AIR FORCE

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

"Sweating Out" Their Ship

JANUARY 1943

Vol. 26 No. 1

JANUARY 1943

Contents

DEPARTMENTS

AIR FORCE
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January Brief

THIS MONTH AIR FORCE introduces a new department, ON THE LINE (Pages 20 and 21), which will appear each month in the interest of better maintenance of Air Forces equipment. The maintenance mistakes featured in this new department may appear more humorous than helpful at first glance. But, as one of the crew chiefs who helped set up the picture put it: "Say—I'm kidding, but in earnest. These mistakes happen every day." You'll see what he means.

THE FRONT COVER PICTURE and the picture on the inside back cover are the work of Private Roger Coster, AIR FORCE staff photographer.

Rated among the top photographers of Europe before the war, Private Coster served 18 months with the French Infantry and saw 45 days' action against the Germans on the western front.

Released from the French army on a medical discharge, Private Coster returned to his home in Paris, only to leave again, just 24 hours before the German army entered the city.

Private Coster landed in New York City in April, 1941, after photographing his way through Portugal, later Brazil. He entered the United States Army on September 22, 1942.

MAJOR GENERAL RALPH ROYCE whose article on air operations in the Southwest Pacific appears on Page 15, commanded the Northeast Air Area in Australia before taking up his present duty as Commanding General of the Southeast Army Air Forces Training Center, with headquarters at Maxwell Field, Alabama.

Last April, from Australia, General Royce led a flight of three B-17s and ten B-25s on a 4,000-mile bombing raid on shipping, airfields and other Jap-held points in the Philippines.

WITH AIRCRAFT approaching the speed of sound, the technical but highly fascinating subject of compressibility becomes more and more important, particularly to the boys who fly the high speed equipment. This month's AIR FORCE introduces compressibility and its basic principles in an article by Colonel Ben S. Kelsey, now working on special projects for the Chief of the Production Division, Wright Field, Ohio. Two succeeding articles will take up the effect of compressibility on aircraft operations and its relationship to aviation engineering and design.

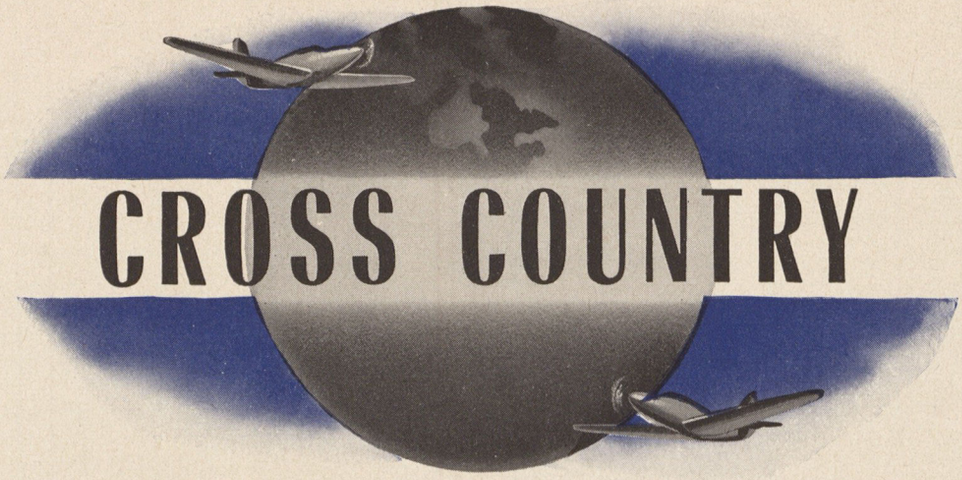
CAPTAIN HAROLD R. HANSEN who takes you along on an Army acceptance flight of a B-17 in his article on Page 29 had his first real urge to take to the air in 1926. Private flights cost about $20 each in those days so he kept his money in his pocket and enlisted in the National Guard Air Corps. He not only got his plane ride but has been flying ever since, is now Army Production Engineering Officer (and chief Army test pilot) at the Boeing Aircraft Company's plant at Seattle.

WHEN CALLED to active duty from the Air Corps Reserve last March, Captain Jon A. Laird was flying DC-3s over the New York-Miami run for Eastern Air Lines. In the Air Forces he continued to fly DC-3s but they were converted for cargo service and he was flying them "over the hump" across the Burma Road in ferrying supplies from India to China. His experience while on that assignment form the basis for the article on Page 31.

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

FORMERLY THE AIR FORCES NEWS LETTER

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



CROSS COUNTRY

IN the Army you "sweat out" everything from chow lines to promotions.

That is, you worry it through until you get some kind of answer, whether it be food or another stripe.

When maintenance men of the Air Forces sweat out their ship, what occurs is something you can't write into Tech Orders no matter how hard you try.

Sweating out is more than just searching the sky for your plane. It is having the personal interest in a machine and the concern for its crew that goes beyond duty and beyond orders.

All over the globe our ground men are sweating internally, you might say, for the successful mission and safe return of the planes they work on.

The three mechs on the cover are actually (left to right) Sergeant Hugh D. Smith, Staff Sergeant James E. Williams and Technical Sergeant James H. Gardner, all attached to a medium bombardment squadron at Mitchel Field, N. Y.

But we might have picked at random any three maintenance men out of many thousands in the Air Forces and put them in that picture. For ground crews are the same the world over. And they are sweating out a lot of planes into fighting shape in a lot of theaters, and here at home as well, despite weather and the enemy and spread-out supply lines.

At the moment, for instance, headlines feature the North African scrap. But headlines seldom, if ever, tell about the fight going on in the desert theater to keep aluminum and steel and wood and rubber in flyable shape at all times.

The headlines don't tell about the talcfine sand that sometimes gets as high as 9,000 feet in the air, about how every time an engine turns over it draws through its intake an abrasive that eats into pistons, bearings, gears and every mechanical part as effectively as emery dust. Or how sandstorms present additional problems; in fact, each time a squadron takes off from a desert field it does so in a sandstorm—one created by the prop wash.

And sand is only one headache for the maintenance men in North Africa. Extreme changes in temperature make it tougher. (Weather conditions in the North African theater are described in detail on Page 11.) Many plane parts, good for 500 hours under normal conditions, are often good for only 50 hours because of the North African climate.

Our best engineers have studied the North African situation to the last lock-nut and as a result many ingenious devices have been adopted to solve the maintenance problems over there. But the real answer lies with ground crews themselves, with the guys who have their own private battle to fight and their own sweating out to do so the main show can go on.

AND speaking of maintenance in North Africa, our damaged planes are being carried off the field of combat in the desert area almost as carefully as are our soldiers. The reason is a huge salvage trailer now being employed to transport damaged planes in the desert.

The trailer bears the name "Queen Mary." With it a damaged plane can be transported from the point where it has been forced down to the nearest place where repairs can be made. The damaged plane can thus be dis-assembled, its component parts carefully wrapped to avoid further damage enroute, and the plane can be carried bodily off the field in such a way that it will be ready for combat again in the least possible time.

Crews of the mobile repair units which include the Queen Mary's are picked men. They have to be. They must be able to work rapidly and efficiently under cover of darkness, must be able to defend themselves as best they can if attacked by enemy planes or ground troops. Most of all, they must have a high degree of ingenuity to tackle the problems that come along. For seldom are two salvage operations the same.

It's possible that before the present scrap is over in North Africa this huge salvage trailer will steal away the title "Ship of the Desert" from the camel, which has had that moniker for centuries.

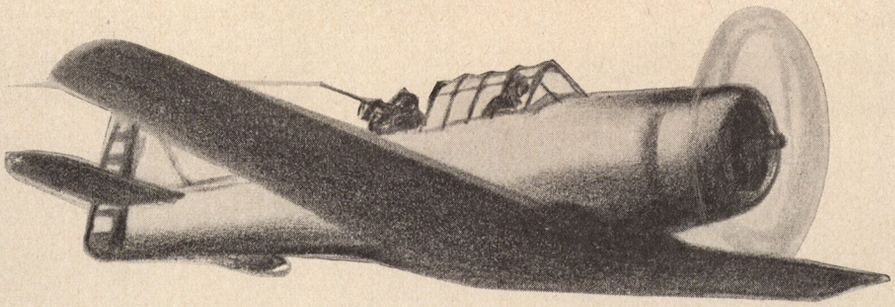
NEW courses, leading to a commissioned status, in meterology are now open to enlisted men under a program inaugurated by the Weather Service of the Air Forces for the training of high school graduates and college freshmen and sophomores to become Weather Officers.

Satisfactory high school or college work in mathematics and science, especially physics, is a prerequisite. High school students will be given a one-year pre-meterological course and college freshman and sophomores a six-months course.

The new courses are in addition to the Aviation Cadet course in meterology. Inquiry about any of these courses should be addressed to the University Meterological Committee, University of Chicago, Chicago, Illinois.

FOR the Fifty-Fourth Fighter Group:

"Happy landings. On your leaving, this Air Force joins with me in admiration for



your performance in combat after long over-water flights; for maintaining your airplanes in fighting condition with few mechanics, without a forced landing chargeable to poor maintenance; for the long and weary days of constant air alert over our farthest advanced bases; for the way you have proved that you can take punishment and inflict it on the Jap. When next you meet the enemy, we will be watching and will take pride in your brave action. With you we honor the memory of Major Wilbur Miller and the others you leave forever here. This will be published in General Orders as a permanent record of the achievement of your Group."

(The above is a paraphrase of the message sent recently to the 54th Fighter Group from the Commanding General of the air force to which the 54th had been attached. For security reasons all reference to the theater, air force and the Commanding General concerned have been deleted.—Ed.)

BOMBARDIERS have a lot of stuff to remember. You might be interested in knowing that the twelve major correctible errors which creep into bombardiering can be summed up as follows:

1. Failure to make a pre-flight check.
2. Failure to lock and unlock racks.
3. Selection of wrong target.
4. Failure to inspect bombs before take-off.
5. Failure to turn on rack switches.
6. Poor knowledge of identification of enemy submarines and surface craft.
7. Accidental release of bombs.
8. Failure to check oxygen supply and equipment.
9. Failure to turn on bombsight switches.
10. Rapid and jerky operation of correction knobs.
11. Incorrect altitude computation.
12. Entering incorrect data in bombsight.

COLONEL L. H. RODIECK, a member of General Marshall's staff, told this one after a recent tour of the South Pacific theater:

"During dinner we heard two B-17s coming in and we dashed out to meet them. Colonel Saunders (Col. Laverne G. 'Blondy' Saunders, commanding heavy bombers at an advanced base in the Solomons area) meets every one of his planes as it lands.

"He was out there when the ship stopped rolling. He was tickled to death to see them and the young pilots were tickled to death to be there. He wanted to know if they had done any good. Well, they had done some bombing, but they didn't know whether they had done any good or not. He then asked if any Zeros had attacked them. " 'Yes, but they didn't do a bit of good. About eight of them hit us, but we only got three of them.' That is very poor, they think, over there.

" 'Did they hit you at all?' he asked.

" 'No, sir. Not a hit.'

" 'Are you sure of that?'

" 'No, sir, they didn't hit us.'

"Colonel Saunders asked 'What are those holes there?' pointing just back of the bomber's door.

"About this time one of the mechanics came out. 'Oh, Colonel, you don't count *those* holes,' he said. 'Those are little bitty holes. We got those ground strafing on the way back.' "

THE Wings Club of New York City, recently given official representation and recognition by the Assistant Secretary of War for Air and the Commanding General of the Army Air Forces, is anxious that its membership should include all officers of the Air Forces. Membership may quite likely prove of benefit to our officers, particularly those visiting New York and London, England.

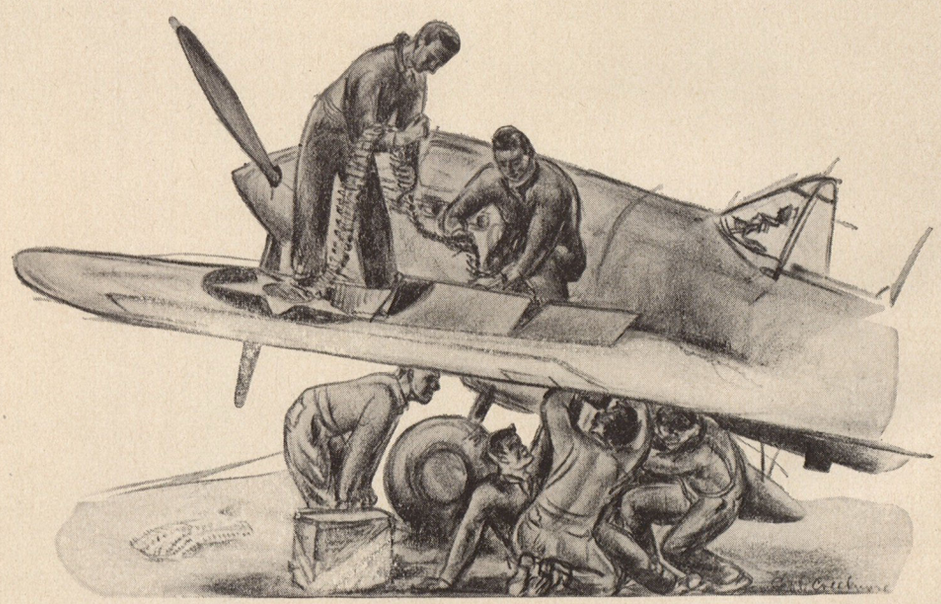
There are no initiation fees and no dues for members on active duty in the Air Forces except during periods when the clubhouse facilities are being used. Dues of $2 for any 30 consecutive days are then in effect.

The Wings Club has acquired club rooms and admissions to all the facilities of the entire 22-story Yale Club building at 50 Vanderbilt Avenue in New York. And that means the works—hotel accommodations, recreation facilities, gymnasium, theater tickets and travel service, restaurants, and all the rest. The club has a reciprocal agreement with the Royal Aero Club of London. For more information you can write the club at its New York address.

MASTER SERGEANT HARRY DARBY, sergeant major of a base tactical group at March Field, Calif., is credited with thinking furloughs are great—for the other guy. It's part of his duties to approve furloughs, but although he joined the Army 25 years ago Sergeant Darby has never had a furlough himself, and has never asked for one. We don't know about this one. We just don't know.

THREE new theater medals have been authorized for officers and men who see service outside the continental limits of the United States. They are the American, the European-African and the Asiatic-Pacific theater medals. The actual medals will not be made up until after the war but the ribbons are expected to be made available within the next few weeks.

RESPONSE to the first issue of AIR FORCE was gratifying. The value of your service journal can be enhanced in the future by your suggestions and the material you send in for publication. We appreciate the comments and correspondence already received. How about some more? Which features of the December issue did you like best—and why? Which features of this issue? Tell us the kind of articles you want and we will try to get them.—THE EDITOR.



OUR AIR FORCE

After One Year At War

By Lieut. General Henry H. Arnold

COMMANDING GENERAL, ARMY AIR FORCES

The Commanding General reports on our combat record and looks to the future

The following article contains highlights from a graduation-day address delivered by General Arnold at Randolph Field, Texas, December 13, 1942.

IN ONE YEAR the Army Air Forces has proved in combat what it can do. Hitler had seven years to build his air force. We had one year to fight and to build ours—and we had to do both simultaneously. Hitler didn't think we could do it—other people had their doubts, too—but *we did.*

We are building overwhelming air power—on schedule. Our monthly airplane production is over 4,000. Another great expansion program is under way to *double* that output.

We will need those extra planes because this is an aerial war in which one or the other of the combatants will be driven from the sky—and it won't be us. This is a grim struggle in which anything goes. There's no umpire to blow the whistle when a Jap or German clips you from behind. The only thing that counts is the score. Did you kill the enemy or did he kill you?

Did we win or did we lose? Well, the record speaks plainly enough.

From February 1, 1942, through December 5, 1942, the Army Air Forces has definitely destroyed 928 enemy planes and probably destroyed 276 in aerial combat. We have lost 130 of our own and 104 are missing. As the result of aerial fighting, the score stands 928 enemy planes knocked out as against 234 of ours.

Hence the ratio of planes lost is about *four* to *one* in our favor. Bear in mind that these figures include *all* our losses as the result of combats but only those enemy planes whose destruction has been verified.

I want you to *improve* that ratio. Get the enemy in your sights and give it to him. It's your life or his. I want you to destroy them six to one, or eight to one, or ten to one before we're through — and I believe you can do it.

After a year of war we have much to be proud of, but we have really just begun to fight. Do not underestimate our foes.

During the past year we have built airfields all over the world, in blistering deserts, in jungle forest, on top of arctic glaciers. We have trained a tremendous number of men. We have developed a world-wide system of air transport. We have dealt heavy blows against the Japanese and Italian fleets. We have carried on successful bombing offensives in all theaters of war.

Best of all, we have built up coordinated operations with our Army and Navy to an extent undreamed of heretofore.

AND as to the future, we have more to look forward to from our aeronautical research than ever before in our history. We have a "secret weapon" or two up our aerial sleeves that will deal paralyzing blows to our enemies. Our fighters and bombers are steadily increasing in range, speed, firepower and bomb loads. Entirely new aerial "battle-wagons" are on the way. We'll put on a special demonstration of them some day for Hitler and Hirohito.

In 1938 we had only 1,800 officers and 20,000 men. Today, one year after Pearl Harbor, I wish to announce for the first time that the Army Air Forces has over a million officers and men.

And we will have over two million officers and men by the end of 1943.

Our industry has also grown up. In 1940 we had in our air frame, engine and accessory plants about 233,000 employed. Today we have over 1,500,000.

The world has never seen a team like today's Army Air Forces before. We all work together, but we are expected to have "first" teams in combat on eight different fronts. That is a job which would slow up Notre Dame even with Knute Rockne at the helm. We have to do it and—with complete cooperation and help from all sides—we are doing it. Who are the members of our fighting teams, what kind of men are they?

They are not just pilots, navigators or bombardiers. They are not just weathermen, armorers or engineers.

On this great fighting team are the workers in the aviation factories—the men and women with the rivet guns.

On this team is the instructor at a flying school who would a thousand times rather knock down Japs, but who follows orders, and sticks on the job.

On this team is the civilian aircraft spotter on his lonely watch.

On this team is the tail gunner in a Flying Fort.

On this team is the aviation mechanic. He's the most important man of all, although you seldom see his name in the headlines.

The mechanics are the guardian angels of this whole flying business—they are the hidden air heroes.

Now as to the war itself.

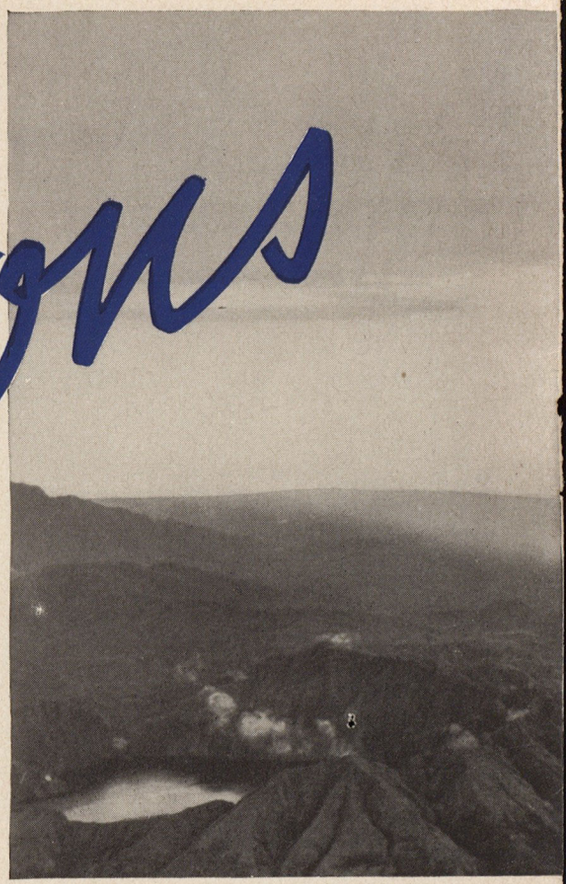
Neither the Germans nor the Japanese have come out of their combats with our Air Force without having to stop for breath —and lick their wounds. The terrific destruction wrought by the Flying Fortresses upon the best fighters that Goering could bring to bear against them came as a distinct surprise. These trained German fighter pilots tried every technique that they could conjure but the results have always been the same.

To date we have had over 1,063 different sorties against the Germans and have lost up to November 30 a total of 32 planes. That total is for losses by both aircraft and anti-aircraft. During those sorties we have definitely destroyed *(Continued on Page 35)*

AIR FORCES ACTION IN THE Solomons

By Lieut. Hulbert Burroughs

HICKAM FIELD, HAWAII



THE B-17s rolled down the Henderson Field runway early that October morning, on their way to drop a few eggs on a Jap air base at Buka and an enemy shipping concentration at Shortland Harbor. The targets were located at opposite ends of Bougainville Island.

The Zero base at Buka was visited first, and from 12,000 feet the B-17s laid a beautiful pattern of 1,000-pounders right down the middle of the runway. Five Zeros moved in to attack but they were turned back in short order.

The B-17s then turned south to Shortland and found 38 Jap ships, including battleships, cruisers and destroyers, not to mention troop and cargo transports, all gathered together for a nice bombing. The ack-ack was heavy as hell. But from about 11,000 the bombers made their runs and scored direct hits on a cruiser and a transport.

Ten Zeros came up to intercept. Two were shot down. Three B-17s collected a few routine perforations. Another was hit by a 20 mm shell that failed to explode. One of the navigators was killed by a stray 7.7 Zero bullet. A radio operator was hit in the ankle.

The B-17s turned for home. They arrived off shore near Henderson Field just as a flight of 25 Jap bombers was pounding the runway. It was easy to see that the B-17s couldn't land on the pock-marked strip, so they began circling high above the area to await developments. From their grandstand seat the B-17 boys saw quite a show.

U. S. warships near the island filled the sky with heavy anti-aircraft fire. Long condensation streamers curled high in the sky as Marine Grumman fighters dived on the attackers. American landing boats in the process of unloading troop reinforcements cut the water with their white wakes as they chugged rapidly away from their mother ships.

Exploding Jap bombs kicked up huge clouds of dust and smoke on Henderson Field. Finally the bombers were driven off.

The B-17s flew low over the field but the runway had been hit twice. In a moment, however, Marine construction crews swarmed about like ants repairing the strip. Nearby a Navy dive bomber, which had been hit on the ground, sent up clouds of black smoke. Other bomb craters dotted the adjacent area.

For two hours the B-17s circled. Then, when the Marines had finished their job, the bombers landed. And just in time to get right in the middle of a repeat performance of the show they had witnessed from the air.

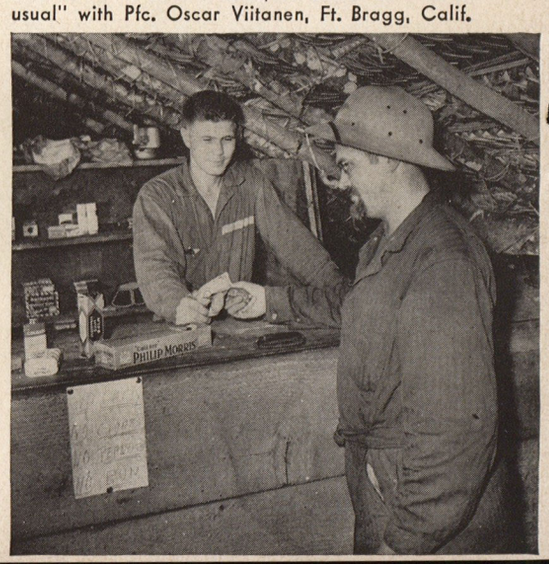
Within 15 minutes another wave of Jap twin-engined bombers were spotted heading toward the field. For most of the Air Force fliers, the receiving end of a bombardment was a new position. A similarly new experience was their wild scramble for Marine foxholes.

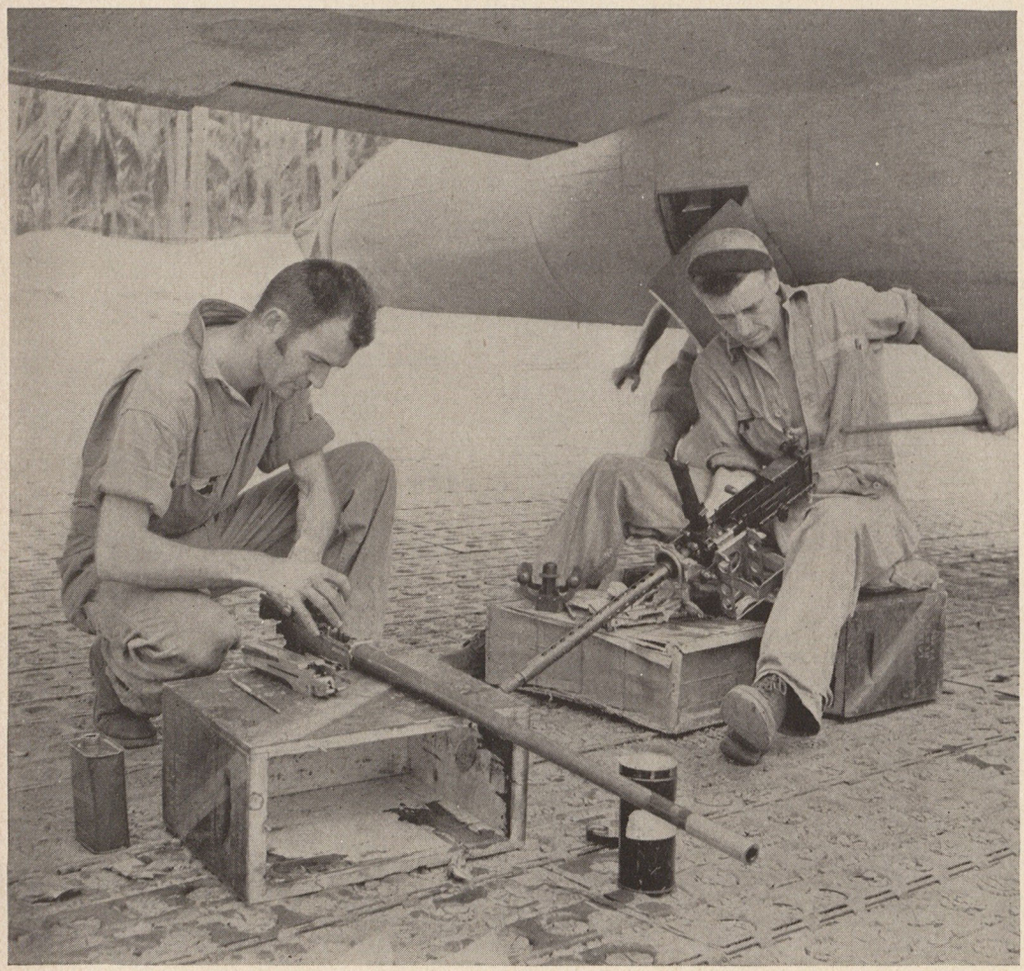
The 20 Jap bombers, flying at 20,000 feet in their usual V formation, dropped their bombs. Three hit the runway, one failing to explode. One B-17 was hit but only slight damage resulted. Most of the other bombs fell wide. Again the indefatigable Marines scrambled onto the runway and, with shovels and crowbars, trucks and rollers, repaired the damage.

By evening of that day the men were ready for a bite to eat and a night's sleep. But that's a little out of routine for Henderson Field.

At 6:30 p. m. a battery of Jap guns from

Sgt. William E. Rembt, Long Island, N. Y., holds a 20 mm. Jap shell which hit his B-17 but failed to explode during a battle with ten Zeros. Below, Pvt. Rudolph Lander, Farwell, Minn., proprietor of a PX in the South Pacific, conducts "business at usual" with Pfc. Oscar Viitanen, Ft. Bragg, Calif.





AT TOP, a B-17 is shown flying over Jap-held Bougainville Island in the northern Solomons after taking part in a raid on Buka airfield at the north end of Bougainville. Note the active volcano and the crater lake.

ABOVE, these B-17 gunners, back from a flight with the Japs, clean their machine guns at a base somewhere in the South Pacific. At left is T/Sgt. Edward T. Spetch, of Seymour, Conn., and at right is Sgt. Vernon Nelson, of Fergus Falls, Minn.

It's wild fighting and rough living on Guadalcanal for our bomb crews who give the Japs their daily pounding.

the hills to the west began shelling the field. Five-inch projectiles whistled intermittently for an hour and a half. Red tracers from Marine coastal batteries rocketed back into the hills in reply. All was quiet at 9 o'clock and some of the men turned in for the night. They were optimistic.

Two hours later, the Jap land batteries opened up again. At 1:30 in the morning a Jap plane, probably a cruiser catapult type, dropped a flare behind the field and in a few seconds a 16-inch shell from a Jap battleship exploded overhead.

Then for two hours enemy battleships, cruisers and destroyers shelled Henderson Field and Marine emplacements with five, six, eight and sixteen-inch projectiles. Some Air Force personnel sought protection in open foxholes; others crowded into covered dugouts. Throughout the rest of the night many lay on their bellies on the ground behind logs or in bomb craters.

One Jap shell exploded near a dugout in which six Air Force men were lying. The walls caved in and buried five of them. The sixth, Staff Sergeant Sebastian Maraschiello, of Buffalo, N. Y., extricated himself and, during the height of the shelling, managed to rescue three of the others.

At 3:30 a. m. "Maytag Charlie," an enemy plane so dubbed by the Marines because its engines sounded like a washing machine, dropped a flare just short of the runway and then laid two big bombs down the field.

Four more times before dawn enemy planes bombed the runway.

Shortly before sunrise Air Force officers inspected the runway and cleared it of shell and bomb fragments. Miraculously, only two B-17s had been hit, neither damaged badly enough to keep it from flying.

But the runway was damaged, particularly on one end. A conference was held with the B-17 pilots. Could they take the heavy bombers off the shortened runway? They agreed it was worth the try rather than have their ships go through another pasting on the ground. More Jap shells from the hills broke up the conference.

The first B-17 taxied to the end of the runway in the face of the bombardment. The pilot locked his brakes, gunned the motors to full RPM and let her go. The B-17 hurtled down the pitted runway, dodged two craters and leaped into the air just in time to miss three others. A half hour later all the planes were off the ground.

Another day had begun on Guadalcanal.

(Continued on next page)

The Japs aren't the only headaches for the men in the Solomons. There is the little matter of weather, for one thing. A "front" in the Solomons is nothing less than a cement wall.

Then on the ground in the daytime there are flies by the millions. Malaria loaded mosquitoes work the night shift and they come in similar numbers. Mosquito bars are an absolute necessity.

There are no luxuries on Guadalcanal. The men sleep in tents on canvas cots with neither pads nor sheets. Officers and enlisted men usually wash their own uniforms. A few have made deals with ex-cannibal Melanesian natives for laundry—provided the fliers supply the soap. There is no hot water, of course. No fresh meat or vegetables, no sweets, no cokes, not much mail from home. And when the mail does come to the South Seas it's usually a month or so old.

TRANSPORTATION, mostly via jeeps and 2½-tonners, is "rugged." When it rains—and the yearly rainfall is about 120 inches, most of which falls during the three month rainy season—the mud is ankle deep. When the mud dries up, the dust is ankle deep. GI shoes have at last come into their own with the Air Force officers.

Despite these hardships and discomforts a tremendous amount of work has been accomplished. One Air Force base in the New Hebrides was hacked out of a dense tropical forest and ready for use in 14 days—thanks largely to that typically American piece of heavy equipment known as the "bull dozer." On one occasion, before adequate servicing equipment was available, one crew, anxious to get into combat, filled the big gas tanks by "bucket brigade," passing five gallon "drinks" from the ground to wing.

Out in the jungle bases there is little distinction of rank either among officers or between officers and enlisted men. There is little saluting. A man is taken for what he is really worth. Between officers and enlisted men there is a feeling of mutual respect and great confidence. This is especially true in combat crews, where morale is very high.

Variety is not lacking in the missions which the B-17 crews fly day after day. Lieutenant Thomas H. Trent, of Hardinsburg, Kentucky, and his crew were out over Kapingamarangi Island (Greenwich Island) near the Carolines, when they spotted a big Jap radio schooner standing off the reef. Having no bombs and despite heavy machine-gun fire Trent dove in for an attack. For 25 minutes his gunners strafed the enemy vessel from as low as 50 feet. By the time the crew had finished its job the schooner was burning and had been beached.

Another of Trent's "routine" experiences occurred on the afternoon of October 15 when he flew to Guadalcanal with other B-17s to bomb a Jap invasion force consisting of cruisers, destroyers and transports. While making his bombing run from 11,000 feet on a troopship, four Zeros made a concerted attack upon Trent's plane.

In the first blast of fire he had his right aileron cable severed by a Jap bullet—that one-in-a-million shot. Out of control, the plane fell 3,000 feet before Trent was able to right it. Again the four Zeros came in, this time to finish off the crippled B-17. Trent's gunners shot down two of the Japs and drove the others off.

Free at last of Jap fighters, Trent faced the almost hopeless task of trying to save his crippled plane. For five long hours he alternately nursed and cursed the faltering bomber. In one stretch of rough weather the plane began to lose altitude. Trent warned his men to prepare to bail out. But again he succeeded in gaining control.

Finally they sighted their home field and were ready to try a landing. In a wide skidding turn Trent made the run for the field, found his right wing dropping too low. It refused to come up even with full left stick. Trent gunned number four engine, brought the wing up and made a perfect landing.

ON THE same flight with Trent was Lieutenant William S. Cope, Salem, Ohio, piloting another B-17. As Cope was making his bombing run on a Jap transport the anti-aircraft bursts grew thicker. Fifteen Zeros waited overhead for our bombers to clear through the ack-ack.

Cope wanted no slip-ups. Over the interphone he called to his bombardier: "Be ready to get bombs away."

In the excitement of the attack the bombardier caught only the words "bombs away." Thinking that something had gone wrong and that it was an order to dump the load, he hastily jettisoned all the bombs. A few moments later two of the cast-off bombs, falling short of the Jap transport for which they had been intended, landed squarely on the deck of a Jap heavy cruiser. Badly damaged, the ship was later sunk by Navy dive bombers.

Captain Vincent M. Crane, Manchester, Massachusetts, and his crew, spent an interesting twenty minutes over Jap-held Rekata Bay one afternoon. From a height of only 200 feet they strafed ground installations, sank two anchored sea-planes, poured 700 rounds of fire into a couple of hundred Japs scrambling around the beach, got hit by a 37 mm. shell which severed one of the control cables in the tail of their ship. By skillful maneuvering Crane made a successful forced landing at Henderson Field, tied the damaged cables together with bailing wire and made it back to his home field.

RETURNING from a tough bombing mission of Jap installations in the northern Solomons, three B-17s ran into one of those cement wall fronts. For hours they sought an opening. Lost and out of gas, they were forced down at sea. Lieutenant James Van Haur and his crew spent seven days at sea on a damaged raft. One man died at sea.

In another plane, Lieutenant Colonel Philo O. Rasmusen, Salt Lake City, Utah, was knocked unconscious by the force of the water-landing. As the ship was submerging, the co-pilot, Lieutenant Clyde Shields, of Aberdeen, South Dakota, himself suffering from a deep head wound, dragged the unconscious Rasmusen through the escape hatch and swam with him to the raft. The pilot of the third plane, Lieutenant Willard G. Woodbury, Omaha, Nebraska, and his crew were luckier. Uninjured, they reached shore in a few hours.

Lieutenant Sam B. White and his crew will have something to tell their grandchildren—if and when. On a mission over Jap territory they were jumped by fifteen Zeros. In a wild fight that lasted about twenty minutes, White's plane was badly shot up. Three hundred and fifty bullet holes riddled the ship, but the crew escaped with no injuries. Lieutenant Everett S. Turner of Binghamton, New York, was struck on the sole of his shoe by a 20 mm. shell. "It was a GI shoe," said Turner. "The bullet suffered more than I did."

On another occasion White and his men were out on a search mission. At 8,000 feet they flew into what White described as "an awfully pretty white cloud." A terrific downdraft hit the bomber and turned it upside down. Crew members rattled around in the fuselage like peas in a pod. The controls went limp. White shoved the stick forward, throttled the motors down. For terrifying seconds the plane careened wildly downward. When it finally broke out of the cloud it was in a vertical dive.

"She was indicating 340 miles an hour straight down and with the motors idling," White reported later. "We were at 2,800 feet before I could get the nose up."

The main spark-plug for such "routine" operations was tough, but affable Colonel L. G. "Blondy" Saunders, one of West Point's former all-time star football players and coach. Working long hours with quiet determination, he still found time beyond his regular duties to accompany his boys on dangerous bombing missions.

It was the Colonel and his boys who had the hectic 24 hours operating out of Henderson Field that early October morning. ☆

"PHYLLIS HAD THE STUFF..."

A pilot's own combat report of extended action against interceptors on a daylight sortie over Occupied France

By Lieut. Charles W. Paine

AT 5 A. M. on October 3, 1942, I was awakened at a Mission hut in one of our bomber stations in England. It was dark, and for a moment I didn't know quite where I was. The hut was so small that I could reach out on either side of me and touch the other officers in their beds. I wondered what I was doing awake at that hour. Then I remembered that the day before I had been assigned as pilot of a B-17 on a bombing operation over Occupied France. At the moment I didn't know the exact location of the objective, but I had been told that it was a munitions plant that was now making goods of war for the Nazis.

I dressed quickly and gulped down the tea that was brought me. After that I went to the Intelligence Office where they gave me the exact location of the objective. My navigator, Lieutenant Thompson, of St. Louis, and my bombardier, Lieutenant Komarek, of Muskegon, Michigan, were there, and I then met them for the first time. We learned that the objective was the Potez plant at Meulte, in Occupied France.

Very shortly after we got news that the operation wouldn't take off as planned, but we were to stand by. There was a good possibility that we'd get "on with it"—as the R.A.F. says—before the day was out.

We stalled around until about noon, while I got acquainted with my crew. I had never met any of them before. They had worked together, but I was a stranger to them. We were polite about the whole thing, but we wanted to know more about each other. As C. O. of a B-17 that was going to take off on an operation over enemy territory, I wanted to know more about them. They'd flown together as a crew and called each other by their first names. A good crew does that. In the air you're all out on the same party. You have to know what each member of a crew will do under any situation of the thousand and one that may come on you without warning.

But I didn't know them, so I went through the motions of inspecting the ship. I discovered her name was Phyllis. It was because of a picture on her front end. It was a picture of a swell girl, but no one in the crew could quite agree as to whose girl it was. The rear gunner, Technical Sergeant Taucher, a coal miner in normal life, said it was because "Phyllis" was *two* of the crew members' girl. That remark caused indignation among the rest, and the thing has never finally been settled. The ship, so far as I could see, was just called Phyllis because she was Phyllis.

PHYLLIS' CREW:

Lieut. Charles W. Paine, Pilot; Lieut. R. H. Long, Co-pilot; Lieut. S. A. Komarek, Bombardier; Lieut. John A. Thompson, navigator; T/Sgt. B. P. Taucher, Rear Gunner; T/Sgt. Ralph Sheeder, Belly Gunner; T/Sgt. A. Bouthellier, Radio Gunner; T/Sgt. Walter Parcells, Radio Operator; Sgt. Thomas Coburn*, Top Gunner, and Sgt. H. Peterson*, Waist Gunner. (*Wounded)

I went through the usual routine of checking the ship and seeing that everything aboard—including the guns—was okay. They were. I've never seen a sweeter functioning aircraft than Phyllis when we took off. She had a good crew, and I hope that I—the pilot and the captain—am in their class.

One thing I found in our favor was that two of the crew—myself and Lieutenant Long, the co-pilot—were lawyers, and that Lieutenant Komarek, the bombardier, was in his last year of law before he got in the Air Forces. Lawyers are often looked down upon, but I can only say that my co-pilot and my bombardier were damn good airmen. The rest of the boys did okay, too, in spite of being commercial artists, truck drivers, statisticians, and other assorted trades.

In the middle of the afternoon, the signal for our take-off came. As is usual at these moments, I was so scared I could hardly walk. Somehow, though, I managed to make it.

Phyllis was a long way from her home in Seattle, but she was magnificent. That was what our ground crew did for us. The guys who'd like to fly, but who take out their yearning by seeing that everything is right before the take off. *(Continued on Page 27)*

NORTH from Great Falls

By Capt. Charles D. Frazer

"THERE'S just one thing to remember on the Alaska run. That is—respect the weather. Sometimes, down in Texas, for example, you can bluff the weather and get away with it. Do that here and you're a gone goose."

We were in the Pilots' Room at headquarters of the 7th Ferrying Group, Air Transport Command.

It was mid-morning, the atmosphere was lazy and still. Several flyers, on cots or scattered chairs, were quietly smoking or reading the paper.

From a red Coca-Cola machine near the door would come an occasional thud as a ten o'clock bottle slid out. From the center of the room you could hear the click of pool balls and, from a huddled group at a corner card-table, a low voice murmuring "I'll call". Frequently, there was the chink of a silver dollar. In Great Falls, Montana, paper bills are regarded as effete. "Eastern money", they call it.

"Yep, the weather up north is always as bad as it promises to be," continued Lieutenant Hughes. "And the trouble is, you have to fly by the seat of your pants. Instrument flying is out, most of the time. Too much metal in the mountains. You get all kinds of compass variations, radio static, and I don't know what all."

Lieutenant Stenson smiled wryly and nodded his head in agreement. Both men know the Alaska run well. For months they have been beating their way up and down this tough air trail which is playing so vital a role in the war and which in peace will probably become one of the world's great airlanes.

The door to the Pilots' Room opened and a slender, gray-haired captain came in, followed by several flyers in leather jackets.

"A lot of planes moving out today," explained Lieutenant Hughes. "These are some new pilots, going to be briefed."

Captain J. P. Herron, the S-2 officer, stood at the head of a long table while the flyers seated themselves on either side. We moved our chairs over near the group and listened.

Imagination stirred at the mere names of way-stations as Captain Herron described the route from Great Falls, the true and magnetic courses, and the radio procedure all along the line. As he talked, route manuals, mileage charts, and maps were passed around among the men and carefully scanned.

Numerous unrelated pieces of advice followed.

"Check weather reports constantly. . . . Stay out of all visible precipitation, both clouds and rain. You'll be sure to get ice. . . . Be on your guard for sharp and sudden changes in temperature and winds. They're frequent. . . . Keep in mind that, usually, you can find warm air aloft. . . . When you get there, make a point to talk with the bush pilots and cargo pilots who have been flying the country for years. They can teach you a great deal."

Listening to Captain Herron, talking with men like Lieutenant L. L. Hughes, a Florida-born service pilot who has flown in many parts of the world and who was a primary instructor in the Army for a year, and Lieutenant W. A. Stenson, a Barksdale graduate who was with a tactical unit before being assigned to the Air Transport Command, you soon understand that ferrying planes to Alaska is no high tea. It's a tough grind, week in and week out. The weather is frequently unbelievable. And it gets cold—so cold that engines have to be warmed up with special heaters.

But you understand, also, that most of the pilots like the trip. The Inland Route covers new, rugged country and every mile of it is an interesting challenge to the airman.

Traffic is guided and gauged at Great Falls by the "Northern" board, a raw wood affair with row upon row of brass hooks; the board covers a good-sized wall in the operations office.

There are four vertical divisions of the board, the headings of which read: PURSUIT, 2-ENGINE, 4-ENGINE, CARGO. Each division has five columns, with subheads reading: DEPART TODAY, EN-ROUTE, DELIVERED, PILOT RETURN, PILOT AVAILABLE.

A typed card is made out for every plane to be ferried. This card describes the ship, gives its number, tells where it departed from, what the destination is, the name of the officer assigned to it, and the time of departure. There are spaces for notes regarding any service or repairs the plane may need.

Ferrying pilots or crews have to send in reports every night, in code. It is a rule of the Operations Chief, Captain O. O. Schurter, that each ship's location and condition must be transmitted; he or some other officer always remains on duty until such data is known.

As a flight progresses, the plane's card moves from column to column with all information relayed back to headquarters marked upon it. Thus, a quick glance will not only tell the particulars about any one ship but will also give a picture of the route as a whole.

This is important, for one of headquarters' principal concerns is to keep traffic flowing smoothly. Too many planes at any one station can be serious. Storage facilities are limited and, if weather closes in somewhere along the line, a depletion of gaso-

ILLUSTRATED BY
CAPT. RAYMOND CREEKMORE

line, food, and supplies at one point may clog the entire route.

Great Falls' facilities have been expanded and expanded again to fill the needs of the 7th Ferrying Group.

Gore Field itself, until a few months ago, was the city's municipal airport. It is situated three miles southwest of town on a tableland, or bench, as plateaus are called in Montana, about 500 feet high.

This bench has been given over completely to the building of an Army Air Forces base.

There are four asphalt runways. There are a few hangars, but these are chiefly working facilities, rather than storage, for part of the process of winterizing planes is accomplished by parking them in the open, where they are exposed to the snow and wind and cold that will be found to the north.

For some time, the 7th Group had its offices in the Civic Center of Great Falls. Officers lived in nearby hotels; enlisted men were encamped on the Center's indoor skating rink, with their cots ranged in the tiers of the spectator gallery. A banquet room served as kitchen and mess hall.

But now everything has moved up on the bench—to Tarpaper City. Barracks, BOQs,

Ferrying planes to Alaska from this windy Montana "bench" is a grind—and an old-fashioned challenge to the airman.

executive and operations offices, parachute room, communications and cryptographic rooms and other facilities are all of "tarpaper palace" construction, lined with insulation board and heated with stoves reminiscent of a mining camp.

FROM the control tower of Gore Field, 3,460 feet above sea level, the whole panorama of the ferrying operations spreads before you.

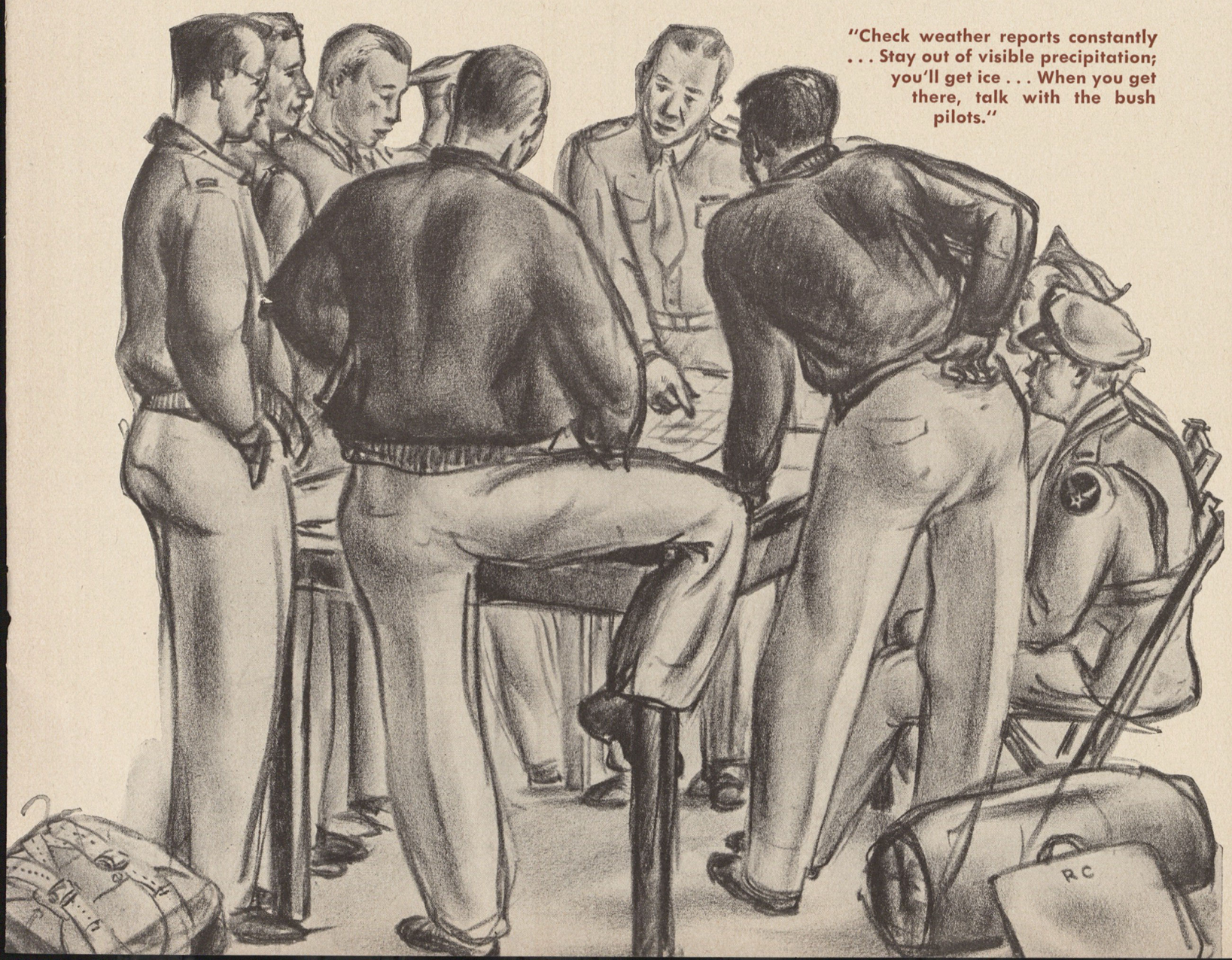
Dispersed around the hangars and on the apron are Army airplanes of every description. B-17s and 25s. A-20s. P-40s and 38s. Numerous cargo planes. Every ship has chalk marks on its olive-drab skin. FULL SERVICE—O. K. GUNS CLEANED AND LOADED—O. K.

In the shops and hangars are scores of civilian workers, many of them women. Driving around in trucks and jeeps, standing on step-ladders and bending over engines, are enlisted men in coveralls. Standing about in groups, just waiting or keeping an eye on work, are the pilots. They are wearing fur-lined caps and flying suits and close by them are parachutes with built-in arctic kits.

These kits, if needed, will be handily complete. Each one contains a frying pan, compass, trout flies and line, little white pills with which to start fires, iodine to purify water, field rations, mosquito netting and fly oil, bouillon cubes, matches, pistol ball, gloves, and a sturdy knife. Every flyer wears a pistol at all times during a flight.

This happens to be a clear day, without a cloud visible in the blue dome of Montana sky. There's little rain here, in any season. From the control tower you can see for miles over bald, treeless hills and plains to the purple Rockies in the distance. The sides of the bench drop away sheerly to the surrounding valleys through which runs the upper Missouri River, tumbling down Black Eagle Falls and Volta Falls, discovered by Lewis and Clark in 1805. Some miles off is a well-known landmark—the 510-foot smokestack of Anaconda Copper's great smelter.

From time to time new airplanes from the south approach the field and the CAA man is busy at the *(Continued on next page)*



"Check weather reports constantly . . . Stay out of visible precipitation; you'll get ice . . . When you get there, talk with the bush pilots."

What's your AIR FORCE I.Q.

Here it is again! This month's AIR FORCE Quiz is a little tougher. Score 5 points for each question answered correctly. From the grades made by a group of officers and enlisted men—100 is perfect; 90 is excellent; 80 is good; 70 is passing; 60 is—well, you can do better! Answers printed on page 40.

1. The empennage of a plane is

a. The nacelle
b. The tail assembly
c. The wing structure
d. The instrument panel

2. A bubble octant is used to measure the

a. Amount of gas in a tank
b. Air speed
c. Oil pressure
d. Angle of elevation of a celestial body

3. A Blenheim bomber is

a. A U. S. plane b. A German plane
c. A British plane d. An Italian plane

4. The first successful powered flight by the Wright brothers took place at Kittyhawk in

a. 1909 b. 1896
c. 1903 d. 1918

5. The term Logistics as used by the military applies to

a. Special logarithm tables used in Quartermaster accounting
b. The art of log rolling
c. The details of moving, quartering and provisioning of troops
d. A logical argument employing military statistics

6. Which of the following words does not belong in this group?

a. Cirrus b. Status
c. Stratus d. Cumulus

7. A Pitot Tube is most closely connected with

a. Lubrication
b. Air speed
c. Propeller maintenance
d. Gasoline mixture

8. Kiska is located in

a. Russia b. The South Pacific
c. The Aleutians d. The North Atlantic

9. Phosgene has an odor like

a. Pepper
b. Apple blossoms
c. Fly paper
d. New mown hay or freshly cut corn

10. The B-25 is a

a. Low-wing monoplane
b. Mid-wing monoplane
c. High-wing monoplane
d. Biplane

11. For installing sparkplugs, Tech Orders state that the length of the wrench should be

a. 20 inches b. 36 inches
c. 10 inches or less d. 18 inches

12. Stewart Field is located

a. In Texas b. In California
c. Near West Point d. In Missouri

TRUE OR FALSE?

13. The B-24 has a tricycle landing gear.

a. True b. False

14. The pilot, bombardier and navigator are the only members of a typical heavy bomber combat crew who are qualified to wear wings.

a. True b. False

15. A radial engine is a liquid cooled engine.

a. True b. False

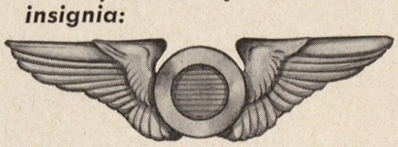
16. The letters BT are the Air Forces designation for Bombardment Tactics.

a. True b. False

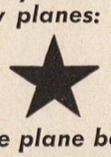
17. When walking with a senior officer, the junior walks on the left; when riding in an automobile, the junior should be on the right.

a. True b. False

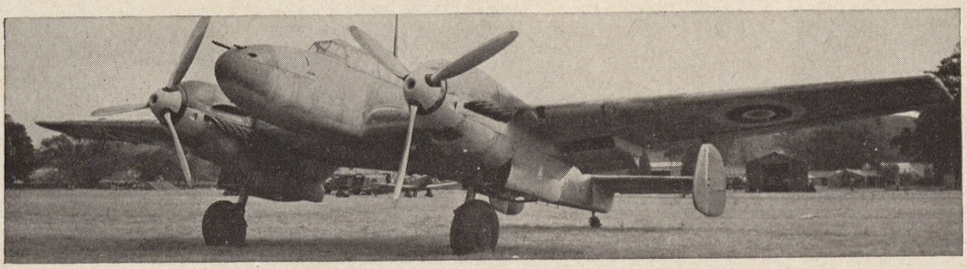
18. Identify this Army Air Forces wing insignia:



19. What country uses this marking on its military planes:



20. Identify the plane below:



GREAT FALLS

(Continued from Page 9)

microphone, giving the flyers landing instructions, reminding them always to have "wheels down and pressure up."

Several fighter planes have been warming up and now they taxi down to the end of the runway. They will, when possible, go north in a flight, with some experienced pilot leading the newer men.

"Army Number —— calling Great Falls tower."

"Great Falls tower," answers the CAA man. "Army Number —— clear to Runway 21." He then gives the code signal for the day, the time, wind direction, velocity, and other data.

One after another the planes speed along the runway. They use nearly all of it, going right to the edge of the bench, for when you fly off this shelf of land you're in the air. They bank to the south, make a wide circle, like homing pigeons deciding on their course, then strike due north.

Now a B-17 is on the runway. It doesn't seem to have enough speed to take off but this is a deception. It's in the air quicker than the fighters.

A pair of B-25s follow shortly after. These ships are probably being flown by Lieutenants Hughes and Stenson; their cards were seen hanging on hooks of the DEPART TODAY column. With them are two sergeant flyers, new men who are taking their first trip as co-pilots.

All these ferrying pilots will be gone about a week, more or less. They will return in empty cargo planes and have a day off when they arrive in Great Falls.

They will no doubt come back with some Paul Bunyan-esque tales. And a good many of these tales will concern bears.

There was the time, for example, back in summer, when a couple of pilots left their clothes on the bank of a pond and went swimming. A bear, after picking the pockets of the uniforms, attacked the men. One pilot got away. The other found himself at close quarters, about to be clawed.

Somewhere he had heard that bear noses are tender. After twenty or more lefts and rights to the muzzle with his fists, he won a judge's decision and drove the animal away.

On several of the flying fields soldiers have to patrol the runways at night in jeeps to keep the bears away; where gasoline is cached in the woods along the route, guard duty is also no joke.

Aside from bear trouble, the pilots will find much to occupy their spare time. Perhaps they will fish or hunt. Perhaps they will find or buy at a bargain some mastodon ivory. Perhaps they will enjoy themselves aboard The Yukon Maid and other river boats of the gold rush days that are still to be seen around Whitehorse.

Whatever else they do, they will come back with information that will be invaluable to all who are engaged in the serious business of getting military aircraft to places where they are sorely needed. ☆

THE OTHER NORTH AFRICAN BATTLE

Prepared by the Directorate of Weather,

HEADQUARTERS, AAF

PHOTOS of military operations in North Africa usually show clouds of dust and sand, sweat-drenched and sun-tanned men.

But there is another serious weather hazard—rain. When it rains hard in the desert the rain brings mud and sometimes destructive floods. Operations can generally proceed in heat and dust, but not in rain.

Weather in this area is typical of desert conditions in many parts of the world. Annual and diurnal temperature ranges are great, and, away from the coast, overnight freezes occur. Great air bumpiness is experienced in summer, especially inland.

Generally the weather here may be divided into two periods, the hot dry period from June to September, and the dust- or rain-storm period from September to May. Dryness and temperature increase from west to east and north to south. Spring and fall are the best operational seasons.

Mean summer temperatures range from 66 degrees to 88 degrees on the coast and from 72 degrees to 100 degrees inland. Temperatures over 100 degrees are common. Highest temperatures are frequently recorded in June, although July or August has the highest mean temperatures. Dryness and temperature increase as one proceeds from Tripoli toward Egypt.

In the interior the rapidity of heating causes air currents which make flying rough, particularly at low altitudes. Rapid heating also causes lifting power and much fine sand and dust is carried into the air. Whirling sand may reduce visibility to almost zero and develop sandstorms known as "simooms" in Libya and "haboobs" in Egypt, which sometimes reach the coast.

Rapid heating in the desert air also causes visual distortion. Heat waves emanating from the superheated sand and rock make

Weather is the second enemy confronting airmen in the desert war theater.

perception of ground features from the air a very difficult problem.

Cloudiness is rare during the summer, although cumulus and even some stratus cloud is occasionally encountered along the coast. Cloud cover for low-flying operations is hardly ever found. Early morning fogs occur on as many as 7½ days a month in some places, but they burn off quickly.

Landing on untreated areas or traveling over unpaved roads throws up huge clouds of dust. Keeping mechanical equipment well-lubricated and free from dirt is a difficult problem.

In September, the low pressure areas created by cyclonic storms begin to take a more southerly course, passing through the Mediterranean, inaugurating the long period of rain and dust storms which continues through May. In the summer, these cyclonic storms pass to the north and usually, do not affect weather in the North African area.

Rainy weather begins gradually. Rains are rather infrequent in the fall. In Libya, there are 1 to 3 days rainfall in September, which increases to 4 to 9 days rainfall in November. In Egypt, the rains come later, with only 3 to 4 days in November. Rainfall increases in December and January and then tapers off gradually. Highest rainfall is experienced in Cyrenaica.

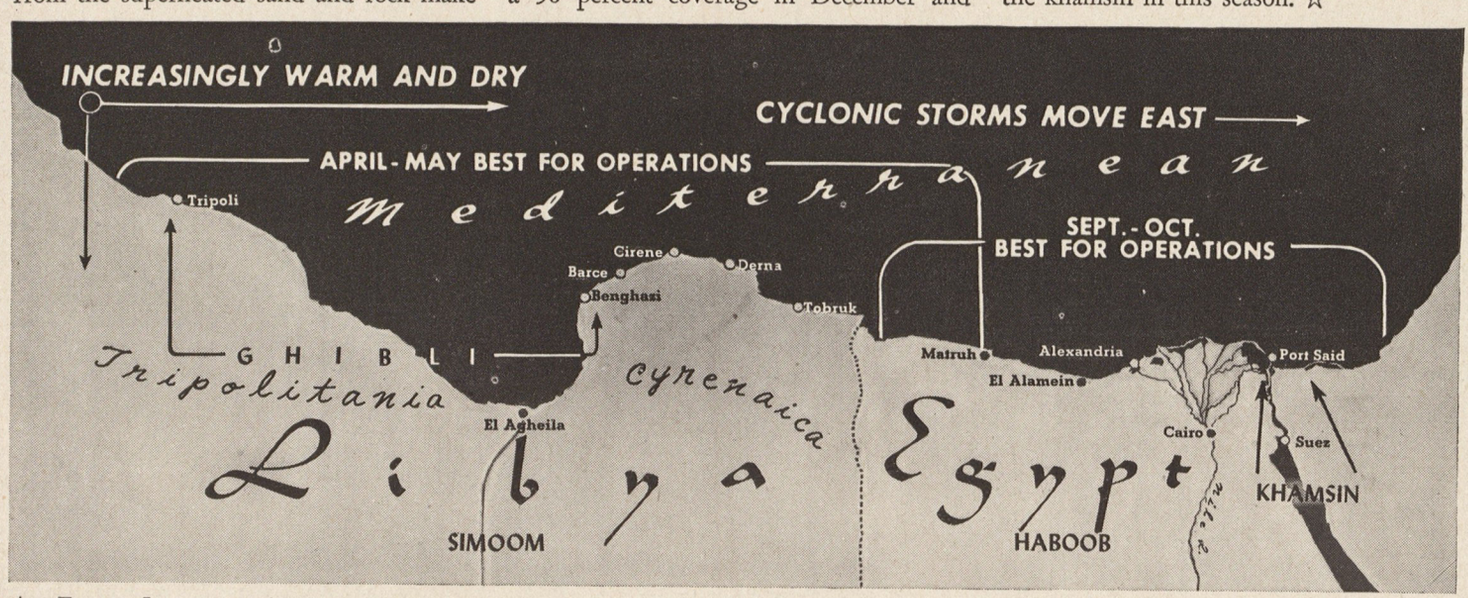
Average cloudiness continues throughout the fall, reaching a maximum of 50 to 60 percent coverage in December, January and February. In Egypt—that is, east of Cyrenaica—the cloud cover is generally between 38 and 40 percent, although Alexandria has a 50 percent coverage in December and January. Mean winter temperatures range between 50 and 70 degrees, with the warmer to the east. Temperatures gradually decrease throughout the fall to winter lows, then gradually increase to summer highs.

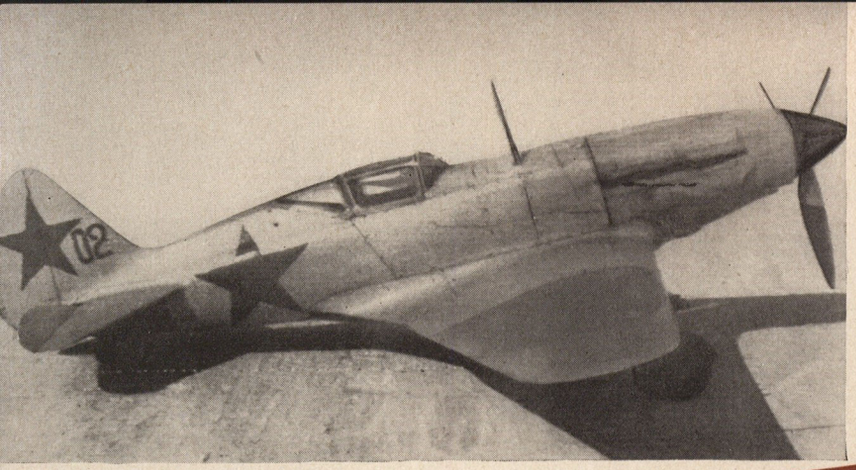
Dry dust winds off the desert have their greatest incidence in fall and spring, although any given year may show a wide departure from the average. In Egypt, a dust storm known as the "khamsin" occurs during the period from February to May inclusive, the greatest frequency being in April. The occurrence of such storms is about 12 a year, although they may vary in any one year from 5 to 6 or 16 to 18. In Libya, "ghibli" is the term applied to dry, hot and at times dusty winds originating over the desert.

Dustiness is variable. Sometimes the wind is a continuation of the simoom and then the ghibli is extremely dusty. There is a higher frequency of these winds in Tripolitania than in Cyrenaica. Spring and, particularly, fall are the seasons of most frequent occurrence.

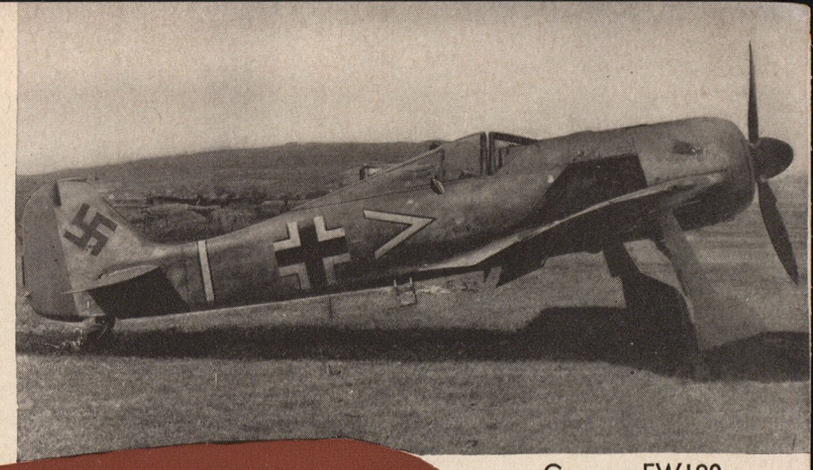
In the west, air operations are least hindered by weather factors in the spring, although fall is also good. Predictable cyclonic activity will bring enough cloud cover to form some protection for aircraft. Good visibility is frequent and usually there is not enough rain to hamper land, sea or air operations. Probable occurrence of the ghibli must be predicted by observing the positions of lows on synoptic charts. Temperatures are not as extreme as in summer.

In the Egyptian area, the season best adapted for air operations is fall. The frequency of good operational weather in the spring is reduced by the high incidence of the khamsin in this season. ☆





Russian MIG-3



German FW190

FOREIGN AIRCRAFT
—Some Technical Aspects

By Lt. Col. J. M. Hayward

CHIEF, FOREIGN DEVELOPMENT PROJECTS, WRIGHT FIELD

COMPARING the relative merits of friendly and enemy aircraft is more than a favorite diversion; it is a serious business to combat airmen and to all who are responsible for assuring that our own aircraft are superior to those of the enemy.

It is not intended here to draw conclusions on the merits of friendly and enemy aircraft but rather to present a few important characteristics of some well known foreign combat airplanes in order to facilitate analyzing the relative technical value of these planes. For it is obvious that the combat effectiveness of an air force is measured not only by good combat personnel but by technical leadership as well.

Early reports on new or unfamiliar foreign aircraft have sometimes greatly minimized their equipment or have attributed extraordinary performance, armament and the like to them. Claims that German and Japanese airplanes were equipped with only a few instruments and were poorly constructed of unsatisfactory substitute materials have not been substantiated by fact. On the other hand, the boasted superiority of speed, high operating altitude and fire power claimed for some enemy aircraft have largely been disproved by experience of our fighting operations or are known to have been obtained at too great sacrifice.

Germany has developed a large number of various types of airplanes, but those which have appeared prominently in reports from the fighting areas include only the Me 109E and F, Ju 87B, Ju 86P, He 177, FW 190 and the Do 217E.

The latest improved version of the Messerschmitt fighter is the Me 109F1 and F2. The design of the Me 109 has been refined to increase its speed to approximately 370 miles per hour and give it a higher service altitude (38,000 feet). In order to accomplish this, low drag radiators have been installed and the armament has been reduced to one cannon (20 mm or 15 mm) firing through the hub of the propeller and two 7.9 mm (30 caliber) guns mounted in the nose of the fuselage on top of the engine. However, the cannon have a high rate of fire: 800 rounds per minute for the 20 mm in the Me 109F1 and 900 rounds per minute for the 15 mm in the Me 109 F2.

Armor plate has improved progressively in the Me 109 series to give optimum protection. The new type of armor arrangement consists of homogeneous armor plate under and back of the pilot, extending well up behind and over his head. Also, an unusual type of deflector bulkhead, comprised of thirty laminations of aluminum alloy sheets, is located back of the seat-shaped fuel tank.

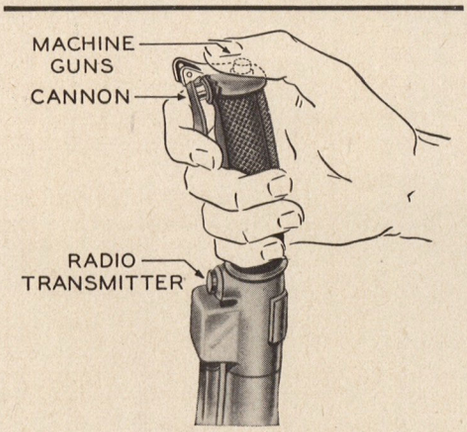


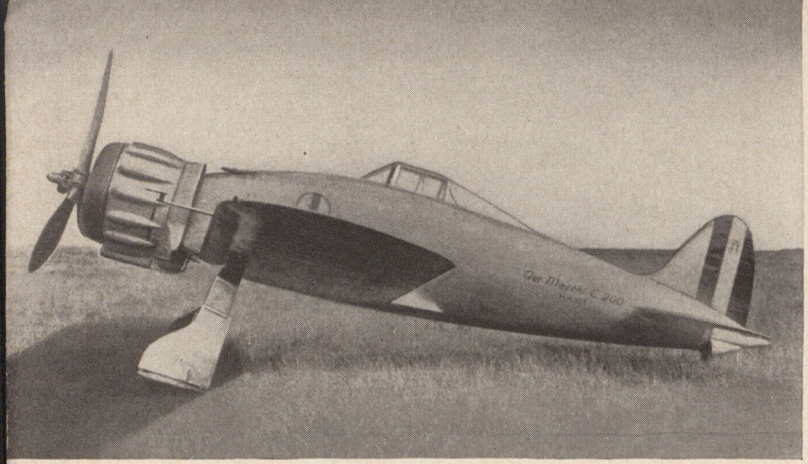
Diagram of a control column handle of Messerschmitt type.

The Junkers Ju 87 (Stuka) obtained distinction early in the war by its use in dive bombing and ground strafing of Allied troops and civilian personnel, particularly during the occupation of the Low Countries and France. This airplane has an ungainly appearance, with its inverted gull wing, projecting dive brakes and fixed landing gear. It is slow and easy prey for a fighter.

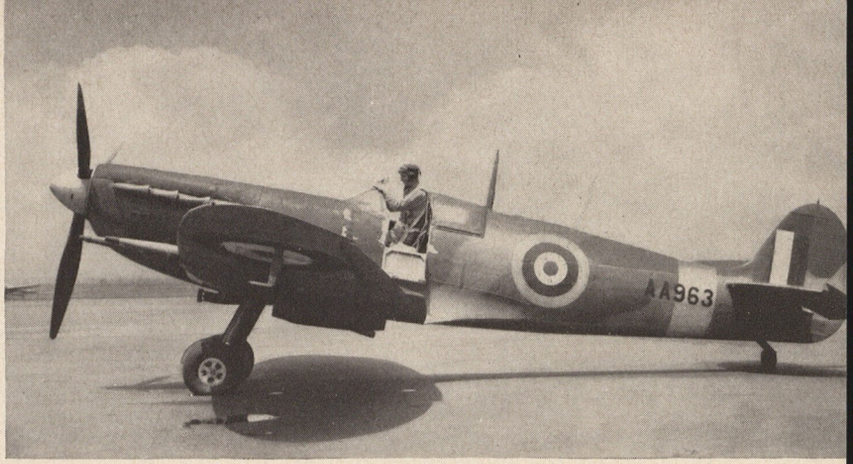
THE two-engine Junkers Ju 86 is a medium bomber, the late versions of which have been given a pressurized cabin. It has been seen at 42,000 feet in scattered raids over England but is believed to carry no armament, depending upon altitude for its protection.

The Heinkel He 177 is the first four-engine German bomber designed for use by the Luftwaffe. Although it is fitted with dive brakes, it has only been reported at high altitudes. The main point of interest in this airplane is its side by side arrangement of two engines in a single nacelle, each set of two engines driving one propeller. It is believed that the airplane can reduce its wing area in flight, permitting higher speeds after take-off.

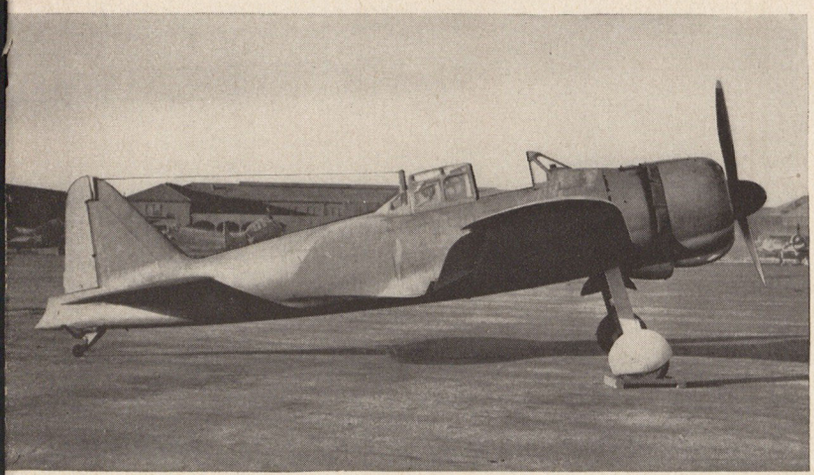
The latest two-engine medium bomber of the Dornier family is the Do 217E which has special equipment for dive bombing. Many novel features have been included in the Do 217E including the 14 cylinder, double-



Italian Macchi 200

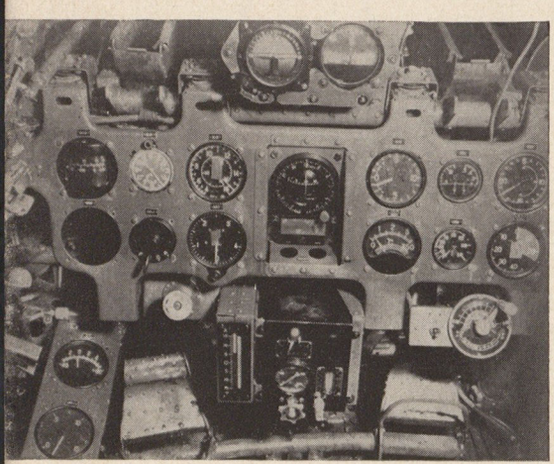


British "Spitfire"

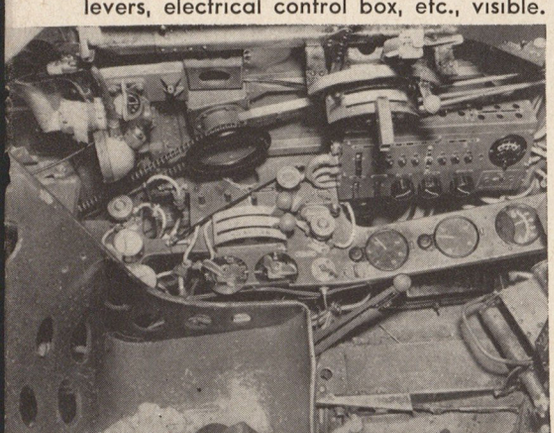


Japanese "Zero"

Our allies and enemies alike are adventuring with aircraft design. Here is a profile of some foreign planes in the news.



INSTRUMENT panel of the Japanese "Zero," showing full complement of gadgets. Below is a view of the left side of the cockpit, with propeller controls, trimming levers, electrical control box, etc., visible.



row, fan-cooled BMW-801 engine, hot air wing de-icing installation and an umbrella-shaped dive brake situated in the tail end of the fuselage.

The first fighter with an air-cooled engine used by the Germans in current operations is the Focke-Wulf FW 190. This aircraft is noteworthy for its compactness and simplicity of design. Reports indicate that it has excellent flying characteristics and that it combines speed, climb, ceiling and maneuverability into a fighter of significant quality. The FW 190, having four 20 mm cannon and two 7.9 mm guns, carries considerably more punch than its famed predecessors of the Messerschmitt series. Like the Do 217E, it has the BMW-801 engine, the main feature of which is a blower fan on the front of the engine revolving approximately two and one-half times the speed of the propeller and forcing cooling air through carefully designed channels around the cylinders. The fan cooling is intended to provide more efficient cooling on the ground, during climb when speed is reduced, and at altitudes where the air is of low density and presents difficulties regardless of the cold temperatures.

Some individual features found on German aircraft are of interest. The handle on the control stick of Messerschmitt planes, for instance, is arranged with a hinged latch that in one position prevents accidental operation of the thumb operated gun button. When flipped over, it uncovers the button and serves as a trigger for the cannon; thus both the cannon and the guns can be operated. A spring holds the latch in the safety position and the cannon button is operated only by the latch which can engage the button. For radio transmission a small switch button is situated convenient to the little finger. On an extension of the throttle handle a pivoted thumb switch permits changing the propeller pitch without removing the hand from the throttle lever.

For a number of years, a heated-wing deicing system has been incorporated in German bombers. Hot air is obtained from a heat exchanger or muff around the exhaust manifold; the air is conducted through the leading edge of the wing, where it escapes through openings near the ailerons.

Many magnesium castings, some of considerable size, have been used in German airplanes. It has been estimated that a two-engine Ju 86 contained from 500 to 600 pounds of magnesium.

The Germans have placed emphasis on ease of maintenance, particularly on replacement of engines in a minimum of time. A crew unfamiliar with a Messerschmitt airplane completely removed a DB-601 engine in less than twenty minutes.

THESE wily Japanese, as usual, have done a good job of copying the developments of engineers in other countries. However, it is inevitable with such a policy that the original examples are obsolete by the time they are adopted.

The well-known Zero, generally the name given the Mitsubishi "00" fighter, is primarily an interceptor because of a high rate of climb made possible by reductions in weight, resulting *(Continued on next page)*

FOREIGN AIRCRAFT

(Continued from Page 13)

mainly from the elimination of passive defense measures. It packs a good punch with its two 20 mm cannon and two 7.7 machine guns but the lack of defensive armor plate and leak-proof fuel tanks make the Zero extremely vulnerable. A large internal fuel capacity augmented by an external auxiliary tank totaling 215 gallons give it a long range, estimated at over 1,200 miles.

The carrier-borne Aichi 99 is the standard Japanese dive bomber which has been used extensively in attacks such as the Pearl Harbor engagement. On the under side of the 48-foot wing, dive brakes are set as in the Junkers Ju 87. There is no armor nor leak-proof tanks and the two fixed nose guns and one flexible rear gun are of small caliber (7.7 mm equivalent to our 30 caliber). The fixed machine guns are believed to be adaptations of a German gun; the flexible types are modifications of the obsolete Lewis.

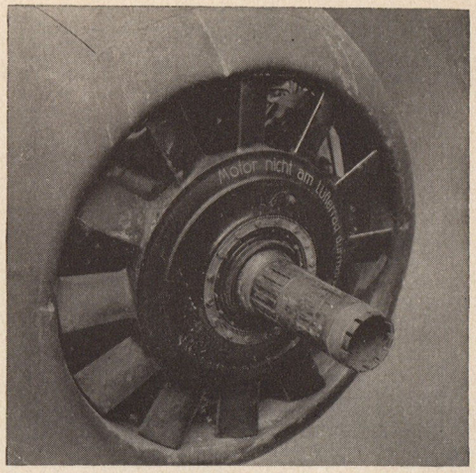
A PLANE closely resembling our Douglas A-24 is the Nakajima 97, which is essentially a torpedo bomber. This plane has been used by the Japanese Navy to carry a 1,700-pound torpedo or two 550-pound bombs. The Mitsubishi 97 (Army), evidently available in large quantities, has been the outstanding Japanese heavy bomber. The bomb load is reputed to be 4,400 pounds and with this load it is believed to have a range of at least 1,200 miles at 190 miles per hour. Four-engine Japanese airplanes reported in operation are mostly the Kawanishi flying boat closely resembling a Sikorsky design; occasionally the German type FW-200; and possibly a model patterned after the DC-4.

Although Italy has produced a fairly large number of airplanes of different types, some of which embody good aeronautical features, there is no indication that the performance of any Italian aircraft is comparable to current models being produced by the leading nations. The Italians show slight progress over the Japanese in equipping their aircraft with armor plate and fuel tank protection. But even in their standard combat airplanes, the Italians seem to have kept their armor to a minimum. The usual gun arrangement in their best front line fighters is two 12.7 mm (50 caliber) machine guns. It has been noted that the majority of Italian fighters are equipped to carry a quantity of light bombs (i. e. 144 two-pound bombs on the Macchi 200) which are dropped and set to explode in front of enemy bombers.

The Macchi 200, originally having a Fiat 840 horsepower 14-cylinder, air-cooled engine, is a fighter which has been in considerable action. The radial engine is being replaced by a German DB-601 liquid-cooled in-line engine which gives it a high speed (in the neighborhood of 325 miles per hour) and an initial climbing rate of 3,000 feet per minute.

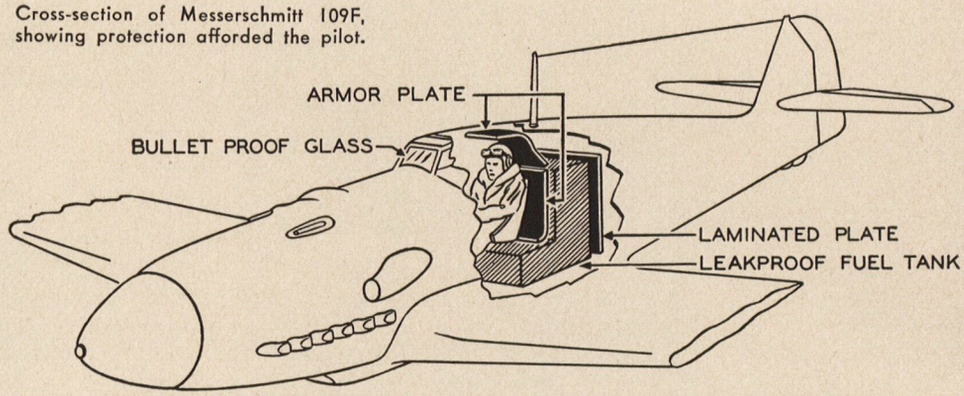
Italy's outstanding long-range bomber is the Savoia-Marchetti SM 79. This tri-motor, four-place monoplane has an estimated high speed of 295 miles per hour at 16,400 feet and is capable of carrying a maximum load of 4,400 pounds of bombs or torpedoes. Power is supplied by three 1,000 horsepower Piaggio 14-cylinder air-cooled engines. The Italians have been known to design some excellent engines and airplanes but shortages of materials and the strain of war conditions obviously have seriously curtailed their production of airplanes and interfered with any aeronautical development program.

PERFORMANCE data on Russia's combat type airplanes is seldom officially disclosed. The Stormovik IL-2 fighter has been used extensively in attacks against tanks. It mounts two large caliber cannon as well as two 7.6 mm machine guns. This armament is complemented by rocket projectiles which have been found especially effective against tanks and ground installations. Pilot and engine are protected with an abundance of armor plate.



The German engine BMW-801, used in the Focke-Wulf FW-190 and the Dornier Do-217, has a fan on the propeller hub which forces cooling air through carefully designed channels around the cylinders.

Cross-section of Messerschmitt 109F, showing protection afforded the pilot.



The DB-3F is Russia's best medium bomber; it possesses excellent handling characteristics, has a high speed of 270 miles per hour and good armor protection. The light bomber PE-2 has a very trim appearance with two in-line engines and a well-streamlined fuselage. Other Russian airplanes include the RATA I-16 fighter—short and stubby with a radial engine; the MIG-3 fighter, with a top speed reputed to be 390 miles per hour; the LAGG-3 fighter with an in-line engine and smooth lines broken only underneath by two well-faired scoops; the two-engine YAK-4 attack bomber; and the four-engine TB-7 heavy bomber with two inboard engines carrying the cooling systems for the outboard engines in large underslung nacelles which also house the landing gear and provide a limited space for rear gun positions.

British historians will record for all time the part which the Hurricanes and Spitfires played in the Battle of Britain. While the Hurricane is fading out of the picture somewhat, new model Spitfires are maintaining their reputation as the outstanding British fighter. The latest Spitfire design, with a Rolls-Royce Merlin XLV 1,210 horsepower power plant, attains a high speed of 375 miles per hour at 20,000 feet.

The Bristol "Beaufighter" is a fast, two-engine night fighter, interceptor or attack plane. Its range, 1,500 miles, and a maximum speed of 330 miles per hour, has made it suitable for long range patrol by the Coastal Command. It can reach a service ceiling of 33,000 feet; its armament includes four 20 mm nose cannon and six .303 fixed wing guns.

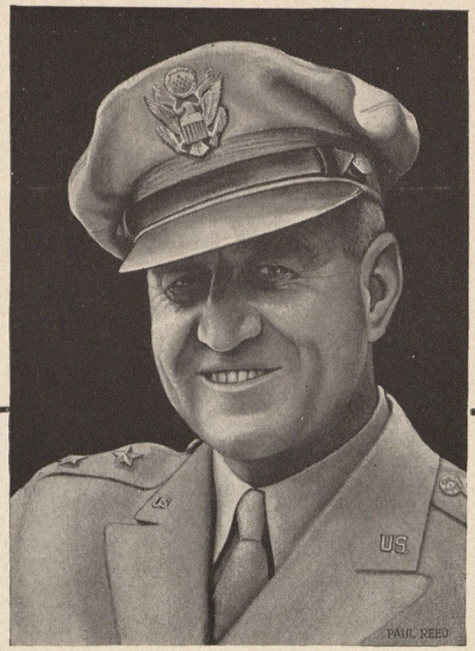
Bombers have been developed considerably by the British. In the two-engine class the Wellington and the Blenheim are prominent. For long range and heavy bombardment the English take pride in their four-engine airplanes, the Stirling, Halifax and Lancaster. The Short Stirling I has taken off with a bomb load of approximately ten tons. The Handley-Page Halifax is not far behind the Stirling in load carrying capacity. In the more efficient Avro Lancaster, a heavy bomb load (12,000 pounds) can be carried 1,200 miles.

All of these four-engine heavy bombers are equipped with .303 machine guns in the turrets, flexible and fixed positions. As the British, until recently, restricted their long range bombing operations to night time, the small caliber guns have been considered adequate protection. The duties of distant sea patrol have been taken by the large four-engine Short Sunderland flying boat.

In friend or foe we can admire the products of engineering skill. ☆

Combat Notes From Down Under

An analysis of Army Air Forces operations in the Southwest Pacific.



By Major General Ralph Royce

COMMANDING GENERAL, SOUTHEAST ARMY AIR FORCES TRAINING CENTER

AIR FORCE has asked me to tell you something of the conditions we face in fighting the Japanese in the Southwest Pacific.

The problems are many-fold, and we should face them frankly. Many of the problems have been overcome, for much pioneering has been done, but a lot of hard work lies ahead. The Jap is a ruthless and competent enemy, and nature causes hardships that are almost as bad as the Jap himself.

But I have found that our men of the Air Forces—whether Army, Navy or Marine—do their work uncomplainingly and set up great records in fighting and in maintenance. Our equipment is second to none, and we can match the enemy everywhere in skill and courage—in the air, on the ground and on the sea. We can have implicit faith in our final victory over him.

The key to our operations in the Southwest Pacific theater is, of course, the island continent of Australia. I arrived in Australia shortly before the fall of Java. Ours had been the last American plane to come into Java from India.

Australia is almost as big as the United States, but supports only slightly more than 7,000,000 people, over half of whom live along the east coast in the large cities of Sydney, Brisbane and Adelaide. Most of the industries are grouped around these metropolitan areas, which in turn are largely dependent on the Murray River Valley in the southeastern part of the continent, the main agricultural region.

West of the eastern coast range is a large semi-arid region which the Australians call the "Bush." The country is so dry that the average Australian does not figure on so many sheep to the acre, but rather on how many acres will support one sheep. Beyond the Bush stretches the western desert. When means are found for irrigating this vast arid region, Australia will be able to support a much larger population.

Because of the vastness of the land, combined with its characteristics and the shortage of population, practically no development of highways or railroads has taken place beyond the vicinity of the large cities along the eastern coast range. In the early days each state was developed separately. Jealous of its independence, each built its own railroad—with its separate gauge.

All of this is of vital importance to our operations. The network of independent railroads, for instance, always creates difficulty in the movement of our supplies. If an airplane engine is unloaded at Adelaide in the south, to be shipped 2,500 miles to Townsville in the north, we have to unload and load it several different times.

TO MOVE our equipment from Adelaide to Darwin, we have to make the first part of the journey by a slow, narrow-gauge railroad to Alice Springs, almost in the center of the continent, because there is no passable highway to that point from Adelaide. From Alice Springs to the small town of Birdum, some 200 miles south of Darwin, the Australian engineers built a military highway for 600 miles over the desert. Our engineers are now helping to improve this highway. From Birdum to Darwin we trans-ship again on another small-gauge railway.

But even where there is an adequate railroad, the methods of operation and the equipment often are, by our standards, entirely out of date and, in most cases, cannot handle the heavy loads that we have to ship to our various bases. Australian freight cars have been known to break under the weight of one of our Army's prime movers. Moreover, one is unable to turn to the roads, because they are usually impassable except in the extremely dry season. I have known many of our large units to be stuck for as long as a month, although we desperately needed them in the combat zone. Of course, such conditions make air transport vital to our operations. To a great extent we found that it can alleviate many of the transportation problems just mentioned.

Communications, likewise, both for ourselves and the Australians, cause many headaches. Inadequate telegraph and telephone lines were overtaxed even in peace-time. They cannot begin to handle the volume of military business. We turned to the greatly expanded use of radio, but this forced us to encode and decode. Not only did we have to use many additional operatives, but we lost precious time in actual combat operations.

In the matter of airports, Australia is not so bad. Before the war the people had developed a system of airplane ambulances—flown by young doctors who had learned to fly in order to take care of the people who lived hundreds of miles removed from any large center of population. Ranches were equipped with what is known as pedal radio sets, permitting calls for medical aid in the quickest possible time. But the airports used for this purpose, while numerous, were not well situated from a tactical standpoint, nor were they large enough to accommodate our heavy, fast military aircraft.

Moreover, it was found impossible to create large fields as we know them in the United States because of the rocky nature of the terrain, or, in the extreme north, because of dense woods and the lack of heavy bulldozers and earth-moving equipment.

This and a fast-moving tactical picture forced the building of operational strips, 6,000 feet long, 300 feet wide, with the middle hard-surfaced to stand heavy bomber operations. This construction, of course, destroyed the top soil, and then the dust problem became acute. Dust got into every moving part that we used: engines, wheels, machine-guns and trucks. At one island airport the dust was fifty percent pure iron oxide. You can imagine what this did to our engines. *(Continued on Page 40)*

Notes from the Air Surgeon's Office:

How to Keep Well in the ALASKAN THEATER

Brigadier General David N. W. Grant

THE AIR SURGEON

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

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

THERE are fewer conveniences, more severe winters and greater distances between inhabited areas, but service in Alaska has many similarities to service in the more remote rural sections of the northwestern part of the United States.

Topography and climate account for local variations in living conditions. Winters are coldest in the inland valleys that are surrounded by high mountains; summers are uncomfortable, due both to heat and humidity, especially on the flat tundra of the far north where the sun does not set and the land becomes a vast swamp after the spring thaws.

As far as the individual soldier is concerned, the general problems that influence health in Alaska are for the most part related to hygiene and sanitation, and to obtaining protection from the cold.

When men live in remote areas, they are inclined, especially during cold weather, to become careless with regard to hygiene and sanitation. It is hard to bathe in zero weather; yet experience soon teaches that we will suffer from various skin ailments and become unpopular with our friends if we don't keep clean.

LONG beards should not be worn if the individual will be out-of-doors much of the time. The moisture of the breath accumulates on the whiskers, and freezes, so that there is danger of freezing the skin. If beards are worn they should be clipped short. Shaving should be done before going to bed, for if it is done in the morning, the face will become chapped.

Even in uninhabited districts, strict sanitary discipline will have to be enforced. Sewage deposited on snow in the winter time will be spread over wide areas when the snow melts. It is significant that typhoid fever, a disease not uncommon in all parts of Alaska, is most frequently encountered shortly after the spring thaws begin.

It is always necessary to be certain that water is safe before drinking it. Be sure that the area is absolutely uninhabited upstream before trusting to luck and drinking from a stream. When there is any doubt, drink tea or coffee, or use one of the procedures prescribed in FM 8-40.

Many of the native women (Indian and Eskimo) have venereal diseases, and tuberculosis is quite prevalent among them, so it is best that they be avoided.

THE cold winter climate will influence every act of life from early fall until late spring. Because of the extreme cold, individuals from warmer climates are inclined to disregard the proper ventilation of dwellings. This is very dangerous, for most buildings are heated by means of small wood or coal stoves. Unless there is adequate ventilation, these stoves are apt to produce a very poisonous gas — carbon monoxide. This gas does not have an odor; there is no warning of its presence until the victim is unconscious.

Gasoline engines also produce carbon monoxide, so it is dangerous to operate an airplane motor in a hangar or run an automobile engine in order to keep the heater warm, unless the hangar is well ventilated, or the car is moving. Be sure automobile exhaust pipes are not broken by hitting stumps or snowdrifts, otherwise the gas is liable to penetrate into the car even if it is in motion.

When a closed vehicle becomes stalled in the snow, the engine is generally left running to keep the occupants warm and to avoid difficulty in re-starting. If snow drifts over the exhaust and carbon monoxide fills the vehicle, the occupants may be overcome with gas. Meanwhile, the gasoline may become exhausted. Later, when the vehicle is found, it looks as if the occupants had frozen to death.

In a stalled vehicle always keep the exhaust pipe open by getting out frequently and cleaning away the drifted snow. *Don't go to sleep* in a closed car with the motor running! If you must sleep, open the window enough for a slight draft and rest your head against the glass with your face in the draft. It is possible to insure adequate ventilation without chilling, if windows on the lee side of a building or of a car are opened. Take turns in sleeping.

When traveling, a vehicle should always contain at least two men, and one vehicle should never travel alone. A lantern, a can of coal oil and a blanket will keep you warm and comfortable in a stalled vehicle, even in a blizzard, for several days. Wrap the blanket around you like a tent. Light the lantern and place it between your feet. A blizzard rarely lasts over three days.

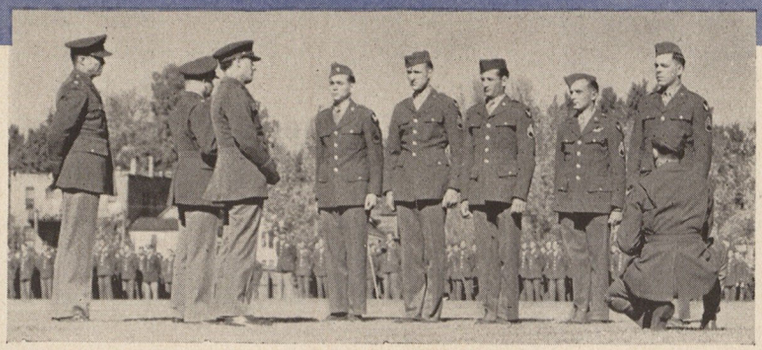
Injuries due to the cold will constitute the greatest hazard that the individual will encounter during the winter time. Frostbite is the most common of these injuries. It usually affects the exposed parts of the body, such as the nose, cheek, chin, ears or the feet and hands. Tight clothes and shoes cut off the circulation and thus play an important part in bringing on this condition.

Frostbite most often occurs in cold dry weather where there is a strong wind. It is usually accompanied by a stinging pain, which gives way to numbness, but not infrequently there is only a sensation of cold and the individual does not realize that he has a frostbitten ear or nose. Serious injury may result if the individual does not become aware of it in a short time. He should have a companion inspect him at frequent intervals, looking for the typical gray or white appearance of frostbite. He should wrinkle his own face and wiggle his toes and fingers constantly.

If there is any stiffness of the skin, it should not be rubbed with snow, nor should the affected part be placed near a fire; it should be *(Continued on Page 22)*

ROLL of HONOR

Capt. Francis C. Gideon



Lt. Col. W. B. David, Col. Arthur J. Melanson and Maj. Gen. Robert Olds award the Soldiers Medal to substitute for Staff Sgt. Edgar T. Raezer and Staff Sgts. Verlan M. Davis; Eugene A. Rynerson; Wm. E. Petersen and Rudolph R. Kudlach.

Major John D. Bridges

DISTINGUISHED SERVICE CROSS

LIEUTENANT COLONELS: Francis R. Stevens*, Richard H. Carmichael. **CAPTAIN:** George Lavin, Jr. **LIEUTENANTS:** Jack Donaldson, Lyman Middleditch, Robert M. Wilde*. **MASTER SERGEANT:** William H. Prince.

DISTINGUISHED SERVICE MEDAL

MAJOR GENERALS: Herbert A. Dargue*, Clarence L. Tinker*. **COLONELS:** Charles Bundy*, Oliver S. Ferson*.

SILVER STAR

MAJORS: John D. Bridges, Edwin B. Broadhurst (also Purple Heart), Thomas J. Christian, John E. Dougherty, Thomas H. Hubbard, Kenneth R. Kreps, Oswald W. Lunde, William E. McDonald (also Purple Heart). **CAPTAINS:** Bruce H. Bennett, John Brownewell, John W. Carpenter 3d (also Oak Leaf Cluster), Kenneth Casper (also Oak Leaf Cluster), Henry J. Hawthorne, Maurice Horgan, Ben S. Irvin, John D. Mainwaring, Lewis B. Meng, Alvin J. Mueller (also Purple Heart and Distinguished Flying Cross), Robert Northcutt, George W. Prentice, Michael E. Sims, Allison W. Strauss*, Robert L. Williams. **LIEUTENANTS:** William H. Ambrosius, Stephen W. Andrew, Clyde H. Barnett, Jr., William G. Bennett, Marne Boelke, Theodore E. Burda, Wilson A. Chapman, David M. Conley, Samuel C. Cravens, Robert Debord. **MASTER SERGEANTS:** Roland A. Boone (also Oak Leaf Cluster), William J. P. Griffin, George Heard, Elving Moncrief, James E. Worley (also Oak Leaf Cluster). **STAFF SERGEANTS:** James B. Bunch, Robert Chopping, O. C. Cook, Meredith E. Durham, Orin W. Hawkins, Stanley C. Jackola (also Oak Leaf Cluster), Milton F. Kelm, John H. Lindgren, Douglas H. Logan, Albert L. Malok, Robert R. Noller, Wallace L. Olford, Leroy H. Penworden, Charles S. Savoini, Irvin S. Schier (also Oak Leaf Cluster), Robert W. Schlotte, Lorenzo H. Snow, Derwin D. Terry, Wiley C. Walters (also Purple Heart). **TECHNICAL SERGEANTS:** Walter Kolbus, John G. McKenna (also Oak Leaf Cluster), Arthur L. Richardson (also Purple Heart and Distinguished Flying Cross), Martin M. Schadl, Ralph J. Stiles, Coy H. Thomas, P. M. Vasalie, Clebert L. Washburg, Sam E. Weaver. **SERGEANTS:** Mario J. Filigenzi, Charles D. Franklin, Jr., Casimir J. Slodki, Charles H. Spencer (also Oak Leaf Cluster), Billie B. Sutton (also Purple Heart, Distinguished Flying Cross and Oak Leaf Cluster), George Sweedar, Franklyn L. Timberlake, Regis D. Weinfurther, Lloyd D. Whipp, Joseph O. Wingard, Kirk K. Wyatt. **CORPORALS:** Robert Alderson, Lowell A. Anderson* (also Purple Heart*), Norman A. Carlsen, Julian J. Champagne, W. D. Clarke, Francis M. Fowler, Harold E. Guse, Paul K. Harmon, Clarence M. Hoehn, Gary C. Hollister, Maurice L. Londer, Ralph I. Martin, Leonard M. Secor, Lonnie D. Wright. **PRIVATES FIRST CLASS:** George P. Marasci, Smith W. Radcliff. **PRIVATES:** Robert P. Elmerick, A. G. Osborn, Sydney Schwimmer, Harold Van Dorn, A. C. Wangler.

*Posthumous

PURPLE HEART

BRIGADIER GENERAL: William E. Farthing. **MAJORS:** Richard R. Barden, James V. Edmundson (also Distinguished Flying Cross). **CAPTAINS:** Nathaniel H. Blanton (also Oak Leaf Cluster), Arthur A. Fletcher, Jr., Francis C. Gideon, J. J. Kruzel (also Oak Leaf Cluster to Silver Star), Cuthbert L. Moseley, Jr. (also Oak Leaf Cluster), John Herbert Posten (also Oak Leaf Cluster), Stephen M. Smith, Percy Stoddart, Jr. **LIEUTENANTS:** Frank E. Angier, John R. Giddens, Stanley R. Holland, James A. Kaughtry, Verner E. Peterson, Marston C. Reed, Lyle A. Slocum*, Walter S. Smith, Harold Spire, Phillip Sprawls, William R. Ware (also Air Medal), Donald A. Walter*, Lewis P. Wells*, Lawrence Werner, Charles E. Windus, Anne G. Fox, Nurse Corps, for bravery in action at Hickam Field on December 7. She is the first woman to win this award. **FIRST SERGEANT:** Frank C. Devine. **STAFF SERGEANTS:** Edwin Smith, Anthony Leodora. **TECHNICAL SERGEANTS:** Joseph Markiewicz, Vincent Tooney. **SERGEANTS:** Kenneth A. Gradle (also Distinguished Flying Cross and Oak Leaf Cluster), Russell Huffman (also three Oak Leaf Clusters to Silver Star), Clevis Jones (also Oak Leaf Cluster to Silver Star), Howard Thompson, Riley R. Wilsey*, Robert L. Whitham*, James Wright*. **CORPORALS:** Bert Lee, Jr., Furman C. Martin, Jr., Kenneth E. Nelson (also Air Medal), Edgar L. Rogers*, Peter Wargo. **PRIVATES FIRST CLASS:** Charles J. Correll, Morris Moskowitz. **PRIVATES:** Blake C. Allshouse, Howard J. Beatty, Edwin T. Bottelson*, Gordon W. Boutellier, Norman M. Boutin, Joseph R. Drisner, Wildred Hellenbrand*, Richard G. McClung, Ben Odette, William Osborne, Walter H. Rockman, Newbra Ross, John H. Schwister, Walter Smith, Garrett C. Tyla. **AVIATION-STUDENT:** G. A. Plaster. **TECHNICIAN:** George L. Finkelstein.

DISTINGUISHED FLYING CROSS

LIEUTENANT GENERAL: George H. Brett. **MAJOR GENERAL:** Lewis Brereton. **LIEUTENANTS:** Edward Crouchley, William Joyner, James H. Mitchell*, Albert Thom, Manford K. Wagnon, Thomas N. Warren, Herbert C. White, Jr., McLyle G. Zumwalt. **SERGEANT:** Leslie Cain. **CORPORAL:** F. Ottauiano.

SOLDIER'S MEDAL

STAFF SERGEANTS: Verlan M. Davis, Rudolph R. Kudlack, William E. Petersen, Edgar T. Raezer, Jr., Eugene A. Rynerson. **SERGEANT:** Earnest L. Kilgore. **CORPORALS:** George Barnes, Bruce G. Benson, James M. Gilbreath. **PRIVATE FIRST CLASS:** John S. Stratton.

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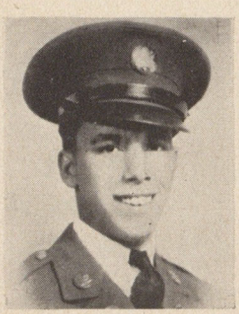
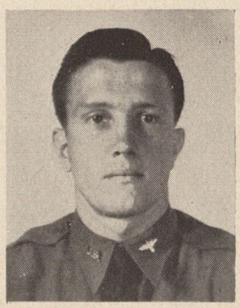
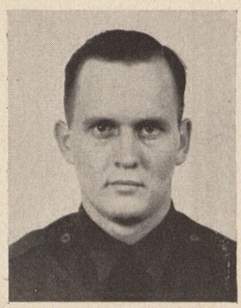


Sgt. Kenneth A. Gradle

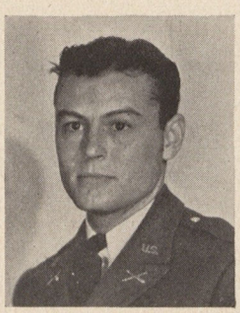


Lt. Herbert C. White, Jr.

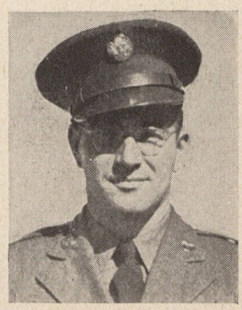


Lt. Richard S. Smith

Capt. Felix M. Hardison



Lt. Col. R. H. Carmichael



Sgt. Herbert E. Baisch

THE BAMBOO FLEET

By Captain Roland Barnick

GOWEN FIELD, IDAHO

THEY called me The Admiral of the Bamboo Fleet.

That's because I flew a resurrected Navy amphibian between Bataan and Mindanao during the closing days of the Philippines battle.

The amphibian had a nickname, too. We called her The Duck.

There were eight of us in the Bamboo Fleet—Captains Jack Caldwell, Joe Moore, Jack Randolph, Bill Bradford, Harvey Whitfield and Dick Fellows, Sergeant Bill Strathern, and myself.

We were all Army Air Forces pilots who had come over with P-26s or P-40s long before Pearl Harbor. Four of us were serving our third year in the Philippines and all of us had been there at least eighteen months when war broke out.

Our P-40s, after the Jap attack, were all busy in combat but they didn't last too long. Some were shot down, some were riddled on the ground, some cracked up in operation.

But we still needed men and planes to maintain air transport communication between the islands of the Philippines.

That's where the Bamboo Fleet came in. It was organized in February, 1942, by the late Brigadier General Harold H. George to fly personnel out of Bataan and Corregidor, and to bring in food, quinine, and other supplies from Mindanao for the wounded among General MacArthur's ground forces.

Of over four planes, three were patched-up civilian ships that had never been meant for war-zone flying. The other was The Duck, a three-place Navy Grumman amphibian that had 700 horsepower and could do ninety miles an hour when the wind was right. The Duck was my plane and that's how I got dubbed The Admiral.

We found The Duck in Meriveles Bay at the foot of Bataan, across from Corregidor. She had been sunk there by Jap strafing about three months before the fall of Bataan.

When we decided to lift her out she was awash clear up to the propeller hub and had been that way for six weeks. But we finally got her up. We did it by means of a barge with a crane on it, a little ingenuity, and a lot of hard work. Dripping wet, the Duck didn't look too flyable.

The other three planes were commandeered by the U. S. government from civilians, natives of the Philippines.

One was a three-place Waco of ancient vintage with about 250 horsepower when it was feeling right and could have made ninety miles an hour if it had been new.

Another was a three-place Bellanca of about the same power and speed—so old and shaky that it had been condemned for private flying when we got it.

The other plane was our "speedster." It was a four-place Beechcraft that turned out 450 horsepower and could do about 170 miles an hour, if pushed.

That was the Bamboo Fleet. And it was appropriately named. The planes were all patched together with native bamboo and what other odds and ends we could find. Where there were no airplane tires around, we used truck tires. On one ship a caster from a wheelbarrow was used as a tail wheel. There wasn't a gun in the fleet.

The Duck was particularly lame. After we dug her out of the bay, we tied her wings on with baling wire, patched the fuselage with native wood, and fixed up the power plant with parts taken from other engines of different type and with miscellaneous parts from various aircraft.

I guess The Duck was held together mostly by faith. Repair of the Fleet, of course, was quite a problem. There were no spare parts to be had and there were few mechanics available. All pilots pitched in on service and repair work, and somehow we got by.

All of our flying was over enemy-held country or water. We would hop off from Bataan or Corregidor fields, fly to Cebu about 300 miles to the south, refuel at hidden bases there and then fly on to Mindanao —a total of 550 miles.

The planes were built to carry from 250 to 600 pounds pay load. We carried from 500 to 1,400 on every trip, with extra passengers going out, extra freight coming in.

We made about 35 round trips in all, evacuating 100 to 120 personnel and bringing in tons of supplies.

The little planes of the Bamboo Fleet finally went down fighting.

The Waco got hers between Cebu and Del Monte in Mindanao. She had taken off from Cebu with three of our men aboard. But she didn't quite get away. Two Jap Navy patrol planes caught her in the air and literally burned her right out of the sky. The crew went with her.

Just about that time the Beechcraft got caught by the Japs in the air over Mindanao, had its landing gear wrecked, and made a crash landing. A Jap plane came in and shot it up on the ground.

The Bellanca was lost trying to get away from Corregidor. She had landed there somehow at night and had been hidden in a cove during the day; the next night she tried to take off down a sloping, unlighted runway that was badly pockmarked with

shell craters. The Bellanca got off the ground all right but she was too old and too overloaded. She crashed in the bay just a few hundred yards off shore.

That left The Duck. The Duck and I were still on Bataan at midnight on April 8, the last night before the peninsula capitulated.

On April 9, at 12:30 A.M., five passengers and myself crowded into the two-seated amphibian. We took off while the area was under heavy Jap artillery and machine-gun fire, and got away only fifteen minutes before the field surrendered.

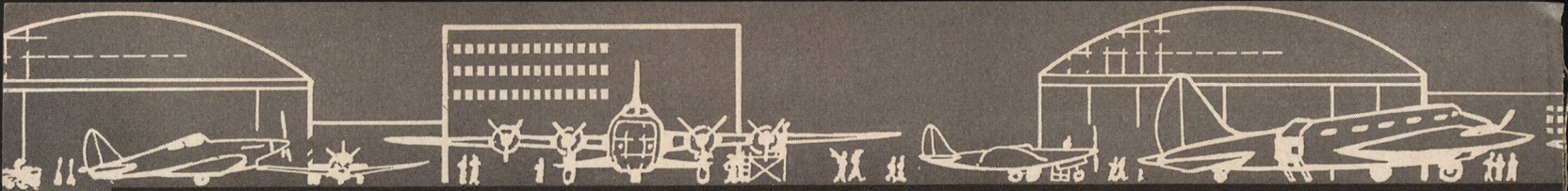
Ours was the last plane to leave Bataan.

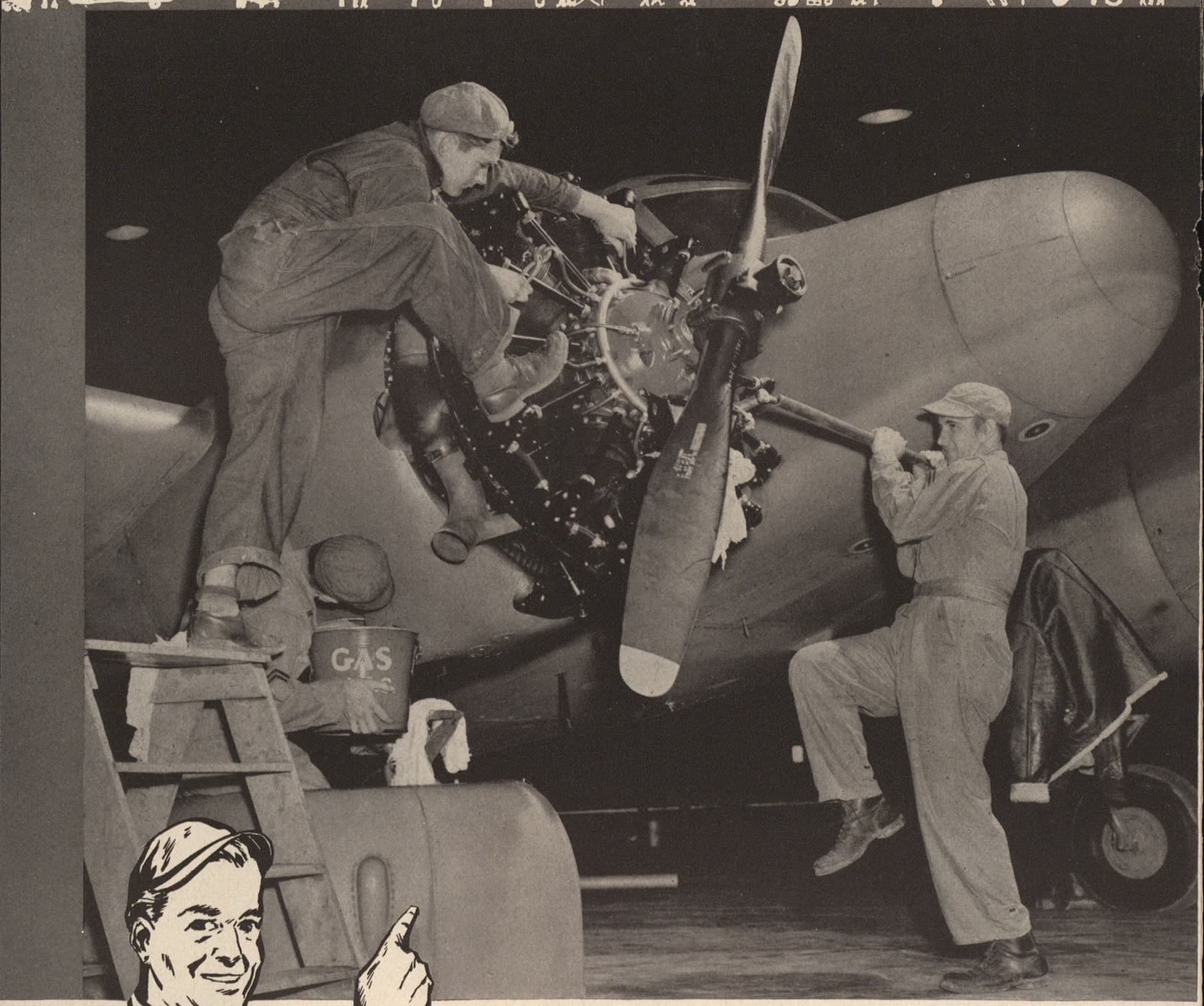
When we got in the air I found we were so heavily overloaded that we could only make 75 feet altitude. To help us climb I had the passengers throw out their parachutes, extra clothing and baggage, together with the floorboards from the plane's hull and everything else whe could strip out.

That gave us another fifty feet.

With no instruments, very little fuel, and a prayer, we headed in the general direction of Cebu. We made Iloilo. The next day we ripped some more stuff off The Duck and adjusted the propeller. That night we took off for Mindanao. We made it, too, and that's where I left The Duck, on April 25. Shortly after I was off for Australia.

I left The Duck intact. There were a few other pilots around who might have flown her after that. I wonder if they did.



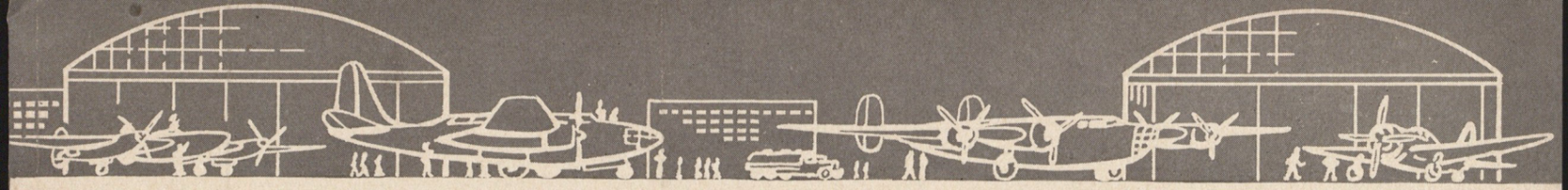


What's Wrong With This Picture?

PLENTY! It's so full of maintenance and safety boners that you should pick out the mistakes in "nothing flat". Are they obvious? Definitely. Funny? Definitely not. These boners—and others like them—are pulled every day by men who know better but just don't think, or who fail to read and follow TECH ORDERS and SERVICE MANUALS.

Naturally, in extreme emergencies and often on foreign combat fronts you'll have to improvise and use the ingenuity that makes AAF mechs tops in their work. But, as long as you can, it pays to use the right tools for the job—and it pays to *use your head.*

The mistakes in the picture are listed on the opposite page. Did you catch them all? Did we?



On the Line

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

THE OPEN SEASON on Mekiwis has started. (Mekiwis, of course, are planes grounded because of faulty maintenance). Men in maintenance and technical inspection work all over the country are sending in their suggestions on "Do's and Don'ts" of maintenance; telling us about prevalent boners that create Mekiwis.

The boners pictured at the left are the pet peeves of (left to right) S/Sgt. Harry E. Lyons, Cpl. Leo Pequiqnot and Sgt. Walter E. Wint, all of Headquarters Squadron, Air Service Command, Patterson Field, Ohio, who posed this picture for AIR FORCE.

Send your ideas and suggestions on improving maintenance to the AIR FORCE Editorial Office, 101 Park Avenue, New York, New York. This applies especially to you old timers who have a lot of ideas that make maintenance work easier, quicker and safer. Others need your tips, hints and short cuts for spotting trouble. We'll print as many as we have room for, giving full credit to contributors. (If you insist on staying anonymous, we'll string along.) Your suggestions will help others *get the Mekiwis off the ground.*

A Warrant Officer at a southern air base starts us off with these tips. Who's next?

TOUGH NUTS AND BOLTS . . .

Ever experience difficulty in starting nuts and washers on the hold-down studs while installing starters or generators? By using a bit of heavy grease, the flat washer can easily be positioned with the index finger. Or, with an old hacksaw blade and some masking tape which will bind it to the castellated nut, the starting of the nut on the stud threads can be made easier.

TIME SAVER . . .

Placing a pencil mark on the head of a bolt or stud which requires locking of the nut by a cotter pin or lock wire will save time. The pencil mark on the head of the bolt or stud, if directly in line with the cotter pin-hole, will always enable you to know under which castellation of the nut the pin-hole is hiding.

SAFETY NOTES . . .

When removing a carburetor, protect the rest of the engine by placing over the opening a piece of heavy stencil paper cut and punched to fit on the studs.

Always check the control locks before putting a plane to bed. Rudder banging from one extreme to another can cause failure of a control system in take-off or in flight.

Thanks to Mr. Mike Dietz, Chief Inspector at Patterson Field, Fairfield, Ohio, for the blue prints and tips on every-day maintenance mistakes appearing at the right.

MISTAKES ON OPPOSITE PAGE

Reading from Left to Right:

1. Look out there, Herkimer—you'll fall off that ladder. It's certainly too far from the engine for convenience or safety. (See A.C. Circular 130-2, Sept. 18, 1933.) What's more, you should be using the correct crew chief maintenance stand.

2. Sabotage! Get your foot off the rocker box and interconnecting lubricating lines. Reference: Common sense.

3. That spark plug high-tension lead wasn't made to hang on. You'll pull it loose. Reference: Common sense.

4. Good Lord, is that a pair of pliers you're using on the "hex" nut of the spark plug elbow? You'd better read T.O. No. 03-5E-1 and use the prescribed elbow wrench.

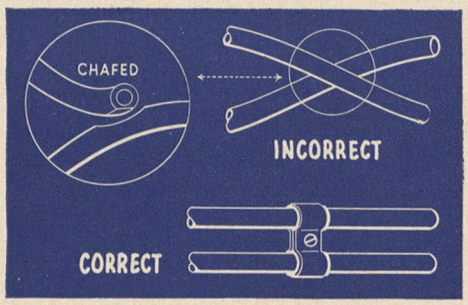
5. Hey, you, under the engine! You're a one man fire hazard draining gasoline in a closed hangar. You should have drained it outside the hangar. Read up on fire prevention in AAF Regulation 85-6. Incidentally, T.O. No. 01-1-1 requires all volatile fluids used for cleaning to be stored in and used from safety-type containers.

6. That cowling definitely should *NOT* be under the engine . . . and you'd better not let the crew chief catch you sitting on it.

7. Hey, stop it, you on the right. You'll freeze that spark plug so tight we'll never get it out. *NEVER* use an extension on a wrench to tighten plugs. The wrench shouldn't be over ten inches long. Better use a twelve-point or box wrench and the torque specified in T.O. No. 03-5E-1. And don't forget to put the anti-seize compound on those plugs.

8. Incidentally, that pitot tube wasn't put there for a coat rack. Oh, you're keeping the grit and dirt out? Then you'd better use the pitot tube cover as specified in T.O. No. 05-50-1.

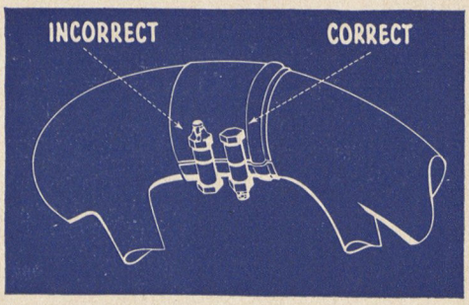
9. And don't forget to take that rag out of the engine. Believe it or not, a Tech Inspector recently found a yard of oily cloth in an intake tube.



COPPER, ALUMINUM TUBING

INCORRECT: Tubing not properly spaced and anchored; results in chafing and, in extreme cases, failure of system.

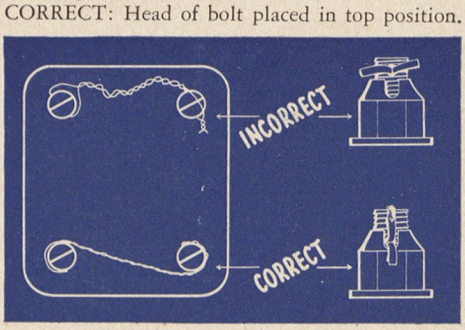
CORRECT: Separate the lines by using clamps or rawhide lacing. (Where a number of lines exist, a fibre block should be used to keep the lines separated and properly anchored.)



EXHAUST BOLTS

INCORRECT: Bolt improperly placed with head in downward position. If nut comes off, bolt works out and is lost; escaping flame causes damage.

CORRECT: Head of bolt placed in top position.



SAFETYING

INCORRECT: Safety wire too loose. Cotter keyhole too high above castellation of nut (When incorrectly safetied, screws will work loose; accessories will move around, shear bolt and cause damage.)

CORRECT: Safetying should be in direction of tightening; wire should be taut. Cotter keyhole should be well down in castellation of nut.

How To Keep Well

(Continued from Page 16)

warmed gradually. If it is the face, place the palm of the hand over the area for a few minutes; if the hand, put it inside the shirt under the armpit; or, if the feet, do like the Russians do, and put it under a companion's shirt. If the warmth does not return and the numbness disappear in a short time, medical treatment is necessary.

In case a doctor is not available, the patient should be taken into a cool room, and the heat of the room gradually increased. If lukewarm water is available, place the frozen limb in it, or, in case of a frostbitten face, make a compress of lukewarm water and apply to the area. All tight clothing should be loosened, and the injured person given warm food and drink. Do not rub the frozen area; but it is advantageous to gently massage the skin about the area in order to stimulate circulation. If the skin becomes black and blisters form, treat them like burns until the patient can be taken to a medical officer.

ANOTHER injury due to the cold that is common in Alaska is trench foot. This is the name given to a condition that results from prolonged standing in cold water or mud, or wearing wet socks and boots. Mild cases are sometimes called chilblains. This condition is most common when the temperature is near freezing (32° F), so that, in Alaska, it usually occurs in the spring or the fall of the year, when there is slush and mud. If care is taken to keep the feet dry, either by wearing waterproof shoes, avoiding mud and water or changing wet socks and shoes at frequent intervals, this condition can be avoided.

The uninitiated should be warned that the skin will stick to cold metal. This is especially important to those that use tools, guns, whistles and the like. The lip, tongue and hands are the most frequently affected parts. The skin freezes when it comes in contact with the metal object, and the only way that it can be released without tearing the skin is to heat the metal. Be careful in this act, otherwise a serious burn or scald may result.

Although Alaska is thought of as a dark, blizzardy country by many people, the sun can account for several painful injuries, even during the winter time. Sunlight reflected from snow, ice or water rapidly produces a sunburn, even in the Arctic. This will not occur during the middle of the winter, since the sun is below the horizon. However, it can occur in spring, summer and fall.

Snow-blindness is another injury due to the sun that can occur when the sun is shining. It usually occurs when there is a slight overcast, and is most common in flat country, especially in areas devoid of any vegetation. It is caused by the reflection of light from snow or ice, and usually begins with a slight blurring of vision. This blurring gradually increases and eventually there is smarting and then severe burning pain. The eyes become red and swollen. Finally, because of the extreme discomfort caused by the glare of the sun, the sufferer must cover his eyes.

This condition is not permanent, but the sufferer is helpless for several days. Once having had snow-blindness, the individual will be more susceptible to further attacks. It can be prevented by wearing pigmented glasses, or, if none are available, by covering the eyes with a scarf and looking through the holes between the yarn. The Eskimo makes goggles of wood or hide with a small slit to look through. Cold compresses of snow, ice, water or strong tea will give some relief but should not be used if there is any danger of freezing. Bandages which exclude all light will have to be worn for several days.

Snow-blindness does not occur among aircraft personnel while flying, but bright Arctic light does produce considerable eyestrain, so dark glasses should be worn always.

It is important to know how to care for and use Arctic clothing, for it is only by constant care and realization of the limitations of the various articles that they will be capable of protecting the wearer from the cold. The basic principle of Arctic clothing is to have a semi-airtight, preferably waterproof, outer garment and several inner wool garments. Wool absorbs perspiration, and since even during the coldest weather exertion is accompanied by sweating, it is necessary to have clothing that absorbs moisture. The outer garments should either be opened or removed during exercise to prevent overheating and to allow air to circulate freely and thus remove the vapor of perspiration. Socks and clothing, wet either because of perspiration, immersion or melted snow, should be removed as soon as possible, otherwise the wearer is apt to become chilled.

SNOW should always be brushed off clothing or it will melt and wet the garments, destroying their ability to retain heat. Tight clothing should not be worn. Shoes that are too small, too many socks and use of straps and leggings all cut off the circulation and thus tend to increase the chance of freezing. When shoes get wet they should be dried out by hanging near the ceiling of a heated building or tent with the other damp clothing. If they are placed near a fire, they will lose their oil, crack and become stiff. Sleeping bags should be aired out every day.

Men wounded in battle in the Arctic are very susceptible to frostbite. They are usually perspiring profusely while engaged in combat and when they fall they become chilled. They lose bodily heat rapidly due to shock, blood loss and direct contact with the cold ground. They should be placed in a warm spot as soon as possible, in a sleeping bag if a building is not available. Snow should be brushed off the clothing of the wounded before placing them in sleeping bags, otherwise it will melt and cause further discomfort and chilling. Wounded men should receive hot drinks as soon as possible. ☆

Forced Landing In The Arctic

IN THE Arctic the careful airman always makes sure that all emergency equipment and rations are on the airplane before he takes off, even if he is starting out on just a short hop. He may be forced down within a few minutes flying time of camp, but on the other side of a mountain range or in an uninhabited area from which it may take days of hard walking to get back to the base.

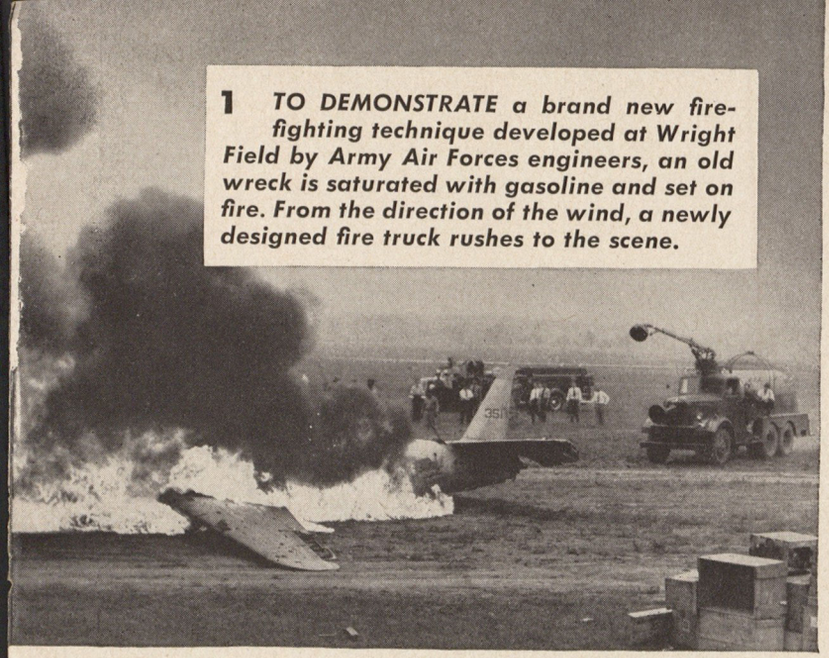
If forced down, stay in the vicinity of the plane until you are sure that the search for you has been called off. Smoke can be seen for great distances in the north; if nothing else is available, pour oil on rags and make a smudge of them. Set out panels of metal or cloth so they can be noticed by an airplane. Lampblack, powdered aluminum or other paints may be carried in the ship to be spread out on snow or water to attract attention. Tracks filled with green branches are also good. Designs should be 200 feet long to be readily visible from the air.

Make a shelter from airplane parts, or a tent from your parachute. An excellent pack-sack can be fastened from your parachute harness and ropes. Snow shoes and sleds can be made from engine cowlings, inspection panels and doors. The inner tubes of the tires may be removed and taken along to use as a raft if a collapsible boat is not among the equipment. All of these tasks will not only keep your mind occupied, but will also keep you moving about and warm, as well as prepare you for any eventuality if you are going to have to make your own way back to camp.

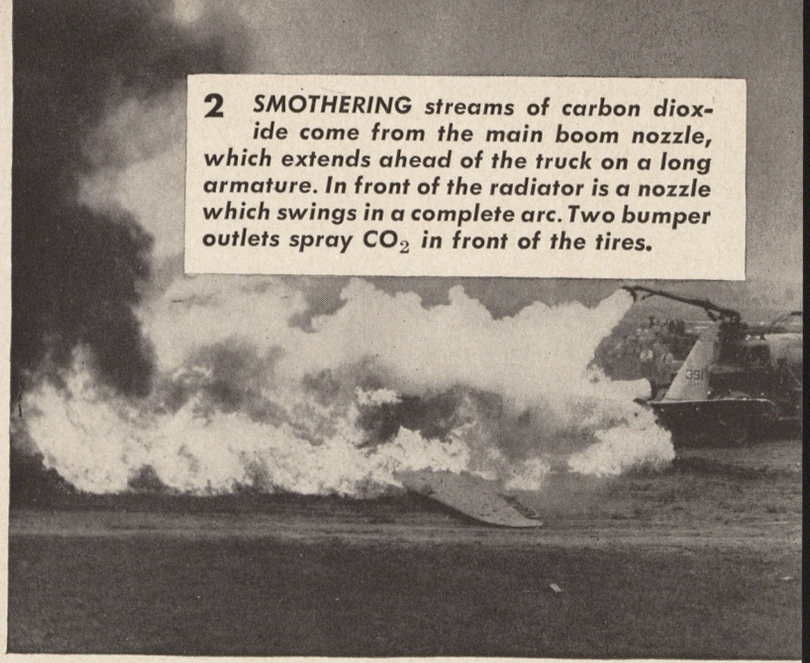
When you are absolutely sure that the search for you has been given up, select the things that you will need and start out on a definite course. The parachute can be used as a tent, windbreak or shawl. So do not discard any flying clothes; you may need extra clothing to replace worn out equipment, or as a change if you get wet. If there are any containers, take along some of the motor oil for use as fuel for cooking or as a lamp. Take along your Very pistol; it may come in handy for signalling if you sight a plane or ship. In summer be sure that you have the mosquito net or insects will cause great discomfort.

Start your journey in the morning. Walk slowly with frequent rests. If the snow is deep or the going is hard you must take your time or you will become exhausted and freeze to death. Take time to prepare at least two cooked meals a day. If lost, follow a stream or the coast and you will have a better chance of reaching a habitation. Cold, hunger and fatigue will be your principal problems, so prepare yourself to combat them before you leave the airplane, and develop a sense of resourcefulness as you go along.

(Continued on Page 39)



1 *TO DEMONSTRATE a brand new fire-fighting technique developed at Wright Field by Army Air Forces engineers, an old wreck is saturated with gasoline and set on fire. From the direction of the wind, a newly designed fire truck rushes to the scene.*



2 *SMOTHERING streams of carbon dioxide come from the main boom nozzle, which extends ahead of the truck on a long armature. In front of the radiator is a nozzle which swings in a complete arc. Two bumper outlets spray CO_2 in front of the tires.*

Fire-Fighting Crash Truck Keeps 'Em Flying

By Pvt. Andrew T. Rolfe

"ONE pound saved equals four more bullets—enough to save a bomber—so keep it super simple," is a motto that confronts the engineers of Wright Field Equipment Laboratory's Miscellaneous Unit. A poster bearing this motto, the inspiration of Colonel Rudolph Fink, hangs on the wall of his office. Each newcomer to Colonel Fink's domain has this thought driven home to him before his assignment orders have rested five minutes on his new commanding officer's desk.

A recent life-saving development announced by the Equipment Laboratory is a new fire-fighting crash truck which smothers the flames of a burning plane in less than three minutes with thousands of pounds of carbon dioxide. This fire-fighting marvel appears to be a far cry from Colonel Fink's motto. However, it owes its success to the constant work of civilian engineer W. E. (Bill) Huffman, who ever since he resigned his first lieutenant's commission in 1920 as a dirigible pilot in the Army Air Corps, has devoted his time to aeronautical research at Wright Field—especially to making CO_2 containers light enough to be carried in aircraft.

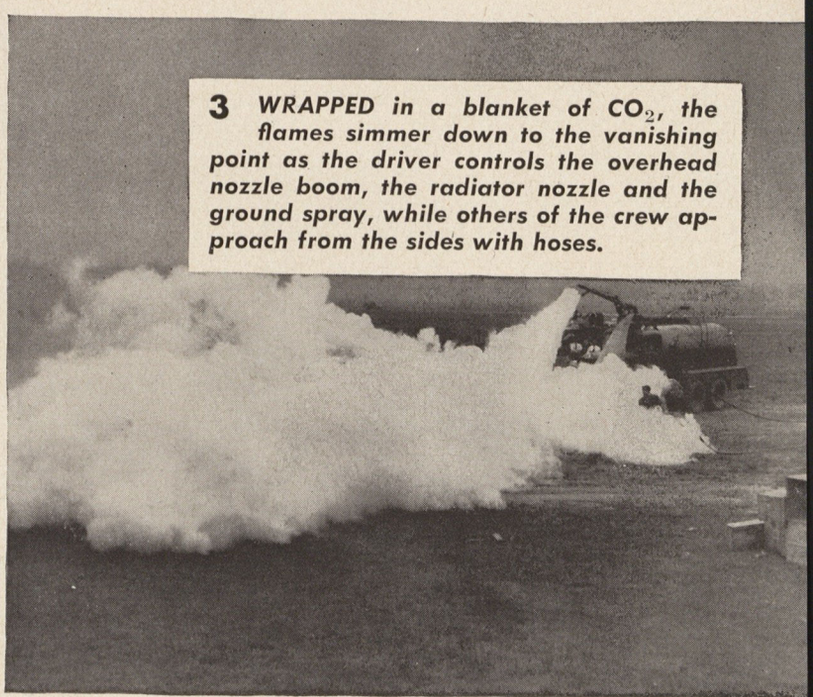
Huffman is the man who made the effective manually controlled engine-nacelle, carbon-dioxide cylinders which, since 1928, have extinguished many an airplane fire at a familiar source — the engine. His valves which stopped the old problem of having ice form in the neck by means of a constant speed control are now serving to inflate life rafts as well as putting out fires.

What has lightness got to do with a CO_2 carrying crash truck? The answer is plenty! To carry carbon dioxide in the amount needed to extinguish the flames of a crashed plane in the ordinary manner would mean that the Air Forces ground transportation engineer, Lieutenant J. C. Scott, would have to design a chassis of such gigantic proportions that the truck would be an awkward tractor-like contraption. Its lack of speed would impair its efficiency.

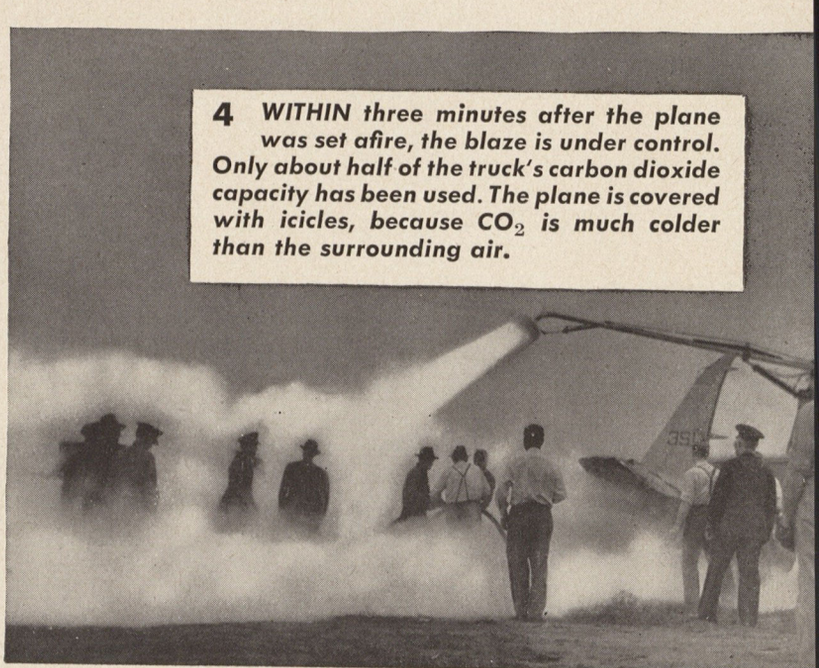
When Colonel Fink conceived the idea of a crash truck carrying enough CO_2 to extinguish a fire enveloping a plane, Huffman was ready to answer Lieutenant Scott's demand that the tank be light.

Working with the industry, Huffman found a way of keeping thousands of pounds of CO_2 at low pressure by refrigeration, thereby eliminating the necessity of a heavy pressure resisting tank.

As a result of this research, the Air Forces now has a fast crash truck which can speedily reach the scene of a burning plane and put out the fire in a matter of moments. The prime purpose of this newest piece of fire-fighting equipment is to save lives. Salvage of the plane is secondary.



3 *WRAPPED in a blanket of CO_2, the flames simmer down to the vanishing point as the driver controls the overhead nozzle boom, the radiator nozzle and the ground spray, while others of the crew approach from the sides with hoses.*



4 *WITHIN three minutes after the plane was set afire, the blaze is under control. Only about half of the truck's carbon dioxide capacity has been used. The plane is covered with icicles, because CO_2 is much colder than the surrounding air.*

WOOFS ON WATCH

By Lieut. Harry P. Kelliher

Mitchel Field

Members of the WOOFS, also known as the WAGS, a new and very doggy branch of the Air Forces, have completed their basic guard training at Mitchel Field, New York, and now take their places alongside soldier-sentries to keep the secrets of this base from prying eyes.

From seven at night till seven in the morning, in all kinds of weather, these highly-trained dogs keep watch at their designated posts; and they can become "man's worst enemy" when the necessity arises.

The duties of the sentry dogs are to accompany a guard on post; to act as an extra pair of eyes and ears; to give warning at a sign of danger or the suspicion of an intruder; but to attack only on command. The dogs are particularly useful in isolated areas and where vision is restricted.

Sentry dogs are real MP's, being carried as such on the roster, and have service records of their own. They also draw rations, just like any soldier.

A number of these animals are at present on active duty at Mitchel Field. This group includes Doberman Pinschers, who have a high reputation as military dogs, Boxers, Collies, French Poodles and one Kerry Blue.

The job of selecting and giving the dogs their elementary training is handled by Dogs for Defense, Inc., a non-profit organization, according to Army specifications. Medium-sized breeds have proved the most effective. They are big enough to bring down a man and more alert than larger breeds.

While military dogs have long been used as sentries by European armies (it is estimated that Axis nations are using more than 100,000 military dogs), these are among the first so trained in this country.

The task of training dogs and Mitchel Field sentries to work together is handled by Staff Sergeant Richard Farnham, who has trained dogs and horses most of his life.

"This could be called a post-graduate course for dogs," Sergeant Farnham explains. "After the animals have thoroughly learned to execute the primary commands such as to heel, sit, lie down, stay, leap over obstacles, sound the alarm, charge and release the victim, strict obedience to the individual guard with which they work must be taught or the dogs will become a menace.

"Selection of the guards who work with the dogs is highly important," the Sergeant states. "Each dog is schooled with the minimum number of guards. Gaining the dog's full confidence is a prime requisite; men who are sympathetic to dogs must be found. These are working dogs, not pets, and no one else is permitted to make friends with them."

The Sergeant says that too often a well-meaning soldier will come up to the dog while on sentry duty to pat his head and make friends. The guard warns him but the reply usually is, "Don't be silly; I've handled dogs all my life, they know me." A couple of vicious snarls or a lunge changes the well-meaning soldier's mind.

The training method used is the "teasing" process. The "teaser" is the man who acts as intruder while the guard and dog practice.

Proof that the dogs are completely acquainted with what they are supposed to do is shown by the fact that the Sergeant, who has trained them, does not dare approach a post they are guarding unless the sentry-partner gives the OK. ☆

COMPRESSIBILITY

An Introduction to Aviation's "Bugaboo"

By Colonel Ben S. Kelsey

PRODUCTION DIVISION, WRIGHT FIELD

MEET compressibility—the now notorious "bugaboo" of aviation.

The semi-mysterious characteristics of this plain and simple physical phenomenon have all but placed it in a class with Gremlins and other mystical figures which are supposed to furnish airmen with embarrassing moments. Actually, compressibility has been with us since the earth was first surrounded by a layer of air. Those concerned with bullet design and acoustics have long been familiar with it, but compressibility didn't mean much to airmen until they attained speeds of 500 to 700 miles per hour, or close to the speed of sound.

There are all sorts of discussions on the subject of compressibility, varying from the pilot's barracks flying to expressions of learned scientists representing the most advanced thought of research laboratories. It would be impossible to discuss all the phases of the phenomenon, since a great deal of the region of flight concerning compressibility is still unexplored. But enough is now known about compressibility and its effects to remove much of the danger connected with it, and certainly enough to explain its character.

Compressibility, as it pertains to aviation, naturally divides itself into three phases. The first of these is a simple physical description of shock waves, their formation and character. This phase, in simple terms, is the nature and formation of sound as discussed in any elementary physics text book, and the similarity of shock waves and sound waves.

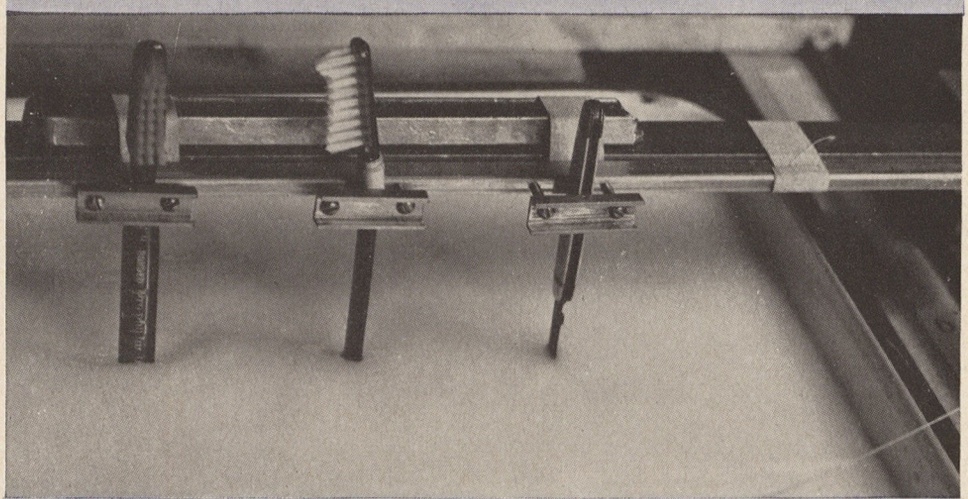
The second phase is logically the effect on an airplane in flight as it would be observed by the pilot; this phase concerns itself with the physical reaction of the airplane to the formation of shock waves.

The third phase involves a discussion of the problem which confronts the research scientist and the airplane engineer; namely, how to forestall, delay or overcome the compressibility effect.

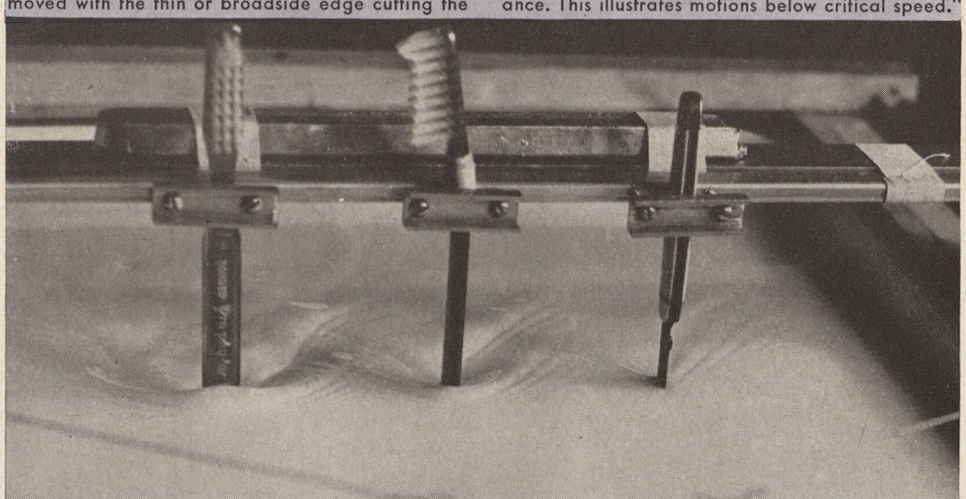
The entire problem of compressibility arises because of a peculiar characteristic of the air which causes sound to be transmitted through it at a definite speed. This characteristic of air is its ability to transmit waves.

We know that sound originates with vibrations and that these vibrations are transmitted somehow or other through the air, with the result that a corresponding vibration takes place when the sound wave strikes our eardrum.

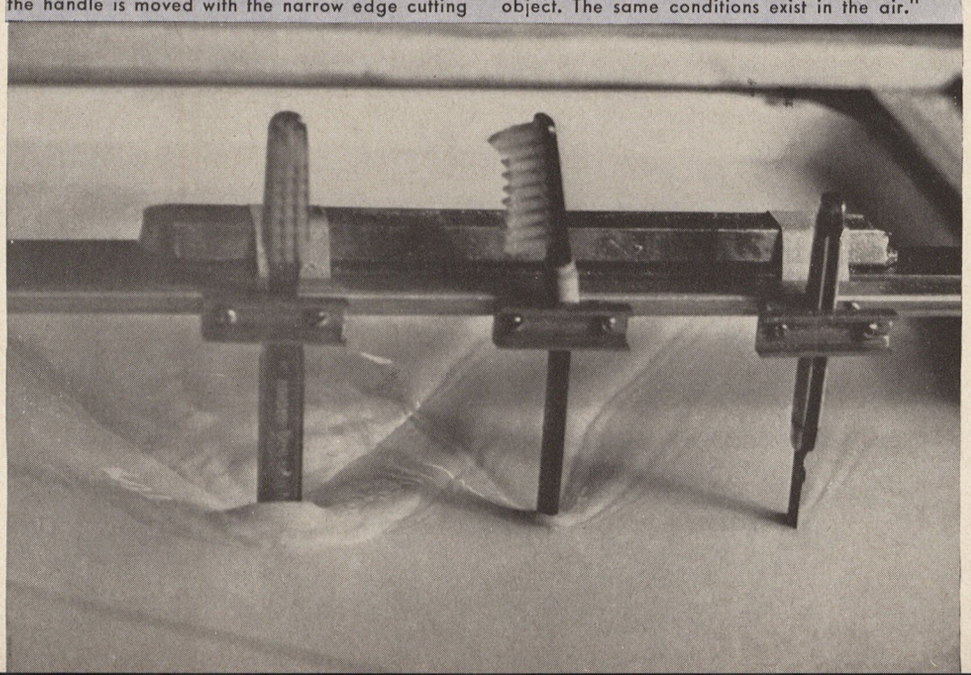
One can experience both objects and waves traveling together through the air at the same time. For example, standing on the cliffs of Dover we could watch the big German guns across the channel throw shells over to our side. After seeing the flash, we could count one minute and about fifteen seconds before the shell arrived. The explosion of the shell on our side would occur just a little ahead of the sound of firing—how much ahead depending on how close it hit. It is obvious that the shell traveled through the air *(Continued on next page)*



". . . at slow speed a toothbrush handle may be moved with the thin or broadside edge cutting the water without causing any appreciable disturbance. This illustrates motions below critical speed."



". . . if the handle is moved broadside fast enough to create waves (above), the speed at which wave formations start is a little less than is needed when the handle is moved with the narrow edge cutting the surface. The formation of waves (below) obviously is a function of how much and how fast the water has to flow in order to get around the object. The same conditions exist in the air."



COMPRESSIBILITY

(Continued from Page 25)

faster than the sound waves caused by the blast of firing. Modern fighter airplanes can reach speeds, particularly when diving, that are comparable to the speed of shells and bullets. Bullets have long been traveling in this region of high speed above the borders of compressibility and have long been forming shock waves; we are fairly well acquainted with the pictures of shock waves which form at the nose of bullets traveling through air.

In high school physics we learned that sound waves travel like the ripples spreading out on a pool of water which has been disturbed by a stone dropped into the pool. We may have also learned that the vibrations causing sound waves actually compress the air in pulsations which transmit a series of waves; but instead of the sound waves moving a surface up and down as do water waves, the crests of sound waves are regions of compressed air (hence the term "compressibility") and the hollows are regions of reduced pressure. But the air itself does not flow with the wave any more than water flows with its surface waves.

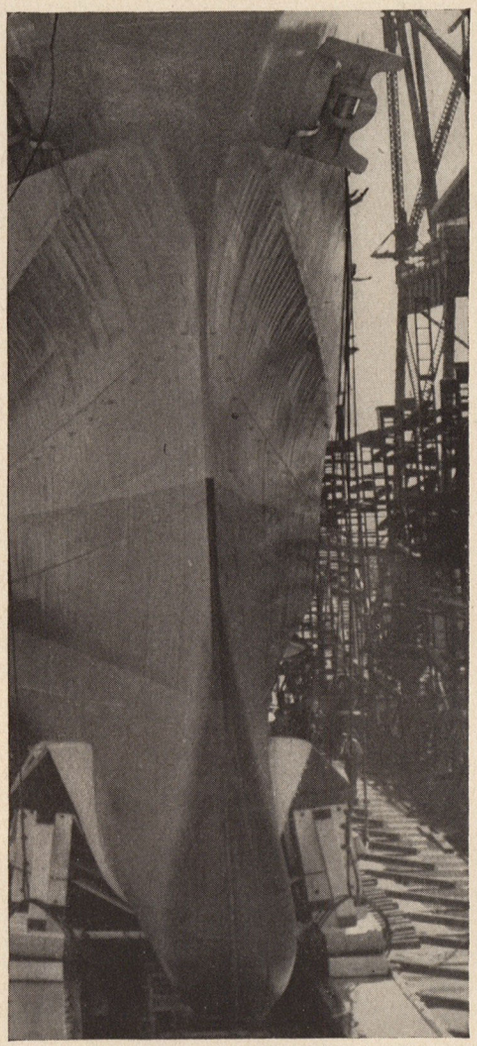
Having learned this in physics, we are in a fair way to understand that sound waves and shock waves are of the same breed. We probably all remember that the "speed of sound" was supposed to vary and was faster in solids and liquids than it was in air. We may have learned that the speed of sound in "standard" air is 1,090 feet per second, and that this represents the normal speed of transmission of the sound vibration. Actually, this is the speed of movement of the *wave*. Perhaps you did not realize that the speed of sound, even in air, varies under different conditions—varying primarily with the temperature. The speed drops with a decrease in temperature to the extent that in flight at high altitudes where the temperature is low a considerable reduction in this critical speed is reached.

THE well-known illustrations of the travel of sound in air serve to show that the speed of sound is not so very high, and that it is a very real factor. Many of us have waited for the sound to reach us after watching someone across the street strike a drill with a sledge hammer. Or we may have counted the number of seconds following a flash of lightning until we heard the thunder. We know that if we divide the seconds (between the lightning flash and the sound of the thunder) by five, we get the approximate distance in miles to the flash itself.

If we could move along through the air at the same speed as a sound wave it might seem as if we were riding the crest, or the hollow, or were in the midst of a pattern of waves similar to those around a boat. Perhaps it would be better to consider making our own disturbance or shock wave just as a boat creates the waves that move with it. In this event, these sound waves or shock waves—which are actually areas of bunched-up and thinned-out air—would stay with us, and if we could see them they might appear as definite as the waves on the surface of the water.

At speeds below that of sound, the air can move out of the way and can close in behind an airfoil without any appreciable compression or formation of a wave. At speeds above that of sound it might even be possible to move out ahead of the wave, leaving it behind, but we should still be concerned with the formation of the wave. Speeds above the speed of sound are relatively unknown except as applied to bullets and propeller tips.

In order to see these shock waves it is possible to take advantage of the variation in light refraction of the alternate regions of compressed and rarified air since the variation in light refraction causes light passing through to bunch up and produce bands of light and shadow when exposed photographically. We are familiar with photographs of these waves formed on bullets, and there are a number of such illustrations applying to airplanes and aerodynamic shapes. For the most part, however, it is necessary to imagine what occurs, or to use familiar illustrations which may not be, strictly speaking, scientifically accurate.



The sharp edge at the water line of our modern freighters, combined with a bulbous nose below the water line, serve to control the formation of the waves, thus saving power to put into speed.

A fairly complete study in compressibility can be made with a toothbrush and a bowl full of water. If the handle of the toothbrush is moved through the water at slow speed, the handle may be moved with the thin edge of the broadside cutting the water without causing any appreciable disturbance. In other words, at low speeds the water is able to move out of the way and back in behind the handle without creating waves. This illustrates motions below so-called critical speed.

HOWEVER, if the toothbrush handle is moved broadside fast enough to create waves, the speed at which wave formations start is perhaps a little less than is needed to create waves when the handle is moved with the narrow edge cutting the surface. This illustrates the fact that the critical speed depends upon the displacement, or the necessity for rapid recovery or flow-back-in after the passage of the handle.

It is obvious that a thin knife blade could move at a still higher speed than the toothbrush, but the surprising thing is that at one speed a knife cuts through with no ripple at all and then suddenly, with almost no increase in speed, a big wave formation sets up. Old Critical Speed himself pops up with a vengeance.

The formation of waves obviously is a function of how much and how fast the water has to flow in order to get around the object. The same conditions exist in the air, but, of course, at a much higher speed, simply because the air is lighter and can be pushed around with less effort.

It takes work to make waves. This can't be measured easily with a toothbrush handle but anyone who has ever stood in a row boat and rocked the boat to make waves knows that he can get tired just making waves without going any place. The effort required to move a boat is expended partially in overcoming the friction of the water on the bottom as it slides by, and partially in making waves. A well-known principle in crew racing is that the crew which bounces the boat up and down, making the most waves, invariably loses to the crew with the smoothest stroke. One has only to look at the bow wave of a blunt nosed freighter to realize that it must take a great amount of coal or oil to shovel that much water across the ocean. We are familiar with the bow-shape of our modern high-speed vessels with a relative knife edge at the water line and a more rounded and blunt nose built below the water line. This is to control wave formation and save power to put into speed.

The air, as we normally think of it at rest, is a rather docile medium. We know that we can walk through it without having to work very much to overcome simple air resistance at low speeds. We also know that as we increase our speed through the air we increase the amount of work required to shove aside the air and slip through it. When we reach the mysterious "speed of sound"

(Continued on Page 36)

"PHYLLIS HAD THE STUFF . . . "

(Continued from Page 7)

We were in Vee of Vees all the way in to the target. The main formation was in Vees, and we, who were in the "rear guard," were in echelon of Vees, from left to right, inside the rear wings of the main formation. Our ship was "Tail-end Charlie." We were the rearmost left-hand ship in the formation, and hence the last to bomb.

WE HIT scattered heavy (high altitude) "flak" on our way in, but it was slight, and did no harm. We got well over our targets, in formation and unmolested, when I heard the bombardier yell through the inter-phone, "Bomb doors open!—Left!—Right a bit!—Right hard!—Right, damn it! Right!"

I kept trying to follow his directions. It was tough because we were in the slip-streams of the ships ahead and it took a lot of rudder to keep Phyllis on the course he wanted. At last he said "Okay! Bombs away! Button her up!", which meant for me to get the bomb doors closed. Then he said "HIT-HIT-HIT on target!" It sounded fine.

The bombing part was easy. We'd got over the target and dropped them on the nose—by the grace of Lieutenant Komarek. All we had to do now was get back.

But that's when they started to pour it on. The open bomb doors had slowed us down a lot, and we were behind the formation. The German's strategy was obviously to pick on the last ship and shoot it down.

Most of the others got no attention at all from them. And I might say that I think it would be a lot better if the last ships in a formation were to slow down momentarily and let "Tail-end Charlie" get his bomb doors closed and catch up before they high-tail for home. You can get a lot of inter-protection from even two other B-17's. And we certainly needed it right then.

But there we were. Behind the others, pulling between 47 and 50 inches of mercury—a hell of a lot at that altitude—and trying to catch up, meanwhile taking evasive action. The flak was really being poured on. Heavy flak. I saw it below me, in front, and then above me. We were bracketed, and I knew that when it came next, they'd have us. They did. We started getting hits and plenty of them. I could feel the ship back and shudder each time they hit us. And I might say, incidentally, that one of the boys in the other ships saw them hit and destroy one of their own pursuits, an ME 109-G.

Things were happening fast, and it's a little hard to get them in their proper order. I'm trying to tell what occurred in about five seconds, but it's going to take a hell of a lot longer than that to do it. I was talking about their pursuits. I forgot to say that I had seen a dog-fight—or what looked like one—ahead and above me. Just a flash of it. That was when we were on the target.

Then came the flak, as I've said before. And then the hits. But after that came something worse. The flak suddenly stopped cold, and I knew we were in for it. That's the toughest moment of a bombing raid—the few seconds between the time the flak stops and the enemy pursuit comes at you. I found time to be scared, but not for long.

Just then all the gunners in the crew started calling through the interphone: "Enemy aircraft at three o'clock, Lieutenant! . . . At five o'clock! . . . At nine o'clock! . . ."

Sergeant Taucher, the rear gunner, was more specific. He yelled: "Hell, Lieutenant, they're coming in! From behind! There's a jillion of 'em! They look like pigeons!"

I said "Give 'em hell, boy!" or something like that.

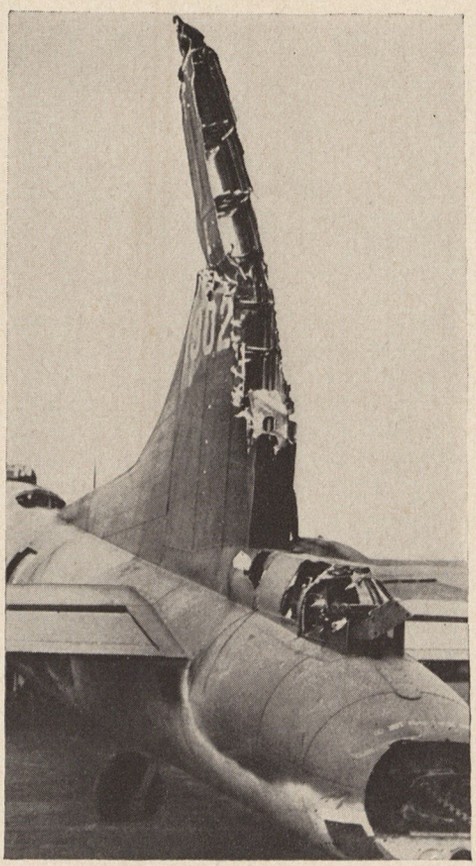
He said, "I can't. My guns are jammed. I'm trying to clear 'em!"

"Keep swinging them around so it looks like you're firing." I said.

"Okay, Skipper!" Then, "I've got one gun cleared now." He started firing.

HE TOLD me later that once he got his guns going he didn't take his finger off the trigger from the time their formation started to come in until the last ship of it had gone out. They were employing two tactics that were new to me—and damned effective. When they peeled off to attack, they came in so close together that by the time one ship had shot us up and banked away, the next in line had his sights on us.

The other dodge they used was to pretend to come in on one of the other ships, and then do a twenty-degree turn and shoot hell out of us. And while Taucher said their fire came mostly from a range of about 1,200 yards, he also said that they were so close when they *finished* firing that he could see their faces. Mostly they came from the rear, but at least one of them got up under us from in front, stalled, and, as it fell off, raked us the length of Phyllis' belly. I could feel his hits banging into her.



DESPITE a badly shot up rudder and tail assembly, this B-17—like Phyllis—also got back from a daylight raid over France.

As a matter of fact, I could feel the effect of all their fire. It was rather like sitting in the boiler of a hot water heater that was being rolled down a steep hill.

I began to realize that things were getting tough. There was an explosion behind me as a 20-mm. cannon shell banged into us just behind the upper turret and exploded; and I kept thinking, "What if it hit the flares?" If it hit the flares and ignited them I knew we'd go up like a rocket.

Then I looked out at the right wing and saw it was shot to hell. There were holes everywhere. A lot of them were 20-mm. cannon holes. They tear a hole in the skin you could shove a sheep through. The entire wing was just a damn bunch of holes.

I looked at Lieutenant Long, the co-pilot. That was a treat. There he was with his wheel shoved clear over to the right in a desperate looking right-hand turn which seemed, at the time, very funny because *my* control wheel was centered. I started to laugh and then decided there wasn't anything to laugh about. The position of his wheel meant his aileron control cables had been shot away. That wasn't funny at all.

About that time several other unpleasant things happened all at once. First, the waist gunner, Sergeant Peterson, yelled through the interphone: "Lieutenant, there's a bunch of control wires slapping me in the puss," which meant that the tail surface controls were being shot up. Second, the right-hand outboard engine "ran away" and the engine controls were messed up so we couldn't shut it off. Third, the left-hand inboard engine quit. And fourth, the ship went into a steep climb which I couldn't control.

I FORGOT to say that the whole left-hand oxygen system had gone out with the first burst of flak, and that I was trying to get the ship down to 20,000 feet to keep half my crew from passing out. I forgot to tell about this before because things were happening too fast to tell them all at once. Behind me there was a pretty nice little piece of drama going on that I couldn't see. My radio gunner, Sergeant Bouthellier, passed out from lack of oxygen, and the radio operator, Sergeant Parcells, seeing him lying by his gun, abandoned his own oxygen mask and put the emergency bottle over his face. Sergeant Bouthellier revived, just in time to see Sergeant Parcells pass out himself. He, in turn, took the emergency bottle off his own face, and revived Parcells. After that, on the verge of going out again, Bouthellier called through the interphone to tell me that the oxygen supply line was damaged. With Lieutenant Long's help I managed to

put the ship into a steep dive and leveled out at 20,000 feet. At this altitude, everyone could keep going without oxygen.

To return to the fourth unpleasant thing that happened—when Phyllis went into a steep climb I simply couldn't hold her level. There was something wrong with the controls. I had my knees against the wheel and the stabilizer control was in the full-down position. The control column kept trying to push me through the back of my seat. I motioned to Lieutenant Long to help me and between the two of us we managed to get it forward and assume normal level flight.

Then I started to think. The enemy fighters were still shooting us up, we had a long way to go to reach England and safety, we were minus two engines, and it took almost full left aileron to hold that damaged right wing up. It was clearly time to bail out of that aircraft. It seemed a funny idea, but I decided it was the only thing to do. So I yelled into the interphone: "Prepare to ditch!"

Then I started to call the roll. Everyone answered "Okay, Skipper!" except the top gunner, Sergeant Coburn. Sergeant Peterson was badly hurt, but he answered, "Okay, Skipper", and even had time to ask me if I was wounded. He said, "How's the ship, Lieutenant?" I said "Okay." He said, "On second thought, what I really want to know is 'How are you'?".

I MIGHT say right here that it was the finest bomber crew that ever took off. The whole gang was right on the nose. Everyone did his job every inch of the way. I'm the one who is telling the story, because I was the guy in command. But there were nine other men in Phyllis, and any of them could tell you a better story of what happened. Phyllis had it all right; but so did her gang.

But to get back to what happened. I gave the order to prepare to "ditch" ship, with visions of a German prison camp in my mind. But just about that time Sergeant Coburn, the top gunner, slid out of the top turret, and fell to a position between me and Co-pilot Long. Coburn's face was a mess. He was coughing blood and I thought he'd been wounded in the chest. It later proved that he wasn't, but he was clearly in no condition to bail out of an airplane.

Things were tough right then. They were still shooting at us and the coast of France was a long way away. Our target had been about 60 miles inland and with our reduced speed—two engines out of action—it would take us quite a while to get to the coast. I felt a little sick inside. I yelled through the interphone that anyone who wanted to could ditch right then and there. But no one wanted to. Phyllis was still "airborne," as the British say, and I guess by this time they trusted her. Meanwhile, the enemy pursuit kept pouring lead into us, and there's no evasive action worth a damn you can take when you are shot up the way we were.

Lieutenant Long left his controls and went back to give first-aid to Sergeant Coburn. Immediately, I had the problem on my hands of keeping Phyllis from climbing through the ceiling. The damned stick just wouldn't stay forward and I kept on gaining altitude. I called for help through the interphone, and I'm sure that everyone on that ship thought I was injured. Lieutenant Komarek tried to get up through the hatch to help me; but he couldn't because Lieutenant Long and Sergeant Coburn were on the door in the floor through which he'd have to come. I didn't dare throttle the engines, either, for fear we'd just quit flying. Phyllis, at this point, had a stalling speed of about 160 m.p.h., in spite of her ambitious climbing tendencies. So I just fought her.

Meanwhile, Coburn was doing his best to bleed to death. Throughout, however, he never lost consciousness, and he kept making funny remarks.

Finally, the radio operator, Sergeant Parcells, came forward and took over the first-aiding of Coburn, allowing Lieutenant Long to crawl back into the co-pilot's seat. Between us we got Phyllis under control.

We were over the Channel by that time and some British Spitfires took us in tow. The Jerry pursuit stuff gave up and departed for home. We went into a dive from 20,000 feet for anywhere on the coast of England.

The runaway engine gave us a lot of trouble. The electrical system was shot to hell, and we couldn't shut it off. Long tinkered with the fuel valve but no soap. I was afraid to tinker with the fuel valves. Finally we gave it up. Phyllis was still flying, and I didn't want to ask her too many questions.

We made a wheels-up landing at the first aerodrome we saw in England. We could only make left-hand turns because both Long and I knew that if we ever got that shop-up right wing down we could never pick it up again.

I buzzed the field once and scraped a chimney or two off some buildings at the end of the runway. I knew we were going to have to crash-land because the hydraulics were shot, and I couldn't get the wheels down. Besides, I didn't want to land Phyllis normally at 160 m.p.h. She'd have coasted clear across England.

So we belly-landed her. The long way of the runway and cross-wind. It was a damned fine landing—marred only by the fact that Coburn, the wounded man, kept making remarks about how tired he was of flying. Sarcastic remarks. I promised him that I'd put him on the ground and was lucky enough to do it in good shape. We all walked away from that landing. Belly-landing a B-17 is an art, and both Long and I agree we have mastered it. Sergeant Coburn agrees, too.

And next time anyone tells you a Fortress can't take it, give them the works. As one of the boys said after we got back: "Phyllis had the stuff." God rest her soul.

Oh, yes, Komarek, the bombardier, got sick after we landed. But he was considerate about it. He took off his flying helmet and used it as a receptacle so the kids that dismantled Phyllis wouldn't have to clean up after him. We all laughed like hell about that. ☆

THE BOYS WHO KEEP 'EM FRYIN'

By Pvt. Mort Weisinger

AN ARMY travels on its stomach, and to make certain that the stomach isn't lined with tough-as-leather beef cuts, the Army Air Forces are monthly graduating hundreds of student cooks from Baker and Cook schools throughout the nation. Culinary cadets who have never known a calorie from a vitamin are being taught literally to cook with gas.

For two months these white-clad "grease monkeys" ride the range of a stove, finally emerge qualified in the arts of stewing, sauteing, simmering, braising, fricasseing, roasting and baking.

These captains of the chow go in for soldier-like strategy. The science of decoy is mastered, and student cooks learn how to bait appetites by garnishing dishes with a variety of colorful vegetables. A green pepper ring, the scarlet splash of paprika on a boiled potato, spinach's green complemented with the luring yellow of sliced egg — all these tricks from the Army's recipe to win appetites and keep its men well fed.

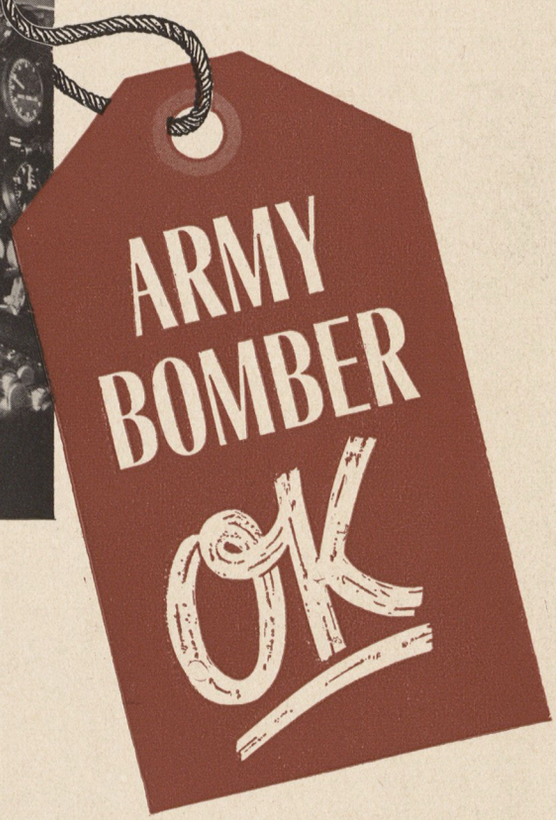
"When the menu calls for hamburger, and the men have had hamburger recently, I camouflage it", one alumnus cook told us recently. "I make chili con carne out of the meat, or make stuffed green pappers."

The business of salvage and the elimination of waste in the kitchen is also important. "When we have pancake batter left over from the morning's breakfast, we use the surplus batter to make corn fritters for dinner", this same chef told us. "And if the rice doesn't go over at dinner, we make a rich rice pudding out of it for supper", he added.

A graduate baker joined the conversation. "I've just had a two months' loaf (meat) on the government's dough", he flipped. He waved his diploma at us. "Honest", he said, "I'll make some girl a good wife. I can make biscuits, bread, pies, buns, and doughnuts."—*Atlantic City Beam.*

Here's how new B-17s are tested by the Army after they roll off Boeing's production line—on their way to the wars.

Capt. Hansen adjusts the controls of a B-17.



By Captain Harold R. Hansen

Chief, Army Production Engineering,
Boeing Aircraft Company

WHEN a B-17 is wheeled off the Boeing production line, it undergoes two tests—a company test and an Army test.

These differ considerably.

The Boeing check-up is primarily functional. First, a company pilot and co-pilot take the ship up alone for a period of twenty to forty minutes. Cruising slowly at three to six thousand feet above Boeing Field, they carefully analyze the plane's performance in flight, making sure that props, engines and controls function properly.

After this, they land and pick up a crew of company electricians and mechanics. Then follows a flight of an hour or more, during which countless adjustments of regulators and equipment are made.

All irregularities and malfunctioning of equipment or accessories which cannot be corrected in flight are noted by the company pilot. These are then corrected by company ground mechanics and "signed off" by Army inspectors.

The B-17 is now turned over to the Army B-8 Inspection group. The term "B-8" comes from the number of the Materiel Center directive which requires a complete and very searching inspection of 428 individual items. In addition, the B-8 Group inspects about 150 more items which become accessible as cowling, panels and doors are removed to get at the 428 basic articles and assemblies.

Again discrepancies are noted which will be corrected by company mechanics and "signed-off" by Army inspectors.

The big bomber is now ready for the Army acceptance flight.

Another Air Corps man and I have been waiting in the Pre-Flight Flight Operations Office. Sling a chute over your shoulder, come along with us, and we will try to give you some idea of how this airplane is tested before it's sent off to the wars.

WE find a lot of traffic on the field. Seattle weather is unpredictable, with plenty of fog, but today is clear and the runway is warm with landings and take-offs.

Riding across the apron in a station wagon, the Boeing operations man hands me the company pilot's report. I ask him, "Which ship are we flying?"

Before we get into the ship, I very carefully read the Boeing flight report. Everything is reported in order.

Next, we examine cowlings, especially the outer sides, which cannot be viewed from the cockpit. The object is to see that no Dzus fasteners are loose. If they were, they might fly off and rip the devil out of wing or tail surfaces.

We look at the turbo intakes and landing gear to be sure no rocks or foreign matter clog them, and check the landing strut against hydraulic oil leaks. Along the way, we observe that the brake hose sets at a proper angle.

One propeller blade shows a nick, probably made by gravel. Where you find one, you will usually find more on other props. That's the case. The co-pilot makes a note on the flight inspection report to dress out all nicks.

Incidentally, we have two reports to write. One, the Flight Test Check Sheet, shows how thorough our examination of the airplane will be. Eleven items must be checked, as follows: (1) flight controls, (2) propellers, (3) radio equipment, (4) engine and turbo operation, (5) automatic flight equipment, (6) wing de-icers, (7) hydraulic system, (8) heaters and defrosters, (9) electrical system, (10) flight instruments, and (11) power turret operation.

The second sheet is the Pilot's Inspection Report, which is simply a memorandum of irregularities discovered on the flight, with corresponding spaces to be filled in by plant mechanics who will correct the faults and by inspectors who will approve the work.

Boarding the plane by the side door, our inspection continues as we move forward to the pilot's compartment.

The tail wheel strut? O.K. Miscellaneous equipment—is it all anchored down? Yes. While we have elbow room, we don our chutes and make certain they fit right. Moving into the radio *(Continued on next page)*

ARMY BOMBER—OK

(Continued from Page 29)

compartment, we run our eyes and our fingers over the wiring and check all instruments. Calibration correct.

Into the pilots' seats now and the first thing is to check the gas. The tanks are filled but the tiny gas warning light doesn't operate and we make a note to have it fixed.

On 1 . . . On 2 . . . On 3 . . . On 4—one after another the engines are started and, while they warm up, we call the control tower for taxi and take-off instructions.

Try the brakes. They hold but seem a bit too weak. A memorandum is made to tighten them. Next to be tested, in order, are prop governors, turbos, manifold pressure and RPM. Everything normal. For a minute or so, we run oil through the propellers at high pitch, so it will flow properly, and then test individually each magneto and each engine. Board instruments are carefully watched for inaccuracies and we make certain that the blue lights from which luminous dials and indicators reflect are in proper working order.

Strap into the seats now, for the plane is ready to take off. We taxi down to the far end of the runway. "Use all the runway you've got" is still one of the wisest slogans in the business.

ONCE in the air, we bank sharply over the ridge of hills that flanks Boeing Field on the east and, as we climb, all generators and batteries are checked. O.K.

The radio compass needle is wavering. We are above a radio station and, as we fly over, the needle swings exactly to 180 degrees. The marker beacon light is burning.

The snowy peak of Mount Ranier lies a few miles ahead as we cruise south at about 160 miles an hour. We won't fly higher than 6,000, probably, nor very fast. There's no point.

Tiny rivers of propeller de-icer fluid on the engine cowling show that it is flowing correctly and the rubber wing de-icers breathe in and out regularly, just as they should. Oil pressures and temperatures are both about right, as are the fuel pressures and cylinder head temperatures.

Now we *very carefully* trim the airplane for straight and level flight, paying particular attention to the ball in the bank and turn indicator. It is imperative that the B-17 be perfectly trimmed, or our automatic flight equipment—which we are now about to test—will not function properly. We then center the airplane, flying straight and level with hands and feet off the controls, and we extinguish the "tell-tale" lights by adjusting the aileron, rudder and elevator centering knobs, in the order named. As the "tell-tale" lights are extinguished each of the engaging switches are immediately thrown "on."

This is the most important part of our flight, from the Army's standpoint. Company pilots are not permitted to fly with secret equipment. Certain Boeing mechanics are trained on it, and one of them is along with us on this flight, riding in the bombardier's compartment, making any necessary adjustments. Few are needed. We bank at a 30 degree angle to the left and then to the right. The plane levels out smoothly each time.

This automatic equipment, like many other things, will require adjustment in the field, of course. But it is our job to be sure it's right to start with—that, above all, there is no faulty gyro.

While we have the airplane flying on the A.F.C.E., we put it into a bank to the left and then to the right to such a degree that the bank and turn indicator is registering a one-needle-width turn. We now check the amount of turn for 120 seconds; if the rate is not three degrees per second the bank and turn indicator must be replaced and readjusted.

Taking the controls again, we feather the props and stop the engines. One after another they are switched off, until we are flying on various combinations of three engines, then two engines, and finally on just two engines of either wing. The plane performs well under all circumstances.

Our flight is just about over. We have been gone 30 or 40 minutes, checked all vital controls, instruments and equipment. There are six irregularities, all of which have been noted on our inspection report. They are minor, however, and the airplane will not have to be test-flown again. It will merely go back to the plant for correction of the minor flaws and further inspection. Had we found a major irregularity, the ship would be taken up once more.

But Number 53 is in good shape. In a day or two at most it will be ferried away by a pilot of the Air Transport Command. Later, perhaps, it will be assigned to you. ☆

Americans Can Still Shoot

A TALL man with Captain's bars on his shoulder watches closely as the gunners aim and fire at clay pigeons. Now and then there's a slight lull in the proceedings and he slips a shell in his own gun and calls "Pull!"

A bird sails out. It breaks into bits with the Captain's shot, despite the fact that he hasn't bothered to raise the gun to his shoulder. From his position 25 feet behind the trap the Captain has shot from the hip.

This is Captain Phil Miller, one of the best trap shots in America, now technical advisor in charge of all shotgun ranges at the Army Air Forces oldest Flexible Gunnery School at Las Vegas, Nevada.

Captain Miller has been shooting and teaching others to shoot for more than 30 years. He won his first major trap shoot in 1915 and then for a decade walked off with practically every shooting award in both professional and amateur competition. Then in 1925 he decided to retire.

But nine years later Captain Miller came back. At the Grand American in 1934 he broke the first 200 straight. In 1937 he won the Amateur Clay Target Championship and a year later the National High Average Title. In 1939 he won the Grand American all-round Championship and was named captain of the All-American team. At Las Vegas, the Captain is somewhat surprised but nonetheless pleased to see that recurrent phenomenon, The American Eye, in action. "There must be something in our blood," he says. "Even after a generation of city life our boys have not forgotten how to use a gun. We're closer than we think to the pioneers."

Captain Miller finds that there is no class or region which holds a monopoly on the tradition of the shot gun. Generally speaking, of course, country boys take to training more readily. Captain Miller tells of a Georgia private who had never seen a trap in his life before he walked on the Las Vegas range. He promptly broke 50 out of 50. The answer? He had been shooting rabbits "down home" as long as he could remember.

Conversely, the Captain counters with the story of a Boston city slicker who beat the pants off a Virginia duck hunter. They come from everywhere. A piano player, the Captain discovered, makes a first class gunner. So do billiard experts and golfers. Anyone whose eye and hand are already accustomed to functioning together knows what to do with a trigger and a target, Captain Miller has found.

The trap and skeet ranges are an integral part of the aerial gunnery training course at Las Vegas—a course which manages to combine the best elements of a sweat shop and a university. The Captain, at 49, has been through the entire gunnery schooling, from the first classroom lecture to the final phase—plane-to-plane firing. He has a diploma which states that he is a qualified aerial gunner. And he has gunner's wings.

Captain Miller has very little time for relaxation, but occasionally on Sundays he gets a few hours off. That is the time when he does what he enjoys most: He rounds up a couple of other officers and together they visit the trap ranges to—you guessed it—"kill" a few clay pigeons. ☆

The Burma Roadsters Delivered the Goods

By A. R. Strang

WRIGHT FIELD

YOU no doubt are familiar with the Short Snorters Club, but perhaps you haven't heard about that chapter in the Far East known as the "Burma Roadsters."

To claim membership, you must fly or drive over the Burma Road. Not everyone is eligible, of course. The Japs have been flying over the Road for some months now —but not a Jap has been asked to join. And this slight has made them furious.

That brings us to Captain Jon A. Laird, a veteran Burma Roadster, and the two impressions he brought back from the Far Eastern hunting grounds. Captain Laird left the Burma Road area last July to take his present post as Assistant Engineer Officer of the Accelerated Service Test Branch at Patterson Field, Ohio. Neither of the impressions he brought back are military secrets. The first, his theory about the unfriendliness of the Japs, was acquired while hauling freight above the Burma Road across the Himalayas from India into China and return in a C-47 transport. He has very definite ideas about that one.

The second impression which can be related safely is that three rupees was too much to pay for the baby King cobra he bought to bring back as a pet. Under the fakir's persuasion, the baby snake proved that it could raise a good part of its 10-inch length, flare its hood and strike. But its body was almost transparent. Captain Laird's suspicion that it lacked guts was confirmed when the snake died at altitude over the South Atlantic in a Clipper.

Like many critical operations at Army Air Force outposts, the job of lugging freight over the hump was never a joy ride. The heavily-laden C-47s, in the hands of airline pilots who had been hurriedly recalled to active duty in March for this express assignment, often accomplished the impossible. Or so it seemed to the Japs in Nakajima 96s, armed fighters with a speed of 270 miles per hour at 17,000 feet.

By any comparison on paper or in the air, the Japs should have had a field day. Armed only with tommy guns, the converted DC-3s cruised at about 140 miles per hour. The route was too long for fighter escort. Interception from the Jap's base, within easy striking distance across the Burma border, should have been a military certainty.

"From our base in India, a series of 12,000 and 14,000-foot peaks stretched northeastward toward China," Captain Laird explains. "Out there, they call them either the HiMALayas or the HimaLAYas. Off to the left the peaks reach 22,000 feet. Between these jagged upturned fingers are valleys with sheer rock sides through which the monsoons boil down from China in the spring and from the other direction in the fall. We encountered quarter and cross winds up to 100 miles per hour and higher.

"We tried to maintain 16,000 feet all of the time, but it was not always possible with the loads we carried. Going in, we carried ammunition, spare parts, chemicals, machinery, medicine and food from the Indian railhead to Kunming. En route, there was an army of 70,000 Chinese which had been cut off. We dropped rice to them regularly.

"Coming out of China, the loads were just heavy—Army and Navy personnel, diplomats, evacuees, war correspondents. They rode along even though they knew there was oxygen only for the pilot and co-pilot, and that we would hunt the dirtiest weather we could find, for the first 3½ hours at least, to lessen the chance of being intercepted.'

Although they were always in there trying, the Japs, up until the date of Captain Laird's departure, had not bagged a single Burma Roadster C-47. His explanation for this embarrassing score pays tribute to the Chinese.

"Our real protection," he reports, "other than plenty of bad weather, was the best air raid warning system in the world, in my opinion. It's uncanny how those Chinese men and women—and even the children—detected and reported Jap planes over Chinese territory. They were always on the job and had lots of short wave radios.

"Their warnings constantly kept us informed where the Japs were flying, how many and what kind. This gave us time to duck into the clouds, or in clear weather to drop down into a valley and circle until the 'all clear' came, hoping that we wouldn't be spotted. Lacking the speed to run away from the Jap fighters, some of us came back safely after eight hours in a valley or running in clouds. The Japs would never come into a cloud after us."

"General Chennault's AVG's, with the fall of Rangoon, had withdrawn to secret bases in China. They had good hunting around Lake Tali, where the Japs were bombing a Chinese resort almost daily. None of us knew why. But since Lake Tali was directly on the air cargo route, the Burma Roadsters were very glad that the AVG's were not permitting the Japs to linger in that area when freight was going through.

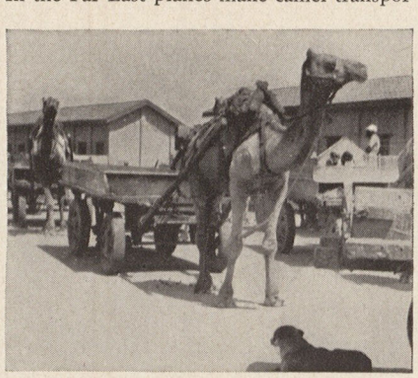
"One day we were over the Burma-Chinese border, tuned into the AVG network," Captain Laird recalls, "when we got a warning that a formation of 18 bi-motored Jap bombers with a fighter cover was 40 miles away. There was a broken overcast, not enough for good cover. So I dropped down into a valley and circled for the better part of an hour. Suddenly, through the haze, a plane, followed by another, pulled up over the lip of the next valley and scared hell out of me. I pulled away, heading for my destination and expecting company at any moment. I heard two AVG's talking to each other, something about 'that Number 37 is mighty lucky. He was hiding down there in a valley while 20 Japs were setting 4,000 feet above but they didn't even spot him.'

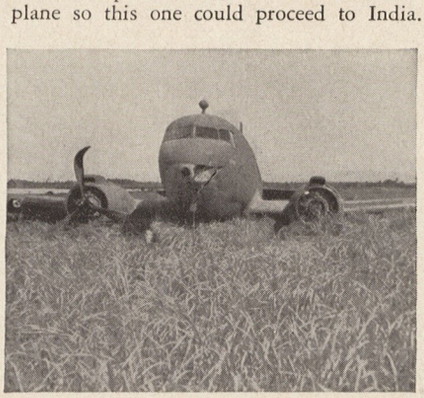
"Thirty-seven happened to be the number of our plane.

"Back at our destination, I learned that the two planes which had come at us from the next valley were two of our cargo ships which neither the Japs nor the AVG's had seen. Little wonder that the Burma Roadsters believe they owe their lives to the alertness of the Chinese."

All in the Life of Burma Road Cargo Pilots

IN THE early months of war they kept the Road open by dodging Japs and flying freight in C-47 transports. Ground transport (below) . . . on downhill dunes, it fairly flew. In the Far East planes make camel transportation like this look just as slow—well, just as slow as it looks. Now and then, as pictured below, overloads and short runways had this effect. But parts were borrowed from another plane so this one could proceed to India.





Technique

A Monthly Review of Technical Developments in the Air Forces

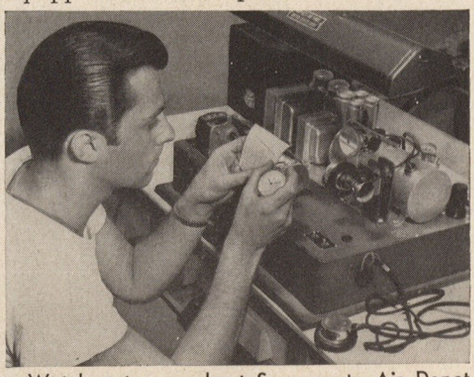
Watchmasters Keep Air Forces On Time

IT IS OBVIOUS that the split-second timing of Air Force operations makes it necessary for the watches used by aircrew members to tell the exact truth. It is also obvious that the village jeweler's time-honored method of regulating his customers' watches by checking them with a master clock, sometimes for weeks, is out in the kind of fast-moving warfare that is being fought today.

The Army Air Forces' answer to this is the "watchmaster" — an instrument that makes it possible to regulate a watch to 100 percent accuracy in less than a minute. No master clocks play a part in the method. The exact speed of the timepiece being tested is figured mathematically by a sound-excited printer on a graph moving at constant speed.

A straight, smooth line on the revolving graph means the watch comes up to Air Force standards. A rising line means the watch is fast, a falling one that it is slow.

To assist the repairman locate the trouble in an imperfect watch, the watchmaster is equipped with an earphone. This is to the repairman what a stethoscope is to a physician. With the graph it diagnoses the ills of a timepiece all the way from a simple cleaning job to a cracked jewel or defective mainspring. Guesswork is completely eliminated.



Watchmaster graph at Sacramento Air Depot reveals a slow watch with mathematical skill.

The watchmaster is especially valuable to navigators over the Pacific where there are no radio beams to follow, and where it is necessary to know the exact time to make readings from the sun and moon.

Portable Hangar

for Task Force use

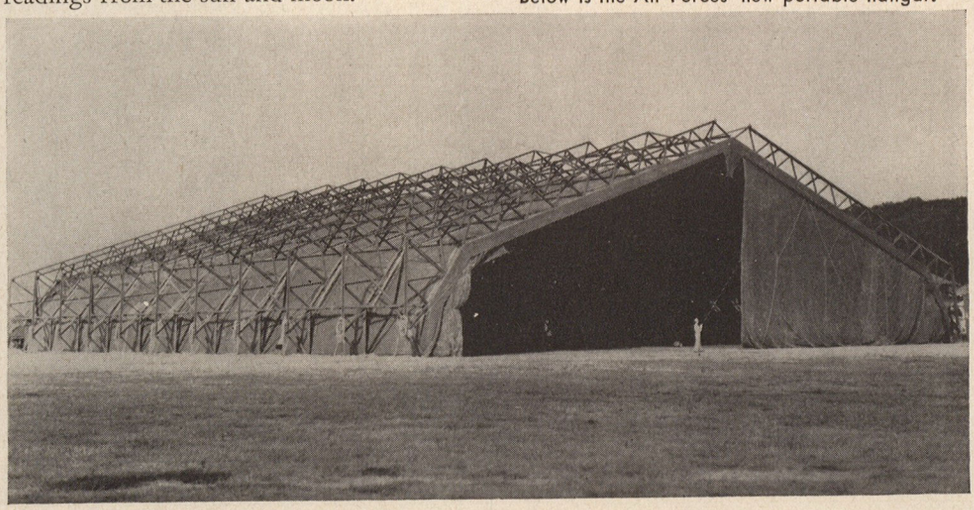
A NEW PORTABLE HANGAR, developed by the Engineer Section of the Directorate of Base Services, has gone into production. The new hangar is designed for use in all theaters of operations for the repair and storage of airplanes, supplies and equipment, or to house and hospitalize troops in the event of an emergency.

The frame of the hangar is of cold formed steel and the coverings and end doors are of a specially treated dark canvas, opaque to light of low intensity, waterproof and flame resistant. In cold climates local wood sheathing can be substituted for or added to the canvas covering, thus obtaining additional insulating qualities. The size of the hangar can be adjusted to fit almost any need by simply adding or subtracting bays.

The normal-sized portable hangar weighs about 52 tons, is 35 feet high. The canvas covering and steel frame can readily be broken down into small bundles for ease in shipment. Experience in erecting the hangar indicates that unskilled troops can put it up within three or four days, and that it can be dismantled in much less time.

A portable, oil-fired, circulating air heating unit has been specially developed for heating the hangar.

Below is the Air Forces' new portable hangar.



Rolls Royce by Packard

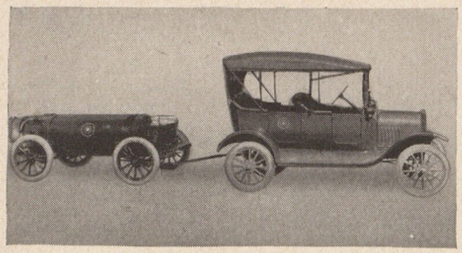
STUDENT mechanics at Selfridge Field, Michigan, are learning about the Packard-built Rolls-Royce 12-cylinder V-type engine direct from the people who make it. This has been made possible by the Field Service and Service Instruction Department of the Packard Motor Company, which has donated the services of three instructors and much valuable equipment to the job of teaching Selfridge soldiers how to maintain the American version of this famous British engine.

The course given by the instructors is one of many arranged by Colonel William T. Colman, Commanding Officer of Selfridge Field, for the Air Service Command is to train ground troops to operate under field conditions—without the conveniences of permanently established bases. A typical class scene is shown above.

As a result of Colonel Colman's arrangement, there is little Selfridge mechs do not know about the Rolls-Royce—the power plant of the P-40F and a number of other Allied planes.

Among other things the mechanics have learned that the Rolls-Royce engine is not something new—it was designed about thirty years ago in England, and is even now *basically* the same as it was before World War I. Naturally, because of the demands for more power and high altitude performance, improvements have been incorporated. For one thing it has been necessary to add a reduction gear and supercharger of the two-speed type—low is 8.15 to one for altitudes below 13,000 feet and high is 9.49 to one for altitudes above 13,000 feet.

—*Capt. Richard M. Ramey*



Progress: Airplane design is not all that has advanced in the Air Forces since World War I. There has also been progress in other, supporting fields.

Typical of this progress is the steady advancement in the design and capacity of aviation gasoline trucks, vividly illustrated by these pictures. At left is shown a 100-gallon trailer, used to refuel the Handley-Pages and Sopwith Camels of World War I. Ready to pull this tank to the flight line is one of the then "latest" types of mechanized ground equipment—a Model "T" Ford.

As the airplanes got bigger and better, so did the gasoline trucks. The center picture shows a 600-gallon truck of 1928 vintage bringing gas and oil to a Keystone bomber. At right is a modern 4,000-gallon gasoline truck and trailer, used to refuel the largest of Army Air Forces planes. It can "gas up" a Flying Fortress quicker than the 100-gallon tank shown at left could fill the baby gasoline container of a Sopwith Camel.

New Truck Hoist

A PORTABLE HOIST that can easily handle an 8,000-pound plane has been developed by Lieut. Col. James H. Reed, Jr., Commanding Officer of the Sub-Depot, Morris Field, North Carolina.

The hoist is designed for use on winch-equipped, two-and-a-half-ton government trucks. It is made largely from two iron pipes three and a half inches in diameter, and wire cable. The cable is used to anchor the hoist to the truck.

When in use the hoist rests on the truck's front bumper, with detachable supports used to prop it up. The wire cable is extended from the top of the hoist entirely around the body of the truck, and fastened in the rear with clamps. When not in use the hoist is supported from the side of the truck by means of brackets. When needed

Colonel Reed's portable hoist lifts a wrecked P-40.

it can be slipped off these brackets and on the bumper in less than five minutes.

The total cost of the unit is under $200. In most cases it will do the work of a much more expensive wrecker truck, even though it is much easier to handle and much cheaper to operate. It can be used for a number of different purposes, including lifting wrecked planes to place them on trailers, for changing engines, and for actually moving wrecked planes from runways and fields. In this case wheels must be used under the front bumper in place of stationary supports.

The Sub-Depot at Morris Field will furnish prints and drawings of the device to any squadron or Air Forces unit requesting them.

Van Slyke Technique—Here's what some of the soldiers behind the battlefronts are doing. The scene above is the high-altitude pressure chamber at Wright Field, and the hand on the face of the altimeter in the center of the picture shows that the men are in the low-pressure atmosphere of 40,000 feet. In the foreground Major David B. Dill, high altitude scientist, has just taken a sample of blood from the arm of Staff Sergeant Thomas Green, while Staff Sergeant George E. Hohenshilt swabs the puncture. The sample will be tested by the Van Slyke technique to show the effect of extremely high altitudes on human blood. Experiments like this help airmen to penetrate to higher and higher altitudes with safety.

Jack and Dolly

THE INGENUITY of Captain J. N. Hudgens, Sub-Depot Engineering Officer at Drew Field, Fla., has greatly increased airplane maintenance efficiency at that station through the invention of inexpensive time- and labor-saving devices.

Two popular inventions of Captain Hudgens are a man-powered tripod jack that saves wear and tear on the expensive hydraulic jacks used in airplane repair, and a four-tier movable repair tray, known as a "Tray Dolly."

Captain Hudgens' jack was made from angle iron and heavy gauge pipe. It stands on a three-foot triangular base, is 52 inches high, and has an adjustable horizontal pipe attachment approximately an inch and a half in diameter. There is also a metal pin that is used to hold the jack at desired heights. After the parts of this jack are cut to the proper lengths they can be welded together in little more than an hour.

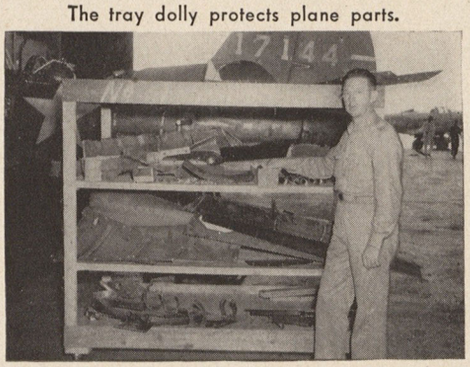
Although it took him only a few days to invent it, Captain Hudgens believes his jack will last a lifetime if it is not overloaded. So successful has it been that, since the first one was constructed many more have been made and put in use by the Drew Field machine shop.

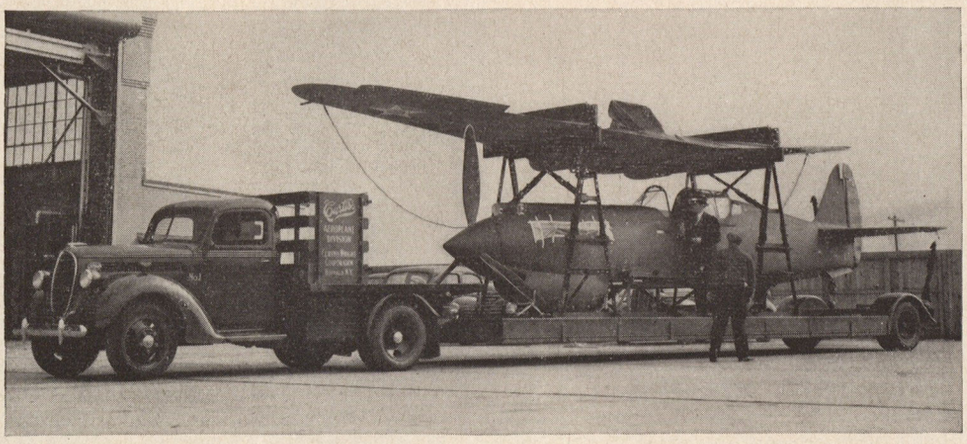
The Tray Dolly is made from scrap lumber. It is used as a place to shelve airplane parts during repair, thus keeping them off the floor where they may become misplaced,

Capt. Hudgens (left) and the tripod jack.

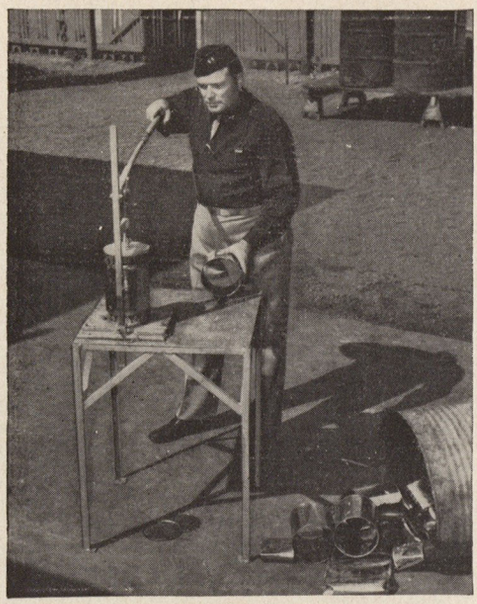
dirty or bent. Tray Dollies can be marked with chalk numbers so mechanics know to which plane they belong. Castor wheels permit them to be moved easily to any part of the hangar when they are needed.

The tray dolly protects plane parts.





This is how P-40s get around before they have wings to spread. The scene is an Air Forces materiel receiving center, where the plane has been brought for final assembly and delivery to the Army. The trailer was specially built by Curtiss-Wright for this journey from its factory to the Air Forces "induction" station. After final assembly here, the plane is ready to be flown to the squadron to which it has been assigned.



Captain Parker demonstrates his salvage machine.

Can Salvage Machine

SALVAGING tin cans may seem like a very minor part of winning a war, but at a place like Cochran Field, Macon, Ga., it can get to be quite a problem. Cochran has been using up tin cans at the rate of 50,000 a year—enough to make salvaging really worth while, but also very difficult.

In fact, up until a few weeks ago it was taking four men two and one-half hours a day to cut up and crush used cans in a manner suitable for salvage. What's more, they were using up $25 can-openers at the rate of three per month.

This was the kind of situation that to Captain Sheldon C. Parker (above), mess officer at Cochran, constituted a challenge, and he did something about it. The result is a new machine that cost only $12 to construct, and which has cut the time spent in salvaging cans at Cochran in half. It is made of molybdenum, one of the hardest of metals, and after more than three months, has shown no appreciable sign of wear.

Captain Parker's machine is set upon a table of steel. A jagged tooth die is set into a plate which is fixed on the table, and another one is set in an upper plate that can be brought down by operating a hand lever.

The dies of Captain Parker's salvage machine have been made in three sizes, making it possible for the machine to cut up 95 percent of all cans issued by the Army quartermaster. The dies are easily interchangeable; pins hold them in place, and no tools are needed to insert or remove them.

For Better Maintenance

THE aircraft maintenance record of Lemoore Sub-Depot, Lemoore, California, has been greatly increased during recent months by means of an awards system developed by Lieut. Col. F. H. Barber, Commanding Officer.

The system is simple; it consists of awarding a plaque each month to the squadron turning in the most efficient maintenance record. The record is computed as follows:

Each month the average number of planes in commission in each squadron daily is divided by the average number of planes assigned to each squadron daily. This gives the percentage of planes that were in commission in each squadron during the month for which the award is to be made. When a plane is laid up through no fault of the squadron maintenance men (such as from a shortage of spare parts) it is counted as being "in commission" as far as the award is concerned. Colonel Barber's "awards chart" looks something like this:

School* Squadron	Av. No. Planes on Hand Daily	Av. No. Planes in Service Daily	Percentage of Planes in Service
First	32.74	32.37	98.59
Second	32.88	32.53	98.94
Third	30.11	29.53	98.07
Fourth	32.84	32.03	97.53
Fifth	32.84	32.57	99.18
Sixth	24.69	24.27	93.30

* Squadron numbers are fictitious.

In this competition, the Fifth School Squadron would be adjudged the winner.

PICTURE CREDITS

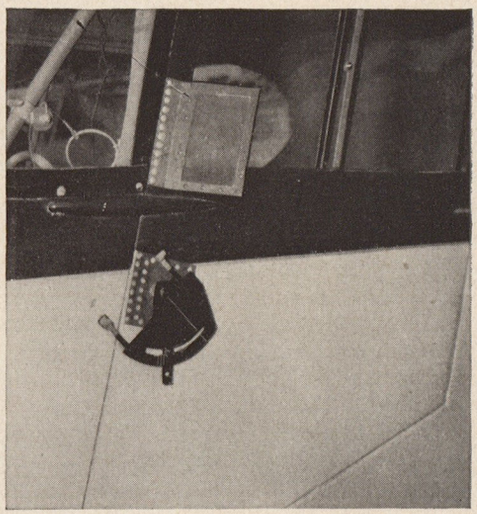
12-13: Sovfoto; British Ministry of Information; British Combine; Rudy Arnold. 14: British Ministry of Information. 25: Lockheed Aircraft Co. 26: Rudy Arnold. 27: Associated Press. 29: Boeing Aircraft Co. 34: Rudy Arnold. All other photos secured through Official Army Air Forces sources.

Inexpensive Bombing For Civil Air Patrol

MANY small Civil Air Patrol planes covering long reaches of the American coastline are equipped with inexpensive but effective bomb racks and bombsights invented by Major Lester G. Orcutt while he was stationed at Morrison Field, Florida.

The bomb rack was designed, built and installed on a Stinson 105 in 48 hours, at the request of Army Air Force Headquarters. It was built to carry 100-pound demolition bombs so CAP planes could blast subs they spotted on their daily patrols.

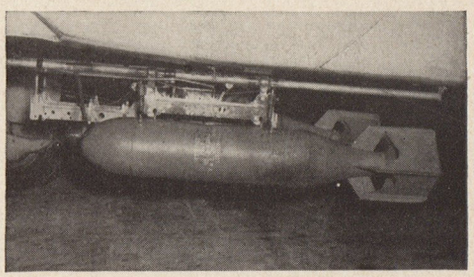
Pilots who flew the planes soon wanted a bombsight so they could aim their bombs. Two days later Major Orcutt had turned one



Major Orcutt's bombsight, in position.

out. The materials only cost 20 cents, but it was effective up to 3,000 feet. So successful was the bombsight and racks that they have since been produced en masse for light patrol planes in all parts of the country. For certain special purposes it has even been used on occasion in regular military planes.

Major Orcutt's bomb rack is a metal frame attached to the right lower longeron. The release lever is placed on the floor of the



The bomb rack in use, holding 100-lb. bombs.

cockpit right in front of the co-pilot's seat. Since the first design, the rack has been improved so that it can carry two demolition and two smoke bombs.

The bombsight is made of metal and consists chiefly of two adjustable sight rings. It is attached on the outside of the cockpit door of the small planes for which it was designed. The positions of both the sight and the racks are shown in the accompanying photographs.

(Continued from Page 3) 293 enemy planes, probably destroyed another 150 and have damaged 192. That is a record unequalled by bombers of any other nation. However, we must not rest on our laurels and think smugly that all is well, for we know it will not be long before the Germans come out with an answer to our Flying Fortresses, and we must be ready for it.

For a long time, we had our P-38s in England and tried vainly to get them into a fight to determine just how good they were. The Germans would not close in and fight. Recently, however, the Germans have fought us in the area over Tunis. To date the P-38s have held their own, even though they have had a very difficult task. They have covered and protected the ground troops, and at the same time met the German ME109 and FW190 fighters. The number shot down has been about even, so we are satisfied.

From Air Marshal A. T. Harris, RAF, to Lieutenant General H. H. Arnold, AAF:

By the first anniversary of Pearl Harbour the Japs are already paying dearly in the Solomons and New Guinea for their infamous assault. The Italians who begged a share in the destruction of London (with pitiful results) cannot take even our minor air offensive and are evacuating their cities in panic. It now remains for Germany to feel the weight of combined allied bomber attacks. The Reich will have plenty of new scars to show by December 7th, 1943. Greetings and good luck to the U.S.A.A.F. from Bomber Command.

If we can always shoot down plane for plane with the Germans, it will not be long before we have definite air control, for we cannot only produce more planes than they can but we can also turn out more and better combat crews.

I TELL you now that both the German and the Japanese Air Forces are on the down grade. They have passed their peak. We are just approaching our peak in airplane production and combat crew training. Our plane production alone is more than that of the Germans and Japanese combined. We have in addition the production of the British and the Russians. So despite the long pipe lines which we must keep filled, our enemies are playing a losing game in the air. They are reluctant to meet us in an all-out combat and yet if they do so meet us, it marks the end of their control of the air, even over their own countries.

Now just another thought about this air-warfare. Few if any of us have had time to figure out just what effect our Army Air Force planes have had upon enemy warships and freighters and troopships. This is what we have done:

Sunk	51
Believed sunk	21
Hit and damaged	159

Those ships were all types from battleships to destroyers, tankers, cargo ships and troop carriers. They were moving and standing still. Some were in harbors, others in narrow channels and still others out in the high seas hundreds of miles from shore, but regardless of where they were our bombers have been able to hit them and sink a large percentage of them.

On land we have dropped millions of pounds of explosives. The results have been devastating. When General Montgomery's troops reached Benghazi they found the harbor and city a mass of ruins and debris. The port was burned out, the docks were destroyed and there were quite a number of ships sunk in the harbor. We dropped about a million and a half pounds of bombs on that place.

Today we have our bombers working in eight combat zones. Each day that passes sees our numbers increase and our striking power building up. Within a few months the Germans, the Italians will be feeling the impact of these hundreds of planes dropping their bombs, not on one or two nights a week but every day and night in the week.

WHEN that time comes we will hit their submarines while being constructed, on their ways, at their bases and out in the wide oceans. We will hit their transportation facilities, their industries, their munitions plants, their airplane and tank factories. Hundreds of thousands of their people will have to move to other localities. They will realize what a true war of today means. Such is the fate that will come to both Germany and to Japan.

That is the kind of missions that you men here today have ahead of you. You must be ready to take your place in the gigantic Air Force Team slowly growing, relentlessly preparing for this tremendous task. It is going to be a tough hard task—not an easy one—but we can and will do it.

Now I'll give you a story to illustrate the kind of *fighting spirit* that you must have.

This combat story is revealed for the first time. Recently, in the Southwest Pacific, A-20 light bombers and B-26 medium bombers attacked Japanese anti-aircraft positions at Soputa. Our planes roared in at an altitude of 75 feet, barely skimming the tree tops. The Jap anti-aircraft guns were hidden in among those trees but that didn't stop our pilots from dropping their parachute bombs with deadly effect. Parachute bombs are terrifying things. They take more time to hit the ground, but all of the fragments are thrown into the air when they burst—few are buried in the ground. Our planes, flying only 75 feet up, were able to drop these bombs with pinpoint accuracy—and get away in good time before they exploded. I am proud to announce that we were the first air force to develop and use this deadly war weapon.

In this raid on Soputa, Jap anti-aircraft guns were destroyed. Ammunition dumps were exploded. In this thrilling action an anti-aircraft shell exploded near one of our A-20s. The burst blew the plane's tail up in the air, and damaged the controls. The pilot, Captain Edward L. Larner, 25, of San Francisco, could not get the plane back on even keel. His plane rammed through the tree tops for over a hundred feet. It collected foliage and brush until the plane looked more like a Christmas tree than an A-20. The nose of the plane and the leading edges of the wings were smashed in, but Captain Larner kept his head and finally pulled up out of the trees. Although there were countless holes in the wings, with broken branches protruding—he kept on flying it—but with difficulty. When the Flight Commander returned *for another run* to machine-gun the Japs, Captain Larner apologized to the Flight C. O. for withdrawing from the formation because, as he said, his *"plane was hard to fly!"* But he flew that plane back to its own airport and landed it safely. That pilot never heard the word quit. With Captain Larner was Sergeant Otha M. Pierce, 32-year-old aerial gunner from Duncan, Oklahoma.

From the Commanding General, Army Air Forces, to Air Marshal A. T. Harris, RAF:

The celebration of this first anniversary of Pearl Harbor is a solemn moment in our lives. The memory that one year ago from this day our belief in the honorable intentions of a portion of the human race was irreparably shattered will constitute a guide for our actions in the future.

The encouraging results already attained from the close alliance between the R.A.F. and our Air Forces will continue to bear bigger and better fruit.

We return to you our kindest greetings and hope that the good fortune attendant on the British courage and skill goes forward with us to the end of time.

Few people today realize what a substantial contribution toward the winning of the war our bombers are making — be they B-17s, B-24s, B-25s, B-26s or light bombers, such as the Douglas A-20.

I would particularly like to speak of our heavy bombers— the B-17 Flying Fortress and the B-24 Liberator. They are our basic *offensive* weapons. The Flying Fortresses and B-24 Liberators are bombing submarine bases, airplane factories, hydro-electric plants, ammunition dumps, food stores, rail centers, naval installations and ships in all corners of the world.

The heavy bomber is blasting the enemy at high altitudes, middle-altitudes, or just

above the house-tops. It is withstanding blistering anti-aircraft fire.

Many different kinds of missions are required of bombers to deal with different kinds of objectives. The retreat of General Rommel's Afrika Korps illustrates this wide *variety* of offensive air action. In the first place, the British were able, with the help of the United States Army Air Forces, to attain and maintain air superiority over Libya and Egypt.

No campaign in this war has been won by a task force not having air superiority.

DURING the past twelve months our research engineering program has been vastly accelerated. I cannot reveal the *most* gratifying developments. However:

(1) Our .50 caliber machine guns have proved themselves to be terrific weapons of aerial destruction. They are one of the outstanding successes of the war, in which Americans can take just pride.

But listen to this: Our highly destructive .50 caliber machine guns will seem like peashooters, compared with the fire-power that we are putting into our newest, big ships.

(2) We have steadily improved our standard models of fighters and bombers.

(3) Some time ago I said that the B-17 and the B-24 were perhaps the last of the "small" bombers. We have new fighters and bombers on the way with tremendously increased speed, fire-power, bomb loads, range, and maneuverability.

Not long ago the Tokyo radio announced that the Japanese public could expect to be raided again before the war was over by American bombers.

For once, I will say to Tokyo, you are right! Yes, we are coming and we hope to make it soon. And when we do come, it will be in large numbers — and we won't stop with one visit. We will return again and again.

(4) Our glider program is proceeding on schedule.

(5) Our newest transports will carry more freight and more men.

(6) Our newest motors, both air-cooled and liquid-cooled, have been vastly stepped up in horsepower.

(7) Photographic reconnaissance on our combat fronts is increasing in effectiveness due to new developments in cameras, and photographic technique. Our pursuit planes can take good pictures at 300 miles an hour, from 30,000 feet, accurately enough to show up individual railroad ties.

The past year has given us what some people call "sound morale". I am not especially fond of the word morale, but if morale is the only word that tells the story, then sound morale is what we've got, and got it in abundance. ☆

COMPRESSIBILITY

(Continued from Page 26)

we start creating compression waves which, like the bow wave on the freighter, require considerable additional energy simply because we affect the air for a greater distance roundabout.

When we start creating these shock waves they eat up energy at a tremendous rate, with the result that more power and more push simply make bigger waves but do not necessarily permit us to move any faster. It might be compared to the soap box politician who workers harder and talks louder but just can't say any more. It isn't the noise and fuss that counts. Actually, an airplane can create enough "fuss" so that it can never be dragged appreciably beyond a certain speed without using an impractically great power.

Airplanes since their inception have been built to take advantage of the characteristics of air when displaced gently, or, from the wind tunnel point of view, when the air flows smoothly over the surface. In the early days there was some thought that a rough surface on the wing gave more "bite" and consequently more lift. We now know, of course, that we get better results with smooth surfaces simply because we *reduce* the disturbance.

To visualize airflow around an airplane or a bullet it seems easier to think of the object standing still and the air flowing around it. As far as a little molecule of air is concerned, it gets the same reaction but it may be difficult at first to visualize the similarity between flow past an object and an object's motion through the air.

Actually, when an airplane wing comes along, the little molecule of air has to jump out of the way, speed up over the top, and come back down in behind the wing. The passage of the wing has, in effect, created a region of lower pressure and the air has to flow in to fill it up.

Again we get back to the old toothbrush. If the little molecule of air has been displaced too far it just can't get in fast enough to stick to the surface, with the result that the molecule gives up and leaves a disturbed region of relatively rarified and turbulent air on the surface of the after portion of the wing as it goes by. We get either a stall or a compressibility burble or a combination of the two, depending on the speed.

It may be confusing to think that an airplane may react the same way in going too fast as it does in going too slow. A stall is simply trying to get too much lift. We increase lift by the amount of displacement of the air and by trying to increase the downward push. At any given speed the little particle of air has to move faster in order to pick up this downward velocity and its ability to accelerate is limited. When it can no longer make the grade we get the condition known as stall, i. e. a breakdown in smooth flow.

At very high speed the little particle of air may not have to move so far, but it has to move faster, with the result that it again has to accelerate rapidly and its ability is again limited. These two factors are always tied together; consequently, any consideration of compressibility is a function not only of speed but also a factor of lift or displacement. This means that critical speeds for wave formation will not always be the same but will depend upon shape and altitude.

There has been a lot of nonsense observed and talked about the fact that the so-called critical speed, namely the speed of sound, will always be a positive physical barrier to the further development of aircraft speeds. One may find any number of theories to prove conclusively that airplanes cannot fly if built beyond a certain size or weight. Yet, flyable airplanes have been built twenty, fifty and one hundred times the weight of these so-called limits, depending upon which limit you choose. We could probably find that each 100 mile per hour milestone had some defender who claimed that it was impossible to go beyond.

By the same token, critical speed is probably more nearly like a wall or obstacle which has to be hurdled but may not necessarily be a hard and fast limit.

The crack of a bullet as it passes overhead is evidence that it is possible to build objects which can hurtle through the air at "supersonic speeds." One has only to visualize a bullet big enough to house a man to realize that it is conceivable that travel may be accomplished at such speeds. The problems of starting and stopping, and of control, are at the moment relatively unknown, but exploration of the unknown has always been a challenge.

WHO wants to ride a bullet? Literally hundreds of pilots have ridden successfully in projectiles which travel at speed definitely above the speeds of slow bullets and only slightly less than some higher speed projectiles. For instance, a 600 mile per hour dive, which is well within reason, involves a speed of very nearly a thousand feet per second through the air. At high altitudes this speed is definitely above the speed of sound.

It is hard to visualize what it would feel like to ride in a bullet, but at the speeds now reached a number of effects due to compressibility have already been observed. Another article will attempt to describe some of these effects by calling on imagination to describe some of the possibilities which might be encountered when riding a bullet.

We know what the shape of a bullet should be. It usually has a sharp point and the tail is usually blunt. The curvature of the shape and the sharpness of the nose are apparently critical. Perhaps airplane designers will have to study ballistics and trajectories to design airplanes in the future. Perhaps our blunt-nosed, sharp-tailed airplanes should simply swap ends when they cross the threshold of the speed of sound.

Bullets, boats and propellers have been making waves for years; to this knowledge we have added some waves peculiar to airplanes. In a succeeding article some of the design considerations influenced by compressibility will be presented. ☆

Aerial schoolroom for student navigators

LEARNING THE TRICKS OF

GLOBAL FLYING

By Herbert H. Ringold

You have to know all the trade secrets when you transport the big planes from here to hell-and-gone and back again

THE plains of Northern Missouri are pancake flat, lack a sizeable body of water and have neither tropic heat nor Arctic cold. But for practical training purposes the 600-mile radius around Rosecrans Field at St. Joseph might be a jungle, desert and ocean all in one.

Rosecrans deals in the trade secrets of global flying. There at the Air Transport Command's Operational Training Unit trainees are taught the ins and outs and ups and downs of flying our biggest ships all over the face of the earth.

In global flying you've got to know all the tricks. You've got to know the right way to come down in an emergency on water, beach, desert and jungle; how best to maneuver a heavily loaded, unarmed plane while under attack from enemy fighters; the precautions to take against sabotage; how to load for maximum range with minimum fuel.

For emergency landings in jungle country, as an example, they recommend coming in with gear up, making full use of flaps to land at minimum speed. They suggest landing nose high into the heaviest possible jungle growth to use it for a cushion.

Over water, you are instructed to land gear up, without flaps, to prevent a diving motion, since the flaps are located below the center of gravity. A B-17 will sink in about 30 seconds so you have to know how to get out in a hurry and inflate your life raft.

For beach landings, you come in gear down and flaps down, exactly as if making a runway landing.

On the desert, come down on your belly; your plane can be jacked up and flown out again. This was proved in Africa when a flight of P-40s, being convoyed by a B-24, got lost in a sandstorm. Twelve planes were in the flight and they all came in gear up. Of the twelve, ten were flown out immediately; the other two were flown out after their props had been straightened. And there wasn't an injury to the entire flight personnel.

That's the kind of instruction the boys at Rosecrans are getting under the direction of Lieutenant Colonel Curtis A. Keen, Commanding Officer; Captain Norman K. Warner, Director of Training; a staff of old commercial air line and Army pilots with thousands of hours of commercial air line and transoceanic flying; navigation and radio officers to whom the stars and waves of Africa, India and Australia are as familiar as their home heavens, and technical research pilots whose practical proof on long range flying procedure adds factors of safety and miles per gallon to the performance of the aircraft these crews are to deliver to the battle fronts of the United Nations.

A flight engineer arrives from Nashville, Tennessee. A radio *(Continued on next page)*

LEARNING THE TRICKS OF GLOBAL FLYING

(Continued from Page 37)

operator has just finished training at nearby Scott Field, Illinois. A navigator comes up from the school at Coral Gables, Florida. A co-pilot recently from four-engine training at Turner Field, Georgia, may be paired with a pilot recently commissioned from commercial air lines (many pilots at Rosecrans are) who may have previously been an operator of a civilian flying school, an old barnstormer or a forced fire patrol pilot. All are reserve officers who maintained their flying efficiency in civilian service, bringing to this emergency plenty of hours in commercial flying plus Army background from original training and reserve officer status.

THESE five men live, learn and fly together in the same ship they will eventually take out to some foreign base. Right off, they are formed into a five-man flight crew, and are drilled in teamwork. If one man can't get along with the rest, he's moved to another crew.

A series of examinations and flight checks are first on the training list to determine what the men already know. Then comes individual instruction.

The flight engineer, for example, is taught the peculiarities of his particular job in long range flying. He learns the specific measures to be taken against sabotage. Check tires for cutting. Watch out for crossed wires and foreign material in the battery cells. Guard against abrasives in the generators. Be sure of the wiring around the fuses. See that there has been no tampering with the solenoids. Make a general check for damage to the electric wiring. Pay careful attention to the fuel system; the introduction of water, chemicals, or any foreign matter will cause a sudden stoppage, and a handful of sugar will mess up the works. The lubricating system must be gone over with a mother's patient care. Straw or rags in the intake scoops may cause a malfunctioning of the carburetor. The transfer system has to be inspected for leaks. From top to bottom, inside and out, the flight engineer learns what he might run up against in foreign territory.

THE radio operator is taught secret codes and ciphers for overseas operation. He practices code until his speed is improved to a point of perfection. He gets so he can recognize a Messerschmitt and a Zero in his dreams. He gets additional training in servicing his radio equipment while in the air, and learns about the different types of radio equipment he may have occasion to use.

The navigator discovers that he is the most important man in the plane while it is making a water crossing. To give him specific training, "The Little Red Schoolhouse of the Air" has been utilized. This is the name given a C-53 which has been rigged up to hold seven or eight student navigators, a radio operator, and an instructor. When the plane starts off on a cross country flight, the navigators go to work exactly as if they were crossing the ocean. They don't get to look at any landmarks, since most of the flights are made at night and they have to bring the ship in on celestial navigation. It is a simulated trans-Atlantic flight and the boys are made to realize that 700 miles out of Natal they won't find a conveniently located church spire to show them the way home.

Following individual instruction, a five man crew is brought together for coordinated training. From now on, this is the same crew that will fly together to any point on the compass. They are taught the approved methods of avoiding ack-ack fire; what to do in case the station they are approaching fails to recognize them; the principle of using corridors for approach; and the necessity for use of proper recognition signals to avoid causing false air raid alarms.

Specific instructions are given concerning proper loading and balance. This is particularly vital to insure the maximum range with the fuel available and to guarantee stability in flight. Information on power control is given to insure maximum range under any conditions at any altitude, including the possibility of one engine failing.

Emergency methods of fuel transfer in actual flight are also taught. One crew on a trans-Atlantic mission found that their fuel tank was losing gas rapidly. Everything indicated that the tank had been punctured by a machine gun bullet. But a fast and accurate check in flight proved that a transfer pump had been turned on accidentally; the fuel from the auxiliary was going in and overflowing. A quick switch and the faulty operating pump was put in proper working order.

A DAY celestial flight is made with no maps and an allowable error of only two miles from the set course. A night celestial flight is not less than 600 miles each way with complete dependence placed upon three star fixes and an allowable error of not more than two miles. A day D/R flight is taken without sun lines, maps, or radio facilities. The Link Trainer is used for Q.D.M. and loop approaches through corridors hemmed in by mountain and barrage balloons. An instrument check on range includes the fade 90-degree system with field approach, but requiring a pull out. Regular cross country flights are an essential part of the training. And this is all in addition to 31½ hours of academic instruction and 17 hours of military training, including Infantry and Physical Drill.

Rosecrans Field was activated early in July of last year. For months the men lived in tents and the Commanding Officer had his headquarters in a trailer. Permanent barracks have probably been built by now, but it won't make much difference. At Rosecrans you practically live in your plane, getting ready for the time when your ship will be your home on any one of the four continents. ☆

Old Sarge Finds Our Mechs Modernized

By

Corp. Larry H. Boeck

MASTER SERGEANT F. G. BULLOCH has been in the Air Forces for 22 years and he knows a sharp guy when he sees one.

Sergeant Bulloch, who is line chief of the 62nd base headquarters and air base squadron engineering department of Sheppard Field, Texas, is convinced that things have changed as far as being a mechanic is concerned.

"Time was," the Sarge explains, "when a mechanic was a jack-of-all trades. He fixed anything that needed fixing on a plane. Today, that's different. The fellows graduating from A. M. school learn to do everything, of course . . . but they also learn a lot more than mechs did when I was going to school and they have to be more alert and studious."

"The mechs today," he points out, "are specialists, which means they're hell on wheels for some special job like props, hydraulics, and the like. This is so because planes have changed a lot. Back 20 years ago, a crate was considered powerful when it had an eight volt electrical system. Most ships today have 32 volts."

"Another thing: the old ships had a horsepower of 150. Today, that's stepped up to a hefty 2,000 horsepower. Those vintage crates didn't have any 100 octane gas, or 92, for that matter. All of it was unleaded."

For the radiators, the Sarge remembers, the boys used plain, ol' alcohol. It looked a lot like the white gasoline now used in gasoline stoves. The resemblance was so great he remembers one mechanic who poured the gasoline into the radiator instead of the alcohol. The boys started to warm the ship up and the gasoline came out of the overflow pipe. Then a blaze started. All of which, says the Sarge, is a little tip to be alert.

To start the ship, the boys used the old hand prop system, since there was no starters, toggie switches or T. O. 02-1-29.

"The biggest change," Sarge Bulloch relates, "is in the way the mechs today work. They really are 'commandos in coveralls.' The boys have to be fighters as well as mechs, and the way they have kept battered crates aloft in the war zones is great testimony to their ingenuity, fighting heart and ability."

"Yes, sir—commandos in coveralls. A wrench or a tommy gun—all the same to the boys."—*Sheppard Field Texacts.*

Forced Landing

(Continued from Page 22)

Avoid snow drifts, broken ice fields and other rough going, unless it is absolutely necessary to cross them. Snow is not deep on ridges as the wind blows them clear. You *must* travel *slowly* and avoid exhaustion.

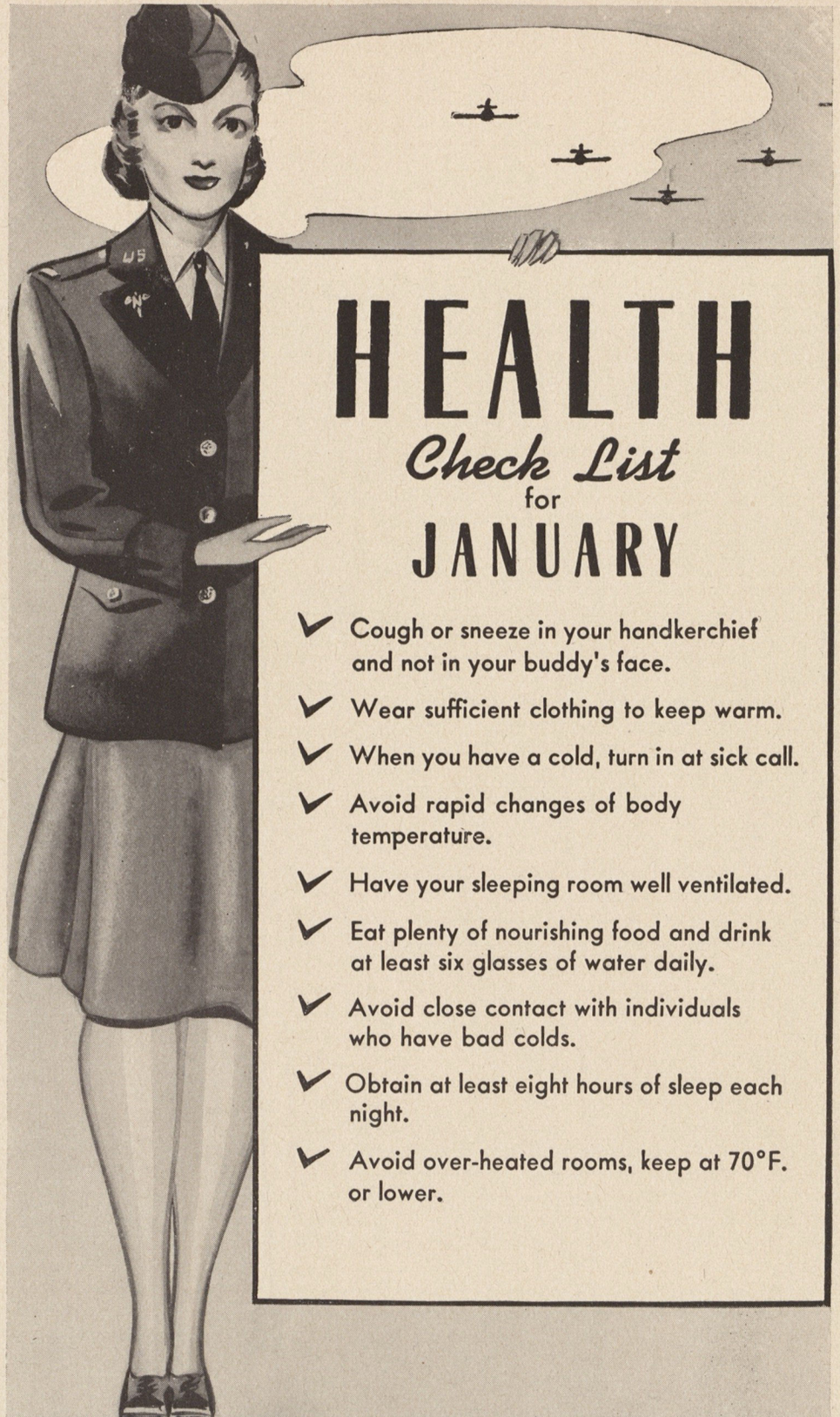
There is abundant water in the Arctic. The only bad result from eating snow is that it chills the mouth and throat and a great deal must be eaten to satisfy thirst. If river or lake ice is available, it can be chopped up and chewed or melted. At sea, last year's ice can be melted for drinking or cooking water. It can be recognized by its bluish appearance, as contrasted to grayish salt ice, and it produces a glare while salt ice is milky in appearance; also, last year's ice has rounded corners and cracks as a result of thaws and rains. During the summer, fresh water is found in the hollows on old ice.

When stopping for the night, get in a lee and make a tent out of your parachute, but be sure that wind-blown snow doesn't cover your camp during the night. A windbreak immediately adjacent to the tent is best. A boulder, cliff, a snow or ice-wall provides protection from the wind. A ten-foot square of silk or canvas makes an excellent tent; three corners are staked down pointing into the wind; the fourth corner is tied to a bush or tree. A small fire in the open end of the tent can be used for cooking and keeps the tent warm. Wood, coal, various mosses, and animal fats and oils may be used to make a fire. Iron pyrite is plentiful in many parts of Alaska and can be used as a flint and steel if matches are not available. The sparks must be caught on dry tinder; moss, grass and weeds can be made into tinder. A burning candle will produce enough heat to make a tent quite comfortable. If pine boughs are available lay them on the ground inside the tent so your clothes and sleeping bag do not get wet. Sleep with feet nearest the fire; they are the parts of the body that are chilled first.

If you have no equipment, you will not necessarily freeze to death. Eskimos have gone for many days in bad blizzards by sitting with their backs to the wind and their arms pulled up out of their sleeves and held close to the body. When the cold would awaken them from time to time, they would get up and move about to get warm again. However, if a person is exhausted when he sits down to sleep, he may not appreciate the warning symptoms of cold, and thus not get up when chilled.

Uninjured men forced down in the Alaskan wilderness, by proper use of their emergency equipment and rations, should be able to exist indefinitely.

Anyone assigned to Alaskan duty will do well to become familiar with Field Manual 31-15, Subject: Operations in Snow and Ice; Field Manual 1-240, Subject: Arctic Manual; Technical Order No. 01-1-67, Subject: Arctic Operation; and Alaskan Air Route Guide published by Air Intelligence. ☆



HEALTH

Check List for JANUARY

- ✓ Cough or sneeze in your handkerchief and not in your buddy's face.
- ✓ Wear sufficient clothing to keep warm.
- ✓ When you have a cold, turn in at sick call.
- ✓ Avoid rapid changes of body temperature.
- ✓ Have your sleeping room well ventilated.
- ✓ Eat plenty of nourishing food and drink at least six glasses of water daily.
- ✓ Avoid close contact with individuals who have bad colds.
- ✓ Obtain at least eight hours of sleep each night.
- ✓ Avoid over-heated rooms, keep at 70°F. or lower.

HEALTH Is Our Most POWERFUL WEAPON

COMBAT REPORT

(Continued from Page 15)

Of course, every effort was made to lay the dust, but in most cases no black-top was available to cover the strips properly. Sometimes resort was made to the use of molasses—a trick learned in the Philippines, where the surplus of molasses would really hold the dust for a considerable length of time.

In New Guinea the problem was very much the same due to the hilly nature of the ground, except that if our planes ever got off the runway they frequently bogged down in the soft, swampy land. Operational needs often forced the use of these strips before dispersion areas could be built. The inability to effect dispersion immediately in many instances was the cause of the loss of planes from strafing by the enemy.

Most of the operations took place in the northeastern and northwestern parts of Australia. The climate and the type of operations were different from anything we had seen before. Our pilots and our combat and maintenance crews have experienced conditions they little dreamed existed. But, nevertheless, our men of the Air Forces have been masterful in their achievements.

On the northwest side, for example, we had one fighter group of P-40s that was especially successful. Ably led by Colonel Wurtsmith and skillfully managed by subordinate commanders, it established the remarkable record of 64 victories against 16 pilots lost from April 7 to the time of my departure from Australia on August 23. It is felt that credit should be given them for twice that number, as the Japs had to return home over 500 miles of open sea after this Group had jumped them. Many Jap planes were surely lost in the sea due to mechanical failures, such as holes in the oil coolers and leaky radiators, that forced them down some time after breaking off combat. Certainly others were lost through lack of sufficient fuel to return to their base.

FOR OPERATIONS off New Guinea, our bombers especially faced many difficult problems. They were usually based on the northeast side of the mainland of Australia. Often they had to fly 1,000 miles before reaching their point of departure for the raid.

If Rabaul was the target, they flew to an airport on New Guinea, refueled, and then headed for the target 550 miles away, first climbing over a 14,000-foot mountain range within the first sixty miles, which forced them many miles off the direct route. This meant a total of 3,200 miles an airplane had to cover to make one raid on Rabaul, approximately eighteen flying hours for the crew. Excessive use of engines, the wear and tear of combat and the effects of dust not only cut down the operational life of our planes but necessitated more frequent rest for the combat crews.

The weather there adds a great deal to the strain of combat. A constant equatorial front hangs in a northwesterly-southeasterly line from New Guinea to the Solomons. It shifts back and forth only about sixty miles during the various seasons. Its weather has a nasty habit of being clear and unlimited one moment, and a solid sheet of rain the next.

Many of the pilots, in order to make their way home with gas still in the tanks, have to force their way through weather of this kind. The buffeting they get takes a lot out of them and their airplanes. Many of their missions had to be abandoned because of this front, and I feel sure that some of the ones that failed to return did so because of extreme meteorological conditions.

THIS weather, combined with combat, gives the navigator as difficult a job as he has ever experienced. The utmost accuracy on his part is demanded in flying over sea and jungle—and this despite the lack of landmarks, decent maps, navigational and radio aids, and the inability to use celestial navigation because of heavy cloud formation. The fact that he seldom fails is a commentary on the fine training he received at home.

The Fortress really hits hard. To support the Marine landing at Guadalcanal on August 7, Colonel Carmichael personally led his Group over Rabaul. Not only did his Group plaster the Japanese main airfield of Vunakanai, but it shot down forty percent of attacking Zeros in an aerial combat that lasted for an hour and a half.

The B-26 and the B-25 have had a similar record over Lae and Salamaua. In one raid that I recall, the B-26s, without fighter escort, shot down fifty percent of the Japanese who attacked them.

Flying conditions in the Southwest Pacific theater demand the best in equipment and we have the best. But it takes proper maintenance to keep it that way. Here the ground crews are doing a remarkable job. None of us could fly without them. In our April raid on the Philippines from Australian bases, I personally saw how vital they are to flying.

Too much credit for the success of that operation cannot be given to the combat crews who not only faced the dangers encountered throughout the trip to, from, and during the raids, but who helped in most of their own maintenance and rearming once we arrived at secret bases in the Philippines. Their brilliant success, however, depended on the work previously done by the Air Force ground troops in Australia. He who does not pay tribute to the boys who keep him flying isn't much of an airman.

But the good work of our ground crews is generally reflected throughout all of the service. Despite obstacles and incredible hardships, our men are cheerful and eager to get on with the job of winning the war.

They do recognize that they are up against a ruthless enemy—one of the toughest foes we have to face. If he is successful in combat, he has accomplished a divine mission for the Emperor. Should he die, he then goes to one of the great Japanese shrines, where he is rewarded for his efforts with hot Sake wine and geisha girls. We should do everything we can to help him get there. ☆

ROLL OF HONOR

(Continued from Page 17)

AIR MEDAL

LIEUTENANTS: Lawrence W. Hanson, Phillip C. Seveilla. **WARRANT OFFICER:** Herbert G. Spees. **PRIVATES:** John M. Bowsen, Thomas N. Collins, Milton Kalter, Robert W. Murray.

OAK LEAF CLUSTERS

MAJORS: Clarence McPherson*, Weldon H. Smith. **CAPTAINS:** Felix M. Hardison (three Oak Leaf Clusters to Silver Star), Guilford R. Montgomery, David C. Rawls, Elliott Vandevanter, Jr. **LIEUTENANTS:** Melvin McKenzie, Austin Stitt. **STAFF SERGEANT:** Raymond P. Legault.

* Posthumous

CITATION

THE SEVENTEENTH PURSUIT SQUADRON (provisional), United States Army Air Forces in the Far East.—As authorized by Executive Order 9075 (Sec. III, Bull. 11, W.D., 1942), a citation in the name of the President of the United States, as public evidence of deserved honor and distinction, is awarded to the following-named unit. The citation reads as follows:

"The 17th Pursuit Squadron (provisional), United States Army Forces in the Far East is cited for outstanding performance of duty in action during the period January 14 to March 1, 1942. In the defense of Java and other South Pacific Islands and in the combined operations that checked the enemy and saved the Allied Fleet at Soerabaja, it repeatedly entered into combat against a numerically superior enemy while escorting A-24 dive bombers. In less than one month, under great difficulties, the 17th Pursuit Squadron shot down 38 enemy airplanes. Its pilots exhibited the greatest bravery and resourcefulness; its ground units, in the face of heavy enemy fire, performed all duties with utter disregard of personal safety. The superior courage and devotion to duty shown by this squadron will always be worthy of emulation."

ANSWERS

To Quiz on Page 10

1. (b) The tail assembly.
2. (d) A bubble octant is used by the celestial navigator to measure the angle of elevation of a celestial body.
3. (c) A British plane.
4. (c) 1903.
5. (c) The details of moving, quartering and provisioning of troops.
6. (b) Status does not belong. (Cirrus, Stratus, and Cumulus are three basic types of cloud forms.)
7. (b) Air speed.
8. (c) Aleutians.
9. (d) Phosgene is a lung irritant used for casualty effect in chemical attack. Has an odor like new mown hay or freshly cut corn.
10. (b) Mid-wing monoplane.
11. (c) 10 inches or less. (Tech. Order No. 03-5E-1.)
12. (c) Near West Point.
13. (a) True.
14. (b) False. (The Air Crew Members Aviation Badge is worn by other members of the crew.)
15. (b) False. A radial engine is an air cooled engine.
16. (b) False. BT stands for Basic Trainer.
17. (b) False. The senior should be on the right when walking and when riding.
18. Combat observers wings.
19. Russia.
20. German Messerschmitt 110. (This ship was captured by the British.)


U.S
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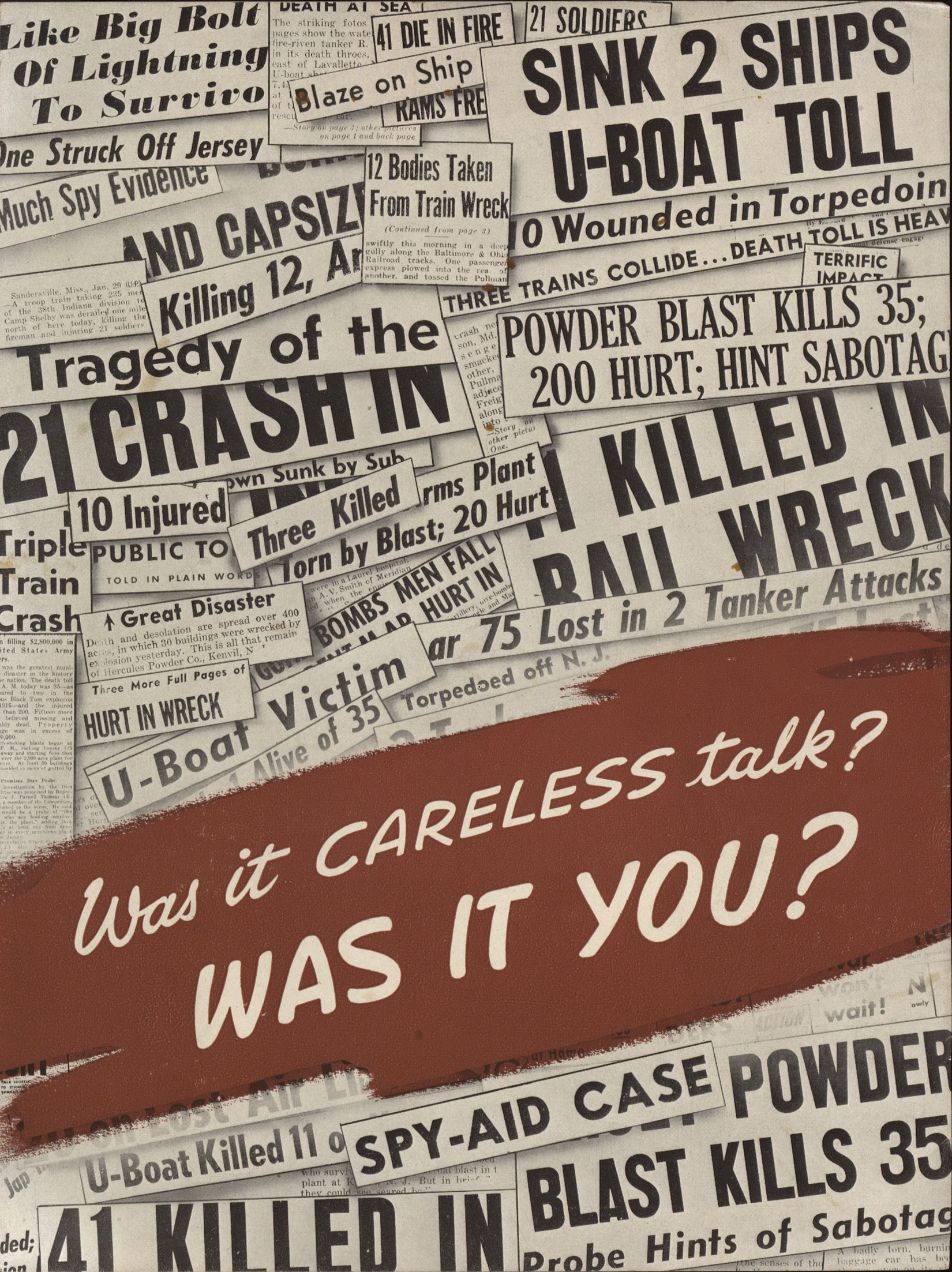
If you NEED it ...
...can you USE it?


Was it CARELESS talk?
WAS IT YOU?
Like Big Bolt Of Lightning To Survivo
One Struck Off Jersey
Much Spy Evidence
DEATH AT SEA
41 DIE IN FIRE
Blaze on Ship
RAMS FRE
21 SOLDIERS
SINK 2 SHIPS
U-BOAT TOLL
12 Bodies Taken From Train Wreck
(Continued from page 3)
0 Wounded in Torpedoin
THREE TRAINS COLLIDE... DEATH TOLL IS HEAV
TERRIFIC IMPACT
Killing 12, Ar
Tragedy of the
21 CRASH IN
POWDER BLAST KILLS 35; 200 HURT; HINT SABOTAG
KILLED IN RAIL WRECK
10 Injured
Three Killed
Torn by Blast; 20 Hurt
PUBLIC TO
TOLD IN PLAIN WORDS
Great Disaster
BOMBS MEN FALL
HURT IN
ar 75 Lost in 2 Tanker Attacks
Three More Full Pages of
HURT IN WRECK
U-Boat Victim
Alive of 35
Torpedoed off N. J.
U-Boat Killed 11 o
SPY-AID CASE
POWDER
BLAST KILLS 35
Probe Hints of Sabotag
41 KILLED IN