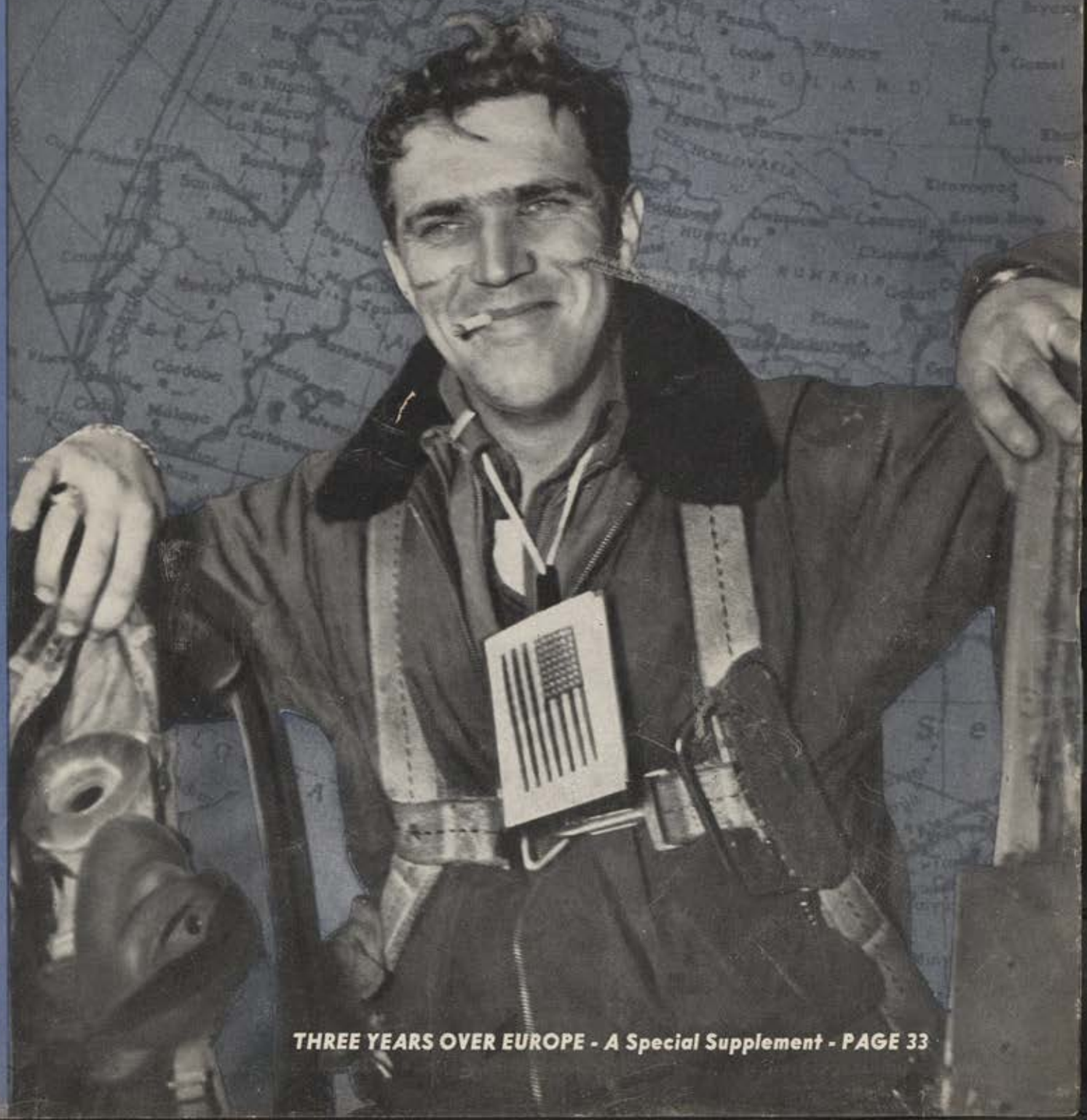
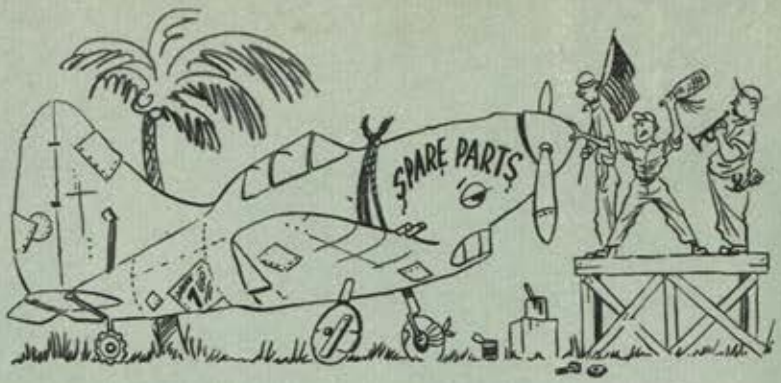
AIR FORCE

THE OFFICIAL SERVICE JOURNAL OF THE U. S. ARMY AIR FORCES ☆ SEPTEMBER 1945



THREE YEARS OVER EUROPE - A Special Supplement - PAGE 33

"I'll bet I get a nice boost for this magnetic nail sweeper."



"Not too hard, Seymour."

G.I. INGENUITY

BY CAPT. WM. T. LENT
AIR FORCE Staff

"Five mallards at 10 o'clock high."

"Dammit! I told you to leave him at home when you're working on the line!"

"How's about giving a little thought to my pinups, now!"

To All Personnel of the Army Air Forces:

A few days before Japan's surrender, a B-29 Superfortress dropped the world's first atomic bomb on Hiroshima.

And yet, in the larger sense, that one atomic bomb was not dropped by one B-29 and its lone crew. All those who have heroically given their lives to the AAF, every man and woman now in its service and all who have returned to civilian life—all participated in the dropping of that bomb. The crew of the B-29 was comprised of the thousands of crews that have flown for almost four years through flak and the fury of enemy fighters over Europe, Italy, Africa, China and throughout the Pacific from Moresby to the Marianas.

Its ground crew is not stationed on one Pacific island alone but is with the Occupation Air Force, at every AAF base from Kansas to Karachi to Kwajalein.

The strip on Guam from which it took off is the sum total of the thousands of strips built by our aviation engineers from pastoral England to the wilderness of New Guinea. It was serviced by the millions of men who have worked in the deserts and jungles and in the northern outposts of Greenland, Iceland, the Aleutians.

You are the AAF, the life and blood of American airpower. The war against the Axis is over and yet we have two missions to fulfill. To maintain order and safeguard the accomplishments of victory, it will be necessary that adequate numbers of AAF personnel continue to serve in the occupation and other air forces. There must be an orderly transition to peace-time conditions. And further in the future, the AAF must recognize its responsibilities as an effective instrument of peace. This is a challenge that I know the AAF will accept, not as a duty but as a privilege.

The Wings of Victory are yours. Wear them proudly.

H. H. Arnold

H. H. ARNOLD,
COMMANDING GENERAL
ARMY AIR FORCES

Vol. 28 No. 9 September 1945

AIR FORCE

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

DEPARTMENTS AND FEATURES

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Rendezvous

Degree of Ruggedness

Dear Editor:

After reading "They've Got You Covered" by Sgt. Louis W. Davis (March AIR FORCE), I've come to the conclusion that whoever captioned the picture of Tingkawk Sakan control tower on Page 59 as "rugged" would be interested to know that the big super job was the second one. Those sticks appearing as a "H" in the center of the

picture were on the tower for a good many weeks until the very busy engineers had time to push the jungle back to build the "rugged" one.

S/Sgt. Arthur G. Meyer,
APO 218, c/o PM, New York City

Dear Editor:

I have read with interest the article "They've Got You Covered" by Sergeant Davis in the March 1945 issue. Hats off to Sergeant Davis of AACS for his interesting article on the fine work the AACS is doing, but I noticed one glaring omission in this saga of airways communications—he never mentioned the Army Communications Service of the Signal Corps.

True, in the early days of the war, this outfit was lacking in manpower and organization, but now we have grown up. . . .

S/Sgt. Charles J. Sloanmaker,
APO 629, c/o PM, New York City

Under varying and often exceedingly difficult conditions, AACS and ACS are both doing a real job. Sergeant Davis and AIR FORCE *doff their hats to you and ACS, too. —Ed.*

Farewell

Dear Editor:

With regard to my swan song, "Three Years Over Europe," (Page 33), which I understand you will run more or less intact in this issue, may I say that it has been probably the most gigantic brains-picking operation in the history of the AAF. My victims lie scattered from the Pentagon to Caserta, and from London to Leipzig, and without the eye-witness information they gave me and the reports they made available, the round-up could never even have been attempted.

It's probably unfair to single out any individuals, but many of the better ideas came from Lt. Cols. Bill Haines and Caleb Cof-

fin—both in England when I talked with them.

Any loud squawks from readers concerning glaring omissions or grievous errors you can refer to me. By that time I will be on terminal leave, and will not pay the slightest attention. Hail and farewell.

Maj. Arthur Gordon

To ex-staff member Gordon, any squawks occasioned by your magnificent "swan song" we will gladly absorb. May your years as MR. Gordon be long and prosperous.—Ed.

Glip Credit

Dear Editor:

The current issue of AIR FORCE carries an article on "Glip-Bombing" by the 341st Group of the 14th Air Force. The authorship of this article is incorrectly attributed to Lt. Col. George W. Taylor. The article was written jointly by Dr. Carl J. Rees and myself, Rees being senior author, I being junior. If there is any way that this can be corrected it would be appreciated.

We are very gratified with the excellent treatment you gave this article. The bomb group referred to has done a marvelous job and we are pleased to see them justly publicized.

Lt. Col. George W. Taylor,
APO 627, c/o PM, New York City

Dear Editor:

I was quite interested in the so-called "Glip-Bombing" article in the June edition of AIR FORCE. It is always great for morale when credit is given for an achievement that renders the prosecution of the war more efficient.

"Glip-Bombing" achieves the same purpose as glide bombing in that the impact angle of the bomb is sharp enough to afford penetration of the target without skipping.

The "Gomboy" Group was part of General Morse's Chinese-American Composite Wing stationed in China.

A squadron of this group was operating in Burma during June and July, at which time they used the "glip" or "glide" method of bombing against bridges with outstanding results. It was at this time that a member of the "Bridge Busters" obtained the technique when he visited the squadron.

This same technique was used by Maj. Raymond Hodges in his missions of November and December against a famous and tough bridge in China. He also achieved outstanding results with this same technique. . . .

I feel that this unit of the Chinese-American Composite Wing should be given the credit to which it is entitled.

Lt. Col. David J. Munson

Costs and Fuel Cocktails

Dear Editor:

We have been having a few arguments here lately which aren't being solved, so I thought you would put us straight.

First: the total cost for the construction and experiments of the original B-29.

Second: the results obtained when an equal amount of 100 octane aviation gasoline and 91 octane aviation gasoline are

(Continued on Page 73)

In This Issue

The weary but happy fighter pilot whose picture was selected for this month's front cover as representative of the human element in the AAF's "Three Years Over Europe" is Lt. Robert G. Young, Jr., P-51 pilot of the 8th Fighter Command. Although Young gave out with this grin when he climbed from the cockpit of his fighter after escorting his "big brothers" over Berlin several weeks before V-E day, his face seemed to us to reflect the feelings of hundreds of thousands of AAF airmen in the ETO when they knew on May 9, 1945, that their fighting job in Europe had come to a gloriously successful end.

Around Young's neck hangs a reproduction of the American flag to identify him to Soviet troops had he been forced down behind their lines which were at the outskirts of the Reich capital when this photograph was taken. On the reverse side of the tag is an inscription in Russian as an added identification precaution.

Young, whose wife lives at Midland Park, N. J., was a chemical laboratory assistant for the Merck Company, Rahway, N. J., in civilian life.

☆

Maj. Arthur Gordon's "Three Years Over Europe," the special supplement beginning on Page 33, is no mere summary or compilation of data relating to the AAF's role in the defeat of the European enemy. It is more an eye-witness story of AAF men and planes, and their gigantic accomplishment during the war years preceding the final collapse of Germany's military machine. Major Gordon, below, arrived in England in the fall of 1942, when our initial missions over the Continent were not yet a faint shadow of the mass attacks to come. During the ensuing months while serving successively as an intelligence officer, as chief of the Magazine Section, 8th Air Force PRO and later as European staff correspondent of AIR FORCE, Major Gordon participated in a number of combat missions both from England and Italy, for which he was awarded the Air Medal by General Spaatz. Returning to the States in July, 1944, Major Gordon became editorial director of AIR FORCE and continued in that capacity until he went back to Europe in April of this year "to be in on the finish."

In a foreword to "Three Years Over Europe," Major Gordon says its purpose is simply to help our airmen tell their stories better by giving them a broader picture of the whole AAF effort in the European conflict. We think you will find it does that—and more. Major Gordon refers to "Three Years Over Europe" as his "swan song," having gone on terminal leave—with well over 100 points—shortly after completing the article.

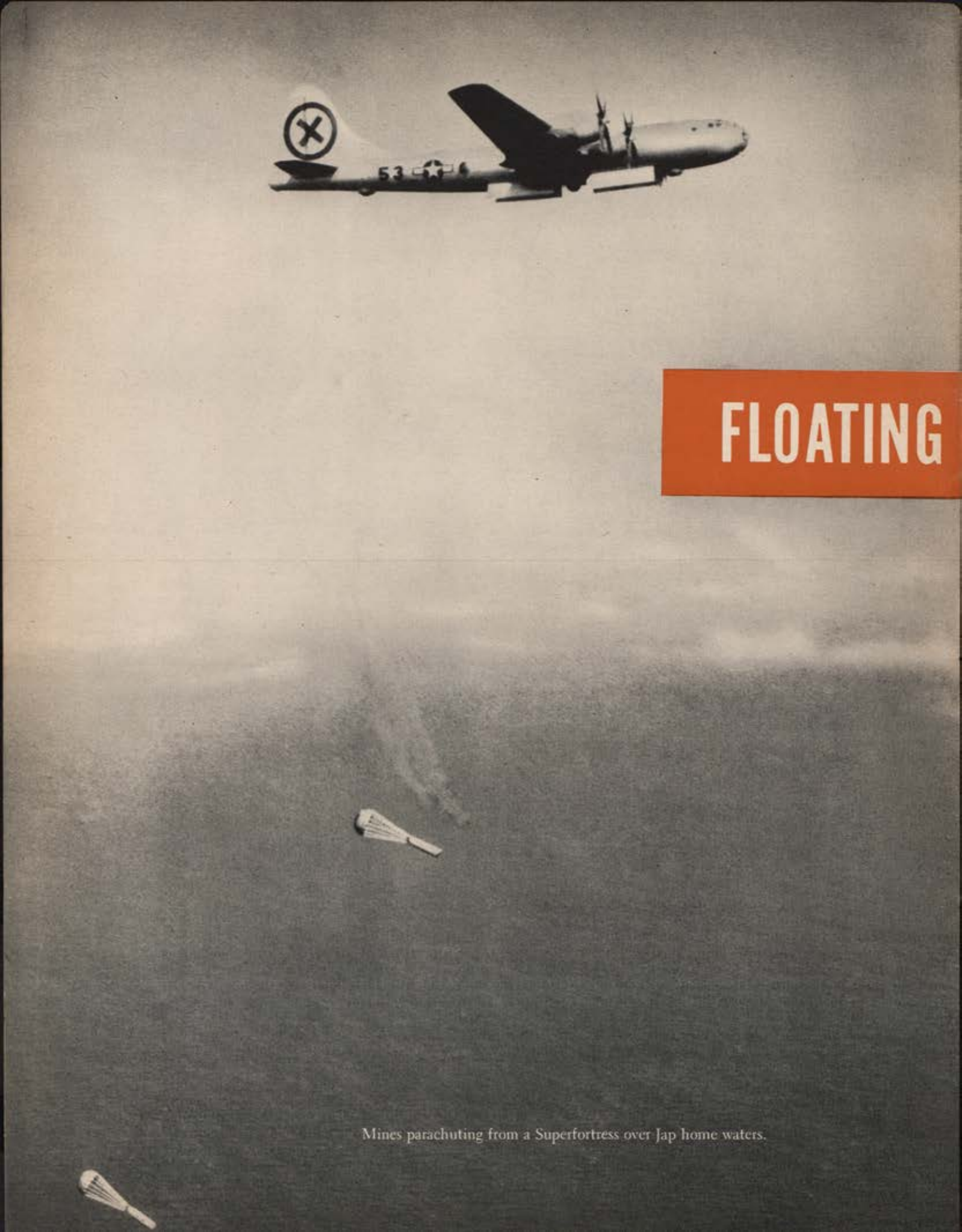
☆

Two other AIR FORCE staff holders of the Air Medal are represented in this issue—Maj. Milton R. Krims ("Floating Death," Page 4) and Capt. Eric Friedheim ("Welcome to Dulag Luft," Page 16). In the June issue we reported that Major Krims, our correspondent in the Marianas, had flown against all four major targets of the historic March 10-20 missions which introduced the Japs to low-level incendiary attacks by B-29s. For these and subsequent Superfortress missions flown before he reported to our Manila office, he was awarded the decoration by General LeMay, then in command of the 21st Bomber Command.

Captain Friedheim was awarded the medal after he had been forced to bail out of a flak-riddled C-46 behind the German lines during the airborne invasion of the Rhineland. Captain Friedheim, who told of his experience in his "Rhineland Rendezvous," published in the May issue of AIR FORCE, descended into the thick of battle and spent five days making his way back to his base. He has now returned to New York little the worse for wear.

☆

Basic material for "Air Disarmament, Germany" (Page 10) was compiled and forwarded to our New York office by Capt. Charles Cooke, AIR FORCE staff correspondent in Europe, and S/Sgt. Douglas J. Ingells, of our Wright Field staff. The finished product was put together by Cpl. Peter Baumann, our home office "Technique" specialist. Latest flash from AIR FORCE Far East Branch in Manila tells us that Maj. Ben Grant, former chief of our Washington office, has arrived for duty with Lt. Col. James H. Straubel, editor and director of AIR FORCE, Maj. Andrew R. Meyncke, distribution trouble-shooter, and Capt. Woodrow P. Wentzy, AIR FORCE's Manila production chief, who were already on the scene. ☆

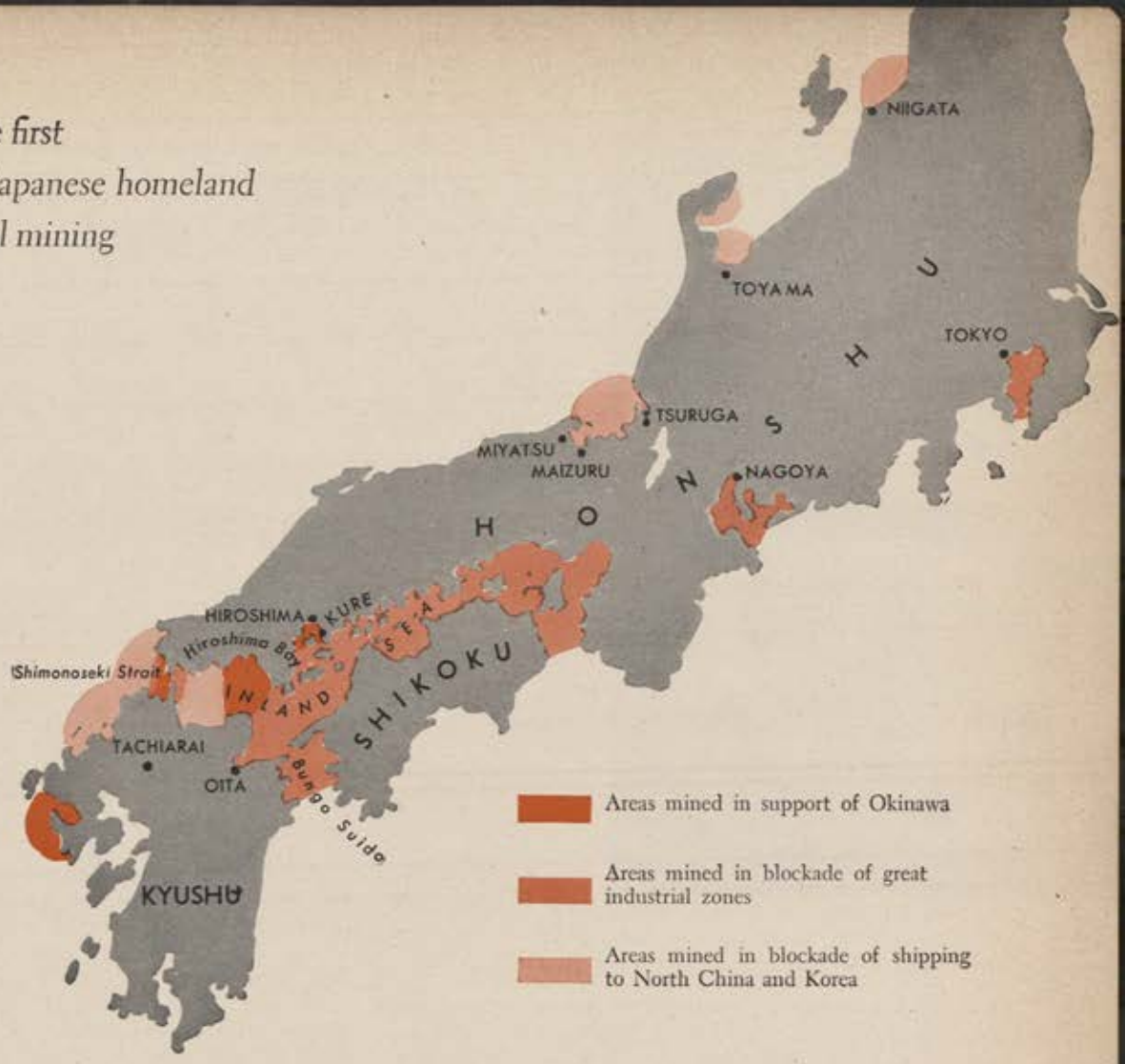


FLOATING

Mines parachuting from a Superfortress over Jap home waters.

Our B-29s placed the first stranglehold on the Japanese homeland with the biggest aerial mining job in history

DEATH



BY MAJ. MILTON R. KRIMS

AIR FORCE *Overseas Staff*

The green blue waters of Japan's Inland Sea are ominously quiet these days. Shipping clings timidly to the safety of harbors, naval units brood at anchorage. Occasionally a convoy of ships ventures into the open, forced by desperate necessity to trade heavy losses for anything left to deliver. The only shipping that plies back and forth in grim and sometimes suicidal parade consists mainly of minesweepers. And their work is never done. The mines keep bobbing back—from the air.

Not long ago, the Inland Sea was a very busy waterway; shipping from Korea, Formosa, the Philippines and North China poured through Bungo Suido and the narrow Shimonoseki Strait bringing food and raw materials to Japan's hungry people and hungrier factories. Even after the Philippines were lost and the war moved much closer home than the Japanese had anticipated, the Inland Sea was reasonably—if temporarily—invulnerable because it was an inner zone and protected from our submarines by an extensive network of minefields.

But as the strategic bombings of the 21st Bomber Command's B-29s gradually reduced the enemy's exterior ports, destroyed his stockpiles and forced dispersal of his factories, he became more than ever dependent on the supposed safety of the interior. His over-burdened railroads and highways forced him to turn increasingly to shipborne traffic on the Inland Sea. He was left with two entrances to the relatively safe sea, Shimonoseki Strait and Bungo Suido. Bungo Suido did not offer complete safety due to ever increasing American submarine action in the southern and eastern waters. But Shimonoseki seemed ideally situated; a narrow and well protected channel separating Honshu from Kyushu, it provided a safe entry for critically needed supplies from Korea, Formosa and North China. From a strict military standpoint, it also provided the safer of two exits for the Japanese fleet, hiding in the Inland Sea, when and if it decided to sortie against the U. S. Navy.

But the Japs were not alone in their regard for the war potential of the Inland Sea. Many Americans had been giving it much thought for a long time; our Board of Economic Warfare had certain ideas regarding its importance. Two men, one an ex-mathematical physicist from the Carnegie Institution of Washington and the other an ex-student of sales and industrial management from Ohio State, eventually had a chance to do more than think about it. They were Ellis A. Johnson, in the Navy, and George A. Grossman, in the Army. Today, Commander Johnson and Captain Grossman work together as mining officers for the 21st Bomber Command. It was inevitable they should combine forces.

Some seven years ago, the then Dr. Johnson was peacefully minding his own research business when a friend asked his help for one night on a mining problem at the Naval Ordnance Laboratory in Washington, D. C. Within several weeks, he was "helping out" seven days and seven nights a week. Soon he found himself a mining expert and

This high altitude reconnaissance photograph shows the narrow Shimonoseki Strait before it was mined from the air by B-29s.

in uniform. He was worrying about mines at Pearl Harbor the day the Japs made their first and last visit. He was mining officer aboard the Lexington and the Yorktown. He went through the First Battle of the Philippines, and the Palau raid. He had become one of the Navy's foremost mining experts. It was while serving aboard the Yorktown that he wrote his plan for mining the waters of Japan, especially the Inland Sea and, as suggested by BEW, the Shimonoseki Strait. He was sent back to Washington to discuss his plan and there, in due time, he met Captain Grossman.

Captain Grossman, a product of OCS, was originally an ordnance officer. Lt. Col. George Younger, in charge of Special Projects, OC&R, Hq AAF, had long believed in aerial mining, had sponsored the idea of sending young AAF officers to the Navy mining schools. Selected for training in this program, Grossman took courses at several Naval schools and became convinced of the potentialities of offensive aerial mining. Called upon to lecture at the first and only mining school in the AAF at the School of Applied Tactics, Orlando, Fla., he soon built his lectures from twenty minutes to six hours, and eventually was awarded the Legion of Merit for his outstanding work as an instructor. And luckily the course was at its best when the first B-29 crews attended the school as part of their overall training program. Convinced that the B-29 was the only airplane that could carry out his ideas for mining Japan, Grossman did all he could to convince the men of the 20th Air Force that mining was a practical offensive weapon.

There were a lot of established notions about mining. Although already used offensively by both the Germans and the British, mining was still considered by our forces to be a defensive weapon. There was plenty of knowledge about surface and undersea craft mining, very little about aerial mining. To create an effective plan called for a high degree of technical knowledge and to sell it called for real salesmanship. Working together, Johnson and Grossman made converts until finally, with their help, the 20th Air Force was persuaded to give mining a try.

The plan against Japan was divided into three phases: first, to interrupt shipping between ports of the Inland Sea, then to neutralize Japanese naval vessels lurking within the safety of the Inland Sea, and finally to throw a complete ring of mines all around the Japanese home islands. The plan called for the first determined attempt in history to impose a strategic sea blockade by aerial mining upon a maritime nation with the aim of preventing both external and internal shipborne commerce.

The team of Johnson and Grossman arrived at 21st Bomber Command headquarters in December of 1944 as mining officers charged with planning and setting up aerial mining operations against the Japanese homeland, these operations to commence April 1. They had no intelligence section, no mines, no airplanes, no depots. They added Lt. Harold I. Judson to assist with the work. A new administrative clerk, Sgt. George Hano, turned out to be an enthusiastic and competent overtime worker. They were given valuable assistance by Capt. George K. Jeffrey, a shipping specialist. Gradually their organization began to take form with everyone contributing nights as well as days. The problem was more than just dropping mines; it was a complex matter of dropping the right type and number of mines in exactly the right places—and at night. They wanted always to keep one step ahead of the enemy and this called for a lot of planning and unorthodox thinking. Among other unorthodox ideas, they proposed dropping mines from 5,000-7,000-foot altitudes. Such low-level B-29 operational flying was considered dangerously close to heresy until the incendiary raids of March 10-20 proved it could be done successfully.

They needed certain types of mines and they needed trained personnel to assemble as well as drop them. The Navy provided the Mine Assembly Depot and agreed to furnish the mines, which would carry parachutes of from six to nine feet in diameter, automatically releasable on contact with the water. Two top-notch Naval mining men, Lt. William Wallace and Lt. James Martin, were transferred from COMMINEPAC, Pearl Harbor, to the 313th Wing as wing mining operations officers. Competent civilian scientists were added gradually to the depot staff until today the very best of them are on Tinian, solving immediate problems rather than experimenting for an indefinite future.

The 21st Bomber Command provided the B-29s and the crews of the 313th Wing based on Tinian. Lt. Donald Boyd, brought from the States, was assigned to the Wing as ordnance mining officer to have charge of the physical loading and handling of mines.

Then came a period of intensive preparation and training. Preparation consisted of gathering every possible piece of information about Japan's current defenses, shipping and economy. Training began with the armament and ordnance crews required to load the mines on the airplanes, and continued with the aircrews who would deliver them. As always, the crews themselves helped tremendously in developing their own bombing methods. Capt. George W. Shaffer of the 313th Wing and his crew, now missing in action, flew many of the first experimental missions from which were developed the aerial mining technique still being used. He and his crew worked nights, flying experimental missions between regular operational bombing missions. These experimental runs were completed by March 7. Although hardly satisfied, the mining crews felt they would be able to run their first mission by April 1.

Meanwhile, other forces were moving into Japan's front yard. The largest invasion fleet ever gathered in the Pacific was heading toward Okinawa. Suddenly the Navy requested 21st Bomber Command to commence mining operations against Japanese vessels that might attempt to counter attack our forces at Okinawa.

The first mining mission took off March 27, four days ahead of schedule, and dropped its new type of mines on Shimonoseki Strait, Hiroshima Bay and large areas in the western part of the Inland Sea. Other B-29s, at the

(Continued on Page 79)

With no self-starting apparatus on the Nick, two men crank right engine with a hand rope.

Captured almost intact on Palawan, this Jap Nick was readied for tests by our pilots.

Main armament on Nick for frontal attacks is a 37-mm nose cannon, shown in sideview.

Rear view of Nick with Jap camouflage. Parts necessary for renovation were made by hand.

Head-on view of Jap fighter-bomber shows muzzle of cannon and three-bladed props.

Cpl. J. England repairs nose gun as General Barnes, CG, 13th Fitercom, looks on.

NICK gift

In their hurried exit from Palawan airbases, the Japs left plenty of equipment, like this Nick, for our technical intelligence experts to mull over — but they didn't leave any tech manuals for our mechs

Twin fixed .50 caliber machine guns may be seen mounted directly behind pilot. A flexible machine gun also may be fired from rear cockpit.

Guerrilla Lightning

BY CPL. HARRY A. CENTER
13th Fighter Command

From the air, Cebu held no inviting charms for the 11-man Air Support Party circling Tuburan strip.

To begin with, the rugged strip, two-thirds of the way up the west coast of the pollywog-shaped island, had been hastily readied by the guerrillas. It looked like something out of Terry and the Pirates.

The inland area of the island were dominated by ridges rising to 3,500 feet. A main road girdled the lowlands along the shore with occasional dead-end tributaries to the foothills. Nearly all the towns were along the main road, but most of them were full of Japs.

When the support party of the 13th Air Force was safely pancaked on the strip in two C-47 loads, guerrillas hurried to unload the equipment. It wasn't much—a jeep-mounted radio control system and a trailer of supplies.

The C-47s took off again and the party was on its own, the first new American faces to be seen on Cebu in three years. It was February 15, 1945.

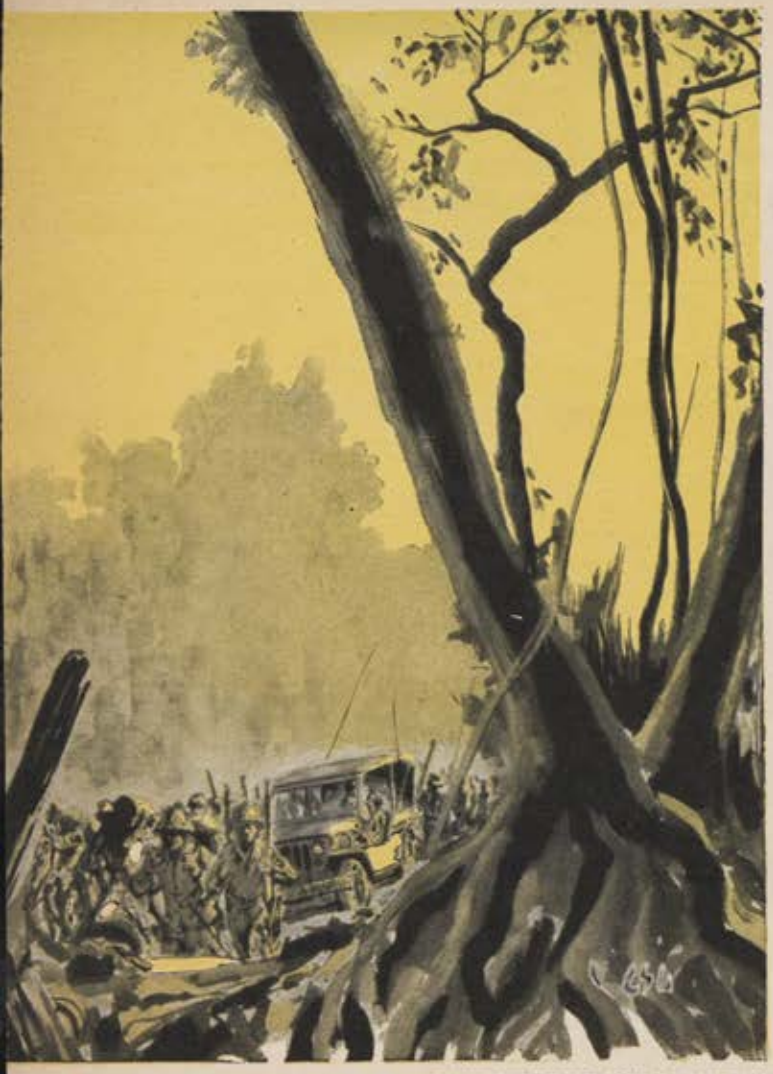
"We shall never forget that welcome," the detachment leader, Capt. Edward M. Thompson, recalls. "People cheered us all along our route. When the jeep stopped they offered us their food—eggs, chickens, bananas, pork, tuba—and with tears of joy in their eyes, crowded around to touch us. They walked for miles to see Americans."

The ground situation, as explained by Col. James M. Cushing, American head of the Cebu Area Command of guerrillas, was ripe for action.

A strong force of Japanese was in the area north of an east-west road slicing the neck of the island. Other forces held the east coast, with their main body in Cebu City.

Colonel Cushing had a tattered but well-trained guerrilla army, its equipment limited to small arms. In earlier days they had made shotguns with pipe barrels—used almost anything that could be fired as ammunition. Later they added rifles supplied by the 8th Army and 4,000 pieces captured from the Japs. There were a few .50 calibers

How a 13th Air Force Support Party, smuggled to Cebu, worked with guerrillas in coordinated air-ground attacks on the Japs



ILLUSTRATED BY SGT. LOUIS S. GLANZMAN

with homemade mounts, salvaged from crashed planes.

Hundreds of guerrillas formed the Volunteer Guard service group. They hauled supplies to the front with a few pre-war trucks fueled with Japanese gas or alcohol distilled from tuba, the juice of the palm tree.

In every town, womens' groups fostered by Mrs. Cushing functioned as volunteer auxiliaries. They fed the army, sewed their ragged uniforms, nursed the injured. Food and quarters were obtained in house-to-house fashion. Nothing was denied the soldiers; no questions were asked concerning payment.

Colonel Cushing's ground strategy was to let the Nips take any specific objective they wanted, then heckle them by hemming them in, picking off expeditions and severing communication lines.

With the arrival of the Air Support Party, the concentration of Nip troops in the north was given first priority.

"You're going close to the Jap lines," Colonel Cushing told the team. "But don't worry. Major Hale's MP battalion is assigned to you for security, and every man will fight to the last ditch to protect you and your equipment."

The first night, 300 Volunteer Guards built a road and hauled the jeep and trailer up the hills to a summit overlooking the Tabuelan-Lugo Road. On the morning of February 16 radio contact with Leyte headquarters of the 13th Air Force was accomplished.

Home and workshop for the control team was a grass shack topping a hill overlooking the target area. Gathered around a bamboo table were the controller, guerrilla intelligence and operations officers, and skilled technicians. Equipment, besides the radio jeep, consisted of an LS-3 speaker grid maps from headquarters intelligence, pencilled maps drawn by residents of the target area, photo reconnaissance pictures, and a pair of 7 x 50 field glasses.

Four F4U Corsairs of Marine Group 12 came over the first day and their flight leader called in to the station. After the flight was authenticated, the controller flipped one earphone for the guerrilla liaison to hear, and clarified the target for the pilots. Checking back, the flight leader described the target as he saw it—an estimated 500 Japs in Lugo, Liki and surrounding palm groves. Guerrilla liaison satisfied, the flight was sent in to bomb and strafe.

The next day four flights of four peppered concentrations in Lugo, Liki and Sogod.

On February 19 an operator standing-by on the telephone system rigged of barbed wire received a message:

"The advance guard of a Jap column will be at the Carmen-Sogod Bridge at 1420."

The operations officer glanced at his watch. It was 1400. He handed the message to the controller. Three flights were expected that day; only two had appeared. A long-shot, blind message went out over VHF.

"Hello. Hello. Any flights in area needed at once. Report to controller. Report to controller. Over."

An answering voice come from the third scheduled flight—from over the Camotes.

"Hello, controller. Hello, controller. Will be with you in 15 minutes. Over."

At 1420 on the button, the four Corsairs bombed and strafed Carmen-Sogod Bridge and the land around it.

Twenty minutes later, the telephone monitor handed another message to the operations officer:

"Jap advance guard wiped out by planes at bridge. Main body turned back into Rough Riders ambush. Thank you."

Timing had been perfect, the Jap attempt to reinforce Lugo prevented.

Four days later, the guerrilla 88th Regiment under Col. Alexandro Almendras took Lugo with but one casualty. He sent back a runner with the report that the town approaches were dotted with fresh graves, blood and a pile of burning bodies.

North Cebu was under control.

Cebu City was next on Colonel Bushing's list. When guerrilla forces formed their pressure block against the city from the west, the fighter control team and its equipment had to be moved 50 mountainous miles to Dacit Ridge, four miles north of the capital

(Continued on Page 78)

AIR DISARMAMENT, Germany

This Dornier 335, shown with American markings, is driven by a propeller mounted in the front and by another installed in rear.

BY CAPT. CHARLES COOKE and S/SGT. DOUGLAS J. INGELLS
AIR FORCE *Staff Correspondents*

Jules Verne would have gaped in wonder at some of the high-priority projects the Luftwaffe was perfecting at the time of the Nazi surrender: A 5,000 hp aircraft engine, a wind tunnel producing gales three times faster than the speed of sound, a fighter plane with an engine in the nose and another in the tail, non-rotating, non-oscillating parachutes with ripcords pulled by a timing device, a successful flying wing, complete aircraft factories buried eight miles inside of mountains.

Even discounting the widely discussed "interstellar platforms" that were to have shriveled up any designated part of the earth, or the V-3s, V-4s and so on that were to have made any spot in the world the instantaneous target of a super-robomb, most Allied researchers, who even now are probing through the secrets of GAF and Wehrmacht experimental stations, feel that the Germans might well have changed the course of the war had time been on their side.

Technical Intelligence and Air Disarmament men are combing the Reich's scientific arsenal with painstaking care to overlook nothing that could prove of value to us, now or in the future. Tons of documents and blue prints, miles of microfilmed reports, vast stores of special equipment and prototypes of experimental aircraft have been transported to England and the United States for evaluation. It is the greatest treasure-hunt in history, with the most unpredictable hiding places yielding invaluable machinery, plans and models. In a crazy-quilt tabulation, gypsum mines, smokestacks, hospitals, schools, prisons, brassiere factories, breweries, bedrooms and haystacks have all been used by the Luftwaffe to conceal their technological secrets.

The thoroughness with which our job is being performed is a striking testimonial to the long-range planning of our leaders. As early as two years before V-E day, over a hundred of the best staff minds of SHAEF and USSTAF were at work on "Air Disarmament, Germany." As a result, the Air Disarmament Command was activated on September 23, 1944, and based at Watford, England, with a personnel of 3,400 as part of the 8th Air Force Composite Command. Later, however, ADC was changed to Air Disarmament Division, its population enhanced to 13,000 officers and men and its administration turned over to the combat-wise 9th Air Force. Col. Harold K. Kelley is boss of ADD, which is headquartered in a big gray school building in the city of Luxembourg, and which is deployed into every area of U. S.-occupied Germany and Austria. Two Air Disarmament Wings comprise its field organization, one based at Fulda and the other at Kaufbeuren, and these supervise four AD groups (controlling 10 AD squadrons), four-ex-medium bombardment groups (controlling 16 AD squadrons), two ordnance maintenance companies, an Air Service group, a mobile weather squadron and a mobile communications squadron. ADD's packing and crating center, an intensely busy place right now, is at Hanau.

Air disarmament teams, trained at a secret school at Chipping Ongar, England, crossed the channel after D-Day to move close behind our ground forces as they swept into and through Germany, overrunning a spew of AAF targets. Airfields, ammo and bomb dumps, supply depots, aircraft factories and research institutes were surveyed and catalogued. Flash reports were sent to ADD Headquarters of

The 9th Air Force has taken off on a new and enormously complex mission—the complete and permanent disarming of the Luftwaffe—and our Wright Field laboratories are busy analyzing the equipment and blueprints uncovered by the disarmament teams

any items that had been expressly requested by Wright Field's Air Technical Intelligence staff, or which were obviously "hot" though not on Wright Field's list. In addition to their known, briefed objectives, ADD men were constantly uncovering "targets of opportunity," on which exhaustive reports were made. And the work goes on.

As indicated, top priority is given to materiel requested by Wright Field's ATI. Next in importance comes materiel which can be turned over to United Nations forces, without prior ATI scrutiny, for direct combat use against Japan. Third in line is a long list of "common-user" items —equipment which can be employed by our Army or Navy. At the bottom comes scrap.

Nothing garnered by ADD in either its "primary" or "final" phases of operation is thrown away or destroyed. As defined in a high-level policy decision, primary disarmament is "the separation of the GAF from its arms, aircraft and equipment," while final work is, "the complete elimination of Germany's air war potential." In practice, however, the two phases are not wholly separate, and in one day an ADD team may seize a dozen ME-109s (primary) and begin the complete dismantling of an aircraft engine plant (final). Primary operations will be finished by units now in the field, but final disarmament is expected to take years and will be concluded by occupation forces.

Rocket-propelled Messerschmitt 162 fighter plane features tricycle landing gear, bent wingtips, split tail and engine atop fuselage.

Flettner helicopter, with counter-rotating, intermeshing blades, once landed on the deck of a submarine which was moving at 18 knots.

Simplicity and streamlining were prime factors in German jet engine design, as shown below in night fighter version of ME-262.

Needless to say, business has been booming. A late count of known objectives for investigation in U. S.-occupied Germany is 6,245, of which 1,200 had been processed by mid-July. About 100 new cases are being reported each week, and the books are being closed on them as rapidly as facilities permit. Some 800 "hot" items have been collected for shipment to Wright Field, and many of these are too secret for mention here. A few, however, may be spoken of in general terms, and these are presented as a cross-section of the rich prize in weapons our scientists and engineers have been given for "redeployment" against Japan.

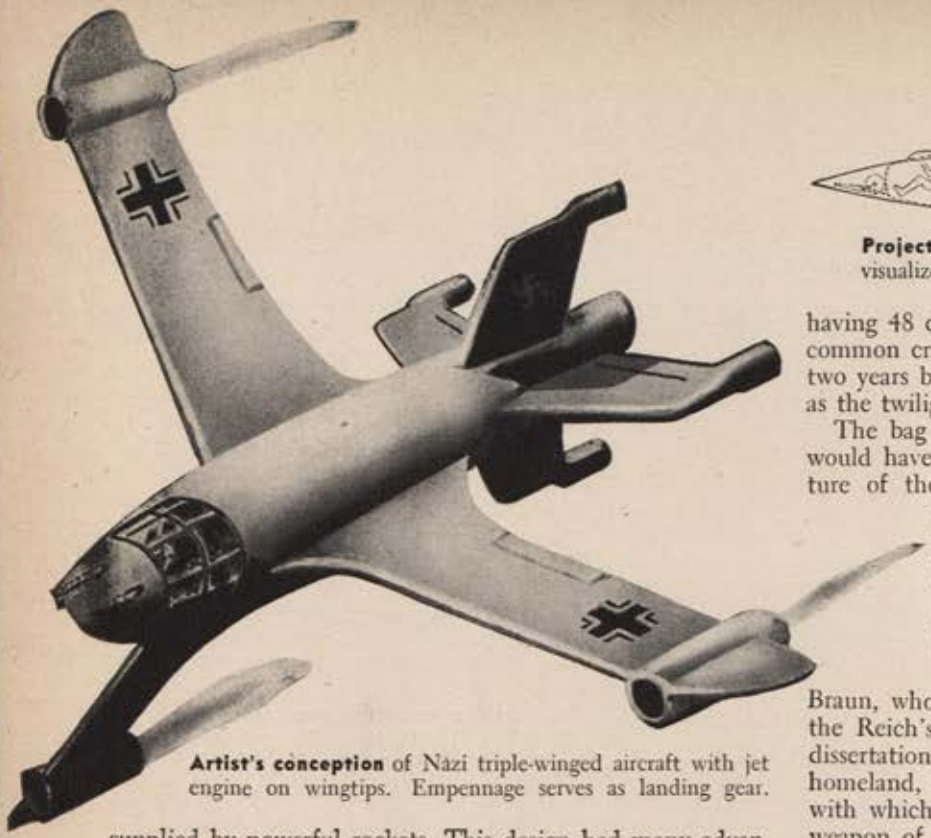
At Oberpfaffenhofen, near Munich, an assembly plant yielded a complete Dornier 335, the "mystery plane" which was to have been the Luftwaffe's answer to the 9th's fighter-bombers. Two Daimler-Benz, 2,000 hp engines are carried, one in the nose and one in the tail. Approximately 450 mph in level flight and 600 mph in a power dive are its reported speeds, while a feature of the craft is a three-button controlled explosive seat which propels the pilot clear of the two props in the event of a bail-out. The seat has its own parachute which opens automatically to steady the flyer until he can disengage himself and pull the ripcord of his own chute.

Near Bad Tolz, a new-type helicopter was pulled out of a hayloft by its inventor, Dr. Anton Flettner, and proudly exhibited to an ADD team. Its two rotors, turning in opposite directions, enabled it to fly straight up, straight down, backward and to hover. In a test it had once landed on the deck of a submarine moving at 18 knots. Flettner and his brainchild had been bombed out of their Berlin plant and he had taken refuge in his country home.

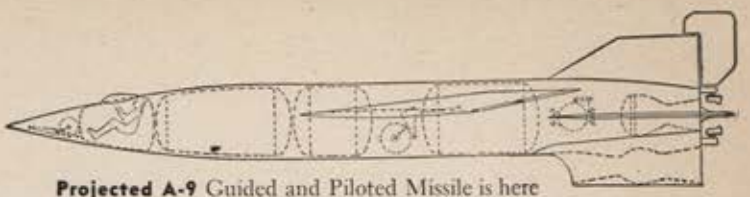
For a long time the Nazis were exponents of the flying wing. They had one design called "The Bat" which was nearing completion when the war ended. Having a shape like one of the noctural mammals, it was powered by two jet units buried in a thick wing. The cockpit, except for a low canopy, was streamlined perfectly into the airfoil.

Jet power plants were no vaguely understood phenomenon to the Germans. As far back as 1938, there were reports of jet-propelled experimental aircraft, and two years later we knew that they were flying a jet plane with considerable success. Captured documents make it evident that Luftwaffe engineers long ago rejected the centrifugal compressor in favor of an axial-flow compressor, whose principal advantage is that its lends itself more easily to streamlining and simplicity. Its frontal area is about one-third the diameter of our jet units, and flow of air is straight through the engine nacelles, whereas in our engines the air twists and turns around elbow ducts before it is compressed, mixed and ignited and ejected as hot gas thrust. In the enemy's version, furthermore, a bullet-shaped tail pipe plug effectively varied the area of exit, permitting high thrust power while burning a small amount of fuel.

The most advanced type of German jet plane was the Triebflugel Flugzeug (power-winged airplane) which had three wings placed on its fuselage like the fins of a bomb. It was powered by ram-jet (Athodyd) units, was shaped like a long cigar and carried one man. The Athodyd engines, long tubes with straight-through ducts which utilize forward speed to compress air, were located at each wingtip, while initial power for take-off and Athodyd operation was



Artist's conception of Nazi triple-winged aircraft with jet engine on wingtips. Empennage serves as landing gear.



Projected A-9 Guided and Piloted Missile is here visualized as a super V-2 long-range rocket bomb.

supplied by powerful rockets. This design had many advantages, since any combustible fuel, gas or liquid, which can be vaporized could be used as fuel—including pulverized coal. Moreover, the Athodyd engine is the simplest type of power plant from the production and maintenance standpoint, and since the take-off rockets were jettisonable after the craft attained high speed, weight could be kept at a minimum.

To get the plane into the air, it was stood on end while a jet blast shot it straight up like a skyrocket, thus eliminating runways. Landing, too, could be accomplished in a small space by pulling the nose up in a steep climb, reducing power slowly, and letting the craft settle to the ground, tail first.

In a Dornier 217, the Athodyd was used as an auxiliary power plant, with the bomber taking off on conventional engines and then switching over to the jet when it had reached a desired speed. In this instance the Athodyd used was a tube 33 feet long with a diameter at its center of 43 inches, tapering about ten inches to each end. Inside, an arrangement of forged tubing permitted fuel to be supplied to 60 jets, which sprayed the fuel against the direction of flight to furnish compression by ram effect. According to closely-guarded records, this switchover increased speed from 250 to 420 mph.

The Germans were not far behind us in the special equipment field. At Regen, the 401st Air Service Group of the 1st AD Wing found a lens factory turning out fine precision lenses for bombsights, in an enormous smokestack. In Erbrach, near Nuremburg, the Ernst Plank factory was happily turning out improved flak sights—and packing them for shipment in American Red Cross cartons originally addressed to United States PWs. A wind tunnel located at Kochel was producing gales three times faster than the speed of sound—and the metal casing of the tunnel had to be enclosed in a water jacket to keep it from melting. It was here that the ultimate shape of the V-2 was decided, while other projects on the agenda included a robomb to be launched from a submerged submarine, a V-2 with wings and autopilot, a torpedo with an 80-mile range and anti-aircraft rocket projectiles of revolutionary design. Then, too, a 5,000 hp aircraft engine was discovered, having 48 cylinders in the form of four V-12s hooked on a common crankshaft and gear box. This project, shelved for two years by Goering's Air Ministry, was frantically revived as the twilight of Nazi power approached.

The bag of machinery, prototypes and special apparatus would have been of relatively little value without the capture of the scientists, designers, inventors and manufacturers who made them into operational realities. Hundreds of these men were caught in ADD's dragnet and rounded up for interrogation. Many were eager to talk freely, and from their written statements we have obtained a clear picture of German military planning and thinking.

Among the bigger fish is Professor W. von Braun, whose background probably qualifies him as one of the Reich's outstanding authorities on rockets. In a brief dissertation on the development of liquid rockets in his homeland, he gives an illuminating estimate of the regard with which this form of power-source was considered as a weapon of the future. The professor writes of experiments being conducted as early as 1929, of serious military interest in 1932, of extensive research at Peenemunde on the Baltic, of trials in 1938 with the first liquid rockets having automatic control systems and rudders and which could reach seven miles into the stratosphere when fired vertically.

Referring to the robomb, von Braun places it in Nazi long-view planning as merely the beginning. He discloses that it was intended to construct a winged V-2, designated as the A-9, which would carry a crew and be equipped with retracting undercarriage, pressurized cabins and special aerodynamic aids for landing. About 375 miles in 17 minutes was the expected rate of travel, and range was estimated at more than 3,000 miles. Another possibility he mentions is the construction of multi-stage piloted rockets which could reach a maximum speed of more than four miles a second outside the earth's atmosphere. "At such speeds," he points out, "the rocket would not return to the ground, since gravity and centrifugal force would balance each other out. The whole of the earth's surface could be observed from such a craft, and with the aid of powerful telescopes, such objects as ships, troop movements and construction work could be seen and reported."

A further plan dear to the hearts of German masterminds was the building of an observation station in space, using rockets to carry up men and materials. Erection was considered no problem as the components would have no weight in the state of free gravitation, and the work could be done by personnel wearing some form of diver's suit, moving at will in space by means of small rocket units.

It was along such lines as these that the enemy was working and thinking when the war came to an end. And it is to forestall the fulfillment of such plans that the Air Disarmament Division has undertaken to eliminate the German Air Force once and for all. That is the task assigned to the 9th Air Force, and only when it is completed will they be able to write, "Mission Accomplished" across the record book of the war in Europe. Long afterward, however, the slow work of study, appraisal and classification will continue in American laboratories and proving grounds, as our own aircraft engineers adapt enemy resourcefulness and cunning toward the molding of a stronger AAF. ☆

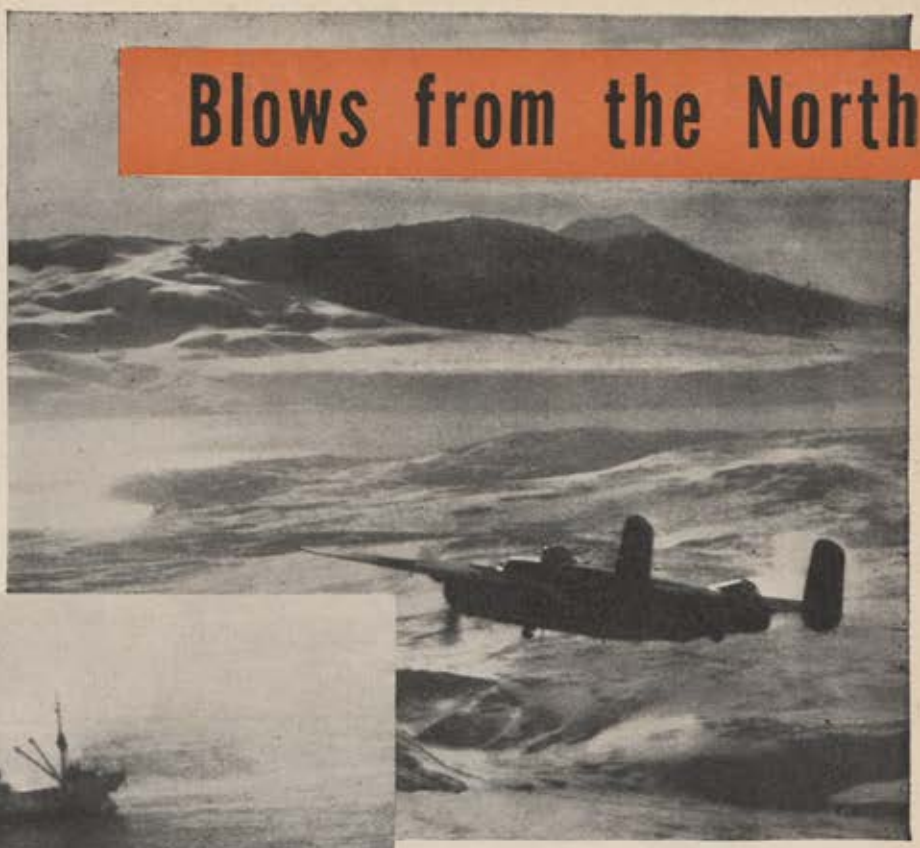
Blows from the North

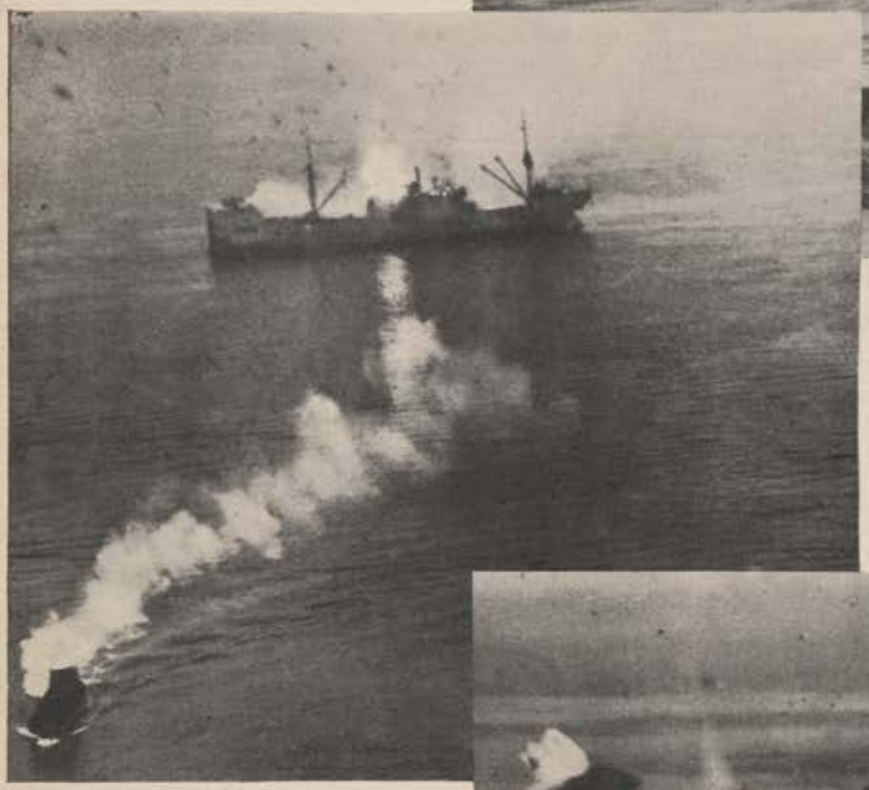
Striking from Aleutian bases, the 11th Air Force completes the AAF ring around Japan

After three years of handling the cold, dreary job of holding down the northern flank of the AAF ring around Japan, the 11th Air Force is still blasting the Japs. The campaign waged by the 11th has been in three phases: the first ended with the Jap defeat at Dutch Harbor, June, 1942; the second culminated with the evacuation of Kiska in July, 1943, after the Japs had been chased from the Aleutians; the third is the continuing Kurile offensive.

Northern Kurile bases were to have been a Jap springboard for invading the U. S., but since June, 1944, the 11th has kept the Japs strictly on the defensive. During such Pacific invasions as those at Saipan, Guam and Okinawa, the 11th helped keep the Japs busy by flying diversionary missions in the Kuriles.

The main targets in the Paramushiro operations have been shipping, airfields, communications, Jap radar and ground defenses, and canneries. A major problem for the 11th is the small size of the target areas, which calls for extreme preciseness in navigation and bombing technique. But the weather and the 1,400-2,200-mile distances also keep the navigators sweating. Only 150 days out of the year are fit for flying and many of those are far from perfect. In rating her enemies the 11th considers weather a big first with the Japs several lengths behind. When the 11th's B-24s and B-25s do get through they are opposed mainly by Oscars, Zekes, Hamps and sprays of fairly accurate ack-ack. ☆





Lead B-25 comes in over Shimushu, northernmost Kurile island, to attack Jap convoy in Paramushiro Strait. Volcanic cone in distance is Araido To.

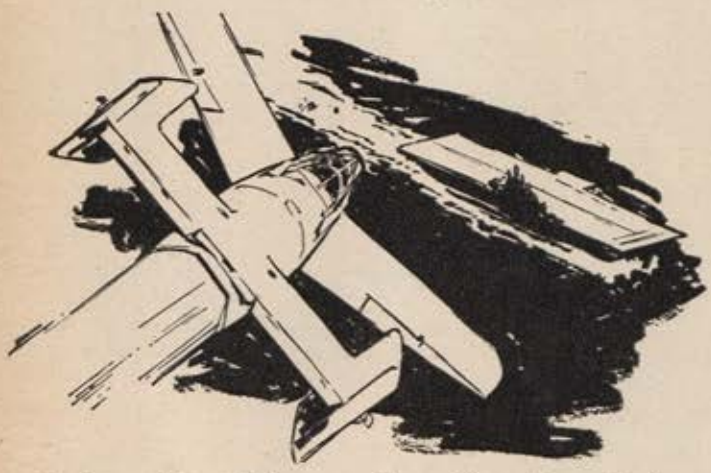
Direct hit blasts Jap freighter as small trawler scurries for safety, smoking from strafing damage. Ship and shore ack-ack knocked down one B-25.

Mitchell at right has strafed troops and buildings after pasting 2,500-ton cargo ship with direct hits. Total of six Jap vessels was sunk during attack.

THIS IS YOUR ENEMY

. . . it's your life or his

You Are the Bombs. When Rear Admiral Masubimi Arima, commander in chief of a Jap airfleet, was reported by Radio Tokyo to have "dived his flaming plane upon the deck of an Allied carrier" in the battle of Formosa, he made the first headlines in the continued story of Jap air suicides. In various guises since then, Japs have committed Jibaku. This flaming aerial melodrama, which Tokyo announcers now describe as "deathlessness in death," puts the hitherto exalted



business of hara-kiri on a pretty earthly and prosaic plane. At any rate, "Kamikaze," a term borrowed originally by the Japanese Naval Air Force from folklore, has been squarely planted in the history of the Pacific air war (See "Divine Wind Blows Nobody Good," Page 14, July AIR FORCE.)

Apart from the deliberate nicking, side-swiping and crashing that occasionally occur in dogfighting, the majority of earlier air crashes were probably the result of "fly-through" tactics. As the Japanese have pointed out, their organized suicide program did not get underway until autumn of 1944. Initially it was a desperate attempt to stem Allied naval operations. Tactics varied, but they were obviously not impromptu. Some pilots used a vertical dive from high altitude; some approached low, gained a few hundred feet and then dived; some came in at shallow angle glides; a few made vertical dives, dropped bombs on one ship, hedgehopped a second, and crashed a third; some made a strafing run and then turned back to crash.

Less systematic in plans than the Luftwaffe, the Japs were nevertheless speedier about putting suicide into operation. Special developments were also encouraged. Most widely advertised is the Baka, invented by a Lt. Comdr. Niki of the Japanese Navy. Although it acquired the name meaning "fool" from Allied intelligence officers, it was originally known as Oyako, the "mother-child bomb." First of the Army planes to act the "mother" role was the Helen. Usually the bomb is launched from the air, but it was planned for ground launching as well. Some types have been fitted with wing-rockets. (For details see "Inside the Baka," Page 28). Among related weapons newly developed, Flash V-1 looks something like the P-51 and is intended for attack on both naval craft and bomber formations.

Superfortress crews of the 20th Air Force have reported relatively few suicide attacks compared with the Navy's experience in the battle of Okinawa. The die-to-kill attacks will grow more prominent, perhaps, as Japan's situation becomes more desperate. So far, no standard approach has been observed by the B-29s. Evasion, increasing frequency of night missions, and effective fighter escort will discount effectiveness of the attack. Announcements from Tokyo addressed to the Americans concede that the suicide program has exacted a terrible toll of Japanese airmen. More heavily brocaded "addresses" to Kamikaze pilots about to depart on a mission are designed for Japanese. Compared with a turning knife or a running jump off a cliff, this kind of military "honor" undoubtedly gives the airmen satisfaction as they hear their CO intone, "You are not mere bombers in formation. You are yourselves the bombs."

Hirohito's Deficit at Borneo. Gradual conquest of Borneo was somewhat shadowed by the direct attack on Japanese islands. It was a significant chapter, however, in Japan's decline. On November 16, the Japs were able to put 220 planes in the air over Borneo; seven months later, they could muster only 9. In the same period, airfields available to them had been reduced from 20 to 6. These figures, however, do not suggest the quality of the Japs' defense of the island. Beginning with the first raid of the pre-invasion campaign, August 13, 1944, and continuing through the months of autumn and winter, direct Jap interception and air-to-air bombing were often effective. By the time of invasion, both had dwindled.

Resources secured for the Allied cause by the advances of the Australians and Netherlands East Indies troops were important. These areas once produced about 20,000,000 barrels of oil annually. Reclamation is well underway. With a population of about 3,000,000 Borneo was prominent on the Jap calendar of conquest for other reasons—timber, crude rubber, copper, coal.

Eleventh Hour in Italy. GAF evacuation measures in Italy give sharp evidence of what may happen to a defeated air force. As the Allies crossed the Po, only 26 German planes managed to get out to new fields. The mass of Luftwaffe flying-stock was destroyed on the ground. Three Italian groups in the GAF, getting no orders to retreat, burned their equipment, and headed for home. As the second week in May began, General von Pohl's headquarters proper was left with one JU-188, four FI-156s and 23,000 assorted Nazis in various states of disrepair and disillusionment.

MATAF statistics tell the story. The GAF's Italian inventory of gas, by cubic meters, went down from 3,600 on October 1, 1944, to 780 on January 1, 1945. From the first week of January until the end of hostilities in May, planes of the MATAF flew about 105,000 sorties.

Jap Air Diet and Dosage. Although the Japanese airmen do not have anything comparable to the AAF's flight-feeding program at Smoky Hill, nutrition for flyers and routine aviation medicine have been given elaborate attention by the JAF. Chocolate sticks, dried fish and fruit are common in aircrew lunches. Air surgeons prescribe massage for muscular fatigue; for general fatigue, dextrose injections; for sleepiness in flight, a sleep-prevention pill bearing the provocative name of Inemuri Boshi Shoku.

Vitamin tablets are common additions to JAF diet. Each flyer is given fresh fruit, such as apples or persimmons, and one glass of fresh milk daily. "Night-vision tablets" and air sickness remedies are also general issue for aircrews. One bottle of Air (Koku) Whiskey and another of port wine are allotted to fortify the spirit, stir the courage and improve the outlook.

By the Light of the Moon. Not long ago Jap night fighters were handed new handbooks. Discussion of their highly dangerous aerial trade ranges from very broad generalizations to specific suggestions for attack. Night fighting, the manual says, is largely dependent on "concentrated firepower, achieved by coordination and careful formation flying." Approach from the rear is recommended, but actual attack should generally be from the front, "slightly low, determined and lightning-swift, according to the skill of the men and the degree of visibility."

The problem of night vision is given emphatic but somewhat vague treatment. "The most difficult part of night fighting," the trainee learns, "is detection of the enemy. Even when moonlight is insufficient, one can expect night fighting to be much the same as day combat once the enemy is spotted, but for some reason detection of the enemy at night by direct vision cannot be systematic."

In case the night fighter forgets all this, he can act on the final suggestion: "When other methods fail, ram the bomber."

Cooking—With the Gas Off

Though music be the food of love,
As Shakespeare said—we still were wrong
In June to muddle food and song
With talk of "stewing samisen."

GIs from here to Zanzibar
Yelled, "That's a boiling Jap guitar!"
Wrote scholar-cooks from islands rocky,
You mean SUKIYAKI, pronounced SKEEYAKI.

Hereafter we will keep our stews
Separate from the lyric muse.

B-29 That Wasn't There. Jap "bait" spotted by photo reconnaissance is varied. One trick involves the outline of a B-29, done in lime, with a trail streaming out from one engine to suggest fire. The layout is intended to lure Allied planes to low level over a field studded with antiaircraft.

Captured airfields once used by the Japs reveal an increasing number of bamboo and wicker decoy planes. Most common "designs" are those resembling Tojo, Frank, Sonia and Sally. They work, too; most of those examined have been pretty well shot up or bombed. ☆

ILLUSTRATED BY SGT. LOUIS S. GLANZMAN

WELCOME TO DULAG LUFT

By CAPT. ERIC FRIEDHEIM

AIR FORCE Overseas Staff

ILLUSTRATED BY T/SGT. DON BROCKELL

A P-47 pilot, just released from a POW camp was wondering, almost seriously why the Germans lost the war.

"They seemed to know everything about our air forces," he said. "They had accurate information about most of our secret equipment and they could tell how many airplanes and men we had in practically every combat group in England. At Dulag Luft, their interrogation center in Frankfurt, they even could predict what targets we were attacking next.

"When I was captured, the interrogator at Dulag Luft greeted me like a long-lost brother. He said they were glad to see me and had been expecting me for some time.

"And you probably won't believe this. That joker actually inquired about my mother's health in Terre Haute and asked how my kid sister was doing in high school."

To our Counter Intelligence officers, there is nothing remarkable in this pilot's story. During the past few months they had heard the same thing from hundreds of other American flyers who had passed through the POW processing of the Luftwaffe. Their own investigations had convinced them long since that throughout the war there was little the Germans did not know about Allied air operations. The CIC was painfully aware that many of our most closely guarded air secrets often came to rest in the files of the enemy intelligence staff within a matter of days or even hours.

Most of our captured airmen were mystified when German interrogators confronted them with a seemingly vast store of facts and figures about virtually every phase of Allied military aviation.

"They must have had spies in every American and British squadron," an astonished group commander reported. "When I came to Dulag Luft they not only knew the name of my adjutant and mess officer but also the fact that I promoted them three days before."

There is no evidence that the Germans had spies planted among Allied combat units. According to CIC, this probably would have been a waste of effort. The truth is that the Germans obtained most of their information directly from Allied sources, a large percentage of it through carelessness and laxity in observing security regulations.

Tucked among the archives of Dulag Luft are thousands of documents, photographs, letters, newspaper clippings and papers of all sorts —carefully indexed and catalogued. From this vast collection, the Germans extracted the keys that opened the doors to many of our military secrets.

A substantial portion of this voluminous file flowed into Dulag Luft from the pockets of captured personnel or from Allied airplanes that came down in enemy territory. Part of it came from American and British newspapers, books and periodicals and from monitored broadcasts. Practically none of it originated from German undercover agents in Allied areas.

In this file are many odd items. A railroad ticket, good for a one way journey between two English villages; an American army post exchange ration card marked with a heavy black pencil; the crumpled snapshot of a man wearing a checkered suit; a charred, dog-eared diary whose pages were filled with seemingly meaningless scrawls.

The job of German intelligence agents at Dulag Luft was to find out everything possible about the Allied air forces.

There are more ways than one to spill the beans and the 'greeters' at this famous interrogation center were familiar with them all when it came to gleaning information from captured Allied airmen

The fact that they succeeded remarkably well is revealed for the first time in a staff report prepared by Capt. Gorden F. DeFosset of the Counter Intelligence Corps, U. S. Strategic Air Forces in Europe.

It is an amazing account of ingenuity and clever detective work by which the enemy combined the use of captured documents and the questioning of prisoners in order to keep abreast of Allied air developments.

Many thousands of Allied airmen passed through Dulag Luft where all were subjected to varying forms of questioning. There was no torture or other severe physical mistreatment. In contrast with the Gestapo, the administration at Dulag Luft generally observed the Geneva convention and sought to loosen prisoners' tongues with methods more subtle than a rubber hose.

It is to the credit of American airmen that most of the information assembled at Dulag Luft did not come from them directly. The average prisoner refused to be lured into a discussion of his job in the air forces or any other military subject. But there were some, of course, who for one reason or another, did talk freely. From what the CIC has been able to learn, 80 per cent of the information obtained by Dulag Luft was supplied by captured documents and the rest from POW interrogation.

The documents evaluation section at Dulag was staffed by experts. The amount of useful data they could extract from a seemingly innocent piece of paper testifies to their efficiency and resourcefulness. Nothing in the way of documents, written or printed, was too insignificent to merit close scrutiny. They would pore over a copy of a service newspaper, a letter or an officer's AGO card as though they were blueprints for some new Allied secret weapon. And not infrequently their painstaking efforts were rewarded.

There was the case of the railroad ticket. The circumstances under which it was found gave the Germans an important lead about the impending transfer of airmen attached to a British Wellington bomber group from one part of England to another. On the basis of this information, the Luftwaffe subsequently learned that the RAF was shifting a number of these planes to antisubmarine patrol duties.

Then there was the case of a Flying Fortress pilot who bailed out over Germany. Captured immediately, he was taken to a nearby airdrome for preliminary search and questioning. The pilot refused to divulge anything more than name, rank and serial number, and after relieving him of his watch and wallet, his captors sent him on to Dulag Luft.

Here he was handed a questionnaire containing 27 questions ranging from the identity of his unit to his religion and home address. Quite properly, the pilot refrained from answering these questions.

"Why do you refuse to identify your group," his interrogator asked.

"I am not required to give you anything beyond name, rank and serial number," the pilot insisted.

The interrogator laughed and pulled a note book from his pocket.

"You Americans must think we are stupid," he said. "We already know everything about you. We know with certainty that you are from the 100th Bomb Group. If that surprises you listen to this."

Reading from the book, the interrogator not only told the pilot the location of his base but also described the English countryside surrounding it. With obvious glee, he correctly named the group's commanding officer and then discoursed for several minutes on the condition of the bar at the 100th Group's officers club.

The astounded pilot's resistance melted. Confronted with so much information about his unit he saw no reason to remain silent any longer.

If that pilot still wonders how the Germans found out he was from the 100th Group, the answer is in the files of Dulag Luft. Inadvertently he gave himself away by the ration card he carried in his wallet.

Although the same type of ration card was issued to every American military organization in the ETO, Dulag Luft's experts could identify the unit to which a prisoner belonged by the manner in which his card was cancelled. The post exchange clerk at the 100th Group always used a heavy black pencil when marking the cards. At this base, the PX counter was constructed of rough board and all the cards from that group carried the impression of its distinctive grain pattern in the pencil marking.

American aircrews always were briefed against transporting papers and other extraneous documents, but in the words of one Dulag Luft officer "their partiality for personal souvenirs had long made itself felt to the advantage of the Germans."

One day, a newly-appointed American group commander was shot down and killed during an operational flight over France. A notebook found near the wreckage was sent along to Dulag Luft. Although it was partially burned and the notes almost illegible, Dulag's sleuths soon managed a substantially accurate interpretation. From this little book, the Germans obtained their first authentic information about the number of bomber crews undergoing training in the United States as well as how many heavy bombers were available for this purpose. More important, the notebook divulged highly secret data about the very heavy bombardment program and also the illuminating fact that at that particular time there were not enough B-29s on hand for training.

Another time, a Marauder group, en route from America to England, was caught in bad weather and crossed the Normandy coast by mistake. Three of its aircraft were shot down and several crew members captured. Among the documents seized by the Germans was the diary of a flight leader listing the names of all the crews in the group as well as up-to-the-minute reports on the serviceability of every plane.

These are extreme examples and fortunately few in number. For the most part, Dulag Luft drew their clues and leads from considerably less conclusive evidence.

A fruitful source for identifying the units of prisoners were the photographs furnished Allied airmen to facilitate their escape through the underground.

(Continued on Page 73)

Normandy beaches looked like this in the radar scopes of 8th Air Force bombers during pre-invasion reconnaissance flights. Despite solid clouds, coast line and built-up portions of towns show up clearly.

Stripping the mystery and Buck Rogers magic from one of the most important scientific developments of the war

A B C of radar

Radar scopes looked like this when invasion was in progress. Radar operator has turned switch to obtain a magnified exact picture of small section of coastline. Scores of small craft are recorded as white blobs off the French coast.

BY CHARLOTTE KNIGHT AIR FORCE *Staff*

Radar is probably the most widely discussed scientific development of the war. Ever since its partial unveiling a year or so ago, there has grown around it a fabulous collection of tales—some tall, some true, some flavored with comic-strip magic. To bring the subject down to earth, AIR FORCE presents a few non-technical ABCs about this electronic miracle of World War II.

To begin with, there are things it won't do—such as "see" under water, through mountains, or around corners.

But it is true that it will do just about everything else. Radar can detect and record the approach of a plane long before the aircraft can be heard or seen. It can spot surfaced submarines and pick out bombing targets through the thickest overcast. It can lead planes to unknown and frequently unseen landing fields, and its airborne "pathfinders" can blaze trails to all-important DZs (drop zones) in advance of paratroop invasions. It can be synchronized to "control" searchlights and guns, both ground and airborne. In spite of clouds or smokescreen, it can give pilots a current relief map of the terrain beneath, or warn them of fog-bound mountains that loom up ahead. It is the secret weapon that enables night fighter pilots, invisible to the enemy, to seek out and destroy hostile raiders in blackest night. And it can determine whether or not a craft is friend or foe.

All this and more.

There are now scores of different types of radar in operation, all devised to meet specialized needs. All of them, however, have this one common denominator: detection and ranging by means of radio waves. One misconception, commonly encountered, is that radar is vastly different from radio. On the contrary, radar is a type of radio, and there is nothing mysterious about it when you learn what the word itself means. "Radar" is of wartime coinage, made up of the first letters of these words:

RADIO DETECTION AND RANGING
RA for Radio, D for Detection
A for And R for Ranging

Strip from it the Buck Rogers aura with which it has been popularly surrounded, and radar emerges as an easily understood principle, as elemental as bouncing a rubber ball against a wall. Radio waves go out from a transmitter, strike a solid object and "bounce" back again. By measuring the time that elapses between the time the radio "pulse" is sent and the time the reflecting "echo" is received back at the station, you can arrive at the range of the object or "target."

Although the principle, so-stated, is here reduced to its simplest terms, it is not intended to imply that the radar

mechanism itself is anything but the complex, delicate and slightly uncanny equipment it actually is. One experienced radar operator voiced the feelings of the majority of his colleagues when he said, "For two solid years I sat in front of a scope and interpreted 'blips'. I saw *what* the radar did, but I still don't know *how* the damned thing did it."

The "how" is a little matter that kept some of the leading scientists of the United States and Britain huddled over quartz crystals and vacuum tubes in secret laboratories for more than a decade before radar came of age in the Battle of Britain. Stated in very general terms, this is what the inventors were up against: ordinary radio—that is, long and medium wave—sends out energy in the form of ether waves in *all* directions at the same time. It is not localized nor are its waves of sufficient strength to be reflected from objects they may strike.

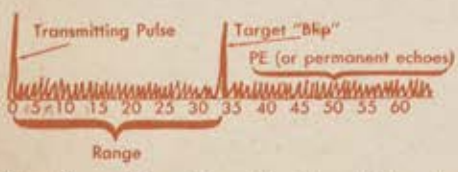
In order to do any detecting, it was necessary to use very short waves, concentrating a tremendous amount of energy into a directional "beam," like that of a searchlight, which could rotate in a 360-degree sweep. Any object in the path of this beam

would cause the radio waves to be reflected and these echoes in turn could then be picked up by receivers back at the sending station.

This is what happens then. the transmitter sends out a pulse, waits for an echo, transmits another pulse, waits, and so on. This process is completed from 60 to 5,000 times a second. Of course, if there is no object in the path of the waves, they simply continue into space.

As mentioned earlier, it is simple enough to figure out that if you measure the time it takes for an echo to come back after it has hit something, you can determine how far away that object is. However, it must be remembered that radio waves travel with the speed of light—or 186,000 miles a second—which doesn't allow much time to make any computations about range. A radio wave striking, for instance, an airplane 25 miles away would take only 300 microseconds (300 millionths of a second) to return to the sending station. Developing an intricate instrument that would measure such infinitesimal time-lapses and enable them to be converted into accurate physical distance was the biggest problem in the radar picture.

The scientists set to and found the answer in a particular type of cathode ray tube, which is the heart of the radar set. It is a vacuum tube of special construction capable of permitting the outgoing pulses and returning echoes to be observed on the face of the tube—called an "oscilloscope"—on which is etched a calibrated scale to give true range in yards or miles.



"Scopes" are different types, each providing the radar observer with different information about the "target" under detection. The simplest scope works something like this. Each pulse of energy being sent out creates a spot that starts at the left side of the tube and travels across the face at a known rate of speed, but since the pulses are going out at such a very fast rate, they appear to the naked eye as a solid line called the "time base." When an echo is returned, this appears as a vertical line called a "blip" or "pip" or "signal" at some point along the time base. The distance between the transmitter pulse, which shows up as a blip at the starting edge of the scope, and the echo indicates the range

Another scope, which is synchronized with the rotating antenna, provides azimuth readings; still another may give elevation of the target, and in some cases two or more of these features may be combined in a single scope. The most widely used airborne scope is a circular one called the PPI (Plan Position Indicator) which furnishes a 360-degree radar picture. In this instance a needle-like time base swings like a sweep-second hand throughout an arc simultaneous with the rotation of the antenna, "painting" as it goes around a picture of all that the radar "sees." The objects encountered appear on the scope in a variety of forms, depending upon their characteristics. Recognition of landmarks below—lakes, cities, coastlines, even ships in harbors—which show up on the PPIs regardless of overcast, makes possible our blind bombing, both direct and offset.

Skilled operators can judge in general the number of aircraft in a target on a range tube by the thickness and pulsations of the blip itself. Special identification equipment (IFF· Identification Friend or Foe)—both air and ground—can automatically produce characteristic signals on the scopes by which friendly planes can be distinguished.

In addition to speed, radar waves have other characteristics of light. For instance, they will not penetrate a hill or any other *solid* obstruction in their path. Much of the radar evasive action on the part of our planes—and the enemy's too for that matter—is based upon this well-known limitation of radar. If a radar set is sweeping an area in which mountains are located, a "shadow" or blank space will appear in the coverage behind the mountains, as shown in the sketch. To avoid being picked up by the enemy's radar, flight paths usually take all pos-

sible advantage of mountains, flying in behind them undetected and then "jumping" on the target.

It makes a good deal of difference to the "shadow" effect just how far away the mountain is from the radar site. If it is far enough away, the mountain will have no effect. On the other hand, if the mountain is very close, there will probably be a black-out in coverage at *all* elevations in that direction.

Again like light, radar waves travel in a straight line, with very little "bending" recorded. Since they do not follow the curvature of the earth to any great degree, they cannot "see"

great distances beyond the horizon. If the radar beam travels long distances, eventually the beam will seem to rise.

Actually, of course, the beam is a straight line and the earth is receding.

Hedge-hopping or flying on the deck some miles before reaching a target becomes readily understandable when this line-of-sight principle is kept in mind. If you take the radar-optical horizon as your criterion, and assuming your site is at sea-level, these general figures apply: a plane 20 miles away has to be about 275 feet in the air in order to be "seen"; at 40 miles it must be at 1,700 feet; at 100 miles about 5,200, and at 120 miles about 8,000. (This, at any rate, is the *theory*. Actually, there are no hard and fast rules about how radar waves will behave. It is a subject that continually surprises even the experts. Surface craft have been reported "picked-up" by sea-level radar stations 40 miles away, and targets have been unaccountably tracked in mountainous territory where no coverage was expected.)

Radar, like any other type of radio, transmits and receives on certain frequencies. Therefore it makes itself vulnerable to wave-length jamming, a process which both the Allies and their enemies have used with varying degrees of success ever since radar became a serious threat. Both sides have simultaneously continued to develop countermeasures.

War or peace, radar is here to stay. The transition from a laboratory play-pretty into the useful and potent weapon it is today took a lot of selling and a lot of proving. And according to the men who had to do both, it wasn't easy. There were plenty of skeptics in every theater at first, men who could not be easily convinced that several million dollars' worth of queer looking cabinets and cumbersome antennae would considerately let them know a half hour or so before an unseen enemy dropped in to wipe them out.

The radar men who had to set up shop in many of our combat zones in the early days of the war had to be missionaries, salesmen and electronic experts all at once. Not infrequently the highest ranking man in the group would be a second lieutenant, whose gold bars conveyed nothing about his engineering degrees from Cal. Tech or M. I. T. nor about his long, specialized training in electronics labs in both the U. S. and England. He and his highly skilled crew of enlisted men would arrive at some remote outpost with several tons of strange crates and some orders about setting up an aircraft warning system.

"It was sometimes a tougher problem to sell your CO on the idea than it was to replace all your condensers sunk on the way over," said one veteran radar officer. "Most of the time you'd find that in the first place radar had been kept so secret that he hadn't the remotest understanding of what it was supposed to do. And then, being a 'fighting man himself' he'd distrust on sight a bunch of pampered (which we weren't but had to prove) lab technicians. You'd really be out of luck if his attitude also happened to be that of we-got-along-without-it-all-right-in-the-last-war-why-do-we-need-it-now? Anyway, who is a second looey to argue with an eagle?

"But after a few air raids, particularly if our planes were caught on the ground, things would be different. After that these same officers would be willing to settle for anything—even that electronic nonsense—and they'd shout 'Where the hell are those radar boys who were around here getting in my hair?' "

Even as late as the Anzio campaign the boys were having selling troubles. "A number of officers around there didn't have too much respect for the gadget until one night we happened to pick up a ground target and passed it along for routine investigation," related a member of a Mediterranean Signal Air Warning company. "When it turned out to be six enemy tanks behind our own lines, tanks which nobody knew about until that moment . . . well, our stock went up considerably."

Of course it helps, when you're trying to win converts to a new device, to have that mechanism give a flawless performance at all times. Unfortunately radar sets are given to embarrassing their operators on some very awkward occasions, like so many children who throw temper tantrums on the very night that very special company has come to dinner.

There was that night in Iceland, for instance. An aircraft warning system, manned by U. S. military personnel, had just been established on the island a few months before Pearl Harbor. Shortly after it was in operation it got a most unorthodox workout. This is the way one of the radar officers recalls it:

"Remember that big convoy that sailed into Iceland early in September of 1941 when our troops took over? Well, the convoy arrived at night and the boats were to be unloaded next day, so all our personnel and equipment were sitting out there in the harbor of Reykjavik. That night our radar operators picked up a large formation of 'planes' heading toward Iceland. The 'blips' on the scope indicated it was a mass raid which 'split up' into separate flights as it came closer.

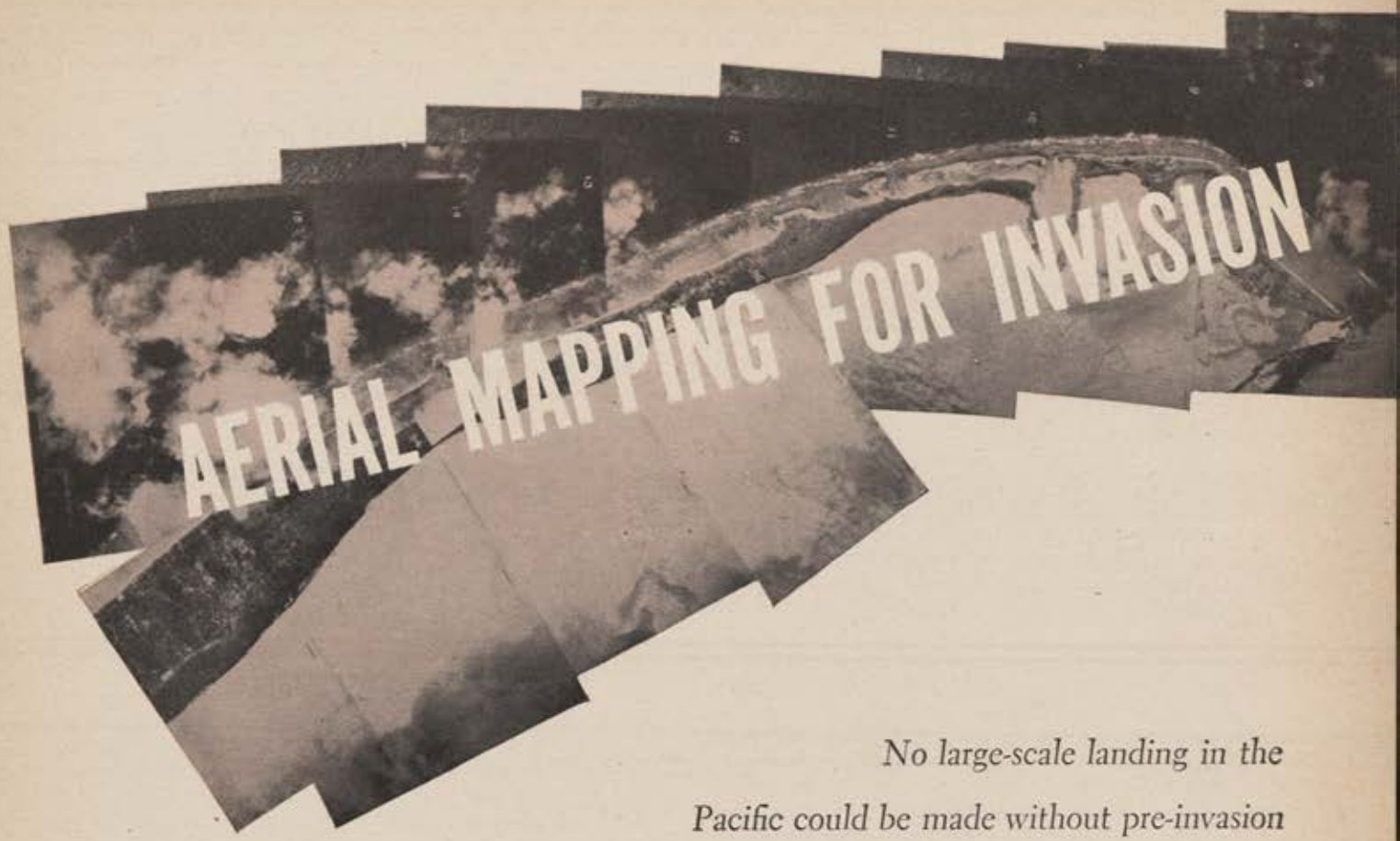
"It is scarcely necessary to add that all hell broke loose around there. There were a few P-40s on the island and the pilots were still on the boats. We got them off in record time, got them in the P-40s and sent them up. None of them had checked out on night flying, few of them knew much, if anything, about celestial navigation, but there wasn't enough time to worry about that. We simply scrambled them and headed them toward the approaching 'raiders.'

"Frankly it was a pretty bad time and we were all plenty scared. All our ships were sitting there in the harbor, a perfect target for an enemy raid. We knew there must have been some leak about the landing. We also knew that it was impossible to intercept successfully a raid of the size indicated on the radar scope so we just had to bite our fingernails and wait for the disaster.

"Along about this time, though, the radar operators were going nuts. Something very screwy indeed was going on. The 'planes' had first been tracked at about 200 miles an hour. All of a sudden these 'flights' were observed to be travelling anywhere from 10 miles to 2,000 miles an hour —you heard it the first time: 2,000 miles an hour! This sort of thing kept up all night but no planes appeared. Finally we realized of course that something was playing tricks with our radar and things quieted down out in the harbor.

"The phenomenon has occurred now and then since that ill-fated night, but that was one of our first experiences with the aurora borealis—a subject not covered in the TMs. Technically we call this, or any other such meteorological disturbance, 'anomalous propagation'; up there we referred to it more simply as 'The Old Man of Greenland,' or maybe you'll just hear it called 'phantoms.' There are a

(Continued on Page 76)



AERIAL MAPPING FOR INVASION

No large-scale landing in the Pacific could be made without pre-invasion aerial mapping, an operation which guided our ground forces direct to the Japanese homeland

In the Pacific, Allied forces started out with few reliable maps of the areas on the invasion schedule. Scores of islands were unknown quantities. Some maps dated back to 1890, and they were principally coastal charts. Even these often were inaccurate—the map of Bougainville did not have two of the most important rivers charted; almost all of Borneo was unmapped.

Through aerial mapping, new roads, airdromes and ground installations were disclosed; rivers were found to have changed their courses; water depths and reefs were discovered; towns and cities were relocated.

Even the Philippines, which had been mapped in part, were remapped and new AAF photo methods applied.

Combat mapping in the SWPA, Western Pacific and China Sea areas is accomplished by units recently redesignated Reconnaissance Squadrons Long Range (Photo). These are the only squadrons in the FEAF using the photo B-24s, known as F-7s. In the FEAF organization both 5th and 13th Air Forces have combat mapping squadrons assigned to photographic reconnaissance groups. Their particular assignments are completely dependent upon the long range requirements of invading ground forces, and ground commanders are loud in their praise of the work. This combat mapping is not to be confused with long range photo reconnaissance ("30,000 Foot Periscope", July AIR FORCE), or aeronautical charting which utilizes geodetic control points ("They Map the World," May AIR FORCE), or with tactical reconnaissance.

During 15 months of operation in the SWPA, Western Pacific and China Sea areas, combat mapping squadrons of FEAF have mapped such invasion points as Hollandia, Wakde, Sarmi, Maffin Bay, Biak, Noemfoor, Cape Sansapor, Middleburg, Morotai, Leyte, Samar, Mindoro, Marinduque, Luzon, Palawan, Mindanao, Negros, Cebu, Panay, Borneo and islands in other areas within the inner ring of the Japanese empire.

Not a single F-7 has been lost directly to enemy action.

To show how a combat mapping unit functions, AIR FORCE presents on the following pages the picture story of an actual pre-invasion mapping mission over Leyte last September by a squadron of the 5th Air Force. The action took place between 1630 hours, September 16, and 1630 hours, September 18, and prepared the way for the actual invasion of Leyte on October 20.

HERE ARE THE STEPS IN PHOTO MAPPING LEYTE

1. Frag Order

This is the day before the mission. The most anxiously awaited document is the Fragmentary Field Order. Upon receipt of the "Frag Order," operations personnel compose a flight schedule which informs all personnel who will participate in the mission of the time of breakfast, briefing and take-off, and the aircraft which will be used. Intelligence personnel plot the flight lines over the area to be photographically covered on the target maps and indicate known enemy ack-ack positions on the maps. In addition, Mission Folders are prepared which contain the target maps (one for pilot and one for navigator), navigational charts, and enemy aircraft and shipping identification aids.

2. Briefing

Intelligence officer briefs aircrew members on mission to be flown. They are informed of area to be photographically covered, altitude at which photographs are to be taken, which type camera (K-18 or K-17) is to be used over different flight lines, location of known enemy ack-ack positions, and evasion tactics to be employed in case an F-7 is forced down. When intelligence officer has finished, operations officer instructs crews in manner of approach to the target area, assigns flight lines to be taken by each crew, and type of formation to be used. The weather officer then forecasts weather en route, over target, and return. Finally, communications officer instructs crews in radio codes to be used, what in-flight radio reports will be made, and other information relative to radio communication.

3. In Flight

After a 0300 take-off, three F-7s are over "target," shooting the coast of Leyte Island with their special cameras. Mapping missions are conducted in flights of three planes for mutual protection, and for strip mapping in which each plane covers a designated area. The flying has to be precise. Weather is the biggest problem.

4. Aerial Photographers

At 21,000 feet, the aerial photographers in the camera bay start their cameras after receiving the "go" signal from the navigator. It's the aerial photographer's job to see that the proper filter has been fitted over the lens, that the intervalometers have been set correctly, and that the cameras are functioning smoothly.

5. Flight Lines

Flight lines are drawn carefully over the area to be photographed. Flight line spacing depends on altitude at which mission is to be flown and type of camera to be used. Usually, 60 percent overlap and 40 percent sidelap of successive pictures are employed.

6. Interrogation

As soon as F-7s land, crews report to intelligence for interrogation. Number of exposures, sightings, interception, ack-ack encountered, and weather are reported. Preliminary mission report is telephoned to higher headquarters at conclusion of interrogation.

7. Delivery

Intelligence personnel rush film to laboratory for processing. Success of photo mapping mission rests largely on navigator and aerial photographer. Navigator uses bombsight to pick up check points on ground coinciding with target map. He directs pilot where to fly and instructs photographer when to turn cameras on and off. Navigator and photographer keep photo flight log on which is recorded number of exposures taken of a run, geographical coordinates of the points at which cameras were turned on and off, true altitude, temperature, focal length of cameras, time when exposures were made and type of filter used.

8. Developing

Film is developed by inspection method. Photographer error in judging proper exposure results in either overexposure or underexposure. Experienced developing man notices this immediately and develops film to compensate for photographer error. Photo Intelligence officer views film and plots it against target map to determine exact photographic coverage obtained. From this information final mission report is composed and forwarded to all higher headquarters.

9. Printing

After film has been viewed and lettered by photo draftsmen, prints are made from film. "Dodging" is performed on negatives which are partially overexposed or partially underexposed by increasing or decreasing amount of light in certain parts of printer. Approximately 250 prints an hour are turned out.

10. Distribution

Distribution of prints varies with number of headquarters interested in mission. Besides being used for map making, prints are also studied by various photo interpretation sections for intelligence purposes. "Hot" prints are rushed to photo interpretation sections immediately upon completion of processing. In mapping runs, approximately 14 prints of each negative are required. On Leyte mission, 8,500 prints were made and distributed. Large scale battle maps, photo maps, and special maps are produced from prints at Army base map plants.

11. Invasion Maps

Vital necessity for any large-scale invasion is map showing all details of area to be invaded. These maps must be precise, simple, and yet apprise landing troops of all features of beaches and terrain. Accuracy of maps depends on accuracy of flight strips.

12. Invasion

This photo was taken during landing operations in vicinity of Tolosa, Leyte Island, Philippines. Landing parties were equipped with invasion maps and infantry units proceeded inland along routes previously plotted on maps.

HEADQUARTERS
8th PHOTO WING, RECONNAISSANCE, APO 920
16 September 1944

EXTRACT

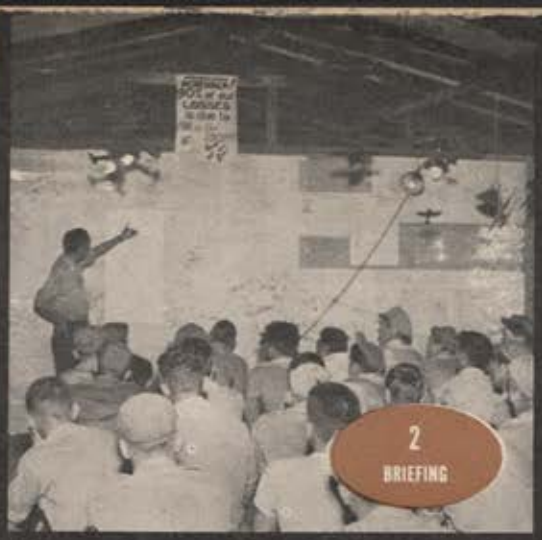
3. a. The 6th Photo Group will perform the following missions 17 Sept 4

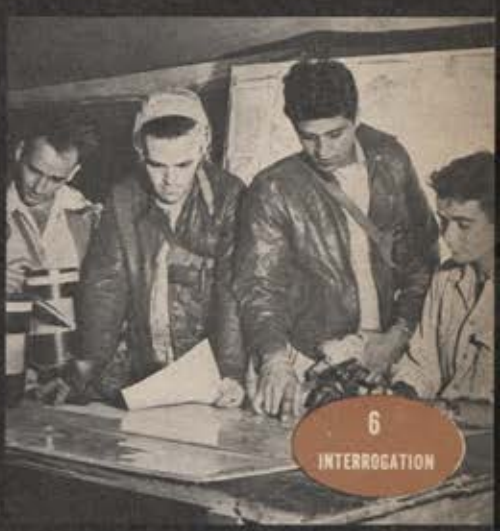
Mission Number	Sq	A/C	R.T. Call	W.T. Call	T/O Time	Missio
261-C-1		3 F-7			0300	Map LETTA SAMAR 151

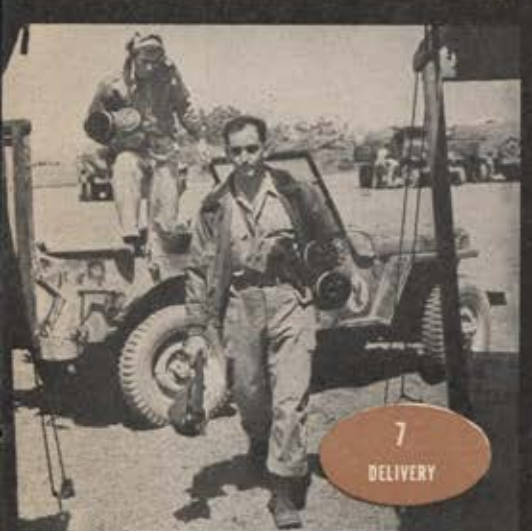
By order of Colonel MARTHA:

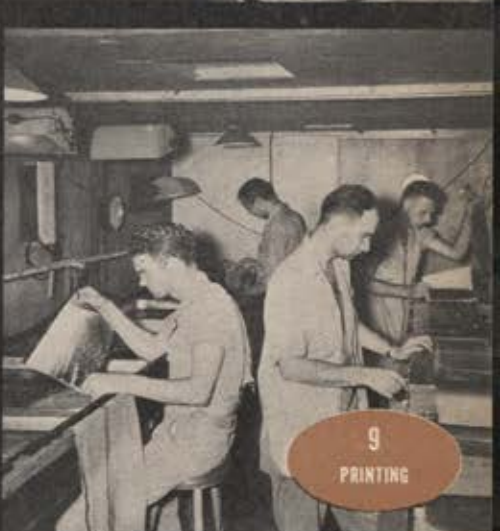
OFFICIAL:

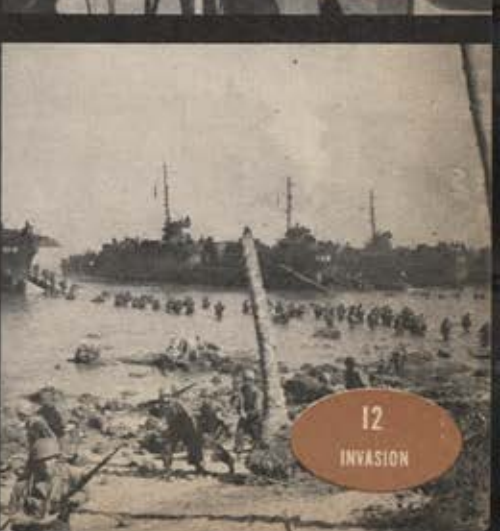
1 FRAG ORDER











Strategic Kyushu

The industry, communications system and airfields of this gateway to the Jap mainland have proved a fertile target for our Pacific air force

Our forward bases in the western Pacific have made possible the first coordinated large scale air effort against the Japanese empire. Coupled with strategic operations by B-29s, our heavies, mediums, attack bombers and fighters of the tactical air forces in the Pacific now are able to strike the Jap and Chinese mainlands, roam well into the Yellow Sea, hit parts of Korea, the southern portion of the Sea of Japan, all of the Inland Sea, and sever the Tsushima Straits—most vital water route between Japan and Asia.

Strategically, this development is the first direct step in isolating Japan proper from the mainland of China on which the enemy depends so heavily for a prolonged defense of his empire.

The gate to the Jap mainland is Kyushu, southernmost island of Japan. Kyushu's strategic importance is manifold. With the southern tip of Honshu it controls Shimonoseki Strait, an entrance to the Inland Sea. In large measure Kyushu controls Tsushima Strait and Chosen Strait. Kyushu is the nearest to the continent of Asia of any of Japan's important areas. It guards the approaches to southwest Japan and is the seat of a vital industrial district—the northern Kyushu site of the great Imperial Steel Works, largest producer of pig iron and steel in Japan.

Up to the time the tactical air force began operations over Kyushu, air action against this enemy home island was on a limited scale. This spring B-29s were diverted, at the Navy's request, from their strategic task against Japan to strike Kyushu airfields, and the Navy twice has sent carrier task forces against Kyushu targets; these B-29 and carrier strikes were for the most part coordinated with the Okinawa campaign. The B-29s have hit certain well defined strategic targets, and a few land-based Navy planes have run missions over Kyushu. Now our tactical air forces in the Pacific have much of Japan's inner defense within its range and the final phase of the air campaign is under way.

A glance at the accompanying map will introduce the reader to Kyushu. The men who have been introduced to it from the air find three general regions: central Kyushu, a rugged mountainous area extending southwest-northeast across the island in a belt some 30 miles wide; the southern region, of irregular terrain, which includes scattered lowland and coastal strips with rugged mountains, hills and steep-sided plateau blocks, and northwestern Kyushu which levels off from the higher elevations to the east and south with two large level areas and peninsulas and islands extending toward the China Sea.

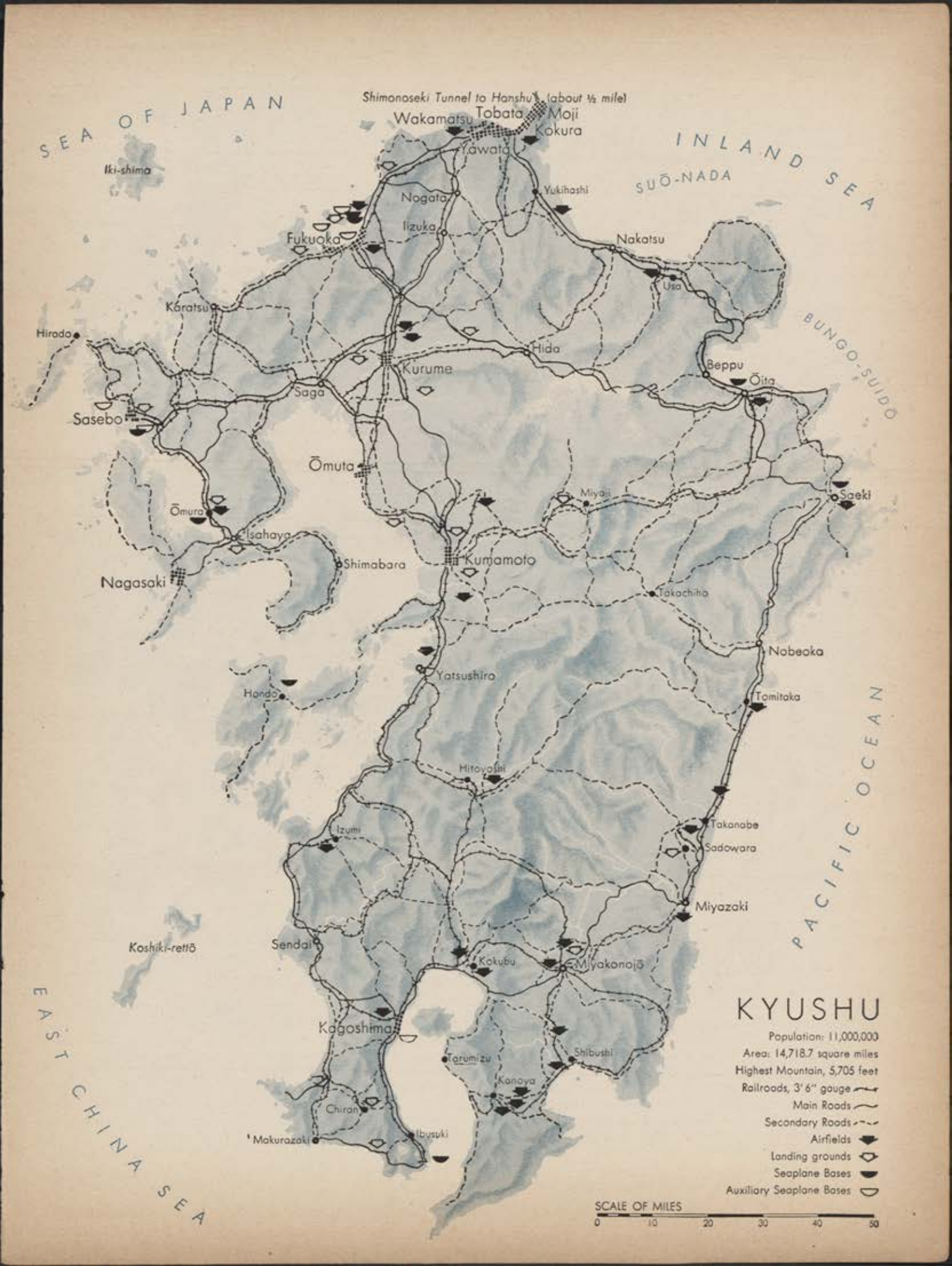
The northwest section of the island is heavily industrialized but with a known deficiency in food production; the southeast portion is the least densely populated and least industrialized, but known to be nearly self sufficient in food supplies. Kyushu has several excellent ports and many other landings and anchorages. Nagasaki is one of the three major ship building centers and Wakamatsu is the chief coal exporting port of Japan.

The rugged terrain restricts both roads and railroads largely to coastal and valley routes requiring numerous tunnels and bridges and defiles. Railroads far exceed roads in importance, although the communications network, always

a vital target, is believed to be well planned and operated with good equipment. Wartime requirements force communications to operate far above normal capacity and maintenance is believed to be a weak spot in the network.

Over Kyushu airmen often find strong winds and cloud cover; torrential rains and typhoons are prevalent during September.

Kyushu also has numerous airfields. The enemy's first major employment of these fields was in his strong but unsuccessful air opposition to the Okinawa landings. He next was forced to use these airfields in defense of Kyushu itself. Now he faces the possibility of having these same fields become impotent. ☆


Shimonoseki Tunnel to Honshu (about ½ mile)
SEA OF JAPAN
INLAND SEA
SUŌ-NADA
BUNGO-SUIDO
PACIFIC OCEAN
EAST CHINA SEA
Iki-shima
Koshiki-rettō
Wakamatsu
Tobata
Moji
Kokura
Yawata
Yukihashi
Nogata
Iizuka
Fukuoka
Nakatsu
Usa
Karatsu
Hirado
Hida
Beppu
Ōita
Kurume
Saga
Sasebo
Ōmuta
Miyaji
Saeki
Ōmura
Isahaya
Shimabara
Kumamoto
Nagasaki
Takachiho
Nobeoka
Yatsushiro
Hondo
Tomitaka
Hitoyoshi
Takanabe
Izumi
Sadowara
Miyazaki
Sendai
Kokubu
Miyakonojō
Kagoshima
Tarumizu
Shibushi
Kanoya
Chiran
Ibusuki
Makurazaki
KYUSHU
Population: 11,000,000
Area: 14,718.7 square miles
Highest Mountain, 5,705 feet
Railroads, 3' 6" gauge
Main Roads
Secondary Roads
Airfields
Landing grounds
Seaplane Bases
Auxiliary Seaplane Bases
SCALE OF MILES
0 10 20 30 40 50

BEACHHEAD CARAVAN

ILLUSTRATED BY CAPT. NORMAN TODHUNTER

BY 1st LT. WILLIAM E. MASSEE
Hq. 68th Group, AACS

Kunai grass almost hides the clutter of vehicles jammed into the dusty clearing near headquarters of the 68th Group, Army Airways Communications System. Three large trailers are surrounded by a huddle of Army vehicles, tarpaulin shelters and scattered heaps of radio parts. The scene is reminiscent of a carnival ready to hit the road.

Under a pyramidal tent at a packing-box table littered with tools, wire and spare parts, Cpl. Raymond J. Anderson works on a homemade condenser plate, polishing it by hand. The sound of hammering comes from one of the hulking trailers, over which bristles a group of 50-foot antennas, each supported by its guy ropes. Inside the trailer Cpl. Paul H. Weese is busy sealing up a spare parts closet, checking the fastenings on chairs and transmitter doors. Finished with the job, he jumps to the ground, locks the trailer door after a last look around, and for the hundredth time glances at the neat lettering stenciled on the trailer side: *Mobile Communications Unit No. 2. Transmitter Unit. Keep Out.*

Baking under a New Guinea sun, men have worked for three long months getting the caravan ready to roll. Now the first mobile radio station built in the SWPA, complete down to GI brooms bracketed to the walls, is ready to do a job on the next beachhead. Knowledge gained from supplying communications for fighting aircraft during three years of war, in combat operations from France to the Philippines and all the way-stations in between, has gone into the design of this detachment on wheels.

Ever since the days of the first air strike against the Jap, our air forces in the SWPA have screamed for faster and more complete radio communications. When assault troops seize a piece of Pacific real estate, planes begin using captured strips at once for emergency landing and refueling. AACS manages to get the planes down and back into the air again with jeep-mounted control towers, while portable transmitters and receivers handle the first weather reports. But on the second or third day after the task force is in, the communications job isn't so simple. Cargo planes come in by the dozen, necessitating messages about arrivals, departures and weather conditions. Emergency signals about engine parts, flight difficulties, gas, oil and ammunition supplies may be logged into the message center any minute; rear area headquarters must know how its pilots are doing, what they need. Small, portable transmitters and equally

When task forces were ready to storm invasion beaches on the Jap homeland, something brand new in radio communication outfits had been set up to guide our aircraft

inadequate receivers cannot possibly handle all the traffic.

In Europe, communications for the AAF involved relatively short distances, and buildings could usually be found in which to house the radio units. Landline teletypes were used to handle much of the traffic, for wires could be strung from town to town. In the mid-Pacific a few high powered units were successfully employed to do the job. But the leap-frogging tactics in the SWPA, with its great distances and uninhabited terrain, posed different problems. High mountain ranges interfered with signals and Savannah Five weather caused static; many large and powerful radio units were needed to send out signals loud and clear.

Big radio units were being sent in with our task forces in the SWPA, but it took days to get the equipment set up. Delicately built, these units cannot be operated casually in the open field; moisture or dust will ruin them. In the rush to get the more powerful equipment on the air, these units often were set up too quickly, then overworked. The problem was to get powerful radio equipment, lots of it, and working right. The answer was mobile units.

Mobile radio units, as such, are not new. Jeep control towers were used back in 1943. During 1944 the mid-Pacific battles taught AACS how to mount some of the fragile equipment so it could stand rough jolts. But the 68th AACS Group operating in the SWPA had difficulties all its own, and the coming invasions demanded solutions.

This newest of mobile units can handle as much traffic as the permanent AACS station on Los Negros. It can supply all traffic control and navigational communications that aircraft operating with a task force will ever need, and then some. This outfit can go in with a task force, be operated while the permanent station is being built, then be taken out and overhauled before being sent onto a new beachhead. It can operate completely on its own for 120 days, which means taking along spare parts, maintenance equipment and organizational supplies sufficient to keep the facilities on the air 24 hours a day over that four-month period. Every piece of equipment is shock-mounted to withstand the bumps of beach landings. Trailers are hermetically sealed so they can be dumped over the side of an LST and floated ashore, can operate in blackout, be hidden under trees and their locations changed at will.

The mobile detachment consists of more than a dozen vehicles with the three big trailers stealing the show. One trailer is a receiver unit; another is a message center housing eight or ten clerks plus teletype operators; the third is a transmitter trailer. In addition, the detachment has six-by-six trucks to haul the big trailers, smaller trailers to carry power units and supplies, mobile gas tanks and jeeps.

In operation, the receiver trailer is run up next to the message center, and a cat walk is placed between the two doors. There are seven positions in the receiver unit—for weather intercept, air-to-air ground traffic, and point-to-point communications for weather and PXing. An air conditioning system sucks air through a fan into a duct which runs the length of the trailer, discharging a cool breeze above each position.

The transmitter trailer is removed from the other two units during operations, and connected by long cables which are stored in metal trays under the body when the unit is on the move. In addition to a battery of point-to-point transmitters, a homing transmitter and an emergency homer, there are several air-to-ground sending units. A crew of four can erect the entire antenna system in half an hour. Each transmitter has its own ground, and a radio ground can be provided if necessary. A complete maintenance work center is built in.

The trailers inside resemble lounge cars on the Super-Chief. In the message center, a long table running along one wall has a Spanish-brown masonite top and chromium legs. Six clerks can work at the table, each with his own typewriter bolted into its individual well. A work table for special operations seats two; a brace of teletype positions are set along the wall opposite the clerks' table. The trick chief has a special desk equipped with a radio which can tune in on weather intercepts. A field telephone connects him with the other trailers. An electric fan and a clock are near each entrance; cabinets are partitioned off for rolls of paper and reams of message forms; office supplies are stored in special cubbies; thermite bombs and grenades are fastened into brackets near the field safe. The plywood floor is covered with black linoleum.

The requirements for the mobile unit were figured out by Col. Reeder G. Nichols, CO of the 68th Group, and his staff. The first big decision was to go whole hog: build a complete radio station on wheels, a detachment as big and powerful as a permanent AACS station and just as fast in handling messages. The second decision was to build a preliminary unit which could be used in the Malabang show.

Capt. Kenneth B. Almond, a radio technician with AACS since 1938, was picked for the construction job. Given the pick of men in the organization, he selected a five-men crew: Cpls. Raymond J. Anderson of Oakland Park, Fla., Edwin S. Tomlinson of Brooklyn, Paul H. Weese of New Lexington, Ohio, and Richard L. Olson of Bloomington, Ill., and T/Sgt. Leolan H. Fry of Gerrington, Kan., the NCOIC.

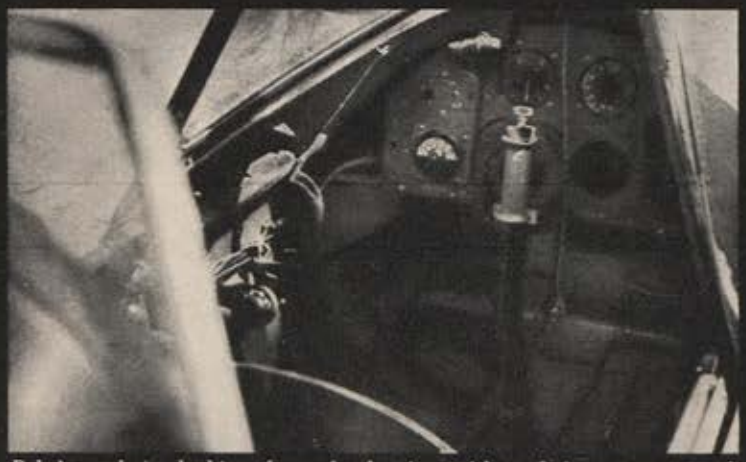
The group was allotted just enough of the critical radio equipment needed for carrying out normal operations. Receivers and transmitters had to be salvaged from reparable and secondhand units, since those for permanent stations had to go in with each task force. All the more powerful radio equipment was designed for installation on level floors, so all equipment had to be rebuilt or remodeled for mobile operation. Transmitters, rectifiers and modulators for the transmitter trailer weighed about 4,000 pounds; the trailer could carry a load of 3,000 which meant extra bracings. Transmitters and receivers soon burned out unless artificially cooled, so air conditioning was incorporated.

The trailer units were converted from two-wheeled house trailers of pre-war days which had been left in an AACS supply depot. A water-soaked transmitter, steel antenna, dozens of receivers, cables, switches, battered radio cabinets and other equipment were salvaged from scrap heaps. Aluminum from an abandoned Jap plane made good patching material for a banged-up trailer. Paint supplied by the Navy sealed up the cracks.

It was like making a P-38 engine out of a couple of jeep motors, but the first mobile unit began taking shape.

(Continued on Page 72)

Inside the Baka



Baka's cockpit, looking forward, showing stick and instrument panel.

Baka is made of aluminum and plywood, has armor plate around cockpit.

Baka rocket tube contains six grains of propellant charge in its motor.

Fairing removed, showing mount and warhead which contains trinitroanisol.

Some technical data and flight characteristics of this Jap suicide plane

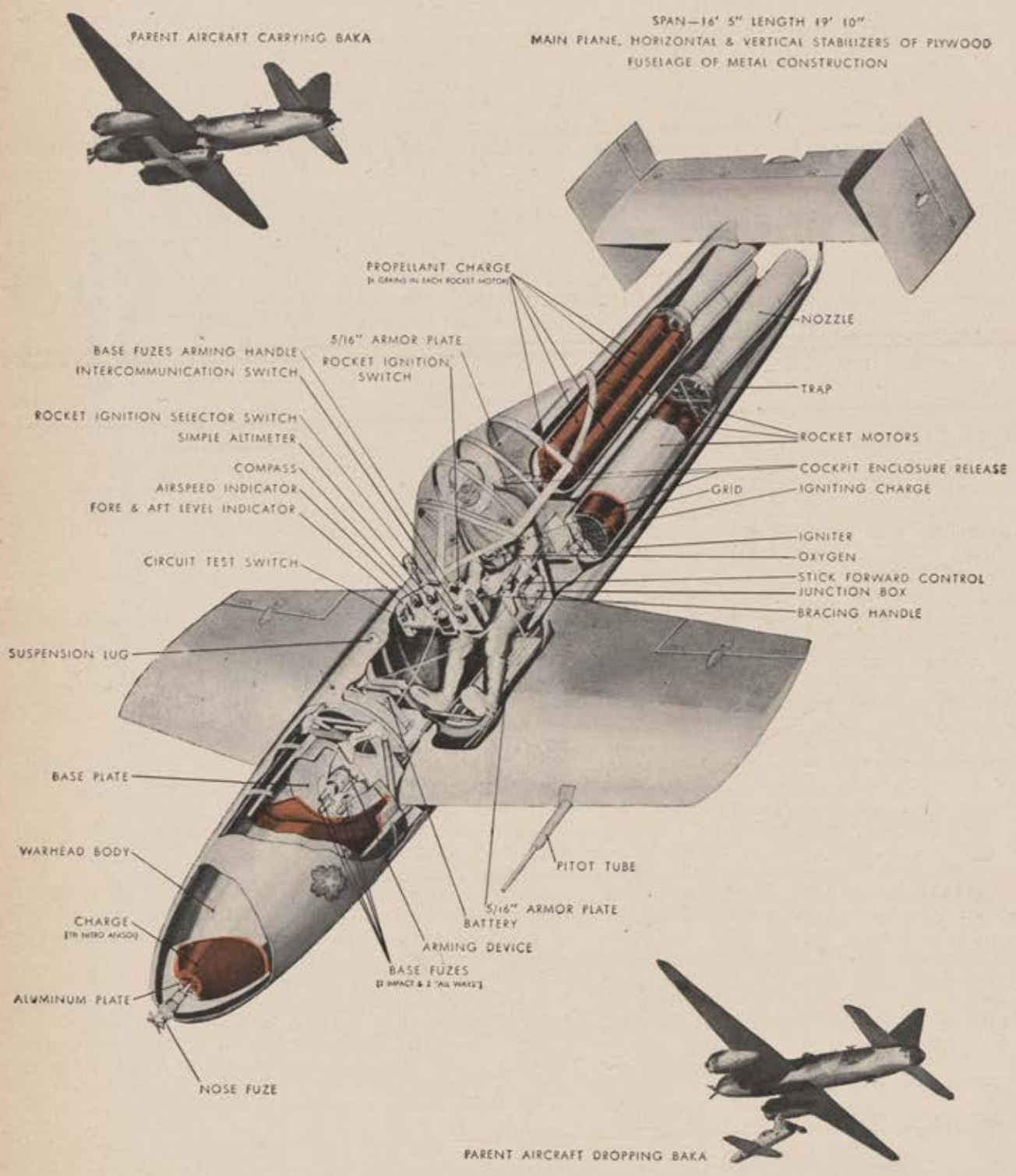
Pride of the Kamikaze corps, the Jap suicide rocket plane Baka ("The Fool") is a pilot-controlled flying bomb that carries 1,165 pounds of explosive in its nose and dives on its target at between 500 and 600 miles per hour. The Baka is usually carried under the belly of a Betty, although Liz, Helen, Peggy and Sally have been used, all with modifications. Attached partially in the bomb bay by one mounting lug and slings fastened under the wing and empennage, the Baka is cut loose from the mother plane up to 25 miles from target. Its range is determined by the altitude at which it can be released, but its weight and drag probably limit the mother plane to 20,000 feet.

Five rocket units propel the Baka, three of which are mounted in the tail cone, the other two slung under the wings. These charges may be fired either singly or simultaneously at the pilot's discretion. The Baka itself is guided by a conventional stick and rudder arrangement, and the pilot has at his disposal a selector switch for the firing of the propulsion charges, a pull-type arming handle for the base fuzes of the explosive charge, a compass, an altimeter, an airspeed indicator and an inclinometer. All control surfaces have dynamic balance arrangements to eliminate flutter at the high speeds at which the craft operates.

The explosive charge in the nose is covered by a streamlining cone. It has five fuzes, one in the nose and four in the base. The nose fuze is a straight impact fuze and is vane armed. Two of the base fuzes are straight impact and the other two are of the "all way" type. All four base fuzes are armed manually from the cockpit.

From nose tip to tail the Baka measures 19 feet, 10 inches, spans 16 feet 5 inches from wing tip to wing tip, weighs 4,537 pounds and can carry a wing load of 70.6 pounds per square foot. A post and ring sight is mounted on the nose nacelle for aiding the pilot in aiming the Baka at its target, but accuracy is poor because the pilots have no way to practice handling the bomb as it speeds in its suicide dive. There is no landing gear.

The Baka shown on this page, a member of the Cherry Blossom Unit of the Kamikaze, was found in a cave on Okinawa after our forces had taken over the island. A cutaway drawing appears on the opposite page. ☆


PARENT AIRCRAFT CARRYING BAKA
SPAN—16' 5" LENGTH 19' 10"
MAIN PLANE, HORIZONTAL & VERTICAL STABILIZERS OF PLYWOOD
FUSELAGE OF METAL CONSTRUCTION
PROPELLANT CHARGE
NOZZLE
5/16" ARMOR PLATE
BASE FUZES ARMING HANDLE
INTERCOMMUNICATION SWITCH
ROCKET IGNITION SWITCH
TRAP
ROCKET IGNITION SELECTOR SWITCH
SIMPLE ALTIMETER
ROCKET MOTORS
COMPASS
COCKPIT ENCLOSURE RELEASE
AIRSPEED INDICATOR
GRID
IGNITING CHARGE
FORE & AFT LEVEL INDICATOR
IGNITER
CIRCUIT TEST SWITCH
OXYGEN
STICK FORWARD CONTROL
JUNCTION BOX
BRACING HANDLE
SUSPENSION LUG
BASE PLATE
WARHEAD BODY
PITOT TUBE
5/16" ARMOR PLATE
CHARGE
BATTERY
ARMING DEVICE
BASE FUZES
ALUMINUM PLATE
NOSE FUZE
PARENT AIRCRAFT DROPPING BAKA

So you want to own a light private plane after the war? Well, here are your prospects

That small, low-priced, cheap-to-operate airplane you've been thinking about for after the war is just around the hangar apron—but it's still expensive to own.

By mid-fall you can buy one. It will cost between $900 and $4,000 depending upon how much airplane you want. You can pay cash, or take advantage of some new aviation pay-as-you-fly financing. But for every hour you fly, count on spending about three dollars for gasoline, oil, engine over-haul and miscellaneous costs. Add to this an annual output of approximately $500 for storage, depreciation and insurance. For that figure, which will amount to about $1,200 a year, you can fly for two hours every Sunday or split it up into trips totaling some 8,000 miles, at an average cost of 15 cents a mile.

If you can afford that, you can own a plane. But don't expect too much from it. Utility is limited, chiefly because of the weather. When there are storms, you won't fly any more than you'd take a canoe out in a rough sea. Fog will ground all planes not equipped with expensive blind flying instruments which will cost as much as the plane itself. If you want to fly cross-country, plan on spending at least a couple of nights a week studying up on new rules and regulations and navigation. So what you're really getting (for the time being, at least) is a flying machine whose use is comparable to that of a motor boat—good for a short spin or a short cruise, if the weather is good.

In appearance, the first post-war light planes will differ little from pre-war models, but they will be sturdier, better built and have more horsepower. There'll be a plane to fit your personal desires. Fast little airport planes for the fighter pilot, who wants something that will zoom and zip like a Mustang, but do it on a minimum of gas. A side-by-side deluxe sport model having all the conveniences of a roadster. There will be enclosed cabin tandem run-abouts. The family aerial car, a four-place sedan model, built for cross-country pleasure or business. Amphibians tailored for the sportsman.

The typical private plane will have a wing span of about 35 feet so it can land between the parallel telephone poles along almost any highway. It will weigh about 1,300 pounds, it will have a 65-75 horsepower engine, simply built so that you can make some minor repairs yourself the same as you do on an automobile. Accommodations will include room for pilot and one passenger with a baggage compartment capable of carrying about 50 pounds of luggage. Its fuel capacity will average about 16 to 18 gallons—enough to take it 300 to 400 miles non-stop. Top speed will be about 110 mph; top ceiling about 16,000 feet, but there is no oxygen as standard equipment. It won't have two-way radio, wing slots and flaps, or even windshield wipers unless you pay extra.

According to the Civil Aeronautics Administration, the market for such a plane will be 10 times what it was before the war. Officials have estimated that at the end of the war there will be approximately 350,000 Army and Navy pilots, 150,000 civilian pilots and students, plus some 2,500,000 men and women trained by the armed forces in numerous aviation trades. Indicative of the trend are the 3,000 military pilots who have been applying weekly for their civilian wings.

PIPER "SKYCOUPE"

Plane manufacturers—big and small—have been deluged with letters from AAF men who want full particulars on owning and operating their own light plane. Now, with one war won, a brighter prospect for getting materials and a green light flashing in Washington, these plane builders are eager to open business. Already they have sales agencies set up in every state and they are holding certain areas for returnees who are interested in setting up their own airport businesses.

SKY

The pre-war light plane factory was like a toy shop, a small group of workers putting together one airplane. The post-war model is a machined creation. Big hydraulic presses require but a single operator to stamp out wing ribs—one every two or three minutes. The thin sheet of aluminum-alloy metal goes in raw, comes out a perfectly formed rib far stronger than the pieced-together wooden version. Arc-welding, introduced for the first time in light plane construction, makes possible instantaneous joining together of fuselage metal framework pieces. Expensive dies turn out cowlings and other specially shaped metal parts in the same way that car fenders are made. A machine that works like an automatic stapler fastens the cloth covering to the bare frame. Doped sections move along an overhead conveyer, pass through high-temperature driers.

These time-savers and others make light plane manufacturers confident they can and *will* turn out better and cheaper planes. First prices, however, will be about the same as the pre-war scale because money saved in production has been gobbled up by high wartime labor. But prices don't seem to dampen the enthusiasm for owning a light plane.

Out in Wisconsin, for example, an airport operator and plane dealer wired Republic Aviation, "Can I double my quota? Customers buying planes like they used to buy bicycles." He had sold more than 75 planes of a design that hasn't yet gone into production and he had the cash for down payments. Of equal significance, his customers, some of them servicemen, were buying a plane for use in their particular locality—an amphibian to use on Wisconsin's hundreds of small lakes and at the same time take advantage of airport facilities.

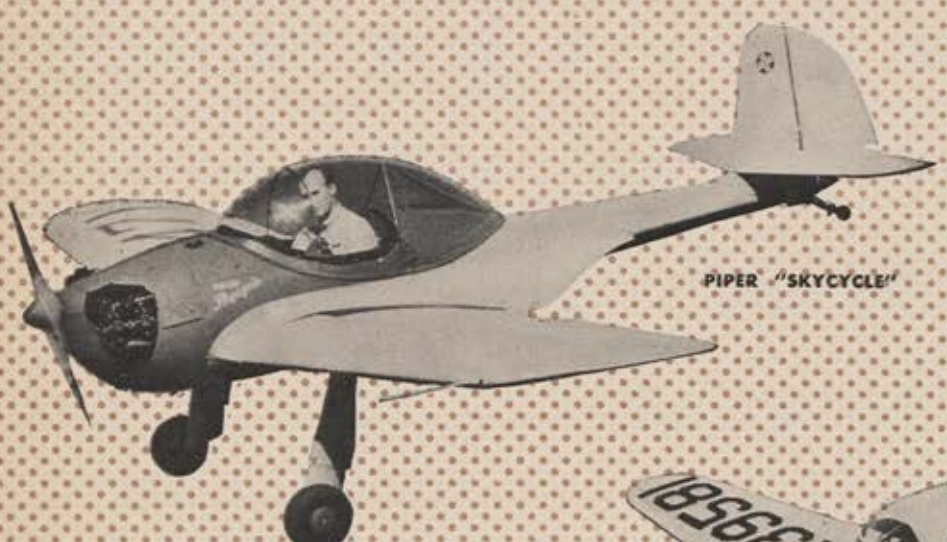
It was this sales point that the builders of the Thunderbolt had in mind when their engineers designed the much-talked about four-place "Seabee" amphibian, the plane that "can't be built for $3,500" but will sell for that figure—so they say. The secret, according to Republic's crack engineers, is a process they call "Elimination Engineering"—cutting down on the number of parts to lower production expenses. They took a wing panel from the "X" model and cut the number of pieces from 134 to 21 by beefing up spars, eliminating ribs and dimpling the stretched aluminum skin for added strength. The horizontal stabilizer that once had 42 pieces, now has 10 and the time-slashing formula is being applied to every major section of the airplane. On the stabilizer alone it means cutting the cost from approximately $6.25 a pound to less than 40 cents a pound. That's based on a production of

2-PLACE LUSCOMBE "SILVAIRE"

STINSON "VOYAGER 125"

FLIVVERS

REPUBLIC "SEABEE"



PIPER "SKYCYCLE"

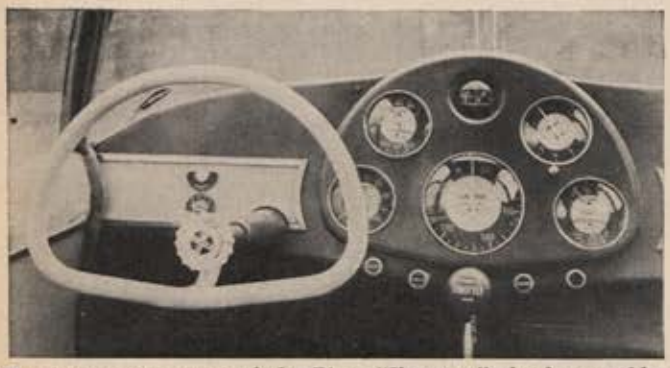
AERONCA "ARROW"

5,000 planes, but already the company has orders for more than 3,000 and these came within six months after they announced the model!

The "Seabee," for its price tag, is a lot of airplane. It has a roomy cabin with furnishings like a custom-built Chris-Craft. The engine, of 185-horsepower is a pusher, located behind the passenger compartment which accounts for the almost noiseless interior. An extra door in the extreme nose favors the fisherman, who can land on any small lake, open the door and drop a line just as you'd fish from a small yacht. A rugged all-metal hull permits landings in waves three feet high. One careless pilot, who forgot to put the gear down, landed on a runway with no more damage than scraping paint off the hull bottom. What's more, you can fly this 2,600-pound (gross) "duck" for five hours without refueling at a 105-mph cruising speed and there's the extra safety bonus of being able to land on any airport plus some 33,900 small lakes which have sufficient area for take-offs as well.

The spotlight for sales, however, is on the major pre-war light plane companies—Piper, Aeronca, Taylorcraft, Stinson, Luscombe, Culver, Rearwin, Ercoupe. What the flight-agers want is a conventional airplane, cheap and simple.

They will get simplicity. One pilot, who has flown most



The instrument panel of the Piper "Skycoupe" closely resembles the dashboard of an automobile. Note starter button at left.

every type of light plane, new and old, commented. "The design boys have made flying almost too simple. You make your feet do what your hands normally do on the steering wheel of a car. In the air, trouble begins when you go too slow, vanishes when you pour on the throttle. You climb and descend by the sound of the engine and the wind. You keep balance by the seat of your pants. If you can do that, you got wings."

There's a little more to it than that. It takes you about eight to ten hours before you "get that feeling" and can solo. After that there's about 50 more hours of getting acquainted before you can get a CAA ticket which entitles you to take up passengers.

One designer, Fred E. Weick, who built the Ercoupe ($2,590), a small, low-wing, all-metal tricycle job, made it even more simple. He linked the ailerons and rudder controls together, eliminating the need for rudder pedals and feet-hand coordination. All you have to do is move the stick or wheel to right or left for a turn and bank, or back and forth to climb or dive. It's the next best thing to push-button control. The Ercoupe also has a secret built into it that makes it impossible to spin—and getting into spins, the records show, has been the cause of most fatal accidents.

Something new and entirely different is William T. Piper's "Skycycle," the motor-bike of the light plane world. To get the first experimental plane, engineers took a large droppable fuel tank, mounted a light 40-horsepower engine in it, cut out a cockpit, added an extension boom for the rudder and elevators, hooked on a pair of wings and it flew.

The new model, which has a built-to-plan fuselage and a special set of new airfoils, looks more like an airplane. It has a 55-horsepower engine and a 10-gallon fuel capacity which can push it along at a claimed cruising speed of 90-plus for a range of 350 to 400 miles. It weighs less than 400 pounds empty, will carry up to 250 pounds, but its plush padded cockpit is a tight squeeze even for a guy who weighs 180. As one pilot said: "You don't fly it, you wear it." Some think, however, because it is tricky, fast, tiny and a one-man airplane that you fighter pilots probably won't hesitate to drop about $900 for a pair of wings to do some sky riding.

Bill Piper, who made the name "cub" synonymous for light plane, has some other new models, too, namely the *Skycoupe* ($2,000), a two-place low-wing, and the *Skysedan* ($2,995) for four people. But you probably won't be able to buy one for at least two years. It will take that long to perfect, tool-up and produce. For immediate sale the Piper post-war plane will be just a "Cub," an improved version of pre-war two-place and three-place trainers and cruisers.

One model of the *Skycoupe* is flying. It has a tear-drop shaped fuselage, automobile type doors and windows that give it the appearance of the plexiglass nose on a B-29. Unique for light planes is the twin-boom tail, pusher engine, retractable landing gear and self-starter. On the instrument panel you don't have to ponder over aeronautical terms like *altimeter, manifold pressure, bank and turn indicator*. It's all there on simple dials and knobs labeled—starter, throttle, primer, fuel, speed, oil, gas, compass.

Aeronca has a similar design called the "Eagle" which is now in the wind-tunnel and mock-up stages. Messrs. John and Carl Friedlander, whose company produced the first low-priced light plane, the "flying bathtub" in 1929, are planning to produce a two-place low-wing, the "Chum," which has that two-control, anti-spin feature adapted from the Ercoupe. They also have new and improved models of the popular pre-war two-place, side-by-side "Super Chief" and a new tandem trainer, the "Champion," which will be the company's first bid for postwar business.

The new "chief," which will sell for about $2,900, has better vision, metal ribs and sound-proofing, all of which were lacking in 1940 models. The landing gear is specially built so that the wheel and strut can be switched from side to side. Such a small item as handgrips on the struts have been added to facilitate ground handling. Brakes, like those on a P-38, but in miniature, permit short stops. Wing tips are removable and Aeronca men are thinking in terms of "replace" rather than "repair."

The closest thing to a family plane which is now ready for production, sweating out materials, is the four-place Taylorcraft Model 15, a four-door sedan. Not too unlike pre-war two-place Taylorcrafts, the new plane has a blown-up fuselage with two side-by-side seats in tandem. It will sell for about $4,000. Slots and flaps permit landing speeds as low as 40 mph. Removable rear seats allow large cargo space.

Stinson Division of Consolidated-Vultee Aircraft Corporation (B-24 parents) is also out to get the family business with a new four-place airplane. Although their big Wayne, Mich., plant is busy turning out liaison planes for the Army, engineers are ready with commercial design. The popular Stinson model will be the "125" built to accommodate pilot and three passengers. It looks like the three-place "105" pre-war design but has more horsepower, fatter fuselage and interior construction characteristics gleaned

(Continued on Page 62)

Three Years Over Europe

BY MAJ. ARTHUR GORDON
AIR FORCE *Staff*

In the long run, the story of the part played by American airpower in the European victory cannot be told by the generals, or the military analysts, or the war correspondents, or even the historians, however gifted they may be. It will be told by the AAF men who were there, the men who made the history—all 875,000 of them who survived. For years to come they will be telling it, in corner drugstores and barber shops, at family dinners and barbecues and clambakes and wherever people talk about the war. They will tell it as honestly as they can, and for their listeners that will be the last word on the subject.

This review of the AAF in action over Europe does not pretend to be a complete historical record or an exact appraisal of what airpower accomplished. Its scope is too small, and it is written too close to the event to have the full wisdom of hindsight. Its purpose is simply to help the participant tell his story better by giving him a somewhat broader picture of the whole than he might otherwise have. If he understands some of the basic reasons and principles that underlay his own action, if he can see that action in its proper perspective, he will be able to tell the story of airpower with more assurance, accuracy, and conviction. The story needs to be told and re-told, lest in years to come complacency and inertia once more rob us of our strength. It does not require any special selling. The record speaks for itself; the facts are more than sufficient. The best testimonial to the importance of airpower in our national life is simply the plain unvarnished truth.

'The destruction of Germany's great war industries was accomplished almost entirely from the air. No one can stand among their ruins without a feeling of awe for the devastating power of such attacks. The courage and skill of our pilots and their crews in these operations is legendary. They deserve the highest tribute of our people.' THE HONORABLE HENRY L. STIMSON, SECRETARY OF WAR

When the Nazis surrendered unconditionally at one minute past midnight on May 9, 1945, the gods who love irony must have laughed. The nation that had first counted on airpower to bridge the perilous gap between its aspirations and its capabilities, then used the air in revolutionary ways to conquer a continent—there was this nation, shorn of its air strength by superior airpower, its cities beaten into dust and ashes, its industry crippled and driven underground, its armies rendered powerless to halt the march of the invaders.

The Germans themselves were more than willing to admit that airpower had boomeranged on them with terrible impact. In the weeks after V-E day one top Nazi general after another added his voice to the almost unanimous chorus: "We failed primarily because your airpower robbed our skies of protective wings, our armies of mobility, our tanks of oil and our factories of raw materials." This from the men who had counted on air weapons to lead them to world domination. Irony indeed.

For the laughing gods, however, the irony must have been the sharper for the narrowness of the margin of failure. More than once, even after American strength was thrown into the balance, the Germans nearly won the air war. Given a little more foresight, they might have created a single-engine fighter force that would have halted our air invasion of Europe. Given a little more time, a little more luck, they might have brought their V-weapons and their jet planes to a point where they could have forced a stalemate. But as one of their airmen remarked bitterly after his capture, their timing was consistently bad, their critical decisions on how to apply their strength were usually made too soon or too late.

This was most unfortunate for the Germans. It is the application of power, not power itself, that decides battles. Thinking, not sheer mass of planes or tanks or guns, is what wins wars. In the air, where there were few precedents to follow, few textbooks to study, the side with the best brains was bound to win.

It did.

The victory was so enormous that it was hard to grasp at first. To the men of the AAF who did the flying in the ETO, and to the men on the ground who handled the countless small anonymous tasks that kept the planes aloft, the days immediately after V-E day were touched with a strange unreality. There was both pride and bewilderment in the face of victory. Pride in the magnitude of the achievement, reflected in the price that was paid—8,314 heavy bombers lost in combat, 1,623 medium and light bombers, 8,481 fighters, 38,185 men killed or missing. And bewilderment because the scope of the effort seemed so vast as to defy comprehension. "We did it, all right," said one crew chief, "but we'll never know exactly how."

In a way, the crew chief was right. Nobody will ever know exactly how the AAF applied the aerial power without which the war could not have been won. In war, as somebody once said, truth is the first casualty. Not necessarily because sinister forces try to hide it, but because it is so hard to pick out from the mass of irrelevant detail.

The story can be told in outline, however, and the main threads of the narrative are not tangled or confused; they are quite clear.

From the beginning the mission of Anglo-American airpower was to weaken the German will and means to wage war to a point where successful landings could be made on the Continent, then facilitate the destruction of the German armies by our own. To accomplish this mission, it was necessary to cripple certain key German industries. Before that could be done, it was essential to neutralize the Luftwaffe and retard the development of German countermeasures such as the V-weapons that threatened the success of the whole plan. But the broad strategic mission was plain: set the stage for invasion, then facilitate exploitation by the ground forces. Everything that the AAF did was directed to this end, with the comforting knowledge that every blow struck against the Nazis directly or indirectly aided the Russians on the gigantic Eastern front.

There was not, it is true, always complete agreement as to the methods by which this mission was to be accomplished. We made errors of judgment which are easily discernible by hindsight. We underestimated German ingenuity in repair and salvage. We may have been too sanguine about the ability of heavy bombers to protect themselves against improved fighter tactics. We were slow to grasp the full importance of photo reconnaissance—and night photo coverage never was adequately developed. We bit off more than we could chew in the way of target systems—partly because overall war strategy necessitated diverting heavy bombers to another theater early in the war. The task of neutralizing the V-1 sites was particularly difficult, and the first results left much to be desired, although the net result probably saved London. Our early airborne efforts were not the smooth operations of 1944 and 1945.

But these were just grammatical errors compared with the grievous blunders the Germans committed in their use—or rather misuse of airpower. The Teutonic mind, capable of brilliant short-range planning and revolutionary engineering, seldom showed the imagination and foresight that would have enabled the Nazis to exploit their initial advantages. They failed in the Battle of Britain and in their attempts to blockade the British Isles. They failed in their final defense of the homeland more because they planned their air defenses too late than because of any material or mechanical deficiency.

This was not true of American planning. In the broad application of airpower, our basic ideas were sound, although in some cases we seemed to be flying straight into the teeth of the best air doctrine. The proof of the pudding was in the eating thereof. The fact that we were eating the pudding less than three years after our recipe went on the stove is one of the most extraordinary military achievements of all time. It is, moreover, a testimonial to our air thinkers who had been teaching certain basic doctrines in our military schools for 15 years prior to the war.

How those somewhat academic doctrines were tested in the battle laboratories of war is a long story, but if it is ever dull that is the fault of the story-teller. The individual

participant, immersed in his particular task, was in no position to see the air war over Europe as a gigantic chess game in which one move was countered by another, one tactic brought forth another, with the issue actually in doubt until superior power and more intelligent application of that power brought the final checkmate. But it was.

One thing that makes the story fascinating is speculation about what did not happen. The might-have-beens of war are not unprofitable to contemplate, for we may be sure that our enemies of the future will not neglect the study of them. If the Germans had not changed target systems at least twice in the Battle of Britain; if they had moved through Spain to pinch off the Mediterranean at Gibraltar; if we had allowed ourselves to be dissuaded from our determination to carry out daylight precision bombing; if the Germans had developed an adequate sight for their rocket-throwing fighters; if our long-range fighter escort had not appeared exactly when it did; if the V-weapon timetable had not been dislocated and retarded by our bombing—all these ifs and many others are pregnant with military potentialities. What happened is most significant in the light of what might have happened.

There are a thousand ways to attempt to tell the story of the part airpower played in the European victory. There is the statistical method. But statistics have a way of becoming merely astronomical figures that do not tell the whole story. Besides, they indicate only size, and size was not the deciding factor. The statistics are all on record for those who want them. There is, too, the familiar distinction between strategic and tactical use of airpower. But the distinction is misleading; certainly a high-altitude, long-range daylight mission to Berlin involving sky battles that cost the belligerents several hundred planes is a tactical as well as a strategic operation. And certainly the work of a long-range fighter bomber, bombing an enemy headquarters 200 miles behind the battlefield, has strategic as well as tactical significance. The line of demarcation is not at all clear. Besides there are countless air activities, from vertical envelopment to air-sea rescue, that do not fit in either category.

The best plan, probably, if the larger picture is not to become blurred with too many details, is to attempt to trace the chronological counterpoint of offense and defense from the beginning—or even a bit before the beginning—to the end. Let us, therefore, think back to the uncertain days of 1941 when our country was technically at peace but when, actually, the hot breath of war was on our necks with the reality of conflict only weeks away.

By July 1941, the international situation in which the United States found itself was so critical that the possibility of a two-ocean war had to be faced and all possible preparations made for such an eventuality. Consequently the President asked the Secretary of War for a report on our military plans and capabilities. That report undoubtedly played a large part in the discussions that took place when the President met Mr. Churchill on the battleship *King George V* one month later—a meeting that resulted in the Atlantic Charter.

The air section of the report faced squarely the fact that there could be no invasion of the Continent of Europe for at least three years (the authors of this estimate were correct almost to the day), and then only if the war against Germany were given priority over a possible conflict with Japan. The broad recommendations of the air chiefs, which in the next 40-odd months were followed with amazing fidelity, called for a concentration of our air effort against Germany's war potential from bases in Britain with a defensive or holding war in the Far East. The report did not foresee the disasters that were to overtake us in the Pacific, but many of the difficulties of daylight operations over Europe were anticipated. The necessity for more armor and more firepower in our heavy bombers and the need for long-range fighter escort were clearly indicated—this in the days when we had a grand total of 70 heavy bombers fit for combat and, except for the untried Lightning, no long-range fighters at all.

There were misconceptions in this pre-war report. There were bound to be. The electrical system of Germany, given highest target priority by our planners, subsequently proved less vulnerable than anticipated. So did such communications as canals and marshalling yards once Germany developed her repair system to such a fine art. The German transport system did not begin to collapse until mid-1944—and then only under the impact of very intensive and sustained bombing. We were optimistic about our bombing accuracy under combat and European weather conditions. We overestimated the destructive power of high explosive bombs on certain targets. The report did not concern itself with airborne operations or even with strictly tactical application of airpower in cooperation with ground forces.

American faith in a discarded concept of air attack

But the startling thing about the report was the fact that it was based on a concept of air attack that flatly disregarded the lessons of air warfare learned over Europe in the two previous years. It assumed that the backbone of American airpower would be the daylight heavy bomber—a weapon both sides in Europe had discarded after bitter experience as too costly a means of waging war. This must have been forcibly pointed out to Mr. Roosevelt at his August meeting with Mr. Churchill, yet he had enough faith in his American advisers to go ahead with preparations for such an offensive. Without this faith the European war might be in progress right now.

In August 1941, the AAF was hardly ready to engage in global war but it was not totally unprepared either. In April 1939, an expansion program had been inaugurated providing for 5,500 airplanes. A stepped up training program for aircrews and ground crews had been initiated. Orders for military aircraft from Britain and France had resulted in an expansion of our production facilities. When France fell, the President had called for a production of 50,000 airplanes per year. In 1941, the training program was increased to provide ultimately for an AAF of some 640,000 men. This was not ideal, but it was a far cry from the public indifference and inertia that hampered such expansion during the complacent '30s. If we had had in 1941 the airpower that AAF commanders had long been clamoring for, the war would have ended much sooner and countless lives would have been saved.

When war finally came, the Air Forces were shifting from first into second gear. The foundation for expansion was laid. Yet when the Japanese struck in the Pacific they virtually wiped out our overseas air arm. And within the continental limits of the United States at the time of Pearl Harbor, there were only 631 airplanes suitable for combat.

One week after Pearl Harbor, a plan for an Army air force of 90,000 planes and 2,900,000 men was complete. Ten weeks later the vanguard of the 8th Air Force was in Britain. Six months later, in June 1942, a token force of 13 Liberators flew 2,000 miles from Africa to bomb the oil refineries—prophetic target—at Ploesti. Of these pioneer Liberators, only 4 planes returned to their starting point. The British must have had to bite their tongues to keep from saying "We told you so." The Germans must have relaxed a bit. The real test was yet to begin.

It did not begin until August 17, more than eight months after Pearl Harbor. Before discussing the tactically unimportant but historically portentous flight of 12 Fortresses to Rouen, it might be advisable to recall the air situation as it existed in Europe during the summer of 1942.

Of the five air forces that had participated in the European war up to the arrival of the AAF, one was extinct, one was a farce, one was a battered enigma, one had won the most important defensive air battle of the war and was building a powerful night striking force, and one—still the largest and most formidable—was heavily committed from the Arctic Circle to the Sahara and from the English Channel to the gates of Moscow. These were the French, Italian, Soviet, British and German air forces, respectively.

The air situation in Europe in the summer of 1942

In mid-summer of 1942, the four surviving European air forces still showed strong traces of the original thinking that had gone into their composition, although the RAF and the GAF were changing rapidly to keep pace with the trends of the war itself. Each of the four had been designed to fit requirements of its own country; each was a mirror, in a sense, of the ambitions and intentions of the people who built it.

Italian airpower, which had looked threatening before the war with its reasonably good but underarmed fighters, its torpedo and dive bombers, its creditable record in the Schneider Cup races—and the first publicized jet-propelled flight, for that matter—had never shown much enthusiasm for real fighting. Its brief appearance in the Battle of Britain had ended in ignominious rout. Its record in Africa was somewhat better but not much. The Italian air force was parceled out to ground commanders and destroyed piece by piece. At best, like the Italian navy, it had maintained a nuisance value, and that was rapidly disappearing.

The Soviet Air Force, virtually destroyed by the GAF in the campaign of 1941 and sorely battered again in 1942, had somehow managed to survive—bolstered by its own reserves and American help—to the point at least where there was fighter cover for key cities. Within a few weeks, in a struggle reminiscent of the Battle of Britain, this fighter force was to exact a heavy toll from the Nazi Bomber Command's daylight efforts to reduce Stalingrad.

The Soviets had never gone in for long-range bombardment. Perhaps they knew our plans and assumed we would take care of it. In any case, by this time they were pushed too far back for such a program to have made sense, even if they had had the production facilities or the planes. With much of their industrial area overrun, they were forced to concentrate on types of planes that could give maximum support to their greatest asset—manpower. One result was the Stormovik, a heavily armed fighter-bomber which the Soviets used more or less as a flying tank. An effective ground support weapon, it was not conceived as a match for the best German fighters in aerial combat. Except locally, German air superiority on the huge Eastern front at this stage of the war was complete.

The RAF, at this point, was in a transitional period. Designed as a purely defensive weapon, its primary mission had been to hold the British Isles at all costs, prevent invasion and protect the vital shipping lanes. Fighter Command, aided by radar, German miscalculation and its own magnificent fighting qualities, had won the Battle of Britain—and with it time for the United Nations to set about winning the war. Bomber Command, significantly, had directed its first attack against a Nazi naval base, and up to mid-1942 had dropped most of its tonnage on the German Navy or the bases that supplied it.

With the aid of Coastal Command, the two commands had helped avert the threat of invasion. When the Americans first appeared over Europe, Bomber Command was patiently building up its strength for shattering area attacks by night. It had tried no sustained daylight operations since some disastrous losses in 1939. Like the Germans, it had been forced under cover of darkness by the threat of flak and fighter interception. It was painfully perfecting the pathfinder technique that later resulted in some very accurate night bombing. But many months of trial and error and bitter losses lay ahead. And between Bomber Command and that perfection still stood the Luftwaffe, with its expanding production facilities turning out a constantly increasing stream of night fighters.

The GAF at that time had about 4,500 first-line aircraft —a number that remained remarkably constant throughout the war, although the proportion of fighters to bombers mounted drastically as time went on. It had already proved itself a formidable weapon. It was, as has been said, the instrument upon which Germany depended to neutralize the overwhelming predominance in size and numbers of the coalition that she knew was bound to rise against her.

In August 1942, the GAF's record was impressive. It had enabled the German armies to overrun Poland. It had neutralized British seapower in the conquest of Norway. Its Stukas had demoralized the French and facilitated the break-through at Sedan. It had cracked the stubborn Greek resistance and hurdled the sea-barrier before Crete. It had virtually severed Britain's Mediterranean life line and was giving solid support to Rommel in his drive to the gates of Egypt. In Russia it had helped to drive the Soviets back to the approaches to Moscow and the Caucasus.

It had, in fact, only three blots on its record: the Battle of Britain and the failures at Malta and Moscow.

In all three cases, significantly, it was the German bomber rather than the fighter force that failed, and each time in the face of determined fighter opposition. Truth was that the GAF had started out primarily as a close support weapon, a sort of flying artillery arm geared to short intensive ground campaigns with periods of rest and refitting during winter months. Even reconnaissance was mainly a short-range affair. As such, it had succeeded brilliantly. But it came to the Battle of Britain with no carefully thought-out plan either of blockade, with long-range attacks on shipping and short-range attacks on harbors, or of effective neutralization of the RAF's fighter command. Actually, it had vacillated between the two, changing target systems from the docks and channel shipping to the few fields that serviced the Hurricanes and Spitfires, and finally in blind fury to the senseless blitz of London. Its fighters made the further mistake of flying close instead of area support so that the British were able to vector their fighters straight to concentrated targets. Apparently German intelligence was not well informed on British radar and how it functioned. When asked by Allied interrogators after the war why these mistakes had been made, Goering said that the bombers were so lightly armed that they had to have close support. As for changing target systems, Goering tried to throw the blame for the assault on London upon Hitler who, he said, ordered it in revenge for the bombing of German cities.

In any case, the Battle of Britain gave the German bombers a jolt from which they never fully recovered. They did good work in the Balkans and paced the panzers into Russia and figured prominently in the battle for Stalingrad. They virtually closed the northern shipping routes to Russia. But they were never able to force a decision at Malta, or chase the British fleet out of the Mediterranean, or even hamstring the endless Russian retreat. They could

Classic example of early precision bombing was this bullseye attack on the Italian cruiser "Trieste" as it lay in an antisubmarine net at La Maddelina, Sardinia. At left, a cluster of bombs from our heavies drops toward target; hits it dead center (2); sinks the cruiser (3).

Airdrome destruction at Neuburg, Austria, was part of campaign to neutralize Luftwaffe. Recce reports showed 30 planes destroyed.

Bomb blasts mingle with enemy smokescreen as 15th Air Force Liberators strike Austrian railyard, an important strategic target.

Damage done in the early days to sub pens, such as these at St. Nazaire under attack by our heavies, did not come up to expectations.

and did operate effectively in daylight only in the absence of fighter opposition—and then their work was more tactical than strategic. The Germans still clung to their concept of the air as a medium for ground support.

When the Americans began their air experiment in daylight bombing, therefore, the clearest doctrine that had emerged from the air war was the superiority of the day fighter over the day bomber. It had been tested over the beaches at Dunkirk, in the Battle of Britain, in costly RAF assaults on Germany, in the skies over Malta—and was apparently receiving final confirmation over Stalingrad.

That was one truism.

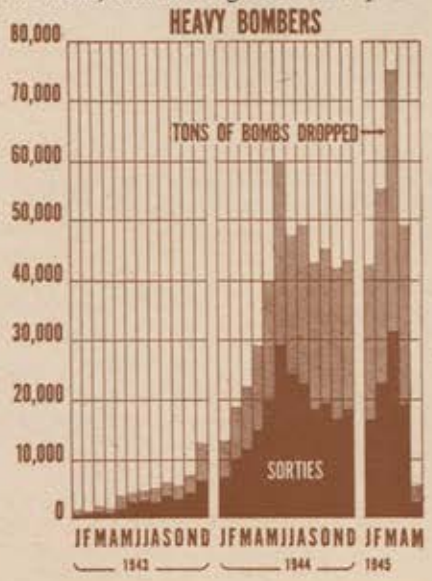
The other was that no ground force could launch a successful offensive against tactical air superiority. The fact that the ground force possessing such superiority had always—up to that time—been victorious had led some observers to the fallacious conclusion that air superiority *invariably* brought ground success. This was to be disproved later in Russia, at Cassino and elsewhere. Indeed, conservative airmen never claimed any such thing. But in the fighter vs. daylight bomber question, the preponderance of evidence was all on one side.

It was all against the bombers that had been used up to that time—slow, underarmed instruments of dubious accuracy. The Americans had two new contributions to make—a bombsight so accurate that good daylight results were obtainable from an altitude above the level at which flak was prohibitive, and a bomber sufficiently well armed to protect itself against the type of fighters then dominating the skies over Europe. More or less by force of circumstance and geography, American airpower had developed along lines that led it inevitably to the one place in air war that no other air force cared even to claim. Our B-17s and B-24s, conceived originally as a defensive weapon that would enable us to meet an invading fleet far at sea and sink it by precision bombing from above effective flak level, seemed to have the qualifications for that power. And American industry had the capacity for providing the B-17s and B-24s in the necessary quantities.

The British were frankly skeptical. They had given the matter much thought, and had finally put their faith and national effort into night bombers. They had flown early models of the Forts over Europe and had lost several. As early as April, they had tested a B-17E and written a report from which they drew several gloomy conclusions. The defensive firepower, they said, was too weak to afford reasonable protection, the tail gun position being cramped and the ball turret very awkward. They also pointed out that the bomb bay could not carry block-busters and that the bomb load was small compared with that of a Lancaster.

The American reply to this was that improved accuracy would more than balance the lesser bomb load. As for the armament, certain modifications were being made. Switching from day to night bombing was a vastly more complicated procedure than simply taking off after sunset instead of after sunrise. Furthermore, night technique at that stage of its development offered little hope of smashing the GAF in the nest. And unless this was done, a swarm of planes would be hatched that might make invasion an impossibility.

The first Britain-based test came on August 17 when 12 Fortresses flew with Spitfire escort to Rouen, bombed the marshalling yards and returned without loss. This mission, and the longer unescorted bombing runs of the weeks that followed, were mere military pin-pricks in the thick hide of the Germans, but for anyone who could read the signs they were among the most important events of the whole war. The question was not whether we were doing serious damage to the submarine pens at St. Nazaire and Brest and Lorient. The fact is, we were not. The question was whether or not the Luftwaffe could destroy or turn our unescorted formations from our objectives as the Spits and Hurricanes had either shot down or turned the Dorniers and the Heinkels from their British targets two years before. This was the 64-dollar question because in all the arsenal of democracy the only weapon that could possibly neutralize the Luftwaffe was American strategic bombing. The Germans did not fully realize this in the autumn of 1942, but the success of the unescorted American heavies did shake their faith—secure until then—in a defense based mainly on radar, flak and fighter interception.



As early as the spring of that year, before an American heavy bomber had even reached an 8th Air Force base, the German high command had begun shifting aircraft production from bombers to fighters. In December 1941, that proportion had been 510 bombers and 130 fighter-bombers to 360 single-engine fighters. Two years later the figures were 400 bombers, 255 fighter-bombers, 600 single-engine fighters. By December 1944, single-engine fighter production was 1,425, twin-engine fighters 245, and bombers 15!

From the start the Germans developed a healthy respect for the firepower of a formation of Fortresses. After one laggard, crippled Fort took on a flight of ME-109s over Holland, shot two down and damaged others, the word went out over the grapevine (we have a German PW's word for this) to "lay off those *verdammt* Forts." But it wasn't long before heavier armament had been installed in the Germans' two basic fighters, the FW-190 and the ME-109, and intensive study of shot-down Fortresses had resulted in improved tactics in attacking bombers.

Compared to the sky battles that came later, those air engagements were small, but they lacked nothing in ferocity, and the caliber of the Jerry pilots was probably higher, on the average, than it ever was again. They were fighting over territory controlled by their own armies; in most cases the Americans were flying unescorted. If there was ever a time when everything favored the Germans it was then.

We were not yet prepared to fight every day—or even as often as weather permitted. If we had tried to at that time, our loss rate possibly would have exceeded replacement rate so drastically that the whole daylight offensive would have been jeopardized. Knowing this, the commanders carefully husbanded their strength. There are those who still claim that we should have waited until we had the planes to mount a really telling offensive, overwhelming German defenses before they could recover from the initial shock of surprise. There are several valid answers to this. The first is that we could not have mounted a major offensive, even if we had had the planes, without the experience gained from trial and error in these early missions. Our first large air battle was fought over Lille on October 9. There was, as

might have been expected, an element of confusion. Some squadrons missed rendezvous, some brought their bombs back with them, and there were conflicting claims of fighters destroyed. Such confusion was a necessary preliminary to the cold, almost uncanny efficiency of operations of 1944 and 1945. We learned that our planes had to be modified in some respects and our training of crews intensified before we were ready for large-scale action. The Germans learned much from our early strikes and improved their defenses accordingly. But we learned far more.

The second reason why delay was inadvisable had to do with morale. The United States had been in the war for three quarters of a year. Britain needed the lift that would come from the announcement that a powerful new ally was actually fighting beside her. America needed the sense of participation that such air strikes would give.

Finally, there was no point in waiting for a rapid build-up of bombers in Britain, because the course of the war had dictated a change in overall strategy which meant that no such build-up could be achieved for several months. That change resulted from the decision to invade Africa.

Operation *Torch*, as the African invasion was called, was dictated by the activities of a man then known as the "Desert Fox"—Rommel. As his panzers clanked forward on the dusty coastal road that led to Alexandria, the situation in the Mediterranean grew more critical. To those on the Allied side responsible for the conduct of the war, it became increasingly evident that he must be stopped. The worst thorn in Rommel's side was Malta. If Malta fell and Rommel's supply lines grew stronger, then there was every probability that Egypt would fall too. With Egypt would go the Suez Canal and the Middle East. The Germans would flank the Russians, win the Caucasian oil which they so desperately needed, possibly link up with the Japanese in the Indian Ocean. By July 1942, the consequences of not stopping Rommel were so obvious and so grave that earlier plans had to be shelved. Our Britain-based air offensive would have to struggle along as best it could, without the services of some of its most experienced squadrons and—even more disheartening—without the Lightning fighter cover originally scheduled to escort the heavies to worthwhile targets in Germany.

At the time of *Torch*, American airpower was already represented in Egypt by the 9th Air Force. At the start of the battle of El Alamein, October 23, 1942, it had 164 aircraft consisting of a squadron of Fortresses, a squadron of Liberators, two P-40 groups and one B-25 group. These, plus British air strength of some 1,100 planes, were opposed by about 2,000 Axis planes of all types. The Luftwaffe had its hands full dealing with these guardians of Egypt. It was not equal to a heavy assault on its rear. The responsibility for that assault was given to the 12th Air Force which landed with the invasion forces on November 8.

Torch differed sharply from subsequent invasions in that it was directed against territory held by a power that was semi-friendly, or at worst only half hostile. Adequate air cover, it was thought, could be provided from carriers and nearby Gibraltar. There were two operational plans for the invaders, a war plan in case the Vichy forces resisted, and a peace plan in case they did not. The uncertainty as to which plan would be followed persisted until a few hours before H-hour.

For the invasion, an American paratroop force was flown from Britain in 39 C-47s in the first American airborne operation of the war. Their story is worth recalling because it indicates the growing pains incident to any new project, in peace or war, and because it was the small seed from which grew the great vertical envelopments later in Normandy, in Southern France, in Holland and across the Rhine.

The planes took off on the night of November 7, expecting to receive a friendly welcome in daylight the next day. The flight down was a rough one. Most of the planes had been undergoing modification until a matter of hours before take-off. In some planes, wingtip lights burned out, making formation flying in the wretched weather almost impossible. When the C-47s finally reached Africa, they found severe fighting in progress. French fighters raked the defenseless transports with machine-gun fire, forcing several to crash-land in the desert. These were some of the difficulties but even so the operation had a measure of success inasmuch as the scattered arrival of the C-47s thoroughly confused the French air defenses and had them tilting at shadows.

North Africa: the proving ground for Allied tactical airpower

On the whole, air opposition was light. Spitfires from Gibraltar made short work of such Dewoitines as offered resistance. Carrier-ferried P-40s swooped onto captured airfields. Within a day or two some heavy bombers, including the "veteran" 97th Group from England, were moved in. Mediums and fighters also arrived to begin the long task of hacking at Rommel's rear guards and his supply lines.

Living conditions faced by these airmen were rugged, to put it mildly. Ground crews performed miracles of ingenuity in keeping aircraft operational in a climate that seemed to consist of a diabolical combination of dust storms and bottomless mud. Missions were flown at short notice, with organization improvised on the spot. Fighter pilots attended bomber briefings to get a picture of the type of mission they were being called on to escort. Troop Carrier dropped the paratroops that captured Bone airdrome, flew countless air supply missions, learned how to operate on a shoestring.

But even in those early days, the pattern of tactical support was emerging precisely as predicted by the logicians in the pre-war classrooms. First: gain air superiority. Second: isolate the battlefield. Third: provide direct cooperation with the ground forces in the liquidation of the enemy. The success of the second phase depended, obviously, on the first. Without air control there could be no interdiction of the battlefield. And until the battlefield was isolated, close cooperation could have no more than local effect. All this the air planners knew already. The African campaign was to teach them how to apply that knowledge successfully.

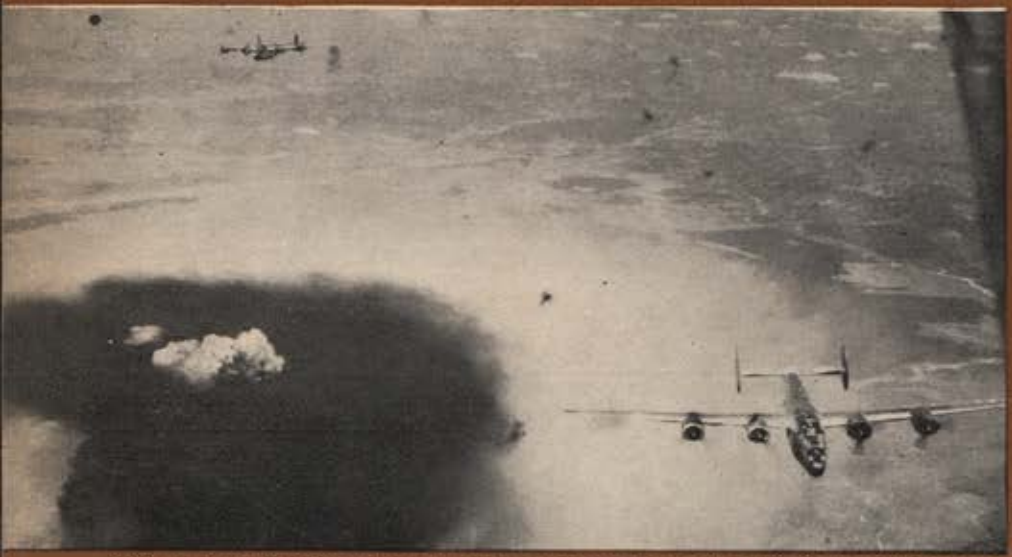
Air superiority was not gained in a week, or a month. At the time of the African landings, the embryonic 12th Air Force consisted of 551 aircraft. There were 1,700 miles between it and the other jaw of the Anglo-American pincer. And the Luftwaffe fought hard. But the truth was that the GAF at this moment of its greatest territorial expansion was simply stretched beyond the limits of its capacity adequately to supply itself. Committed to major efforts in both Russia and Africa, with the growing weight of the RAF's night assault oppressing its cities and the AAF's Britain-based day offensive already casting an ominous shadow, its doom in Africa was sealed from the moment our landings succeeded. The Germans must have wondered in bitter afterthought whether their African squadrons, pulled out in time, might not have tipped the scale at Stalingrad.

At the time, their faith in Rommel was so high, and stakes for which he fought so glittering, that any such admission of defeat was out of the question. So they fought on, until the harbors of Tunisia were choked with ships sunk by the AAF, and the desert battlefields littered with the skeletons of more than 1,000 of their first-line aircraft.

While the North African campaign was slogging through the mud that marked the end of 1942, our daylight bomber effort from Britain had reached a virtual standstill. In December, exactly four missions were flown. This was not

Scenes like this became commonplace as American bases sprang up throughout England.

Havoc blasts enemy supply lines on Cherbourg as par



This attack on flak-covered Ploesti refineries helped reduce the Nazi oil output 93 percent.

Constant patrolling by mediums prevented adequate r

Supply site for V-bombs is spotted by 9th Air Force planes and put out of commission.

Wesel, Germany, focal point of American forces wh

t of campaign to weaken Nazis during invasion landings.

German photo records destruction at Fieseler aircraft plant during 8th Air Force attack.

inforcement of badly sagging German defense positions.

Airborne lifeboat descends to B-17 crew down in North Sea after mission over Germany.

ich crossed the Rhine River north of the Ruhr Valley, shows effects of large-scale bombing attacks which preceded the Rhine paratroop operation.

altogether due to weather, although the weather was bad. It was primarily because we did not have the aircraft available. There were four groups operational in those bleak days —three B-17 outfits and one B-24 group—and for the moment they were orphans of the war. The requirements of the African campaign were such that expanding our force in Britain was out of the question; its replacement rate barely equalled combat losses, which were mounting as the Germans improved their fighter tactics and as the American heavies moved out of the effective but very short-ranged Spitfire protection.

As for the damage the heavies were doing to their targets —primarily the submarine pens—it did not come up to expectations, to say the least. The concrete pens at Lorient, Brest, and St. Nazaire, with their 12-foot-thick roofs, were proof against any bombs being used at that time. Furthermore, bombing accuracy under combat was in its early stages. Our bombardiers, who could hit a 100-foot circle from 20,000 feet in the quiet sky over Lake Muroc, were only learning how to do the same thing over German-held Europe with the skies full of flak and hostile fighters.

However, from the point of view of the planners of the daylight offensive, optimism at that stage of the game was not entirely amiss. Too much stress had been placed on the limitations of daylight bombing and there had been a lot of publicity focused on its growing pains. Optimism was actually necessary to maintain opposition to critics who, in all honesty, favored the switch of the American air effort to night bombing. Their attitude was based not so much on the belief in the superiority of night bombing as doubt whether day forces could survive fighter opposition. This was the crucial question, and at the time of the Casablanca conference in January, 1943, there was no proven answer.

The men who commanded our British-based Fortresses and Liberators, however, were convinced that a switch to night operations would be disastrous. Despite the limited scope of their operations, they had accumulated evidence to document their theories. Some of the evidence was invisible. The uncovering of German field armies in Russia and Africa to meet the new air threat from the west, the decline of the GAF bomber forces to meet the demand for fighters—there were no photographs of these trends, but they existed. The strain imposed on Germany by a round-the-clock bombing, the opportunity to whittle down the Luftwaffe in combat, the economy of effort inherent in precision bombing—all these points and others were presented by General Eaker, CG of the 8th Air Force, and hammered home in a long statement to the Combined Chiefs of Staff at Casablanca.

Hindsight shows that the General might have summed up his argument simply by saying, "Gentlemen, at this stage in the development of night bombing, the destruction of the German Air Force cannot be accomplished by such means. Night bombing will not give us the accuracy necessary to destroy aircraft factories on the ground, nor the opportunity to decimate the Luftwaffe in the air. The only weapon in our arsenal capable of such a task is the American daylight heavy bomber. Unless we use it, and use it soon, the Luftwaffe will be so powerful that a land invasion of the Continent will become an utter impossibility, and even our air invasion will fail."

The Chiefs of Staff decreed that daylight bombing should continue. They ordered a Combined Bomber Offensive whose mission was "the progressive destruction and dislocation of the German military, industrial and economic system and the undermining of the morale of the German people to the point where their capacity for armed resistance is fatally weakened."

That gave the green light to the architects of destruction from high altitude. Ahead of them lay the critical year of 1943. It was clear, even at Casablanca, that the year was to see the most ferocious air fighting in history. The airmen, with other Allied commanders, hoped for a clearcut decision by the end of 1943. The hope for it was well founded but they did not get it.

The reason they did not get it was that the GAF still stood between them and their dream of unrestricted bombing of German industry. The Luftwaffe had lost much of its offensive strength, but its fighter production curve was rising steadily and Germany still had faith in it. The world had seen in the Battle of Britain what a determined fighter force could do in defending the homeland even when badly outnumbered.

A year before, soon after America's entry into the war, Goering had demanded—and received—top priority for the production of fighters. Plans called for production, by December 1944, of 3,000 aircraft per month as compared with the average of some 1,200 in 1942. Single-engined fighters alone were to be quadrupled. The reorganization was planned along mass production lines, with the use of slave labor to overcome manpower shortage as part of the program. The Germans took the precaution of locating most of their new factories at a respectful distance from the airfields of Britain. They did not think it necessary, at that time, to go in heavily for dispersal or to place their key production centers underground. Nor, apparently, did they reckon with the possibility of air attack from the south on such centers as Regensburg or Wiener Neustad.

The result of these miscalculations was a set of industrial complexes ingeniously contrived so that interchangeable units could facilitate repair of any damage to the whole system. It was, at the same time, a concentrated and vulnerable target for any air force that refused to be deterred by distance or aerial opposition. The Germans knew this perfectly well. They had in their possession enough crippled Fortresses and Liberators to know that the same aircraft which could strike their sub-pens on the fringes of Europe had sufficient range to reach the farthest corner of the Reich. But they never dreamed that one day Allied fighters would go all the way with the bombers, and they counted on their own fighter screen to protect the sources of their air strength. Perhaps they even hoped that we would make the effort, and fail, and abandon in despair all plans for the subsequent invasion of Europe.

In any case, in early 1943 the 8th Air Force, with no more than six groups and able to put no more than 100 aircraft over a target, must not have seemed too formidable an antagonist. The Stalingrad disaster and the African situation, where mounting Allied air strength was slowly strangling Rommel, must have caused the German high command more sleepless nights than a certain group of experts working patiently in Britain. But these Operations Analysts were determining, with a cold scientific logic from which the human element was weirdly excluded, which targets represented the Achilles heel of military Germany.

By April they were ready with their answer. The Nazi war effort was based on six major industries producing submarines, aircraft, ball bearings, oil, rubber and military transport. Each industry was vulnerable, to some degree, to high altitude precision attack. Poring over bomb plots and damage assessments from previous 8th Air Force attacks, the experts calculated how many heavy bombers were required to do the job. They weighed the factors of weather, of enemy opposition; they took into account the problems of target recognition, of German ingenuity at camouflage, of such protective devices as smokescreens. Like laboratory

technicians they arrived at a formula calling for certain numbers of planes flying certain numbers of missions. They submitted the plan to the Combined Chiefs of Staff. Give us these tools, they said, and we think we can do the job.

The plan was approved; indeed the first phase had already begun with an attack, on April 17, on the Focke Wulf factory in Bremen. But the loss of 16 heavies in this attack—the heaviest to date—was a warning that the Germans were not going to let our plan succeed without a bitter and protracted struggle. Such losses had been expected; the replacement rate had been fixed by the master plan to take care of them. But during 1943 anticipated replacements sometimes did not arrive as originally scheduled, and throughout the best weather months of that year, the 8th was several hundred planes behind the figure estimated as necessary to do the job. Since the number of German fighters opposing them was steadily mounting, the ferocity of the air battles increased, without decisive effect.

Before tracing the course of the air fighting over Germany in those critical summer months of 1943, it might be well to glance at what was happening in the Mediterranean. There the war was going well. Airpower was slashing at Rommel's over-extended supply line, blocking roads, strafing motor columns, sinking ships, shooting down air transports. Much of the doctrine of tactical airpower was being reasserted in action: that to operate effectively in conjunction with the ground forces, you first must have control of the air, that when you do have such control, the primary role of tactical airpower consists in attacking supply lines in the rear rather than close support in the immediate battle area. New lessons were learned every day about the value of softening up the enemy air force by bombing airdromes before launching a ground attack, about the importance of hand-in-glove coordination between air and ground commanders, about the necessity for integrated air forces that could act as a whole rather than scattered squadrons operationally tied to a particular army or navy unit.

This principle of unity of command was accepted at Casablanca in January 1943. In the following month, the converging 12th and Desert Air Forces were merged in the Northwest African Air Forces under General Spaatz, with a second air command in the Eastern Mediterranean, under Air Marshall Tedder. It was not until the end of the year that the solution of the joint command problem found clearest expression in the creation of the Mediterranean Allied Air Forces, in which the function of air units, not their nationality, determined where they were placed and how employed.

As the days lengthened and spring arrived, General Spaatz's forces proceeded with the arduous and necessary task of whittling down the Luftwaffe. A constant problem in those early days was how to find enough fighters to protect the bombers against the still threatening Axis airpower. The original heavy bomber group, the 97th, found revenge for the pasting it had taken from the GAF on its first night in Algiers by plastering Axis shipping and harbor facilities. In December, it had been joined by three squadrons of Liberators from the 92nd Group in England, who lived in the desert on spam and dehydrated cabbage, harrassed Rommel's rear guards, and struck across the Mediterranean at Naples and the Sicilian airdromes. Several groups of mediums, living under conditions just as rugged, gave the Nazis a foretaste of what B-25s and B-26s could do. There were some bad moments in the Tunisian campaign—as, for example, when Rommel flung his panzers through Kasserine Pass. On that occasion everything with wings was thrown against him—even the heavies flying below medium altitude. But there were also red-letter days like the famous Palm Sunday engagement when P-40s of the 57th Group caught a swarm of JU-52s and ME-323s flying men and supplies to Rommel's hard-pressed forces and shot 79 into the sea in a slaughter reminiscent of the Battle of Britain.

In the MTO there was more variety of air combat—if not more heroism—than was dreamed of in northern Europe at that time. High, medium and low-level bombing, bridge-busting, strafing of armored columns and airdromes, skip bombing of Axis shipping—all these tactics and many others appeared in the 191 days between the landings in North Africa and the collapse of Axis forces there.

The kindergarten days of the 'Focus Cats', eyes of the Army

It was in this period, too, that an aerial weapon whose potentialities had never been fully exploited began to be recognized as the indispensable aid to modern warfare. In 1939 one of Germany's best generals, Werner Von Fritsch, had predicted that the side with the best aerial photo-reconnaissance would win the war. In Britain the RAF had skilled photo-interpreters assessing bomb damage and making target selections based on high altitude photos brought back by unarmed Spitfires or Mosquitoes. A squadron of American Lightnings, profiting by RAF experience, was almost operational. But it was in Africa that tactical reconnaissance proved itself invaluable to the ground forces. At one point during the final stages of the drive on Tunis, when weather grounded the recce boys, the ground commander flatly refused to move until his air photo coverage was obtained. Flying P-38s (F-versions) members of the 90th Photo Recon Wing experimented with night photography, and brought low-level photo-recon missions—dicing missions, as they were called—to a state of development which was invaluable later on in Italy and still later in the battles of France and Germany. They got little recognition for their work—photo recon was strictly hush-hush in those days—but they came to be acknowledged as the real eyes of the Army. To the long-range planners, with an eventual D-day in mind, their work proved beyond question that complete photo-coverage of the invasion area and its defenses would be indispensable to successful landings.

With the final collapse of the Axis African forces on May 18, 1943, airpower was free to turn its attention across the Mediterranean to what Mr. Churchill had once called the "soft underbelly" of the Axis. The Northwest African Air Forces was, by this time, a battle-hardened aggregation of nearly 4,000 aircraft, with 2,630 American airplanes, 1,076 British and 94 French. The first Axis target to feel the weight of its blows was Pantelleria. Between May 30 and June 11, this heavily fortified Italian island rocked under more than 6,000 tons of bombs and finally capitulated without a ground assault—the first territorial conquest to be achieved solely through airpower. It was a great victory, and a relatively cheap one—we lost 63 aircraft and claimed 236 of the enemy's while gaining fighter fields indispensable for the invasion of Sicily. It was a great victory, but airmen knew that such complete collapse of a garrison's morale was the exception rather than the rule. Had Pantelleria been defended by British and inhabited by Maltese, its fall might have been considerably delayed.

With Pantelleria fallen, plans moved forward rapidly for the invasion of Sicily. The primary mission of the Northwest African Air Forces was the destruction of the enemy airpower based there. Between July 1 and D-day, July 10, nearly 3,000 sorties were directed against airfields on the island and on the Italian mainland. The Luftwaffe took such a beating on the ground that it was able to offer only token resistance when the invasion finally took place.

All was not sweetness and light in the air, however, dur-

ing the invasion of Sicily. The airborne operations, in which American gliders made their first combat appearance, showed with clarity the need for complete coordination of land, sea and air forces.

Training for the airborne show had been complicated by the weather. Blistering 120-degree heat warped some of the CG4As and, just 10 days before the Sicilian D-day, a howling sirocco caused additional damage to the fragile craft. Nevertheless, preparations went forward.

The 51st Troop Carrier Wing, with 133 planes and gliders, was to carry British troops into action, the gliders to be released over the sea but close enough to the coast to make their landing zones. The 52nd Troop Carrier Wing, with 227 aircraft, was to drop American parachutists. Heavy preliminary bombing of the invasion area and strong fighter patrols were ordered.

In spite of such preparations, some things went wrong. Smoke from the bombing, rising to 5,000 feet, blinded both C-47 and glider pilots of the 51st Wing. Defensive flak was heavy. A strong head wind, plus other factors, resulted in 50 gliders landing in the drink. The 52nd Wing had little better luck. Some of their craft were shelled by our forces. Fires on the ground, reflecting on windshields, made visibility already obscured by smoke and dust even worse. Eight aircraft went down under fire from both friend and foe. Some chutists landed miles from their intended drop zones. Afterwards the mission was given an 80 percent efficiency rating, but this charitable reckoning must have taken into consideration the fact that the enemy was thoroughly confused by our own confusion and greatly overestimated the numbers of Allied aircraft involved.

The going continued to be rough for Troop Carrier throughout the remainder of the Sicilian campaign. Not so much from the Luftwaffe; our strikes against enemy airdromes kept air opposition light. But enemy flak was deadly. On July 11, we lost 23 aircraft out of 144. Two days later, a misguided Allied convoy sent up a barrage that knocked down seven more C-47s. Harrassed pilots began to shy at the sight of anything bigger than a rowboat.

It was a painful process of education, but the lessons were plain and not to be forgotten. They were: absolute necessity for complete coordination between all members of the triphibious team; need for distinctive markings to facilitate aircraft recognition; better radio navigational aids; planes less vulnerable to ground fire than C-47s; bigger drop zones for parachutists. Ruled out of the book were glider-releases over water, and the so-called "crash landings" of CG4As, which were too lightly built to stand the shock without injury to the occupants.

These lessons were applied to great advantage a year later in Normandy.

As the Axis grip on Sicily was slowly being broken, five groups of Liberators, three from the 8th Air Force and two from the 9th, staged what was probably the most spectacular single mission of the war—the August 1, 1943, strike against the Ploesti oil refineries. The decision to fly the 2,000-mile round-trip from Africa and go in at treetop level, gambling heavily on the element of surprise, was a bold one. It was based on the theory that the pinpoint accuracy obtained would justify high losses, that dodging radar detection would minimize losses by catching fighter and flak defenses unprepared.

Unfortunately, some faulty navigation nullified the element of complete surprise. The damage inflicted was considerable, but out of 177 Liberators, 42 were shot down or crashed, and 31 others failed to return to base. Ploesti was destined to be destroyed eventually by bombing, but to accomplish that destruction the heavies reverted to their fundamental tactic of high-level precision bombing. Not until almost a year after this first low altitude attack, when P-38s successfully dive-bombed the refineries through an effective smoke-screen, did American aircraft care to brave the flak defenses of Ploesti at low level.

After Sicily, inevitably, came Italy. Pre-D-day softening up of German airdromes, particularly a spectacular strafing of 200 JU-88s at Foggia, kept the Luftwaffe's head down. But the Wehrmacht was tough. At Salerno, the only suitable invasion point within range of our fighter cover, the Germans drove a counter attack to within a few hundred yards of the beach. Once again, as at Kasserine Pass, the heavies joined the mediums and the fighter bombers in an all-out effort to break up the attack and save the beachhead. On two successive days more than 1,000 sorties were flown, a commonplace later in the war, but a distinct achievement over a distant beachhead in September 1943. The morale lift given our ground troops was enormous.

OPERATIONAL TYPE AIRCRAFT PRODUCED BY GERMANY DEC. 1941 — MARCH 1945

PERIOD	JET & ROCKET	S.E.F.	T.E.F.	BOMB	OTHERS	TOTAL
DEC. 1941		360	130	510	150	1,150
1942		5,070	1,505	6,615	1,865	15,055
1943		7,440	2,555	6,155	1,340	17,490
1944	700	12,165	3,170	3,000	630	19,665
JAN.-MAR. 1945	670	2,975	530	20	120	4,315
					GRAND TOTAL	57,675

Movement of the 15th Air Force to Italy in the autumn of 1943 was a triumph of logistics. The main objective was to lose as little operational time as possible. Existing airfields in the Foggia area had been badly battered. These were repaired and others were carved out of the soggy Italian plain. The engineering problems involved were enormous. Steel mats were essential to keep bombers from bogging down in the spongy turf. Roads had to be built. Distribution of supplies inside Italy was a major headache. Most shipments were landed at Naples where shattered port facilities were restored with brilliant efficiency by Army engineers. This equipment then had to be transported over the spiny backbone peninsula to eastern airbases. Sometimes the task of moving several hundred tons of steel mat from one side of a marshalling yard to another was more of a problem than getting the same shipment across mountains.

Fortunately, warfare in Africa had taught everyone, including the AAF, much about the difficult art of keeping mobile. Combat crews never once lacked material with which to fight. Bomb stackage was kept ahead of requirements. Gasoline was piped in and stored in adequate field facilities. By the end of December, supply problems were largely licked. With its strength building up rapidly, the 15th stood ready for the critical responsibilities of the new year.

In England, the 8th was ready, too. Behind it lay a year of air fighting of unparalleled ferocity, a year of hope and triumph—and some bitter disappointment.

The year had begun with the first tentative strikes against the north German coast. Costly experiments with medium-level bombing had proved conclusively that Nazi flak was too deadly for any but high-level operations. And bombing accuracy gradually improved. The attacks on Kiel and Vegesack silenced most of the critics of daylight operations.

In the spring of 1943, however, the cardinal principle of concentration of our air effort was not fully realized. We made some successful strikes against rubber factories at Huls and Hanover, but were unable to repeat them, and the effect was not cumulative. German salvage was very efficient. Our failure to destroy the rubber industry was an example of biting off more than we could chew.

Besides, we were barely holding our own against the Luft-

waffe. By June, the Germans had more than doubled the fighters that opposed our first attacks, and had introduced a mortar-type rocket. It outranged our .50 caliber machine guns and its burst had a lethal radius of over 100 yards. It was fuzed to explode at 1,000 yards, and if the Germans had devised an adequate sight for it, they might well have driven us out of the sky before our long-range fighters appeared on the scene. Fortunately for us, Thunderbolts carrying 100-gallon belly tanks made their appearance in July. They were badly outnumbered, at first, and their range was still limited to the fringes of the Reich. But they slaughtered the twin-engine Nazi rocket-throwing fighters until the Germans were driven to their weird expedient of providing fighter cover for their own intercepters.

The flaming year of 1943: the mortal duel between the AAF and the Luftwaffe

The range of our fighters, especially when the Mustangs finally got into action, was the biggest surprise of the war to most of the Luftwaffe commanders. One prisoner, captured shortly after the Battle of the Bulge, told with evident satisfaction how General Galland, the Nazi fighter commander, refused to credit the reports of his own men until four Mustangs pounced on him one day while he was observing an air battle in an ME-410, and chased him all the way to Berlin. He was convinced. So was the German high command. They knew then, as they admitted afterwards, that they had to develop their jet fighters—and soon. Nothing else would stop the daylight invaders.

All through that flaming year, weapon clashed with counter-weapon. The Germans tried various forms of air-to-air bombing. None was successful. We trotted out the YB-40, a heavily armed Fortress designed to be a platform for firepower and nothing else. That was not a success; the added firepower did not compensate for loss of speed. With better luck, we introduced flak suits that reduced casualties appreciably. The Germans experimented with intruder Fortresses, with faked radio signals. We sent a squadron of B-17s to fly some night missions at very high altitude, while the RAF bombed the same target several thousand feet below. The reports were discouraging. Meanwhile, the RAF's superb air-sea rescue service reached the point where it could and did drop whole motor launches to ditched airmen complete with everything except blondes.

RAF's Bomber Command, meantime, was locked in a night duel with the Luftwaffe as deadly as the day conflict. Beginning in March, 1943, with the 12-city blitz on the Ruhr, it poured a steadily increasing tonnage on Germany. How much it hurt the Nazis could be judged by the skill and determination with which their night fighter force fought back. It was tough going, and the night bombers could not count—as the day bombers now could—on squadrons of friendly long-range fighters to come charging to the rescue. They had to rely on deception and raw courage. They had an abundance of the latter, but the losses were cruel, and German civilian morale showed no sign of cracking under the rain of fire from the night skies.

It is still too early to attempt finally to evaluate the relative merits of night and day bombing at their respective stages of development in 1943. When asked a question along such lines after the war, Goering shrugged his massive shoulders and said, "Well, we could always evacuate the cities!" But it must be remembered that the RAF's pathfinder technique had not reached the degree of perfection it attained later. And the use of radar promises to make some forms of night bombing virtually as accurate as day, before the scientists are through with it.

The shattering daylight battles of the last week of July, when the 8th made its first determined assault on the Nazi aircraft industry, left both sides close to exhaustion. It was at this point that the lack of reserves was felt most sharply by the AAF. By now it was evident that the growth of the Luftwaffe fighter force had to be stopped. With our heavy bomber squadrons weary and below strength, without long-range fighters for the last stages of deep penetration missions, the planners of the daylight offensive had to choose a target that would cause Germany the greatest possible dislocation. They chose ball-bearings.

Concentrated in a few well-defended areas, the ball-bearing industry looked like the most promising Nazi industrial bottleneck in the late summer of 1943. Its dislocation would affect not only aircraft production, but transportation, guns, tanks and many other war products.

The attacks on the ball-bearing plants produced some of the fiercest air battles of the war. By September 1944, the Germans had lost the equivalent of five months pre-attack production. We have the testimony of the general manager of Junkers in Italy that "the attacks on the ball-bearing industry were an unqualified success and disorganized Germany's entire war production." Luftwaffe prisoners, too, complained of engine failures caused by inferior bearings. It is true, however, that Germany was cushioned against the blows to some extent by fairly large reserves and by the fact that demand for bearings dropped sharply as Allied airpower smashed factories and curtailed production. The campaign against the ball-bearing industry hurt the Germans, but it was not decisive in the sense that the later campaign against oil was decisive.

The two deadly air battles over Schweinfurt on August 17 and October 14 represented the climax of the air fighting in 1943. The second attack, which cost us 59 heavies shot down over Europe, one in the Channel, and six that crashed trying to land, gave us proof that until we had adequate Mustang cover over remote targets, the cost was simply too high.

Yet if we were gloomy, the Germans were near despair. Goering issued an order in which he stated flatly that Luftwaffe's defensive efforts were inadequate. This was significant because the Germans had made frantic efforts to improve it. Steadily increasing attacks by our Britain-based Marauders on German fighter fields were driving the Luftwaffe farther and farther back toward the territorial borders of the Reich. During August, the Nazis had pulled the crack 3rd Fighter Wing out of Russia—at a time, too, when the German lines were sagging under the Soviet offensive between Kursk and Orel. They had converted night fighters to rocket-throwing fighter-bombers. They had set up elaborate refueling and rearming points from which their fighters could fly double sorties against the daylight invaders. They had issued orders, on pain of court-martial, that German fighter pilots were to go for the bombers and ignore the escort altogether. In a final desperate measure they had created the Sturmstaffel, a suicidal group of pilots who took an oath to ram the American heavies if all else failed. This Teutonic form of Kamikaze never came to much. But the fact that it had official sanction shows the German dread of our remorseless application of precision bombing.

With autumn came bad weather. Our formations had to fall back on instrument bombing, which at that point was far from a state of perfection. The Luftwaffe, licking its own wounds, rarely bothered to come up to oppose it. The climb through the icy overcast wasn't worth the risk involved. Slowly both sides built up strength for the final test which lay ahead. When USSTAF was created at the turn of the year, with the 8th almost at full strength and the 15th building up rapidly in its newly acquired Italian

bases, everyone knew the test was at hand. The decisive battles had not been fought in 1943. Perhaps 1944 would be a different story.

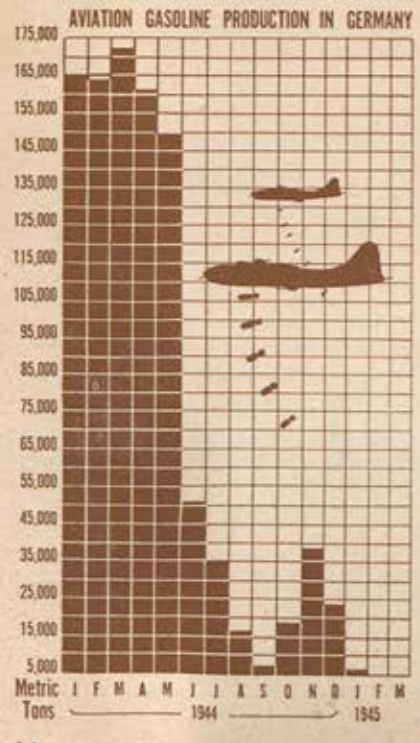
The year began with a furious assault on the German fighter factories. By now there was absolute clarity of purpose as to the first priority of daylight strategic bombing. It was the neutralization of the Luftwaffe. Without that imposed paralysis, the great machinery of invasion, for which the dynamic codeword *Overlord* had been coined, could not begin to turn.

By this time the German's monthly production of single-engine fighters had reached 650, with great expansion imminent. Breaking the back of this production would not only safeguard the invasion armada, it would leave our heavies free to attack the real Achilles heel of the Nazi war effort —oil. It might, moreover, liberate the RAF from the darkness that had been its chosen element for so long. Failure to neutralize the Luftwaffe simply meant that the war might be prolonged indefinitely.

The first round was fought on January 11, when some 800 heavies with escorting fighters attacked aircraft factories at Oschersleben, Brunswick, Halberstadt and elsewhere. The Luftwaffe offered furious resistance. Fifty-three bombers and five escorting fighters were lost. Our returning airmen claimed 292 Nazi fighters destroyed.

The decisive week did not come until late in February. Before that week, and indeed sporadically after it, the German Bomber Command showed a flickering spark of life. This took the form of the baby blitz on London, an effort in which an attacking force rarely exceeding 100 planes took heavy punishment to drop a few more bombs on the city that had survived the big blitz of 1940-41.

Just why the Germans chose thus to decimate their remaining night bomber squadrons, which might much better have been used against the juicy targets offered by the invasion, still remains a mystery. Perhaps it is not too far fetched to wonder if the German high command, watching the progress of certain secret construction along the French coast, came to the conclusion that their bombers were obsolete in view of what was coming and decided to give German home morale a boost at the cost of their remaining planes.



What was coming, of course, was the V-weapon assault on England. Since the summer of 1943, Allied intelligence had watched with growing concern Germany's experiments with the long-range rocket and the flying bomb. The RAF's surprise attack on the experimental station at Pennemunde on the Baltic was reported to have delayed the work by several months. But by the end of 1943, queer launching ramps were mushrooming along the coast, all ominously sighted toward London.

To the Maurauders of the 9th Bomber Command went the major responsibility for neutralizing this new threat. The targets became more and more difficult as the Germans modified and camouflaged their launching sites. Moreover, they were so heavily guarded by flak that exasperated AAF crews wondered audibly if the whole thing were not an elaborate Jerry flak trap. As the concern of high British officials became more acute, the heavies were also assigned to the targets. Their use was uneconomical—fighter bombing in the end was to prove the best antidote to the flying bomb sites—but the threat was too grave to ignore. The delay and confusion thus imposed on the Germans undoubtedly saved London from an ordeal far worse than eventually materialized.

It is interesting to speculate as to what effect the V-weapon program had on the Luftwaffe. The diversion of materiel—and even more important—of the best scientific brains in the Reich undoubtedly weakened the GAF to some degree. The Nazis could hardly be blamed, for they knew they could never hope to match us in mass production of orthodox types. But if they had concentrated on their jet program instead of V-1, V-2 and other unpleasantnesses, they might have realized their dream of an aerial stalemate.

In any case, the V-weapon threat never interfered with Allied preparations for invasion. Neither did the Luftwaffe. That issue was settled in February with the almost miraculous week of good weather and the great two-pronged blitz from Britain and the Mediterranean on the Nazi fighter complexes. When the smoke of blitz week cleared away, German single-engine fighter production was reduced by 60 percent, twin-engine production was cut by 80 percent.

Dispersal was already underway, and with their amazing antlike persistence, the Nazis started doggedly to repair their factories. Constant policing of their production remained necessary, and grew more and more difficult as the industry disappeared underground. But the air losses they suffered during blitz week, both in planes and in pilots, made it impossible for them to come up regularly in strength if they wished to retain any sort of force in being against the certainty of D-day. In succeeding months, the Luftwaffe fought only to protect such vital targets as oil refineries, or the sacred heart of the Reich—Berlin. Even so, D-day found it tired and dispirited. The lifeblood had been drained out of it in February 1944.

In Italy, meanwhile, the MAAF had ably supported the Anzio landings, neutralizing German airfields in the vicinity, cutting supply routes to the battlefield. But the Germans were able to contain the beachhead and prevent the capture of Rome. Accordingly on March 15, an attempt was made to blast a hole in the main front across Italy at Cassino. This was the first mass use of AAF heavy bombers in close cooperation with ground troops. Four hundred and eighty-three planes dropped 1,205 tons of bombs on the town in a spectacular bombardment that caused worldwide comment. Cassino was pulverized but no break-through was achieved. The ground forces were unable to follow-up at once with a heavy infantry attack due to a few hours of waiting for bulldozers to clear a path for tanks through the cratered rubble. In the interval the stunned Germans were able to regroup and re-establish strong defenses. This lesson was not ignored when similar concentrated bombing was used at St. Lo, at the Rhine and before Cologne.

In the 12th Air Force's Operation *Strangle*, supply problems of the German armies in Central Italy were rendered so acute that when the Allies finally jumped off in the push for Rome, Kesselring was unable to hold them. By cutting all railroads, the mediums and fighter-bombers of the 12th forced the Germans to use motor transport. Then they pounced on these motor convoys and destroyed them. When the Nazis, in desperation, tried to send sup-

Flying Fort passes over smoking bearings plant in Berlin during March 1944 attack.

Troop Carrier C-47s drop men and supplies over southern France beachhead during invasion.

Rail bridge at La Frilliere, France, is completely wrecked after four successive aerial attacks.

Blasted German convoy gives eloquent proof of thoroughness with which tactical planes paved way for armies advancing across Rhine.

plies down by sea, Coastal Air Force sank their ships. It was a brilliantly conceived and executed operation.

As the days lengthened, preparations for *Overlord* quickened. Over Europe, long-range fighters divided their activities between their protective role and hunting for the GAF on the deck. Britain-based AAF mediums stepped up their attacks on airfields in France and Holland. The RAF withdrew from its grim battering of Berlin and turned its attention to French marshalling yards and enemy supply concentrations. Our photo-recon flyers mapped coastal defenses ceaselessly. Weather planes flew halfway across the Atlantic in rehearsal for the all-important day. The heavies, their mortal duel with the Luftwaffe almost ended, began girding themselves for the tactical commitments of D-day and a new strategic campaign—the campaign against oil.

The experiment with high altitude fighter-bombing

One interesting innovation that appeared in those expectant days was the brief experiment with high altitude fighter-bombing. A Lightning group, led by a modified "Droop Snoot" carrying a Norden bombsight and a bombardier, proved capable of dropping a respectable bombload with considerable accuracy and a minimum of risk. The implications of this type of bombing—with the bomb pattern easily controlled by formation flying, with relatively less danger from flak, with no escort required since the Lightnings could jettison their loads and defend themselves if attacked by enemy aircraft, with a risk element of only one man per ton of bombs instead of two men per ton as in a medium or heavy—the implications were interesting, to put it mildly. Granted that the Lightning was not so stable a bombing platform as a Marauder or a Fortress; granted, too, that the success or failure of the mission depended entirely on the skill of one bombardier—nevertheless this method of getting a bomb on a target seemed to have much to recommend it in terms of speed, safety and economy of men and machines.

The part played by airpower in the preparations for *Overlord* and in the operation itself cannot, obviously, be fully discussed here. A whole chapter, indeed a whole book, could be written about any one of a dozen major contributions: the RAF's last-minute neutralization of German radar which left the enemy groping blindly for the direction of our main thrust; the patience and skill that lay behind the work of the lone weather plane whose code message, flashed from far at sea, started the wheels of the whole gigantic machine; the superb effort of Troop Carrier in depositing two paratroop divisions behind the enemy lines and flying supplies to them despite fierce anti-aircraft opposition; the work of the fighters who struck at ground targets and guarded the seaborne armada; the instrument bombing of 1,077 AAF heavies who laid down a carpet of explosives 10 minutes before the landings, while the assault troops waited in their landing craft less than 1,000 yards from the beaches, the aviation engineers who built the landing strips under fire . . . the catalogue is endless.

The story of how tactical airpower cut the remaining bridges over the Seine before sundown on D plus 1, thus leaving the German defenders virtually cut off from reinforcements, has already been told in the pages of AIR FORCE and elsewhere. It was another *Strangle* operation, applied to an even more critical situation. There is no lack of evidence as to its effectiveness. General Guderian, Germany's great tank expert, growled afterwards: "Lack of German air superiority in Normandy led to complete breakdown of German net of communications. The GAF was unable to cope with Allied air superiority in the West."

Nevertheless, by the middle of July the Germans had managed to bring up enough reserves to contain our ground forces in an uncomfortably small space. The hedgerow war was falling farther and farther behind schedule when once again the heavies were called upon for a maximum effort. The British struck first at Caen, on July 18, and the Tommies made a five-mile advance. But the real breakthrough followed the American effort at St. Lo on July 25. Here 1,500 aircraft dropped 3,400 tons on the fixed positions of the enemy. The follow-up was instantaneous and decisive. The 1st Army, paced by the 9th Tactical Air Command, widened the breach and swung east. A week later General Patton's 3rd Army poured through the gap. The German counterattack at Avranches was smashed by a joint RAF-AAF effort. Tactical airpower was off on an offensive sweep that was to last until the end of the war.

With the breakthrough at St. Lo, the air war entered the exploitation stage. Limitations of space prevent here a full or even an adequate discussion of the colorful and varied achievements of the three Tactical Air Commands and the 1st Tactical Air Force in the pell-mell race across Europe. Some of their exploits were completely without precedent, as when the 19th TAC undertook to protect Patton's unguarded flank in his dash toward Germany, and did it so well that the German troops south of the Loire finally abandoned any thought of counterattack and surrendered in despair.

The farther the Germans retreated toward the homeland, the more they were harassed by swarms of fighter-bombers leapfrogging into airfields they had just abandoned. The degree of coordination between these tactical aircraft and the ground forces was far beyond anything the Nazis had achieved in their palmiest days of conquest. Tank commanders could whistle up fighter bombers in a matter of seconds. Roving aircraft controlled artillery fire, directing it on enemy emplacements and concentrations. Tactical reconnaissance planes kept an eye on enemy movements, spotting traffic jams that strafing Thunderbolts turned into traffic shambles. The losses of the Germans in vehicles of every kind had to be witnessed to be believed.

Meanwhile the Italian-based heavies, having shared the credit for the February victory over the Luftwaffe, were busy aiding the Russians by strikes against Balkan communications. This campaign to deny the Germans access to the Balkan battlefields continued right up to the fall of Vienna. At the same time MAAF was dropping supplies to partisans in Yugoslavia, flying shuttle missions to Russia, hammering Axis ports in Vichy France and occupied Greece, pounding the Brenner Pass through which material was flowing to the stubborn German armies in Italy, participating in the oil blitz, and preparing for the August 15 landing in Southern France, an operation in which our air mastery was so complete that only one German plane was on hand to oppose some 2,700 Allied sorties on D-day.

The oil campaign, which ranks along with the neutralization of the Luftwaffe and the immobilization of the Wehrmacht as the greatest contributions of airpower to victory in Europe, actually began a few weeks before the invasion of Normandy. To the British went the assignment of destroying synthetic oil plants in the Ruhr which were within easy range, even during the short summer nights. Oil targets in central, northern and eastern Germany, western Czechoslovakia and western Poland were given to the 8th; those in south and southeastern Germany, Austria, Hungary, Yugoslavia, Italy, Albania, southern Poland, southern France, and most important—Ploesti—went to the 15th.

This combined offensive continued in mounting strength through June and July. By the end of that month all but a handful of the important refineries and synthetic plants

had been attacked. Every intelligence source indicated at the time, and the Germans have since agreed unanimously, that the results substantially hastened the end of the war. Conservative estimates showed that the loss of output at the 66 separate plants attacked between May and July was in excess of 400,000,000 gallons. By August, gasoline production had been reduced to 20 percent of Germany's minimum requirements. By V-E day the oil industry was down to seven percent of pre-attack level.

This unqualified success, which left the remnants of the Luftwaffe with no gasoline for training pilots, left the panzers stranded for lack of fuel, and dislocated the submarine campaign more than bombing had ever done, was not achieved without cost. The Germans ringed their refineries with the thickest concentration of flak guns ever assembled. With plenty of guns and skilled crews, they took a high toll of our men and machines. The strikes against Ploesti alone cost the 15th well over 200 heavies.

The Nazis tried, too, to disperse their oil industry, but it was a slow process and they began it too late. Our timing of the oil blitz was good. If we had started it sooner, German dispersal would have begun sooner and might have gone far enough to provide the fuel for their jet program which was rapidly nearing completion when our ground forces moved in. If the underground jet fighter factory at Kahla with a monthly capacity of 1,000 ME-262s had been left unmolested for five or six more months, the consequences are not pleasant to contemplate. These heavily armed jet fighters were being seen in the sky by the end of 1944. They were neither sufficiently numerous nor, as a rule, sufficiently aggressive to constitute a major menace, but technically they were far ahead of any aircraft the Allies had in action for short-range interception and they are unquestionably the fighter planes of the future.

Accompanying the brilliance of the strategic performance against oil and the magnificent work of the TACs, there were a few disappointments in the latter half of 1944. None was important in relation to the whole air effort, but in any attempt to present a balanced picture they are worth mentioning.

One was the partial failure of the Allied Airborne Army's first major effort to turn the northern end of the Siegfried Line. The retreat of the British from Arnhem emphasized the necessity for dropping airborne troops fairly close to the advancing ground forces, and highlighted some of the limitations of airborne supply.

Another source of some disappointment were certain missions which were flown against the Germans who were clinging grimly to the Atlantic ports. They merely proved again that a motionless enemy, well dug into a fixed position, is hard to dislodge by air attack.

Then there were the much publicized shuttle flights to Russia. They did prove that the individual Soviet and American airmen had a lot in common and could get on well together. But any official exchange of information was somewhat limited.

On the other hand, Allied airpower performed superbly in the gravest threat against our march to the Rhine. This was in the Battle of the Bulge.

For the first four days of von Rundstedt's desperate counteroffensive—an offensive designed to buy a little more time at any cost—the weather was unflyable. On December 21, TAC Reconnaissance flew some suicidal sorties. On December 23, the weather mercifully cleared, and the TACs hurled themselves at the Nazi armored columns while in the next week the mediums and heavies dropped more than 100,000 tons of bombs in a gigantic interdiction effort. The Germans, obstructed in their narrow corridor by the heroic stand of ground forces at Bastogne and St. Vith, were unable to supply themselves under the ceaseless rain of bombs. By December 27 they began to pull out. Within a month, the bulge was hammered flat.

New Year's Day, however, saw the last offensive effort of the dying GAF. Goaded to desperation by Allied attacks on their airfields, the Luftwaffe commanders squandered their last reserves of fuel by flying some 800 sorties, most of them at low level, against Allied airdromes. They hit us a sharp crack—127 aircraft destroyed on the ground, 133 damaged. But the Nazis lost about 200 aircraft to flak and fighters, and they could not stand such losses. Some of their battered squadrons were returned to the Russian front in a vain effort to halt the final drive on Berlin. In the West the Luftwaffe was through. In March, when the great airborne assault across the Rhine took place—an effort involving some 14,000 troops carried in transports and gliders—not one of the carriers was lost to enemy air action.

There is no need to elaborate here on the final weeks that saw the airfields of the shrinking Reich jammed with aircraft which had neither fuel to fly nor place to go. In the first three weeks of April, our air forces destroyed more than 3,000 planes, most of them on the ground. This slaughter coincided with USSTAF's announcement that it had run out of strategic targets. Strange by-products of our bombing appeared, such as the bitter assertion of one prisoner that the Volksturm, the German civilian army, was nothing but an unemployment scheme made necessary by the destruction of German industry from the air.

By April, it was clear that Germany was conclusively beaten. The final capitulation in May was something of an anti-climax. Those who witnessed first hand the evidence of the terrible scourging Germany received from the air were not surprised by the total collapse of her war effort. The amazing thing was that any nation could have endured so much for so long.

Actually, the first postwar surveys seem to indicate that the German war machine was not fatally damaged by bombing—regardless of how the German people suffered—before July 1944. The reason for this was simply that up to that point German industry was keeping pace with the rising tempo of the bombing. German production in mid-summer 1944 was considerably higher than it was in mid-summer 1942, because in 1942 the Germans still hoped to win by a blitzkrieg type of warfare that did not require the harnessing of their full industrial strength. In July 1944, however, with the Luftwaffe knocked out of the fight, and selective bombing being applied ruthlessly by the Allies, the production curves of the Nazis went into a decline that led finally to oblivion. One of the main reasons was that our fighter-bombers began to paralyze rail traffic within the Reich itself. Coal trains leaving the Ruhr dropped to something like eight percent of normal. General Pelz, the Luftwaffe's fair-haired boy, was not exaggerating when he said, in the autumn of 1944, that unless the Allied fighter-bombers were driven away, there would be no coal for Germany's industries. Dispersal of industry to escape our strategic bombing made this transportation problem even more acute. But it is worth noting that until bombing of transportation facilities became heavy and sustained, the German railways were able to absorb terrific punishment.

In the last analysis, the mission of Allied airpower was to hasten the collapse of the enemy. It achieved this mission partly by crippling his war production, partly by denying him mobility.

Exactly what percentage of German industry was destroyed by bombing is yet to be determined. The Nazis tried to hide the true facts even from one another. But the overall figure is not so significant; it was *selective* damage that counted. The 93 percent destruction of German oil produc-

tion was far more important in bringing Germany to her knees than the percentage of damage to her industries as a whole, whatever that figure may have been.

As for mobility, unless you can move freely, you cannot fight a successful war. When the Luftwaffe was slapped down and kept down, the Germans lost their mobility in the air. On D-day and thereafter the Nazi armies lost a fatal degree of their ground mobility to Allied air superiority which severed communications arteries and made daylight road movements virtually impossible.

Throughout the long years of war, as marshalling yards were torn up, railroad rolling stock destroyed, bridges knocked down and oil refineries smashed, German industry gradually lost the mobility that supplied it with raw materials and carried finished products to wherever they were needed. Lack of ability, for example, to transport V-weapons to their launching sites was one of the main reasons why this menace never became more effective.

		1942	1943	1944	1945
DELIVERIES TO AAF	BOMBERS	5,827	15,022	20,116	5,658
	FIGHTERS	5,213	11,766	18,291	5,842
GAF PRODUCTION	BOMBERS	6,615	6,155	3,000	20
	FIGHTERS	6,575	9,995	16,035	4,175

Such German local successes as there were toward the end of the war came only when the Nazis were solidly dug in and didn't have to move, as in some of the Channel ports, or when bad weather grounded the Anglo-American air arm, as it did temporarily in the Battle of the Bulge.

In postwar interrogations, prisoner after prisoner complained bitterly of being pinned down, of arriving too late, of not getting supplies on time. They could not fight offensively because they could not move. And they could not move because in a thousand ways Allied airpower had robbed them of their mobility. There, if you like enormous nutshells, is one to put the European war in.

The temptation to try to look into the future is irresistible, and such crystal-gazing is no idle occupation, because on it depends the supremacy of this nation in the air.

It is obvious that an air force such as we will possess on V-J day will be a tremendous factor in supporting and enforcing the principles and ideals of the United Nations Charter. Aerial photography directed by ourselves or our Allies can be useful in observing the activities of nations that are potential troublemakers, and the tremendous range of our very heavy bombers will enable them to remain a threat to any aggressor if global bases are maintained.

We must never discount, however, the possibility that in the future, despite our vigilance or perhaps through lack of it, new and revolutionary air weapons may be used against us. The flying bomb is still in the kindergarten stage of development. So is the radio-controlled rocket. The appearance of the jet fighter put the whole daylight bomber offensive in serious jeopardy. It is known that right up to the end of the war the Germans were working feverishly on improved flak defenses. If the range and accuracy of their antiaircraft fire had been much more deadly, our bombers would not have been able to stand the losses. And they had other unpleasant tricks up their sleeves.

In retrospect it seems that we were indeed fortunate in applying the overwhelming power of long-range bombardment just when we did. A few years earlier the bombers could not have carried decisive loads. A few years or even months later, improved defenses might have stopped them.

In the Pacific, we are now witnessing long-range strategic bombing brought to a magnificent climax. But the air defenses of Japan, even today, are not comparable to those of Germany in 1943 or 1944. We should not let such successes make us complacent or blind us to the ultimate vulnerability of the big planes to defenses now envisioned.

In any future war—and it is more realistic than pessimistic to face the possibility—the only certainty is that the weapons of the last war will be outmoded, and nothing becomes obsolete faster than an air weapon. Air fleets in being do not guarantee air superiority. Pre-eminence in research is just as important. To repeat a phrase from the beginning of this article, thinking—not materiel—is what wins wars. Boldness in discarding old weapons, ingenuity in devising new ones, and intelligent plans for using them are indispensable to national defense.

No one knows exactly what the laboratories of the future will bring forth in the way of new explosives, rocket projectiles, radar-guided flak, and so forth. At any time revolutionary weapons may revise all previous military concepts. The trend may be away from the super-airplane. Swarms of smaller, faster, more versatile planes capable of great range, considerable bomb-load, and a high degree of self protection, guided by radar, operating regardless of weather, by day or night, and augmented by various advanced types of V-weapons—this may be the shape of airpower in the future.

Whatever the future may hold, we would be foolhardy to rely on the protection of our surrounding oceans. To airpower already discernible, oceans will be no barrier. Nor can we be sure of finding, again, a natural airbase like Great Britain anchored to the flank of our deadliest adversary. We must maintain a force capable of instantaneous offensive action against any opponent anywhere at any time. The only power that can traverse land and sea overnight and put the enemy on the defensive is airpower.

AAF BOX SCORE OVER EUROPE

Cost of Strategic Bombing in Europe	$27,639,000,000
Total Sorties Flown	1,689,000
Sorties Flown on D-Day	9,984
Total Tons of Bombs Dropped	1,555,000
Total Men Who Flew Against Germany (Man Sorties)	7,235,562
Our Total Aircraft Losses	26,000 (18,000 on Combat Missions)

Much has been learned in three years over Europe about the stunning impact of bombing, especially when concentrated against two or three vital targets. But much has also been learned about countermeasures. Any aggressor nation, given the opportunity that Germany had before this war, will certainly disperse and conceal its key industries in such a manner that the power of strategic bombing to inflict fatal damage will be greatly lessened. The moral is too obvious to stress: the time to stop aggression is before the aggressor is ready to strike.

The time has passed—or should have passed—when people argue heatedly about whether or not airpower, unaided, can win wars. To date, it never has. This does not mean that it never will. But the question is almost academic in the face of two certainties that have emerged from the European war with the respective fates of Britain and Germany as final proof:

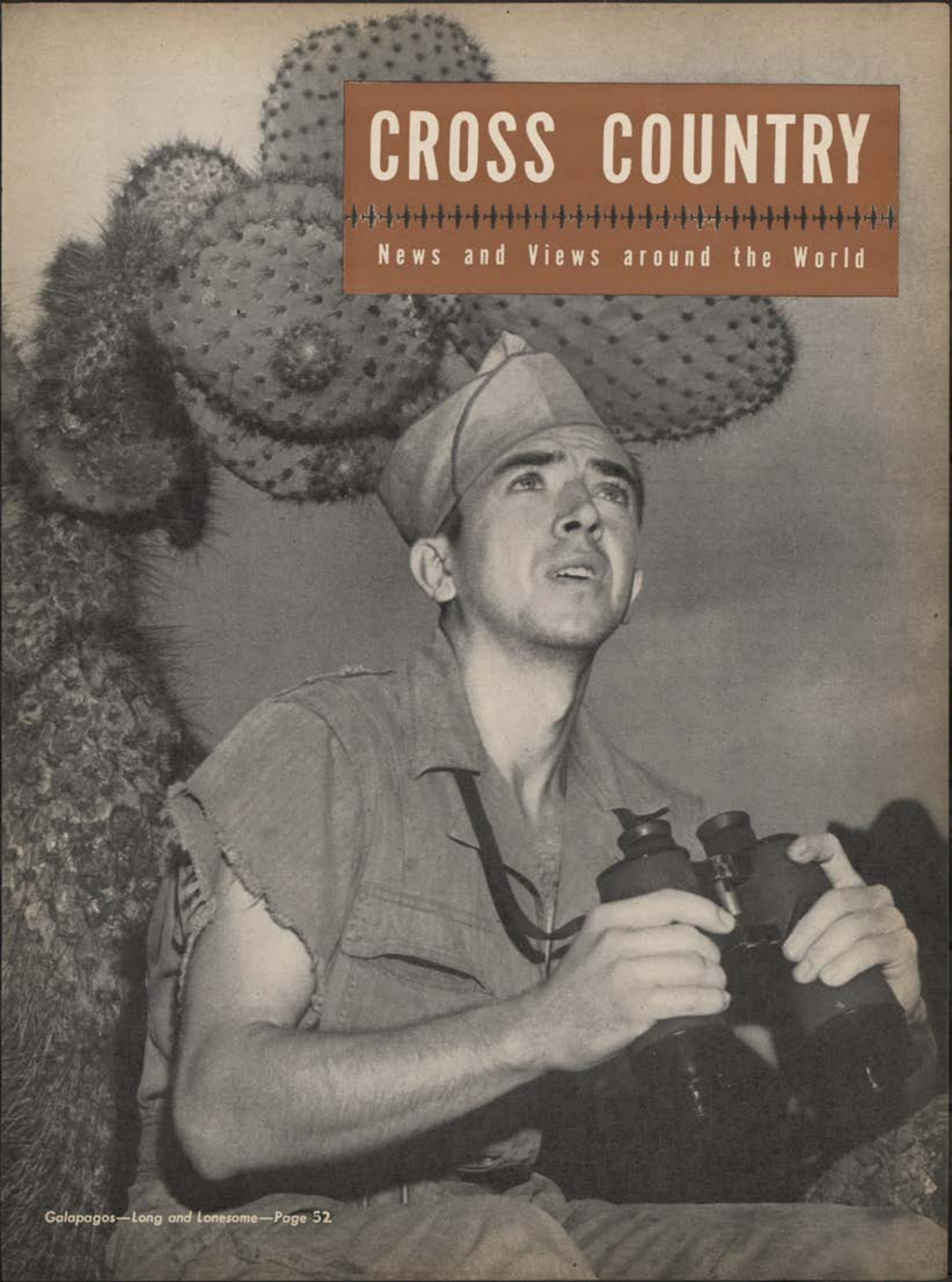
If you hold the air, you cannot be beaten.

If you lose the air, you cannot win.

We would do well, if we wish to dwell secure in this nation of ours, to remember those two lessons for the rest of our lives. ☆

CROSS COUNTRY

News and Views around the World



Galapagos—Long and Lonesome—Page 52

The Gang on Galapagos

The official history of the Galapagos Islands, located 805 miles southwest of Panama City and 505 miles west of Ecuador, tells of the fabled and beautiful Baroness Eloise de Bosquet Wagner Wehrborn who turned her back upon the social whirl of Vienna in the 1930s to sail away with two lovers and take up life upon one of these lonely rocks jutting out of the Pacific.

The Baroness arrived with great gusto and, so continues the official record, stripped down to panties and brassiere, and hung a pearl handled revolver around her small petal-smooth waist. She then rested a shapely limb upon a cleft of hardened lava and proclaimed herself Empress of the Galapagos.

Today a small group of AAF men, living on these desolate rocks, point with understanding to the passages of Galapagos history which reveal that within a few years the daring young adventuress went raving mad and began beating her lovers. Her little expedition mysteriously disappeared in 1934, island accounts show.

An AIR FORCE correspondent, Capt. Joseph D. Guess, recently visited these islands and here are some of his observations: On the Galapagos Islands there are AAF aircraft warning stations which have kept a constant watch for enemy activity since the earliest days of the war, and they will remain on guard so long as there is the barest chance of enemy infiltration or sabotage in the Panama Canal area. These men operate the rim of defenses just as other air warning men keep watch in many more rock-bound and jungle-ridden spots of the Pacific. And for solitude, ruggedness and inaccessibility, these Galapagos stations are among the most forlorn of all.

These outpost sentinels have aided in locating many lost friendly aircraft, have guided bombers to submarine areas, have performed heroic rescues, but mostly their mission has been tedious months of listening, staring for hours on end into the sun, watching location instruments. It has been a long, weary, boresome, vital job.

"Sometimes at night," said Pfc. Cyril Bowers, 25 months in the Galapagos, "you see shooting stars and wish they were enemy flares. It gets so doggone lonesome out here as the months roll by, you begin to pray for some action to break the monotony."

Yet, actually, dangers are always present. Although most of the 2,000 volcanoes, which belched forth billions of tons of lava to form these islands, are now inactive, a few of them still mutter and rumble—then go into action. Some months ago one of the watchers saw a large crater come to life without warning. It began to spout huge streams of lava, turning all it touched into fire and ashes. Part of the station area was overrun. The molten stream crawled across a pile of lumber, leaving nothing but a black dust. A radio call was made for help and an evacuation party arrived, but this was a season of constant enemy threat and it was vital for the station to be out of action as little as possible.

On the rocks. . . .

With goats—

Shots—

A chaplain—

And beer

M/Sgt. Adolph H. Wentz volunteered to stay alone and stand watch, then report by radio when the volcano had quieted down. Wentz set himself up on the beach and saw the rest of his party disappear by boat. The fiery eruption continued in force for 36 hours, then subsided. It was another nine days before the lava cooled down and the sergeant was rejoined by other station personnel.

But it is the degree of isolation, and nature's everyday animosity, which present the common hardships on these outposts. A nine-man crew is typical of the AW stations. They may be a hundred miles away from the Galapagos airbase. They have a barrack and an observation hut built high on a pile of rocks overlooking the ocean. On some of these islands of huge, ragged rocks are fissures through which a man might stumble and disappear forever. There are no places for landing strips anywhere near most of the stations. A plane drops mail once a week.

"The sack lands right at our hut door," said Cpl. Charles Catino, electronics expert, 25 months in the area. "The bomber boys are accurate, bless them. A few feet off, and we might never locate our mail."

The terrain is too difficult to clear off or level, even for a volley ball court, but the men have devised a number of rather bizarre off-duty activities.

"For a while," said T-5 Bernard Kennedy, 38 months in the 6th Air Force, "you get a kick out of catching sharks, or playing with seals. To catch a shark you drill a hole through a rock to hold the line. Then you bait a hook with a piece of bread and catch a small fish. Use the little fish to catch a bigger fish, then use the larger one to catch a shark. A good-sized tiger-shark stretches out eight feet, weighs 350 to 400 pounds and provides fresh meat for a week."

The seals probably come up from the Antarctic in the Humboldt current which rushes up along the west South American coast and turns out to the Galapagos to bring these islands, sitting directly beneath the equator, a bearable climate. Frequently a seal flops out of the ocean to rest beside a sprig of cactus, or cavort with an off-duty AW watcher.

Not all of nature's creatures on the rocks are so amiable, however. There are droves of ants and sand fleas, and foot-long centipedes and scorpions. Over the rocks roam packs of vicious dogs and herds of goats, the ancestors of which were left there by 17th century pirates. The wild dogs are silent, sure-footed beasts that live upon marine iguanas, strange, ugly, two-foot lizards. The goats make out a hardy existence by nibbling at cactus clumps.

Legends tell of uncountable loot buried in the Galapagos, but no AAF man has found even a piece of eight. As one of them has figured, it would take 300 bulldozers one year, or one bulldozer 300 years to turn over all the rocks on but one of the larger islands.

"About once every 20 days," explained Sgt. Frank Emry, one of the veterans, "we have a really great event. The supply boat comes with canned rations, some fresh meat, a little beer, books, newspapers, fresh water and maybe a portable movie, but most wonderful of all—new faces. Somebody new to look at!"

And among these new faces there regularly appears the grinning visage of S/Sgt. George Mohr. The sergeant pulls up to an island and unloads his paraphernalia amid hoots and howls of mock protest. "Doc" Mohr then takes out his needles and tells the men to "hold still and look the other way." Doc travels from rock to rock, remorselessly determined that each man will get shots and stimulators on the proper day.

Farewell and Hail

On her first trip westward since the war ended in Europe, the Queen Elizabeth carried 14,790 American troops out of Gourock, Scotland. Among them were 10,000 8th Air Force men, ground personnel of several bombardment groups which had attacked Germany for more than two years —the 91st, 351st, 398th, 401st, 457th, 482nd, and their air service groups.

Unlike the grim, expectant 8th Air Force men who landed overseas in May, 1942, wearing helmets, leggings and carrying carbines and packs, the returning men were clad in new-issue "Eisenhower" jackets and flightcaps, and carried only duffle bags and personal belongings. To many of the men, taken to Europe in Liberty ships, the Queen Elizabeth seemed like the Waldorf-Astoria afloat.

The actual loading of the big ship was a quiet and orderly affair, with most of the men deep in their own thoughts as they took their parting steps on British soil. A few of the soldiers, leaving British wives who will follow them to the States, seemed divided in their emotions. Lt. Wayne Roberg of the 401st Bomb Group, was sad at thought of leaving his bride of less than a month. "I've been sweating this boat ride for 27 months, but now that I've got to leave Betty behind, all the kick is gone."

Sgt. Floyd Broome of the Second Air Division expressed the thoughts of many another American when he said: "It's sort of like leaving your second home—like leaving a cousin to see your mother and dad."

The Airplane Commander

For the pilot who leads a flying crew, "The Airplane Commander," Air Forces Manual 65, is a martial 10 commandments. It contains abundant thought and study for the new plane commander as well as for the veteran of hazardous missions over flak zones of Europe and Asia.

Stressing the commander's importance and responsibilities, the manual contains a check list the flying chief can use on himself. This check covers points on piloting, bombardiering, navigating, engineering, gunnery and radio—points a commander should know to fulfill his duty

QUESTIONS

on Policy and Procedure

Q. Is a member of a combat crew (on flying status) wounded by enemy action when flying under competent orders entitled to draw flying pay while hospitalized for the wound? What is his pay status if captured by the enemy?

A. *Military personnel in flying status who are wounded by enemy action while in actual flight should be considered as having been incapacitated for flying by reason of an aviation accident. Therefore, they are entitled to flying pay for three months as provided in Executive Order 9195, 7 July 1942. It is the intent of pertinent existing regulations and directives that flying personnel will not receive flying pay while being excused from meeting flight requirements for a period in excess of three months for an incapacitating condition, the result of an "aviation accident." Where an individual incapacitated for flying by reason of an aviation accident has already qualified for aviation pay for the month in which he was injured, the 3-month period during which no flights are required does not begin until the first of the following month. If an individual is incapacitated for more than three months but is able to participate in the necessary flights prior to the expiration of six months from the date of injury, he may make up his flying time at any time prior to the expiration of the second three month period and thus draw flying pay for the second three months' period. If, however, the individual is incapacitated for a period in excess of six months, he receives flying pay only for the first three months' period of incapacitation.*

Any person in flying status and receiving flying pay who is officially reported as missing in action, interned in a neutral country, captured by an enemy, or beleaguered or besieged by enemy forces, will, while so absent, be entitled to receive flying pay as well as all other pay and allowance due him. No flying pay will accrue to his account after date of liberation unless required flights are performed or unless subsequent hospitalization is required as a result of flight injuries, in which event provisions of Executive Order 9195 (above) apply.

Q. Is it necessary to prepare extracts from Service Records (Sec XXXV, Par 78, TM 12-230) when enlisted men are merely being processed at a station?

A. *The Adjutant General advises that this is unnecessary, unless a material change occurs in their status while at that station.*

Q. Is a "summer battle jacket," made of light-weight materials, authorized?

A. *No. Such a garment is not an authorized item of the summer uniform, and there is no authority for the wearing of such an item by either officer or enlisted personnel (Sec VI, Cir 177, WD, 1945).*

Q. If an officer in the Air Corps Reserve on active duty is temporarily appointed to a higher grade in the Army of the United States does his time still count towards the $500 a year lump-sum payment for Air Corps Reserve Officers?

A. *Yes. Such an officer, though holding a higher temporary AUS commission, continues to serve as an Air Corps Reserve Officer, and may count service during such period in computing lump-sum payment (MS Comp. Gen. B-47363, 4 May 1945).*

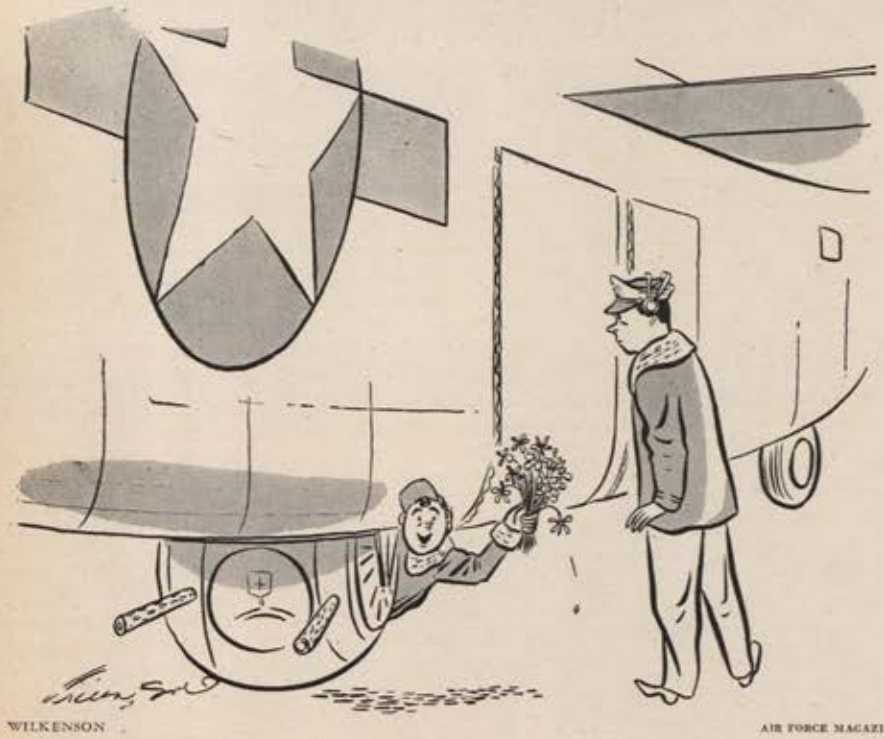
Q. Is the wearing of the discharge emblem on a uniform optional?

A. *Sec III, Cir 454, WD, 1944, states that this emblem "will be worn as a badge of honor indicative of honest and faithful service" by all military personnel (both officers and enlisted men) discharged or separated from the service under honorable conditions. Commanders concerned will insure that the honorable discharge emblem is affixed to the uniform of all qualified personnel during processing and prior to actual discharge or release from the service.*

Q. May mess equipment be issued to an officers' club on memorandum receipt?

A. *A temporary loan on memorandum receipt may be made to newly organized officers' messes pending purchase of similar equipment from mess funds. Reimbursement for breakage and loss will be made from mess funds. The sale of regular issue china, glassware, and silverware to officers' messes is prohibited by par 5, AR 30-2290.*

PREPARED BY THE OFFICE OF THE AIR INSPECTOR



WILKENSON AIR FORCE MAGAZINE

successfully and to gain the necessary respect and discipline of his men.

Manual No. 65 is published by Headquarters, Army Air Forces, AC/AS, Training, Training Aids Division, 1 Park Avenue, New York 16, N. Y. Distribution will be made to all pilots.

Information Files

Information Files now are available, or in the works, for five aircrew members—pilots, navigators, bombardiers, radio operators and radar observers (bombardment)—according to the Office of Flying Safety.

Here's the current status of the files and their revisions:

PIF—Revision 19 published in August.

NIF—Revision 3 published in July. Revision 4 due in October.

BIF—Revision 1 to be published in September. First copies of the book itself were distributed in May and June, 1945.

ROIF—Revision 3 to be published in September. New covers for ROIF are available at operations offices.

ROBIF—First edition available now to radar observers (bombardment) only. Revision 1 to be published in October.

Carpetbagging Libs

The strict secrecy which for a time covered activities of the 492nd bombardment group of the 8th Air Force has now been lifted, revealing the work done by these night-flying, black-painted B-24s based in England.

The group, located at Harrington just west of Kettering, had the mission of dropping hundreds of trained agents and sabotage men, and thousands of tons of military supplies including jeeps for resistance movements. Together with black Liberators of the 801st group, they made these night drops over France, Belgium and Holland. Flying from bases in Dijon, France, planes of the group later went deep into southern Germany, dropping agents in the mountainous national redoubt—men who observed enemy movements in that area and reported back to London by radio.

Liberators of the group flew with the RAF on 21 high altitude, night bombing attacks on targets in Germany. The C-47 Dakotas of the 492nd, flying at night, landed at secret fields in German-held France to bring in supplies and fly underground workers back to England for instructions and sabotage training. In the closing months of the European war, the group continued to fly agents and supplies from England, dropping them at night in Denmark and Norway.

The 8th Air Force's first dropping of supplies to the underground was carried on from January to August, 1944, by the 801st bombardment group (Prov.) commanded by Col. Clifford J. Heflin, of Fresno, Calif. In August the work was taken over by the 492nd which also was commanded by Colonel Heflin.

Operations which required landings in France were extremely hazardous. The Maquis had prepared landing strips with flashlights used for improvised flare paths. The C-47s were loaded down with 906 gallons of gasoline for the 1,000-mile round trip. They were without armor or armament and flew at low altitude into the German night fighter belt.

The first such flight was made by Colonel Heflin after D-day when he took four passengers to France. On the return trip he took off in a driving rain his plane carrying two American airmen, a Canadian gunner, a British gunner, and RAF navigator, a British major who was an organizer among the Maquis, a young French girl and Frenchman who were to attend a sabotage school, and two Hindus who had been rescued from the Germans by the Maquis.

In the following weeks, planes of the group landed at 12 such air strips. At one time a C-47 nosed over while landing, but mechanics flew in from England and soon had the aircraft ready to return.

Operations involving the parachuting of men and supplies over pinpoint targets in the occupied countries were known by the code word "Carpetbagging." The black Liberators flew singly at very low altitude around flak areas and through fighter-defended zones, skirting the rims of tree-topped hills to glide into valleys where the drops were to be made.

From One POW to Another

Lt. Daniel N. Myers, an 8th Air Force P-51 pilot, fell into the North Sea and, after 12 hours, floated into a German-held Frisian island. Myers was taken to a German prisoner of war camp and there he met a British flyer with a personal experience story that topped his own by a mile.

The Britisher said he had been a flying cadet training in the United States. One day he was shot down off the coast of Florida by a German U-boat. He was taken aboard the submarine and eventually reached Germany and the POW camp.

Mission on Mindanao

A platoon of 13th Air Force radio technicians eluded Jap patrols, fought alongside Filipino guerrillas and successfully operated an aircraft warning station on Mindanao for five months before the island was invaded.

The platoon's adventure was reported recently at Jungle Air Force headquarters by its leader, 23-year-old Lt. Edward T. Pompea of New London, Conn.

Hand-picked from units all over the Southwest Pacific, 39 enlisted men and Lieutenant Pompea were taken by submarine to Mindanao in September, 1944, weeks before the Leyte landings. Their job was to establish a radio network which would warn American bases to the south of Japanese aircraft movements.

Guerrilla help was promised, but offsetting this was the danger of discovery by patrols from the large enemy garrison on Mindanao.

The first contacts with the Japs came soon after the radio equipment was put into operation, Lieutenant Pompea said. Enemy patrols were observed by Filipino guerrillas heading toward several outposts established by the radio technicians. Within a few hours the outposts were dismantled and set up in new sites.

"We kept moving and the Japs kept following," the young officer said. "They never caught up with us, but there were times when it looked bad."

The radio men had brought rations only for 30 days, but their mission stretched into months. The Filipinos contributed

food and some of the soldiers shot wild deer and pigs in the jungles.

The biggest thrill came a few weeks after they had established their radio service. One man, turning the dials, thought he heard an announcement from "Radio Leyte." The others crowded around. Soon over the wireless came a broadcast announcing that American authorities had established ceiling prices on food to prevent inflation on Leyte.

"We knew then the Philippines had been invaded," Pompea said. "We passed the news along to the Filipinos, and they celebrated. We did, too, with some Jap whiskey a guerrilla gave us."

The platoon's hazardous mission ended when American forces established a beachhead at Zamboanga in March and overran large areas of Mindanao.

The radio technicians reported their mission accomplished without a single casualty marring their five-month expedition to the Jap-held island, although several men were hospitalized for malaria and jungle illnesses.

Trigger Unhappy

S/Sgt. Walter J. Szulborski of Bethlehem, Pa., is still trying to figure out whether he is the luckiest, or the unluckiest gunner in the entire Army Air Forces.

At the height of the aerial war against Germany, Sergeant Szulborski flew 50 missions against some of the hottest and most heavily defended targets in the European theater. He participated in the first two bombing raids on Berlin. He flew repeated missions against the Ploesti oil fields. He was on the first shuttle bombing raid from Italy to Russia.

Time after time, the vital and guarded industrial target of Brunswick felt the weight of bombs from his Fortress.

Yet, with more than 250 combat flying hours to his credit, Szulborski never fired a shot. This gunner had no opportunity to shoot at either enemy plane or objective.

As a matter of fact, no member of his crew—except a non-conformist ball turret gunner who got off a few desultory shots—ever had the opportunity to fire a gun

Not a chance

PLANE BONERS

Analyzed by Veteran Pilots

DALLAS, TEXAS—An A-26 pilot had to go around because of traffic congestion. Permission to make a short approach was granted as he came around the second time. When the final approach was made the pilot said landing gear green lights were on, hydraulic pressure was up, and horn was silent. Immediately after touching the runway the nose gear slowly collapsed.

Comment: Retraction tests demonstrated that warning lights and horn operated normally. When questioned, the pilot stated he had lowered gear at an airspeed of approximately 200 mph. This speed is too high to lower gear and, because of short approach, insufficient time was given the gear to lower and lock before touching the runway. Don't lower your gear until you have slowed down to the proper airspeed, in the A-26 about 160 mph is best. Allow enough time between lowering gear and landing to give hydraulic pressure time to effect locking of the gear.

BOISE, IDAHO—P-38 pilot leveled off for a landing with wheels not fully extended. On landing the right gear began to retract and the pilot retracted the gear to prevent the right wing from striking the ground first. The plane plowed off the runway with the main gear retracted.

Comment: Gear wasn't down and locked. If the pilot had followed a procedure such as the following he would have known it:

Watch the landing gear indicators (if installed) to see that wheels lower properly.

Make sure the pressure indicator gauge has returned to 1300 psi.

Test hand pump to make sure it resists operation.

Retard throttle momentarily to test warning horn (if installed) and light.

GREENWOOD, MISS.—A normal landing was made with a P-47, and after rolling about 500 yards the pilot retracted landing gear instead of raising flaps.

Comment: A split of the many millions tossed away by careless mistakes in airplanes would buy us all an evening to remember.

FAYETTEVILLE, ARK.—On a cross country flight a B-17 pilot asked an operations officer to call ahead and check an airport condition at Fayetteville. The operations officer did and was told by municipal airport manager that runways were in good condition. Pilot arrived at Fayetteville, attempted to land and skidded on the sod runway. He then pulled up for a go-around but hooked a fence with his tailwheel, pulling the plane to the ground where it struck some trees.

Comment: AAF Reg. 85-12 was violated in using a municipal airport not authorized for Army aircraft.

8TH AIR FORCE—Pilot in a P-51 started a loop at 12,000 feet. At the top of the loop the fighter fell out and went into an inverted spin. Pilot tried recovery but was unsuccessful and bailed out at 3,000 feet.

Comment: In looping the P-51 you have to fly the airplane over the top, maintaining sufficient speed to pull it through. The nose won't fall through by itself.

COLUMBUS, OHIO—A B-17 instructor ordered a student to operate manually the landing gear. Another student, acting as pilot, asked the instructor to run the before-landing check-list. The instructor, forgetting about other student cranking gear manually, put gear switch in down position.

Comment: Because the instructor wasn't capable of thinking about more than one thing at a time, the first student suffered a broken wrist when the landing gear motor went into action and tore the manual gear handle out of his hands.

PANAMA CITY, FLA.—Pilot stopped at a ramp intersection to allow gunnery instructors to climb out through the bomb bay of his B-24. One instructor climbed down and walked into the revolving No. 3 prop. He was badly injured.

Comment: Lucky man. Stop and look around before you walk away from airplanes. Then walk away only toward the tail, never toward propellers.

HOBBS, N. M.—After a night engine run-up, a B-17 student pilot held the plane with brakes while his instructor was checking Form 1A under the cockpit dome light. The student pilot unknowingly let brakes off and the plane rolled forward 150 feet without the pilot or instructor knowing it. It crashed into another B-17.

Comment: Do your paper work before starting the engines. Keep parking breaks set until ready to taxi unless the brakes are hot. Don't ruin your night vision by working under bright lights.

PREPARED BY THE OFFICE OF FLYING SAFETY

NEW BOOKS

WAR

OLD LEATHERFACE OF THE FLYING TIGERS: THE STORY OF GENERAL CHENNAULT. *Keith Ayling.* A biography of the organizer of the Flying Tigers and the 14th Air Force. BOBBS-MERRILL, INDIANAPOLIS, 1945.

SUPERFIGHTER—THE MUSTANG. *Air News (Periodical).* The production and combat record of the North American P-51 Mustang fighter. DUELL, SLOAN & PEARCE, N. Y., 1945.

WE FLEW WITHOUT GUNS. *J. G. Genovese.* The story of a pilot who flew with the RAF, the China National Airways, and finally as a test pilot. WINSTON, PHILADELPHIA, 1945.

MY RIVAL, THE SKY. *Margo Kurtz.* The wife of the pilot in "Queens Die Proudly" sweats it out at home. PUTNAM'S, N. Y., 1945.

I TOOK THE SKY ROAD. *N. M. Miller.* The exploits of Liberator Squadron VB-109 in the central Pacific by its commander. DODD, MEAD, N. Y., 1945.

HISTORICAL

PER ARDUA; THE RISE OF BRITISH AIRPOWER 1911-1939. *H. A. S. G. Saunders.* A history of the RAF. OXFORD UNIVERSITY PRESS, N. Y., 1945.

POSTWAR

TWENTY CAREERS OF TOMORROW. *Darrell Huff and F. M. N. Huff.* Suggestions for the men who will be making a vocational choice in the post-war years. WHITTLESEY HOUSE, N. Y., 1945.

TECHNICAL

ENGINEERING PREVIEW. *L. E. Grinter and others.* An organized course of study for students of engineering. MACMILLAN, N. Y., 1945.

PRACTICAL MARKSMANSHIP, THE TECHNIQUE OF FIELD FIRING. *M. M. Johnson.* An inventor and designer of automatic weapons tells how to secure maximum efficiency in field firing. MORROW, N. Y., 1945.

SCIENCE TODAY AND TOMORROW. *W. B. Kaempffert.* The progress made today in science with predictions of things to come. VIKING, N. Y., 1945. 2d ser.

THE NEW PLASTICS. *H. R. Simonds and M. H. Bigelow.* The advances made during the last five years by the plastics industry. VAN NOSTRAND, N. Y., 1945.

COASTS, WAVES AND WEATHER FOR NAVIGATORS. *J. Q. Stewart.* The physical environment in which navigation is carried on as well as technical information for the navigator. GINN, BOSTON, 1945.

These books are available to AAF personnel through the AAF Field Technical Library Service, which provides for technical libraries at all major installations. For a complete list of books so available, see TECHNICAL PUBLICATIONS FOR ARMY AIR FORCES TECHNICAL LIBRARIES, Book List No. 2, March 1945 and supplements thereto. These lists are compiled by AAF Headquarters Library.

Personal copies of these books may be obtained from the publishers or retail bookstores.

in combat during their entire 50 missions.

"The thing that bothers me most," Szulborski says, "is the fact that when I went overseas with my group in November, 1943, I was as well trained and qualified a gunner as any man in the AAF." The sergeant is now stationed at Langley Field, Va., and assigned to the AAF Training Command Radar school.

Brazilian Fighters

The War department recently paid tribute to the 1st Brazilian Fighter Squadron, which operated during the six months prior to V-E day under its own colors as an independent unit of Lt. Gen. John K. Cannon's Italy-based 12th U. S. Air Force.

The squadron, based near the Tarquina area in Italy, was under the command of Lt. Col. Nero Moura, former adviser to the Brazilian Air Ministry. Equipped with P-47s, the squadron was a component of the 350th Fighter Group, a part of the 22nd Tactical Air Command. The crews trained at Panama in March, 1944, and later at Suffolk Army Air Base, Long Island, New York. On October 6, 1944, the squadron arrived in the Mediterranean theater and the first day's operations, consisting of five sorties, took place on October 31.

Most of the unit's missions were dive bombing attacks but they also included armed reconnaissance, fighter sweeps, escort and weather reconnaissance work. Combat flying time per month averaged 32.1 hours per aircraft with squadrons and total flying time averaged 38.3 hours. The average monthly bomb tonnage per aircraft was 5.7 tons. The fighters dropped 991 tons chiefly upon German motor and rail transport, fuel dumps, gun positions, airfields and bridges.

During these operations the squadron's loss was 0.8 percent per sortie. Nine of its pilots lost their lives. The squadron's planes consumed 1,109,728 gallons of gasoline.

The Brazilian airmen refer to themselves as "The Ostriches," a name derived from their emblem—a raging ostrich perched on a cloud, blasting away with an enormous revolver, and protected by the Shield of the Southern Cross, the national insignia of Brazil.

Triplet Promotion

The famed Chappelear triplets, Army nurses stationed at AAF Regional and Convalescent Hospital, Coral Gables, Fla., recently passed another milestone together. Left to right, Ellen, Elizabeth and Mary were promoted to first lieutenants by Lt. Col. Harriet M. Whitney, principal chief nurse.

Inseparable since birth, the Chappelears were graduated from high school in Hughesville, Md., in 1939. They took nurse training together at the Providence Hospital Division of the Catholic University School of Nursing in Washington, D. C., and were graduated in September, 1942. After a year on the staff of Providence Hospital, the sisters enlisted in the Army Nurse Corps in October, 1943, and were assigned to the Biltmore unit of the AAF Hospital at Coral Gables.

They went up together

Heads Up for Civilization!

The tip-off came when a pilot returned from a low-level mission on Luzon with his P-38 wearing a beard of telephone wires. It then became apparent that veterans of the 13th Air Force, newly arrived in the Philippines, were the airmen who needed re-education—not the hot pilots fresh from Uncle Sugar Able.

Stateside pilots, making their battle debut in the Pacific, have always been snowed under with advice, but this time it was the grizzled pilots from the primeval hunting grounds of the Solomons, New Guinea and Borneo, who needed some words of wisdom.

Capt. Jay H. Rose, 13th Fighter Command, says the transition from jungle to civilization was not an easy one. Many of the pilots, long away from buzzing restrictions and man-made obstacles, had forgotten that a civilized area adds dangers of its own to a strafing attack. Consequently, it became imperative to break the battle-

cocky pilots of their jungle habits, Captain Rose recalls. They had to be taught that these were unlike the days when a strafing pilot could roar down Rabaul's main street and raise hell with the Jap-sponsored geisha house.

There were taller houses, power lines, smoke stacks, factories, telephone poles—and heavier ack-ack to contend with.

Vegetables on the Half Shell

Ascension Island has 35 square miles of land, plenty of sunshine and a good climate, yet the AAF personnel stationed there could not raise so much as a dandelion on the island's bleak and barren surface.

Then, in January of this year, a party of eight enlisted men, an officer and a civilian landed at Ascension and blithely said they were there to grow fresh vegetables. The response was pathetic. "On this mess of lava and cinders?" the GIs asked. "Nothing has ever grown here. Nothing does. Nothing will." They settled back to their canned rations and watched the newcomers with a cool and jaundiced eye.

Then the island came to life. Four months later the visiting farmers were harvesting tomatoes, radishes, lettuce and cucumbers. Within a year the tomato plants will yield 40,000 pounds. There will be enough lettuce for 20,000 servings, and the radish beds have been estimated to produce 6,000 pounds every six weeks.

The explanation is hydroponics, the science of growing vegetables without soil. Hydroponics was introduced to the AAF at Regional Hospital, Coral Gables, Fla., after Col. Daniel Ogle realized that he had facilities for patients who were interested in carpentry, cabinet making and the like, but nothing for the ones who were farmers. It was not feasible to set up a small farm, and it wouldn't be easy for a man with an injured arm or amputated limb to plow a field. Consequently, chemical gardens were authorized. These proved successful, not only in providing recreation for the men, but also in supplying a large amount of fresh vegetables.

Through an inspector's report, this use of chemical gardening attracted the attention of several generals at AAF headquarters. About the same time General of the Army H. H. Arnold returned from a field inspection trip and gave the project his enthusiastic approval.

Synthetic gardening may be described in this way: A vegetable bed is made by digging first a number of long, thin trenches and pouring concrete into them. The inside is painted with a non-toxic asphalt to keep out certain poisons, and each section is approximately 100 feet long, 36 inches wide, and from 10 to 12 inches deep. Each bed is then filled with an inert media such as sand or gravel or, if necessary, a commercially prepared solution. A nutrient solution, containing the chemicals necessary for the growth of the plants, is passed through the beds by a series of pipes and valves. With that done, there is no further work but to wait and harvest the crops.

While the science of hydroponics is a relatively simple matter, it is necessary that the first work be completed by expert personnel. Eventually, however, the operation is turned over to base personnel who will receive instructions in the necessary technique. Teams of eight men will tour the world to establish the original gardens, and one or two team members will remain on a temporary basis until one complete cycle of harvest is completed.

Chemical gardens will not be established at installations where fresh vegetables can be grown. The synthetic process is not a competitor of ordinary means of farming and will be used only to provide vegetables at remote stations which ordinarily would not receive a sufficient supply.

In order to help select locations of future sites, certain information must be supplied. The office of the Air Quartermaster, in command of Brig. Gen. W. R. McReynolds, will want to know something about the normal amount of sunlight at the various installations, nature of the water supply, temperature range, the availability of gravel, construction materials, water tanks and similar pertinent facts. Maj. Ewing W. Elliot, chief of the Hydroponics Section, is now engaged in a survey to obtain much of this information.

Sown and grown in gravel

Panamanian Rescue

The 12th Emergency Rescue Boat Squadron, part of the 6th Air Force in Panama, recently rescued two men trapped beneath an overturned barge, an experience somewhat different from their usual task of picking up airmen in rafts, or from planes in the water.

This rescue was made by a squadron commanded by Maj. William A. Sears, when a Panamanian sand barge capsized in shallow water about 40 miles up the coast from Panama City. By tapping the heavy steel hull of the barge Major Sears was able to locate the two men who were trapped in a one-foot air space between the water and the bottom of the upside-down craft. The crew cleared off a thick coating of barnacles, then the major ordered everyone else back to a safe distance while he set to work with a cutting torch on the hull which contained gas lines and tanks for its Diesel engine. Within half an hour he had cut a hole large enough to release the first man. Another hole was cut to free the man trapped forward. The men, nearly suffocated, had been underneath the barge nine hours.

Engineer's Wings

The Superfortress engineer may now be identified by the wings he wears. Lt. Gen. Barton K. Yount's AAF Training Command has announced that henceforth all graduates of the command's flight engineering course will be awarded the new aviation badge, reproduced here. Instructors and re-

cent graduates now undergoing B-29 transition training are changing over to the new type of wings.

Heretofore, flight engineers have been awarded wings which bear the letter "O" in the center, to correspond with the aeronautical rating of Aircraft Observer. This rating and type of badge were shared with several other aerial specialists. The center of the new engineer's wings shows the outline of a Superfortress engine and four-bladed propeller.

Pacific Air Command

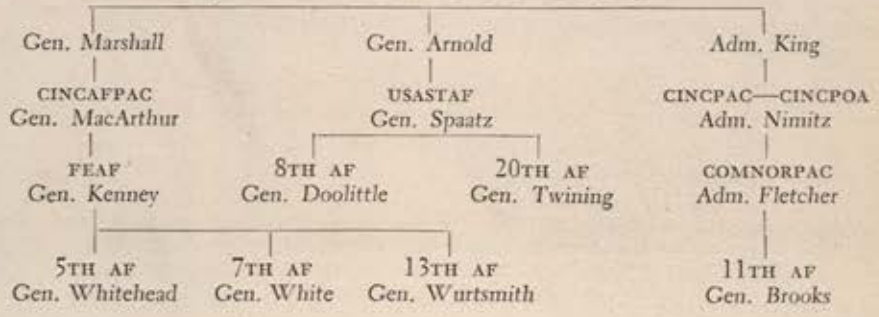
Army air command in the Pacific has been reorganized broadly along the tactical and strategic lines which proved so effective in the European theater. The tactical and strategic air forces, however, operate under an entirely different top command organization from that employed in the ETO.

General Carl Spaatz, our strategic air commander in Europe, has the comparable job in the final round against Japan, except in this instance his weapons are B-29s instead of Forts and Libs. General Spaatz operates directly under General of the Army H. H. Arnold, Commanding General of the AAF, and the Joint Chiefs of Staff. His deputy is Lt. Gen. Barney McK. Giles, and as the strategic components they have the 8th Air Force, headed by Lt. Gen. James H. Doolittle, and the 20th, under Lt. Gen. Nathan F. Twining. Maj. Gen. Curtis E. LeMay, former commanding general of the 21st Bomber Command, is chief of staff for USASTAF. The 8th's 29s will operate out of Okinawa while the Superforts of the 20th are continuing operations from the Marianas.

The tactical air assault is the job of General George C. Kenney and his Far East Air Forces, which now embrace the 7th as well as the 5th and 13th. General Kenney continues operationally as top air commander for General of the Army Douglas MacArthur, commander in chief of Army Forces in the Pacific. In addition to fighters, light, medium and heavy bombers, General Kenney's tactical operations also are employing B-32s in their first taste of combat. Commanders of the air forces under General Kenney are Lt. Gen. Ennis C. Whitehead, 5th; Brig. Gen. Thomas D. White, 7th; and Maj. Gen. Paul Wurtsmith, 13th.

Completing the AAF ring around the Jap homeland are the USAAF in the China Theater (10th and 14th), under the command of Lt. Gen. George E. Stratemeyer, and the Aleutians-based 11th Air Force, commanded by Maj. Gen. John B. Brooks and under operational control of the Navy's North Pacific commander.

ARMY AIR COMMAND IN PACIFIC



Dropped His Watch

Lt. James L. Bailey, a pilot stationed in the Hawaiian Islands, sauntered into his base legal office recently and said he wanted to file claim for a wrist watch. The lieutenant was asked what happened to his watch and he gave this explanation:

He was flying a Culver radio plane at 2,500 feet in the wing position of a practice formation. The formation was moving along quietly, when the first thing Bailey knew he was conducting a one-man flying circus.

Suddenly the lead plane dove out of sight and Bailey, instinctively, pushed the stick forward to follow the leader. Just as he did this, a squadron of P-47s loomed directly ahead.

By his quick move Bailey missed the Thunderbolts, but the strain of the dive loosened his safety belt and threw the upper part of his body out of the cockpit, leaving only his knees and feet inside. Stability of the light plane caused it to pull automatically out of the dive. Then, realizing that it might climb back into the path of the P-47s, Bailey pushed the stick again and the Culver went into a second dive.

This time Bailey was thrown completely out of the cockpit and on to the wing. But as he plunged out, instinct caused the pilot to grab for the side of the cowling and he managed to hold on until he could pull his knees under him and drag his body back to the side of the plane.

With all his remaining strength the pilot crawled back into the cockpit and pulled out of the dive, blacking out for a few seconds. It also took fancy flying on the part of some of the P-47s to miss the little plane's crazy antics.

Bailey's slight injuries included two cuts on the hand and a sprained finger. The wrist watch was ripped off when he was tossed out on the wing.

Award for Escape

S/Sgt. Lee C. Gordon, AAF ball turret gunner, was the first American to be awarded the Silver Star for escaping from a German prison camp and reaching Allied territory with valuable information.

Flying with the 8th Air Force's 305th bomb group, Gordon bailed out of his Flying Fortress when the plane was disabled by fighters and flak over Wilhelmshaven on February 26, 1943. He was captured and taken to a Frankfort prison camp for interrogation.

While being transferred to another camp late in March, Gordon and seven other prisoners escaped by jumping from the train, but were recaptured a few days later.

The sergeant escaped again on June 1 and rode through Germany on a bicycle for three days before he was picked up. He made his third and successful escape attempt from the prison camp at Moosburg on October 13, 1943, and reached the United Kingdom on February 27, 1944. ☆

"A group of jet fighters passed me at the same altitude."

The Private Air Force of Cpl. Weinberg

BY LT. SAMUEL W. TAYLOR
Hq, USSTAF

ILLUSTRATED BY SGT. LOUIS S. GLANZMAN

How a GI used the 8th Air Force to settle his personal score against the Nazis

When in November of 1938 the Gestapo threw a 16-year-old lad named Erwin Weinberg into a concentration camp they didn't dream of the retribution it would entail. He was but one of thousands taken in a roundup of Jews in Germany following the death of a member of the German legation in Paris named Von Rath, allegedly killed by a Jewish boy. The Nazis might well regret that because of the treatment he received, Erwin Weinberg went to America and eventually became a corporal in the U. S. Army Air Forces. Corporal Weinberg was never to fly a mission, drop a bomb, or shoot a gun at the enemy. Yet he was to enlist the enormous might of the 8th Air Force as a weapon for the settlement of his personal score. And now that his people won't suffer, the story of Corporal Weinberg and his private air force may be told.

He had a large account to settle. He and his father were arrested and flung into a boxcar crammed with other Jews. They knew their destination, Buchenwald, even in 1938 a name to be spoken in a whisper. At Weimar they were ordered out, faced against a wall, and then beaten over the heads from behind with rubber truncheons by SS troopers.

"This wasn't the extermination program," Erwin Weinberg says. "That didn't come until later. The Nazis merely wanted to discourage us and get us out of Germany. We were released if we could arrange to leave the country." Extermination or not, 500 Jews died the first month.

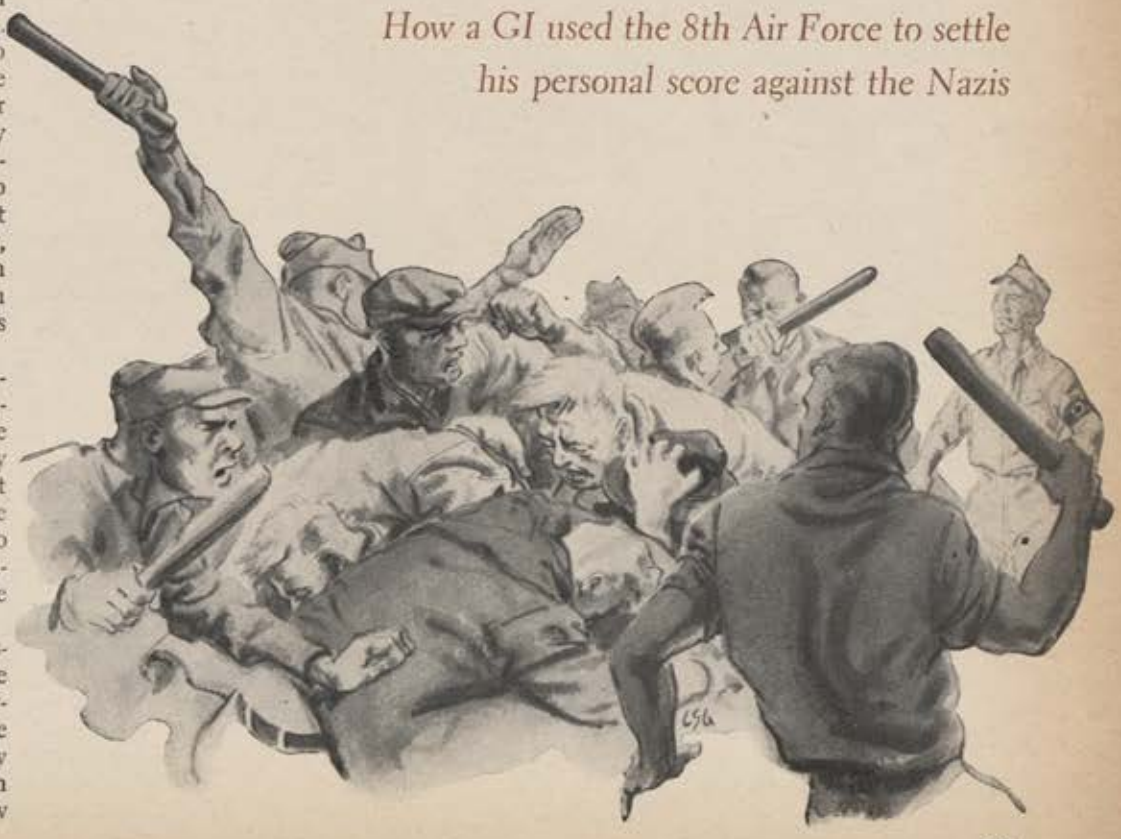
His mother secured permission to go to England. The Weinberg family had been trying to get to America since 1936, and their names finally reached the top of the list in 1940. Erwin arrived in the new land on a Tuesday, and went to work Friday morning in a Philadelphia factory making Army uniforms.

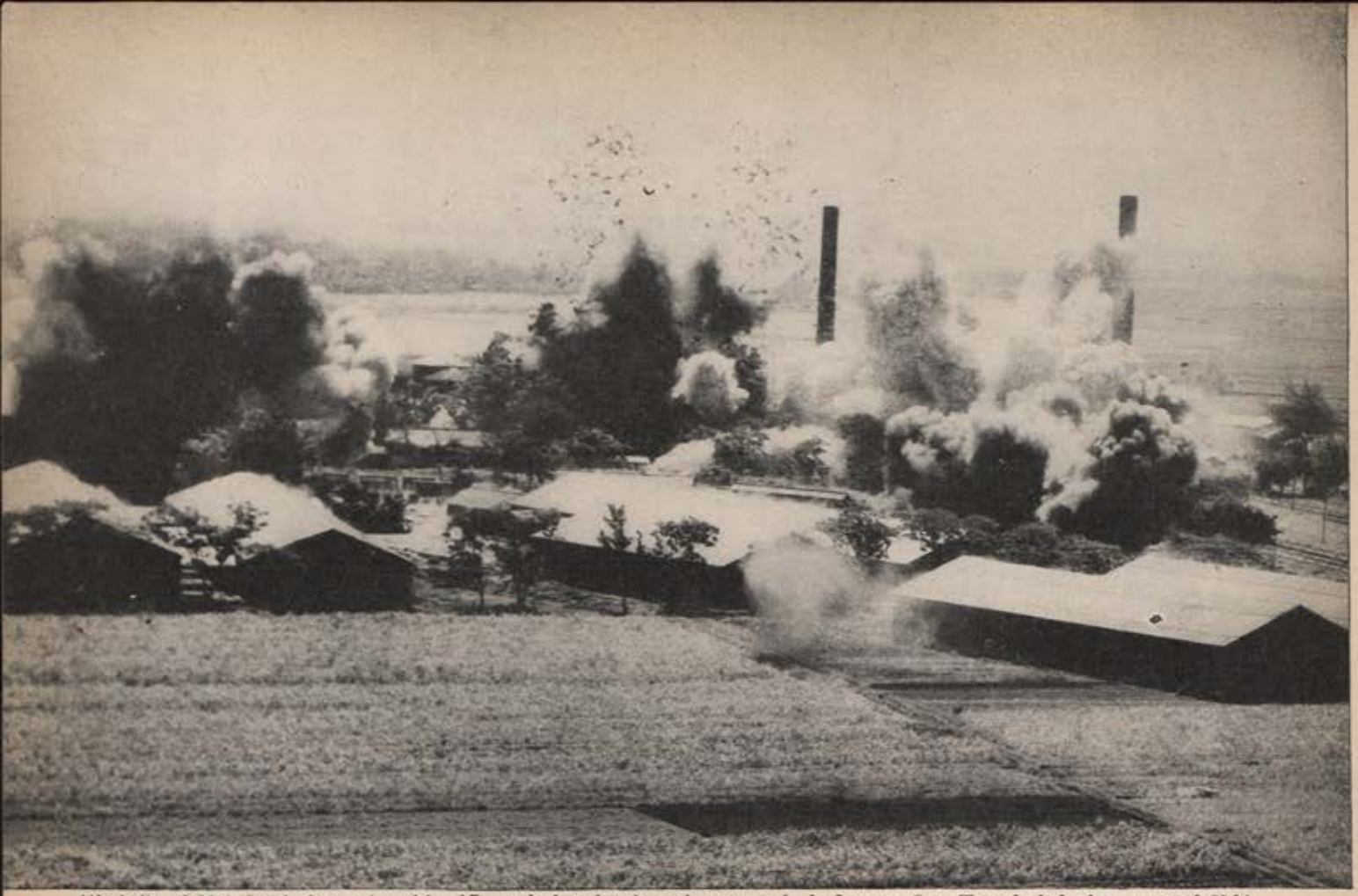
Young Erwin sewed U. S. Army uniforms and waited. The British began bombing Germany after the Blitz, and he got an idea of how to settle the score. But he was just one person, and he didn't know how to go about doing what he wanted to do. America entered the war, and he couldn't enlist because he was an alien. He wondered whom he could see, to tell his idea. It seemed impossible that anyone would listen to him.

But there is something about determination that makes the breaks. Finally in June, 1943, the Army accepted him, and for the air forces, where he needed to be. He became a U. S. citizen, which helped. The following February he landed in England, where he had to be. But still he was only a private, at the very bottom of the torturous Army channels. What could a private do?

He obtained permission of the first sergeant and spoke

(Continued on Page 72)





Mitchells of 38th Bomb Group in a May 17 attack drop bombs and propaganda leaflets on Suan-Tau alcohol plant west of Kaki.

Heavy explosions and black smoke cover Chickuman rail yards as B-25s score direct hits on rolling stock and installations in vicinity.

FORMOSA ... dud of the Far East

B-24s blast warehouses, rail lines leading into Takao harbor.

Bombs find mark in crowded factory district at Hoikow, Formosa.

Mitchell hit by flak during parabomb mission over alcohol plant.

Flak takes its toll as B-25 at left plunges to ground in flames.

Some of the finest bombing and strafing in the entire Southwest Pacific air war has blasted the once strategically important island of Formosa into a state of impotence. Mediums and heavies of the 5th Bomber Command, supplemented by bomb-carrying fighters of the 5th Fighter Command, have laid waste principal Formosan seaports, crippled airdrome facilities so completely that hardly a plane has been able to operate from the chain of airfields for months, severely damaged rail centers, hydro-electric plants, copper and aluminum refineries and the island's vital alcoholic industry from which Japan once drew a large percentage of ingredients for high octane aviation gasoline. With air and ground action moving steadily northward into the heart of the Japanese Empire, Formosa long since had ceased to be a major factor in the outcome of the war in the Far East. ☆

AAF QUIZ

Here is something new in AIR FORCE brain twisters. Beginning this month, every question in the AIR FORCE Quiz will be based on information contained in the preceding 12 issues. If you have been reading AIR FORCE carefully, this should be easy. See Page 79 for answers.

1. The Luftwaffe at the time of Germany's unconditional surrender in May, 1945, had been in existence
   A. *18 years* B. *4 and one-half years*
   C. *15 years* D. *10 years and 2 months*
2. British Air Commodore Frank Whittle has contributed significantly to the advancement of aviation by his work with
   A. *incendiary bombs*
   B. *area bombing*
   C. *radar* D. *jet propulsion engines*
3. The F-13A is a
   A. *Navy experimental fighter*
   B. *B-29 photographic plane*
   C. *Navy trainer*
   D. *AAF jet trainer*
4. From January 1, 1939, through March, 1945, the AAF Training Command graduated approximately how many pilots?
   A. *100,000* B. *225,000*
   C. *50,000* D. *750,000*
5. The latest type of launching device for rocket-firing fighters permits the P-51 to carry how many rocket projectiles?
   A. *6* B. *8* C. *10* D. *12*
6. The "Glip" (double-glide approach) technique of bombing has been used with best success against
   A. *bridges* B. *naval vessels*
   C. *parked enemy aircraft*
   D. *vehicular traffic*
7. The Air Transport Command in 1944 flew approximately
   A. *1,000,000 miles*
   B. *30,000,000 miles*
   C. *75,000,000 miles*
   D. *300,000,000 miles*
8. Generally considered to be the most maneuverable of all the present Jap fighter planes is the
   A. *Oscar Mark II* B. *Zeke 52*
   C. *Tony* D. *Nick*
9. How many cylinders are in the Wright Cyclone engine used on B-29s?
   A. *12* B. *16* C. *18* D. *24*
10. For a normal parachute landing, your arms should be
    A. *Folded across your chest*
    B. *Folded before your face*
    C. *Extended outward, with elbows slightly bent*
    D. *Raised upward, with hands grasping risers*
11. Compared to the number of moving parts in a conventional engine, the jet engine has about
    A. *5 percent as many*
    B. *10 percent*
    C. *25 percent* D. *50 percent*
12. The Davis wing is used on the
    A. *B-26* B. *B-24* C. *A-20* D. *B-17*
13. A B-29's wing loading is
    A. *40,000 lbs.* B. *64,000 lbs.*
    C. *120,000 lbs.* D. *144,000 lbs.*
14. Armament can best be concentrated in the nose of a fighter with wings of swept-back design
    A. *True* B. *False*
15. The average antiaircraft projectile gains altitude at a per-second rate of
    A. *250 feet* B. *1,000 feet*
    C. *2,500 feet* D. *3,250 feet*
16. The Army plane "Question Mark" made aviation history in 1929 by
    A. *Flying non-stop from New York to San Francisco*
    B. *Ferrying supplies to earthquake victims in Chile*
    C. *Winning the Schneider Cup speed race*
    D. *Staying airborne for six days*
17. Under Public Law 790, any shipment of gifts sent by military personnel stationed outside the U S. to persons in the U. S. is duty-free to the extent of
    A. *$25* B. *$50* C. *$100* D. *$10*
18. A compressibility shock wave on an aircraft wing was first photographed by
    A. *Maj. Frederick A. Borsodi*
    B. *Col. A. V. Laving*
    C. *Lt. Col. John Sparks*
    D. *Capt. George S. Petersen*
19. Women's Army Corps personnel on duty with the Army Air Forces as of May, 1945, totaled
    A. *75,000* B. *30,000*
    C. *150,000* D. *280,000*
20. Identify this airplane.

SKY FLIVVERS

(Continued from Page 32)

from war production. Cruising speed is about 116 mph, with a range of 580 miles.

Another company which has mass production machinery at work is Culver Aircraft Corporation, makers of the Culver Cadet, two-place pre-war low-wing, the fastest small plane on the market in 1930-1940. Once it was a front-wheel, tail-wheel airplane. Now it has tricycle gear. There will be a bigger, more powerful engine. Production methods like preforming of parts and spar jigs for maintaining perfect profile will cut down on the cost.

Although most companies, at some time or another, hope to go to all-metal construction, besides the Ercoupe there is only one metal plane on the "first available" list, Luscombe's "Silvaire," which has metal fuselage with fabric covered wings. Before the war "Silvaires" sold for about $1,985 and the price of the new model will be about the same. For that you'll get a high-wing design that looks like Lindbergh's famous "Spirit of St. Louis." Larger gas tanks will permit a range of about 500 miles.

There are, of course, many other postwar planes. Embryo designers have created all types of aircraft, some faster, some bigger, some that introduce new flight principles like tail-first planes and rotating wings. There are airmobiles under consideration. Planes that have removable or folding wings and can be stored in the garage or driven along the highway like a car. Some concerns are engaged in building civilian helicopters. Higgins, Bell, Kaiser have rotating wing airplanes in the design and test stages. They look good, but our own engineers tell us that the practical helicopter is several years in the future. The whirligig machines in their present state cost too much. Too many "bugs" must be flitted out before they become practical for civilian use.

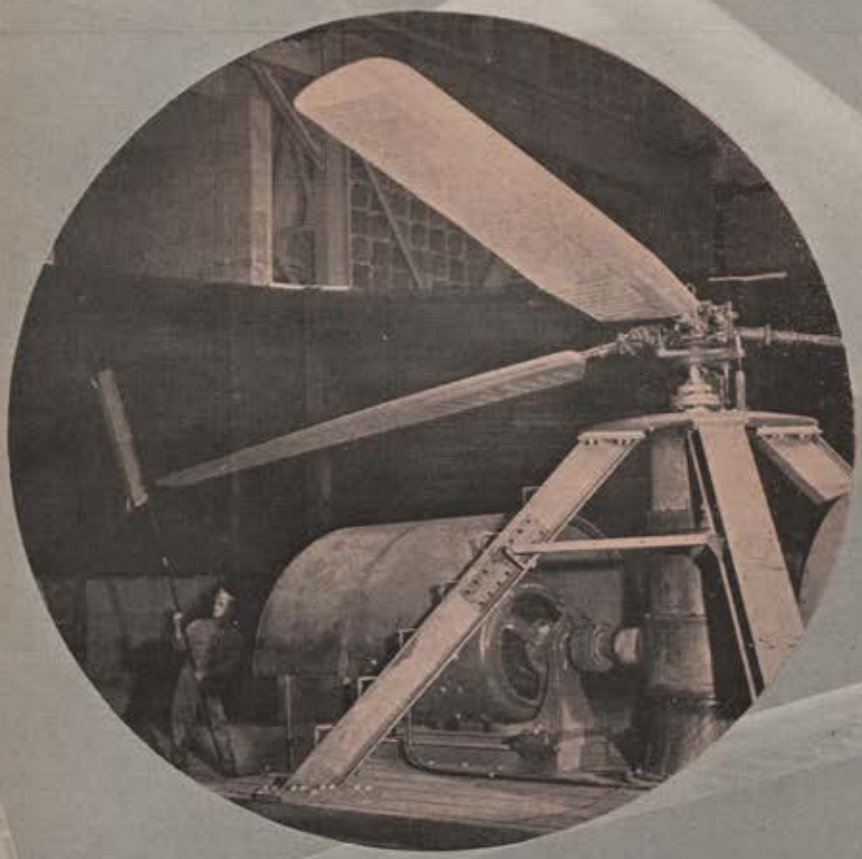
Some designers, with an eye to the future, are considering jet-propulsion for the light plane. One engineer has gone so far as to apply a jet engine to the Ercoupe with an "interesting" theoretical conception. The men I talked with, however, believe that jet stuff in small planes is a long way off. They point to such present disadvantages as expensive fuel consumption, complicated redesign, the dangers of using "hot" engines with fabric-covered planes.

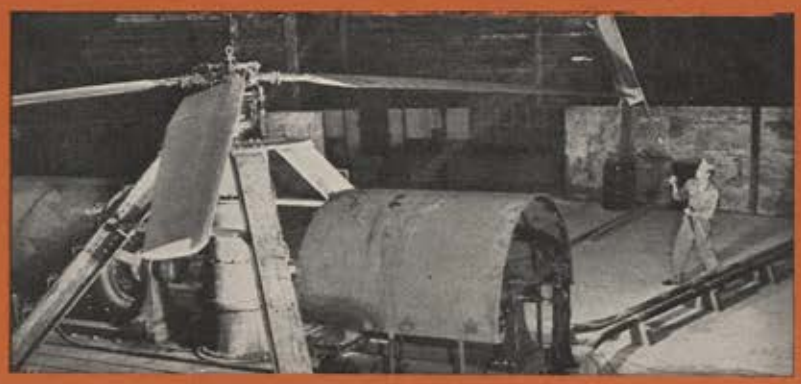
The "Sky Flivvers" are here. But the day won't come, for a while anyway, when they will blacken the sky.—Douglas J. Ingells, AIR FORCE Staff. ☆

Styled as "America's First Light Airplane," this Aeronca was powered with 28 hp engine.

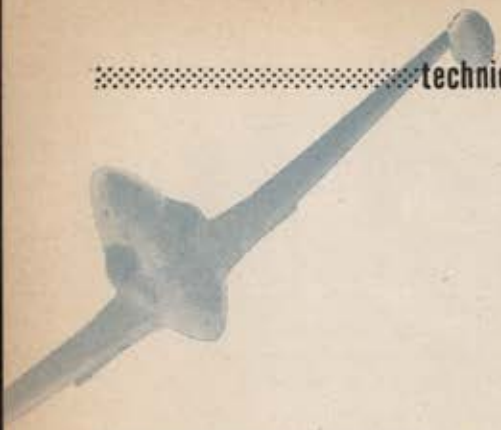
Development, Maintenance and Supply of Aircraft and Equipment

technique





Helicopter Rotor Test—Page 69



The latest, modified version of the P-80 demonstrates a great improvement over the Shooting Star's earlier models, both in appearance and in its combat performance. Three views reveal its clean aerodynamic lines, while picture at lower left shows a General Electric Company turbo-jet power plant.

The P-80A—New and Improved

Since its first flight in January, 1944, the jet-propelled Shooting Star has been struggling through the growing pains of technical development, and today's "A" model P-80 represents in full measure the fruit of engineering progress and research. Its nose has been extended more than two feet, the wing structure has been improved and the duct system has been changed. The gross weight of the plane has been increased by several thousand pounds, and with a special high-gloss wax polish, cruising speed of the craft has been jumped by 20 mph.

In appearance, the new fighter is one of the cleanest aerodynamically of any ever built, which is one of the reasons why it has shown exceptional characteristics in compressibility regions. Its ceiling and range are comparable to our latest conventional fighters, and an improved type of wing employs aerodynamic innovations that offer a superior rate of climb and angle of climb at high speeds. A hydraulic aileron boost and electrically operated flaps give the plane a superlative degree of maneuverability, while the bubble canopy, the location of the pressurized cockpit forward of the wing and the slender lines of the nose greatly improve pilot visibility for all aerobatics, including ground strafing at a speed that befuddles the compensating sights of antiaircraft guns.

The fuselage is of semi-monocoque construction, and all skin is flush-riveted to reduce surface drag. Wing span is 39 feet, length is 34½ feet, and height to the top of the rudder is 11 feet, 4 inches. Weight is about 8,000 pounds empty and close to 14,000 pounds when fully loaded with ammunition, photographic equipment, bombs and fuel. Droppable tanks may be carried under the wingtips.

The power plant is an improved General Electric turbo-jet unit that takes air in through the fuselage ducts ahead of each wing and exhausts through the tail—in contrast to the G. E. I-16 twin-engine installation on the P-59, which exhausts from nacelles located on each side of the fuselage. Jet engines are rated by the number of pounds thrust they can produce at sea level in a static condition, and under specific conditions this power output can be translated into hp ratings by multiplying true airspeed by net thrust and dividing the result by 375.

The turbo-jet functions powerfully and smoothly, generating its energy so readily that the engine requires no warmup and prepares the Shooting Star for take-off in less than a minute. It uses much less fuel at high altitudes than it does going at the same speed at low and medium heights, and its only control is the throttle. It produces no

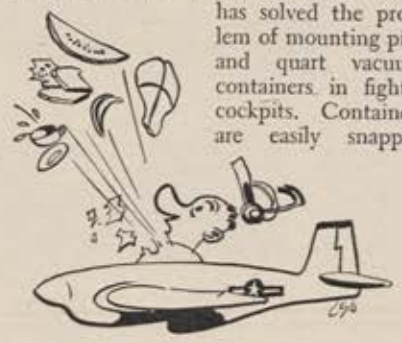
vibration, thus lessening pilot fatigue, and no noise is heard in the cockpit, since the rumbling roar of combustion passes out from behind. Moreover, the jet engine is far lighter than gasoline engines of comparable power and can be restarted in flight at any speed above 175 mph.

On its first test run the Shooting Star attained a true airspeed of over 500 mph, and is now on its way to surpass the 725-775 speed of sound. In subsequent trials, covering a period of more than a year and a half, many bugs have been chased out of the plane. A duct rumble that cut down efficiency and affected maneuverability has been eliminated by controlling the flow of boundary-layer air. Antennas that created large drag forces at high speeds have been replaced by internal antennas, and shell cases that battered the floor of the plane are now thrown into the airstream from an electrically operated ejection chute door that opens while the guns are firing. Another problem that presented itself was the fact that at high speeds and altitudes cockpit temperatures ran as high as 150 degrees F. and the controls were almost too hot to handle. To cool the pressurized air, a miniature turbine-compressor type refrigeration unit weighing only 18 pounds and operating from air compressed by the jet engine impeller is being perfected and already has successfully cooled the cockpit to 75 degrees F. at 20,000 feet.

Designers of the P-80A have tried to make their plane a mechanic's dream. To pull out an engine, only five tools are required, and the job can be done in 20 minutes. To take off the rudder or elevator, only one nut and a slide-cover have to be removed. And Lockheed engineers are still striving to further simplify the maintenance and repair work for ground personnel.

tech topics . . . about aircraft and equipment

Chocolate bars, sandwiches and hot coffee are the foods airmen like best to have with them on long missions, according to a recent survey among pilots and crew members. As a result a series of new rations to include more of these "delicacies" are being worked out. . . . A small bracket that works with claw-like action has solved the problem of mounting pint and quart vacuum containers in fighter cockpits. Containers are easily snapped



into the bracket and can be removed with the slightest pressure of one finger. . . . New galley kits for cargo planes and bombers also have been produced. Each unit is about two feet square and contains a grill, two hot cups and storage space for food supplies.

Special polaroid filters for a new camera lens eliminate glare and reflection during taking of over-water photographs. Also under test for drying photographic prints is a continuous-belt type of dryer made of fibreglass.

A small dolly simplifies ground handling of the AAF's "Flying Dutchman," air-sea rescue boat. A hydraulic lift on a carriage raises the boat into position for "bombing up" the "mother" airplane. It permits attaching the boat in about half the normal time previously required. . . . Another small wheeled dolly is being built to haul a light-weight engine starter for jet-propelled aircraft. The dolly is also transportable by air.

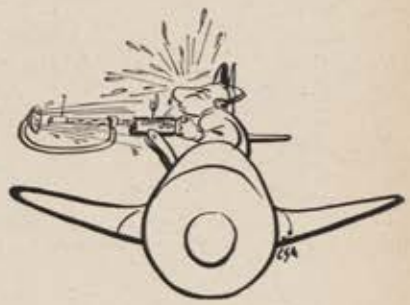
The Link Instrument Flying and Landing Trainer has been equipped with an automatic pilot to acquaint personnel with the principles, appearance, operation, adjustment and maintenance of auto pilots. The device, mounted in the Trainer has cutaway parts encased in clear plastic to show how the robot functions.

Latest full-feathering propeller is a combination design. It has a hydromatic hub shell and electrically-operated blades. The principles of the Hamilton Standard Propeller and Curtiss Electric Propeller were combined to get this unorthodox operation.

Because sometimes day fighters take off in the dark hours just before dawn and return when darkness is setting in, special taxi lights have been developed for this type of aircraft. The lights are smaller, weigh less than standard taxiing lights for larger aircraft and soon will go into production. . . . Fluorescent lighting for aircraft cabins is also one more step nearer actuality. Trial installations incorporating a special lighting circuit that permits use of 14-watt fluorescent lamps have been fitted in the cabin of the C-97 cargo giant.

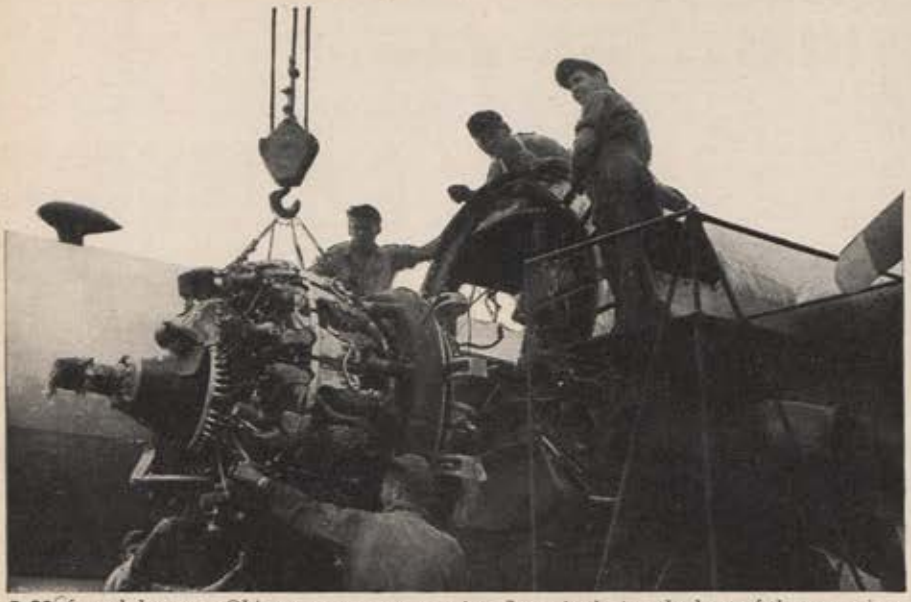
For more than two decades pilot seats in aircraft have been the same for all types—fighters, bombers, transports or liaison airplanes. Now, based on surveys conducted among flying personnel, seats are to be specially designed for each new type of plane. . . . For pilots who fly VLR fighters like the P-47N or P-51H engineers have developed special arm rests, cushioned and padded like the arm rests in an automobile.

To increase the barrel life of aircraft machine guns, armament engineers are running a series of tests with new cooling systems. One method is to wrap the gun barrels with a cover saturated with a low temperature chemical. Another system automatically squirts a chemical coolant into the gun bore after each round of



fire. Different alloys and plating inside the gun bore also are being tried.

Removal of some equipment on one B-29 airplane has permitted installation of a high-speed camera for taking pictures of ejected shell cases and links from the nose turret. This photographic record may help engineers to find new methods for eliminating the danger of empty cases striking the skin of the big bomber and causing unnecessary damage. . . . Present type "Focalscopes" which aid in focusing the lenses in big aerial cameras have been modified to permit focal adjustment on latest aerial cameras having long extended lenses. . . . Installation of a Gunsight Aiming Point Camera in a glider has been accomplished to record instrument readings during flight. The camera, operated by remote control, is fitted with a lens of suitable focal length so that each picture frame covers the entire instrument panel.



B-29, forced down on Okinawa, gets a new engine, flown in during the heat of the campaign.

Okinawa Engine Change

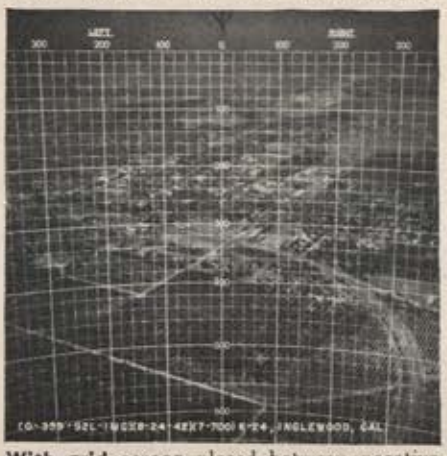
The first B-29 to land on Okinawa during the rugged campaign, came down on Yontan airfield very much against its will. Number two and number three engines had failed, and the plane was forced to make a landing during the heat of the battle, when Jap raids could be expected at any time. Lt. William E. Robertson, pilot of the plane, ordered his radioman, S/Sgt. Joseph M. Morin, to put through a message to headquarters, and after several attempts were jammed by enemy interference, the 21st Bomber Command finally received the call for assistance. One week later the Superfort was on its way home with two new engines—but it took the combined efforts of the AAF, including ATC, and the Marines to make its return possible.

The commanding officer of a Saipan-based service group, was ordered to organize a mobile repair and maintenance unit and get it—together with two new engines—to Okinawa with all possible speed. Three different AAF organizations were drawn from and personnel were brought in by air in record time. Although experts in their specialties, the men were hampered by lack of heavy equipment until the Marines provided a C-2 hoist and a local fighter outfit furnished two crew stands. Then, working through rainstorms and interruptions caused by enemy strafing and bombing attacks, the two defective engines were removed from the plane and torn down. At the proper time, two ATC C-46s landed at Yontan with the new engines, together with a fork lift, and despite the discomfort of the weather and the fact that they were well within Jap artillery range, the men proceeded with the operation. Problems were solved in ingenious ways, with the barrel of a Jap gun used as a prop bar and a pre-oiler made out of tubing from an enemy plane—and finally the engines were installed and the plane successfully flight-tested for its long hop back to Saipan.

"Checkerboard" Photo Prints

A new aerial photographic technique in which a grid is placed between the negative and the print paper so that a "checkerboard" screen is superimposed on the picture, recently enabled observers and ground fire control officers to direct artillery fire and spot hits visually with a minimum of mathematical calculation.

The fire control system permitted an aerial observer to have an oblique, charted photograph of enemy positions before him, whereas previously only vertical maps were available. And with the six-mile photostrip of enemy terrain before him, including all up-to-the-minute changes, he could signal to the ground station as to what square to sight on, while artillery personnel found the intersecting lines and by simple triangulation determined the distance, elevation and direction of the target.



With grid screen placed between negative and print during developing, airphoto of terrain is charted to increase accuracy of artillery.

Super Power Plants

AAF engineers, working in close conjunction with aircraft engine manufacturers—who labored for two decades to produce a successful 1,000 hp power plant—have outdone themselves in the last 36 months to perfect designs that are capable of generating 3,000 hp. One of these is the in-line, liquid cooled, 24-cylinder Allison V-3420.

Although there has been much talk about these super-engines, it was not until recent months that such high hp ratings actually have been obtained in flight with a conventional engine. To get 3,000 hp from a liquid-cooled engine, experts took two V-1710s like those in the P-38 and geared the two crackshafts together to drive a common shaft. The Allison has a smaller frontal area, being small enough for enclosure inside a large wing, and can drive either tractor or pusher, single or dual rotation propellers, and can employ extension shafts to allow for remote propeller drive. A feature of the V-3420 is that nearly all of its parts, except the crankcase castings, are identical with those of the V-1710 engine, now in service, and this interchangeability will keep production costs at a minimum besides simplifying maintenance.

The basic accessory housing of the inline engine incorporates a single-speed, single-stage, gear-driven supercharger for low or medium altitudes, but an auxiliary turbo-supercharger can be utilized for increased high-altitude performance.

The engines have been graduated with honors from preliminary tests at Wright Field's Power Plant Laboratory. And with the goal of 3,000 horsepower having been attained, designers and manufacturers are combining new fuels, water and fuel injection systems and large-type engines in the hope of producing a 4,000 hp power plant before long.

Waist Gun Turrets

Originally worked out as part of a weight-slashing program for B-24s, small waist gun turrets, each with a remotely controlled sight, have been de-

vised for installation on the sides of Liberators and have succeeded in cutting about 470 pounds from the gross

In an effort to reduce overall weight of the B-24, remotely operated waist gun turrets have been installed on an experimental model.

weight of the plane without reducing the number of guns. Sighting stations are just aft of the turrets and each provides vision over half a hemisphere.

So far the modification has been put into effect on only one B-24, which is being used as a laboratory to test the equipment. It has been found that although the two-gun turret makes up for the loss of firepower caused by the elimination of the conventional ball turret, the field of fire of the new turrets does not permit shooting straight forward or directly to the rear.

Hurricane Reconnaissance

For the purpose of determining exactly how dangerous tropical hurricanes are to aircraft in flight, four B-25Ds and their crews were recently assigned to the AAF Weather Wing to fly directly into storm areas and report on the extent of the "unflyable" weather.

Each crew consisted of pilot, copilot, navigator, weather officer, radio operator, engineer and crew chief. Extra gas tanks were mounted for long range cruising, and because there was insufficient time to install other meteorological devices, a B-3 driftmeter was the only special equipment carried.

The Army Hurricane Weather Officer at Miami, Fla., determined the approximate routes to be flown, after coordination with the Navy and Weather Bureau Hurricane Liaison Officers at Miami. Variation of flight plans, to obtain a maximum of information during the storm, was made on recommendation of the weather officer on board the plane, who also made observations on clouds, weather and surface winds over the ocean. The posi-

maintenance tips . . .

from the crew chief's stand

Many B-29 URs have been received lately concerning feathering pump and motor failures. In most cases such failure has been caused by improper ground operation, and mechs are cautioned to eliminate prop feathering operations on the ground except where absolutely necessary, and to take special care to see that the unfeathering cycle, when it must be performed, is conducted properly. When a Superfort returns to base with a feathered prop, therefore, follow the approved ground unfeathering procedure and remove the front sump plug, unfeathering with a wooden blade wrench. Do not unfeather electrically.

Now available through Air Corps Supply, is a torque indicating hose clamp that is expected to have a wide application in complying with TOs. The tool is designed to adjust hose clamps to proper torque value and is operated so that when the desired torque has been reached, as indicated by numerals stamped on the load seal at the end of the "T," the handle will move freely in a 90-degree arc before again applying force. In recent tests conducted by the AAF Proving Ground Command, the handle operated satisfactorily after being immersed in water for 30 minutes and after a soaking in SAE No. 30 oil for 10 minutes. It was also dropped five times from a height of six feet onto concrete with no apparent change in the torque value reading.

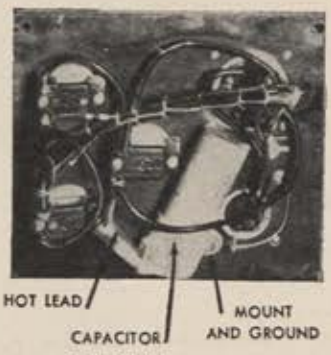
The complete kit contains two of these handles—one 15-inch pound and one 25-inch pound—a 9/32" hose clamp, a socket wrench and two flexible extensions for use in places where the T-handle is inaccessible alone.

"What, oh, what is to be done with rescinded TOs?" seems to be heard rather generally in these days of redeployment. The best available authority—TO 00-5 itself—says that, in general, TOs will be retained as long as the relevant aircraft and equipment is in service. Rescinded TOs, however, will be removed from the files and will be retained separately for reference purposes in area Air Service Commands and Air Depots for a minimum period of two years following rescission. All binders as well as each individual TO will be plainly marked to indicate that they are rescinded publications.

A free-wheeling tail dolly may be made out of scrap lumber, hooks, hinges, casters and a hydraulic jack, as shown above. The model illustrated was constructed by production line maintenance men at the Chico, Calif., Basic Flying School.

On P-61Bs, pilot's and gunner's hinged windows may be blown open by blast from turret guns, due to vibration set up by firing of 20 mm cannon. Service activities experiencing such difficulty in keeping the windows latched, should locally fabricate latch pins slightly longer than those currently used in order to improve the registering of the pins in the locking holes. New latches should be fabricated of aluminum alloy, Specification AN-A-11A in accordance with Northrop Drawing No. 105916, except that the dimension from the centerline of the lock should be increased to 15/16".

During bombing missions, it may be found that when the bombsight switches are turned on in B-25s it will greatly increase the noise level in the headsets on command position. Not only will the added noise be hard on the ears and nerves of crewmen, but at high altitudes it may interfere with radio reception. On investigating the source of the trouble, Capt. Irwin S. Erdman of an AAF proving ground detachment found that the noise is caused by inadequate shielding of wiring, which allows the static from the arcing of motor brushes and governor points of the bombsight to pass into the command radio equipment. He therefore recommends that a low voltage, 0.5 MFD capacitor be mounted behind the stabilizer switch panel, with the case being grounded to the panel and the lead connected to the hot side of the bombsight switch. He reports an 80 percent improvement.



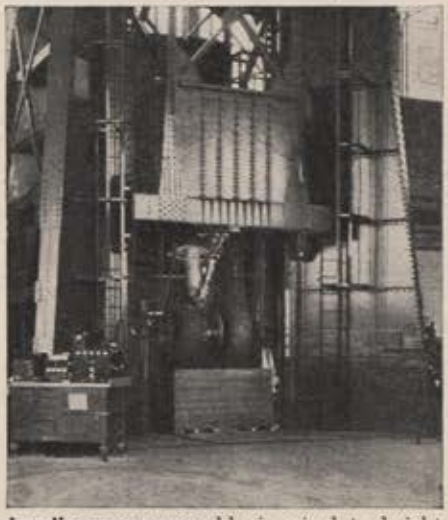
tion of the aircraft and wind measurements were determined by the navigator, who relayed this information to the weather officer by interphone. This data was then coded in WAF-2 and relayed to the radio operator for transmission to Miami Hurricane Center.

Flying conditions encountered in the storm areas varied with each storm, but some consistent characteristics were observed which, according to Maj. I. Irving Porush, Army Hurricane Weather Officer, permit certain generalizations to be made regarding the type of weather encountered. These embraced stratiform clouds making for relatively smooth flying between layers, squall lines forming south of the storm center, greater cumulus and cumulo-nimbus activity in the formative and immature stages of storms than in the mature stages, and relatively favorable flying conditions in the approaches to the storm area and often within the storm itself. It was found that most storms had a very small center, and that it probably would not be encountered at 200 mph or more.

First Lt. Otha C. Spencer, who piloted one of the B-25s, reported the following effects on the plane: Water entered the airscoop and caused a leaning-out of the fuel-air ratio. Water also penetrated to the magneto rotors, cannon plugs of the electrical wiring, spark-plug shields and collected in the rear tips of the engine nacelles. Clogged pitot lines resulted in erratic altimeter and IAS readings, while cylinder head temperatures dropped from a normal reading of 180 degrees C to below 100 degrees C. In addition, loosened rivets were noted along the nose section below the pilot's and copilot's windows, as well as cracks in the engine ring cowling, cracks in the vertical stabilizer and loosened control cables.

Landing Gear Drop Test

Although still used for structural tests, engineers at Wright Field's Structures Test Hangar have abandoned the "hanging" method for functional drop tests of landing gear. Instead, new test machines hoist up landing gear assemblies separately, then drop them with impact forces simulating actual landing. The method is more accurate, requires less time and can be conducted before the airplane itself is constructed, enabling proven landing wheels to be installed without further test.



Landing gear assembly is raised to height of 55 feet in drop test, then brought down with simulated impact of actual landing.

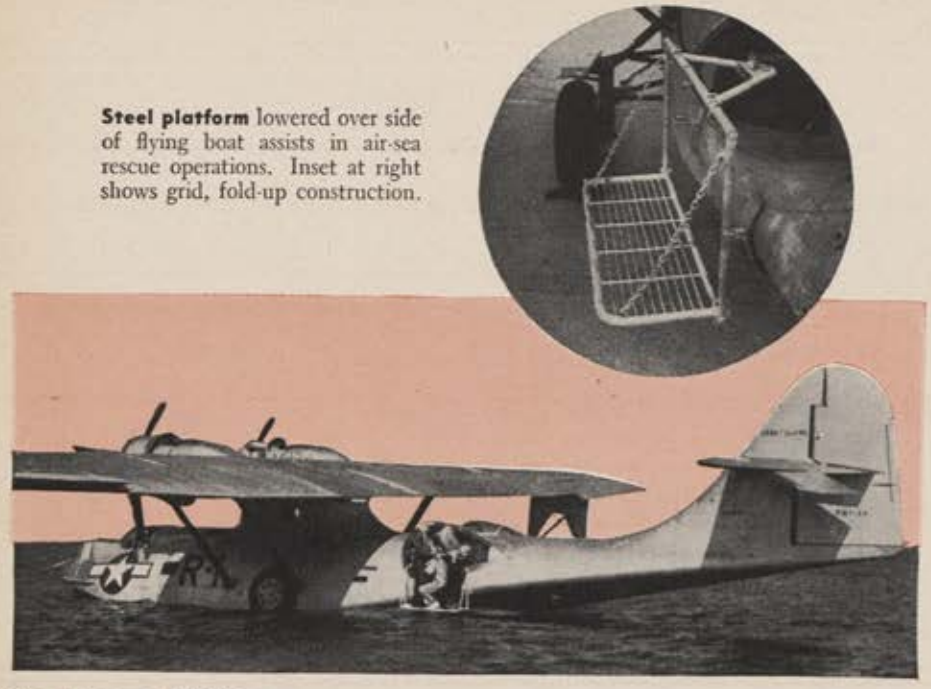
A large steel bucket, filled with buckshot to simulate the total gross load of an airplane, is bolted to the landing gear strut of a complete wheel assembly. A winch hoists the loaded bucket and the gear to the desired height for the test, then drops the rig by a hydraulic release mechanism, while a space-time camera shoots a continuous record on a graphic film, showing how far and how fast the gear drops. Strain gauges measure the loads.

When the wheel is dropped, it strikes an inclined platform which simulates the knee-like backward bending action of a landing gear strut during an actual set-down. For some tests, a small electric motor starts the wheel spinning in reverse before it is dropped, thus reproducing the effect of speed.

Four of these drop test machines are installed at present, and they range in size from a giant that can test the undercarriage of a 500,000 pound airplane to a midget for testing nose and tail wheels. The largest one towers 55-feet above the hangar floor—so high that a hole had to be cut in the roof and a copula built to accommodate its protruding members.

what's wrong with this picture?

"Look at the birdie", for a few moments and if you click with a pic you'll see that these photo maintenance men are doing things with their camera equipment that are strictly for the birds. At least 10 shutter shudders are being committed, but don't take off on a reconnaissance mission to Page 71 to see what develops until you've snapped a few more exposures. The accentuators of the negative are (from left to right) T/Sgt. Earl Schoen, T/Sgt. Cecil Morrison and Sgt. E. Gardner, all of Photographic Laboratory, Engineering Division, Wright Field.



Steel platform lowered over side of flying boat assists in air-sea rescue operations. Inset at right shows grid, fold-up construction.

Sea Rescue Platform

A collapsible, lightweight steel-grid platform attached to the gun mount in the blister of an OA-10 flying boat is now dropped over the side in air-sea rescue operations to help crash victims into the plane. Capable of supporting four men, the platform folds up like a cot when not in use and can be easily stowed inside the hull near the gunner's position. During a rescue, it is held in place by a large steel pin inserted through the gun mount, and by two brackets on the hull itself.

The device was built by the Consolidated-Vultee Aircraft Corp. and may soon become standard equipment on all OA-10 rescue craft.

Helicopter Rotor Test Rig

As part of an extensive helicopter development program, engineers at Wright Field are studying rotor rpm, thrust, torque and coning angle of blades on a specially designed rotor test rig that makes possible continuous research on the ground in any kind of weather and without the risk involved in actually flying. (See Technique cover.)

The whirl test stand consists of a large rotor support made of concrete and steel and a special gear for transmitting power to the rotor from two 300-hp motors. A soundproof, thick-walled control room is provided, and a 12-inch thick oak plank barricade stops pieces of blade when the rotors fail during destructive tests. The rig can whirl rotors larger than any now in existence—up to 80 feet in diameter—and spin them at speeds up to 500 rpm, which is more than double the maximum rotor speed of the Sikorsky XR-5.

With a series of dials, switches and nobs in the control room, test operators can simulate any condition of hovering flight for the helicopter. In a few seconds they can get the rotor up to 300 rpm or accelerate it to any rate desired, and through an observation window they can measure the coning angles of the blades with an ordinary surveyor's level. High-speed cameras are able to photograph any attitude of the blades, and special calibration instruments and gauges measure torque, establish strain in material, indicate rotor rpm and permit calculation of lift forces.

A routine test procedure is to run a calibration test which enables engineers to plot performance curves of thrust and torque versus rpm at various pitch angles. This is followed by an endurance test in which the motor is turned to slightly above normal operating conditions for 100 hours. Then comes a full hour of rotating at excessive speeds, after which the rotor, in many cases, is whirled to destruction.

New Horizon Indicator

An electrically operated Universal Attitude Indicator which will not tumble during aerobatic maneuvers has been developed by Sperry and the ATSC Equipment Laboratory at Wright Field for installation in all fighter planes, including the Black Widow. The indicator will supplant the gyro artificial horizon, and although it involves new techniques in instrument flying, experienced pilots will need only a few minutes to acquaint themselves with it.

The old gyro horizon would tumble in any dive steeper than 60 degrees and in any bank or roll beyond 100 degrees, while the new instrument allows a 360-degree freedom about the roll and pitch axes of the plane. Moreover, it has a "gimbal lock" which eliminates having to cage and uncage in near vertical dives or climbs.

A further difference is that indications are read in a pattern rather than from a line. The stabilized unit is a ball, the upper hemisphere of which is painted black and the lower yellow, with DIVE being printed on the black portion and CLIMB on the yellow. With black showing, the pilot is diving and with yellow visible the plane is in a climb, while in inverted flight the words will appear upside-down. Graduated lines, smaller toward the poles, indicate the angle of dive or climb, and a pilot returning to level flight would fly toward the larger lines on the sphere. The bank scale is the same as in the gyro horizon.

The Universal Attitude Indicator is operated by three-phase, 400 cycle, 115 volt AC, and this use of electricity over the vacuum system of the conventional gyro horizon will give the instrument greater longevity and permit its use in low temperatures at high altitudes. The indicator can be immediately installed in planes having suitable power sources and can be placed in others after modifications. It will be especially useful in the cockpit of jet craft.

New Valve for Oxygen Units

To prevent flak hits from ruining a plane's oxygen supply, the medical section of the Air Service Command, USSTAF have devised an oxygen valve system which provides check valves at regular intervals along the oxygen feed lines so that the network does not go entirely dead when a hit on any of its parts is sustained. In present high-level flights, when a link in the oxygen chain is broken, the check valves protect the supply for the rest of the crew while the affected member, whose mask has gone dead, uses an individual oxygen bottle during the balance of the mission.

Although perfected for use over Europe, the arrangement was utilized in the Pacific air war.

B-32, new bomber in very heavy class, has high wing and nose profile of Liberator, tail of B-29.

B-32—Liberator's Big Brother

The Consolidated-Vultee B-32, latest of our heavy bombers to join the Pacific air fleet, has been designed to take up where the B-24 ends. Originally planned as a larger version of the Liberator, including its twin-ruddered tail and high wing features, the present model is actually a compromise with the B-29, since its tail height of 32 feet compares most favorably with that of the Superfort. In bomb load, speed and range, too, the B-32 is similar to the other, but in size it is somewhat smaller, being 15 feet shorter in fuselage length and 6 feet less in wingspread. Locally operated turret design, indented windshield and the high wing are also distinguishing characteristics.

Maintenance ease and accessibility has received major attention from the designers of the B-32, and engine nacelles are interchangeable at any of the four positions. As a time-saving advantage, it has been demonstrated that a complete engine nacelle, including all accessories and the prop, may be removed from the plane by four men in 1½ hours, cutting the time for a similar job on the Superfort by several hours.

New Versions of P-38

Two new types of Lightning fighters are taking their place in the AAF's scheme of operations—a modified P-38L with two cockpits and special equipment for night fighting and a pathfinder Lightning.

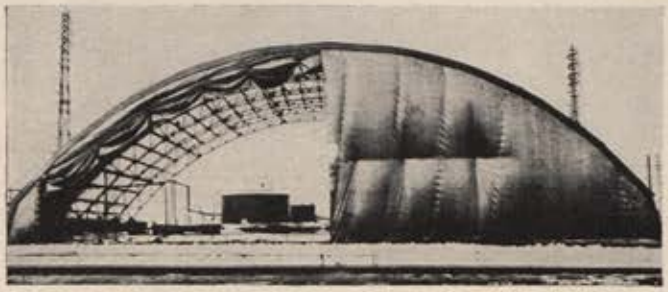
To turn the "L" into a night fighter, engineers moved the cockpit seat forward several inches and added another seat for an observer. The canopy was modified so that the extra passenger could sit upright in a standard seat, and separate escape canopies were provided for both pilot and passenger in cases of emergency. Armament installations remain the same as on the standard fighter model, and it is possible to carry externally hung bombs or fuel tanks. The whole modification adds approximately 500 pounds to the fighter, but has very little effect on its combat performance.

For the Pathfinder installation, special equipment was placed in an elongated nose section and the plane acts as a lead ship, aiming bombs for the entire formation.

Glass Cloth Hangars

Glass cloth, woven of glass fiber yarns and coated with synthetic rubber, or resin, is being used by the AAF for curtains, side walls and ends in newly built hangars at advanced airbases. Structural steel framework and the glass cloth are shipped as a unit, saving shipping space and weight and speeding construction time.

Glass cloth was found to be desirable for this use because of its resistance to the effects of mold and fungi, high strength in proportion to its light weight and the ease with which it may be fitted around a plane's fuselage. Canvas duck, previously used, was subject to rot from tropical dampness, while in Arctic regions would become semi-rigid due to the extreme cold. Glass cloth, on the other hand, has excellent weathering properties and is not affected by extremes of temperature.



To combat fungi in tropical areas, special fabric made of coated glass fibers now serves as sidewalls and ends for new AAF hangars.

Fuel Flow Meter

Flow meters that measure the exact amount of fuel consumption for each engine of the C-54, C-82 and B-29, and visually indicate the figure on an instrument dial, are helping to conserve gasoline on long-range flights. Unaffected by changes in temperature or altitude, the meter provides data to enable a pilot to adjust his mixture controls to obtain maximum power from every gallon of gas.

The Fuel Flow Meter consists of a transmitter and an indicator dial operating on 26 volts from the plane's electrical system. The transmitter has a special fuel-flow measuring mechanism that works like a gateway and is mounted between the fuel pump and the car-

P-38 with special equipment in elongated nose is pathfinder for formation.

buretor on each engine, being wired to the panel-mounted indicator.

Two needles on the dial of the indicator record fuel flow to a pair of engines, and in four-engine planes there are two indicators on the instrument panel. Calibrations on the dial show the rate of flow in pounds and gallons per hour, and graduations range from 100 to 3,000 pounds, or 17 to 500 gallons—enough to record even the highest rate of fuel consumption estimated for future big bombers.

At present, three types of flow meters are in use, but all operate on the same principle. Only the dial faces are different and these vary according to the airplane and its known fuel consumption. The latest type, still experimental, will have an automatic counter which indicates on the dial the total number of gallons of fuel consumed from take-off to landing. ☆

WHAT'S WRONG with the picture on Page 68

1. Using pliers to tighten bolts, as the man at the left is doing, is likely to ruin the expensive K-22 aerial camera. As TO AN 10-10AC-13 points out, use the regulation kit.

2. The slightest jar will knock down the small window glass that is leaning against the camera on the ground, breaking it or impairing its properties of clear vision.

3. Cameras weren't built for men to stand on, as the man at the right is doing.

4. The sergeant at right is holding a K-17C camera by its electrical power cable. This is meant to furnish power to the camera mechanism, not to serve as a handle.

5. He's also smudging the window in the plane's nose with his hand. Dirty windows mean fuzzy prints.

6. The man on the ladder is cleaning a lens, but it's not supposed to be done with a cap. Special tissues are provided for this purpose and should be used.

7. The toolbox on top of the nose is in a precarious position and could easily fall on a man or camera.

8. There's a camera magazine on the wing at left. That's no place for a piece of mechanism so delicate and precise.

9. Coming back to our squatting friend, that screwdriver on the K-22 can easily topple down onto the lens and damage it.

10. Look along the ground to the right, and you'll see a camera magazine lying face-down on the concrete in such manner that its machined surface may be easily marred.

on the line

with mechs around the world

The rip-cord cable on B-8 type parachutes won't tangle with downcoming pilots now that Pfc. Walter Criswell's idea has been adapted at an overseas Air Service Command base. As shown in the picture, the device is simply a canvas loop sewn into the shoulder harness of the parachute through which the cable is passed to keep it from interfering with free head movement.

In the Philippines, photo technicians of the 13th Air Force Bomber Command realized the need for simplifying the settings on K-17 and K-18 cameras, and therefore developed a ring and bead sight that approaches the operating ease of a Brownie camera. Three fixed settings—clear day, dark day and through broken clouds—enable the camera to provide excellent pix. Instrumental in the construction of the sight and mount were S/Sgt. Willis Andre, Los Angeles, Calif., (holding camera) and Lt. Frederic Ford, Charlotte, Vt., supervising installation.

The unusual device in the left hand of S/Sgt. James J. Vokoun, Prentice, Wisconsin, is a specially made propeller wrench which he designed out of salvage materials for use in securing four-bladed props to the propeller shafts of P-51s at his 8th Air Force fighter station in England.

"Don't strain, get a crane," reads a sign in the manufacturing and repair department of an overseas ASC depot where S/Sgt. Joseph Flitter, LaPorte, Ind., helps repair battle-damaged propellors for re-use against the enemy. And Sergeant Flitter, watching his fellow specialists do considerable straining as they removed the 500-pound props from high-wing heavy bombers, went the sign one better. Combing the salvage hangar for a B-17 bomb-hoist unit and a B-24 landing gear retraction mechanism, he was able to convert a standard-model tug into a mobile hoist-and-boom unit with which two men can now drive up to a grounded plane, remove the damage prop and carry it back to the repair shop in a mere 45 minutes as against a previous three-man job that required fully two hours. The boom assembly is raised and lowered into position by a cable attachment.

The "Thunder Dragons" Fighter Group in China must operate from forward fields where facilities are frequently negligible and air lift tonnage must be kept at a minimum. Accordingly, Capt. George L. Timme, Jr., Glenside, Pa., had to keep size, weight and portability in mind when he decided to construct a radio control tower to fill in until a more permanent structure could be built. Scaling at less than 400 pounds, the unit mounts a transmitter-receiver, aircraft battery, generator, a 10-foot collapsible aluminum antenna and a microphone and headset which can be used away from the generator by means of forty feet of cable.

Spurred on by the report in the November, 1944, AIR FORCE, of the prowess of Lightning fighter No. 42-12694, assigned to the 13th Air Force, the men of the Philippines-based 5th now claim they have the new longevity champion. She is P-38 No. 42-12985, converted for photographic work, and has rung up 929 hours of active duty, flying high altitude recco missions over Wewak, Madang, Hansa Bay, Hollandia, Kavieng and elsewhere. Her crew chief is T/Sgt. Herbert G. Roose of Bellingham, Wash.

PRIVATE AIR FORCE

(Continued from Page 59)

to an officer. "Sir, I have information of value to the Air Force. It's about my home town of Fulda, in Germany. I have been watching the newspapers, and Fulda never has been bombed. Yet there is a ball bearing plant there—Gebaur & Moller—and our bombers are attacking ball bearing targets. And the Gummiwerke Fulda A G is a rubber factory. There is an enamel factory that probably is making war materials now. I know the location of those plants."

The officer was interested. He suggested that the soldier see an intelligence officer. Two days later Pvt. Erwin Weinberg found himself transferred to headquarters of the U. S. Strategic Air Forces in Europe. He talked with Maj. John H. Simone. The major definitely was interested. He called for the target folder on Fulda. Intelligence data showed that a ball bearing plant was known to exist at Fulda, but its location was unknown. Intelligence was not sure which of two factories was the rubber plant.

To prove he knew what he was talking about, the private took pencil and paper and drew a rough sketch of the location of the two plants in relation to roads and rivers. Satisfied, the major requested air reconnaissance of the target.

The air forces were busy at the time, preparing the way for D-Day. Other reconnaissance targets had higher priority. Erwin Weinberg worked as interpreter and file clerk for reconnaissance pictures. He hoped each new photo would be Fulda. Meanwhile the attack on ball bearings was discontinued, its purpose of impairing the production of ordnance and aircraft having been achieved. Weren't they ever going to bomb Fulda?

Then one day the major called him in and handed him reconnaissance photos of Fulda. "Can you pinpoint those targets?"

"Yes, sir!" Private Weinberg circled the ball bearing factory, the rubber plant and the factory that had been making enamel.

And then, finally, in August, the major called him in again, and showed him more pictures—strike photos of bombs exploding in the rubber plant and marshalling yards, a reconnaissance picture taken afterwards showing damage. The heavy bombers struck Fulda twice more in December, again in January 1945, and in March. The 9th Air Force sent medium bombers to hit it a last time in April.

Erwin Weinberg collected spare pictures of the bombing of Fulda. His own target, bombed six times on the basis of information he had delivered. The one picture he likes most of all shows where a bomb spilled over the target and made a direct hit on his father's house. This was the house the Nazis took without payment.

"But they never really sent much strength over my target," he says disappointedly. "Never more than 100 bombers or so at a time." However, even that is a pretty fair air force for a GI.

"I think I did all I could for the Army," he says. Few will question this. He is now a corporal, though he doesn't connect his advancement with his contribution towards the destruction of the Fulda targets. He says it's just the T/O.

His one remaining goal on this side of the water is to engineer an inspection tour of his air campaign. He wants to walk over the ground and examine the bomb craters and the demolition. By the time you are reading this, the corporal probably will have realized his ambition. ☆

BEACHHEAD CARAVAN

(Continued from Page 27)

The biggest problem was the placement of operating positions in the receiver trailer. T/Sgt. Bill Rivers of Baltimore, who had been transferred from the crew to another important job, figured out the answer. There wasn't room in the trailer for all the cabinets, desks and chairs—plus the operators. Something had to be cut. Rivers found that one table could be made to do for two operators if he placed the positions side by side facing in opposite directions and separated by a common table with two keys.

Then came the Malabang campaign and the experimental mobile unit was pushed to completion, minus frills and fripperies, but with all the basic innovations. While they began work on the final model, members of the crew sweated out the answer from the task force. The first report came through: "Operation 100 percent successful. Thank God for smooth roads."

The unit had passed the test, but the heavily-packed trailers had proved top-heavy. The solution was to mount everything so that even if the trailers tipped over the equipment wouldn't be ruined. When the final model was road-tested, the equipment held but a wall clock tore loose. All clocks then were mounted on rubber pads, and on the second test they didn't even wobble. That just about completed the modifications necessary to fullfill the requirements of large-scale invasions ahead.

The mobile unit is poised for new beachheads, this time on the Jap mainland. Its development has meant a lot of headaches, but was well worth them, for the trailers will save time, lives and equipment. The headaches of the AACS men were cured with a few hours' sleep. For the Jap, the headaches are just beginning. ☆

Rendezvous

(Continued from Page 3)

mixed. What will the octane rating be? Will it have any effect on an aircraft engine?

Pfc. Thomas A. Ashley,
APO 858, c/o PM, New York City

ATSC says the cost of the original B-29 was $3,382,396.90, with the current production cost approximately $500,000. ATSC experts, again, state that an equal mixture of 91 octane and 100 octane fuel will produce a performance number fuel of 95/112, or an octane rating of 95. In case you are more than academically interested, use of such mixed fuel in a 100-octane engine would cause detonation, piston burning and overheating. Take a look at Tech Order 06-5-1 before mixing.—Ed.

Treating a Plague

Dear Editor:

I'd like to have you clear up a few points for me, if you'll please.

As you know, GIs are known the world over for their "bull sessions" which eventually lead to heated arguments. These are questions that have plagued my buddy and me and I'd like to have them straightened out before we become enemies: Has North American redesigned the wing dehideral of the B-25 lately? Have the latest B-25s still retained the "gull wing" dehideral, or has it been changed?

Pfc. Joe Senjanec,
APO 360, c/o PM, New York City

Spars and ribs in B-25 wing structure have been "beefed up" to increase the safety factor, but the wing's external appearance hasn't been noticeably altered—still the "gull-wing" design.—Ed.

A Case of MEs and JUs

Dear Editor:

Looks like the shot on Page 15 of the July issue really belongs on Page 52 under the heading of "What's Wrong with This Picture?" The two glaring mistakes noticed by the aircraft recognition department of Langley Field are that the plane you identify as an ME109 is really an FW190, and your JU88 is really a JU188.

Langley Field Recognition Dept.,
Langley Field, Va.

Dear Editor:

If that Jerry plane . . . is an ME109, I'll not only eat the ME109 but I'll also eat the JU88 it carries, bombs and all. . . .

Pvt. Ben Grossman,
Squadron D, 243rd AAF Base Unit,
Great Bend, Kan.

The pickaback experts assure us that the Germans concocted several varieties of this makeshift weapon—ME109 and FW190 having been combined with several versions of the JU88, and (according to one report) an FW190-HE111 pickaback having appeared in numbers on one occasion. Of these combinations, however, the ME109-JU88 was much the most common. As for the dual affair pictured in the July issue, top plane is indeed a Focke Wulf; the lower one a JU88G (that is, a JU88 with 188 tail design).—Ed. ☆

WELCOME TO DULAG LUFT

(Continued from Page 17)

Eagle-eyed officials at Dulag Luft could easily identify a prisoner from the 91st Bomb Group if he had one of these pictures in his possession. Photographs carried by personnel from this group had a peculiar brown color. Snapshots of 95th Bomb Group members also were a dead give-away. Every man in this group wore the same checkered civilian coat when he had his picture taken.

Officers' AGO cards often conveyed a number of helpful hints to the Germans. These cards invariably showed where the prisoner had been commissioned, and in some instances, where he had been trained. An AGO card issued at Langley Field or Boca Raton indicated its owner probably had taken blind bombing training. Naturally, the Germans subjected these particular POWs to intensive grilling.

Allied training operations always were a subject of prime interest to the Luftwaffe. Air training always is a good indication of what the opposing side has up its sleeve. It provides a reliable gauge of how fast replacements are coming in to take their place in combat; it also furnishes a tip-off on new weapons or tactics.

Dulag Luft interrogators found many of their captives willing to talk about purely training matters. Some POWs did not believe there was much military security involved in routine training activities since so much publicity had been given the training program during the early years of the war.

Considering the extensive volume of highly-secret operational data that constantly streamed into Dulag Luft it is a wonder that Allied air losses were not larger.

Frequently, the log books and briefing notes recovered from Allied aircraft contained remarks on the effectiveness of flak, smokescreens or other enemy defenses encountered during the mission. This made highly important reading for the Germans for it showed them the effectiveness of their anti-aircraft defenses.

Captured literature oftimes indicated the location of targets that were scheduled for Allied attack. Although the Germans once gained possession of the RAF's target folder, the dossier at Dulag was kept current largely through various fragments of information that come in from time to time.

It was not uncommon for large German manufacturers to ask the Luftwaffe if their factories were on the list, and if so, when they could expect to be bombed.

While interrogating prisoners, the Germans took great pains to impress them with the fact that there was little the captive could add to the Luftwaffe's already large stock of information about the Allied air forces. This was done with the obvious intent of inducing the prisoner to talk.

The majority of Allied airmen passing through Dulag Luft had undergone preliminary questioning by some German official agency near the point of capture. Results of this inquiry usually were sent on to Dulag before the prisoner.

Upon his arrival in Frankfurt, the average prisoner usually was placed into solitary confinement while the interrogators studied all the data available on him. Dulag Luft had a large biographical library, material for which had been obtained from various sources, including American and British newspapers and magazines. Service journals and army publications, found in great abundance in crashed aircraft and in the pockets of prisoners, always proved a fertile ground for biographical matter.

Dulag Luft's historical section possessed voluminous data on various Allied squadrons and groups, all of which was available to the interrogator preparing to question a particular prisoner.

For the most part, Allied airmen remained silent during the questioning process. Interrogators often threatened to call in the Gestapo when a POW refused to talk; prisoners arriving at Dulag Luft without identification tags were warned they would be shot as spies if they persisted in being uncooperative.

This sort of treatment was the general rule for the rank and file of air crews. Higher ranking officers, lieutenant colonels and above, were handled with more refinement. For them Dulag Luft reserved its "wine, women and song" method. It was customary to invite them to the officers' mess or to a hunting lodge near Frankfurt where their German hosts discreetly sought to pump them for information during the course of friendly conversation over the dinner table. In some cases, however, the Germans felt no compunction about throwing some of their high ranking "guests" into solitary confinement if they felt there was any chance of breaking down their resistance. Col. Hubert Zemke, commanding officer of the high-scoring 56th Fighter Group, said he spent nearly three weeks in solitary while the Germans tried vainly to make him talk about his knowledge of the Soviet Air Force.

But toward the close of the war, with defeat just around the corner, some of Dulag Luft's top personnel spent more time trying to ingratiate themselves with high ranking prisoners than they did to ferret out Allied secrets. One captured American colonel was offered the opportunity to escape to Sweden if he would agree to take along the two sons of an important Luftwaffe officer. On another occasion, several German Air Force officers asked their "guests" for advice on how to escape punishment when Germany capitulated.

The chief of Dulag's air documents section, now a prisoner himself, commented that captured air crew members simply failed to recognize the importance of the information that could be pieced together from seemingly innocuous documents. In many cases, he said, the ordeal of interrogation would have been lightened for prisoners had their German captors not discovered some extra bit of documentary evidence which gave them a fresh lead or clue that otherwise would not have been obtainable. ☆

They all meet at Hickam

After V-E day the crossroads of the Pacific became the crossroads of the world

ATC brings personnel from all branches of the service into the terminal at Hickam Field

Customs inspects baggage for uncensored photos, classified documents, dutiable material

Somebody once said that if you sat on the veranda of Shepherd's Hotel in Cairo you'd meet everyone. However, he never stipulated how long you had to sit. But there is a guarantee now that you'll meet almost everyone in the U. S. Army who travels by air if you sit on the concourse of the new air terminal at Hickam Field, Honolulu —and you won't have to sit very long. For Hickam is the funnel through which all air traffic must pass between the States and any country or island in the Pacific. In June, 1945, over 31,000 passengers came through the ATC terminal at Hickam Field. As the redeployment of troops and aircraft from ETO to the Pacific stepped up this number was steadily climbing until within a few weeks it was more than double. ATC's Hickam operation has proven so successful that installations similar to this one will soon be erected at important ATC bases throughout the Pacific. ☆

Wounded from Okinawa and Guam are shuttled to another C-54, taken to San Francisco.

In addition to coffee and doughnuts, this canteen dispenses plenty of fresh pineapple.

The Intercom

As a medium for the exchange of ideas, AIR FORCE presents these answers to its Question of the Month. Replies are those of personnel recently returned from combat duty in the areas indicated.

QUESTION: What was the most interesting letter you received while overseas?

1st Lt. Emanuel Greenberg, communications specialist, 20th Air Force: "When I was in India, I received a letter from a friend of mine who was stationed only thirty miles away from me. But the letter had gone to the United States, chased me all around my past stations, and traveled more than 30,000 miles to end up just a short distance from where it had been written originally. The letter told me all about India—the monsoons, mosquitoes, and snakes — a laugh because I was right in the middle of them. Instead of answering it, I just went over to see my friend."

Maj. Sherman Wilkins, pilot, 20th Air Force: "A major I knew with a B-29 group in the states wrote to me when I was in India. He kidded me about what our planes were doing against Japan. He said that he had heard some place that some sort of airplanes which he assumed were Superforts had bombed Tokyo. At the time, we were the only outfit attacking Japan and he knew it. But he was always very envious that I had got into action before he did and he told me how much he looked forward to combat. It has a tragic ending, however, because he is now missing."

T/Sgt. Peter Perhach, radio operator, 8th Air Force: "I was sweating out my kid brother who was a radio operator in a tank on Iwo Jima. My sister wrote and told me that he had been wounded. Then I got a letter from him. He said that he had been hit but it was only a flesh wound and he was back in action. That was the best news I had ever received. I was wounded on my 20th mission and spent 5 long months in the hospital, but my brother really had the rough time. I certainly don't envy the ground forces. Give me an airplane everytime. It's much less dangerous."

Sgt. Robert J. Byrne, armorer, 5th Air Force: "I wrote to my girl and asked her to marry me. I certainly sweated out the answer to that letter. And it was sent just around the time when our mail deliveries were slow. The reply finally came—she said 'yes,' and we were married when I returned. I still have the letter. It took her eight pages to say she would be my wife. She wanted to know why I had never asked her when I was in the states. And she told me to return soon because she didn't want to have the longest engagement on record. Thirty-nine months later we married."

Sgt. Robert Krewson, gunner, 20th Air Force: "I had bailed out over China and my folks were notified that I was missing in action. I returned just two weeks later to find that our navigator had come back a day before me and he had wired the family that I was safe. Then I received a letter from them saying that they had the news of my survival. I had been worried about how the family would hold up under the shock of my being reported missing in action. When they assured me that they were all right, I certainly felt wonderful. That was the best letter I have ever received."

T/Sgt. Gailer Minster, gunner, 8th Air Force: "The news that I was the father of a son. The baby, John Frederick, was born on January 26 and I got a letter on the first of February. I had been on 26 missions when I received the letter, and I had been worrying about the baby and the missions at the same time. My wife told me that our 21 months old daughter thought that her new brother was quite a fine fellow and that everybody wanted me to get home in a hurry. Then I was even more anxious to finish my tour of duty. About a month later, I flew my last mission and returned."

ABC OF RADAR

(Continued from Page 20)

lot of different names for it, but at least we learned it wasn't Jerry."

And there was that "enemy convoy" on the Tiber. This was about three years after the Iceland fiasco. Late one afternoon during the critical days at Anzio, one of our radar stations there picked up a number of surface targets up north in the mouth of the Tiber that looked like enemy shipping. The group of ships appeared to leave the Tiber and swing out into the Mediterranean where they were tracked heading south in a sort of semi-circle toward Anzio. Forty-three "ships" were counted in the convoy as they showed up on the radar scopes.

The word was passed on to headquarters and some Spitfires were sent out to investigate. They returned about dusk and reported seeing nothing.

"What altitude were you flying?" the flight leader was asked.

"Ten thousand."

"Well, for hell's sake, how do you expect to spot a target at dusk from that height? Go back in at 300 and see what you can find."

The Spitfires flew back, searched the area and informed Anzio headquarters that they had located three small ships and had drawn fire from one of them. That was all.

But the radar continued to pick up the signals, the targets were being tracked at the rate of speed that ships would travel and everyone was getting worried. The Navy sent some PT boats to scout around. They found one enemy vessel and exchanged fire, claimed they could find nothing else.

By this time it was really dark, and PT reports or no PT reports, the convoy's tracks were only 12 miles offshore, heading toward Anzio. Fifth Army had not expected this sort of coup from the Germans and frankly were unprepared for it. Headquarters was in an uproar. Most of the artillery was in inland in the front lines of course, so the antiaircraft boys began ripping down their sandbags on the seaward side and depressing their guns so as to be ready to fire on the surface ships.

All outfits had been alerted by 2100, and in the darkness they sweated it out. Minute by minute the radar tracked the convoy nearer. Just about the time that enemy guns could have been expected to fire on the vulnerable beachhead positions, the entire "convoy" came right in over the shoreline, floated directly over Fifth Army heads and turned towards the mountains, quite the most ephemeral ships since the Flying Dutchman. The 43 targets had been a nice cluster of wispy clouds at zero elevation which had rather inconsiderately behaved like an armada.

Radar is new, much of it is still in the experimental stage, and many of the sets have been constructed in a desperate race against time and the enemy. A good deal of it is still an unknown quantity—even for the experts—and radar men have learned that the only thing they can take for granted about it is its unpredictability. This, they are quick to point out, can be chalked

up, not to any shortcomings inherent in the radar, but rather to the failure of the men themselves to comprehend completely all its complexities. Sensitive to any aspersions cast in the direction of their sets, experienced radar men will argue, "There is nothing wrong with the equipment. It is as nearly perfect as scientists can make it, and its capabilities are nothing short of fantastic. But we can't expect to understand it thoroughly overnight and until we do strange things may continue to happen now and then."

And for every illustration of radar's capricious nature, such as the two above, radar operators will swap you hundreds like this one, incidents which collectively did much to swing the balance of war in our favor at a time when the enemy had the edge in superiority of numbers:

King George VI one night paid a visit to a Ground Controlled Interception station during the Battle of Britain. It was the first time His Majesty had visited any of the "most-secret" GCI stations, and the operators crossed their fingers and hoped the "gadget" would do them proud. They could scarcely have hoped for the dramatic demonstration that resulted. Thousands of feet above the heavily concealed, solid concrete room where controllers sat in front of the scopes, an RAF night fighter, "controlled" by the GCI, was attempting an interception with a Jerry raider.

Patiently the controller explained to H. M. the complicated workings of GCI radar, how enemy raiders were picked up and tracked at night, and how the Beaufighters were carefully vectored into position *behind* the foe. While he was talking, the controller kept his eyes on the two white dots on the PPI (Plan Position Indicator) scope that showed up every time the needle went round. One dot represented the enemy, the other the Beaufighter. As he saw the RAF plane being directed into position for the kill, he explained to the King, "Any moment now our pilot will begin to fire."

In a few seconds when the needle swung around the scope again, the controller knew the night fighter pilot had hit his target. Calmly he turned to King George and said in a very matter-of-fact voice: "If Your Majesty will kindly step outside the building, he will see the enemy raider coming down in flames."

The King stepped to the door and looked at the sky. The Nazi plane, enveloped in flames, was plummeting to the earth before his eyes. ☆

PICTURE CREDITS

28, 29: U. S. Navy Bureau of Aeronautics. 30: Piper Aircraft. 31: Aeronca, Republic Aviation, Luscombe, Stinson, Piper Aircraft. 51, 52: Sgt. Cecil L. Riley. 64, 65: Lockheed. 69, 70: Consolidated Aircraft.

All other illustrations secured through official Army Air Forces and Signal Corps sources. Requests for prints of photographs for official use and publication appearing in AIR FORCE should be directed to the AAF Photographic Library, Headquarters, AAF, Washington 25, D. C.

The Versatile B-29

Someone decides we need a big bomber capable of flying very long range and bombing from high altitudes, around 25,000 feet or more. So we get the B-29. Someone else decides we need to burn up Jap targets from altitudes of between 5,000 and 7,000 feet. So we use the B-29. Comes the invasion of Okinawa. It is decided that Jap fighter strips on Kyushu need to be neutralized. So the B-29s are ordered to do the job. And now B-29s up and make like fighters.

"Shrimper" was one of a force of B-29s attacking Usa Airfield, Kyushu. April 26th was a bad day with a complete undercast. "Shrimper," commanded by 1st Lt. Charles H. Lamback, dropped its bombs by instruments. Lieutenant Lamback was rather unhappy about not being able to see how much damage he and his squadron had done. So, instead of making a run for the coast, he looked for a hole in the clouds, found one, broke through to come out directly over the airfield. He made a preliminary run over the field while the crew located the bomb hits. They also saw six Bettys parked beside the strip. The gunners asked for permission to shoot at the Bettys, and Lieutenant Lamback could find no good reason for refusing their request. They made another run over the field, the gunners strafed, and two of the Bettys were seen to burst into flames. That seemed like pretty good results, so they continued their run, strafing dock area buildings and shipping. Thus "Shrimper" and its crew have the distinction of being the first Saipan-based B-29 to make a daylight, low level strafing attack on a Jap home airfield.

But it's something even newer in the life of a B-29 when it flies fighter cover for a Naval vessel. Two of them managed this unique tactic on the same mission.

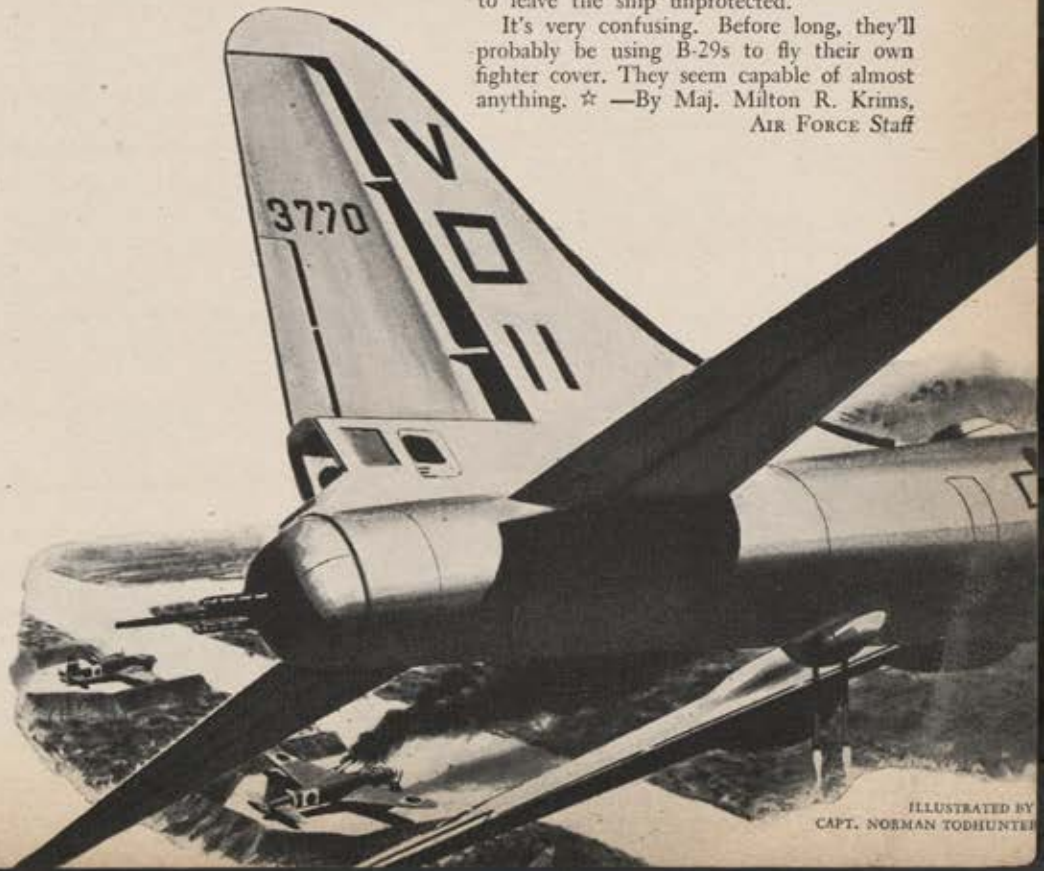
This particular day two B-29s, acting as Super-Dumbos, were flying their prescribed sectors. One was piloted by 1st Lt. John H. Buck, the other by 1st Lt. Alfred Stendahl. The B-29s were bombing Miyakanojo Airfield on Kyushu. The Super-Dumbos were flying air-sea rescue for this mission as well as searching for a crew that had ditched the previous day.

Lieutenant Stendahl's Super-Dumbo located some floating debris, then sighted an American survivor on a raft. Then they sighted several small Jap surface craft heading toward the floating debris. Lieutenant Stendahl put it very simply: "We strafed them from mast level and sank four." As an afterthought he added, "The others hurried back toward Japan."

At the same time Lieutenant Buck's B-29 was flying over a naval vessel, directing it toward a crew that had just ditched. Suddenly enemy fighters appeared. Lieutenant Buck squared off his B-29 to defend the naval vessel. "First," said Lieutenant Buck, "a lone Paul made an attack. We chased him, firing our forward guns. We ran him down so fast we had to make a 360° turn to avoid passing him. Then we went after him again and had to break off to prevent a collision. But our right gunner, Sgt. Louis Cutler, got him. He spouted smoke, then flames, finally crashed into the sea.

"We returned to the ship just as another Paul was coming in. We chased him, and when he saw us he left. We didn't want to follow him too far because we didn't want to leave the ship unprotected."

It's very confusing. Before long, they'll probably be using B-29s to fly their own fighter cover. They seem capable of almost anything. ☆ —By Maj. Milton R. Krims, AIR FORCE Staff



ILLUSTRATED BY CAPT. NORMAN TODHUNTER

NAAFW Scholarships

Sgt. Bill Jones was in the Air Corps when most of the AAF's present members were still in grade school. He was already in the Philippines when war clouds were gathering in the Far Eastern sky. What happened to him there—and many like him—has already been seared into the mind and heart of America. Taken prisoner when Bataan fell, he endured the savage torture of the infamous "Death March" only to die later in prison camp of malnutrition and disease.

When he died, Bill Jones was 39. Back home he left his wife, Sarah, and four children. Two of them, both with brilliant records in school, are ready for college or vocational school. The sooner they finish their training, the sooner can they earn their own living and ease the financial burden on the family. But a widowed mother's budget can make no provisions for the tuition fees this will require. Sarah shakes her head, wishes there were some way she could give her children the education they need.

There is, Mrs. Jones. This is it:

You have not been forgotten. There are hundreds of Bill Joneses, hundreds of AAF men who have died in enemy prison camps. Many of them left behind sons and daughters who are, or soon will be, in need of financial assistance to help them complete their schooling.

For more than a year now a group of women volunteers, all of them wives, mothers, sisters or daughters of AAF men, have been quietly making plans to take care of these cases. To date, the Scholarship Fund of the National Association of Air Forces Women has in it, as a modest beginning, $17,000 to be put to immediate use as loans and scholarships for those eligible to receive it.

Unfortunately the record of deceased prisoners of war, particularly those who have died in Japanese prison camps, is incomplete. As a result the NAAFW is unable, in many cases, to communicate with the very persons for whom the fund was set up. Mrs. Henry H. Arnold, president of the association, reports that the NAAFW is anxious to get in touch with the widows of men who have died in enemy prisons and who have children eligible and in need of help from the scholarship fund. These individuals are urged to write to the National Association of Air Forces Women, 1702 K Street, NW, Washington 6, D. C.

Scholarship funds have been raised by private donation, contributions from servicemen, and by a portion of the profit made from the sale of NAAFW members' silver wings. Mrs. Howard C. Davidson heads the committee in charge of the project and is assisted by Maj. Gen. Frederick Anderson, Col. Corrin L. Strong, Lt. Col. Carl McClure, Maj. Edward A. Bradunas, Mrs. Oliver P. Echols, Mrs. Arthur W. Vanaman, Mrs. Lawrence Kuter and Mrs. William Crom.

"Eventually, as the organization's funds expand, it is hoped to broaden the scope of this scholarship program to provide assistance to many more hundreds of families of air force men killed in battle," Mrs. Arnold said recently. "But for the moment we must limit it to the children of those who died as prisoners of war."

At the present time, the scholarship program constitutes but one of many welfare projects being carried out by the NAAFW. Members of the organization, all working on a volunteer basis at every airbase in the U. S., have set up housing committees in crowded cities and towns adjacent to AAF stations, supervised day nurseries, worked in post hospitals, contributed thousands of hours to the Red Cross, worked as volunteer chauffeurs, receptionists, librarians, waitresses and cooks, assisted post chaplains and Personal Affairs officers, and taught classes for the AAF's Convalescent Services Program—just to name a few activities.

Since its organization on February 8, 1944, more than 40,000 air force women have asked to be enrolled as members-at-large in the association; still another 35,000 are actively affiliated with the NAAFW as members of AAF Women's Clubs throughout the U. S. More than 22,000 wear the official wings of the group.

All profits made on the sale of these pins are used to carry out the work of the organization. Cost of the wings is $1.80, including federal tax; to be eligible to wear them, an individual must first be a member-at-large of the association, annual dues for which are $1.00. An AAF officer or enlisted man wishing to enroll a woman relative in the NAAFW must therefore enclose with the application a total of $2.80 together with his grade, unit and serial number as well as the relationship and address of the person for whom he is taking the membership. ☆

GUERRILLA LIGHTNING

(Continued from Page 9)

city. Almost like magic 1,000 Volunteer Guards materialized and the trek was started. Most of the way there had been no road, but the guards had built one. In some places there was too much mountain. The guards harnessed jeep and trailer with ropes, bodily hoisted them up the side of cliffs and lowered them down mud-slithering walls.

They made the trip in the almost incredible time of 30 hours. Behind was a barbed wire telephone line of 35 miles.

Aerial pummeling of Cebu installations began at once. Indicating a healthy respect for American bombing, the Japs disposed troops around unlikely targets, like Guadalupe church. Their stores were in tunnels and caves. The controller called for 1,000-pound GP and jellied fire bombs.

Installations were burned and mauled, then the target shifted to dispositions facing guerrilla lines.

For the safety of the guerrillas, ground markers came into play. Panel sheets were laid out to designate both friendly positions and the Nips. When the Nips imitated the panels to confuse the pilots, the guerrillas outfoxed them with a variety of symbols.

As an added precaution to assure precision bombing, the controller often had pilots drop one test bomb. With any corrections necessary, the next run delivered the works.

At times, close work in strafing was controlled by a guerrilla observer in a P-61 Black Widow. It worked well. The Lightnings or Corsairs would tack on behind the Black Widow and head on the target.

By March 12 the Japanese command had apparently decided something must be done about the accuracy of the fighter-bombers. One way was to choke off Tuburan strip—both a supply funnel and emergency landing-field—and maybe corral the support team in the hills. The move to Tuburan would also relieve pressure on Cebu City.

A message reached air support team from Colonel Cushing:

"Proceed at once to Taburan strip; 1,500 Japs with 500 reserves are attacking."

When the team arrived, the Japs were four miles away and the field was socked in. Leyte had planes, but it, too, was weathered in. On the field were two F4Us which had flown dusk patrol the night before and set down at Tuburan on bad weather reports from Leyte. The pilot's decision to stay over was influenced somewhat by the prospect of a guerrilla-cooked chicken and steak.

With a ceiling under 1,000 feet, their airplanes rearmed with ammunition from crash-landed planes, they made one pass on the Jap lines. That was that—they had no more starting cartridges to get up again.

The Nips had been scattered, but they were re-forming for another assault. Even the guerrilla regimental commander—outnumbered and outgunned—was ready to admit the strip was doomed.

Suddenly two lone P-38s of the Jungle Air Force Ringmaster Group winged over, heading home after a cover mission.

Hopefully, controller contacted them.

"Have you gas and ammunition enough

to handle an emergency mission for us?"

"Roger!"

Orbiting the battleline, the pilots were briefed on the most difficult target there is—a zig-zag line, something like this:

"See that bridge and tall tree beside it?"

"Bridge—tall tree—Roger."

"From there to the schoolhouse. See?"

"Schoolhouse. Roger."

"Then to where the third creek empties into the river."

"Roger."

"Now back to a point crossing the road at the bridge by the crossroads."

Finally the jigsaw was traced. The steeplechase was on. On the second pass, a pilot's jubilant voice came in.

"Hey! There's a whole mob of guys running down the road headed north."

The controller: "It can only be Japs—go get 'em!"

The pilot, a moment later: "Whoopie! Lookit 'em go."

When the pilots came back, one called, "I'm on my return run and they're still lying all over the road."

Those two pilots saved the strip. What was left of 2,000 Japs were scattered so badly the guerrillas took a two-day rest.

From then on, there was no peace for the Nips; they were herded by fighter planes and heel-sniping guerrillas.

On March 21, Guerrilla Team No. 1 received its final communication from headquarters:

"Have your team at Tuburan 0830, 23 March, to be lifted up this headquarters."

There was no doubt of the mission's success, despite being one of the first of its kind, in the face of adverse weather and terrain and against a better-armed, numerically stronger ground force.

Reasons boiled down to radio equipment which was operational the entire 37 days, guerrilla liaison which was fast and accurate on vital targets, and pilot savvy.

On the morning of March 25, units of the 8th Army's American Division stormed the beaches south of Cebu City. Within 48 hours of bitter fighting, the Division had taken the capital. ☆

Answers to Quiz on Page 62

1. (D) 10 years and 2 months
2. (D) jet propulsion engines
3. (B) B-29 photographic plane
4. (B) 225,000
5. (C) 10
6. (A) bridges
7. (D) 300,000,000 miles
8. (A) Oscar Mark II
9. (C) 18
10. (D) Raised upward, with hands grasping risers
11. (B) 10 percent
12. (B) B-24
13. (C) 120,000 lbs.
14. (B) false
15. (B) 1,000 feet
16. (D) Staying airborne for six days
17. (B) $50
18. (A) Maj. Frederick A. Borsodi
19. (B) 30,000
20. B-24 (Recaptured in Salsburg, Austria)

FLOATING DEATH

(Continued from Page 6)

Navy's request, hit the Tachiarai and Oita airfields and the Omura Aircraft Factory, all on Kyushu.

Photo reconnaissance indicated almost immediate results. All shipping through Shimonoseki had stopped; other shipping in the western part of the Inland Sea seemed to be frozen. As so often before, the enemy had been surprised. He could be expected to take immediate countermeasures, but he wasn't given much opportunity. Again in late March B-29s of the 313th Wing mined Shimonoseki and Hiroshima and added Kure and Sasebo. These missions were the largest aerial mining operations ever attempted.

When American forces landed on Okinawa, April 1, Kure was again mined. Photo reconnaissance showed one Jap fleet had moved to several different positions, evidently in an unsuccessful hunt for a passageway through the minefields. So far, no naval vessels had gotten out of the Inland Sea to engage our forces operating against Okinawa.

Mining operations continued during early April. Despite frantic attempts by Japanese minesweepers Shimonoseki was impassable and most of the Japanese fleet units at Kure and Hiroshima were unable to get by the surrounding minefields. The only way out was through Bungo Suido.

Finally, the 42,000-ton Yamato, accompanied by six smaller craft, proceeded toward Okinawa in an evident attempt to interfere with our operations. A B-29 of the 73rd Wing flying a routine weather mission and commanded by Lt. J. W. Rawlings, Jr., sighted the Yamato and its escort. Shortly thereafter, aircraft of Task Force 58 sank the Yamato, biggest, newest and last of its class before it ever got within sight of Okinawa. Neither Captain Grossman nor Commander Johnson claims mining sunk the Yamato; they state simply that the mining operations made it impossible for the Yamato, whatever its intentions, to leave the Inland Sea by any way other than Bungo Suido.

The Japanese increased their minesweeping. When usual tactics failed, they sent out suicide squadrons composed of small boats approximately 50 to 75 feet long, evidently designed to explode the mines on contact. Even then results for the Japanese were most unsatisfactory.

The Okinawa campaign support revised the order of precedent but not the overall mining plan. The mining operations blockaded shipping to and inside Japanese home waters yet they were essentially tactical and intended to support the Okinawa operations. However, they were an integral part of the strategic scheme and supplemented the strategic bombings of Japan by the B-29s. They blended into the next phase of the mining plan which was designed to assist in the destruction of Japanese productive power, both military and civilian, by completely paralyzing Japanese shipborne commerce between its industrial cities. This second phase began in mid-April with the mining of the entire Inland Sea area, plus Tokyo and Nagoya. Within three weeks mining had seriously injured the supply lines between the individual cities of Japan bordering on or connected by railroad with the Inland Sea ports. No merchant shipping was seen in the Shimonoseki Strait, very little was moving in the interior, very little in the exterior. The Japanese radio publicized a warning that passage of evacuees from the burned out areas could not be accomplished for an indefinite period due to the closing of the Strait. It was estimated that of 650,000 tons of raw materials and food bound for the Empire during the first 20 days of the mining operations over 500,000 tons were prevented from being delivered. And during this time, Japan's great industrial cities were being hit by incendiary attacks that burned up stockpiles and factories as well as great food centers. Losses in food imports alone must have added tremendously to Japan's myriad problems. The only solution was to divert shipping to the northern Honshu ports.

Now the B-29s really reached out. Starting in the last weeks of May they mined Tsuruga, Miyazu, Maizuru, and even Niigata in the longest mission ever flown over the Japanese homeland by a B-29. The Japanese were forced to suspend movement of ships to these ports. They made frantic but futile attempts to sweep the mines infesting their waters. Finally, in desperation, they sent their ships through anyhow, absorbing their losses in an almost suicidal attempt to obtain badly needed supplies.

Then began the third phase, the all inclusive job of throwing a ring of mines around the home islands of Japan—a job that is certain to help immeasurably in bringing the Pacific war to a faster close. Meanwhile, the great B-29 attacks on Japan's cities were growing daily. The Japanese were finding it increasingly impossible to raise and distribute enough food to sustain the population. And food imports were dropping all the time because of the minefields planted by the B-29s in Japan's harbors and shipping lanes. Yet much of Japan's shipping will continue to be sacrificed to feed iron, coal and other necessities to her war machine. It is not unreasonable to assume that if the government's present policy persists there will not be enough shipping left to feed the people of Japan even after peace has been restored. The people of Japan face not only defeat but starvation.

On April 7, the 21st Bomber Command received the following message from Admiral Nimitz: "The Navy is gratified at being able on Army Day to congratulate the 21st Bomber Command on its outstanding achievement in completing the very effective mining operations reported yesterday. This project, like all your operations to date, has been executed with precision and determination which arouses our admiration. It is a definite contribution toward winning the war."

Commander Johnson, Captain Grossman and all the other mining enthusiasts with them are particularly happy about that last sentence. They believed for a long time that mining would be exactly that. It was gratifying to have their faith justified. ☆

SHOOTING THE BREEZE

Got any good stories?
Send 'em in!

Southwest Pacific. Two correspondents for AIR FORCE had just strolled out of a mess hall at an island airbase when they noticed a comely native girl coming up the road. She came on gracefully, looking neither to the right nor the left. As she passed, one correspondent clutched the other for support and they both gave the girl a second

take. Her button-down-the-front dress was securely fastened by eight Good Conduct Ribbons.

China. An ATC pilot reported the following telephone conversation with the weather office at an advanced fighter base where he landed recently:

"Hello," the pilot said, "will you give me the winds aloft?"

"Who is calling?" the weatherman asked.

The pilot identified himself.

"Oh, good!" the weatherman exclaimed. "When did you land?"

"About 30 minutes ago."

"What did you find the winds aloft?"

"Oh, about 260 degrees at 30," the pilot answered impatiently.

"Well, thank you very much," said the weatherman and hung up.

U. S. A.—Fortunate is the airman who has escaped the sodden wit who says morbidly, "If this parachute fails to open—bring it back." Lt. Ralph L. Watts, trainee pilot at Bartow, Fla., had an experience which finally matched the advice. Forced to abandon his P-51 when fire developed in the cockpit, Watts jettisoned his canopy. The next moment the pilot was struck by some unidentified object and knocked unconscious. When his mind cleared he found himself floating through space and safely to the ground, his parachute functioning perfectly. Inspection of the chute revealed that the ripcord handle had not been pulled and that the packer's seal on the bottom of the chute was still intact.

India. American soldiers in this region have not impressed the natives as being the sharpest traders in the world. Yankee cleverness has not always been apparent when the GI deals on a business basis with jewel wallahs.

Recently an AAF mechanic was buying such a bauble from a jewel wallah. He had been assured that his rupees were being spent for a rare gem, worth a hundred times the purchase price.

The mechanic was reaching for his billfold when the salesman, who obviously couldn't read English, made the mistake of proudly exhibiting a chit (letter of recommendation) from his last customer. It read:

"To Whom It May Concern, Beware! This thief took me over for half a month's pay. He sold me a sapphire and I sent it to my girl. She sent it back and said 'I drink cokes out of better glass than this'."

Florida. At an ATC Ferrying Division field there is a current drive, ordered by the Provost Marshal, to round up all stray dogs. Consequently, about once a month,

the MPs shift their attention from rolled-up sleeves to GI pups without dog tags. At such times, however, the catch is always small. The dogs seem to know when the heat is on, and by the same instinct they reappear when the search is over.

The other day, the sergeant of the guard screamed his jeep to a stop in front of the consolidated mess and jumped out, ready to sweep up a load of dogs. But there was not a pup in sight.

"All right, you jokers," the sergeant demanded irritably. "Who's been tipping them off?"

Germany. The commanding officer of the 9th Air Disarmament Group at Nellingen, near Stuttgart, had asked his sergeant to put through a telephone call. A short time later the sergeant reported that he had

been unable to reach the desired station.

"How did the operator route the call?" the CO asked.

"The usual way," said the sergeant, "Blockbuster to Thunder to Growl to Murmur to Whisper."

"Well, try once more," the officer said.

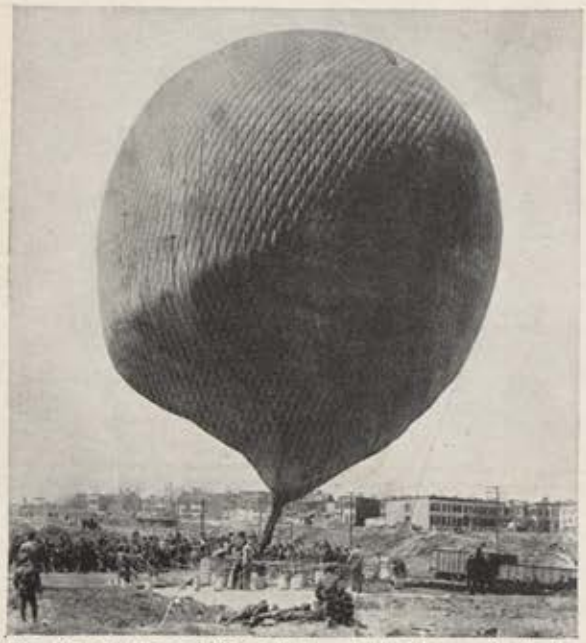
After another half hour the sergeant reported failure again.

"We can get Blockbuster to Thunder to Growl to Murmur to Whisper," the boy said, "but we can't hear Silence at all."

India. At one station here the accent has been upon good housekeeping. Everything is kept in order. A cigarette in the street is considered profane. Order and cleanliness reign. In order to get along, put trash in the trash can, ashes in the ash can, garbage in the garbage can—and don't touch the fire buckets which are neatly labeled: For Fire Only.

The only disruption of this idyllic state occurred recently when a native civilian took the "For Fire Only" sign too literally. The man poured out the water and dumped in some trash. It was burning merrily when discovered. ☆

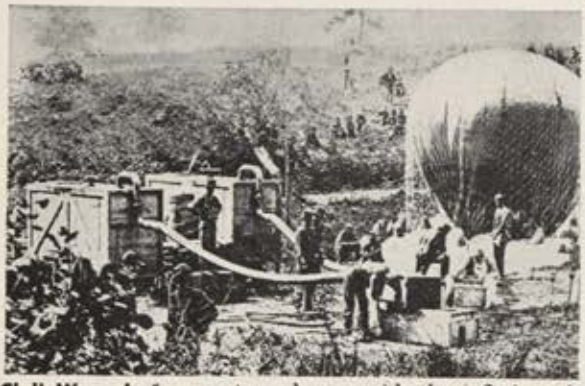
The Album LIGHTER-THAN-AIR



The Signal Corps balloon boys got this bag up into the blue with compliments of the Washington, D. C., Gas Co.

Here's Charley Jones who got this soggy football off the ground with the help of a Curtiss engine at his back.

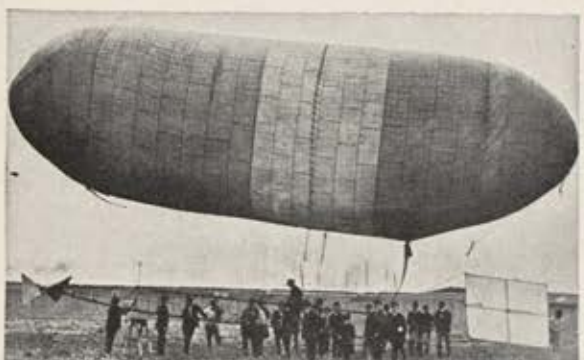
Baldwin's airship, the "Signal Corps No. 1," is shown during a test over Fort Myer, after its purchase by the Army.



Civil War air force gets underway with the inflation of the balloon "Intrepid" during the battle of Fair Oaks.

Whoever met Looie got a front seat at this Gordon Bennett International Race, held in St. Louis on October 21, 1907.

The Peoria balloon was really cooking with gas when it won this well-sponsored race at Peoria on August 18, 1909.



Horace B. Wild is all set to take a trial float in the "Coey Flyer," which looks like it needs a good dab of mustard.

Army's C-2 comes to rest at Crissy Field, San Francisco, after completing flight from Langley Field in 1922.


HANDS OFF!
Captured enemy material is an invaluable source of technical intelligence. Don't destroy it! Souvenir hunting robs our technical experts of information that can save American lives. Equipment, parts and small gadgets that look unimportant to you reveal vital secrets to skilled specialists. When properly interpreted, they can help shorten the war. Crashed or captured enemy equipment must be dismantled only by Technical Intelligence personnel.
Also remember this: the enemy mines equipment he leaves behind.
DON'T BE A SUCKER
FOR A SOUVENIR!
LSD