gore Huggins, Philip J. Kuhl, James C. Latham. **LIEUTENANTS:** Richard P. Brannon (Also Distinguished Flying Cross and Air Medal), Arthur L. Burger, Thomas P. Carter (With Oak Leaf Cluster and Air Medal with three Oak Leaf Clusters), Garth B. Cottam, Joseph F. Dockweiler, Jr., Robert W. Elliott, Robert L. Faurot, John H. Geer, Wilson B. Glover, Robert W. Helms, John E. Hesselbarth, Gilmer H. Holton*, Sidney W. Jacobson, John B. Johnson, Melvin B. Kimball, William R. Lett, Leon G. Lewis, John W. Lyle, Jr. **MASTER SERGEANT:** Elmer H. Johnson. **TECHNICAL SERGEANT:** Michael J. Bauman, Jr., B. Hancock (Also Distinguished Flying Cross and Air Medal). **STAFF SERGEANTS:** Donald S. Allen, Theodore J. Bokoles, John Breen, Glen F. Bruns (Also Purple Heart), Joseph J. Byrne, Richard K. Ferrill, Norman S. Goldstein, Raymond F. Jesek, Morris O. Kolling (Also Air Medal). **SERGEANTS:** Edward D. Connor, Jr., Eritreo E. Del Vecchio, Edward W. Driscoll, Bernard V. Duclos, Joseph E. Hartman, George F. Kehoe. **CORPORALS:** Hubert W. Crowell*, George W. Dustin, Jack W. Fox*. **PRIVATE:** Adam E. Gross.

OAK LEAF CLUSTER TO SILVER STAR

COLONEL: Robert L. Scott, Jr. **MASTER SERGEANT:** Pete M. Vasalie. **STAFF SERGEANT:** Virgil E. De Voss.

PURPLE HEART

LIEUTENANT COLONELS: Levi C. Erdman, Jo K. Warner. **MAJORS:** Jack S. Marks (Also Air Medal), Bernard A. Schriever. **CAPTAINS:** Charles W. Dunning*, William B. Kyes, Robert D. Spitzer (With Oak Leaf Cluster and two Oak Leaf Clusters to Air Medal), Thomas B. Storey. **LIEUTENANTS:** Charles E. Bergdoll, Robert B. Bowcock, Nathan H. Corman, Nelson P. Davis, David N. Hirsch, Walter Holmes, Jr., Robert F. McMahon, Harold E. Mitts, Scott H. Neal, Carl T. Rauch, Robert M. Richey*, Meech Tahsequah, Spencer Treharne. **MASTER SERGEANT:** James R. Walter. **FIRST SERGEANTS:** James W. Carr, Herbert B. Martin*, Wallae R. Martin*. **TECHNICAL SERGEANTS:** Monroe M. Clark, Raymond E. Powell*, Charles C. Schierholz. **STAFF SERGEANTS:** Ralph Alois*, Billy O. Brandt*, John E. Cane, Edward H. Caton, Charles N. Doty, Herbert E. Fisher, George K. Gannam*, Carl R. Gross, Henry J. Humphrey*, Dennis W. Lawrence, John H. Mann*, Allen Middleton, Colon E. Neeley (Also Air Medal), Herbert Newell, Jr., Louis F. Patriquin, Curtis Q. Pyrah, Warner E. Renner. **SERGEANTS:** Delmas F. Bise, William C. Boggs, Vincent H. Bonina, Bill V. Diehl, William W. Dunnavant, James B. Ellick, Fred M. Goyan, Sidney V. Hall, Ned R. Herzstam (Also Air Medal), Jearld H. Jones, James A. MacCammond, Jr., Paul V. Moreno, Jacob T. Saba. **TECHNICIAN FOURTH GRADE:** Joseph A. Vanic. **CORPORALS:** Weldon C. Burlison*, Richard X. Chabalowski, Harold F. Graf, John J. Kohl*, Hubert D. Smith (Also Air Medal), William C. Westbrook. **PRIVATES FIRST CLASS:** Earl D. Ashley, John E. Cruthirds*, James J. McClintock*, Robert H. Mayer, Horace A. Messam*, Joseph E. Nelles*, Leroy J. Turnes. **PRIVATES:** Jerry M. Angelich*, Robert G. Brown (Also Air Medal), Joseph H. Guttman*, Edward R. Hughes, Lawrence P. Lyons*, Joseph G. Moser, William M. Northway*, Maurice J. St. Germain*, Marvin V. Wingrove.

DISTINGUISHED FLYING CROSS

COLONEL: George J. Eppright. **LIEUTENANT COLONEL:** Austin A. Straubel*. **MAJORS:** Philip T. Durfee, Leland G. Fiegel. **CAPTAINS:** Bennie Lombard (Also Air Medal), Albert Nowak, Ramsay D. Potts, Jr., Henry S. Taylor, Harold R. Warren, Jr. (Also Air Medal with three Oak Leaf Clusters). **LIEUTENANTS:** Bruce B. S. Barker, Vance L. Beebout, Francis R. Cappelletti (With Oak Leaf Cluster), Phillip E. Cartwright, Leroy E. Ellis, Allen W. Garderer, Jr., Ritchie B. Gooch (With Oak Leaf Cluster), Preston Holden, Norman L. McDonald, Blesch Malmstone, Russell I. Maure, Charles E. Norton, William A. Peterson, William M. Railing, Paul R. Ridley, Robert L. Rose, George A. Schnieders, Verner L. Shea, Bryce V. Smith, George W. Wamsley, Jr., Ralph K. Watts, Robert R. Wilson. **MASTER SERGEANT:** Anthony A. Kuzdrall. **TECHNICAL SERGEANTS:** Glen Beard, Donald T. Ostlund (Also Oak Leaf Cluster to Air Medal), Frank Sayko, Jack R. Tribble. **STAFF SERGEANTS:** Ira A. Adams, Harold R. Conner, George H. Crawford, Irwin W. Dial, William L. Hotard, Cortez E. Houston, Victor Lorber (With Oak Leaf Cluster), Frank W. Lytle*, Claude W. Patterson, Leo Wheatley, Francis W. Wolf, John Wycheck, George E. Zorbach. **SERGEANTS:** Wilbert H. Grogan*, Wallie J. Hewston, Russell I. Huffman, Raymond R. Joslin, Michael L. Kenny (Also Air Medal with two Oak Leaf Clusters), Irving W. McMichael, Guy E. Reynolds, Jr., Thomas J. Stewart, Allen B. Whitehead*. **CORPORALS:** Robert F. Borchert, William B. Bradley, Paul P. La Valle, Benjamin C. Navage, John Thompson, Jr. **PRIVATE FIRST CLASS:** Edward A. Carrol.

SOLDIER'S MEDAL

CAPTAIN: Gerald J. Crosson. **LIEUTENANT:** James H. Horn. **STAFF SERGEANTS:** Charles W. Michaelis, Louis Rabesa, Jr. **SERGEANTS:** Joseph J. Lapent, Frank P. Pierog, Edward T. Taylor. **CORPORAL:** Ernest E. Haack. **TECHNICIAN FIFTH GRADE:** Bruce Stone. **PRIVATES FIRST CLASS:** Jesse E. Sailors, Harry S. Wheeler.

* Posthumous

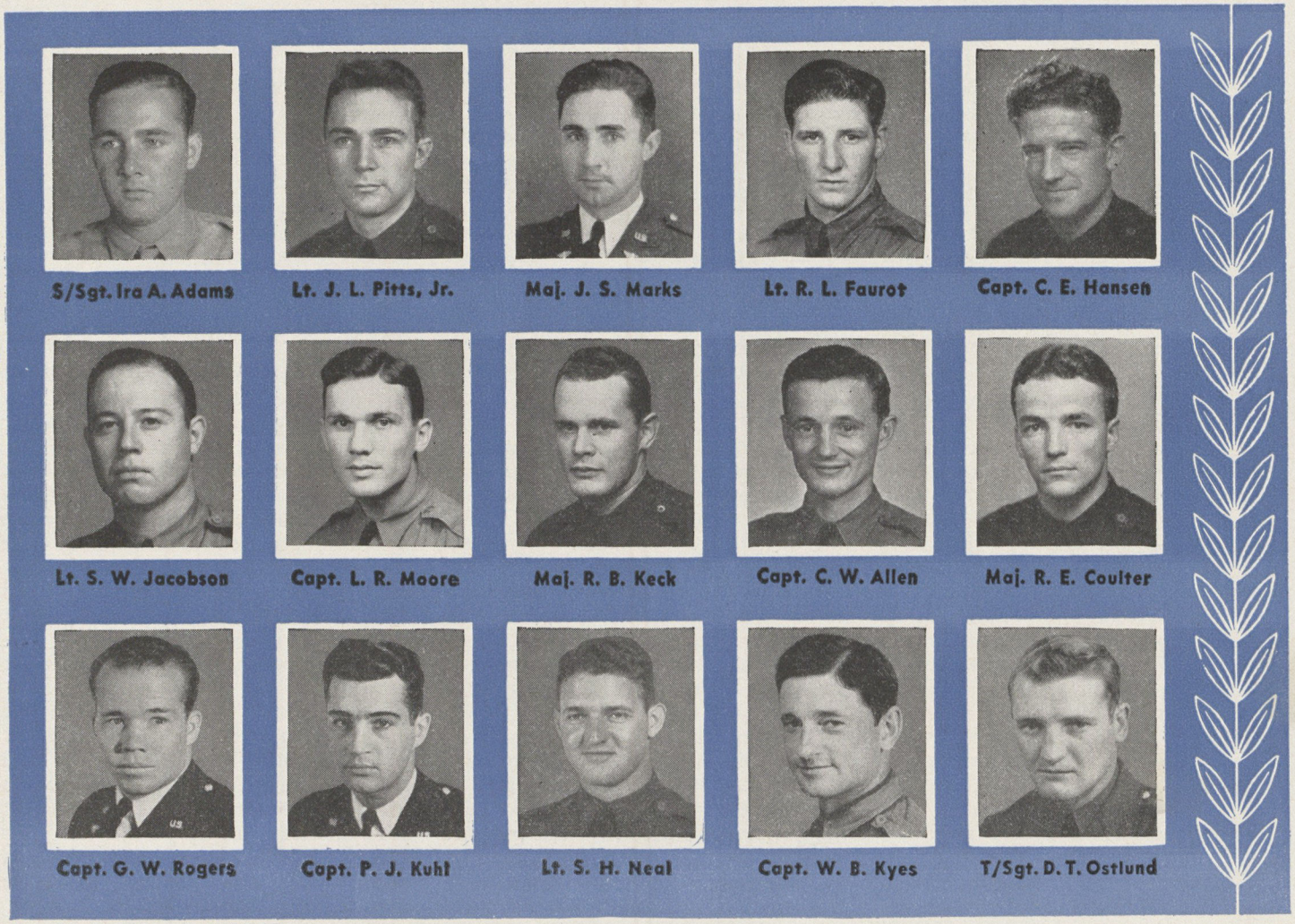
AIR MEDAL

BRIGADIER GENERAL: Russell E. Randall. **COLONELS:** Charles M. McCorkle, Phineas K. Morrill, Jr. **LIEUTENANT COLONEL:** Hiette Williams. **MAJORS:** John C. Bowen, Robert E. Coulter, Ryder W. Finn, Maurice J. Fitzgerald (With Oak Leaf Cluster), Charles A. Gayle, Robert B. Keck, Harmon J. Lampley, Francis H. Matthews, Gordon E. Menzies, Edwin B. Miller, Jr., John A. Rouse, Harold J. Skelly*, Robert E. Smith. **CAPTAINS:** Charles E. Hansen, Claude W. Allen, Ralph A. Blakelock, Robert W. Bonhard, Richard H. Cole, William C. Collins, Ralph F. Dawson, John W. Fletcher, Raymond A. Fortin, Charles William Gettler, L. R. Moore, G. W. Rogers, Frank G. Ward. **LIEUTENANTS:** John Arthur Ahlm, John Joseph Alder, Fredric G. Altman, Frank R. Amend, Arthur C. Anderson, Edward L. Anderson, John Thomas Ashford, Jr., Richard Foster Atchison, Jr., Robert F. Ballash, John R. Bannon, Jack C. Baur, Frank R. Beadle, John T. Bent (With Oak Leaf Cluster), J. L. Pitts, Jr., Billy W. Wheeler, Dave W. Williams, Paul Williams, Albert J. Wilsey, Jr., Joseph M. Wunderl, William P. Wyllie, Jr. (With Oak Leaf Cluster), William F. Xavier, Alexander Yonych (With two Oak Leaf Clusters), Walter Zoppi (With two Oak Leaf Clusters). **MASTER SERGEANTS:** Wilson P. Currie, Lloyd D. Killam, Chester Milia. **TECHNICAL SERGEANTS:** Roy J. Anesi, James R. Currie, William J. Devine, William L. Engler, Clifford Harry Fleming, Erwin K. Freytag, Lester O. Gardner, Frederick A. Hartung, Jr., Francis G. Hinds (With Oak Leaf Cluster), Glenn E. Lathom, Wilburt A. McClellan, Alvy G. Masters, Merle L. Oakley, Allen W. Ramsey, Leon L. Ranforth, Norman C. Threewitt, Delbert Villanueva. **STAFF SERGEANTS:** Joseph R. Alvey, Carl J. Anderson, Carl L. Appling, Kenneth T. Bagnell, Gordon N. Bennett (With Oak Leaf Cluster), Fred J. Bewak, Joseph W. Bunn, Arthur H. Burrow, Richard C. Carignan, James J. Carpenter, Frederick E. Davenport, Jr., Edward F. Drake, Henry R. Eaton, Harvell H. Ellzey, James L. Elrod, Stanley F. Fortuna, Douglas H. Smith, Arthur P. Symons, Stanley F. Szczepanski, Robert J. Verlanic (With Oak Leaf Cluster), Charles H. Wall, Robert H. Westrom, Earl T. Wright, Layton E. Yarborough, Frank J. Zahorsky. **SERGEANTS:** Elmer O. Almy, Roland V. Anderson, Robert W. Anthony, Drewey D. Barnes (With Oak Leaf Cluster), Norman L. Biehn, Richard A. Bieniek, Mac S. Groesbeck, R. R. Gwaltney, Theodore Haas, Martin J. Hill, Lawrence B. Hillard, William D. Hise, Aloysius B. Horstmann, William E. Howard, John D. Hyman, Robert J. Jackman, Andrew L. Jackson, John Jacobs, Jerome James, Howard K. Jaycox, Bernard Jurosek, John E. Kakaruda, Donald W. Kemble, Elmer W. H. Kersten, Thomas M. Klimazepski, William L. Kline, Jr., Charles Thomas Krest, Jason C. Lancaster, Joseph W. E. Lapham, John W. Leuning, Chester C. Love (With Oak Leaf Cluster), William T. Lynch (With Oak Leaf Cluster), Stanley L. McCorkle, William A. McKinley, Ralph B. McMillen, Cecil J. McNeer, Allen A. McRae, David N. McWilliams, Alton F. Mahan, Samuel Mazzeo, Vincent C. Mullane, William J. Murphy, George W. Oakes, John M. O'Rourke, James E. Otott, James R. Parkinson, Frank J. Pawlick, Gildo J. Ponti, Pasquale Prata, Joseph E. Prokop, Walter C. Race, Milton Rayberg, James W. Roberts, Duane W. Rumph, Robert H. Sangster, Jr. (With Oak Leaf Cluster), Samuel J. Scott, John H. Shearer, Francis J. Simone, Parley D. Small, Harold Snyder, Elwood E. Spellman, Bill M. Stolzer, Norman L. Stubee, Edward W. Swedo, Harry M. Teufel, Howard R. Thompson, John A. Thompson, John G. Tittsworth, Pierce B. Tyler, Dick Tyron, Aloysius S. Underwood, John F. Vlad, Lee O. Walker, Frank M. Wall, Kent R. West (With two Oak Leaf Clusters), Edward J. White, Thurman L. Wolfe, LeRoy W. Wright, Frank G. Zern. **CORPORALS:** Oliver D. Clements, Ralph M. Colflesh, Edwin W. Connally, Truman B. Corley, West M. Coss, Herbert E. Cummins, Harold Denson, Charles E. Franklin, Donald A. Fromme, Wesley V. Golcher, Gerald I. Grubb, Henry S. Herr, William H. Hickey, Sahoroian V. Hudson, James R. Lassiter, Weldon R. McWhorter, Orville C. Macklin, James A. Ritz, Michael J. Whalen, Robert W. Wightman. **PRIVATES FIRST CLASS:** William R. Colson, James Geanious, Cling L. Hulcher, Wilbur A. Lewis, Franklin A. McKnight, Delmar R. Ogle. **PRIVATES:** George T. Brouillette, Jesse C. Easterling, David J. Eckholt, Henry Hughes, Benjamin Kleinburd, Bernard D. Lane, William R. McCormick.

OAK LEAF CLUSTER TO AIR MEDAL

MAJOR: Richard D. Stepp. **CAPTAIN:** Kenneth D. Vandayburg. **LIEUTENANTS:** John J. Charters, William B. Drysdale, William K. Long (Three Oak Leaf Clusters). **MASTER SERGEANT:** Edwin F. Rhodes. **STAFF SERGEANTS:** Arlee F. Aten, Lawrence Holgate. **SERGEANTS:** Hugh A. Jones, Jr., Abraham Todras. **PRIVATES:** Wilbert H. Elliott, Vincent O. McMahon, Jr. ☆

* Posthumous.



bursting shells and shrapnel hitting the plane reminded me of a sudden thunder and hail storm heard from the inside of a tin shed. I managed to get the fire out of number four but number three was stubborn and burned more fiercely. I finally feathered it. Number four still was running but it was not much use. The vibration shook the whole ship. The blaze coming out of the trailing edge of the wing grew larger and larger. I knew it was burning around the gas tank and would soon cause an explosion.

About that time all hell popped loose. All our guns were blazing at seven FW-190s that had just attacked right through the flak. Suddenly a hole about two feet square appeared in the wing where number three gas tank is located and flames shot out. It must have been a hit from the bottom because the fire in number three gradually dwindled to the burning of oil. We called for the P-38s to come up and help us but the message probably never went through. Enemy fighters kept hitting us in the rear.

Harry hadn't said a word so I told the crew to put on their chutes and then go back to their guns. Just then one fighter got our instrument panel and windshields with a 20 mm. shell. It exploded right in front of Harry and for a second I thought his face was bleeding as he looked toward me. I knew I was hit too because blood was running into my eyes and oxygen mask. I jerked off my glasses and threw them to the floor. I thought my right eye had been knocked out.

The same shot had shorted the parachute bell so Fozzy bailed out.

Someone called up and said we were afire in the bomb bay, radio compartment and in the waist. I told them to fight the fire but keep an eye on the 190s. Suddenly our aileron controls went limp and the tail dropped abruptly. I knew we had

HELL OVER BIZERTE

(Continued from Page 11)

an elevator knocked off. Harry and I were shoving forward with all our might making for the clouds still below us. Though our guns were going constantly, we were almost helpless. The fighters kept coming in raking the ship from one end to the other. But the flak had stopped. At last the foggy mist of the clouds closed around us and the men were happy.

But instrument flying without instruments is no fun when you have only two engines and a rudder to help you. Somehow we came out below the clouds and were in a valley, limping on and on toward the sun.

FINALLY she quit flying. A mountain was coming up in front, we were losing altitude and we didn't know our speed. Suddenly a little patch of plowed ground came into view. I grabbed for throttles and switches and let her hit. We made it.

We all got out by various means and began looking for wounds. Most everyone had a few scratches and bruises. Harry and I were shot in the legs, arms and face. Vandergriff had a couple of holes in his arms. Everything was pretty hazy for awhile. We dressed our wounds and went to an Arab's house nearby to rest while some of the boys went for help. We didn't have to wait, however. The Arabs took us to a British Station.

Later we were able to chuckle over several incidents.

After Fozzy bailed out, Buck was going to follow, but with his broad beam and seat-pack chute he couldn't quite squeeze through the escape hatch. He tried so desperately, however, that he almost couldn't get back in. I chuckled when Buck came crawling out of the nose with the seat of his breeches torn nearly out. Tapping me on the shoulder, he shouted, "You've got to land this damn thing because I'm too goddam big to get out."

Incidentally when Fozzy landed in his chute three Arabs came forward. Two wanted to take him to the Germans and one to the English. The one fortunately prevailed after Fozzy had given him his knife as a present. Fozzy learned from the British that he had landed in a "No-Man's valley—the Allies were on one ridge and the Axis on the other.

At one point Whimpy decided things were getting so hot he had better come out of the tail and put on his chute. When he got back one of his guns had been blown off and there was a gaping hole where a seat was supposed to be. Then a FW-190 came in for a tail shot. Whimpy leaned across the opening and sprayed lead from his one gun without aiming. The 190 peeled off hurriedly.

When Gowan was trying to put out the flares which had caught fire, he exhausted his five extinguishers with no apparent results. So he tossed burning flares into the empty ball turret and poured water on them. That did the trick.

When they were ordered to put on their chutes and return to gun positions the whole crew complied except Francis, who was firing so many rounds he figured if he left the gun to get the chute they would get him before he got back. One death looked as good as the other to him so he stayed and kept his turret going even after one gun had been shot away.

Vendy ran out of ammunition so he went to the backdoor and thumbed his nose at the attacking 190s. He figured this was the least he could do.

Out of the seven fighters that attacked us we know that three will never attack again. We got one, maybe two, while Fay in another ship got two.

I guess we cheated death. ☆

He was in bed with a bad cold, running a temperature, the day before the raid. But after orders came through that evening he went down to the operations room, checked the course, the navigation, the target, the approach, the aiming point and other problems in planning the mission with his assistants. He had little sleep that night, but he led his Group over Wilhelmshaven the following day.

By now, of course, the impression the men have of their commanding officer is totally different than it was several months ago. Ask any of them what they think of him and the answer invariably is the same—an inadequate attempt to describe their whole-hearted admiration and respect for a man they all say they'd follow to Hell and back, if necessary.

His terseness, at first mistaken for sourness, is now legend.

Once when he was briefing the pilots he told them they would rendezvous with

"IRON ASS"

(Continued from Page 29)

an escort of Allied fighters after attacking the primary target. When someone asked if they would get an escort if they attacked the secondary, he remarked without hesitation, "You won't," and went casually on with the briefing.

One of his officers, who apparently played football before tackling Fortresses, compares him to a football coach.

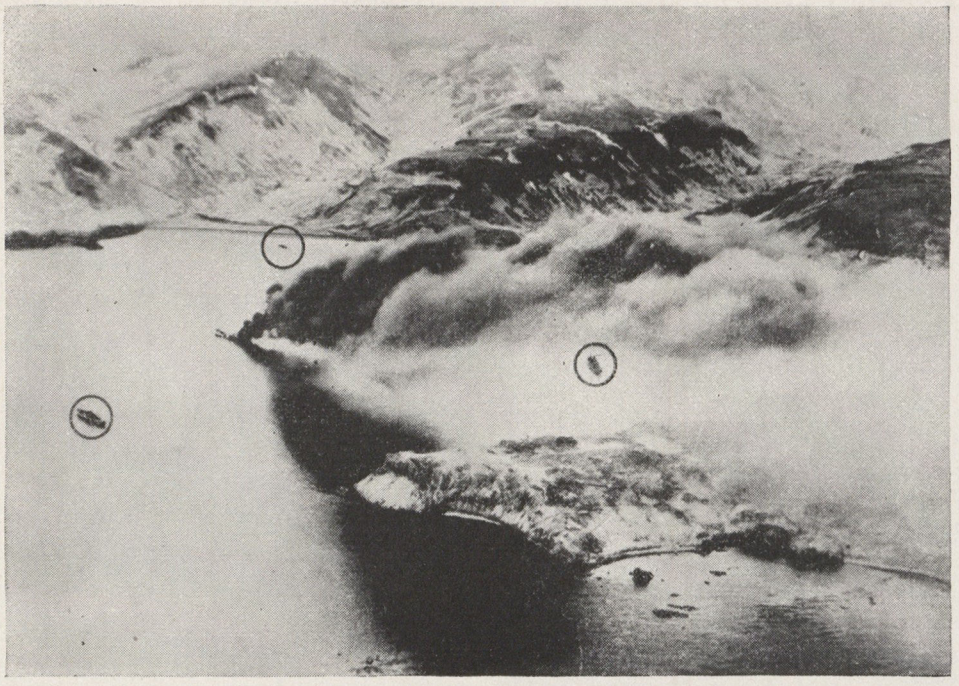
"He's just like Bierman at Minnesota," the officer explains. "He trains us in fundamentals. Keeps us going in the air, or in school, all the time. He knows his business, and we all know he knows it."

With the Group now taking part on nearly every raid on enemy-occupied Europe, the C.O. is lenient with passes to the combat crews. But when he gives them 48 hours, he doesn't mean 58, as they thought. Anyone who returns too late, without a good excuse, can be certain of going before a Summary Court, which usually does nothing more drastic than take away some of the offender's pay.

All the men recall their discovery that their C.O. understands men as well as machines. Back in the States, just before the Group departed for England, he gave them a brief lecture on their responsibilities as Americans, as visitors, and warned some of his chronic belligerents against participating in tavern brawls.

"But if you do," he added, "don't get licked."

You probably know other C.O.s like this. You might be serving under one of them right now. The C.O. you just read about is Colonel Curtis E. LeMay, a 36-year-old veteran who, among other achievements, participated in the first "Good Will" flight to South America and pioneered the North Atlantic ferry route. ☆



A Jap transport burns in Kiska harbor and three other Jap ships are marked for destruction by aerial bombardment.

UP WHERE THE SOUP BEGINS

(*Continued from Page 15*)

Some of the boys had some interesting experiences. Like what happened to Lieutenant David Stevens, co-pilot in a B-24.

He was on the weather run near Kiska. Instructions were to get weather reports and stay away from the big guns defending the main Jap base. The crew had to change ships just before the take-off and the plane they got out in didn't have any bombs. Lieutenant Brown, the pilot, brought the ship to within a half mile of Kiska, and Stevens, thinking he was just a little too close for comfort, sarcastically remarked, "Why the hell don't you fly right over the place?" Brown didn't need any coaxing. He made a 270 degree turn to the right and came directly over Southhead, the south point of Kiska harbor. Then he circled right back over Little Kiska at 1,800 feet. The Japs threw up everything but Tojo's false teeth but nothing happened.

During good flying weather the Japs had plenty of practice with those ack-ack guns. When the soup cleared we had to make up for lost time. Often enough it meant pushing those heavy ships along 20 feet over the water. That's almost close enough to get your feet wet. One crew ran into some fog about twenty minutes out and stayed at 20 feet for three and a half hours. They climbed to 4,000 feet to feather a prop 700 miles from their base and then flew back again at 20 feet.

Sometimes the Japs play a pretty smart game with their ack-ack guns. Lieutenant Madison went up to Attu one day and found the weather overcast at 1,200 feet. He observed the island from an offshore point of about two miles and then entered Holt Bay to inspect enemy activity there. He went directly into the harbor at 660 feet and found no opposition at all. When he turned to leave the bay after deciding that the enemy obviously was not prepared to defend it, all hell broke loose. Ack-ack bursts were all over the place. The Japs had waited patiently until he was within 500 yards before they opened fire. Nobody knows how, but he got his ship back safely.

ON THOSE missions we used to have a lot of fun listening to the Japs on the radio. They talked pretty good English and they tried to scare us away. Most of the time they hissed, "Men of Umnak, you are doomed. Lay down your arms—surrender." Sometimes they would offer misleading remarks, such as "Ret's get home" and "That ship went down." They screamed and bellowed blood curdling yells but we used to hand it right back to them. We found out that they didn't like to be called little men. So we called them little bastards and little sons-of-bitches. Our Colonel, W. O. Earickson—there was a man—holds the Aleutian title for plain and fancy cussing at the Japs. He didn't understand fear and he used to go right over the strongest Jap installations swearing a jagged blue streak and dropping a few bombs just to let them know he wasn't kidding.

In the kind of weather we were flying, the navigator was the boss. Pilotage was extremely difficult even when the visibility was decent. One day you would see a mountain right close by and the next day you wouldn't be able to find it.

Most of the flying was on instruments, but we found out that the only use for a drift meter was to hang our hats on it. All the wind judging up there is done by the visible observation of the white caps—and that can be surprisingly accurate after a little practice. The ocean swell comes in and moves out again from under the white caps, making the caps move into the wind. Accurate wind velocity and direction could be determined rather easily that way.

The Aleutian theatre is probably the only place where you should not fly a tight formation. In that kind of weather, you have to split up or you'll be running into your own ships.

We happened to be flying the big ships, but our fighter squadrons—38s, 39s, and 40s—really did a terriffic job. At first the Japs relied upon their float type Zeros, but our fighters polished them off so neatly that the Nips had to depend almost exclusively on ack-ack. But that didn't stop the peashooters. Those 39s used to go in and actually drive the ack-ack guns right out of their mounts—and we don't think they did the Jap gun crews much good either.

The Japs built hangars for their planes but the 38s with bombs on their wings knocked off the hangars as fast as the Japs built them. They also constructed a submarine base and Captain Brickeet must have considered that a personal affront. He came buzzing along with a couple of bombs and bingo!—no sub base. It got so bad for the Nips that they began using beached boats as supply depots. That fooled us for a while until one of the boys got curious. He dropped a few on one of the boats and it burned for six hours.

One day over Adak two P-38s jumped on a big Jap plane. He got smart and ducked into the clouds. So one 38 went above the cloud and one dropped beneath it. They just hung around waiting for the Jap to come out, and two seconds later he joined his honorable ancestors.

Everybody up there did a bang-up job but our mechanics had the toughest deal and the stuff they did is unbelievable. Despite the weather, they worked right out in the open. One time they dismantled a complete B-24 engine looking for a good piston to put on another ship. Try that when the mercury is dropping out of the bottom of the thermometer. Another time, a 38 came in for a landing, ground looped, and cut the tail right off of a 24 from just behind the waist gunner's window. The mechs took a tail off another wrecked 24 and attached it to this ship. The job took a month but that plane got back into the air.

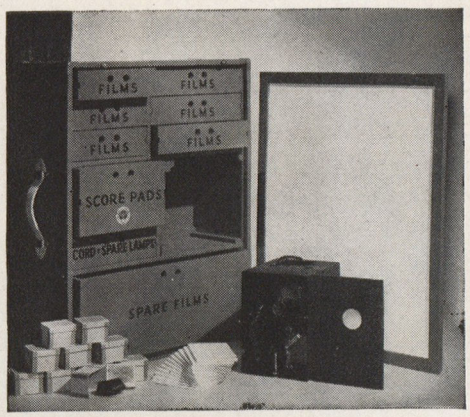
That's how it goes.

It takes longer and it's harder work, but we get things done up there. And it means more that way. Just the same, if you get the Aleutian assignment spit into the wind once for us. ☆

SYNTHETIC DEVICES

THE number and scope of synthetic devices in use by Army Air Forces training activities are continually increasing. Commercial manufacturers, as well as experimental engineers in Allied military services, are working overtime to develop these gadgets which result in valuable short cuts and in the saving of critical materials and equipment in wartime air training.

The four devices shown on this page are typical of the many included in the synthetic training devices catalog distributed by the AAF Training Aids Division to the headquarters of Commands and training Air Forces. In addition, AFTAD maintains a display room of these devices at its headquarters, Park Avenue and 32nd Street, New York City. Brief descriptions of selected devices will appear from time to time in the Training Aids section of AIR FORCE.



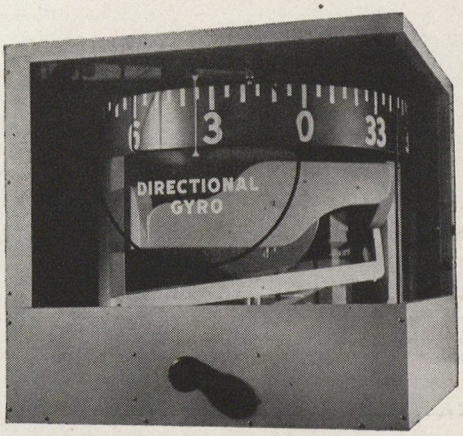
Visual Quizzer

THE spirit of competition is injected into training with the visual quizzer, a gadget which shoots rapid-fire questions on everything from naval vessel identification to celestial navigation.

It is a compact portable unit, complete with projector, screen, scoring pads and films.

Film frames with illustrations and multiple-choice questions are flashed on the screen at automatically-timed intervals. The student inserts the number of his choice on the score pad. After a series of about eighteen questions, a frame appears with the correct answers.

Student interest is maintained because it is a race against time. The frame changes every few seconds. There is no backing up, no second guesses.



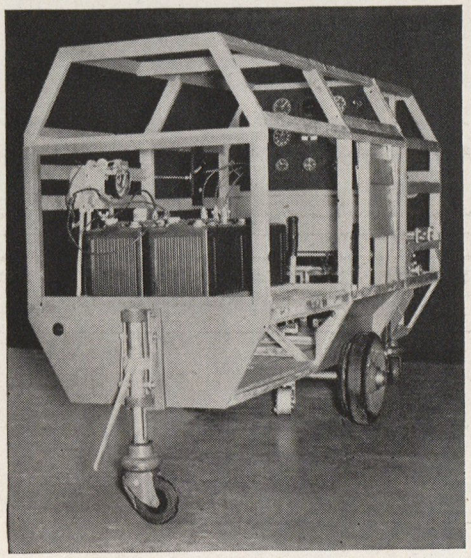
Directional Gyro Mock-up

WITH the introduction of the giant directional gyro mock-up, one of the most troublesome problems of classroom instruction has been solved. Large groups of students can see the workings of the mechanism without difficulty as the instructor proceeds with his explanation.

The gyro mock-ups range in size up to 24-inch cubes. Many of them are built in cutaways so the internal mechanism can be shown. They are of commercial manufacture.

Most of the other airplane instruments are being similarly duplicated.

The cockpit is entirely closed and the pilot flies blind. The stick and rudder controls simulate those of an airplane.



Bendix Navigation Trainer, Type E-1

THE illustration shows the Bendix Navigation Trainer, Type E-1, with the cowling removed.

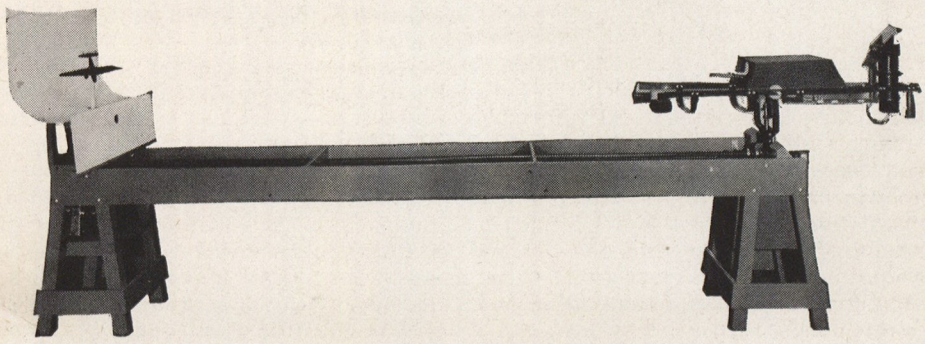
Actually, it is a mock-up cockpit with all necessary instruments, mounted in a cart which moves slowly over the floor. Equipment is provided to permit practice and instruction in dead-reckoning, radio direction-finding and homing. A chalk mark on the floor indicates the path to be taken by the cart.

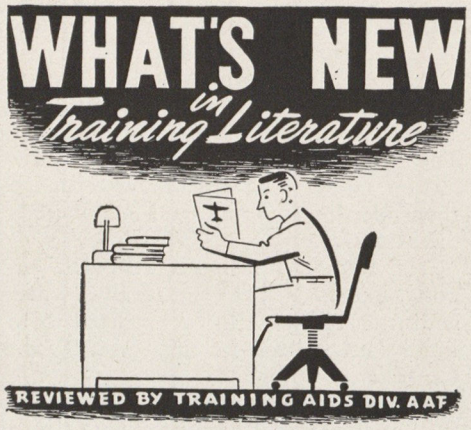
Fixed Gunnery Deflection Trainer, 3-B-6.

THIS device is composed of a long stand with the target at one end and a reflector sight and spotlight at the other.

The target is a standard airplane model supported in front of a background of clouds. The plane may be adjusted to any altitude and the control operated to indicate any desired speed.

The student aims, allows for radii lead and fires. The spotlight shows where his bullets would have gone if it had been the real thing. If his aim is correct, the light registers a hit. Bursts fired and hits scored are registered automatically on a scoring device.





Revisions and Changes

IN accordance with the radiotelephone procedure as approved by the Combined Communications Board, the following War Department Field and Technical Manuals have been revised or changed and are being distributed (dates shown indicate latest editions):

FM 24-5, Signal Communication. Changes have been prepared to revise those portions of the manual that have been affected by new procedures.

FM 24-6, printed as Radio Operators Manual, Army Ground Forces. April 12, 1943.

FM 24-8, Combined Teletypewriter (Teleprinter) Procedure. New manual.

FM 24-10, printed as Combined Radiotelegraph (W/T) Procedure. January 20, 1943.

FM 24-11, Combined Operating Signals. January 17, 1943.

FM 24-12, Army Extract of Combined Operating Signals. April 5, 1943.

TM 1-460, revised as Radiotelephone Procedure for AAF.

TM 11-454, printed as The Radio Operator. Discusses procedure only.

TM 11-459, printed as Instructions for Learning International Morse Characters. This manual covers the instruction in International Morse characters, which previously was included in TM 11-454. April 21, 1942.

Want to Stay Alive?

IF YOU are going overseas, you would do well to study carefully, and if possible carry with you, copies of these pocket-size publications:

Survival, by the Airlines War Training Institute.

Arctic Emergencies, by the Flight Control Command.

Jungle and Desert Emergencies, also by the FCC.

These handy booklets contain valuable information on what to do and what not to do, what to wear, what to eat, and other details well worth knowing in case of a sea, desert, jungle or arctic emergency.

Equally informative on the same subjects are publications of the Arctic, Desert & Tropic Information Center, Eglin Field, Fla. Here are the titles of some of the bulletins: *Forced Landings and Desert Survival, Aircraft Maintenance in the Desert, Desert Operations, Jungle Notes, Notes on Arctic Living* and *Ocean Survival.*

Some of these publications have been widely distributed in the AAF. The importance of the subject matter cannot be emphasized too strongly.

Instrument Flying

THE field of instrument flying is covered by four new, fully illustrated Technical Orders. They are:

T.O. No. 30-100A-1, Instrument Flying, Basic Theory and Practice.

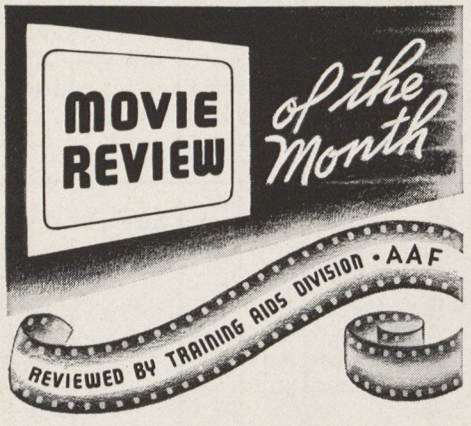
T.O. No. 30-100B-1, Instrument Flying, Advanced Theory and Practice.

T.O. No. 30-100C-1, Instrument Flying, Instrument Flying Trainer, Instructor's Guide.

T.O. No. 30-100D-1, Instrument Flying, Technique in Weather.

For Supply Officers

AIRBORNE radio equipment is treated comprehensively in a handbook recently prepared by the Signal Section, Air Service Command, Patterson Field, Ohio. This publication is approved for distribution in the Air Service Command, but copies may be obtained from the ASC by interested personnel of other commands. The prime purpose of this manual is to "speed up" the training of inexperienced supply officers and help them become more familiar with the different types of equipment in the shortest period of time.



"Take-Offs"

Released for AAF distribution last month, "Take-Offs" (TF 13305) serves as a basic instructional film for flying students and provides an effective refresher lesson for advanced pilots. This new film on flying techniques covers the main points involved in executing take-offs, stressing safety factors and coordination of flight controls. Other titles in the same series to be released at an early date include "Landings" and "Elementary and Pylon Eights."

"The Squadron Communications Officer"

The specific technical duties of the squadron communications officer are described in this film (TF 1-717), which is intended principally to orient squadron communications officers who are new at their jobs. The film also points out many of the general administrative duties the communications officers may be called upon to perform.

"Pre-Flight Radio Inspection For Fighter Aircraft"

This film (TF 1-771) illustrates visual and operational checks made in the pre-flight inspection of the SCR-522 as installed in the P-47. It also points out the similarity of this procedure to inspection of the SCR-274 installed on other types of fighter aircraft.

"Airplane Engine Cooling Systems — For Pilots"

The third film of a series on airplane engine cooling systems (TF 1-758) describes for pilots the correct procedures for operating engine controls on liquid-cooled and air-cooled aircraft engines in order to insure effective cooling. Although the first part of the film is devoted to an explanation of the principles of cooling systems, the major portion deals with the various controls which affect engine temperatures and the optimum operating conditions. Two other films previously released in this series are for the engine mechanic and deal with maintenance and service of the cooling system: TF 1-756 "Airplane Engine Liquid-Cooled Systems—For the Mechanic," and TF 1-757 "Airplane Engine Air-Cooled Systems—For the Mechanic."

"Oxygen Equipment — Servicing High-Pressure Removable Cylinders"

This reel (TF 1-489) shows the procedures that must be followed in refilling high-pressure removable oxygen cylinders on aircraft. It emphasizes the care that must be observed in such operations, particularly stressing safety precautions for personnel servicing high-pressure oxygen equipment. Previously released in this same series are TF 1-488 "Oxygen Equipment—Types and Use at High Altitudes," and TF 1-487 "Oxygen Equipment—Servicing Equipment in the Airplane." ☆

considerations in their construction. Moreover, they are always located so that expansion can take place; in fact, our largest "Strips" already exceed anything existing airports can produce in runway length. From a cost standpoint, you can build over 15 adequate "Flight Strips" for the cost of a single suitable airport. The difference in maintenance costs is even more impressive. In fact, an entirely new "Flight Strip," with all necessary requirements as to width and length of runway, can be built more reasonably than an existing runway on an airport can be changed over into a makeshift landing area to accommodate modern cargo aircraft. Thus, it doesn't take too much imagination to foresee "Flight Strips," located outside cities away from fog and smoke belts, where cargo (and even passengers) can be unloaded and transported by truck and car to the centers of population.

Along established air routes "Flight Strips" would be the stepping stones or staging fields, not only as auxiliary landing areas for emergency use, but as air cargo or passenger "yards" for local deliveries. Add the possibility of glider-train transportation and you visualize a not unlikely air service of the future. Off civil air routes, "Flight Strips" could be utilized for feeder airline service.

Our third major consideration concerns "Flight Strips" and international air traffic — present and future. For while the catchword has become "freedom of the air," we might well substitute "freedom of the airports" as the key to the problem. You can have all the free air you wish, but aircraft must land and take off and for that you need landing areas.

Again, I will not attempt an overall discussion of the subject, with so much thinking left to be done about the job at hand, except to say that development of the

'FLIGHT STRIPS'

(Continued from Page 10)

"Flight Strip" program in this country under federal supervision is in direct contrast to the development of airports under local ownership. Many applications of this plan have a direct relationship to international affairs, since you may substitute international agreement for federal supervision and national ownership for local ownership.

Although the Army Air Forces assisted the Canadians in every way possible to develop the airports along the Highway, the Canadians naturally consider them Canadian airports. The Highway's "Flight Strips," on the other hand, were developed entirely under the supervision of the Army Air Forces, which selected the sites with the approval of the Canadian government and asked the U. S. Public Roads Administration to make plans and surveys in accordance with standard "Flight Strip" specifications.

Although both Americans and Canadians are stationed at the airports, each airport is under a Canadian manager. The "Flight Strips" are under the jurisdiction of the road officials who are responsible for building and maintaining the Highway.

The significant point is this: The airports, like all airports, are locally owned, and after the war can be expected to be locally controlled, in this case by the Canadian government.

"Flight Strips," by their very definition, are a part of a highway right-of-way, and are always adjacent to a public highway. Their status is the status of the Alcan Highway: Title rests with Canada because it is their land; construction, maintenance and *use* are covered by an international agreement between the governments of the United States and Canada. Thus, the "Flight Strips" adjacent to the Alcan Highway form the first chain of *international* landing areas.

After the war, "Flight Strips" in Canada, in this country, or in any part of the world, should always be a part of the same laws which govern the construction, maintenance and use of highways. If it is an international highway, as is the Alcan Highway, then "Flight Strips" become international "Flight Strips" to be utilized by mutual agreement between nations.

In this country we have developed these landing areas for aircraft through the joint efforts of Congress and the War Department, the United States Public Roads Administration of the Federal Works Agency, State legislatures and State road administrations, private industry and private organizations, and a host of individuals, principally those in the rural areas. ☆

ANSWERS TO QUIZ ON PAGE 26

1. All four colors.
2. (c) A fighter plane.
3. Zooming to meet our thunder.
4. (a) Navigator.
5. (d) Aerial Gunnery.
6. (d) A maneuver in flight.
7. Left side.
8. (a) Focke-Wulf. (c) Dornier. (b) Junkers. (d) Heinkel.
9. (a) Elevators.
10. (d) Government Issue.
11. (c) Materiél.
12. (c) The command HALT is given as either foot strikes the ground.
13. (d) Drag.
14. (d) All members of the Army and their dependents.
15. Away from his neck.
16. 1530.
17. P-47.
18. Distinguished Flying Cross.
19. Purple Heart.
20. Communications.

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which you will operate. Learn at least a few words of their language, words that will help you communicate your wants. Learn something about native customs.

b. Approach the natives with a friendly attitude. Don't display arms. Don't show fright. Assume that they will help you. Be patient. Get them to do things by indirect hints, such as a display of restlessness on your part. But never show anger—they won't be driven. And play fair with the natives; if you make a promise, keep it.

c. Carry things on your person that the natives will want and use them for rewards. They are a vital help. Carry trinkets, tobacco twists and razor blades. Strips of silk from your parachute will be highly prized. But don't give all your wampum away at once. Ration it carefully—you may need some later on. In many areas you can write out a chit which will bring a reward to the bearer on presentation at a missionary station or military outpost. Most natives understand the use of the chit.

BAIL OUT OVER BUNA

(Continued from Page 13)

2. Before you set out on a mission, make sure you have with you all the emergency equipment you might need. Always carry your jungle kit. Be sure to have *on your person* at least the following: matches in a waterproof container, a compass, a sturdy knife, maps of the area, sulfanilimide (preferably in powder form, for wounds that infect rapidly in the tropics), quinine (for malaria, a constant tropical hazard), halazone tablets for purifying water. You'll *need* these essentials. Wear G.I. boots or a sturdy equivalent that won't snap off if you have to bail out. Keep your shirt on, figuratively as well as literally. If you can salvage your pistol, so much the better.

3. Above all else, stay calm when you are face to face with an emergency. When you get down, sit for awhile and think things through. Prior knowledge of the terrain, the natives, and the conditions under which you are operating will prevent panic. In bail-outs, take extreme caution if you land in a tree. Many men have sustained injury coming down from trees. Of course, you're anxious to hug the earth. But play safe and come down slowly and deliberately. The ground will still be there when you get down and will feel a lot better than if you come down in a hurry on your head or back. ☆

PICTURE CREDITS

5: Royal Canadian Air Force. 7: Acme Newspictures. 14-15: Signal Corps. 16: Acme Newspictures. 26: Signal Corps. 32-33: Polaroid Corporation. 34: ASC, Patterson Field, Ohio. 38: Signal Corps. 45: Wide World. 46: J. H. Keeney & Co. Back Cover: New York Museum of Modern Art. All other photographs secured through official Army Air Forces sources.

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OFFICERS' CLUB

(DOMESTIC)

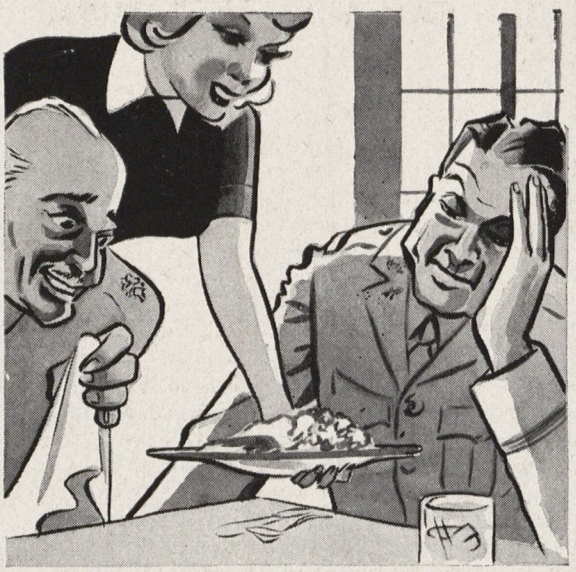
By Lieutenant William T. Lent

Colonel Bustle, Post Commandant, and his partner, Major Plato, S-3, are sweating out a spade finesse through the Supply Officer. Cautious Captain Tittle, Post Adjutant, holds the King but will probably save it, along with the C.O.'s temper.

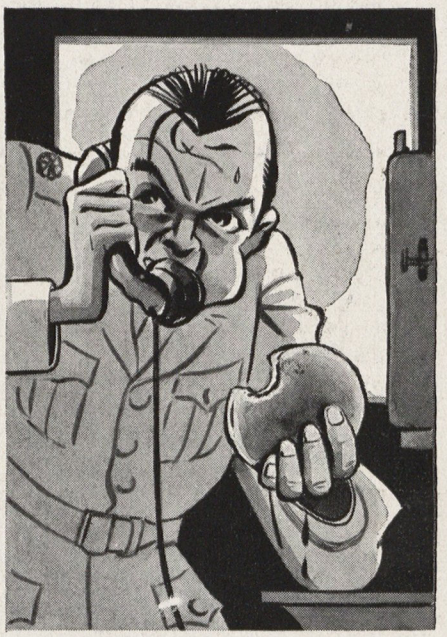
Officers' hats on the shelf have about as much individuality as a belt of 50-caliber machine-gun bullets. Here's what happened when the Unit Personnel Officer and the Special Service Officer left the cloak room during a heated discussion of last night's G.I. stage show.

In this corner we have a few of the flying officers (witness the functional headgear), hopelessly trying to beat the one-arm bandit. The Operations Officer has been stalking the machine for half an hour and now he figures it is just about ripe. He'll probably hit the jackpot with his fourth nickel but will put it all back in.

Pity the poor Chaplain, unto whom all grief gravitates. At the moment he's stuck with the A. & R. Officer's autobiography. When they get to the Illinois-Michigan game of '23, in which his nibs scored 3 touchdowns in the last 90 seconds of play, with a cracked clavicle, the Chaplain will remember an important engagement elsewhere.



Lieutenant Lardoon, Mess Officer, is taking a busman's holiday dining at the Club. He'll wind up in the kitchen leaving a new calorie chart for an indignant chef. That's the Post Surgeon, on the left, with a carnivorous appetite and case-hardened stomach.



Major Galley, combination Public Relations Officer, S-2 Officer, Photo Officer and Group Commander, has just been called to the phone between bites of hamburger to answer the query of the local newspaper editor concerning the forthcoming visit of the Paraguayan President. The Major will return to his cold coffee and then dash madly off to the OCS board meeting.

ARE YOU GUIDING THIS U-BOAT WITH *Careless* TALK?