

# AIR FORCE

OFFICIAL SERVICE JOURNAL

OF THE U. S. ARMY AIR FORCES



FEBRUARY 1943



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*Contents*

Notes on Living and Fighting Conditions in North Africa	4
Clear Thinking Saves a C-53 After a Mid-air Crash	6
An Eagle Fighter Pilot Tells of 250 Combat Hours	7
The Troop Carrier Command, Explained by Its Leader	8
How Ingenuity Helps Training on the Salt Flats of Utah	10
Details on the Organization of the Army Air Forces	13
Health Hints for the Southwest Pacific Theater	14
Compressibility—An Explanation of Its Effect on Aircraft	15
A Bombardier's Account of a Kiska Bombing Raid	17
Our Airmen in the Solomons—A Picture Report	20
The Role of Maps in Global War, First of a Series	22
"Gas Alert Day" at Geiger Field is Realistic	25
How Our Photo Interpreters Outwit Enemy Camoufleurs	32
The Job of a Tow-Target Pilot Is Anything But Dull	34
RAF "Train Busters" Disrupt German Rail Service	36

**DEPARTMENTS**

Cross Country	1	Technique	26
On The Line	18	Roll of Honor	30
Air Force Quiz 33			

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

**February Brief**

**THE PRECISION** with which paratroops were delivered at the right spot at the right time during the invasion of North Africa has been given wide praise. General Arnold recently cited that operation as "a credit to one of our newest Air Force organizations, the Troop Carrier Command, and to the parachute battalions," and added: "You will hear more and more of these organizations as we get deeper into this war."

In this month's AIR FORCE, Brigadier General Fred S. Borum, Commanding General of the 1st Troop Carrier Command, explains in an article on Page 8 how the Command functions and what is involved in aerial invasion. He also reports on troop carrier operations in the Texas air maneuvers last fall.

**GALOSHES IN AFRICA?** Sounds a little strange, but the "desert" war theater right now is featuring mud and cold, and winter clothing—even galoshes. You'll better understand why after reading the article on North African living and fighting conditions, based on the notes of an Air Force officer just returned from that area. It appears on Page 4.

**YOU'RE FLYING** entirely on instruments at 4,000 feet in a big C-53 transport with a crew of six aboard. Suddenly there is a violent crash as an oncoming commercial airliner hits you. Thirteen feet of your right wing is torn away, along with a portion of the aileron surface. Your ship goes into a steep spiral.

Get out of that one if you can! Captain L. H. Penn, Troop Carrier Command pilot, did. He pulled out of the spiral on instruments, established contact with a nearby airport, and came in for an emergency landing without further damage to his ship and without scratching himself or his crew.

Colonel Sam R. Harris, Director of Air Traffic and Safety, describes that bit of "beautiful flying" in an article on Page 6. He cites it as an example of "alert, clear-headed action and skill" in a discussion on the need for reducing pilot error as an accident cause in the Air Forces.

**MAJOR CARROLL W. MCCOLPIN**, 28-year-old fighter pilot, joined the Air Forces last September after 22 months of steady fighting over Europe, first with the R.A.F. and then with Eagle Squadrons. In fact, he is a former member of all three Eagle Squadrons, a distinction no one else enjoys,

and commanded the Third Eagles for several months.

He is tied for top score in the Eagles with a total of eight enemy aircraft destroyed, one probably and an undetermined number damaged. In addition, he is credited with destroying two trains, two boats and three lorries.

Major McColpin, from March, 1941, through November, 1942, accumulated a total of 253 operational hours in 184 different sorties, which is a lot of combat time in fighter aircraft. While at Headquarters recently for intelligence interviews, Major McColpin was asked to do a first person account of his combat experiences, and he complied with the article which appears on Page 7 of this issue.

**SEVERAL** months ago, in the old Air Forces News Letter, predecessor to AIR FORCE, we published an organization chart of the Army Air Forces. It turned out to be one of the most popular features carried by the News Letter.

The Air Forces have undergone a number of changes since then, and, for the moment at least, the chart seems to have stabilized. (We cross our fingers with that one, having seen dozens of organization charts become obsolete at a moment's notice under pressure of the expanding Air Forces.) At any rate, we thought it time to present an up-to-date chart for AIR FORCE readers. It appears on the inside back cover of this issue, and is correct as of January 15.

Going a step further, we asked Colonel Byron E. Gates, Assistant Chief of the Air Staff, Management Control, the top man in such matters, to review the background of Army Air Forces' organization and discuss the present structure in some detail. The article by Colonel Gates appears on Page 13.

**THE COMMANDING OFFICER** of a bombardment unit in the Aleutians, following a B-26 mission over Jap-held Kiska Island, conducted a friendly contest, among crews which participated, for the best written narrative covering that action. The prize-winner was Technical Sergeant L. O. Gardner, a bombardier. We are happy to print his article on Page 17 for all Air Forces personnel to read, and we invite other combat units to follow suit with similar writing contests.

**THE FRONT COVER** picture this month shows armament men servicing the 50-caliber guns of a P-47 fighter.

**FORMERLY THE AIR FORCES NEWS LETTER**

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# CROSS COUNTRY

**A new flight control system and other developments of the month within the Army Air Forces.**

**T**HREE or four months from now pilots of the Army Air Forces will have a new kind of service on cross country flights.

Airways Traffic Control centers and communication facilities will maintain contact with all Army airplanes on such flights. They will give pilots complete information on weather changes and on hazards and other conditions which may arise to make continuation of particular flights difficult.

Coupled with this move will be a general standardization of clearance procedures on cross country flights throughout the Air Forces. Officers signing clearances will be required to *know* that the airplane and pilot are thoroughly prepared for the flight to be made. They will be responsible for seeing to it that all information necessary for successful completion of the flight is available and used.

This announcement is based on information provided by the new Directorate of Air Traffic and Safety.

First official notice of these changes was contained in A. A. F. Regulation 20-1D issued early in January. Under its provisions Colonel Sam R. Harris, Jr., the former Director of Flying Safety, became the Director of Air Traffic and Safety, supervising and coordinating the activities of a Director of Flight Control (Lieutenant Colonel George C. Price), a Director of Flying Safety (Lieutenant Colonel James T. Peyton) and a Director of Safety Education (Major Robert L. Steinle).

Flying Safety and Safety Education are activities which had been carried on by the old directorate for some time. Flight Control is a new element.

The new flight control agency is now in process of organization. It will formulate the rules and regulations under which all clearances for cross country flights will be given. It will set up the procedures to be followed, and through an organization of Regional Flight Control officers stationed at each of the 23 Airways Traffic Control centers will see that control tower and flight clearance personnel understand and are enforcing all regulations and procedures.

These Regional Officers will supervise the system of providing information to pilots as they check into specified stations en route. When the situation warrants, these officers will instruct them to land at the nearest airport, proceed to an alternate airport, or possibly return to their point of starting.

While the change represents an extension of centralized control over flying activities, it will affect only cross country flights, including ferrying and cargo flights. Airline operations will not be affected.

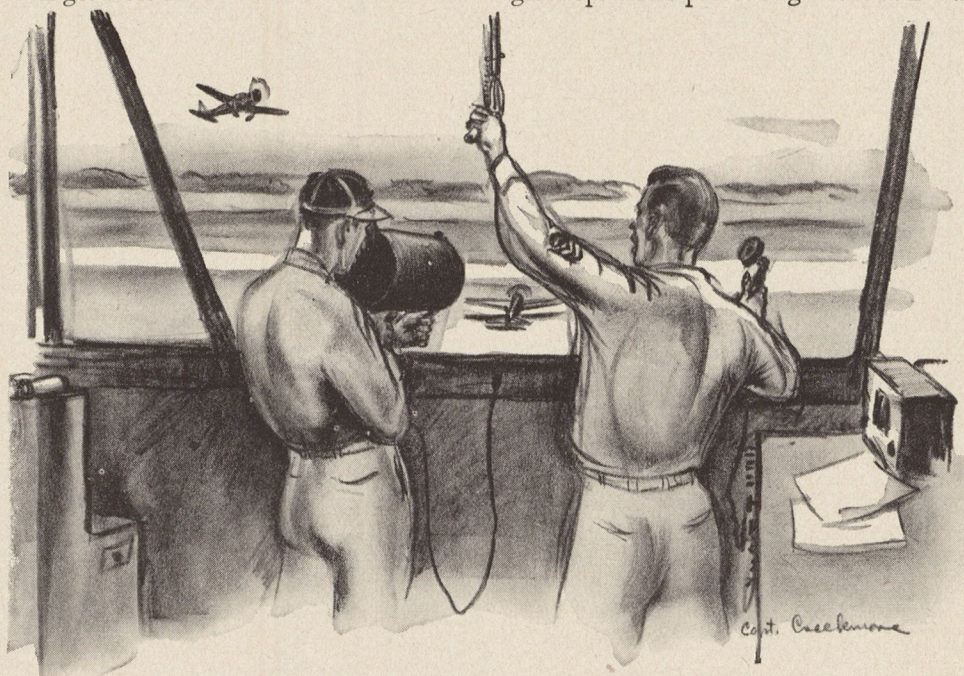
Control tower and flight clearing personnel will be supervised only to the extent of central direction of their procedures and rules for giving cross country clearances, and inspections of their performance. The Directorate will be an allocating agency more than a restricting agency.

Variations in the amount of control to be exercised in the case of individual pilots will be permitted. A system is being devised whereby pilots with many years of experience will be practically unlimited in their activities. Younger, inexperienced pilots will get more assistance.

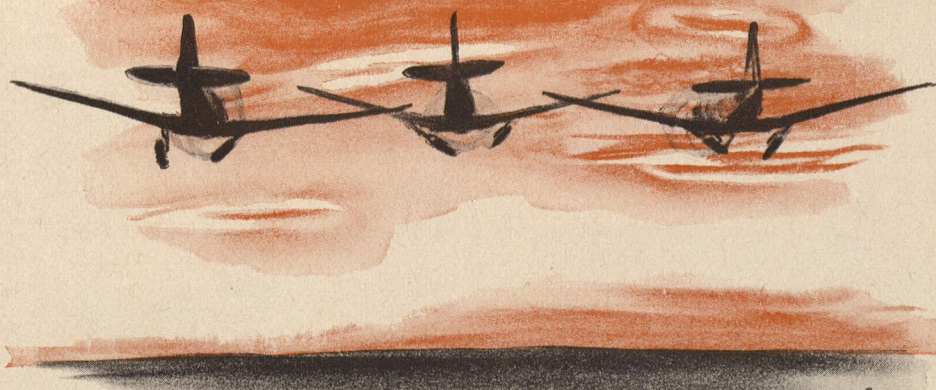
For the average pilot, the new flight control will mean that when he gets his clearance he will know definitely that his airplane is ready and equipped for the flight he must make. There will be no guesswork about the routes he is to follow. It will mean that someone else shares with him the responsibility for knowing every condition that he will encounter—fields along his route and every other feature.

When he leaves the operations office he will be informed of the routine procedure of checking with control towers, taxiing, take-off, and traffic patterns to be followed at airports proposed to be utilized on his route. More important, he will know that every other pilot is following the same procedure as he. Flight control will also endeavor to keep him informed of unusual conditions along his route.

The basis for flight control may be found in the accident records and recommendations from the field. It would have prevented an accident such as the one recently involving a B-25, cleared on a cross country flight with a stop schedule en route for gasoline. The flight was at night and the pilot checked over a radio range on his way to a scheduled gas stop. After proceeding about half way







to this stop, he encountered bad weather and turned back to his last check point. But he ran out of gas and cracked up a few minutes after he turned around. The flight was a potential accident the moment it was cleared. Under flight control, the pilot's gasoline supply over the check point would have been known and thus the accident avoided.

A recent flight of B-26s was cleared for a night flight. They arrived at their destination to find that no field lighting or other night flying facilities were available at that field. The first ship landed about the middle of the field or beyond and ran through the fence, ending up on the railroad right-of-way. The second turned around and headed back to its starting point. The third dragged in too low and clipped the tops of several trees, but fortunately was able to land without killing anyone. Proper technical control of operations offices would have prevented this flight being cleared to a field which did not have the necessary facilities.

Another pilot recently cleared a B-24 on a cross country flight. He arrived after dark and on his down-wind approach, just after passing the point where it would have been possible to glide into the field, he ran out of gas. He had about three hours' gas when he took off. He apparently thought he had eight or ten hours. Flight control will require that every airplane cleared has enough gasoline for the flight as planned, plus enough to get to an alternate airport, plus at least forty-five minutes.

While designed primarily as a safety measure for cross country training operations within the continental United States, flight control is also a school for combat. England, like the United States, started the war on a basis of every man for himself. Bitter experience taught the need for standard control and England has it today. Modern combat is impossible without it.

Flight control is a major step in the evolution of the Army Air Forces. Its benefits must be measured in the *safe* completion of *more* Army Flights and thus in more pilots—better trained—for combat.

COLONEL BYNUM walked briskly into one of the barracks at the Harlingen Aerial Gunnery School the other day.

Not a man jumped to attention. They all lounged about writing letters, chewing the fat—and sleeping. Colonel Bynum stopped in front of a private who sat smacking his lips over a hunk of fudge from home.

The private looked up disinterestedly. "Hello, Colonel, old boy," he said. "Sit down before you fall down, and have yourself a piece of chocolate."

Colonel Bynum sighed, reached for the fudge and stretched out on a nearby bunk.

Private Colonel N. Bynum is a gunnery student at Harlingen who will graduate soon with wings and a Gunner Sergeant's rating.

AN Information Center has been established by the Air Forces at Eglin Field, Florida, to collect and prepare for dissemination data on the Arctic, desert and tropics as it applies to the specialized operation and care of all Air Force equipment, climate, living and food conditions, ethnological conditions, soil, coastal and interior terrain, water supply, and health and disease prevention.

The new unit will gather and interpret all information now available on conditions in Arctic, desert and tropics, as well as information sent in by military personnel already in those areas. To this will be added information gathered from experiments of the Center.

Requests for information may be sent to the Arctic, Desert and Tropic Information Center from personnel in this country or on foreign assignment, and from other branches of the armed services as well as from the Air Forces. An attempt will be made to answer all requests, *no matter how small*.

Under the command of Lieutenant Colonel H. O. Russel, Headquarters, Eglin Field, Florida, the Center will include specialists such as geologists, physicians and minerologists, most of whom will be commissioned, and men who have lived in the areas. Personnel from the Center will ac-

company troops overseas for observation purposes.

The information gathered will be disseminated by answering specific inquiries, by publication of special pamphlets, and through AIR FORCE.

THE Air Surgeon's Office reports that the drinking of fluids before flights to altitudes exceeding 10,000 feet, as well as during such flights, should be greatly restricted. In meals eaten shortly before or during flight to high altitudes, the Office adds, the following foods should be avoided:

Carbonated beverages; all fried foods or food with crusted surfaces; fat meats such as pork or other foods mixed with fat; fresh bread, rolls or cake; navy beans, dried beans, peas and lentils; nuts; raw vegetables, especially onions, cabbage and turnips; dried and raw fruits, except strained orange juice, grapefruit juice and bananas.

WE HAVE read the photostatic copy of a letter from a sergeant in a bombardment squadron on the North African front to an employee of the Glenn L. Martin Aircraft plant, manufacturers of the B-26 for the Air Forces, and of several planes for the Navy and for the British.

Writes the sergeant: "This far away I have heard your factory was shut down. I really hope not and do not believe it."

We don't know where such a rumor started, or if it has spread along the war front to any degree, but we know rumors to be dangerous things and know them to be one weapon of Axis propaganda.

To the sergeant in Africa and to all within eyeshot we are happy to report that the Martin Company hasn't shut down for a minute, and that aircraft and accessory plants throughout the nation are working night and day as never before.

Just for good measure, we quote from a report made recently by Lieutenant General Harry H. Arnold: "We are building overwhelming air power—on schedule. Our monthly airplane production is over 4,000. Our great expansion program now under way will double that output. In 1940 we had in our airframe and accessory plants about 233,000 man employees. Today we have 1,500,000. That explains the tremendous step-up in output of planes and engines."

BASE OPERATIONS at the Air Depot Training Station, New Orleans (Louisiana) Army Air Base, reports several parachutes missing from that office and asks AIR FORCE to request that organizations inventory parachutes at their stations. Should any of the missing chutes be found they are to be returned to Base Operations at the New Orleans station. The chute numbers are: 41-19432, 41-19436, 42-65399, 42-65400, 42-65401, 42-65404, 42-65405, 42-65406, 42-65408, 42-65412 and 65-413.

The Navigation School, Mather Field, California, asks that all Air Force officers

AIR FORCE, February, 1943



be informed that a Navigation Information Service has been established at that school to which officers may send directly any questions concerning navigation technique, procedures, etc. The Service has grown out of frequent contacts between instructors and their former students concerning navigation problems. Answers to questions will be prepared and forwarded promptly, and all classified material will be properly safeguarded. It is also requested that navigators throughout the Air Forces send to the Service accounts of their experiences which may be of interest to instructors and students at the school. Through the Service, the school believes that considerable help may be given to navigators in the Air Forces and at the same time help the school obtain direct knowledge of problems the navigators are encountering soon after graduation. Thus, steps can be taken immediately at the school to avoid many of these difficulties for present and future students.

These two requests to AIR FORCE lead us to believe that other Air Force units might like to use the service journal in much the same manner. That's exactly what we're here for. By circulating to all personnel, we offer a consistent medium for the exchange between organizations and individuals of requests for information, announcements, "want ads" (at no cost, thank you) such as that for missing parachutes, and the like. In fact, send in enough material and we'll set up a section of the magazine just for that purpose, not unlike the "want ad" section of a newspaper. With the Air Forces growing as it is and spreading out all over the world, we suggest that such a section might serve a very useful purpose. Keep your material as brief as possible, accompany it with the signature of an organization or individual, and we'll try to print everything you send in.

THE Directorate of Communications suggests that the following points might well be put in the form of a posted notice where dispatches are written or received at the code room, or might be displayed on the desk tops of message writers:

1. Use radio only for messages that cannot be sent by other means.
2. Avoid stereotyped *beginnings* and *endings*.
3. Condense wording as much as possible without ambiguity.
4. Incorporate addressee and originator names in the text.
5. Avoid repetition of words or phrases; use synonyms.
6. Ask the cryptographic officer to assist in paraphrasing; initial approved text.
7. Write numerals where accuracy must be assured (each digit or primary number as one word). Example: Write "24 men" as TWO FOUR MEN, *not* TWENTY FOUR MEN.
8. Use the phonetic alphabet (p. 56 FM 24-10) for difficult expressions with letters as well as numerals.

For what it's worth, we offer an unofficial report from the Middle East that Germany's Heinkel 111 bomber, with full crew and equipment, can haul exactly 6,400 cans of beer. That contribution to the science of logistics was furnished by Allied airmen who recently captured a Heinkel. Exactly how much captured German beer Allied airmen can carry is a matter of speculation, and enviable speculation, too.

EXCEPTION has been taken to a sentence in the article "Single Engine Operation" by Lieut. Colonel J. B. Duckworth, Columbus Flying School, which appeared on page 14 of the December issue of AIR FORCE. The sentence read: "The ship can be banked steeply into the dead engine and be as solidly controlled as though both were in use." (This discussion involved the necessity for adequate airspeed when flying a twin-engine plane and one engine fails.)

In explanation, the sentence was contingent upon that immediately preceding, which stated: "If a rate of 30 or 40 miles per hour over the minimum single engine operating speed is maintained, no loss of control can result." The meaning: that if adequate airspeed is maintained, the ship could *even* be banked steeply into the dead engine, etc.

Considered by itself, the sentence objected to might indicate that turning into the dead engine in single-engine operation of multi-engine aircraft was recommended. This was certainly not the case. In such operation, whenever possible, the pilot should turn toward the good engine and keep the dead engine up, never down.

FOR maximum effectiveness, AIR FORCE must circulate throughout the Air Forces, spread around the world. If the ratio of distribution in this country is not maintained in ensuing months, you will understand that it is because we are making every effort to keep pace with the movements overseas and get AIR FORCE in the hands of the boys on foreign duty—even to the remotest island outpost. Whatever the changes involved, there will be plenty of magazines distributed monthly for all to read. This will depend, to a great extent, on your seeing to it that AIR FORCE is spread around. Letters keep coming in asking that names be placed on the mailing list. We repeat, there is no mailing list. Our only method of circulation is through bulk shipment. We depend on message centers for equitable distribution at individual fields. And, we depend on you to keep AIR FORCE moving.—THE EDITOR.

## From Numbers to Names

Below is a listing of names (by the numbers) accorded official recognition by the Army and Navy as popular designations for American aircraft. For official use within the Army Air Forces, numerical designations will be retained. (Navy symbols are shown in parentheses):

### HEAVY BOMBERS

B-17  
B-24 (PB4Y)

Flying Fortress  
Liberator

### MEDIUM BOMBERS

B-18  
B-23  
B-25 (PBJ)  
B-26  
B-34 (PV)

Bolo  
Dragon  
Mitchell  
Marauder  
Ventura

### LIGHT BOMBERS

A-20 (BD)  
A-24 (SBD)  
A-25 (SB2C)  
A-29 (PBO)  
A-34 (SB2A)  
A-35  
(SB2U)  
(TBD)  
(TBF)

Havoc (Attack)  
Dauntless (Dive)  
Helldiver (Dive)  
Hudson (Patrol)  
Buccaneer (Dive)  
Vengeance (Dive)  
Vindicator (Dive)  
Devastator (Torpedo)  
Avenger (Torpedo)

### PATROL BOMBERS (Flying Boats)

OA-10 (PBY)  
(PB2Y)  
(PBM)

Catalina  
Coronado  
Mariner

### FIGHTERS

P-38  
P-39  
P-40  
P-43  
P-47  
P-51  
(F2A)  
(F4F)  
(F4U)

Lightning  
Airacobra  
Warhawk  
Lancer  
Thunderbolt  
Mustang  
Buffalo  
Wildcat  
Corsair

### SCOUTING OBSERVATION

(SO3C)  
(OS2U)

Seagull  
Kingfisher

### TRANSPORTS

C-43 (GB)  
C-45A (JRB)  
C-46 (R5C)  
C-47  
C-53 (R4D)  
C-54 (R5D)  
C-56 (R5O)  
C-61 (GK)  
C-69  
C-76  
C-87  
(JR2S)

Traveler  
Voyager  
Commando  
Skytrain  
Skytrooper  
Skymaster  
Lodestar  
Forwarder  
Constellation  
Caravan  
Liberator Express  
Excalibur

### TRAINERS

PT-13 & 17 (N2S1 & 3)  
PT-19 & 23  
(N2T)  
PT-22 (NR)  
BT-13 & 15 (SNV)  
AT-6 (SNJ)  
(SNC)  
AT-7 (SNB2)  
AT-8 & 17  
AT-10  
AT-11 (SNB1)  
AT-13 & 14  
AT-15  
AT-19

Caydet  
Cornell  
Tutor  
Recruit  
Valiant  
Texan  
Falcon  
Navigator  
Bobcat  
Wichita  
Kansas  
Yankee-Doodle  
Crewmaker  
Reliant

### LIAISON

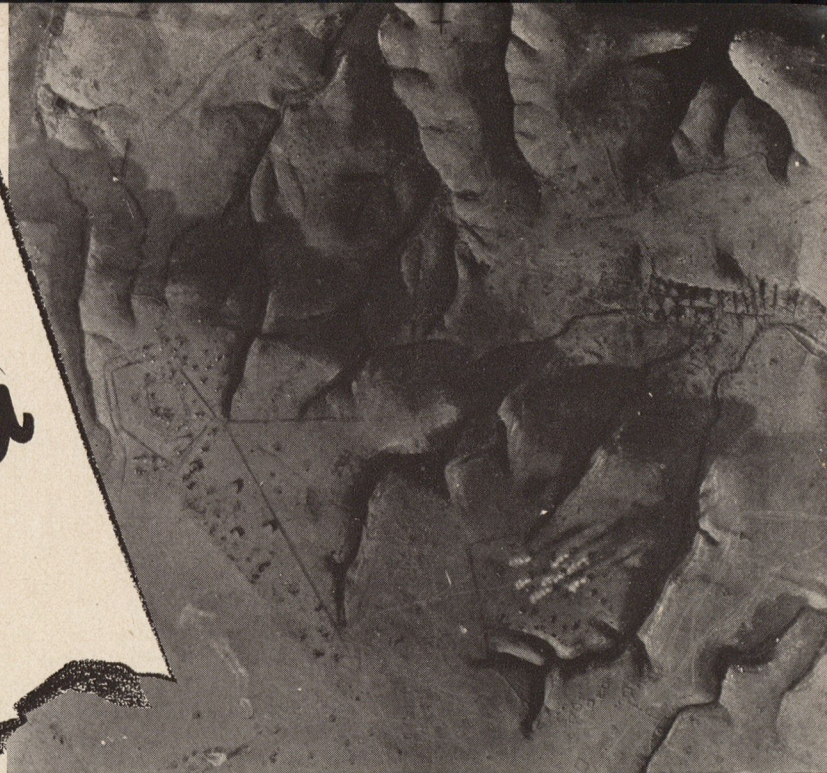
L-1  
L-2  
L-3-C  
L-4-B (ME)  
L-5

Vigilant  
Taylorcraft Grasshopper  
Aeronca Grasshopper  
Piper Grasshopper  
Sentinel



# NOTES

## from North Africa



North African bombing pattern.

### Sidelights from an airman's report on living and fighting conditions in the desert theater of operations.

**MUD AND MORE MUD.** From Casablanca to the front is almost 700 miles and the road network—both motor and rail—is none too good. You are forever being impressed by the distance from one point to another, probably because there is nothing in between but—mud.

In America you can lead a not too sheltered life and in ten years not get stuck in the mud. In North Africa ten minutes is your limit. Everything gets stuck—trucks, planes, feet. Half the operational difficulties of the area can be traced to mud.

**EATING AND SLEEPING.** There is no answer to cover everyone. Plane crews sleep in their planes, ground crews sleep in tents at oases, in hotels, barracks, anywhere. You eat American rations as far east as Algiers, from there on, British. With the British you drink hot tea and wine. Water isn't always safe. British rations aren't bad; there's sure to be some kind of meat stew.

In the towns and cities—such as Algiers—the Air Force has taken over hotels. Some of them are fine, most not bad. The service is fair; occasionally there is hot water. When the word gets around that the taps are running warm, everybody dashes for the soap and towels. It is not unusual to see a colonel—who has an intelligence system in good working order—drop everything and run for home to get his first bath in a week.

There is nothing to complain of so far as the hotel food is concerned. You get a yen for a piece of red meat occasionally, and

green vegetables are scarce, but you get fed.

Breakfast costs thirty francs, lunch forty. A franc is worth  $1\frac{1}{4}$  cents. You change your money into francs very easily, but American Export dollars are good anywhere. These are regular U. S. bills with a yellow seal stamped on them, to the right of the portrait.

**THE FIGHTERS.** The P-38s have come into their own in North Africa. They do everything. They are used on air defense patrols of Allied strong points, over areas of concentrations, for ground strafing against troop columns and armored equipment, for minimum altitude attacks against surface vessels, and for escorting heavy and medium bombers on missions.

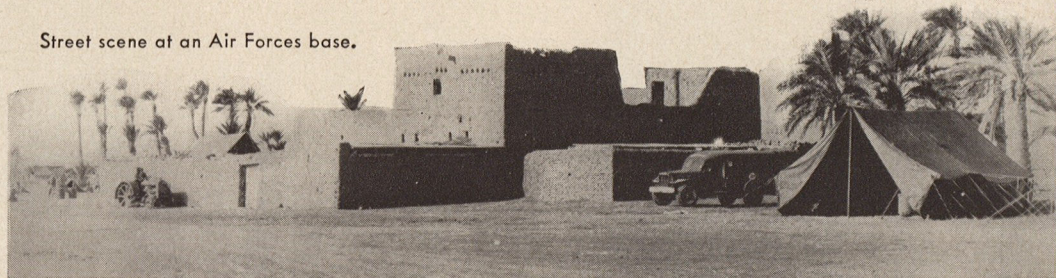
You can hardly find an assignment which P-38s cannot carry out. They escort our bombers 500 miles out and in—as far as the bombers go. They can carry two big bombs and drop them where they do the most good. They are also used for photographic reconnaissance and as weather ships.

The fighter pilots have tough work. Day after day they fly escort duty at 30,000 feet, using oxygen all the time, hour after hour. But they are sold on their ships.

The commanding officer of a heavy bombardment group in the North African theater said he would stake his tactical reputation on the fact that the P-38 is the greatest fighter ever built. "Other fighters are better at certain things, but the P-38 is the best all around ship," he said.

**MONEY MEANS NOTHING**—in the back country. There is the story of the Air Force corporal who wanted to buy some tangerines. He had the dough, and was willing to pay whatever was asked. But the natives would have none of his money. They kept pointing to his shirt and his pants. He caught on, of course, and went back to his tent to see what he could dig up. His supply of clothes was no more than adequate, and he knew everything he owned was precious. Finally he decided to part with his barracks bag. He brought it out. The

Street scene at an Air Forces base.





natives eyed it for a long time, fingered it, and then handed it back. It meant nothing to them. Then the corporal took his knife, cut a couple of holes in the bottom of the bag, slipped a native's legs through, pulled the bag up and tied it tight around the chest. The native was delighted.

The corporal got four bushels of tangerines.

Everybody eats tangerines all the time. You carry them in your pockets and bags and keep them in your room. In the cargo planes there is always a crate open for anyone to dip into.

**THE BOMBERS** are doing a great job. Morale is excellent among the crews. The fact that the crews were trained in England on combat missions accounts for the smoothness of operations.

The crews on both the light and medium bombers are developing a much more efficient degree of crew coordination. There seems now a strong possibility that crews will be returned here intact—with the same plane they flew in the wars—to instruct.

The Germans aren't taking anything lying down. Their defenses are excellent; plenty of ack-ack gets up to high altitudes. They're throwing a lot of 88 mm stuff at us. But nothing is interfering with our accuracy.

One fortress came home with an 88 mm hole in a wing between the motors. It was a clean hole—the shell had gone through and exploded above—and if you looked carefully you could see the shell rifling on the metal of the wing.

It has become general practice for crews in medium bombers to wear helmets and big goggles, so that if the windshield is shattered by flak or anything else they will not get hit by flying glass.

Of all the legends and cracks and mottos that are painted on planes the best seemed to be this: Over the rear gunner's compartment in a B-17 was a picture of a pair of dice, with a seven showing. And these words, "Shoot. You're faded."

**AN INCIDENT** occurred one day at a heavy bomber field which scared the boys a little. A Heinkel heavy bomber apparently got lost, and after circling the field, came in, made a normal approach up wind and landed. The ship, of course, was immediately taken over and the pilot was a very surprised fellow to find that he wasn't in German territory. What scared the boys was that all the enemy's maneuvers hadn't aroused any suspicion.

Flying low over the veldt, a young lieutenant-colonel, from the nose of a B-17, had his eyes wide open at a collection of zoo animals galloping under him—giraffes, zebras, deer, etc. Finally he spotted a buffalo, African variety, and could no longer resist. He let loose with a burst from his nose gun. The buffalo took off.

A general was sitting in the plane, soberly watching what had been going on. After the burst he nodded slowly and spoke

These are the notes of an Air Forces officer just back from an inspection tour with the Twelfth Air Force in North Africa.

to the hunter. "Colonel," he said, "the buffalo is a powerful animal. But the 17 is a good ship. I think you have about an even chance against him."

**THE CARGO PLANES.** Those boys of the Troop Carrier Command are doing a hell of a fine job. They are doing all the air transport in the area, moving, with their C-47s and C-53s, everything that gets moved—equipment, supplies, personnel. They fly—escorted by fighters—from Casablanca right up to the front line airdromes.

They can never rest. They must fly continually under all kinds of handicaps, in and out of small, bad fields. Nevertheless, they show a minimum of accidents and maintain their planes excellently under hard field conditions.

Example: For the Airborne Engineers the cargo boys carried personnel and equipment from Casablanca to a small field far in the interior. This was within a short distance of a drome which it was hoped could be used for heavy bombers. The Engineers—with their miniature bulldozers and their scrapers, jeeps, rollers and

graders—put the field in shape so that a B-17 landed *four days later*. The cargo planes got the bombers there.

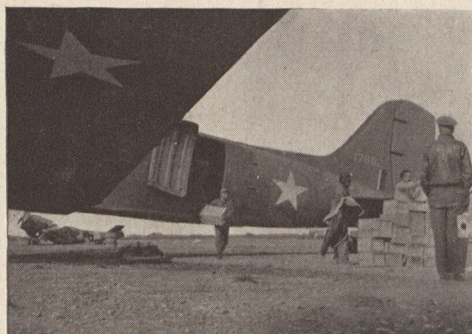
**WEATHER, NOT A CLIMATE**, that's North Africa. It's good for a week, then bad for a week, which means that you fight hard for a week, then take it easy for a week. Of course, you don't really take it easy, you have no time off. You eat and sleep with the planes, and very often repair them as well.

It's cold. Algeria is in the same latitude as North Carolina but without benefit of the Gulf Stream. If you're moving into the area take winter uniforms—and a bedding roll. Take all the uniforms you are likely to need, for when a blouse wears out, you will have to keep on wearing it. Shoes are a big problem. Thin soles are no good at all; the thicker the soles the better. Galoshes will help.

**THE ARAB** is a quiet type. However, if you make an effort he will respond, and he seems pleased to talk. The Arabs have finally got the idea that we are temporary visitors and mean them no harm. On the whole, relations with the French and the natives are satisfactory. There is very little trouble.

The standard horror story of what the natives did to a couple of the boys who made passes at their women has been thoroughly spread around, so all is quiet on that front. And in any case, the native women don't bear what you would call a striking resemblance to Hedy Lamarr.

**GETTING HOME** doesn't take long. You can leave Africa one day and be in Washington the next. Good flying—7200 miles in 44 hours, or 164 miles an hour, including three stops. ☆

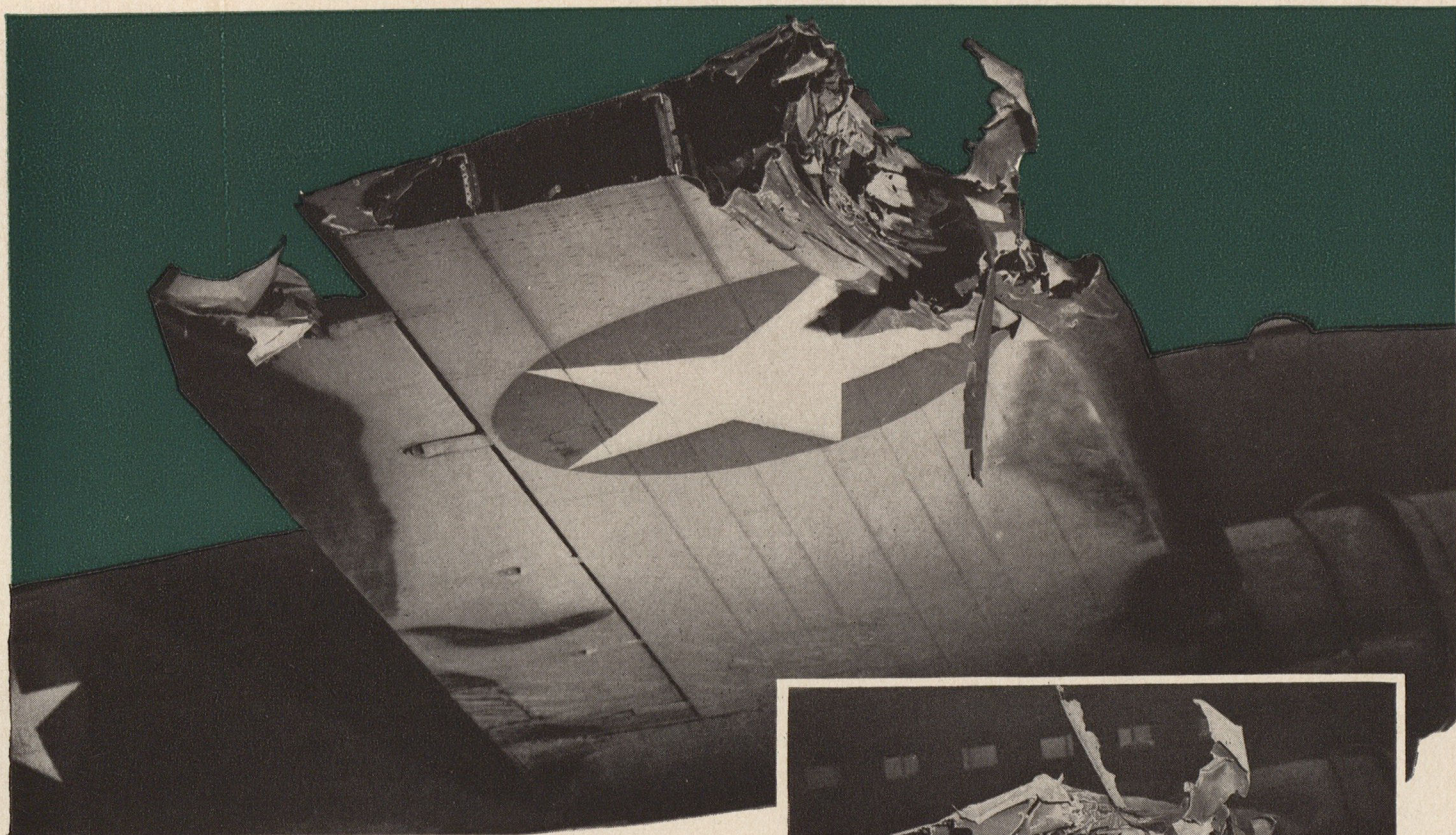


Unloading emergency rations from a C-47.



Tripoli Harbor during a daylight raid by B-24s.

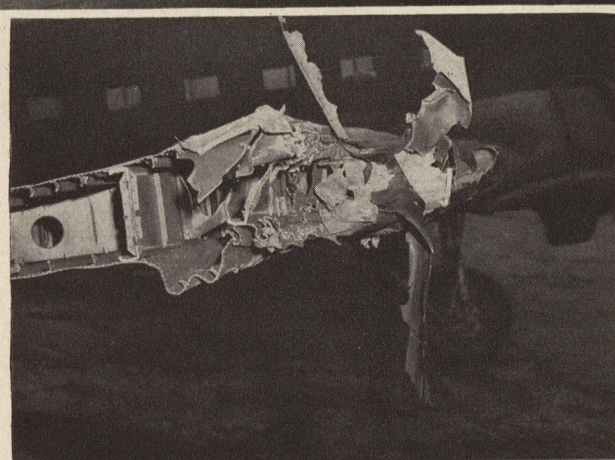




# KEEP ALERT AND KEEP ALIVE

*By Colonel Sam R. Harris*

DIRECTOR OF AIR TRAFFIC AND SAFETY



With thirteen feet of wing missing, this ship landed safely

EN ROUTE to Wichita from Stout Field in a C-53, Captain L. H. Penn of a troop carrier squadron was about five miles from Kansas City at 4,000 feet and entirely on instruments when a violent crash threw his ship into a steep spiral. He knew something had hit him but he didn't know what. The crew got orders to prepare to jump.

Straight and level flight with a perfect airplane is one thing. Pulling a damaged ship out of a spiral on instruments is another. But it worked. The crew of six men didn't jump.

In less than one minute, Captain Penn had established contact with the Kansas City radio. He asked for weather at the airport and warned that he was coming in for an emergency landing. Other ships in the air nearby were sent away from the immediate vicinity and a commercial airliner ready to take off was held on the ground.

Coming out of the overcast at 1,500 feet, Captain Penn found himself north of the airport. In order to avoid a longer turn to the left, he turned the ship to the right

despite a damaged right wing. Wheels down and under control, the ship landed safely. Once on the ground, Captain Penn discovered that he had collided with a commercial airliner which crashed in a field a short distance away, all of its occupants escaping injury.

Thirteen feet of Captain Penn's right wing had been torn away, along with a portion of the aileron surface.

This was a beautiful job of flying. Those moments immediately following the crash were probably the busiest that Captain Penn has ever known, but he moved from one job to the next and refused to get panicky.

THERE are more planes over the United States today than ever before. Because more of them are equipped for it and more men have been trained to do it, there is bound to be more flying in "instrument weather." This means greater exposure to collision accidents.

Obviously, it is impossible to describe in advance exactly what techniques should be used in the event of collisions. In fact, in

999 cases out of 1,000 the thing to do is jump.

The best treatment for these accidents, like all others, is to prevent them from happening. Standardized control throughout the air forces is one long step in that direction. As for the pilot, prevention requires rigid adherence to flight plans—especially to assigned altitudes. By rigid adherence is meant staying within a plus or minus 50 feet of the assigned altitude *all the time*. It can be done by any normal pilot who is on his toes and doing a real job of flying.

Rigid adherence to flight plans also means instrument flying—even under contact flight rules. Modern operational equipment has outgrown the seat of anybody's pants. Your instruments are geared to your equipment. The seat of your pants is not.

Pilot error is still by far the greatest cause of accidents in the Army Air Forces. Alert, clear-headed action and skill such as that demonstrated by Captain Penn will reduce that percentage and with it the list of needless casualties in men and equipment this side of actual combat. ☆



# A Jump Ahead of the Jerry

*By Major Carroll W. McColpin*

U. S. ARMY AIR FORCES

WE knew long before we reached Britain on that crossing back in January, 1941, that things were going to be plenty hot in the months to come.

There were thirteen of us in the first group lined up by a New York committee to go over and give the R.A.F. a hand. Great Britain already had been blitzed from hell to breakfast and the shows over there were still hot and heavy.

We thought we had a fairly good idea of what was coming but we were under-shooting.

Of the thirteen, only two of us are still pitching. One of the boys is an instructor in England; and I'm in operational flying for the Army Air Forces. Of the others, a few got out as the months went by but most of them didn't come back.

AIR FORCE has asked me to pass along a few personal experiences in the hope that some idea of what combat against the German *Luftwaffe* is like might be gained from them. Although in this article I must necessarily speak only for myself, it might be borne in mind that my experiences, in many respects, have been duplicated hundreds of times in the R.A.F.

I had about 300 hours in light stuff under my belt before I went across, which meant that my principal training in Britain consisted in gunnery practice and other phases of O.T.U. The training period lasted six

## **Personal experiences of an American fighter pilot during 250 operational hours with the R.A.F. over Europe.**

weeks, including forty hours in the air and about sixty hours of ground duty.

The R.A.F. was surprisingly lenient with us. The ground courses were not mandatory. Most of the fellows seemed to realize that if we didn't choose to take all the instruction and tips they offered, it would be our necks—nobody else's. That's the way the R.A.F. felt about it.

I took all the training they dished out. And I'm here to tell you, I'm damned glad I did. You can't get too much training in this business.

During the latter part of March, I made my first operational flight—with a British squadron, of course. We were flying Hurricanes then. That first flight was a patrol over the North Sea at night. We were flying at from twenty to fifty feet over the water because that was about the altitude the German bombers usually came in. We didn't spot anything and, all in all, my debut was uneventful, but for the first time I started to feel like I was really doing something.

I flew with British squadrons on ten or

twelve sweeps across the Channel from then until about the middle of May, 1941.


We knew our Hurricanes from nose to tail. We knew the Messerschmitts were faster; we could never catch them, nor could we run away from them. They could outclimb and outdive us. But they couldn't outmaneuver us. This we knew—and knew well.

So we played the game with our best weapon—maneuverability.

The Germans in ME-109Es usually would be waiting for us at 32,000 to 35,000 feet. We would go in at about 28,000 or 30,000 and wait for them to come down for us.

Soon they'd come, diving in at about 600 miles an hour, one after the other. But by the time they were set to open up we wouldn't be there. We'd go into a steep banking turn and come about in the hope of getting a squirt at one of them as he went by.

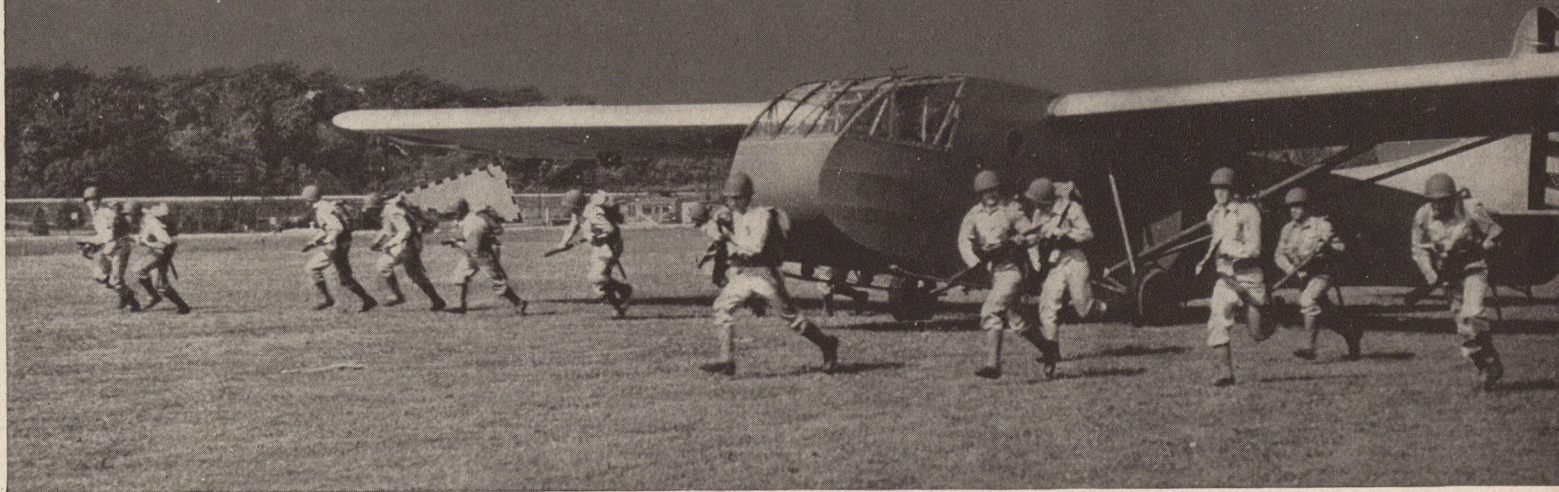
We didn't get many that way (I didn't get any), but they didn't get us either. Those Hurricanes were the toughest fighters in the air. I saw one come home with all but eighteen inches of prop blade blasted off, ailerons and wings shot to hell and more than 100 holes in the fuselage. During the British retreat before Dunquerque, they used wings of shot-down Hurricanes time and again as bridges across ditches in moving trucks and heavy (Continued on Page 37)



MEMBERS of the famed British Eagle Squadrons are shown above on their recent arrival from Europe, with Major McColpin, author of the accompanying article, at the extreme left. Others in the group from left to right are Lieut. John I. Brown, 22, Chicago, Ill.; Captain Reade Tilley, 24, Clearwater, Fla.; Major William J. Dailey, Jr., 20, Amarillo, Texas; Captain John J. McCloskey, 28, Washington, D. C.; Lieut. Dale Taylor, 24, Durant, Okla.; Lieut. A. L. Haynes, 32, Norfolk, Va.; Captain Harold Strickland, 39, Detroit, Mich.; Lieut. Bradford W. Boyar, 26, Hamilton, Texas; Captain Sam A. Mauriello, 34, Astoria, Long Island, N. Y.; Lieut. George L. Strauss, El Paso, Texas, and Lieut. Fred C. Smith, 21, Jackson, Miss.



# HERE COME THE AIRBORNE



*By Brigadier General Fred S. Borum*

COMMANDING GENERAL, FIRST TROOP CARRIER COMMAND

AMERICA's airborne troops are in the news.

During the assault on North Africa paratroopers were flown 1,500 miles non-stop from England to attack Oran. This was the longest air invasion on record.

During General MacArthur's drive in New Guinea our planes carried combat units deep into the jungle and dropped tons of food and ammunition to our troops to help humble the Jap.

These were impressive successes. But they are a mere hint of things to come.

A preview of America's airborne strength was held in Texas late last fall. These maneuvers were the first of their kind ever attempted by the U. S. Army and the results were significant.

The basic military problem was as follows:

Hypothetical enemy forces had crossed the Rio Grande from Mexico and driven a wedge into Texas, occupying three air-ports. Two of these fields were near Eagle Pass and Del Rio, forming a base of the wedge along the river, while the point of the triangle nearest our forces was at Bracketville.

Theoretically, the enemy held these positions with strong units of infantry supported by field artillery of all calibers, and by air forces, machine gun companies, anti-aircraft and engineering and service groups.

Our forces opposing the enemy were concentrated outside San Antonio.

They consisted of selected units of parachute troops and an infantry task force of

the Airborne Command, 2nd Infantry Division, all under the command of Major General Walter M. Robertson, commanding officer of the 2nd Division.

With these troops were two groups and a glider-equipped squadron of the Troop Carrier Command, Army Air Forces, under the command of Colonel Maurice M. Beach. They flew twin-engine aircraft of the C-47 and C-53 types. (Structural differences between the types are slight.)

Bracketville's "enemy-held" airdrome was the first objective.

Attack upon this base, as upon others

that followed, fell into four main phases. Imagine yourself at Bracketville, observing the operation. Assume that the field has already been heavily bombed, as would be the case, when possible, in real warfare.

First come the paratroopers. Planes fly over Bracketville at a low level and drop the "umbrella men" to seize and hold the air-field. After a sharp engagement, they gain control and immediately set up radio communications. By this means, together with pyrotechnics and ground panels, they direct incoming transports to landings on the field.

THIS is the second phase—the deplaning of airborne infantry and the unloading of jeeps, trailers, motorcycles, artillery pieces, ammunition and supplies. As quickly as they are emptied, the planes take off again for fresh loads; this procedure continues throughout the day, even into darkness.

Third phase of the pattern of attack comes on the second day and is primarily a problem of re-supply and consolidation. Food and ammunition are dropped by bright-colored parachutes. Additional men and pieces of equipment are brought in.

Here the gliders play their part. Towed by large camouflaged aircraft, the huge motorless ships are quickly cut loose, landed and parked at the unloading area. From each glider rolls a jeep under its own power, rapidly followed by armed men.

Fourth and final phase of the operation is the evacuation of casualties—stretcher cases and walking patients alike—to be followed, ultimately, by complete evacuation



The Author.



# TROOPS!

## How we are applying the military science of transporting our men, weapons and supplies by air.



of personnel and equipment as the attack moves forward.

In the Texas maneuvers, three airdromes were "taken" in this manner—Bracketville first, Eagle Pass second, Del Rio third—with the execution showing marked improvement at each step of the problem.

From a flying standpoint, the box score of this tough assignment was most interesting. Here are some figures:

Approximately 1,100 round trips were made between departure fields and objective airports.

Total distance flown was 337,000 miles—almost 14 laps around the earth's equator.

Approximately 14,000 men were transported, plus some 1,400 tons of supplies, equipment, and ammunition. Equipment included jeeps, one-ton trailers, motorcycles, large howitzers, heavy-caliber machine guns, light-caliber machine guns, submachine guns, airport mines, mortars and radios, all in addition to oil, water, gas and one day's rations for the men.

For the flying personnel it was a long, arduous grind. Each ship was manned by a pilot, co-pilot, radio operator and chief engineer. Loadings and take-offs were sched-

uled far in advance of dawn and the day's work of flying did not end until long after sundown. Men and machines were both taxed to the limit; both stood up incredibly well.

Flying continued under varied conditions, including winds up to 35 and 40 miles per hour, at low altitudes over rough terrain, and frequently in darkness.

Still, in the whole operation not a pound of equipment was lost and not a man was injured. Luck played some part in this record, admittedly.

One ship, for example, suffered a badly damaged wing and the pilot had to make a forced landing just before dawn. But he succeeded in putting his heavily-laden craft down safely in a strange field.

AGAIN, a plane got out of control when caught in a cross wind on a take-off. The ship skidded across a couple of ditches and through a shack, stopping right side up about three-quarters of a mile from the field. But the crew and airborne troops immediately requested another ship and made their objective only a little off schedule.

There were close calls. Eleven hundred round trips cannot be flown without a few uncomfortable minutes. But the coolness of the pilots and the ruggedness of the big "tin geese" they flew won out in every critical situation.

The efficiency of these exercises in airborne warfare, coming only six months after organization of the Troop Carrier Command, was gratifying to all concerned.

To the Troop Carrier Command is assigned an all-important responsibility: aerial transporting of parachutists, infantry combat teams, glider-borne troops and equipment; evacuating wounded by air, and training and making available troop carrier units to meet requirements in the theatres of war.

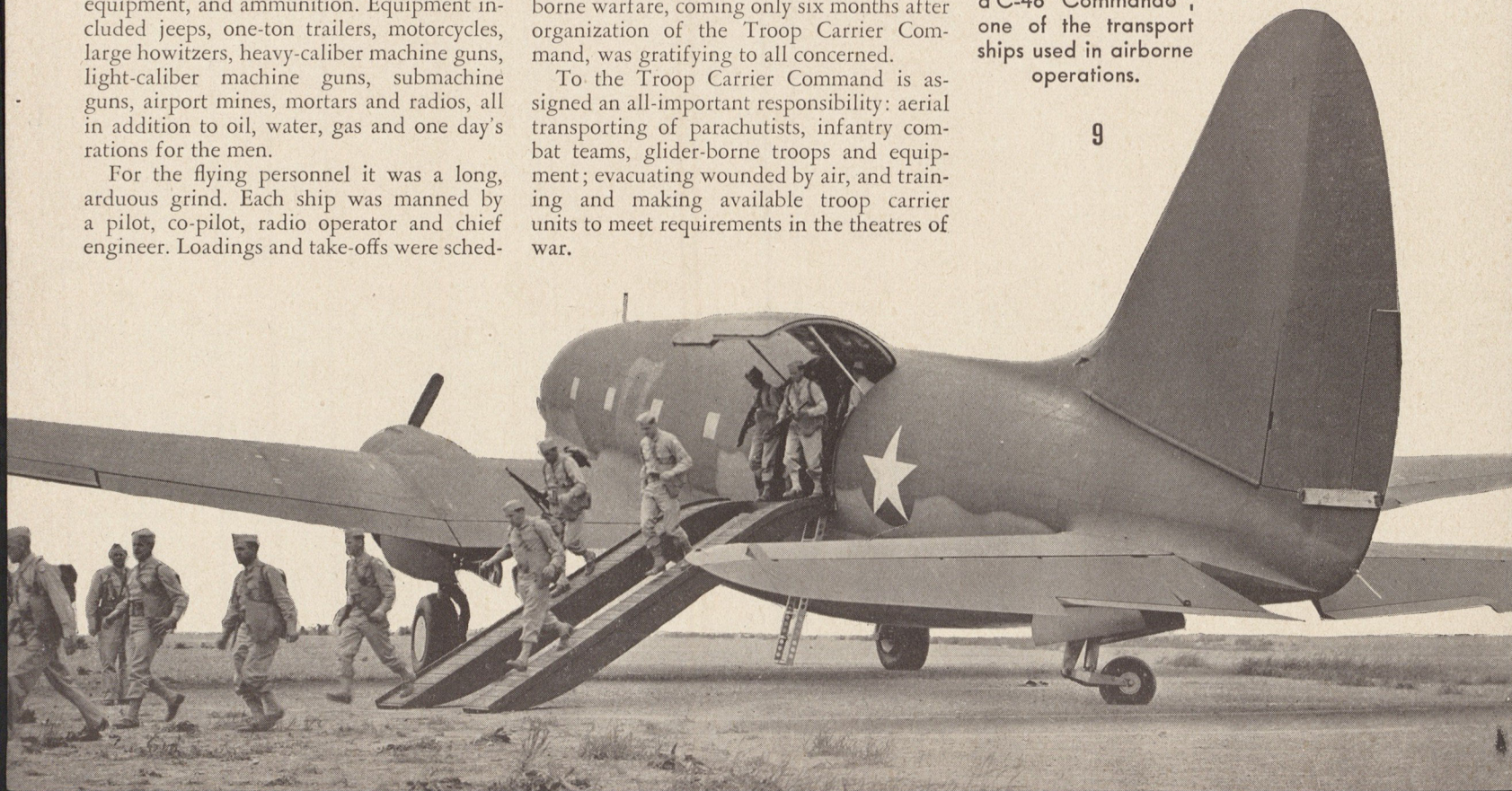
Though a relatively new division of the Army Air Forces, the Command already has units operating all over the world. The 1st Troop Carrier Command has its headquarters at Stout Field, Indianapolis, Indiana.

Squadrons are the basic tactical units. To each squadron is assigned Douglas DC-3 type aircraft, designated by the Army as C-47s or C-53s. In addition to the aircraft, gliders for transport of both troops and equipment are standard for each squadron.

Actual warfare complicates problems, naturally. During an actual invasion, it might be necessary to land troops very deep in enemy territory to cut communications or capture an important installation. Ground forces thus transported by plane and glider might be isolated for some time. In that event, the Troop Carrier Command would be responsible for the continued supply of the men, as well as the evacuation of wounded and the transport of air-trained medical personnel.

The Troop Carrier Command represents one of the newest developments in modern warfare. In the evolution of ground-air strategy and tactics, it is certain to play an increasingly important role as new missions are determined day by day. As the Command's motto has it: "He conquers who gets there first." ☆

Troops deplane from a C-46 "Commando", one of the transport ships used in airborne operations.





# INGENUITY PAYS OFF ON THE GREAT SALT

By Captain Charles D. Frazer

TWO hundred yards of railroad track stretch across a V-shaped ravine in the Utah mountains. On the track a handcar pushes along, powered by a small gasoline motor. The car is operated from one end by a gunnery instructor, while three students, riding sideways, fasten their eyes to machine-gun sights and train .30 calibers on a row of airplane targets some distance away in the sagebrush. The instructor has interphone contact with each student.

As this contraption joggles down the track, all guns blazing, Captain William D. Keys, commanding officer of the Bombardment and Gunnery School at Wendover Field, grins happily.

For this is another of his "notions." And strictly an improvised affair.

The handcar, ties and rails were salvaged from an abandoned California mine. The track was laid by two enlisted men who were railway employees in civilian life. The interphone is a home-made rig and the stately "bucket seat" occupied by the instructor is really a cut-away Pepsi-Cola pail.

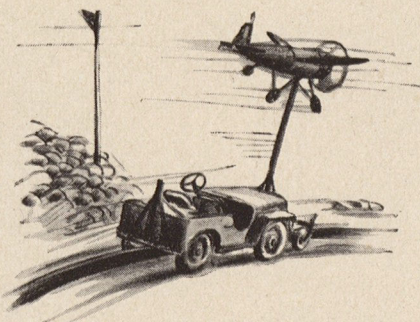
Improvised or not, it teaches gunners to shoot on the move, and that's the objective. Shooting from a bumpy handcar is tough, of course. But the turrets and tail of a heavy bomber give gunners a rough ride, too.

"I think I can tell you what it takes to train gunners," says Captain Keys. "A lot of hard work, a lot of ingenuity and a lot of good non-commissioned officers."

SOME day, somebody is going to ask how the Army Air Forces trained so many men so well and so fast in this war. Maybe Captain Keys has the answer. He apparently has it for Wendover Field, anyway.

For Wendover is a story of officers and men accepting a prodigious, double-duty job and taking it in their stride with ingenuity that only Americans can understand.

An installation of the Second Air Force, Wendover Field was built originally as a base for second-phase operational training. Heavy bombardment crews come here for intense, day-and-night practice in formation flying, bomb attack and aerial gunnery. They train at what is called the largest bombardment range in the world—some two



million acres of salt flats in Western Utah, an area twice the size of Rhode Island.

A few months ago, the headquarters staff of Wendover was asked to train several hundred gunners at a time in addition to regular duties. This meant building a new school, barracks, ranges and whatnot. And no money was immediately available. The school, however, was built in three weeks and is operating briskly.

When the base at Wendover was first conceived, the town was just a widening of U. S. Highway 50—a cluster of stores and houses and gas stations at the foot of a mountain range hard by the Nevada line. Its population numbered 120. Its only claim to fame was the former headquarters of Ab Jenkins and other auto speedsters who burned the wind down Bonneville flats.

The Army moved in and with it came hundreds of civilian contractors and workmen who lived in trailers back of the State Line Hotel.

In remarkably short time the base was built—complete with three wide runways, four hangars, scores of barracks, two celestial navigation towers, power turret and fire control laboratories, headquarters, BOQs, two post theatres, mess halls and all the rest.

Nature must have had Wendover's training job in mind. Flying weather is excellent, generally, and there is practically no habitation in a hundred-mile radius—just salt flats and desert.

Lieutenant Colonel R. M. Dippy, commanding officer of the base, and Captain Keys, head of the bombardment and gunnery school staff, were quick to take up

where nature left off. They observed that automobile tires made deep, noticeable ruts in the salt. So, to make ordinary bomb targets, they simply sent a few jeeps out onto the range, had them driven in a circular path—and there were your pattern targets. This procedure has been followed ever since.

But Colonel Dippy and Captain Keys are never satisfied with the ordinary. They are devotees of drama and realism in training. And, if you fly over the two million-acre range with a bomb crew, that is exactly what you find.

The gray and acrid reaches of the salt flats stretch for miles in every direction. Here and there are gaunt mountains, ridged and jagged and a cold brown in color like the *papier mache* hills of a toy train set. This land once lay under a thousand feet of water—the fabulous Bonneville Sea. And it looks it.

Twenty-five, fifty, and seventy-five miles out on the flats lie the bomb targets.

There is, for example, a 900-foot dummy submarine.

There is a dummy airfield with dummy hangars and airplanes.

There is a fake troop encampment with





# FLATS

**How Wendover's men used their brains and brawn to enlarge the Air Forces operational school in western Utah.**

wooden jeeps, trucks, storage depots, rail sidings and other points of interest to a bombardier.

Wendover's range, briefly, resembles a gargantuan toy store full of attractive enemy targets. Camped out on these flats are crews of men who repair the targets and think up new ones for surprise practice missions.

Operational training also calls for extensive ground gunnery and class work in aircraft identification, range estimation, and the like.

Here again, Colonel Dippy and Captain Keys, with the help of the 325 enlisted men on the bombardment and gunnery school staff, have developed a number of ingenious training devices.

These enlisted men, Captain Keys will tell you, include some geniuses. There is the

fellow, for instance, who dreamed up a moving silhouette for identifying aircraft. You sit in a dark classroom. All you see is a large gun-sight. Into this sight, apparently from several directions and distances, flies a procession of foreign airplanes. Some are level, some appear to be banking or diving.

**T**HIS gadget consists merely of two moving picture reels, on which is wound a long roller of plain wrapping paper. Cut out of the wrapping paper are the outlines of airplanes as revealed by photographs in flight. The roller moves back of the gun-sight, and, with a strong lamp playing on it from behind, it looks like an attack is taking place.

This little brainstorm has been adopted by

the Air Forces for use at other fields.

Another enlisted man thought up the little green shack.

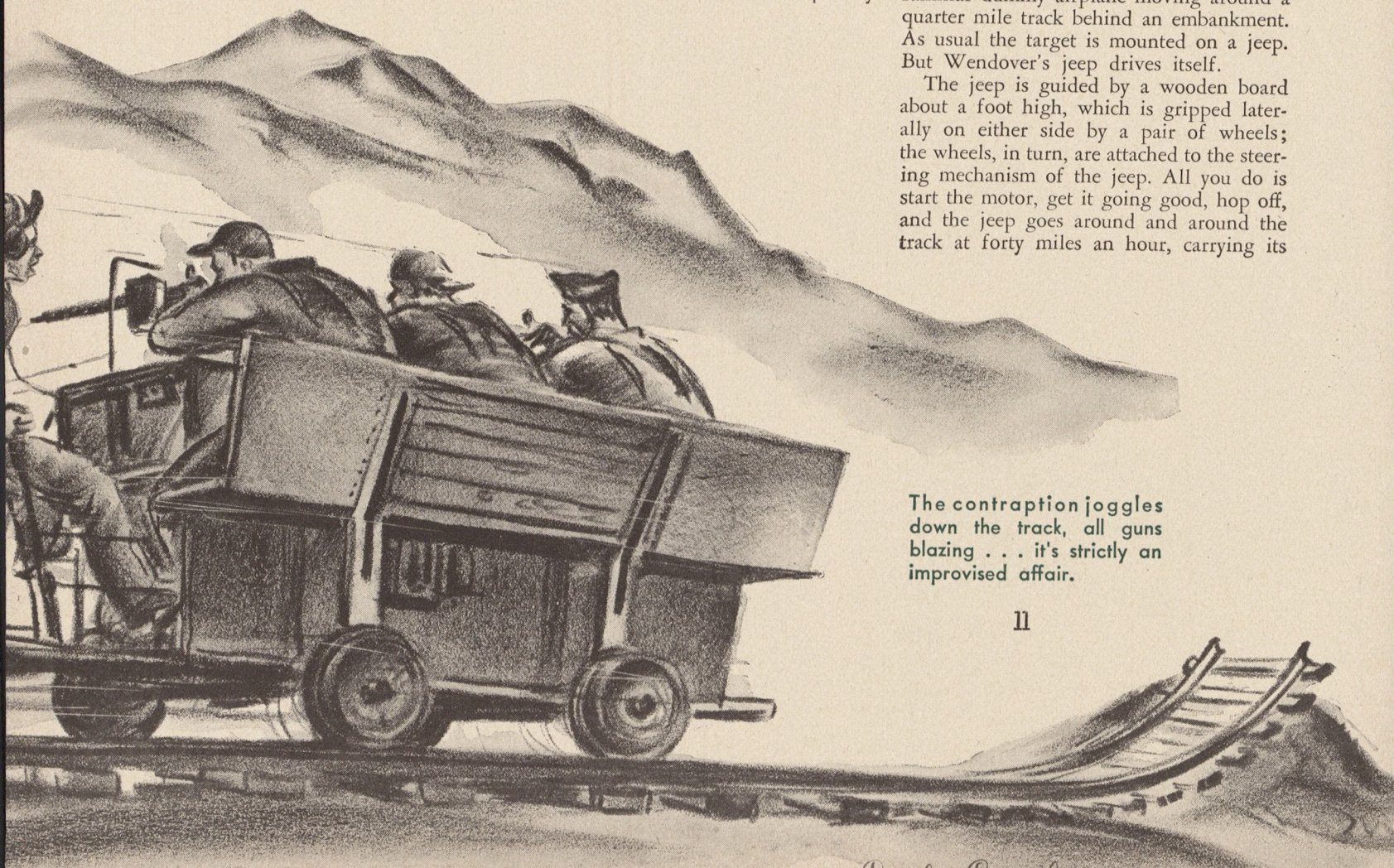
While waiting their turn to shoot from that moving handcar, gunnery students stand in a shack nearby. Above and around them in the shack the air is filled with models of enemy aircraft. The models swoop and climb and peel off bewilderingly as they dangle from an endless, moving bicycle chain. A constant class in identification. Everywhere at Wendover you find small buildings like this where you can just walk in and learn something while you wait.

All instruction is done by visual motion, when possible, making it more difficult, more realistic and more effective.

On the main gunnery range, there is the familiar dummy airplane moving around a quarter mile track behind an embankment. As usual the target is mounted on a jeep. But Wendover's jeep drives itself.

The jeep is guided by a wooden board about a foot high, which is gripped laterally on either side by a pair of wheels; the wheels, in turn, are attached to the steering mechanism of the jeep. All you do is start the motor, get it going good, hop off, and the jeep goes around and around the track at forty miles an hour, carrying its

The contraption joggles down the track, all guns blazing . . . it's strictly an improvised affair.





# Be The Man Who Gets The Mail



target, and wondering, undoubtedly, what all the shooting's for.

Firing at this driverless demon are gunners in all kinds of stations and turrets. These are quite orthodox affairs, except for a belly turret which is slung from a high stanchion in such manner that the gunner has to shoot from a variety of angles, just as if he were flying in a plane.

THE history of Wendover's new gunnery school is one for the book.

Just about the time the base was being completed, Headquarters of the Second Air Force asked Colonel Dippy if he could handle a few hundred gunners, as well as the tactical O.T.U. groups. More gunners were needed throughout the Air Forces. Certainly, replied Colonel Dippy, but that naturally would mean building additional ranges, barrack and mess facilities, and so on.

Here there was a slight hitch. No more money was available for Wendover at the moment, without a new appropriation, which would take time.

Colonel Dippy thought about the problem, conferred with Captain Keys, and then asked Headquarters for unofficial sanction to build another school, provided they could find ways and means to do it without money. Headquarters said go ahead, and bless you.

What followed is a monument to the word "salvage"—and to the American soldier's enterprise and devotion to his job.

Captain Keys, a flyer and former mechanical engineer, and Staff Sergeant Dalroy M. Ward, a willing assistant who knows his way around, took charge of this construction out of nothing.

First, they found some land. It was a big, forgotten gully in the mountains about three miles back of the main base, owned by the U. S. Grazing Service. They wangled permission to build there.

Next, they and scores of enthusiastic enlisted men on the gunnery school staff put together some home-made bulldozers out of old trucks. With these they built a road back into the promised land.

From another truck they fashioned a ditch-digger that looks like a Rube Goldberg product. But it digs.

Hearing that a few old C.C.C. barracks were lying idle in Utah, they hurried to Salt Lake City and talked somebody into donating the structures. Trucks were borrowed from Colonel Dippy's motor pool to cart out the frames and lumber of these buildings. Trucks are forever being borrowed from Colonel Dippy.

A general scouring of the countryside then followed. Captain Keys told the men to salvage anything not being used elsewhere. One thing badly required was cement, so he appointed a standing "cement detail" to bring in what could be found. If, for example, there was any cement left over from the building of runways down at the base, what better use for it could be imagined?

Soon, for a person at the base, it was

almost fatal to lay anything down. And the storehouse of the new school became a treasury of odds and ends.

Small pieces of lumber (up to fourteen feet or so), left-over bits of cement (up to sixty bags a day), lengths of pipe, old stoves, pool-tables, pieces of chain, bedding, paint—all such stuff began to appear out of thin air.

Welding and concrete-mixing machines were borrowed from a private contractor in town. Incidentally, Captain Keys has a phrase to describe people who helped out. "There was a patriotic man," he will say.

One after one, a long row of barracks went up. These were followed by a carpenter shop, a mess hall, and a building that houses a mail room, PX and barber shop.

It was not all plain sailing. There was a bit of trouble with rattlesnakes. "But we make it unpleasant for them," explains Sergeant Ward. "We kill them."

They could neither "beg, borrow or steal" any U-bolts to erect double-deck beds. They found some telephone wire and two-by-fours, however, and made double-deckers by wiring single beds one above the other on wooden uprights.

After living quarters were built, the home-made bulldozers soon carved gunnery ranges from the hills flanking the ravine. No butts were needed, of course. Then a skeet range took form.

NOBODY seems quite certain as to where all the gun turrets came from. It is remembered, however, that after a couple of ships cracked up on the field nobody saw any parts lying around.

The salvagers did not forget their own comfort. They found an Indian cave in one of the hills, complete with ancient etchings on the walls. A bit of a cement floor, a bit of a bar—and it became as fine an n.c.o. club as anybody could wish.

Some things were bought, naturally. A printing press was one. "It's not quite paid for yet," says Captain Keys, "but it soon will be." The fellows in the printing shop, it seems, help on the financing by doing stationery for the men at a small but profitable fee. Tools and spark plugs are bought with profits from beer parties.

And some things were donated. An indication of the esprit de corps at Wendover is that one man contributed \$7,000 worth of radio equipment—his personal property—to the aerial gunnery school.

Colonel Dippy, an engineer, estimates that at this new and home-made school a \$1,000,000 job has been constructed in the record time of a few weeks at a cost of absolutely nothing. Thus has Wendover vastly increased its training capacity.

When the whole story of the Army Air Forces training program is written, Wendover may deserve a chapter of its own. If so, Captain Keys has a title:

"A lot of hard work, a lot of ingenuity, and a lot of good non-commissioned officers." ☆



# Organization of the Army Air Forces

*By Colonel Byron E. Gates*

ASSISTANT CHIEF OF THE AIR STAFF, MANAGEMENT CONTROL

THE present organization of the Army Air Forces is the result of a gradual growth brought about by the experience of modern warfare. That experience has emphasized the vital importance of the air arm and has necessitated a drastic reorganization of the War Department and the Army in the interests of greater combat efficiency.

For a year and a half after the beginning of the present world conflict, the War Department and the Army were organized substantially in the same manner as in 1920 when the National Defense Act was passed. That Act, which embodied the lessons of the first World War, provided for an Army consisting of arms and services of equal rank, each headed by a chief, namely: Infantry, Cavalry, Field Artillery, Coast Artillery, Air Corps, Engineers, Signal Corps, Ordnance, Quartermaster Corps, Chemical Warfare Service, Medical Department, Finance Department, Inspector General's Department, Judge Advocate General's Department and The Adjutant General's Department.

Each branch was organized into divisions, corps and armies, most of which during peacetime were merely paper organizations. Administration within the United States was conducted through nine Corps Areas, each under a Commanding General. The War Department General Staff, over which the Chief of Staff presided, supervised and directed the Army in the name of the Secretary of War.

As a concession to the growing importance of the air arm, a General Headquarters Air Force was organized which operated directly under the War Department General Staff. Aviation was thought of as largely an auxiliary of the Ground Force.

However, the exploits of the Luftwaffe in the European campaigns, the Battle of Britain and the air conquest of Crete emphasized the necessity of building up the Army Air Corps. On June 20, 1941, Army Regulation 95-5 created for the first time the Army Air Forces as a semi-autonomous body within the Army. The name of the General Headquarters Air Force was changed to Air Force Combat Command; it and the Air Corps were placed under the control of a newly created officer, the Chief of the Army Air Forces. Lieutenant General Henry H. Arnold was named to this position and also was made Deputy Chief of the War Department General Staff. He was given substantial powers in connection with determining the training, personnel,

equipment and supply requirements of a modern air force.

The rest of the Army continued to operate under the old organization, except that a General Headquarters was activated at the Army War College under Lieutenant General Leslie McNair. General Headquarters made plans for utilization of the Army of the United States in combat. The War Department General Staff continued to operate as it had previously.

Experience indicated several weaknesses in this type of organization, and the action at Pearl Harbor and in the Philippines, together with the sinking of the Prince of Wales and the Repulse, again emphasized the vital role of air bombardment as an offensive weapon. A comprehensive reorganization of the War Department, set forth in the now famous Circular No. 59,

## **A close-up of the ever-changing structure of America's air strength and its function under the stress of war.**

March 2, 1942, resulted. Three general principles governed this reorganization:

1. The Chief of Staff became the unquestioned military commander of the Army of the United States. G.H.Q. was abolished.

2. It was determined that actual combat should be controlled by task forces and theaters of operations commanders responsible directly to the Chief of Staff.

3. To provide the trained personnel and equipment necessary to fight efficiently, the Army was divided into three components of equal rank: The Army Air Forces, the Army Ground Forces and the Army Services of Supply. Units trained and equipped by these three components are formed into task forces organized to meet the needs of particular theaters of operations, where they fight under the command of the theater commander.

The present organization of the Army Air Forces is aimed to fulfill the mission laid down in Circular No. 59:

"The mission of the Army Air Forces is to procure and maintain equipment peculiar to the Army Air Forces, and to provide air force units properly organized, trained, and equipped for combat operations."

The chart on the rear inside cover of this issue of AIR FORCE is a graphic pres-

entation of the organization which has resulted. War is dynamic, not static. Experience constantly indicates the need for a change of organization to meet changing conditions. The chart now current is not identical with that first adopted last March. Perhaps by the time this article is published other changes will have been made. However, it is unlikely that the basic principles on which the organization was founded will be modified. The organization consists of Headquarters, Army Air Forces, and the various Air Forces and commands.

THE following principles govern the organization of Headquarters, Army Air Forces:

1. Because the Air Forces are part of the Army and a military organization, it is desirable to retain—under the Commanding General and the Chief and Deputy Chief of the Air Staff—the classic military staff divisions of Personnel, A-1; Intelligence, A-2; Training and Operations, A-3, and Supply, A-4. These divisions keep in constant touch with G-1, -2, -3 and -4 of the War Department General Staff.

2. It is desirable to separate planning functions from those of an operating nature to permit consecutive thinking and analysis of over-all policies, plans and programs to insure that they fulfill the mission of the Army Air Forces. For this reason the "A" divisions of the Air Staff are kept small and are divorced from operating functions.

3. To aid the A-Staff in making policy, it is desirable to have:

- a. A section where plans of an operational nature are analyzed, broken down into the personnel, intelligence, training and supply sections and brought together again as an integrated whole after analysis by the "A" divisions. This is the function of Operational Plans.

- b. It is also desirable to plan the program pursuant to which the mission of the Army Air Forces will be performed, i.e., to determine when and in what numbers units must be activated; when they will be fully equipped and trained, and when they will be ready for combat duty. This is the function of Program Planning.

- c. It is further desirable to coordinate the vast administrative organization of the Army Air Forces. Producing units trained and equipped for combat has many of the aspects of big business. Every large corporation has its control division which keeps in close touch with operations and supplies (Continued on Page 40)



# How to Keep Well in the SOUTHWEST PACIFIC THEATER

*Brigadier General David N. W. Grant*

THE AIR SURGEON

The following article is the third of a series on health conditions in the various theaters of operation.—THE EDITOR.

IN THE East Indian archipelago and on the islands to the east there are a number of pitfalls to snare the unwary, and many of these are associated with disease. The white man's culture has made little headway in this part of the world. With few exceptions, the native people live as their stone age forefathers did before them.

Head hunters and cannibals are found in New Guinea and some of the other islands and will attack if given an opportunity. Soldiers on guard duty at night or alone in the jungle must take special precautions to avoid such attacks.

Because of poverty and ignorance, few attempts are made to combat the many diseases that exist here. Disease forms the final link in a vicious circle that saps the strength and initiative of the people. Yet, all of these diseases can be controlled if certain simple precautions are taken.

Military operations in this theater are frequently carried out by small units or by individuals. A basic knowledge of the hazards that exist, and of the ways to avoid them, will make it possible for personnel to better care for themselves when thrown upon their own resources. This knowledge will also help the individual appreciate the absolute necessity for the strict sanitary precautions that are enforced in the vicinity of all military installations—whether bases, airfields or front line fox-holes. Conditions may vary somewhat from island to island, but with few exceptions the same diseases are common to the entire area.

Mosquito-borne diseases are of primary importance. Every part of the region is infested with one or more of these diseases. A rule of thumb states that in the Pacific malaria is found west of 170° east longitude and north of 20° south latitude. Although there are exceptions to this rule (malaria

is occasionally found south of 20° south latitude), for all practical purposes it indicates the highly malarious areas of the Southwest Pacific.

Malaria in this part of the world is especially grave. Practically 100 percent of the people have the disease and it is the greatest single cause of death among them. Dengue, sometimes called "breakbone fever," commonly attacks newly-arrived Europeans and Americans and, although not fatal, is capable of causing great discomfort. Its control is especially important since it can incapacitate a large part of a military command at one time. A third mosquito-borne disease is filariasis. This disease becomes chronic and may lead to marked swelling of the limbs and scrotum-elephantiasis.

THE presence of these diseases makes it imperative that every man be thoroughly versed in the various methods of protecting himself from mosquitoes. First and foremost, he should know the value of his mosquito net and how to care for it. It should be considered an essential piece of his equipment, and should be kept available at all times. Stay indoors as much as possible after dark, but if it is necessary to go out at night wear extra clothing that covers the entire body. Do not wear short-sleeved shirts or "shorts" after the sun has set or when going into the jungle. Malaria-bearing mosquitoes frequently come out only at night and even though no mosquitoes are to be seen locally when the camp is made, there probably are mosquitoes present that will come out about eight or nine o'clock in the evening. The bite of these mosquitoes frequently does not sting and may pass unnoticed. Available insect repellents are of little value, especially if you are sweating, so it is better to use such safety measures as mosquito boots, head nets and gloves. Avoid native villages, for the people act as a reservoir of these diseases and mosquitoes are very common among them.

The so-called suppressive, or prophylactic treatment, with either quinine or atabrine, is useful in many parts of this area. Although this method of treatment does not prevent malaria and thus does not take the place of the previously mentioned precautions, it does suppress the symptoms of malaria so that a man is able to carry on until the tactical situation allows sufficient time for more thorough treatment.

The native people have little knowledge of sanitation. They carelessly deposit human wastes and garbage in any convenient spot and rarely take precautions to secure safe drinking water. It is not an uncommon sight in many parts of the islands to see a house built out over a stream or lake. Two holes are found in the floors of these houses—one through which water is drawn for drinking purposes, the other used as a toilet.

The presence of flies, which occur in great numbers in all native villages, and of polluted water is of great importance to troops, for they are the common means by which the intestinal diseases—typhoid fever, dysentery and cholera—are carried to man. Because of the universal presence of the common intestinal diseases throughout this area, only water that has been treated by appropriate army personnel should be used. Boiling is the best and easiest method of purification. Even rainwater just caught, or water from a sparkling mountain stream, must not be drunk without purification. For his own protection, each individual should know two or more methods of purifying water. (F. M. 21-10).

Although adequate quantities of water are available on most parts of the islands, a thorough knowledge of conservation of water is essential, for there may be times when the tactical situation does not permit stopping long enough to prepare it. A man can survive for four or five days on one quart of water a day. In order to get the full benefit of such a small quantity of water, it is necessary (Continued on Page 29)



# COMPRESSIBILITY

## — Its Effect on Aircraft

*By Colonel Ben S. Kelsey*

PRODUCTION DIVISION, WRIGHT FIELD

**A study of difficulties encountered in going too fast and trying to get too much lift out of a plane's surface.**

A PILOT reported that his airspeed indicator was reading better than 550 M.P.H. at 15,000 feet; actually, he was going downstairs at something pretty close to a thousand feet a second. He might have been in a bullet which had a velocity of a little more than the speed of sound.

A pilot did a half-roll dive with full power and couldn't exceed a certain speed. In other words, he had reached terminal velocity and the airplane was slowing up.

During a dive a pilot noticed a sound as if sheets of tin were being torn off the airplane. Some little "shock waves" or "sound waves" had formed around the cabin.

During a test dive a pilot was pushing on the stick up to a certain speed and then had to pull back the stick to keep from having the dive increase. Some compressibility effect had caused a change in trim.

At 30,000 feet in a vertical dive a pilot reported that on recovery the airplane buffeted and apparently recovered slowly; for some reason or other, the plane did not appear to get the lift it should have from the wing. High speed and compressibility had caused a loss in lift.

Variations of the above examples can be cited many times. They are usually connected with high speed dives, but there are conditions where variations of these effects can be observed even in level flight or in normal maneuvers, particularly at high altitudes. There must be many more such experiences which have not yet been reported or encountered.

A pilot should understand, if he is to analyze what is going on around his airplane, a few simple fundamental physical laws. The first of these is that the airspeed indicator is measuring dynamic pressure in a hole facing forward into the air. The airspeed indicator does not tell how fast the airplane is moving; it simply tells how hard the air is pushing into the hole.

Obviously, as altitude is increased and the air becomes less dense, the push or "dynamic pressure" decreases for the same "true speed" through space. The correction factor for indicated airspeed with altitude should be kept in mind. The pressure varies

with temperature and altitude, and a rough approximation is that the true speed is obtained by taking the indicated speed and adding an amount equal to 1.4 percent additional for each 1,000 feet of altitude.

Altitude speed can be obtained by adding 1.4 percent times the altitude in thousands of feet to the indicated speed. For instance, 300 M.P.H. indicated at 20,000 feet would really mean that the true speed was approximately 128 percent of 300 or approximately 385 M.P.H. A more exact correction would give 400 M.P.H.

THERE are available indicated airspeed correction charts and calculators on which a number of typical examples should be worked out so that a feeling for this factor becomes automatic; for instance, indicated speeds of around 300 M.P.H. at about 20,000 feet should be immediately translated into true speeds of 100 M.P.H. higher.

In high-speed flight, the speed of sound becomes a real factor since it determines the speed at which shock waves are formed. The speed of sound at sea level is approximately 758 M.P.H. but decreases to 685 M.P.H. at 30,000 feet. If one were to fly at the indicated airspeed of sound as measured by an airspeed indicator, the variation in this so-called critical speed apparently

would be very much greater. For instance, the airspeed indicator would read 758 M.P.H. at sea level, but only 460 M.P.H. at 30,000 feet. Compressibility affects the airspeed reading itself and compressibility on the airplane may affect the pressure in the region of the airspeed measuring head. These effects thus may tend to give readings that are too high.

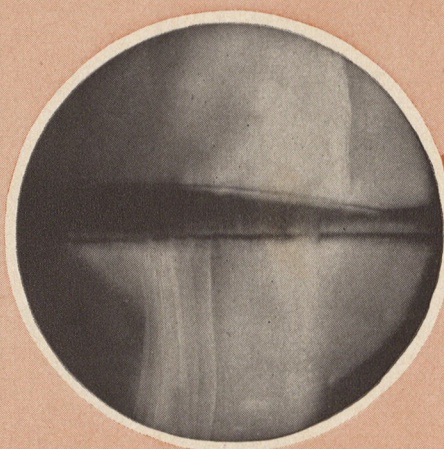
When airplanes move through the air they push the air around. The air has to flow up over and back down behind the wing, and around the various bodies and obstructions. The result is that as far as the air is concerned it apparently moves with respect to the airplane at a much higher speed in some local spots than the straight-away speed of the airplane itself. A typical example would be around the curved leading edge of a ring cowl where the air may be moving at a speed relatively one and a quarter times the speed of the airplane, or over the bulge of a thick wing where it might be even twice as much. This means that there are local points on an airplane which have extremely high local relative air velocity and these points may be subject to compressibility effects before the airplane as a whole has actually approached the speed of sound.

In order to talk about these critical speeds as proportions of the speed of sound, the expression used is "Mach's Number." This number is simply the percentage of the actual speed of sound at that altitude or condition; for instance, a speed of .85 or .67 times the speed of sound would be a Mach's Number of .85 or .67, respectively. It's just for convenience, but it sounds very technical to rip it off like a scientist.

As far as the fighter pilot is concerned, he will at some time or other be aware of some condition for which compressibility is to blame. He should learn to anticipate the possibilities and look over his ship with this in mind.

A few illustrations may make the effects more obvious.

Accompanying a shock wave is a tremendous increase in drag. This may do a lot of things. The most obvious is that the diving speed may be sharply limited by the rapid build-up in drag of a number of items that are small in themselves. A sharp edge around a windshield canopy joint may put a limit on the maximum speed long before it would be expected due to the normal drag increase with increasing speed. Pieces of cowling, window panels, etc., may be torn off or broken although design indicates that they



SHOCK WAVES, which greatly increase the resistance of the wing section, stand out vertically in this photo of a wing traveling at 580 miles per hour.



are many times stronger than any load which could be put on them. The formation of the shock wave may actually imply that a blow or impact is delivered when it forms. Any bulge, sharp corner or edge, or an abruptly faired protuberance, should be looked on with suspicion, and a junction of two such protuberances, where the maximum displacement of both occurs at the same point, is almost certain to be a bad spot.

When a bullet cracks overhead the shock wave is in evidence making noise. Inside the bullet there is probably a continuous rattling, banging or tearing. When compressibility occurs on an airplane, it frequently sounds as if Gremlins were ripping off sheets of covering with jimmies and ice tongs. This may well be disconcerting, but in itself is rarely embarrassing.

Shock waves unfortunately are not as clean cut and sharp as we are apt to describe them. The regions of compressibility may be fuzzy and may develop over a period of time, and over quite an area, particularly on a wing. As discussed in *AIR FORCE* last month, the breakdown in flow over the wing causes a loss in lift not unlike that caused in a stall. This loss in lift will be accompanied by a rearrangement in the pressure distribution over the wing.

The pilot will observe this rearrangement in several ways. The most common condition is a change in trim in dives. A stable airplane should try to return to its trimming speed, so, when dived, it would normally try to nose up more and more as the speed increases. If the breakdown is gradual, or if the speed just gets over the threshold without really breaking into the compressibility region, this trim change may be simply a slight reversal or lightening of stick forces which can be handled easily. It may require adjustment of the trim tab or even require pre-setting the tab and carrying larger loads in the early stages of the dive or recovery. When the airplane really breaks over into high speeds or when the shock waves are big fellows, the changes in trim may be very large and very sudden.

THE loss in lift would normally be noticed in recovery from a dive when it feels as if the airplane were mushing and wasn't coming out very well, although one would normally expect a very solid feel at the speeds involved. As discussed previously, the more lift we try to get the worse the disturbance. We can easily imagine the same condition taking place on a control surface itself when we try to get big control forces from it at these high speeds. The loss in effectiveness would seem to be a stall, and might result in apparent lightening or loss in control. This may be combined with the loss of control or change in downwash resulting from disturbed flow behind a compressibility region up forward somewhere. Local compressibility, on an air scoop for instance, may upset the trim all by itself.

We know that whenever we have a sharp corner we get shock waves because the air can't make the sharp turn at these high

speeds. This brings up some other control possibilities. The bend at the elevator hinge-line when the stick is pulled back, for instance, might precipitate a region of compressibility. This would be accompanied by a big change in pressure distribution over the surface. If the pressure peaked at the point where the aerodynamic balance was located, we could easily have a condition where all the load was dumped there, momentarily overpowering the controls. The same condition could exist where an aileron balance, with its sharply curved leading edge, sneaked out from the protection of the wing at high speed.

LOOKING at the waves made by a boat, it is apparent that most of the motion is up and down and that the water is not moved with the boat. However, the water can't be built up in hills without shoving some of it along. Not very far or very fast, but a little. It is also evident that a boat disturbs water a long distance away from it.

Probably if we could color a small section of air and watch it when an airplane runs by at supersonic speeds, we should think of the air as merely squeezing up and then popping back without going much of any place. Actually, the air gets carried along a short distance, and not smoothly either, so that the wake behind anything making shock waves is a very disturbed place. Also, this disturbance extends out a long way from the object causing the disturbance.

Unfortunately, in airplanes, we usually have tails in the rear and if compressibility in any magnitude occurs up forward, the tail may have to wade through air that looks like the rapids at Niagara Falls. The result is a buffeting or beating. Sometimes this is much like tail flutter except that it isn't self-supporting and is less inclined to be destructive, but it can be uncomfortable. The same buffeting on other parts may be evidenced in peculiar vibrations or noise.

Since compressibility can be precipitated by trying to pull a lot of lift at high speed, the act of trying to get lift may cause the condition which breaks down lift, and the breakdown may cause a loss in acceleration which in turn can cause a re-establishment of lift. It is easy to imagine a trim and speed condition leading to a hobby-horse ride and a bucking one at that. At the same time, drag builds up and lets down with the formation of shock waves and their breakdown so that if this were to take place on

one wing or the other unevenly, the airplane could swing from side to side with a combined roll like a drunken sailor.

Speaking of trouble, it is always simpler to *stay* out of it than *get* out of it. Compressibility is no exception to the rule. If airplanes can be operated so as to avoid exposure to this condition they certainly should be. Maneuvers should be devised so as to avoid the necessity for getting involved, and preliminary signals should be recognized as warnings to get out of the area.

In general, compressibility difficulties are caused by going too fast and by trying to get too much lift out of any surface for that speed. Therefore, a reduction in speed is indicated, obviously. Next, avoid attempting sharp pull-outs or big control displacements.

Don't dive with cracked or poorly fitting windows, or loose or bent cowling; if you do, the stuff just leaves the plane, and something else may get hit in the process.

A PILOT feels as if he wanted high lift devices to help him but these just make things worse so he has to content himself with taking what he can get, gently.

Since the speed of sound increases at lower altitudes and since airplanes slow up as they come downstairs in steep dives, conditions get better at lower altitudes, but this is sorry insurance.

In general, throttling back is helpful, but since the props are wind-milling anyway in all probability it is just a matter of affecting the disturbance behind them.

Use the trim tab to help with trim, and, if necessary, for actual control, but this also involves a reversal when normal flow is re-established.

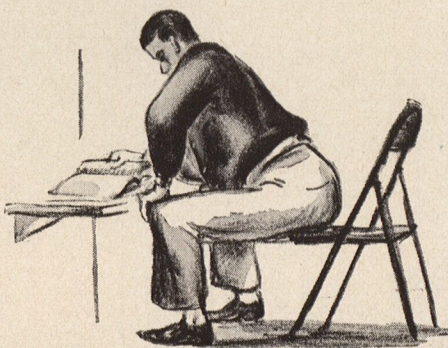
So far, these effects are mostly confined to diving conditions, but at high altitude poor fillets, open windows and other disturbances in regions of high local velocities may cause compressibility effects without the trouble of sticking the nose down.

The dives involved in reaching these critical speeds are not accidental, and even without any of these effects they commit the pilot to a tremendously long recovery.

It is foolish for a combat pilot to throw away the initiative by deliberately putting himself in the compressibility region.

We know little more about the supersonic region than the Sunday afternoon sailor does about the sea when he sets out to sail around the world in his 30-foot boat. Some of the sailors make it and learn a lot, and in the same way quite a few pilots have learned a lot about the relatively unknown region of compressibility. There is no corner on the compressibility market, no one has bought it all up, and everyone who goes over 500 or 600 M.P.H. is exposed to it in some degree. Like all unknown regions, it should be explored cautiously, avoided when possible, but if entered necessarily or inadvertently, observed carefully and in the light of general conditions and knowledge.

*This is the second of three articles on Compressibility. The third will appear in a succeeding issue. ☆*





**A bombardier's story of his first operational flight against the Japanese in the Aleutians.**



# BAPTISM OF FIRE

*By Technical Sergeant L. O. Gardner*

OCTOBER 16 was apparently just another day, except the perpetually dismal Aleutian weather had lifted and Old Man Sol revealed his cheerful face, a phenomenal occurrence.

I casually glanced at my watch. The afternoon was just about over. I wondered what my wife was doing. I noted that several of our ships were warming up at the end of the runway. Lieutenant Hellesvig, one of our navigators, walked by.

"Lieutenant, do you suppose my ship will go on any of these missions soon?" I asked.

He glanced at a slip of paper in his hand, hesitated.

"Why, yes," he said, "You'd better hurry over there. I think you're going on this mission."

My heart jumped. I swung around and started running for the end of the runway. Just then, I noticed a "jeep" speeding in my direction, purposefully. It got to me, swung around and one of the boys on it yelled:

"Hop on, quick! You're on this mission."

I jumped on and we headed for the plane. The jeep slowed down, swerved, and I jumped off and started running for the ladder.

Lieutenant Maurer, the pilot, with a grin, said, "I knew you were around here somewhere," and turned back to the controls.

He started the engines up. We heard two other ships roar by on the take-off. We taxied to the end of the line, waiting our turn for take-off. I set the navigator's alti-

*THIS article was judged the winner of first prize in a contest held for the best written narrative by members of combat crews participating in an attack on two Japanese destroyers of the Hibiki Class on October 16, 1942, near Kiska Island in the Aleutians. Technical Sergeant Gardner was bombardier in a B-26 aircraft in that attack. AIR FORCE is happy to print the article and, as a medium of expression for the entire Air Forces, will welcome the receipt for publication of articles and short subjects from the combat areas.*

meter. I noted that my fellow crew members were Staff Sergeant "Baldy" Hanson and Corporal "Red" Melvin respectively, radio operator and gunner.

Lieutenant Maurer revved the engines up. We started moving, swung around, and suddenly we were thundering down the runway for take-off.

We quickly gained an altitude of 500 feet, circled the field and slid into formation with the other airplanes. By that time, we were rounding the mountain on the north end of the island, and we started to look after our guns and equipment.

I opened the bulkhead door between the navigator's compartment and bomb bay and squeezed my way to the rear of the bombs. Anxiously, I checked over shackles, arming wires, electrical connections. Satisfied I pulled the pins that would render the bombs "Messengers of Destruction."

I crawled back through the bulkhead door and reported everything O.K. to the pilot.

He nodded me to go forward into the nose.

I crawled past the co-pilot, Lieutenant Nielsen, and slid between the rudder pedals and into my seat.

Turning on my indicator switch, I glanced at the panel to see that all bomb stations were lit. Everything satisfactory, I slipped on my headset, called the pilot on interphone and requested permission to test fire my machine gun. I loaded and checked the gun and fired a five-round burst.

Lieutenant Maurer called me, "Gardner, do you know anything about this mission, or what we're supposed to do?"

"No, sir."

"Come on up here where I can talk to you and I'll explain as much as I can."

I crawled out of my cubby hole, between the pilot and co-pilot, then turned around. Lieutenant Maurer explained the mission and illustrated our plan with a sketch.

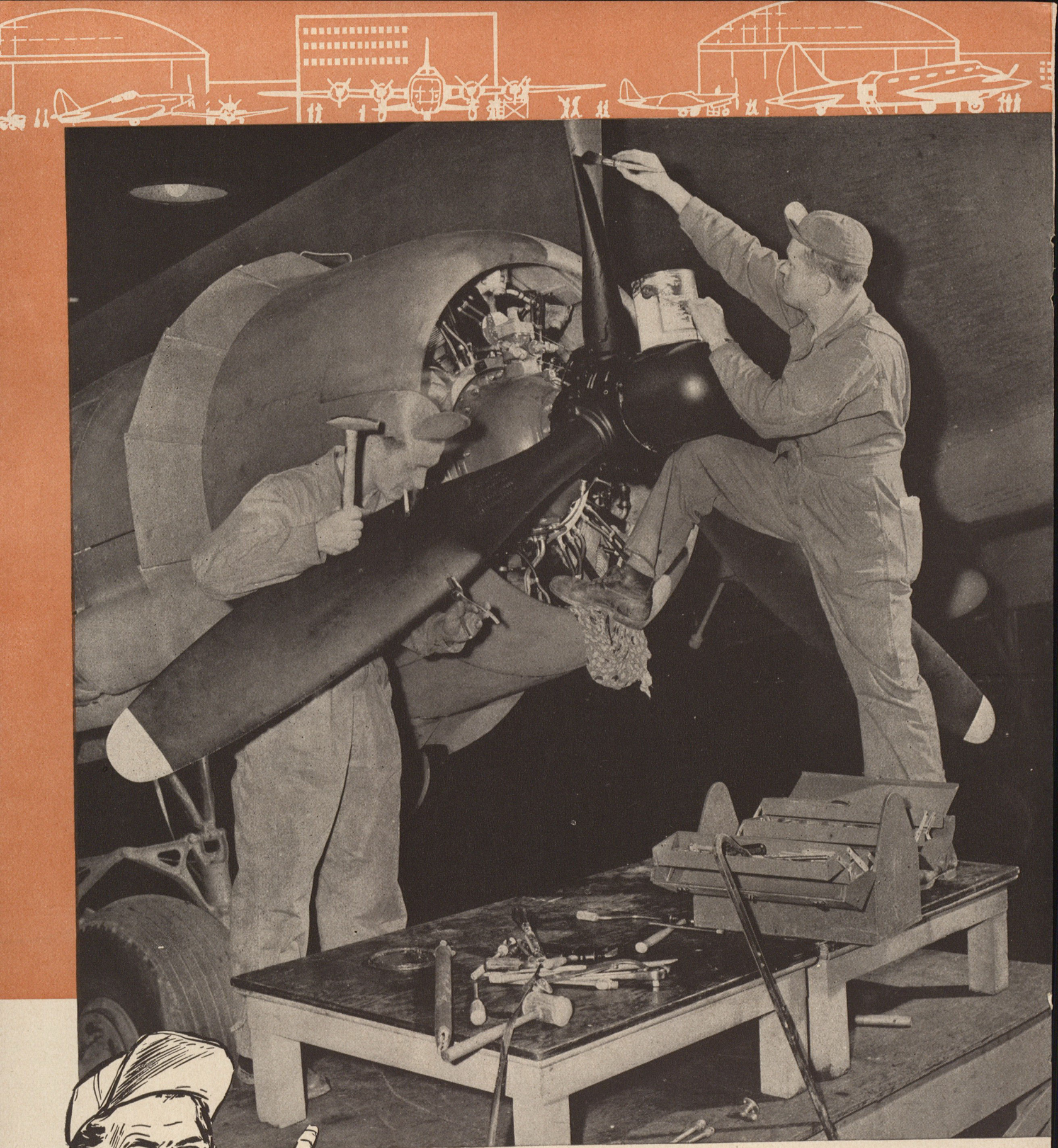
"We'll be there in approximately 45 minutes," he said.

"I understand now, Lieutenant," I said. "Any further instructions?"

"Yes," the pilot said, "There's a rock just off this island ahead. Let's make a run on it and drop one of our bombs to get 'warmed up' and test the bomb racks."

I crawled back into the bombardier's compartment, opened the bomb doors and waited for the red light to go on, so I could put the control lever into "Selective." The target came up. I toggled off one bomb and leaned forward (Continued on Page 24)





**WHAT'S WRONG WITH THIS PICTURE?** Enough to make a line chief's hair turn gray before the job is finished! The boys are really fixing this ship; fixing it so no one else can fix it—or fly it. **THIS IS HOW MEKIWIS ARE MADE.** Aside from the fact that the propeller work should be supervised by propeller specialists whenever possible (and these boys obviously are not propeller specialists), there are nine maintenance boners pictured here. Can you find them? Answer on opposite page.





# On the Line

**A feature by—and for—the ground crews of the Army Air Forces whose hands, skill and precision keep our planes flying and fighting.**

**THANKS** for the response to January's ON THE LINE. We want more of your comments and suggestions. ON THE LINE is YOUR feature; it will be just what YOU make it. This month's maintenance boners were picked and posed by Staff Sergeant John J. Hines and Sergeant George S. Jones of Patterson Field, Ohio.

## **Did You Know . . .**

That Tech Orders, Service Manuals and Handbooks are being illustrated in color and high-spotted with functional cartoons that teach a lesson and give you a belly laugh at the same time?

That paragraph 5h T.O. 00-25-3 provides that each tactical organization be furnished, for spare-time reading, ten extra copies of all Tech Order handbooks pertaining to the Equipment it operates? Ask your Engineering Officer about it.

That YOU can be a very important factor in improving the design of airplane engines and accessories and in preparing Tech Orders to correct unsatisfactory conditions? Your form 54s (Unsatisfactory Reports), covered by AAF Regulation 15-54, are analyzed very carefully by headquarters. Those pertaining to engines and accessories are forwarded to the appropriate manufacturers for study with a view toward improvement of design.

Master Sergeant Leonard F. Girard of Mitchel Field suggests that we stress the following:

## **TOWING . . .**

When towing planes one man should be in the cockpit operating the brakes at *all times*. And better be sure one man is walking beside each wing to check clearances—or you may lose a wing tip.

The correct tow rope should be approximately three and one-half times the tread of the airplane (distance between wheel centers). Be sure to use the proper towing facilities for the ship. Technical Order Handbooks applicable to each airplane should be referred to for the recommended method of towing. See T.O. No. 01-1-50.

Too long a rope puts the tug operator too far from the plane for exercising proper control of its movements; too short a rope is extremely dangerous to the tug operator. That may be you. Better watch it.

## **FIRE PREVENTION . . .**

Things to be remembered: That adequate fire-fighting equipment must be readily available when cleaning aeronautical equipment, which should be done only under competent supervision. See T.O. No. 01-1-1.

That gasoline trucks, whether loaded or empty, will neither enter nor be stored in hangars; that the practice of paint spraying in hangars is prohibited. See AAF Regulation 85-6.

And many a disaster has been avoided by having a fire extinguisher within easy reach when starting or servicing a plane.

## **SPARK PLUGS . . .**

Don't forget to put a thin coating of Spark Plug Thread Lube on the shell threads when installing spark plugs. (If you've ever had to get plugs loose that were frozen—you know what we mean!) Caution: Do not permit the lube to come in contact with the electrode or firing end of the plug. See T.O. No. 03-5E-1.

## **PAINT REMOVERS . . .**

Avoid spilling acetone, denatured alcohol or paint remover on painted surfaces of aircraft as these solvents will attack the paint.

## **BE CAREFUL . . .**

A flight surgeon suggests that if it becomes necessary to use a volatile fluid to remove some substance from the hands or body, be careful that you never use other than Grade 65 fuel. All fuels having an octane rating greater than 65 have tetra-ethyl lead added to reduce detonation. Tetra-ethyl lead is extremely poisonous and is readily absorbed through the skin. Under no circumstances should leaded fuel be used for removing substances from the hands or the body. If volatile fluids are to be used in cleaning parts, be sure to observe the precautions and procedure prescribed in T.O. 01-1-1.

Avoid breathing vapors of volatile fluids.

NEVER spray carbon tetrachloride solutions on hot metal or fire, as the carbon tet, when heated, gives off phosgene—one of the most poisonous of gases.

## **Mistakes on Opposite Page Reading from left to right:**

**1.** Put that cigarette out before you blow up the works—mistakes and all. You should know there's NO SMOKING in a hangar or within fifty feet of a plane. See AAF Regulation 85-6.

**2.** NO, NO, NO—please, don't beat the nicks out of the prop with a pair of pliers and a steel hammer. Follow the procedure for propeller repair prescribed in the T.O. 03-20 Series.

**3.** Stop it, Rembrandt! Propellers should never be brush painted. They're always sprayed in a horizontal position and checked for balance. No attempt should be made to touch up surface of blades when finish becomes chipped and unsightly. See T.O. No. 07-1-1 for complete details.

**4.** The propeller hub is not the place to rest a can of paint—or anything else, for that matter.

**5.** Your foot doesn't belong in the engine cowl. It's thoughtful of you to protect it by using the rag under your foot, but it's better to use a maintenance stand. T.O. No. 00-30-19 tells you how many stands your organization is entitled to.

**6.** And speaking of maintenance stands, why not use one instead of stacking one work-stand on top of another?

**7.** Look out for the tool box! It's in a fine position to get kicked off.

**8.** And tools should not be scattered around on the stand. It's bad practice and, if you're not careful, you'll slip on one and break your empennage.

**9.** Hey, what's that crowbar doing here? You're supposed to be fixing the plane—not wrecking it. This tool should never be used on an engine. Use only authorized airplane and engine tool sets as specified in the airplane or engine handbook. Also see T.O. No. 00-30-45.





# Jungle FRONT

ON tropical islands of the Southwest Pacific, far from the modern hangars and comfortable quarters they knew in this country, Air Force flyers and ground crews are bringing their civilization to a primitive area now used as a battle ground.

Plunked down in a part of the world that never saw an electric light, an automobile or a white man until a few months ago, these airmen have sprinkled the jungle with evidences of their own way of life. They've done it partly with what they brought with them, partly with what they found in the manuals, but mostly with just plain ingenuity.

Today landing mats spread across clearings where monkeys used to play, improvised maintenance devices nestle among coconut and bamboo groves, and such Americanisms as home-made clubhouses and shower baths fringe the darkness of the jungle. These things have all aided in the victory over the tropics, a victory that is a necessary prelude to the victory over the Japs.

These pictures show what the boys are doing when they aren't blasting away at the Japs.

Almost invisible in the dense tropical foliage is this beautifully camouflaged operations office. It looks quiet but it is really the center of base activity.



The building at left is the officers' club. It may not be like the Waldorf but it offers relaxation for tired airmen just the same. Built by the officers themselves, it is made of bamboo and other woods.

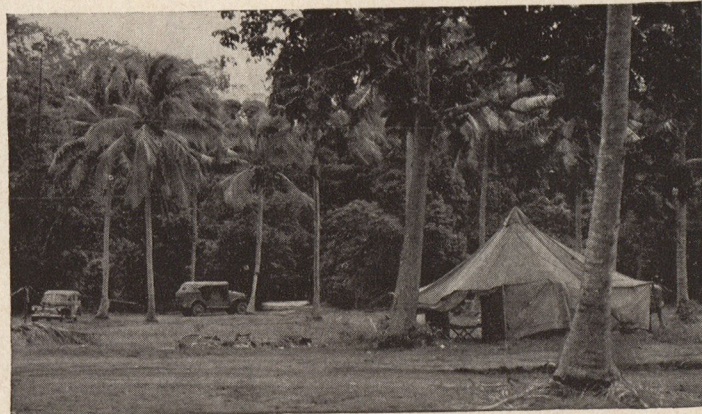


Flying officers (above) relax in their home-made clubhouse. The magazines, not the latest by any means, are read thoroughly anyway. Besides the "library," the building also houses a ping pong table, some miscellaneous tables and chairs, and a bar. When not reading or writing letters home, these officers spend their leisure hours in "hangar flying."

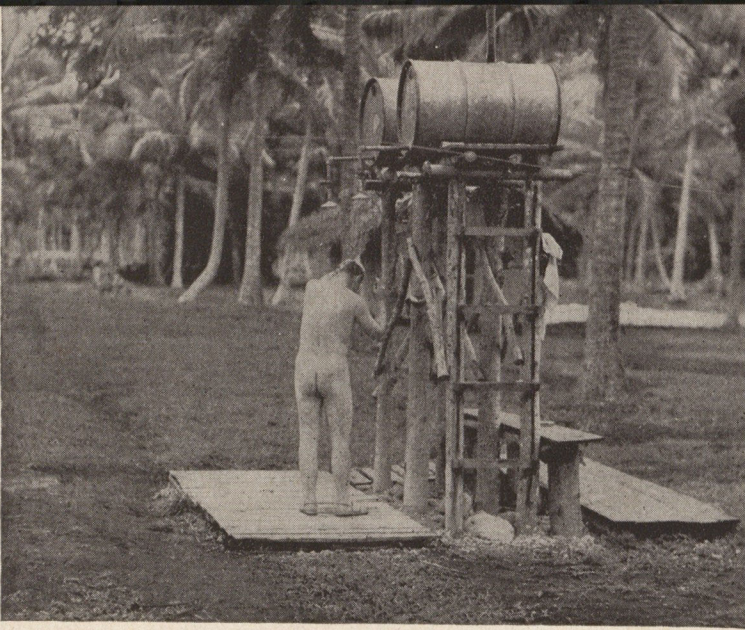


The first structure to be erected at a new field is the control tower (right). After the control tower is up and manned, operations can be started, even though other installations are not yet completed.

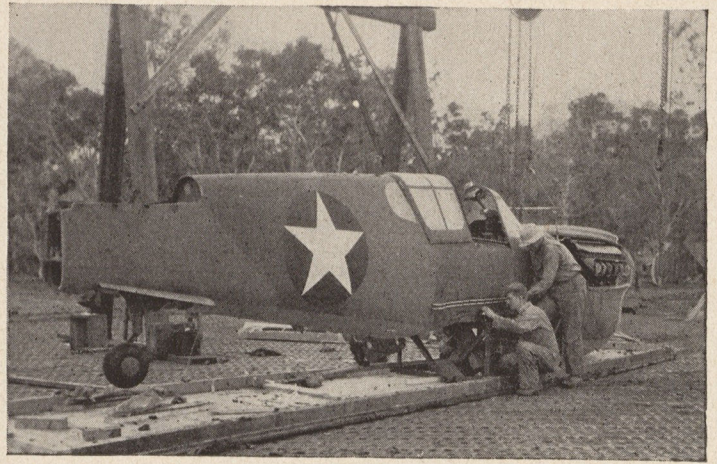
A modern station wagon, Army car and tent mingle with coconut trees in a South Sea setting. Behind the clearing is the camouflaged operations office.







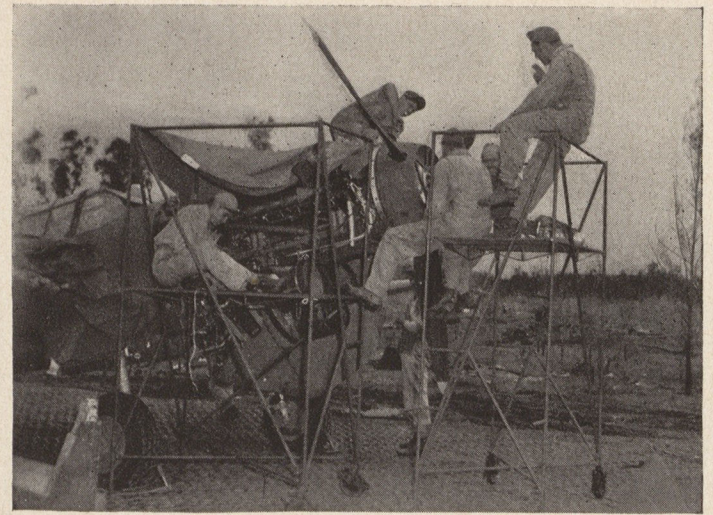
A home-made shower provides a pleasant escape from the tropical heat—at least until the water runs out. When it's gone the barrels at top have to be refilled.



Hydraulic equipment might be better, but these mechs still do a good job of lifting this pursuit ship with an improvised hoist.



Airplane batteries are recharged in this "hangar." Extra care is necessary because spare parts are virtually nonexistent.



A tropical sky is the roof of this South Sea hangar. Canvas sheets keep the weather off the plane as several mechs swarm about.

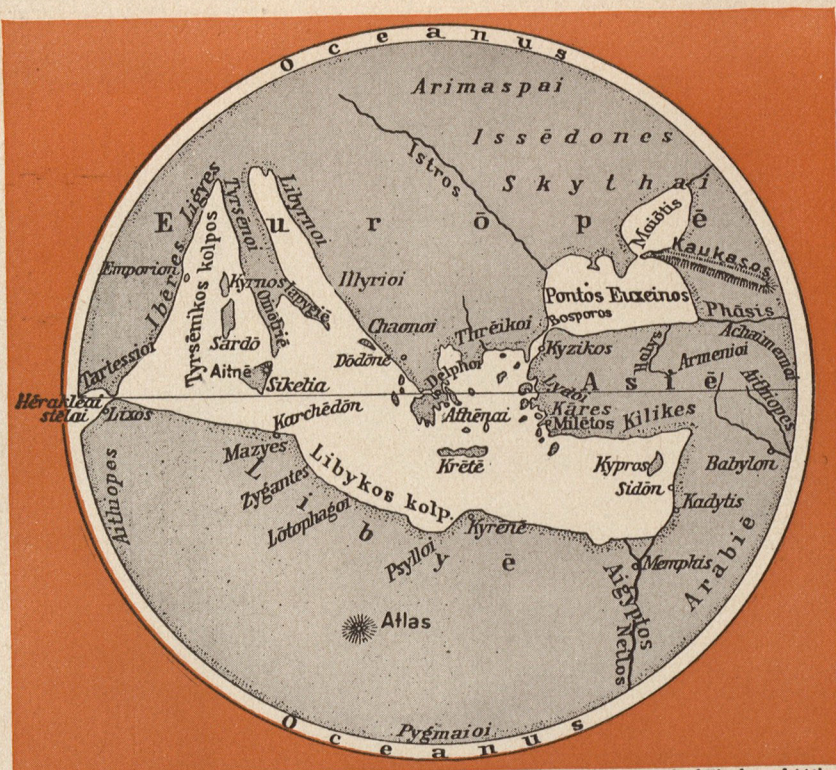
The nose of a P-39 makes a good stove for brewing a South Seas tea party after the triumphant airmen have returned from a stiff fight with the Japs.



A butcher knife snitched from the mess hall helps this colored soldier expertly weave the walls of a new building from palm fronds.







ANAXIMANDER (611-546 B. C.), a pupil of Thales of Miletus, made the "first map of the world", which was then thought to be a cylinder suspended in the heavens.

# Guides for Global War

By Captain F. J. Burnham

MAPS AND REPRODUCTION UNIT, A-2

**Maps and charts are essential tools for the proper execution of modern combat, and aerial cartography is a new development of profound importance.**

NEVER in world history have maps and charts been so important. In this global war they are vital to airmen.

Primitive man drew maps with sticks on the ground to illustrate his direction of travel and the principal objects to be encountered. The early mariner charted the coasts of familiar lands so that he might sail and return safely.

Today a complex system of maps enables the aerial navigator to plot his courses and readily recognize features of the terrain over which he flies. Not only can he locate places by their horizontal characteristics, but he also can avoid vertical obstructions, such as mountains or other hazards protruding from the earth's surface.

An outline of the principles of cartography, both historical and constructive, is one deserving more attention in this air-minded age. Several million dollars worth of maps are published every year in this country, but we still are not map conscious when compared with most of the nations of Europe.

A critical comparison of maps produced in the United States with the maps produced, say, in Germany or Italy, indicates we are still amateurs in the science. We should, therefore, know our maps better

and strive to improve the results of our cartographic efforts.

We know that maps have been in use at least since the time of Homer (about 900 B. C.). These maps now have only historical value but from this humble start evolved the accurate maps we use today. In looking back to historical maps preserved for our study, we see the earth shown as a disk encircled by a great river, Oceanus. The people of Homer's time thought of the earth as such a disk turned up at the horizon like a huge saucer. Later, as extensive commerce and the founding of colonies became

more common, geographical knowledge became more accessible to the masses.

To Aristotle (384-322 B. C.) is given the distinction of founding scientific geography when he explained his theory of the spherical earth, taken, it is said, from ideas of the ancient philosophers.

Mathematical geography followed about 160 B. C. (Hipparchus). These attempts at the formation of the cartographical and geographical sciences were solidified by Ptolemy, the "father of geography," as we are bound to call him after a study of his great work "Geographia."



PTOLEMY (150 A. D.) produced twenty-six maps to illustrate his Geography, drawing largely upon the previous work of Marinus, and showing early repre-

sentations of the continent of Europe. The principles underlying the Ptolemaic conceptions of cartography are described in the accompanying article.



After Ptolemy we lose sight of any concerted effort at constructive map-making until the improved charts now known as the "Portolan Charts" began to make their appearance about 1300 A.D. These were products of the early Italian and Catalan chart makers. Another great impetus was given to maps and charts through the world travels of Marco Polo and the increasing trade with the east.

With the invention of printing in the fifteenth century, and proof that the world was a sphere through the voyages of Columbus and Magellan, our modern cartography really began to assume a definite pattern.

By the end of the eighteenth century the map was truly a work of art, with much of its surface taken up with ornamental drawings and embellishments used not alone for art's sake but to fill up the blank spaces of geographic ignorance.

To those of us who think in terms of travel and combat by air, maps should be easily understood. A map is nothing more than a generalized picture of the earth as we see it from above.

But a map—to define it more exactly—is a graphic representation of a portion of the surface of the earth, or even of the whole globe, on a plane surface, usually with a high degree of generalization and simplification according to its scale, and often with the addition of data of some special subject matter.

IN THE early stages of map making, the representation of physical features was purely local in character. The remoteness and differences of language made its universal usage an almost impossible barrier. As international communications developed, however, there was a gradual overlapping of ideas. Many of our present signs and symbols have been arrived at by international agreement, thereby making the principal features of a map an almost universal language.

If a book is to be read, we must know the language in which it is written. This is not true of a map. It little matters if a map be published in Russian or Japanese; because we can see at a glance the principal features, the location and relation of cities

to each other, and the principal geographic configurations of the country. And, if the scale is sufficient, the relationships of the major political areas are immediately apparent.

For maps to be used to the best advantage, they should be classified in two groups: general purpose maps and special purpose maps.

THE FIRST group, general purpose maps, includes world political maps to show world relationship, continent maps to illustrate the relationship of countries within a unit, and state and county maps for more detailed study. Then there is the popular newspaper map, which may properly be called a political or informative map designed for general use by a greater number of people than are the special maps.

The second group, special purpose maps, is almost endless in its variety and scope. Only the major types will be described here.

The hydrographic or nautical chart, which has played such an indispensable part in the development of nations, embodies technical knowledge in which mathematical science of various kinds has been reduced to the minimum necessary for the comprehension of the mariner.

There is this distinction between the nautical chart and maps in general: while the latter may serve as a reference medium, the nautical chart—in its special and accurate delineation—is an instrument to be worked upon so that a ship's course may be laid off with accuracy and ease and positions readily determined; it must present information in detail, yet with simplicity; it must be up to date with data on a nation's ports and commerce, and it must help the navigator avoid the destruction of life and property.

Aeronautical charts constitute a practically new development in cartography; their primary object is to provide the needs of the airman in as simple and characteristic a form as possible. These needs include his ready solution of certain problems of direction and distance and a comprehension of intervening terrain at a glance. The features to be stressed are those relevant to his purpose. The airway route must be clearly defined, and prominent landmarks, whether

natural or otherwise conspicuous, must be clearly shown or emphasized. These landmarks should include the general trend of railways and highways, their intersections, and industrial positions.

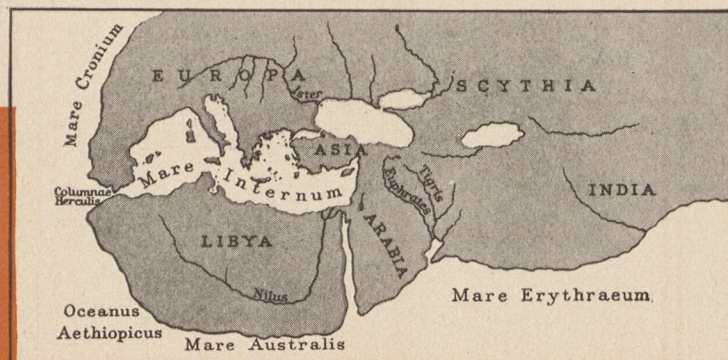
Sinuosity of streams should be generalized; minor roads and other detail that may confuse the flyer should be omitted. Simplicity is desired so that the airman may grasp at a glance the relative location of the places in which he is interested and which will serve him in maintaining his course. Special emphasis through the use of color or prominent landmarks, and the additional use of color for gradients of elevation, serve as a ready means for securing position and orientation.

THE WEATHER BUREAU performs a systematic and continuous service for agriculture and commerce and for marine and aerial navigation. Through the medium of the telegraph, radio and other forms of communication from various stations, supplemented by reports from other countries and ships at sea, weather maps and other meteorological data become an important adjunct in the use of charts, especially in the maritime interests and in aeronautical development.

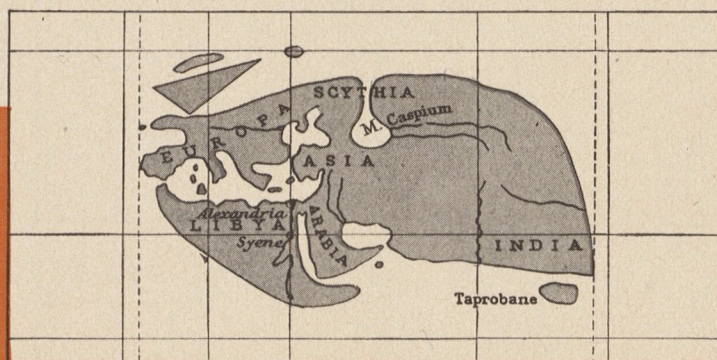
Weather maps, based upon simultaneous observation taken at many places, are issued daily in the United States at the various Weather Bureau offices. In addition, manuscript maps, covering the United States in two sections, are issued at the airway stations for every six-hour period. The bureau also enters various data to show progressive changes in weather conditions from day to day and from month to month on Northern Hemisphere maps.

Other special purpose maps include economic maps used to show resources of countries and their transportation systems; geological maps to plot and describe conditions that are of vital interest to engineers, and soil maps to enable the farmer to utilize his land to the greatest extent.

This paper purposely omits the description of a map that should rank high in the order of special maps, namely, the military map. The subject of military maps, generally divided into strategic and tactical, and the recent development of target charts, will be the subject of a succeeding article. ☆



HERODOTUS of Halicarnassus, who thrived between 484-425 B.C., drew this conception of the world, showing three continents. Note the fairly accurate manner in which the Mediterranean area was represented.



ERATOSTHENES (Circa 200 B.C.) depicted the world in the shape of a parallelogram, without much regard for coast-line details. Little was known of the continent of Africa; therefore it was largely ignored.



## BAPTISM OF FIRE

(Continued from Page 17)

so I could follow it down. I saw a brown streamlined shape fall away from us and plunge into the water just short of the target. Closing the bomb doors, I called the pilot.

"Everything O.K., sir. Just short of the target."

The flight continued. We maintained a rather large echelon formation. We passed the island of Amchitka.

I thought, "Oh, Oh! I'd better keep my eyes open around here."

I checked everything over again. My heart beat a little faster. I felt warm. I kept wondering if I was going to be afraid.

The atmosphere had a peculiar leaden grey hue, though visibility was good. The sky had a high overcast and the water was a dull grey color. We ran into scattered showers, very small.

The pilot spoke, "We're almost there."

To our front, in the far distance, I saw a group of three airplanes. I wondered if they were friendly or enemy.

We came close enough to see they were the other flight. Our formations joined. We could see Kiska Island, very obscured by mist.

My left hand froze on the bomb door control, my right on the gun. I started breathing faster. "Gee, I must be scared," I thought.

We turned left, flew for quite a distance in a large circle to the right. The formation circled, started back the opposite way.

Suddenly, on the far horizon—two ships!

The pilot called, "Everybody ready?"

The crew answered, one at a time, in tense voices, "Ready, sir."

The formation turned to the left and broke into two groups of three, then spread out. We got closer and closer, started circling, like a tribe of Comanche Indians closing in on a wagon train.

Suddenly, sheet lightning darted away from the dark, formidable, grey shapes in the distance. Water spouted on our right. Dirty looking balls of black smoke suddenly appeared on our right front, in ever increasing numbers.

My heart was pounding furiously, my breath was coming hard. I felt hard and tensed up in every muscle. My right hand froze to my nose gun.

We turned around, putting our formation in the lead, and started circling in the opposite direction. The pilot called:

"Everybody ready! This is it! Good luck and give 'em hell!"

The turret gunner: "Good luck, everybody. Give 'em hell!"

The tail gunner: "Good luck, everybody!"

More and more of those deadly looking puffs of black smoke appeared, much too close for our peace of mind. Great flashes continued to dart from the ships.

Our formation wheeled to the left, started

to close in, weaving and bobbing like boxers in an arena, continually changing speed, course, altitude.

I opened the bomb doors. I struggled to turn my head away from the scene long enough to see the bomb door light.

The light went on. I shoved the control lever into "Selective."

Varying our altitude from fifteen to fifty feet, dodging, bobbing, skidding, we closed in like a pack of hungry wolves.

We were the right wing ship of the lead formation. Captain Salter's plane was in front of us and to our left. While firing into the deck of the smaller destroyer, I saw his plane, like a monstrous black bird, rise over the stern of the destroyer to our left and sew bombs like planting corn, right up the center of the ship from stern to bow. The superstructure started to explode violently, erupting flame.

We were almost on our target. I ran out of ammunition. Suddenly the other destroyer loomed up in my face. Quickly, I called the pilot—"Hold it!" I toggled three times. "Bombs away! Let's get out of here!"

I LEANED over and followed the bombs down. The first hit just forward of the stern, at the water line, and the other hit further forward, on top of the deck. I could only see two bombs hit. Closing the bomb bay, I glanced at the indicator lights. Three bombs left! I called the gunner.

"Melvin, take a look at those bombs and see what's wrong. I only dropped two."

"Roger," he answered.

The pilot called, "Everybody O.K.?"

"Gardner, O.K."

"Hanson, O.K."

"Where's Melvin?"

"He's in the bomb bay, checking the bombs, sir. We only dropped two!"

Melvin called, "Gardner, they look O.K. to me."

"Roger," I answered.

We swung out and away. I looked around the horizon. The first of the two destroyers to be hit was shooting huge spouts of flame and smoke. An explosion occurred almost every ten seconds. We started carrying on a joyous, if somewhat profane, conversation over the interphone.

I looked at the second ship. It was wallowing in the ground swell, stern low in the water. Black smoke was pouring from its stern.

We cruised around the remains of the two ships. Obviously one was sinking rapidly, the other severely damaged.

I could only see three other planes in the air besides ours. I called Melvin.

"Melvin did they get two of our planes?"

"They got one," he answered, "I saw it go down."

"Damn!"

Lieutenant Maurer called, "Gardner, get ready. We're going to make another run

and get rid of these three bombs." We turned, started coming in again. I had reloaded my gun and had another ammo can ready. I glanced at the remaining destroyer and saw they were firing at us with the big guns from the forward turrets. Smoke continued to pour from the stern.

We swung around and headed straight for the bow of the ship, maintaining evasive action. Puffs of smoke kept appearing in our vicinity, ever closer.

We had come within shooting range of the ship. I fired my nose gun, following the tracer into the foredeck of the target.

I opened the bomb doors, maintaining fire with my right hand. The ammunition ran out. Quickly, I swung my gun over, yanked out the empty can and shoved another into place. I pushed the control lever into "Selective." I fed ammunition into the feedway of the gun, slammed the cover down and started shooting again. By this time, we were almost at the ship.

I grabbed the gun with my left hand, dropped my right hand to the toggle switch. The pilot straightened out and I toggled about ten times, still firing. The ammunition ran out again, just as we passed over the bow of the destroyer. Horrified, I saw tracers and "pom-pom" coming at us. We had to climb quickly to avoid ramming the mast. I saw a gaping hole in the stern, smoke pouring out. I yanked the bomb doors closed. The aft guns were not firing.

There was a trail of tiny figures in the water, a few clinging to wreckage. In the distance, against a murky grey sky, dense black smoke and pillars of flame erupted from the remains of the first destroyer.

I glanced at the indicator lights. My heart sank! There were still three bombs left. I notified the pilot.

We circled the vicinity a little while longer. One other plane was still with us. We started home, the plane undamaged.

We came in over the field at dusk, circled, and landed. We taxied over to the other planes and parked.

I jumped out of the plane, bent over and patted the ground, my knees still weak from excitement. It was sure good to be alive.

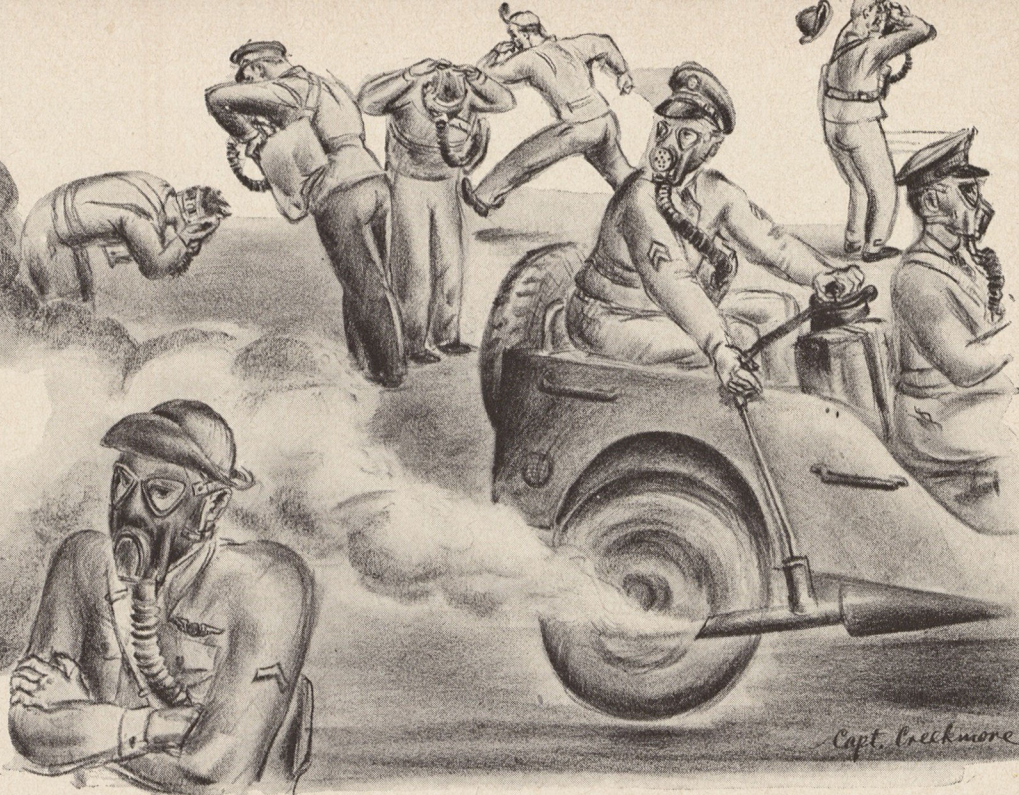
IN THE YEARS to come, I'll think back to the scene of that battle; I'll remember the most perfect bombing run I ever saw, actual or practice. Captain Salter and Lieutenant Patillo and their crew deserve a great deal of credit for the remarkable attack they made on that destroyer.

I'll remember that some of this organization's finest men went down that day and the mission before that, their lives lost in an effort to stamp out the most verminous species to ever inhabit our earth.

I'll remember that I'm living on borrowed time. The extension was granted to me by the skill of my pilot, Lieutenant Maurer, whose excellent flying brought the entire crew out without a scratch. ☆



# APPLE BLOSSOM TIME AT GEIGER FIELD



A GROUP of M.P.s, walking through a sunlit company street at Geiger Field, Washington, are having a good cry. All the men are obviously choked up. Tears sluice down their cheeks as each soldier dabs a handkerchief to his reddened eyes.

The fact is, these men have been gassed. But good. Lieutenant S. F. Eldridge who is known, as Chemical Warfare officers everywhere are known, as Stinky—plays for keeps on Gas Drill Day. When he says "Alert," he means "Alert," and if you mis-

take his meaning and are not prepared to whip on your mask in a hurry, you will get a man-sized waft of tear gas.

Lieutenant Eldridge, on his weekly Gas Day, drives a jeep. He drives it with the concentrated frenzy of Popeye the Sailor. Strapped on the jeep is a cylinder of tear gas and holding a spray nozzle at the "Ready" is one of Eldridge's cohorts. Very adept at this work, he can spray you

in all sorts of ways, even "by the numbers."

Up and down company streets, into workshops and hangars they go, stampeding those who have forgotten their gas masks, or who cannot put them on quickly enough, or who, at the critical moment, find they have strapped them *under* their coats.

RANK, in this realistic drill, means nothing. On the very first Gas Drill Day, the sanctum of Geiger Field's commanding officer, Colonel William G. Schauffler, Jr., was invaded.

In fact, the whole thing is Colonel Schauffler's idea.

The Colonel, a flyer, got a touch of gas in the last war through his own admitted neglect. On another occasion he was piloting an open cockpit plane in infantry contact work when a gas attack came and was lucky to have a mask with him.

Because of his own experiences, Colonel Schauffler swore that should he ever take part in a war again his men would be thoroughly trained in gas mask use.

They are. Every Tuesday is Gas Alert Day. Every man on the field must go about his ordinary duties prepared to don his mask and continue working just as he would have to do in a combat area under real attack.

Each Tuesday Lieutenant Eldridge and others of the Chemical Warfare section patrol the field with their tear gas apparatus and are the Professors who play sad music with the hose on all who are neglectful. This gives dramatic training, with no loss of time whatever.

To date, only tear gas (or CNB) has been used. This has little odor. What odor it has is something like the "apple blossom" scent of a similar but stronger gas, CN.

But Geiger Field (attention, men) has been promised an even more dramatic drill. That will be the day Lieutenant Eldridge trots out the "puking gas." Ugh. ☆

## CHEMICAL WARFARE POCKET REFERENCE CARD

Class	Agent	Odor	Color and State in Field	Persistency	Immediate Symptoms	Protection	Field First Aid
Casualty Agents	Lung Irritants	Chlorine	Highly pungent	Heavy yellow-green gas	1 to 5 min.	Irritates lungs	Gas Mask & Protective clothing. Remove from gassed area. Loosen clothing. Keep warm and quiet. Give non-alcoholic stimulant. Treat for shock and pneumonia. Stretcher case.
		Phosgene	Fresh hay Ensilage	Colorless gas	1 to 10 min.	Burns throat, eyes Choking & coughing	
		Chloropicrin	Chloroform Sweet	Colorless gas	1 to 12 hours	Irritates nose and throat. Vomiting.	
	Vesicants	Mustard	Horseradish	Liquid and colorless vapor	3 to 20 days	Irritates lungs. Delayed blisters.	Gas Mask & Protective clothing. Remove from area. Soak up excess agent. Remove contaminated clothing. Wash skin with soap and water or kerosene. Rinse eyes with boric acid solution. Keep warm. Treat as lung-irritant patient.
		Lewisite	Geraniums	Liquid and colorless vapor	1 to 7 days	Burns eyes, lungs, skin. Blisters.	
Harrassing Agents	Lacrimators	Ethyl-Dichlorarsine	Biting, irritant	Liquid and colorless vapor	1 to 12 hours	Sneezing, crying, vomiting.	Gas Mask. Do not rub eyes. Remove to pure air. Face the wind.
		Chloracetophenone	Apple blossoms	Colorless gas	10 min.	Skin and eye irritation. Crying.	
		Chloracetophenone-Sol	Sweetish	Liquid and colorless vapor	1 to 50 hours	Eye, skin irritation. Vomiting.	
		Chloracetophenone-Sol	Sweetish	Liquid and colorless vapor	1 to 50 hours	Eye and skin irritation.	
		Brombenzyl Cyanide	Sour fruit	Liquid and colorless vapor	2 to 14 days	Eye and nose irritation.	
	Irritant Smokes	Adamsite	Coal smoke	Yellow smoke	10 min.	Headache, nausea, violent sneezing.	Best type filter in mask. Remove to pure air. Keep quiet. Sniff chlorine from bleaching powder bottle. Keep warm.
		Diphenyl-Chlorarsine	Shoe polish	White-gray cloud or smoke	10 min.	Temporary mental depression.	
	Screening Smokes	White Phosphorus	Burning matches	White smoke	10 min.	Solid particles burn skin.	Avoid particles. Put under water. Pick out particles. Do not apply salve or grease.
		HC Mixture	Sharp acrid	Gray smoke	While burning	Harmless	
		FM Mixture	Mild acrid	White smoke	10 min.	Harmless	
		FS Mixture	Burning matches	Dense white smoke	5 to 10 min.	Irritates skin.	
		Crude Oil	Burning oil	Dense black smoke	Depends on wind	Harmless	
Incendiaries		Thermit	White smoke, red flame	5 min.	Burns	Water & sand	Cool incendiary material on or in skin by flooding with water. Do not apply salve or grease.
		Magnesium	White smoke, white flame	5 min.	Burns	Water & sand	
		Gasoline-Rubber	Burning rubber	Smoky red flame	5 min.	Burns	

The above chart necessarily omits color markings and symbols which identify the various devices and equipment used with each chemical agent. Casualty agents are identified by green markings; harassing agents by red; screening smokes by yellow

and incendiaries by blue. Each mark is accompanied by bands of color which indicate the persistency of the gas. The above card, carrying on its reverse side instructions on the use of the gas mask, is distributed by the Air Service Command.





# Technique

A Monthly Review of Technical  
Developments in the Air Forces

Above is a view of the Curtiss Caravan, the new all-purpose cargo carrier made of wood which is now going into quantity production. This sky giant is designated as the C-76.

## First Wooden Transport

THE ARMY AIR FORCES has a new, virtually all-wood cargo plane. It is the giant Curtiss Caravan, officially designated the C-76.

The Caravan is a high-wing monoplane with a span of 108 feet, is 68 feet long and is powered by two 1,200-horsepower engines. It is equipped with retractable tricycle landing gear and is built so that its floor is only 36 inches from the ground, thus making possible rapid loading and unloading of cargo. It has a low landing and stalling speed, short take-off performance and moderate range and cruising speed. Its characteristics make it unusually suitable for operation in areas where there are few facilities for repairing metal planes, and where landing fields are small and operating conditions difficult.

The control compartment of the new plane is situated above the forward section of the cargo space and accommodates a crew of pilot and co-pilot, also offering provisions for a radio operator when desired. The cargo section carries a cable to which the release cord of a paratrooper's parachute may be attached, and each plane can be equipped with fittings for towing gliders.

Woods used in the production of the Caravan are hickory, spruce, birch, gum, mahogany and Douglas fir. The plywood ranges from three-ply, used in the construction of the leading edges, to nine-ply, employed in the center panel. The wings are of the conventional two-spar, box type construction. The wing spars are of laminated spruce cap strips, with plywood webs, internal diaphragms and stiffeners. The fuselage is of semi-monocoque construction.

The C-76 will be built by a new Kentucky plant of the Curtiss-Wright Corporation and by the Higgins Shipbuilding Co. Sixty-five percent of its construction will be subcontracted to the wood industry, thus not interfering with the manufacture of combat airplanes. The major subcontractors are the Mengel Company of Kentucky, the Baldwin Piano Company of Ohio and the Universal Molded Products Co. of Virginia.

The design of the Caravan was conceived by Curtiss Wright engineers, working in conjunction with the Army Air Forces, early in 1942. The manufacturing project was begun in March of that year. C-76s, until the new Kentucky plant is ready, are being built in Curtiss-Wright's Missouri factory.



### New Crash Finder

REACHING crashed planes quickly is no longer a problem at Mather Field, California, where Captain LeRoy G. Heston, station engineer and accident officer, has equipped a jeep with a radio for two-way communication with a scout plane. When a crash occurs, the plane acts as the eyes of the pair, and the jeep, which can traverse almost any kind of terrain, is directed promptly to the scene. Above, Captain Heston and Lieutenant Roy P. Sampson, post signal officer, are shown in communication with the scout plane.



# Dual-Rotating Propellers

By C. I. Valentine

PROPELLER LABORATORY, WRIGHT FIELD

THE ARMY AIR FORCES has an extensive development and test program under way for the design and construction of dual-rotation propellers for use with engines of increased horsepowers and for high altitude operation. This experimentation was begun several years ago when the Air Forces first visualized the necessity for the development of a propeller arrangement in which two separate controllable pitch assemblies were installed, one in front of the other.

The standard dual-rotation propeller is assembled on two concentric shafts turning in opposite directions. The number of blades is always given as the total involved; a six-blade dual-rotation propeller consists of two three-blade sub-assemblies.

There are a number of advantages gained by the use of dual-rotation propellers: (1) The availability of a greater number of blades than is normally feasible, (2) an increase in propeller efficiency under flight conditions requiring high blade angles, and (3) elimination of torque reaction.

The availability of a large number of blades is advantageous because, with the higher powers and greater altitudes now being encountered, sufficient blade area must be available to absorb the added power at efficient angles. Improved take-off and climb characteristics are obtained in addition to increased speeds and ceilings. The additional blades also permit smaller propeller diameters, thus allowing use of a shorter landing gear while maintaining necessary ground clearance for blade tips.

With the single rotation propeller now in general use, an airplane tends to roll in the direction opposite that of the propeller rotation. This is torque reaction. On single-engine fighters this tendency is of consid-

ered magnitude, particularly at low speeds and high power, such as during take-offs and approaches for landings. For normal flight the airplane control surfaces are given a fixed adjustment (called "trim") to balance against the propeller torque. But only one value of propeller torque is balanced for each speed, thus causing the pilot to change manually the trim adjustment when necessary. The dual-rotation propeller, dividing the power equally and turning in opposite directions, eliminates the torque reaction automatically for all conditions of engine power and speed.

As early as 1936 a development project was begun by the Air Forces for a four-bladed, controllable dual-rotation propeller. This was followed in 1938 by a series of flight tests at Wright Field, in which a four-bladed, dual-rotation propeller was used on a single-engine plane. Control of the plane during maneuvers was noticeably easier than with a single-rotation propeller and there was no tendency to roll even with full application of power and with all control surfaces in neutral positions.

About two years ago it was possible to know definitely for what type of airplanes and engines the development of dual-rotation propellers should be undertaken. The Air Forces at that time initiated development projects for six-bladed, dual-rotation propellers with three major manufacturers: Aeroproducts, Curtiss and Hamilton Standard. These propellers are for use primarily on fighter planes utilizing engines in the higher horsepower class.

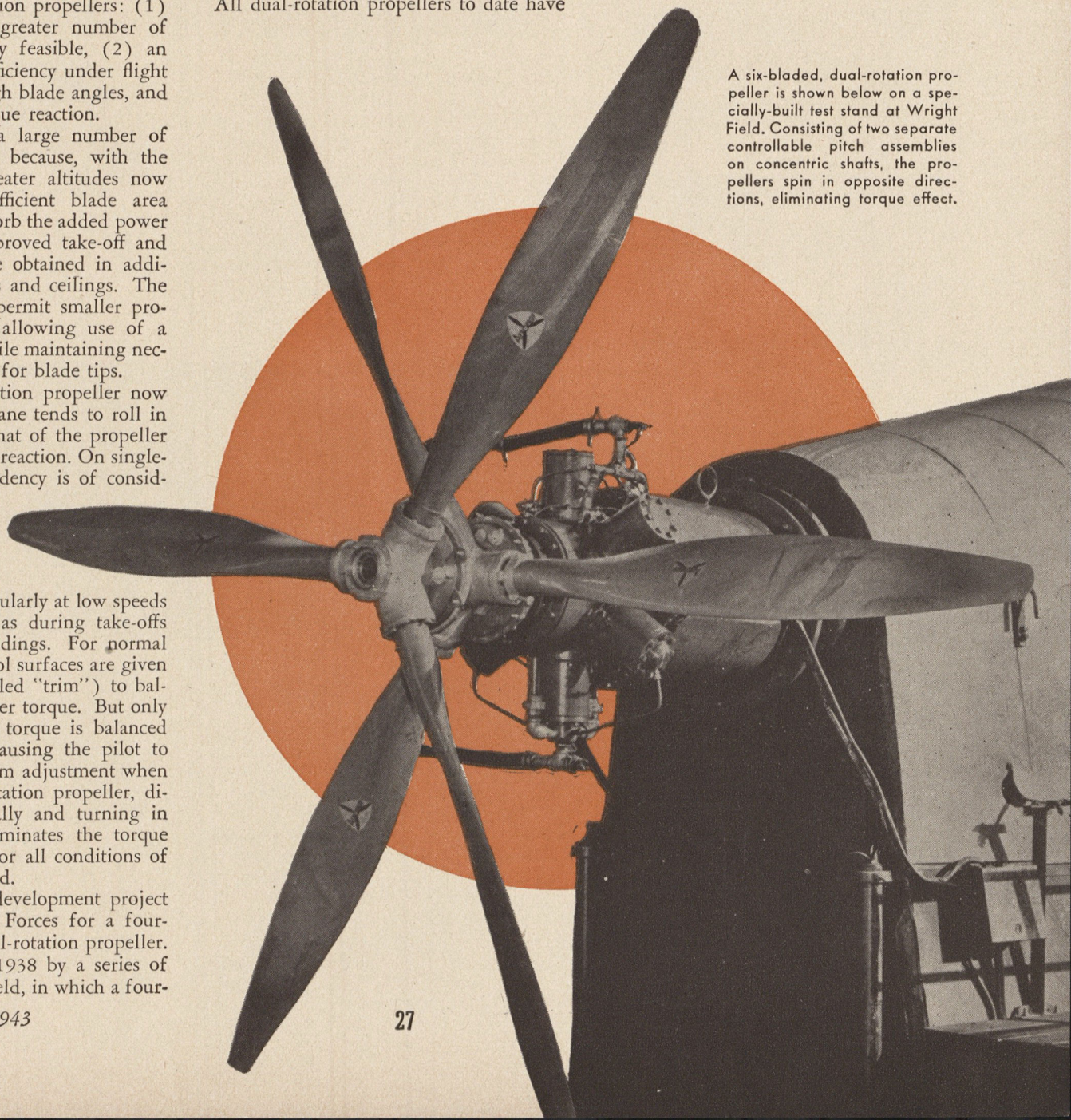
All dual-rotation propellers to date have

been designed to operate with the two sub-assemblies turning at equal speeds in opposite directions. This is considered standard. Engine nose and propeller shaft standards have been established and are being used so that a propeller of any manufacturer's design can be installed on any suitable engine. Blade designs identical to those for single-rotation propellers are used except that both right-hand and left-hand blades are required for each propeller.

Dual-rotation propellers are not considered unduly complicated and are no more difficult to handle than a single-rotation propeller. They involve a weight increase of only about ten percent above the weight of two corresponding single-rotation propellers. The problem of synchronizing machine gun fire through dual-propeller discs is not difficult since, by controlling the position of blade passage, as many openings can be made to occur at a given location with dual-rotation propellers as with a single-rotation propeller.

(Continued)

A six-bladed, dual-rotation propeller is shown below on a specially-built test stand at Wright Field. Consisting of two separate controllable pitch assemblies on concentric shafts, the propellers spin in opposite directions, eliminating torque effect.



erable magnitude, particularly at low speeds and high power, such as during take-offs and approaches for landings. For normal flight the airplane control surfaces are given a fixed adjustment (called "trim") to balance against the propeller torque. But only one value of propeller torque is balanced for each speed, thus causing the pilot to change manually the trim adjustment when necessary. The dual-rotation propeller, dividing the power equally and turning in opposite directions, eliminates the torque reaction automatically for all conditions of engine power and speed.

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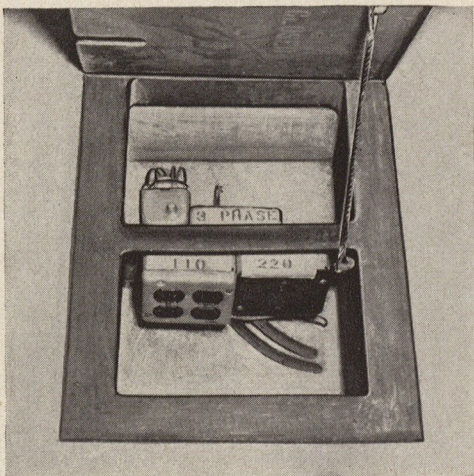
AIR FORCE, February, 1943



## Major Orcutt Again

MAJOR LESTER G. ORCUTT, Sub-Depot Commander, Hunter Field, Georgia, inventor of the inexpensive bombsight and bomb rack described in the last issue of *AIR FORCE*, has done it again. His new inventions are a field lighting unit for night maintenance and an anchor stake for tying planes in sandy soil. Both of these devices were developed while Major Orcutt was stationed at Morrison Field, Florida.

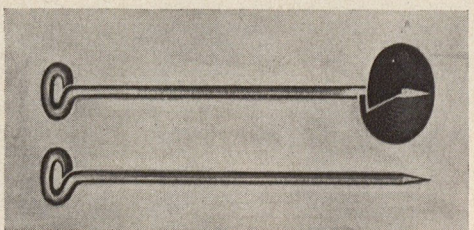
The purpose of the field lighting unit is to provide an electrical connection that cannot be broken when heavy bombers, trucks or tractors run over it. The unit consists of a sunken iron box containing eight plugs and a light that automatically flashes on when the lid is opened. The entire assembly is installed flush with the ground on a two-inch grade of concrete. Holes cut in the lid, which is constructed of one-fourth inch cold rolled iron, leave ample space for power leads when the box is closed. A



Lighting unit—open

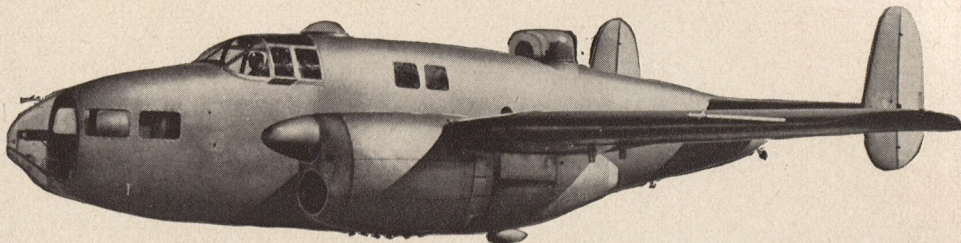
drain pipe is also connected which carries away any water that might accumulate.

The new stake consists of a standard anchor stake with a six-inch steel plate one-eighth of an inch thick, welded near the bottom. The plate is shaped like a corkscrew with the leading edge sharpened, permitting it to be screwed into the ground. Even in sandy soil the stake has proved unusually stable. Tests show it cannot be pulled out even by a two and a half ton



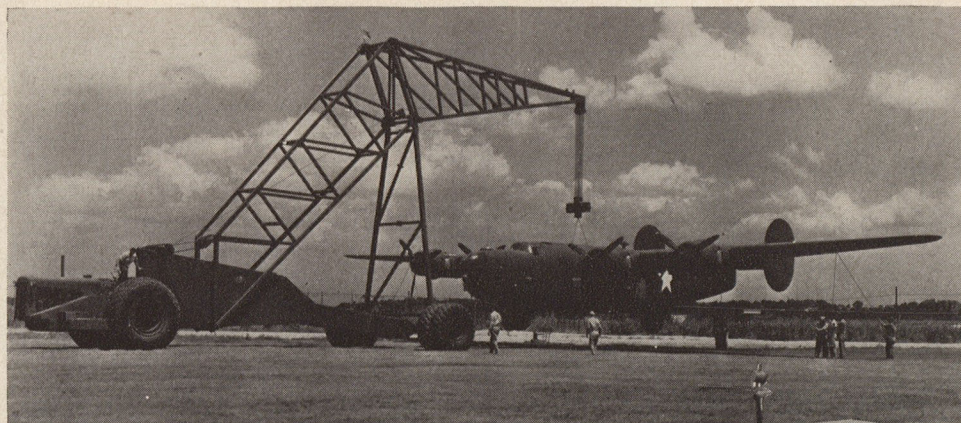
Top is the new stake, and below, the old

truck that could extricate six old-type stakes with little effort. Only a few of the new stakes are needed to anchor a four-engined bomber—a job that takes from twelve to fourteen of the old type.



This is the Fairchild AT-14, new five-man aircrew trainer. It is made almost entirely of plastic bonded plywood, formed by the Duramold process. The

plane has a speed of over 200 M.P.H., can carry a useful load of almost two tons and is powered by two Ranger in-line air-cooled 12-cylinder engines.



## Big and Little

HERE are the big and little of the ground forces machines that keep 'em flying. A new giant crane recently developed by Wright Field engineers is shown above lifting a B-24 with ease. The crane weighs over 130,000 pounds, is self-propelled by a 200-horsepower Diesel engine, and can move disabled planes at a top speed of eighteen miles an hour. The front wheels, over eight feet in diameter, give some idea of its size. At right is the Air Forces' stand-



ard three-wheel motor scooter, used by stock chasers and messengers at virtually all air bases. The box in front carries about 400 pounds. The one-cylinder motor has a top speed of around thirty miles an hour and travels seventy miles on a gallon of gas.



## Radio-Code Machine

DOWN at the Enid, Oklahoma, Flying School they have a new automatic radio-code machine that can transmit six different messages at different speeds among 220 students, all at the same time.

The machine, which is really a combination of six separate transmitters set up on an elaborate rack, was provided by radio station KCRC of Enid. It was obtained through the efforts of Instructors Lieutenant Chester E. Goddard and Mr. William B. Teitzel, former radio engineer at KCRC.

When the machine is in operation, the

code is imprinted on a tape by a printing stylus in much the same manner as a barograph recorder. The tape passes over a photo-electric cell directly beneath a focused beam of light. As the light passes through that portion of the tape on which the code is printed (a long space of light is a dash; a short space a dot) into the photo-electric cell, a small amount of current is generated—sufficient to energize the mechanical sender to transmit the code to 220 pairs of earphones.

Since the new machine was installed, students at Enid (above, in class), have increased their reception speed from six to between seven and eight words per minute.



## HOW TO KEEP WELL

(Continued from Page 14)

to restrict the fluids lost by sweating. Because water consumed rapidly is thrown off in excessive perspiration, it is well to form the habits of drinking small amounts of water slowly, of moistening the mouth and throat frequently with sips of water, and of refraining from drinking as much as possible.

Because salt is lost from the body with perspiration, it is necessary to supply additional salt either in the form of salt tablets or by adding it to the food. Otherwise heat cramps, and possibly heat exhaustion, result.

There are certain definite precautions with regard to foods that should be observed at all times. Native fruits and vegetables are frequently dangerous, either because they have been fertilized with human waste, or because they have been washed in polluted streams. In order to be sure that they are safe, they should be dipped in boiling water for a few minutes before being peeled. Potassium permanganate solution is not satisfactory unless the fruit or vegetable is allowed to soak in it for a minimum of four or five hours.

All foods, other than thick-skinned fruits, should be thoroughly cooked. Do not eat the smoked or raw fish that the natives relish because frequently sea foods are contaminated by tapeworm and flukes. As a general rule, food which monkeys eat is not poisonous to humans if properly prepared.

Because food spoils rapidly in this area, it is necessary to carry such staple food as concentrated rations, canned fruit juices, crackers and thick-skinned fruits when going out on an operational flight.

Before sampling a strange food, make inquiry about it, for although the majority of native fruits and vegetables are safe, some are poisonous. Certain species of fish are edible in one part of the islands, but become poisonous when they migrate to other waters during the spawning season. In some of the more primitive areas, poisoned foods are placed near the family burying grounds, for the natives believe that whoever partakes of this food will proceed to heaven and become a servant of the recently departed relative.

**SULFAGUANIDINE**, a part of the jungle kit, may be taken should diarrhea or dysentery develop. Seven tablets dissolved in water should be taken every four hours until there are no more than five bowel movements per day. Then the dose should be repeated every eight hours until bowels return to normal.

It generally is necessary to supplement an army diet with vitamins. This may be done by taking vitamin tablets, cod-liver oil, beer, or any quartermaster issue for this purpose.

The fungus diseases, although not usually fatal, can lead to such distress that they prohibit a man from being an effective part of a fighting team. The cardinal points in avoiding these are: frequent bathing; thorough drying of all parts of the body, especially

between the toes, the groin and under the arms; dusting all parts of the body with powder, such as the army issue foot powder; and changing to dry clothing as often as possible. Never walk about barefoot, even in barracks or in the shower. A pair of bath slippers may be made of a piece of wood and some string. This will protect you from athlete's foot. Be sure that the clothing of a man suffering from a fungus disease is not washed with yours, unless boiled, for this is a common method of transmission. And above all, do not use other people's towels or allow others to use yours.

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### Tips On Forced Landings In The Southwest Pacific

Chances of surviving a forced landing in the Southwest Pacific theater of operations are enhanced if you know as much as possible about the geography of the many islands, the rainfall, winds, ocean currents, plants, animals and the characteristics of the people.

When forced to bail out at night, don't start looking for an "out" from your predicament as soon as you have your feet on the ground. Wait until morning and travel in the direction of the coast; walk downstream or downhill. If you reach a river you may be able to build a raft of logs and float to the sea.

Observe jungle birds and animals to determine edible roots and herbs. What they eat is usually safe for you. Protect yourself from exposure and insects by utilizing all clothing available, including your parachute. Rest frequently. Dry your clothes when they become wet. Seek out dry places to sleep. Motor oil may be used as an insect repellent and as a fuel.

Travel on the up-wind side of swamps and rivers. Part of your 'chute may be used to collect rainwater, which is preferable to ground water if you have no means of purification.

After reaching the coast, if you do not know your approximate location and are becoming exhausted, improvise a signal device and await rescue, rather than expend your failing strength by attempting to travel.

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In certain parts of the islands, crocodiles abound in the larger streams and make bathing a hazardous undertaking. However, if the bath is taken in a partially submerged stout box anchored several feet from shore, this danger may be avoided. Some of the natives believe that the crocodile is a divine being and that when one is killed its mate will retaliate by devouring a man. Out of respect for this superstition, crocodiles are

rarely shot without first obtaining the permission of the natives. The only vulnerable part of a crocodile is his eyes. If attacked by a crocodile while bathing, by pressing one or both thumbs deeply into the crocodile's eyes he may be made to relinquish his hold. A crocodile may be killed by stabbing through the eyes into his small brain with a sharp instrument.

**LEECHES** are obnoxious pests in the low-lying district of this area. The large dark horse leech is found in fresh water and the small red jungle leech is found on shrubs and jungle grass. The leech bite itself is not dangerous. However, the site of the bite frequently becomes infected and leads to a painful chronic ulcer. This is especially apt to happen if the leech is pulled off, for then it leaves its "stinger" in the wound. When traveling through the jungle, natives carry small sacks of moist salt tied on the end of a stick. They remove the leech by the simple process of touching it with this salt sack. They also will fall off if prodded with a knife or if touched with a lighted cigarette.

The Argus, a small insect similar to our sandfly, is very prevalent. It attacks any part of the body which is exposed, leaving a swollen and painful bite. An immunity to the poison is soon developed in the body, eliminating the swelling, but the bite is always painful. These insects are probably the most common and disagreeable pests found on islands of the Southwestern Pacific.

A heavy service shoe well hobnailed, extending above the ankle, is most suitable for the East Indian area. Boots are too heavy and too hot, but the paratrooper's shoe is excellently adapted to this country. Extra hobnails should always be carried, and clothing should be inspected for poisonous insects before being put on. Centipedes, in particular, like to hide in folded clothing.

Because of the difficulty in keeping clean and dry, minor wounds, such as leech bites, insect bites, scratches, cuts and burns, which would be of little consequence in the United States, become infected easily in this area. No matter how small or trivial, all wounds should be thoroughly cleansed and an antiseptic applied to them immediately.

Venereal diseases are prevalent among the people who live along the seacoast and on the lower reaches of the large rivers. Many of the women in these areas are promiscuous, and both professional prostitutes and clandestine pick-ups are frequently encountered. The great majority of these women have gonorrhea and syphilis, while chancroid is not uncommon. In the remote upland district, there are few venereal contacts and venereal diseases are less prevalent. The tribesmen in these remote areas place great value on chastity and will go to extremes to revenge the violation of one of their women.

It takes from three to four months for troops to become acclimatized to the Southwestern Pacific. After this time the climate will be well tolerated if proper health precautions are taken. ★



# ROLL of H

## CONGRESSIONAL MEDAL OF HONOR

**LIEUTENANT** Harl Pease, Jr.\*

## DISTINGUISHED SERVICE CROSS

**COLONEL** W. O. Eareckson. **LIEUTENANT COLONELS:** Brooke E. Allen, Loren B. Hillsinger, William C. G. Hipps (Also Purple Heart). **CAPTAINS:** Jack Adams (Also Silver Star), Charlie Falletta. **LIEUTENANTS:** Frank E. Adkins, Robert B. Burleson, Christian I. Herron\*, L. D. Landry\*, Henry J. Rose (Also Silver Star and Oak Leaf Cluster to Silver Star), Leland A. Walker, Jr. (Also Silver Star), Donald A. Walter\*. **FIRST SERGEANT** Robert R. Davis. **SERGEANT** James L. Cannon\*. **CORPORAL** Andrew J. Swain.

## DISTINGUISHED SERVICE MEDAL

**LIEUTENANT GENERAL** Frank M. Andrews. **MAJOR GENERALS:** Oliver P. Echols, Willis H. Hale. **BRIGADIER GENERAL** Claire L. Chennault. **COLONELS:** Francis G. Brink, Bonner F. Fellers.

## SILVER STAR

**LIEUTENANT GENERAL** George H. Brett. **MAJOR GENERAL** George C. Kenney (Also Purple Heart). **COLONELS:** John S. Allard, Lauri S. Norstad. **LIEUTENANT COLONEL** John Hubert Davies. **MAJORS:** Gordon A. Blake, John F. Devos, Edward F. Rector, John A. Rouse (Also Purple Heart), William A. Sheppard, Harold N. Willis\*. **CAPTAINS:** Harry N. Brandon, Thomas P. Gerrity, E. C. Habberstad (Also Oak Leaf Cluster to Silver Star), Charles H. Hillhouse (Also Oak Leaf Cluster to Silver Star), Francis B. Rang, Ignatius Sargent, James William Sibert, Edward C. Teats (Also Oak Leaf Cluster to Distinguished Flying Cross), R. E. Thacker. **LIEUTENANTS:** Donald E. Andersen, Joe M. Bean, Albert C. Biggs, Donald L. Bonham, Hilroy M. Boswell,

Warren E. Bryant, Arthur L. Chambers, William T. Chesser (Also Purple Heart), William B. Compton, Stanley Cottage, John A. Crockett, Edward Crouchley, John M. Dawson, Richard H. Dennis, Alexander DeShazo, William A. Dietch, Robert B. Dockstader, Cedric P. Drake (Also Oak Leaf Cluster), Gene F. Drake (Also Purple Heart), James W. Duane, James G. Ellis, Gilbert E. Erb, George C. Farr, Owen R. Fish\*, Harry H. Fitts, Seth A. Ford\*, Thomas R. Fowler, Grover J. Gardner, Edward J. Gignac (Also Purple Heart), Ritchie B. Gooch, Eugene E. Greeson (Also Purple Heart), John S. Hancock, Wayne L. Hartman (Also Purple Heart), Clyde L. Harvey, Jr., Walter K. Heitzman, Alfred A. Heyman, Percy M. Hinton, Curtis J. Holdridge (Also Oak Leaf Cluster), Raymond E. Holsey, Jacob A. Hutchison, John W. Jacobs, Jr. (Also Purple Heart), Edward M. Jacquet (Also Oak Leaf Cluster to Silver Star), Thomas R. Jemison, Arnold Johnson, Charles C. Johnson III, Robert S. Johnson\*, William R. Johnson (Also Oak Leaf Cluster), Wilfred B. Jones, William Joyner, Dale R. Kauffmann, John A. Kelting, Earl R. Kingsley, John D. Landers (Also Oak Leaf Cluster and Purple Heart), J. L. Laubscher, Donald H. Lee, Jr., Virgil B. Lindsey, Robert Linn (Also Oak Leaf Cluster), John D. Livingstone\*, Marvin L. McAdams, Robert M. McComsey (Also Distinguished Flying Cross), Donald C. McGee, Hugh O. McTague (Also Oak Leaf Cluster), George M. Manning, James H. Martin, Jr., Harold V. Maull (Also Oak Leaf Cluster), William Meenagh, Cecil C. Metz, Purple Heart), Alan F. Neel, L. W. Neumann, Mack A. Mitchell, Donald A. Morse (Also Purple Heart), Alan F. Neel, L. W. Neumann, Paul F. Nunlist, Walter E. Nyblade, Charles A. Olson, Frederick O'Riley, Jr., Thomas C. Parkinson, Theodore I. Pascoe, Robert O. Pate, Melvin G. Pfund (Also Oak Leaf Cluster and Purple Heart), Stephen Poleschuk, Robert A.

Price, R. V. Prouty, Robert L. Ramsay, Jr. **MASTER SERGEANT** Paul A. Flanagan. **STAFF SERGEANTS:** Jack H. Agee, John B. Chesson, John F. Clark (Also Purple Heart), Dan Erheart (Also Purple Heart), Julius A. Foster, Albert J. Kennedy, William V. Koon, Brewster M. Land, John A. Wallach (Also Oak Leaf Cluster), Herbert E. Wiest. **TECHNICAL SERGEANTS:** Lavert G. Dempsey (Also Oak Leaf Cluster), Guy K. Dozier, Kirby W. Neal (Also Oak Leaf Cluster), Quentin Pardue, C. C. Schierholz, Bernardino Tortora, Jack R. Tribble, Ivan M. Wright\*. **SERGEANTS:** James A. Andrews (Also Oak Leaf Cluster), Herbert E. Baisch (Also Purple Heart), Orin W. Beardshear, Eugene F. Beistel, Edward K. Bentz, Carl M. Biehn, Norman L. Biehn, Quentin Blakely, Roy Bouse, Leonard G. Brazelton, Henry A. Buller (Also Oak Leaf Cluster to Silver Star), George A. Burke, Floyd H. Chamberlain, Benjamin Clifton, Harold R. Conner, William T. Corbitt, Thomas L. Cotner, Dale E. Crabtree, Harold E. Cummings, Daniel Darling, Jack F. Delaney, Virgil F. DeVoss, Walter A. Doiron, Leo H. Ferraguto, Mario J. Filigenzi, Norman L. Forte, Claude J. Fraley, Charles D. Franklin, Jr., Elias E. Gonsalves, William L. Hamilton, G. W. Hancock, Meyer Levin, William D. Lewis, John R. Mackley, Edward B. Malinay, Mack H. Nealy, Glenn D. Norton, Clarence R. Olson, Richard H. Olson, Donald L. Ornbaum, Edward G. Osborne, Jerome G. Parson, Eldon P. Pickett, Francis H. Pryor (Also Purple Heart), Ernest L. Pugh, Daniel Reuther, Jr. (Also Two Oak Leaf Clusters and Purple Heart), Norris T. Reynolds, Edwin Rhodes, Carl T. Roberts\*, W. C. Rousel, George W. Schmid, Eugene D. Shafer, Joseph L. Soilowski, Norton G. Stubblefield, Marion C. Taylor, Jean P. Yates. **CORPORALS:** F. J. Antone\*, Joseph Bayles, Ernest E. Brown, James O. Cannaday, Earle W. Curtis (Also Purple Heart), Robert F. Graf, H. L. Hernandez, James B. Holley, James N. Hume, John A. Irons (Also Two Oak Leaf Clusters), Roger A. McNamara, Holly Perkins (Also Purple Heart), David J. Thatcher, James C. Underwood, Joseph C. Wateski, William E. Wood, Joseph E. Wrenn. **PRIVATES FIRST CLASS:** Michael R. Andrade, Robert L. Avery\*, Z. J. Balamut, Homer D. Billey\*, Peter R. Fabiano, F. F. Herman, Clydel Horn, George R. Lynch, Paul Mucha, Harry R. Parry\*. **PRIVATES:** Edgar O. Arant, Carl T. Athey, Oscar C. Biddle, H. W. Davis\*, A. A. Francisco, D. A. Garrett, Symie L. Glenn, Elmer G. Howes, Harry T. Isles, Mikel D. White, John J. Wilfley (Also Oak Leaf Cluster to Silver Star).

\*Posthumous.

## The Air Medal

This is a cast of the new Air Medal, the design for which netted Private Walter Hancock of Camp Livingston, Louisiana, a prize of \$1,500, awarded by the Army. Pendant from the Air Corps ribbon of blue and gold, a fleur-de-lis, symbol of North, surmounts a sixteen-point compass rose. The medal incorporates basic features of the American eagle and compass rose which had been included in preliminary designs prepared by the Special Services Division, Army Air Forces. The medal is awarded for meritorious achievement while participating in an aerial flight.

## PURPLE HEART

**LIEUTENANT COLONEL** Boyd Wagner. **MAJOR** Leland O. Gee. **CAPTAINS:** Oliver C. Dona, Ross N. Huguet, Melville Offers, Warren S. Wilkinson. **LIEUTENANTS:** Allen Acomb, Frederick M. Armstrong, Jr., Bruce B. S. Barker, George B. Berkowitz, Oscar Black, Charles Cliburn (Also Distinguished Flying Cross and Air Medal), James J. Donegan, James A. Elder, Louis W. Ford, Oscar R. Kress, Thomas J. Lynch, Reuben W. Hager, Bartholomeo A. Passanante, Gordon H. Sterling, Jr.\*, Kenneth

(Continued on Page 39)

AIR FORCE, February, 1943



# HONOR

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

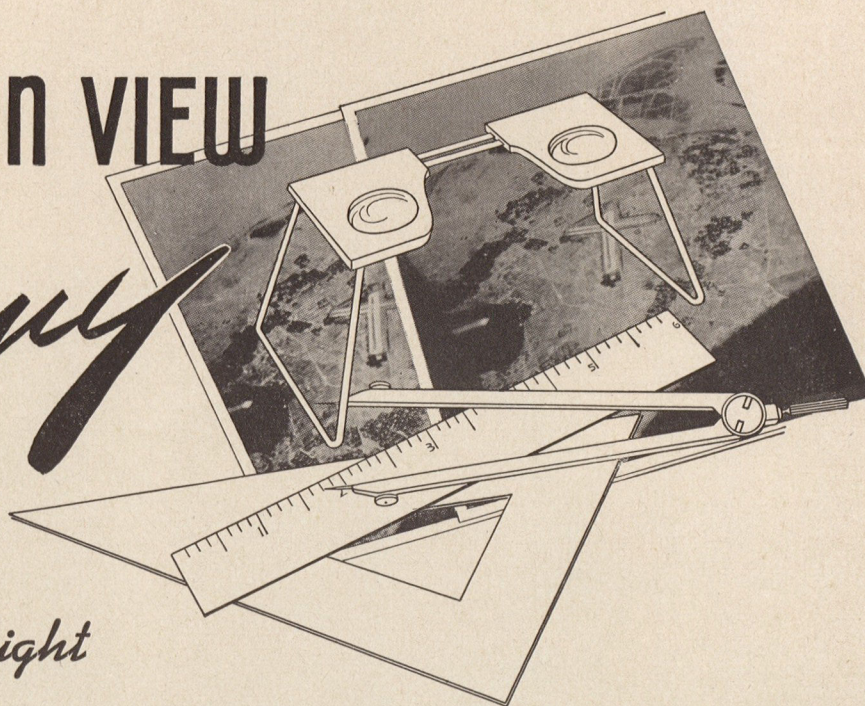


LEFT TO RIGHT, above: T/Sgt. James M. Cooper; Lieut. Frank E. Adkins; Captain R. E. Thacker; Lieut. Lewis C. Murdock; Lieut. Robert O. Pate; Major Ralph S. Garman;

Lieut. Thomas J. Lynch; Captain Charles Falletta; Lieut. Edward M. Jacquet, Jr.; Major Gordon A. Blake; Captain James W. Sibert and S/Sgt. Richard J. Barrett, Jr.



# THREE-DIMENSION VIEW OF THE *Enemy*



*By Captain L. B. Wright*

HEADQUARTERS, ARMY AIR FORCES

WHEN the Japanese took Kiska Island in the Aleutians they tried to make our forces believe that they had considerable aircraft strength by creating outlines of dummy aircraft on the ground.

This did not fool our photo interpreters for a minute. Our own aircraft had taken pictures—aerial pictures which at once revealed the ruse.

Aerial cameras have become the super-spies of modern war. Accurate knowledge of the enemy's strength, disposition and movement, and even his probable intentions, may be obtained by the aerial camera on a scale never remotely approached by the secret agents of other wars.

This has been made possible by three-dimensional photography technique and the relatively new science of photo interpretation, which constructs, from pictures brought back by a reconnaissance plane, a full and significant story.

Dependable interpretation relies upon a third-dimension view. Aerial photographs, viewed singly, provide only two dimensions. Since they give no sense of height, flat objects on the ground may be confused with buildings, innocent soil patterns take on the appearance of gun positions, and many objects—such as built-up roadways and levees, radio towers, power houses and transformer stations—may be missed altogether.

An aerial observer, flying over terrain at an altitude of a few thousand feet, can detect the relative height of objects. But the ability to do this diminishes as he gains altitude. The distance between the pupils of a man's eyes is approximately  $2\frac{3}{4}$  inches; at great altitudes ground objects are viewed, in effect, from the same position by both eyes. Thus, the stereoscopic effect which enables man to recognize differences in elevation is eliminated. If the eyes could be spread apart, the difficulty would vanish.

**Advances in aerial photography and photo interpretation make the camera a super-human military observer who is seldom, if ever, fooled**

Impossible as that procedure is, a photographic method of accomplishing the very same thing has been developed.

An aerial camera is mounted in a reconnaissance plane to record vertical pictures of the ground. Two photographs are taken from different stations in such a way as to include part of the same terrain in each.

This results in two perspective views of the same land which, when viewed so that the left eye sees only the left photo and the right eye only the right photo, a perception of depth or third dimension is readily apparent.

MANY mechanical and optical devices have been built for the purpose of viewing stereoscopic pairs of overlapping photos of the same terrain, but the simplest and most commonly used is the pocket stereoscope. This instrument is similar to the old parlor stereopticon that provided so much fun in the "Gay Nineties."

Obviously, the aerial camera, utilized in this way, eliminates the human failings to which an observer on a reconnaissance flight would be subject and which would lessen the accuracy of his observation.

For instance, if he were to fly over hundreds of miles of terrain, his memory could not cope with all the manifold details of the ground below. If the plane were attacked by hostile aircraft, evasive action would undoubtedly be necessary and, in the excitement, scant attention could be given to observation.

The aerial camera, on the other hand,

has an unfailing and capacious memory and yields a true visual record, in the minutest detail, of terrain over which the plane has flown.

A series of pictures obtained on reconnaissance might reveal, let us say, an armored column. The type of the column would be readily discernible, provided the scale of the photographs did not exceed  $1/10,000$ . The speed with which it was traveling could be estimated by the spacing of the vehicles, the direction of travel by the position on the highway, and the strength by the number of each type of vehicle in the column.

Countless cases might be cited where three-dimensional photography has played an important role in the war.

For example, in the case of the Japs at Kiska, it was obvious from examination of photographs through a stereoscope that the dummy installations were flat, quite unlike actual aircraft. And, by counting and measuring the number of buildings erected and determining the height by means of a mechanical device known as the "Abrams Contour Finder," the quantity of supplies and strength of occupation could be estimated quite accurately.

The possibilities of obtaining intelligence data through photographs are virtually limitless.

Oil storage capacity may be determined with reasonable accuracy by measuring the diameter and height of oil tanks. The height and size of troop barracks is a good clue to the number of troops that can be housed in each building. By the elevation differences between gun positions and the surrounding terrain, the enemy's field of fire may be ascertained.

As a matter of fact, it would not be out of the question to plan an entire campaign from a stereoscopic study of terrain as revealed in modern aerial photographs. ☆

AIR FORCE, February, 1943



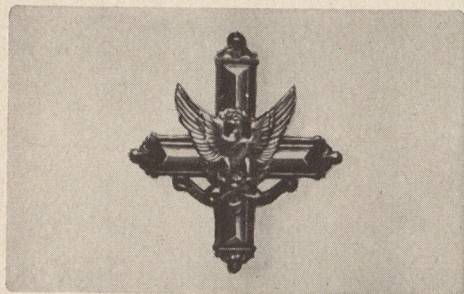


# AIR FORCE I.Q.



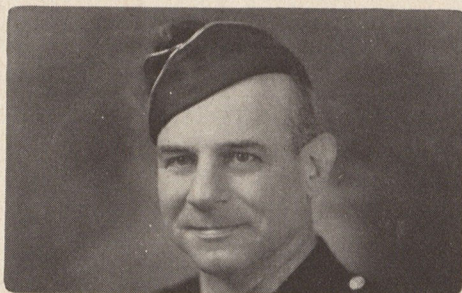
IN THE interest of variety, AIR FORCE presents this month's Quiz in picture form. The following scoring method was set up by a very harsh teacher who hasn't munched an apple in months: eight out of twelve is passing; nine correct is a good score; ten is excellent; score eleven or round out the dozen and you're eligible for second helpings of everything, including promotions. Open your eyes and give it a try.

Answers on Page 36.



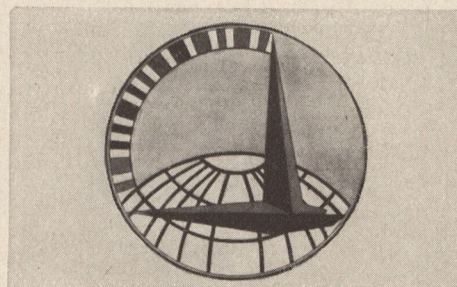
1. The award shown above is the

- a. D.S.M.
- b. F.O.B.
- c. D.F.C.
- d. D.S.C.



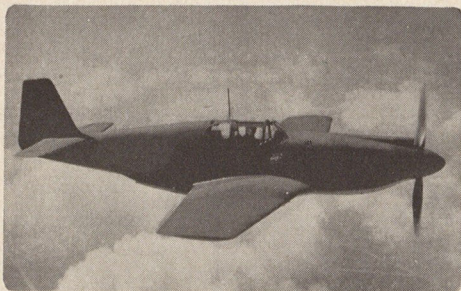
2. This Air Force General's name is

- a. Brett
- b. Doolittle
- c. Spaatz
- d. Brereton



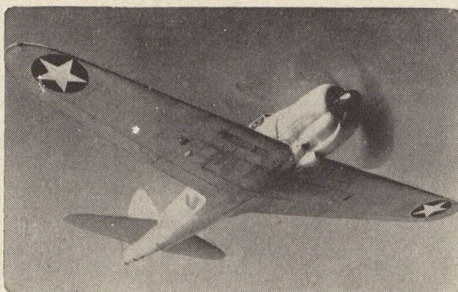
3. What Command insignia is this?

- a. Air Service
- b. Materiel
- c. First Fighter
- d. Air Transport



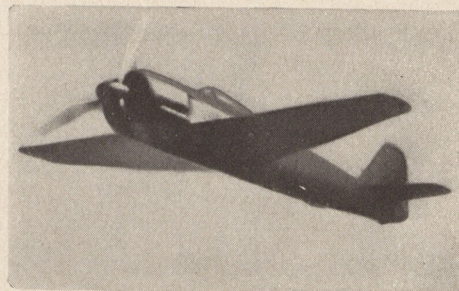
4. This fighter plane is a

- a. P-40
- b. P-51
- c. P-39
- d. P-47



5. You should identify this as a

- a. P-47
- b. AT-6
- c. Zero
- d. Wildcat



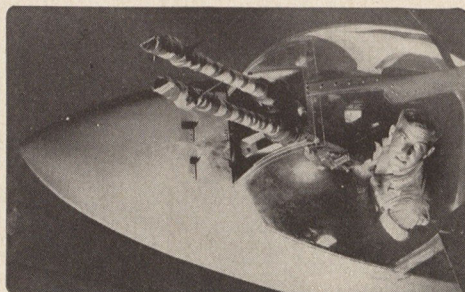
6. Above you see a

- a. Focke-Wulf 190
- b. Hurricane
- c. Airacobra
- d. Messerschmitt



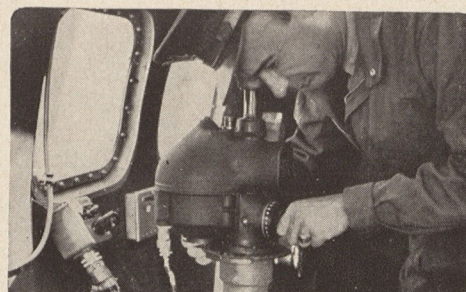
7. The sergeant here is using a

- a. Flare gun
- b. Camera
- c. Traffic signal
- d. Sextant



8. This is the tail gunner in a

- a. B-17
- b. B-25
- c. B-26
- d. A-20



9. This officer is looking into a

- a. Camera
- b. Drift meter
- c. Bombsight
- d. Bank indicator



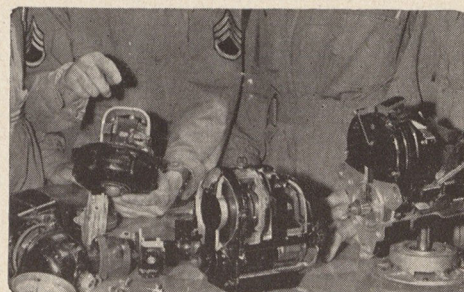
10. These men are directing a

- a. Blind landing
- b. Link trainer
- c. Control tower
- d. Radio beam



11. The ammunition shown here is


- a. 20-mm
- b. 50-calibre
- c. 37-mm
- d. 30-calibre



12. These men are working on

- a. Carburetors
- b. Magnetos
- c. Starters
- d. Pistons





# We Keep 'em Firing

*By Major J. B. Morris*

ELLINGTON FIELD, TEXAS

**New target-towing techniques provide simulated combat conditions for gunnery and anti-aircraft personnel**

**T**ow target work is an exciting and highly specialized function of the Army Air Forces.

Once, the most antiquated ship at hand would be assigned to towing. Targets were "snaked" off the ground on a long steel wire attached to the plane's tail and stretched to the far end of the field and back again before a take-off. What happened when the plane left the ground is obvious. The wire generally became taut just when the pilot needed most of his power. A lot of the gray-haired flyers you see were once tow target pilots.

Now, the "sock is dragged" by fast ships and the targets are paid out on a cable by a mechanical windlass—after the plane is in the air.

So great is the need for moving aerial targets, particularly by anti-aircraft units of the Coast Artillery, that the Air Forces now maintain full squadrons whose sole mission is to fly cylinders or "flags," or to serve themselves as a target in the night for Army ground units.

This is no dull, drab, boring work. Target pilots spend their time being fired on 24 hours a day—fired on by everything from .30 caliber machine guns to rapid-firing "Biggies" that deliver high explosive shells—and they get to feel like sideshow performers dodging baseballs.

In the anti-aircraft training program, tow target missions fall into three broad classifications: tracking, searchlight and firing.

Tracking missions are performed in small ships which fly at a pre-determined altitude and over pre-determined courses. Anti-aircraft fledglings on the ground learn to follow the ships with sound locators, and later, with guns. Searchlight flying is about the same, done at night.

On one of these searchlight missions with the Fifth Tow Squadron at Ellington Field, you approach the searchlight battery

from various angles and from a blackness that cannot be described. The pilot, crouched in the cockpit, flies by instruments or, as he terms it, "riding the gauges." You execute every maneuver the bomber can accomplish in an attempt to get out of the lights, then go out to start over again. Never flying outside a 25-mile area, you will have traveled—at the end of three hours or so—as far as from Los Angeles to Portland.

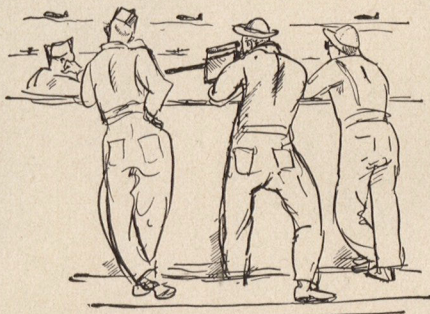
**FLYERS** are never kept at this work long enough to get stale, for, after a few nights of it, they are the best night bombing pilots you can find.

Daylight towing for firing purposes demands the utmost in skilled precision of a crew.

The same bomber is loaded with an assortment of targets called "sleeves" or "flags." They are of various sizes and styles, to be used according to the type of guns being fired, altitude, sky conditions and other factors. The crew consists of pilot and copilot, radio operator, flight engineer and two reel operators.

The firing point and radio contact have been established with the anti-aircraft batteries on the ground. Then come the instructions.

"You will launch a B-14 target, red, and fly a clockwise course at 2,000 feet and tow with 1,800 feet of cable."



The pilot slows down the ship to minimum speed and, as it nears the stall point, gives orders to launch the target. Then, quickly, he closes the throttle and noses sharply down. This maneuver is to get up tail, thus giving better clearance for the target, and to regain speed without blasting the sleeve with propeller wash.

Attached to a cable, which is wound on a windlass, the bundle catches in the slipstream and opens into a red cylinder. (The target had been folded and wrapped with light yarn like a sailor stops his spinnaker.)

When the windlass operator has played out the required footage, you are ready to start the actual towing for fire. You fly in a continuous circle, passing the firing point about 200 yards from the anti-aircraft batteries. As they open up from a scant 2,000 feet below, it is a vivid experience to realize that they are firing at you.

There are, of course, elaborate safety precautions and, to date, no plane has ever been hit.

After a period of towing at this level, you are ordered to replace the "sleeve" with a "flag"—a large wire screen device forty feet long and nine feet high. This target requires 2,400 feet of cable and you are told to climb to 10,000 feet. These will be the "Biggies."

Up at 10,000 feet your technique is entirely different. Here you make runs of ten miles or so.

Sit in the tail gunner's seat; watch the tiny smoke-puffs from the batteries far below; see them burst accurately into the "flag" being towed several seconds later; see the "flag" soon torn to shreds, and you get a much better idea of the gunnery training our Army is receiving. ☆

AIR FORCE, February, 1943





# "ALL IN A DAY"

Around the clock with a Student Mech

By Private David F. Pierce

CASEY JONES SCHOOL OF AERONAUTICS, NEWARK, N. J.





NIGHT and day great French locomotives rumble and thunder across Northern France, each drawing hundreds of tons of goods and war machines at the behest of the Germans.

They carry food, fabrics, and wines for the Herrenvolk, and French-made tanks, aero and lorry engines, and guns for the Russian and North African fronts.

They carry guns and cement for the fortifications fronting the Channel and North Sea.

For almost two years after the fall of France these trains were practically unmolested.

Then, unwittingly, slackness by the Luftwaffe wrote the doom of these trains by the hundreds.

Throughout the 1941 winter R. A. F. night fighters went on "intruder" patrol over the German aerodromes in the near-Continent. Many a German bomber, taking off or landing, was smothered by bursts of machine gun or cannon fire. Some were smashed by bombs dropped directly in their paths, though most of the intruders prefer to shoot rather than to bomb.

When spring came, the Luftwaffe sent up fewer and fewer night bombers.

More and more intruder teams—usually pilot, navigator-plus-bomb-aimer (bombardier), and rear-gunner-plus-wireless-operator—hung around the enemy aerodromes for long, boring hours, then went home without firing a shot.

So a few aggressive, rebellious souls, on completing their dull shifts, went looking for trains.

They found that if they fired a long, steady machine-gun burst at locomotive boilers the train would stop, the steam would pour from the punctured high-pressure tubes, and, sometimes, more gratifying still, the locomotives would actually explode.

When more intruders were fitted with cannon the results were sometimes obtained with a single sharp burst.

So the once-bored intruders spread the gospel.

Reports and photographs proved the damage and chaos on the overstrained rail system already suffering from lack of skilled maintenance engineers.

Train-busting became a recognized sideline. Indeed now, at times, special expeditions go out, although German aerodromes and planes are still the first objective.

The frantic Germans fitted armour plating over the boilers. But these did not stop the shells.

The Germans put anti-aircraft machine-guns in the tenders. These were easily overcome.

Mostly the train-busters fly so low that heavy A. A. guns cannot be depressed sufficiently in time to be of use. One buster followed a train so closely that he carried away a signal arm. Another, Sergt.-Pilot "Scruffy," blew up an ammunition wagon

# TRAIN BUSTING

## The New Art of Wrecking Nazi Rail Shipments

As told by an RAF pilot  
to J. D. S. Alan, Correspondent,  
LONDON SUNDAY DISPATCH

from such short range that his Boston was thrown almost upside down and came home holed like a colander.

On bright nights the intruders fly along the lines, looking at the continuous shining metals. If the lines are broken by a dark patch they look for a train. On cold nights they see the steam and smoke.

On dark nights they look for the tell-tale glow of the firebox or chimney.

The intruders are heartened by the knowledge that the French civilians are forbidden to travel at night. The railwaymen who operate the trains carrying war material to kill our troops and those of our Allies must take their chance, as must the engineers pouring out munitions for Germany in the French factories.

ONE of the pioneer train-busters, foremost in urging the practice as a sideline from aerodrome strafing, is a squadron leader.

The extensive successes and brilliant teamwork of his Boston crew played an important part in the development of train-busting, which has cost the Germans:

*Locomotives worth more than \$5,000,000;  
Destruction of serious damage by fire, explosion, or train-wrecking to hundreds of thousands of tons of war material;  
Delay of some kind to millions of tons of material.*

Here an attempt is made to re-construct an astonishing night flight made by the squadron leader and his team as seen from the pilot's cockpit:

The machine is a Boston.

In front, and below, unseen in the nose, is the bomb-aimer. Behind, unseen, the rear-gunner.

So here we go. We are in the pilot's seat of the Boston, and have completed our duty patrols over aerodromes south of Paris. The moon is not far from full. There is a keen wind, the sky is absolutely clear, visibility is marvelous.

What happens tonight is a typical patrol, with much unmentionable back-chat between members of the crew.

We are flying down the Seine, with Paris behind us.

Let's get right down. Ease back level at 50 feet. Any coal barges to sink?

Whew, look at that flak crossing the river! It's hitting the houses on the other side. Let's go a bit lower.

Now the guns on the other bank have opened! We can get underneath the cross-fire.

Just look at that gasometer (gas tank). It must be two miles away! We'll get a bit closer, then turn in.

Four hundred yards away, 300. Wheel over hard right. Now she's in sight.

Squeeze the button. Watch our fire smack into her! Hard left or we'll hit her. Look, she's burning! Let us climb a bit and look back. See, she's glowing red hot inside. Wonderful sight.

Now we turn to the Rouen railway line. Up to 600 feet. No higher, because then the heavies might make it awkward.

Lovely night. What's that? A goods train! Must be four miles away. Ah, there she is. We'll get behind her.

Column forward a little. Now the train slides into view. Steady. Keep dead in line. Not too fast. I shan't open fire till we are half-way along, about 30 trucks from the engine.

Now, squeeze the button. Watch our fire sew up the train, setting the trucks ablaze. Check at the locomotive. Hold her. Now away, in a climbing turn. She's stopped. Steam is spreading over the fields. We'll turn back and have another crack.

What's that? Another train ahead? So there is. Down on her. Steady. Sew up the trucks. Hold on the locomotive. Ah! She's stopped.

Turn again, Whittington, and back again over them both. Look, there are some trucks not burning. Give them another squirt. Up they go.

Well let's get on to the Rouen-Havre stretch. Down a bit to dodge the heavy stuff.

We must be running a bit short of ammo. Look, another train. Hold tight. Down we go. Another squeeze. She's burning. See those flashes!

Up we go, over the engine. Turn at 500 feet for another crack, head on.

Press the button. Damn!

A short burst and she runs dry. Why don't we carry more ammo? Might as well go home now, chaps. ☆

## ANSWERS

### To Quiz on Page 33

1. d. Distinguished Service Cross
2. b. Major General James H. Doolittle
3. d. Air Transport Command
4. b. P-51
5. c. Zero with American insignia
6. a. Focke-Wulf 190
7. c. Traffic signal
8. c. B-26
9. b. Drift meter
10. b. Link trainer
11. b. 50-calibre
12. b. Magnetos



## A JUMP AHEAD OF THE JERRY

(Continued from Page 7)

field guns to the rear. We were still using Hurricanes when I was transferred to the Second Eagle Squadron in May, but we switched to the Spitfire 5s early in June.

The Spits had everything the Hurricane didn't have, including heavier firepower with their two cannon and four machine guns. They were lighter on the controls and much touchier, but I'll still take the Hurricanes for maneuverability.

Soon after we got our Spits we started escorting the bombers across. The Germans reached the point where they wouldn't mix it up much with just fighters on a sweep—they waited for bigger game. We would go over escorting Blenheims, Hampdens and Bostons at one time or another, and the Jerries would come out.

AND YOU have to give those boys credit for a lot of guts, too. Here's what would happen on a typical bombing raid:

About six squadrons of us would be flying an umbrella over the bombers in layers, one squadron above the other. The enemy would be above us. All of a sudden, someone would yell over the intercom:

"Here comes one!"

Down would come a Jerry, through one layer of Spits after another, with all of us who were in position taking a squirt at him, until he could take a swipe at the bomber formation—if he got that far—and home he'd go. Others would follow his maneuver.

Occasionally, one would come up into us from below, roll over on his back to look us over, open up with a burst and roll into a dive.

If it's worked right you can give those bombers plenty of protection. In the dozens of bomber-escort sweeps I took part in during 1941 we lost only four bombers. Other squadrons had similar records.

In August of 1941 I was shifted to the First Eagle Squadron which was engaged in close escort work. The First Eagles were still using Spitfire 5s.

The R.A.F. fighter and bomber commands were exceptionally well coordinated. Our right hands and arms used to get tired as hell on those close escort sweeps. Sometimes we'd take the stick with our left hands and, frequently, both hands to give the right one a rest. Now and then, one of us would drop down and come in under a bomber formation, ease up close and rest for a half a minute or so. Those bomber fellows knew us like brothers.

I got my first Jerry on September 21, 1941. Like a lot of others I might have shot down one or two before, but this was the first one I could really count. You see, the R.A.F. won't let you chalk up a score unless you see the enemy plane crash, the pilot bail out or the plane break to pieces in the air. If you see one going down with an unusual amount of smoke trailing him, they'll let you count him as a probable.

Under this scoring system all of us prob-

ably got more than we actually counted. Most of the time we were flying so high we couldn't see them crash. Or else we were too damned busy to wait around and see what happened.

But, at any rate, I got my first one for sure that day we escorted six Hampdens to Lille. Incidentally, the Lille missions were the longest on which fighters served as escort.

It was a running fight all the way in and out. Mine happened to be one of the two escort planes to make the widest turn over the target, and just as we had completed the turn an ME-109E dived down on us. The C.O.—he was in the other fighter—figured the ME was too far out of range and kept on course, but I decided to go down after it.

I got a good squirt at the Jerry at about 5,000 feet and then finished him off at 3,000. He smacked the "deck" and broke into pieces but I managed to level off just over the tree tops.

All the Hampdens were hit by flak but none by German fighters. When I regained altitude to join the boys I weaved into a position on the tail of another squadron. That was the customary thing to do, for by the time we got straightened out under such circumstances, our own outfit would be pretty well up ahead.

ON THIS occasion I was just settling down when I saw what I thought was a fellow Spit weaving in to join the tail of another outfit across the way.

I remember saying to myself, "There's a guy who feels as good as I do." Just about that time, this other guy rolled over and shot the Spit about 50 or 75 yards in front of him all to hell. Pieces flew all over the place. The Jerry rolled into a dive and headed for home. You've got to be on the watch for that sort of thing.

During the month of October, the First Eagle Squadron had the top score for the R.A.F. I was pretty lucky. I managed to get five that month.

One of our best shows came early, on October 2. We jumped 24 Messerschmitts when we crossed on a mission that day. Four of us got there ahead of the rest of the squadron. The C.O. and I opened up on the first one and knocked him down. A little later I got two more. In all, we chalked up five out of the 24 without a loss.

On October 16 I got another one during a low-level "rhubarb" across the Channel. "Rhubarb" is the name the British use to describe a sort of private show the boys go on occasionally. We went on these little parties in pairs most of the time. That same day I blew up a train. When the locomotive exploded I was about 50 feet over it, and the blast boosted me up about 300 feet. Boxcars and "goods wagons" were ripped up all over the place.

It was on a similar junket eleven days

later that I knocked down a couple of MEs. While flying alone I suddenly spotted six German fighters in formation. I came in from underneath and behind, and knocked off two before they knew I was there. Then I ducked out of the way before the others could do me any damage.

Fortune smiled on me that day. I managed to blow up my second train and mess up a gun post before heading for home. (Major McColpin was awarded the British Distinguished Flying Cross on November 8—Ed.)

I joined the Third Eagle Squadron, which had just been activated, late in January of 1942.

Early in February a sergeant pilot and I were convoying over the Channel when a bunch of Dornier 217s moved in with heavy cloud cover. I damaged a couple of them when they came out of the clouds for an attack. The sergeant who was new at the game, was running all over the sky like a chicken with its head off. Most of us react that way the first few times we get in hot combat.

One kite broke through and I shot out the tail gunner. I got the front gunner on another one just as my ammunition ran out. Later I made two attacks with empty guns, but the Jerries didn't know the difference and got the hell out of there.

We started making sweeps again in April, and on April 26 I got my first Focke-Wulf 190 in a scrap just off Boulogne. We didn't mind the Focke-Wulfs so much. They are more maneuverable than the Messerschmitts but the Spits have got it all over them.

I knocked out this one by pulling a little trick I had been studying for a long time. We had been waiting for the Jerries to dive in on us; then, just at the right moment, we would bank off to let them go by and continue the turn to get a crack at one as he passed. We didn't get touched following this procedure but we didn't get many cracks at the enemy either.

ON THIS occasion three Focke-Wulfs were diving on us, one after the other. We made the usual banking turn, to the left this time, but instead of continuing the turn I rolled over to the right and came back down, figuring I'd just about get the No. 3 Jerry in my sights. For a split second I thought I had miscalculated and he had gone by. But suddenly he zoomed in front of me and I let him have it.

The Third was the only Eagle Squadron that had any real night fighting. In all, I put in about 50 or 60 hours at night. Our best night fight came on April 29, after forty German bombers began blitzing York at two o'clock in the morning.

We were sleeping in quarters about three miles from our planes which were based about 60 miles from York. Within ten minutes after receiving a telephone call to turn out, we had dressed, reached our planes and taken off.

First to get in the air, I went through the entire take off more or less automatically.



I hadn't waked up sufficiently to know what was going on so I circled the field a couple of times with my lights on and the others followed. I remember shaking my head and asking myself aloud: "How the hell did I get up here?"

About that time we spotted the flames shooting high in the air from burning York. As we neared the town, I made the mistake of figuring a way I thought I could get in some extra licks.

After making an orbit around the town I dived into the middle, thinking I could knock off a few enemy bombers by spotting the source of their tracers as they came in to strafe the streets and houses. I didn't do too well. The other fellows stayed up a bit and got in some better licks. Some show. You could see the shells explode on the enemy kites and, now and then, one of their motors would catch fire.

Final score: three bombers destroyed (they found the wrecks after daylight), one probable (this one limped off toward the North Sea with one engine afire), and two damaged. One of us had to bail out.

We ran into a flock of ME-109Fs during a sweep on May 17, two weeks before I was scheduled to leave for the States on a couple of months' leave.

Before we took off on the sweep, some of the boys had been kidding me.

"You're surely going to kick yourself in the pants sitting in some concentration camp."

As it turned out, they were damned close to being right.

During the scrap I knocked down one for sure and shot the tail off another one but nobody saw him hit as we were flying at about 22,000. He was scored as a probable.

I was in no position to hang around for the result because a couple of Messerschmitts were on my tail and giving me hell. I went into a dive at 20,000 and picked up to about 620 miles an hour all the way down, full throttle.

When I finally leveled off I was about 20 feet over the water, and that's the way I came home. The Jerries chased me nearly all the way in.

I kept saying over and over to myself, "If you bastards think you're going to stop me from going back home, you're crazy."

I headed for the nearest airdrome on the coast and when I set my Spit down I had two gallons of fuel left. Another heavy turn in that dogfight and my leave would have been cancelled—maybe for good.

When I checked out for the States later in the month, I happened to be leading the Eagles with eight enemy planes down for sure. But more than that, I was two up on Gussie Daymond (Major G. A. Daymond, now with the Army Air Forces—Ed.) Daymond and I were engaged in what you might call a little private competition.

It started back when I went with the First Eagle Squadron—his outfit. When I checked in he already had four. I had none. From August to January, however, I knocked off six while he was getting one. That put me in the lead six to five.

Shortly after I joined the Third Eagles,

he got another one to tie the score. Daymond then went on leave and, while he was away, I got a couple which put me in the lead again. But during my ensuing two months' absence he knocked down two more to lock the score at eight apiece. And that's the way it stands.

Shortly after returning to England in July of last year, I was given command of the Third Eagles and we started escorting American B-17s across the Channel. During the next few weeks we completed missions to such important target centers as Abbeville, Rotterdam, Rouen, Maux and Caen. The Germans had let up considerably in this area, which was probably a good thing for them for, in addition to the exceptional firepower of the Fortresses, my squadron was pouring it on for the first time with Spitfire 9s.

On September 15 we were transferred from the R.A.F. to the Army Air Forces. We continued to use Spit 9s and from then until the last of November, when some of us were ordered back to the States for interviews, most of our missions were with B-17s.

During my operational time, I learned quite a few lessons. But perhaps the one thing that stands out most in my mind is this:

The Jerry is good. Don't sell him short. But, when the sides are anywhere near even, you should never get shot down—or even hit—as long as you can see, and recognize his plane. The boys who get it are those who are caught unawares or are not up on their aircraft recognition. ☆

## Lines to the 180° Turn



"Oh, I don't care," said Pilot Dumstare,  
"How the barometer's lookin'.  
I'm hotter than hell and I can tell  
When any weather is cookin'.

"These forecast blokes are a bunch of jokes  
With their isobars and highs.  
They'll hold you bound to the solid ground  
If they see a cloud in the skies.

"Form 23 is not for me—  
I've got natural savvy for weather.  
Just give me a ship and let me skip—  
I'll bring her in like a feather.

"Just let it pour and let it roar,  
Let it buck like the waves of the sea.  
Why listen, brother, that's just another  
Breeze for a pilot like me.

"I'll take a chance on the seat of my pants—  
To hell with a right-about run.  
I'll never learn a half circle turn.  
It's dangerous? . . . Sure, but it's fun."

So up and away on a doubtful day  
Went weather-wise Pilot Dumstare.  
He headed for fun as he gave her the gun  
And zoomed off into the air.

He didn't see on his Form 23  
That a cold front was headed his way—  
Nor did he care—not Pilot Dumstare.  
(You recall what he had to say.)

So into the soup he dove with a whoop,  
"This is my meat, watch me"—  
And watch they did, for that dimwit kid  
Who hadn't read Form 23.

They watched that night with growing  
fright—

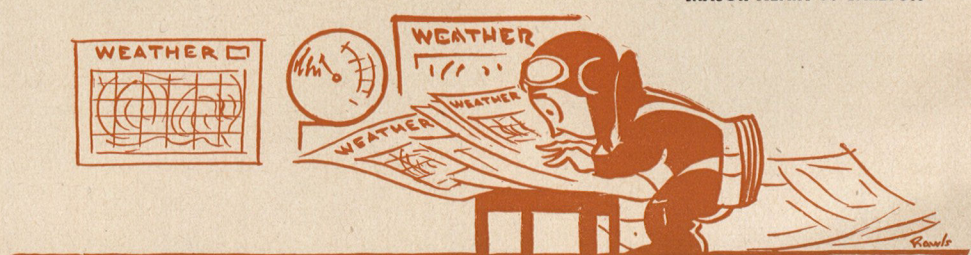
He was eighteen hours overdue.  
The wreck of his plane they found in the  
rain,  
But Dumstare was nowhere in view.

It rained, it poured, the cold wind roared,  
Three days of fury unbent!  
Dumstare crawled in, wetter than sin,  
Cold and ragged and spent.

Now Pilot Dumstare has an added care—  
When he clears for a hop—even short!  
You can watch him pore for an hour or more  
Over every Weather Report.

If he can spy a cloud in the sky,  
Or the trace of a coming breeze,  
Then you'll discern that beautiful turn  
Of a hundred and eighty degrees.

MAJOR HENRY F. CARLTON





# ROLL OF HONOR

(Continued from Page 30)

M. Taylor, Francis R. Thompson, Richard K. Werner. **MASTER SERGEANT** David Semple (Also Oak Leaf Cluster to Purple Heart). **STAFF SERGEANTS:** James G. Brown, Lawton Buchanan, O. C. Cook, Leroy H. Penworden, Alvin Simonds, Claude F. Wiseman. **TECHNICAL SERGEANTS:** Frank Benedict, Verne T. Debes, Luther B. Word. **SERGEANTS:** Edwin L. Albrecht, Russell Fritz, Howard T. Harper, Francis E. Hurn, Wade L. Nelms, Olus E. Price, Warren V. Sherwood, Lloyd D. Whipp, Joseph O. Wingard. **CORPORALS:** Eugene R. Bennick, Francis M. Fowler, John T. McClarnon, Claude W. Winkler. **PRIVATE FIRST CLASS:** Loid W. Andersen, Charles O. Backstrom, Charles W. Bartlett, Levi W. Blakney, Herman Boyd, Harry S. Brissenden, Charles S. Brooks, Jr., Douglas L. Brown, N. D. Bunardzya\*, Bert E. Byrd, Jr., Carmel R. Calderon, Franklin B. Cardwell, Dennis Cawley, Eugene L. Chambers, Leo R. Coale, Paul E. Comstock, T. V. Corbett, Robert P. Damsky, G. T. Davis, George Deraney, Grady E. Exum, Charles H. Freeman, Kenneth W. Gremore, Rogers W. Hall, Walter A. Hammond, Lester W. Holley, George L. Jones, Phillip J. Kane, Chester A. Lamb, John N. Leggitt, Deith E. Libby, Edward Lisiewski, William H. Manley\*, James E. Martin, Louis W. Menge, C. C. Morrison, C. E. Narehood, Harry Newman, M. L. O'Brien, Marvin Olsen, Joseph J. Panek, Donald D. Plant\*, Charles P. Porterfield, John L. Preston, I. H. Pulley, Jr., Eugene R. Ray, George L. Richardson, Joseph H. Riotte, G. R. Rosenberry, R. L. Schott\*, H. L. Sembroski, R. R. Shattuck\*, Maurice E. Stevens. **PRIVATEs:** Kenneth E. Adams, Edward L. Allen, Robert G. Allen\*, James S. Altamare,

## DISTINGUISHED FLYING CROSS

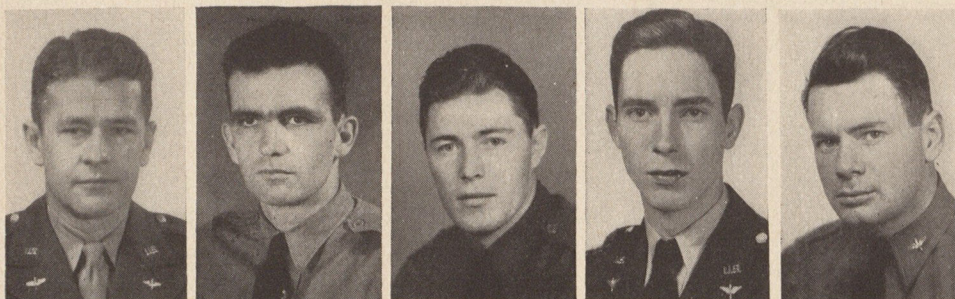
**COLONELS:** John R. Hawkins, Paul L. Williams. **LIEUTENANT COLONELS:** Alvin Edward Herbert, Charles H. Kruse, Elliott Roosevelt. **MAJOR** John E. Dougherty. **CAPTAINS:** John L. Brownell, William J. Cummings, P. W. McIntyre, John P. Randolph, Robert M. Ritchie, Charles R. Sneed, Henry G. Thorne, Robert C. Williams. **SECOND LIEUTENANTS:** Louis B. Briglia, Emmette W. Ford, Perry L. Franks, Raymond M. Gehrig, Warren George, Jr. **PRIVATE FIRST CLASS** John A. Aresl.

## SOLDIER'S MEDAL

**MAJOR** John R. McBride. **STAFF SERGEANTS:** Murnice E. James, Milton F. Kelm. **TECHNICAL SERGEANTS:** Robert M. Aardema, Albertis P. Hildred. **SERGEANTS:** Albert C. Corbello, Eugene W. Cull, A. H. Paddison. **CORPORAL** Clarence E. Bauer. **PRIVATE FIRST CLASS:** Stanley J. Bogdan, Alfred O. Bonin, Walter D. Boulter, James E. Carrow, Edward H. Cavanagh, Solomon Crystal, Myron R. Grant, Abney C. Hines, James A. Huff, Romuald Kaster, Everett D. Keim, G. E. O'Connell. **PRIVATEs:** Thomas P. Deutsch, Dominic J. Dibiasi, Hoyte W. Galloway, Michael G. Heick, W. I. Martin, Jr., W. R. Nixon, Jr., E. R. Savage, Edward A. Singer, Tony Tintori, Harry L. White.

## AIR MEDAL

**COLONEL** John N. Stone. **MAJOR** Ralph S. Garman. **CAPTAINS:** Alexis Klotz, C. R. Rimke, John C. Wagner. **LIEUTENANTS:** Earl L. Carron, Frank H. Donnelly, Leo Hawel, Robert M. Lupton, Jr., Lewis C. Murdock, Frank G. Smolinsky (Also Oak Leaf Cluster), G. W. Sutcliffe, H. W.



Col. John M. Stone

Lieut. Bruce B. Barker

Lieut. Leland A. Walker, Jr.

Captain Jack Adams

Captain Melville Offers

Herbert Aubrey, Clinton D. Baer, Robert E. Baird, Walter A. Barasha, Leonard M. Barnes, Jr., James Bibb, Robert W. Bloxham, Seymour Blutt, Joel J. Boersema, Jack L. Bois, Paul T. Bowsher, Jr., Alfred W. Broughton, Robert L. Brown, Francis R. Bush, Roy W. Byers, Robert T. Byrd, Francis E. Campiglia, L. D. Carey, Dean W. Cebert\*, Joseph A. Christopher, Charles S. Clague, Walter L. Collins, Fred R. Conner, John Couhig, Charles W. Craig, Lincoln M. Crum, Charles R. Dagon, Frank R. Dallas, Allen D. Davis, Robert E. Dietterick, Oscar H. Douglas, William T. Duvall, Cecil W. Dye, Jerome A. Even, Benjamin P. Faunce, R. G. Fitzsimons, Robert E. Fleming, George J. Gabik, Bill P. Gautier, George W. Goff, Allen E. W. Goudy\*, Robert D. Hamrick, Roy Hendricksen, Charles W. Hill, Jr., John P. Holloway, William H. Hudson, Earl F. Hughes, Robert L. Hull\*, James L. Johnson, Thomas R. Johnson, James F. Jones, Louis Jorda, Jr., Bert J. Jordan, Don R. Joyce, Walter L. Kaminski, V. J. Kechner, Wallace A. Kempen, Phelps W. Kight, Thomas P. Kimble, James S. Kossak, Walter Lapie, Harold Lenburg, Ivan C. Lewis, John S. Lopinsky, Warren Lyon, R. W. McClellan, Cecil H. McDonald, B. P. McLeod, J. H. McRoberts, William W. Mauhar, Paul Mitchell, Kenneth L. Mouglin, Vernon A. Nelson, Edward M. Ovecka, Ralph G. Paschall, Louis Penven, Donald H. Peterson, Raymond Raines, William L. Reininger, B. A. Reynolds, Edwin Roberts, H. J. Roseman, M. D. Sackett, L. J. Scalzo, E. L. Schmitz, Frank A. Staab, Arthur W. Werner, Elmon S. Yargus.

Willis. **MASTER SERGEANT** Joseph H. Switlik. **STAFF SERGEANTS:** Richard J. Barrett, Jr., John E. Owen. **TECHNICAL SERGEANT** James M. Cooper. **SERGEANTS:** Orville S. Splitt, Rudolph Turansky (Also Oak Leaf Cluster), George E. Williams (Also Purple Heart), John C. Ford, Ben Lomond, Russell E. Ojala, Victory P. Minckoff. **CORPORAL** Charles H. Reynolds.

## OAK LEAF CLUSTERS

**CAPTAINS:** Harold N. Chaffin, Richard T. Kight, George E. Schaezel. **LIEUTENANTS:** Donald C. Miller, William M. Railing\*, Merle C. Woods. **MASTER SERGEANT** Durward W. Fesmire. **STAFF SERGEANTS:** Max Baca, William E. Bostwick, Derwin D. Terry. **TECHNICAL SERGEANTS:** Francis G. Denery, John M. Geckler (Two Oak Leaf Clusters to Silver Star). **SERGEANTS:** Ignatius E. Barran, Edward J. Czekanski, Orville W. Kiger (Two Oak Leaf Clusters to Silver Star), Victor Lorber (Two Oak Leaf Clusters to Silver Star), Arthur W. Norgaard, William Sage, C. W. Thrasher, Richard A. Williams. **CORPORAL** Robert A. French\*. **PRIVATE FIRST CLASS** John Makela. (\* Posthumous.)

## PICTURE CREDITS

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# ORGANIZATION OF THE ARMY AIR FORCES

(Continued from Page 13)

the necessary administrative tools. This is the function of Management Control, which includes within it the divisions of the Air Adjutant General, Statistical Control, Organizational Planning and Legislative Planning.

4. All military organizations require special staff sections. The duties of the Budget and Fiscal Officer, the Air Judge Advocate and the Air Inspector are not unlike those of similar officers in all traditional military organizations. The Special Staff Section also includes the office of the Air Surgeon, under whose supervision comes the effects of high altitude flying and other aspects of the physiology of flight.

5. An air force in operation divides itself readily into four basic parts—Air Defense, including fighters, anti-aircraft artillery, and an aircraft warning service; long range Bombardment, including heavy and medium bombers; Air Support of ground forces, including dive bombers and light bombers as well as fighters used for strafing ground troops, and Base Services, composed of facilities and supplies which are necessary to get combat aircraft into action. To insure that these four essential military requirements are properly met, a director of each type was created with the duty of supervising and directing, in the name of the Commanding General, the development of their particular specialty in the Army Air Forces.

THESE so-called "Type Directors" are on the Operational Staff level. They supervise and direct the execution of the policies determined by the Air Staff. Their activities are coordinated by the Director of Military Requirements. Since the training of individuals is a large part of the job and the movement of units and their organization into task forces is also an essential preliminary to combat, Directorates of Individual Training and of War Organization and Movement also were added under the Director of Military Requirements.

6. There are certain specialties in which an air force has a vital interest, so vital an interest that it is desirable to have a staff section charged with supervision of the development to high proficiency of the technical service involved. To meet this need Directorates of Photography, Communications and Weather have been created. Their activities are coordinated by the Director of Technical Services who is on the Operational Staff level.

7. It was apparent in building an air force of over two million men that innumerable personnel questions of an operating nature would arise, and it was desired to free the A-1 Section of the Staff from the interminable detail of current personnel matters in order that it might devote itself to personnel planning in the broad sense. So, a Director of Personnel was created to be responsible

for the detailed procurement, classification, assignment, promotion and discharge of both military and civilian personnel.

8. Training flying personnel as rapidly as possible for combat raises serious problems in connection with the prevention of accidents. Safe flying calls for coordinated direction of air traffic. Accordingly, a Directorate of Air Traffic and Safety has been created on the Operational Staff level. Reporting to it are the Directors of Flight Control, Flying Safety and Safety Education. The purpose of the Directorate is to supervise the Army Air Forces flight control system, establish programs to prevent aircraft accidents and provide for safety education of Army Air Forces personnel.

The various sections and divisions described above constitute Headquarters, Army Air Forces. They are in a certain sense an integral part of the brain of the Commanding General. When they speak, they speak in his name and by his authority. They make it possible for him to be advised on all of the vital functions which must be performed if the mission of the Army Air Forces is to be accomplished.

So far, this article has dealt largely with policies and operational planning. The plans, programs and policies approved by the Commanding General upon recommendation of his Staff are carried into effect by the various Army Air Forces Commanders and the Air Forces. Performance of the mission of the Army Air Forces can be likened to a series of funnels, all leading to a main pipe.

Into one funnel—the Technical Training Command—go individuals who are to furnish the technical and administrative personnel for the Army Air Forces, such as radio operators, mechanics, personnel officers, supply officers, weather, photographic and communications personnel and the like.

Into another funnel—the Flying Training Command—go the flying personnel, including pilots, observers, bombardiers, navigators and aerial gunners.

Into a third funnel—the Materiel Command—go plans and specifications for the aircraft and technical equipment which the Air Forces will use. Contracts are drawn, production schedules prepared, inspections performed and modifications made.

The completed aircraft and equipment flows into a pipe marked Proving Ground Command. Here it is tested in flight.

The resulting product then splits into two pipes. Aircraft are flown to their destination by the Air Transport Command. Equipment is stored in depots by the Air Service Command and delivered on requisition to the using units. Both equipment and aircraft when in need of repairs or maintenance flow back upstream to the Air Service Command.

The pipe whose funnel is the Materiel Command meets the pipe whose funnels

are the Technical Training and Flying Training Commands at the schools with respect to training aircraft and equipment and at the Air Forces with respect to combat aircraft and equipment.

The Air Forces in the continental United States have dual functions. On the eastern, southern and western coasts they are part of the defense commands charged with defending the country against attack, but they also provide the operational training which is a necessary prelude to combat. Units are formed from graduates of the schools and work together until they are ready for overseas duties. As occasion requires, units are detached from these Air Forces and sent to the air task forces which are fighting the war. This is one step in the formation of Air Forces overseas.

To train the personnel required for such aspects of modern war as the transportation of airborne infantry, parachute troops and glider-borne troops, the Troop Carrier Command was organized. It does the operational training for this type of unit.

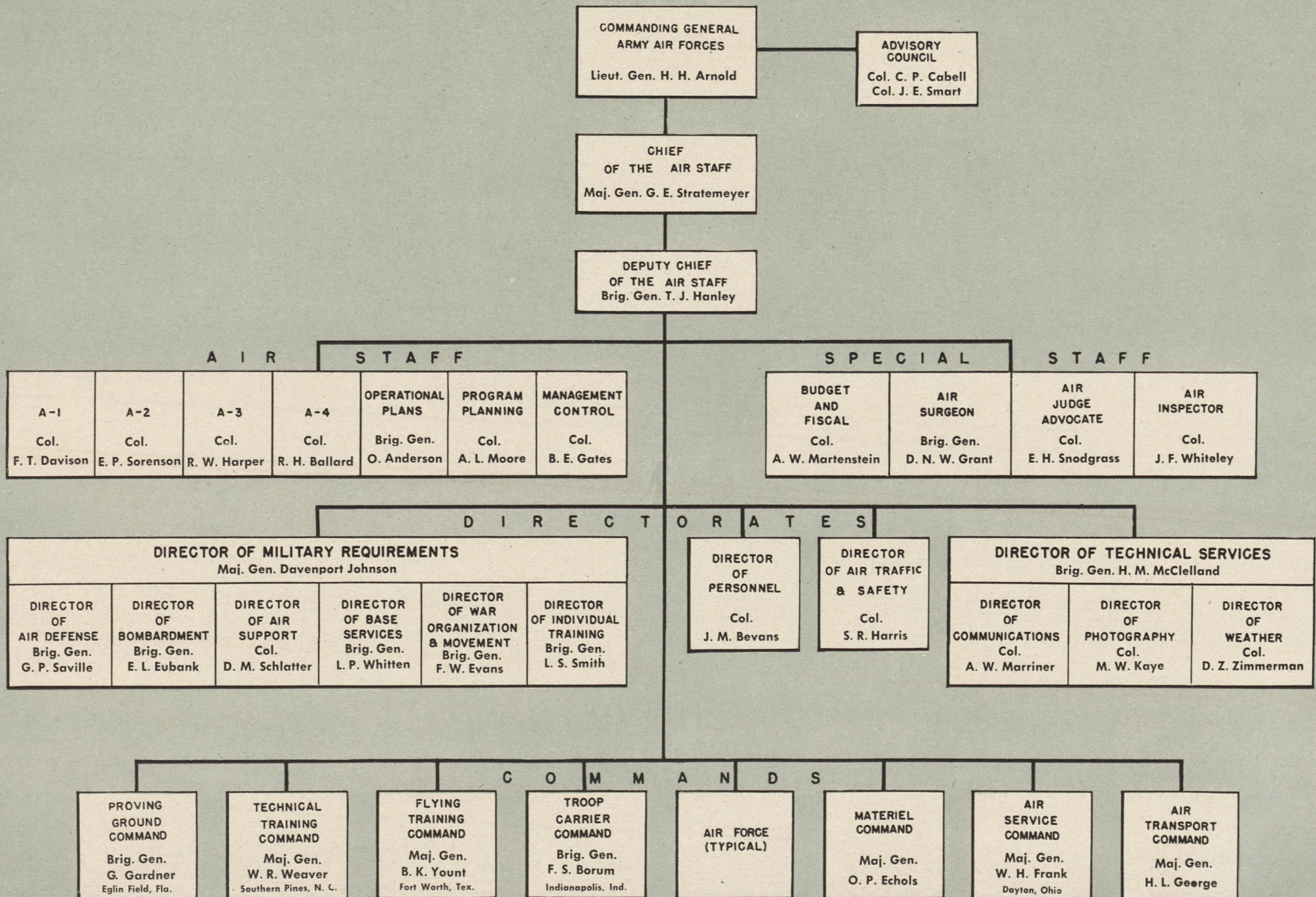
To run the airlines which circle the globe, carrying personnel and equipment to theaters of operation, the Ferrying Command was organized in 1941. Shortly after the reorganization of March 2, its name was changed to Air Transport Command. It also delivers aircraft from factory to field, whether that field be located in Chattanooga or Chungking. It is engaged in operating the most extensive transportation system in the history of the world.

The picture would not be complete without mention of the units of other arms and services on duty with the Army Air Forces. An air task force could not function successfully without units and individual personnel drawn from the Corps of Engineers, the Ordnance Department, the Quartermaster Corps, the Signal Corps, the Chemical Warfare Service and the Military Police. Chaplains perform an essential function with all Army units. More recently the WAACs have arrived to add their important bit to the total picture. Service personnel of this character is procured for the Army Air Forces by the Services of Supply and is welded into the Army Air Forces organization during the operational training period. Relations between these other arms and services and the Army Air Forces are coordinated at Headquarters by the Directors of Base Services, Communications and Personnel.

These, then, are the agencies through which the Commanding General, Army Air Forces, performs his mission of procuring and maintaining equipment and providing Air Forces units trained for combat. It is obviously impossible in so brief an article to do more than paint the broad picture of organization. In a very real sense this organization has grown from the necessity of modern war. Since those necessities are constantly changing, it is not unreasonable to suppose the organization will also undergo revision from time to time. ☆



# ORGANIZATION OF THE ARMY AIR FORCES





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