AIR FORCE

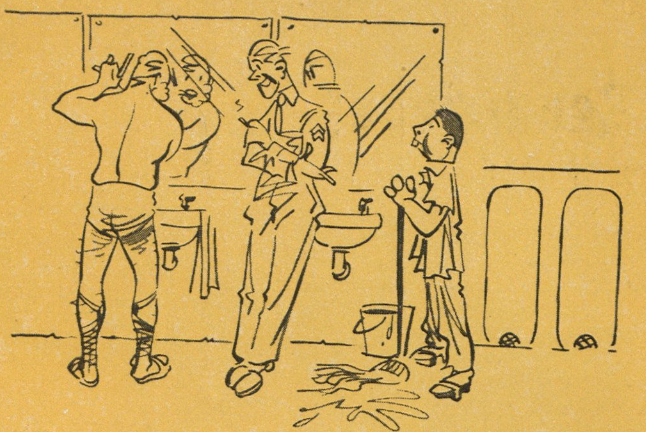
THE OFFICIAL SERVICE JOUR... AIR FORCES ☆ JANUARY 1946

GENERAL OF THE ARMY H. H. ARNOLD – See "Mission Accomplished," Page 2

TOKYO TOURISTS

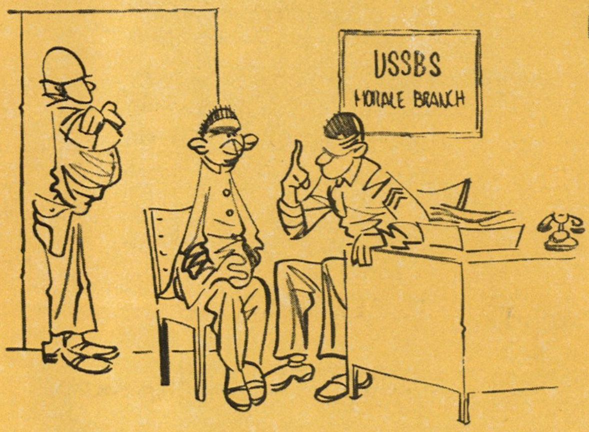
BY CAPT. WM. T. LENT
AIR FORCE Overseas Staff

"Makes me feel like the Pied Piper of Hamelin."

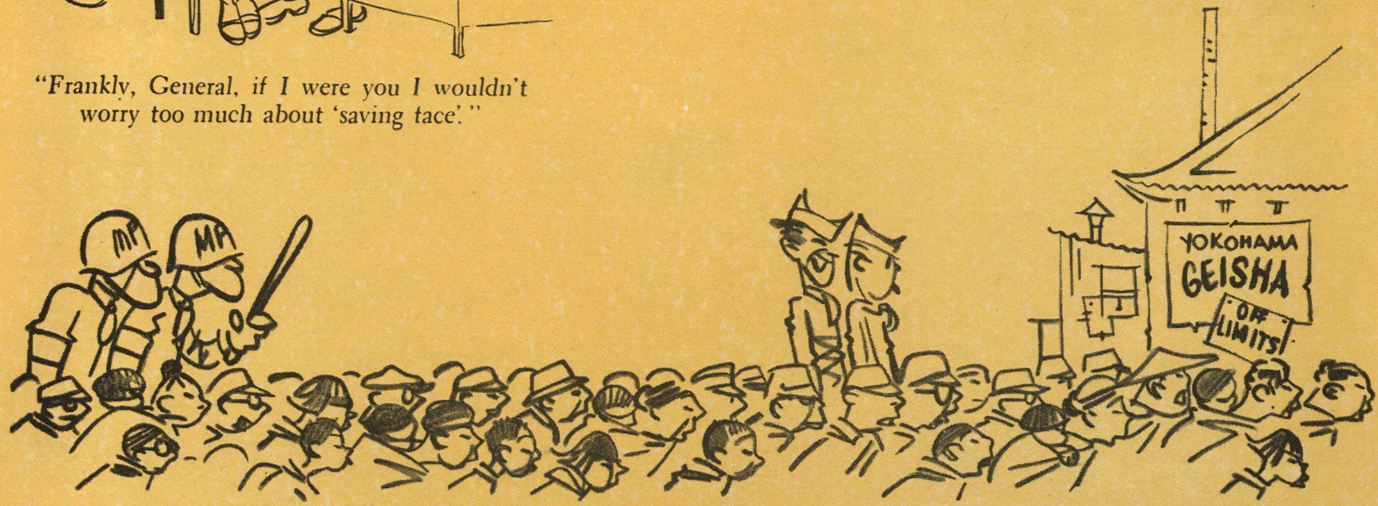


"Boy! Were the mosquitoes bad on Morotai! Ask the Colonel here. He was there for awhile."

"And I won this one in a poker game last night."



"Frankly, General, if I were you I wouldn't worry too much about 'saving face'."



"Don't worry. They'll never spot us in a crowd like this."

Rendezvous

Wonderful Bombing

Dear Editor:

I was very much interested in the article "Superfort Samaritans" by Capt. Gordon O. Culver of the 20th Air Force, published in your November issue, chiefly because I was one of those fortunate POWs whose good fortune it was to receive the "bundles from heaven" via B-29s.

About 9:30 a.m. on August 29 three B-29s flew over our POW camp in Jinsen, Korea. One of them circled our camp and dropped its most welcome cargo while the others proceeded to more distant camps. Since our camp was very small the planes had to fly very low before dropping the drums. Consequently, about 60 percent of the cargo was lost by chutes not opening. Nevertheless, we had plenty of everything. The cartons dropped on two succeeding trips were salvaged nearly 100 percent. The accuracy of the men dropping the cargo was very good, every building in our little compound received its share—through the roof. By coincidence, the hospital was hit with medical supplies and the messhall with four cases of chow.

Perhaps through your assistance we can thank the men, both ground and flight crews, who by their earnest and generous work made it possible for those of us who were so far away for so long a time to enjoy good American chow, tobacco, magazines, medicines and clothing so quickly after the surrender of the Japanese. To the captain and crew of the B-29 "Slick Dick," a special salute for being first and to those who followed him our most sincere gratitude.

Maj. Benjamin F. Stakes,
1011 N. Eugene St.,
Greensboro, N. C.

Dear Editor:

. . . We were really cheering wildly when we saw the B-29s with "PW Supplies" on their wings, and they really supplied us, too. You never saw a happier bunch of men than us after receiving that American food again.

The boys doing the dropping did all right for themselves. Several containers of shoes rolled to a stop at the door to the cobbler shop in our camp and canned goods came right into the mess hall.

So thanks to all the B-29 mercy mission flyers and to you for the very interesting article.

Lt. Ray "Hap" Halloran,
c/o Ashford General Hospital,
White Sulphur Springs, W. Va.

Excerpts from another ex-POW letter relating the results of these B-29 mercy missions appears on page 40.—Ed.

Original 'Snoopers'

Dear Editor:

The article "The AAF Inside Japan" in the November issue contains a paragraph which should be corrected since this is the second time your otherwise excellent magazine has made the same mistake. Reference is made to your statement regarding the 43rd Group's 63rd Squadron. Col. Edward

(Continued on Page 48)

Vol. 29 No. 1 January 1946

AIR FORCE

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

DEPARTMENTS AND FEATURES

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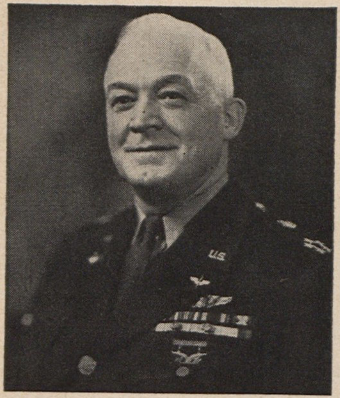
Mission Accomplished

With the greatest aviation assignment in history completed, General of the Army H. H. Arnold will retire from active duty following his return from a special mission to South America. On these pages AIR FORCE salutes General Arnold's record of achievement with the AAF



Back in the days when the Luftwaffe was making it tough for our bombers over Europe, a group of the nation's leading editors, columnists and news commentators were gathered in General Arnold's conference room on the third floor of the Pentagon.

It was a crucial period for daylight precision bombing, and the newspaper headlines daily were proclaiming our "heavy losses" with gloomy monotony. General Arnold had chosen this press conference to make one of his periodic reports on the AAF, to explain our theory of strategic bombing, to give an accounting of our successes and our setbacks. After a factual presentation, he invited questions.

Completely ignoring several of General Arnold's previous statements, a columnist called attention to a recent attack in which we had lost more than 60 Flying Fortresses.

"How can you justify that one, General?" he asked. "Why, the cost of those B-17s that were lost was. . . ." And he had the cost figured down to dollars and cents.

General Arnold's eyes flashed. He pulled several large folders from the papers in front of him and sent them sliding down the long table around which the newsmen were seated.

"If you want to talk dollars and cents," he said, "take a look at those."

The folders were opened, revealing reconnaissance photographs of bomb damage resulting from the attack in question.

"Take a look at those," General Arnold continued, "and tell me what you think *that* cost the Nazis in dollars and cents."

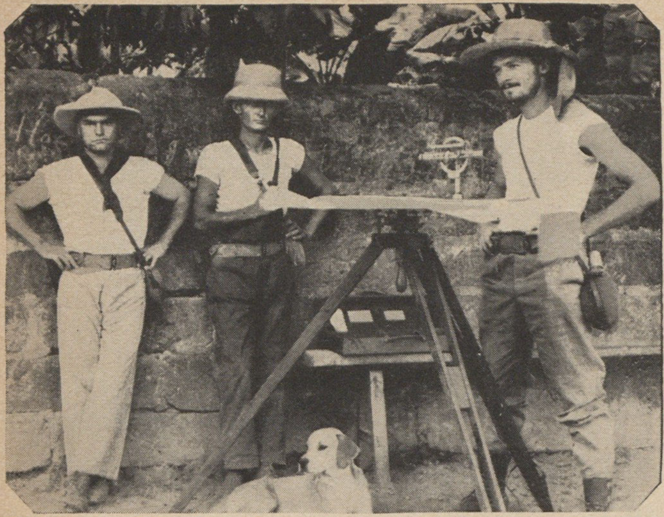
He was silent as the folders passed from hand to hand. Perhaps he was thinking of the cost of that attack in terms of aircrews, of his men . . . and the reason why . . . the reason his air force had been spread too thin and too late . . . the reason why his 8th Air Force in England had to be depleted of its heavies to participate in the North African operations . . . of the lack of dollars and cents before the war to build an air force worthy of the name.

When General Arnold spoke again, he was far from calm. "You can't talk of war and dollars and cents in the same breath. War by its very nature is uneconomical."

He didn't remind the gathering of the false economy practiced since World War I: of the peacetime pressure that kept the production of heavy bombers down to a futile

1 Henry Harley Arnold, aged three, is pictured at right with his sister and older brother. The future Commanding General of the Army Air Forces was born in suburban Gladwyne, Pa., on June 25, 1886. His father was a doctor and hoped he would study medicine.

2 On graduation from high school, however, young Henry decided to take advantage of an older brother's decision not to follow up an appointment to the U. S. Military Academy. Arnold took his place, enrolling in 1903, shortly after the above photo was taken.

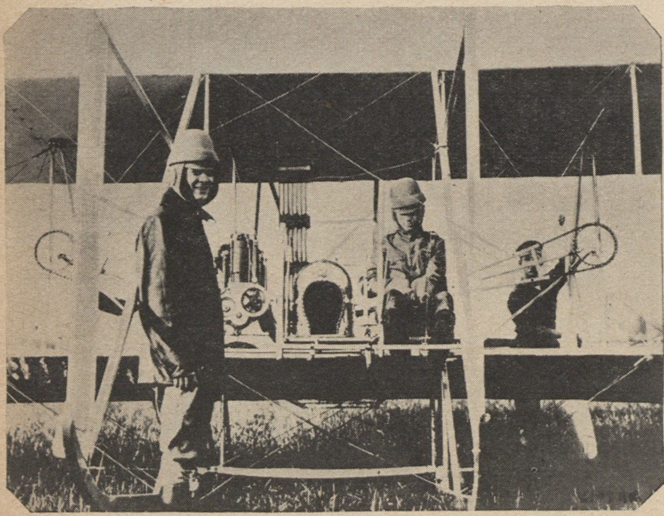


3 As a second lieutenant, Arnold (at right) spent two rugged years in the Philippines. Next came service on Governor's Island where in 1910 he went up in a Curtiss biplane. Outcome of the flight was a request for transfer to Aviation Section of Signal Corps.

4 Ordered to Dayton, Ohio, in the spring of 1911, Lieutenant Arnold (right) took a 60-day course under A. L. Welsh (in the pinstripe at left) and mastered the aerodynamic characteristics of a two-place Wright plane having top speed of approximately 40 mph.

5 Abandoning the checkered cap in favor of a leather helmet, the young flyer was ordered to College Park, Md., the Randolph Field of its day. Arnold won his pilot's rating in July, 1911, and celebrated by flying to the then unheard of altitude of 4,167 feet.

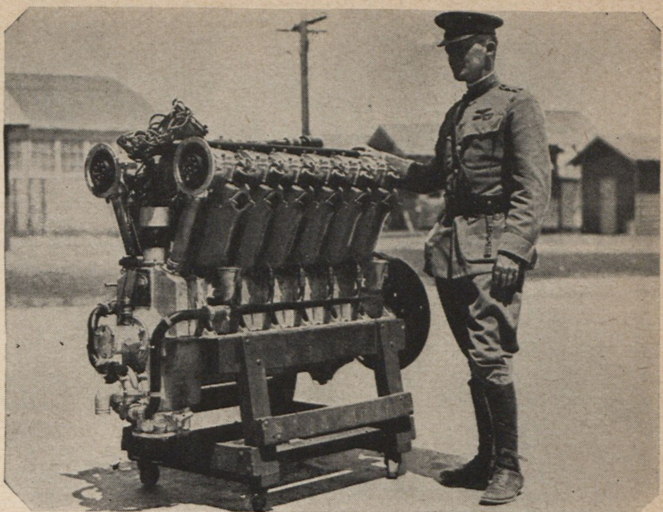
6 One of Arnold's proudest possessions is this Military Aviator's Badge, for which he qualified in July, 1912, by making a flight in a 15-mile wind with a passenger and by completing a 20-mile cross-country reconnaissance flight at altitude of 1,500 feet.



7 Arnold (at left) gives the photographer a confident smile as he prepares to take off in one of the two planes owned by the U. S. Army in 1912. Reconnoitering a 10-mile triangle, he located a troop of cavalry and returned with his report in 45 minutes.

8 In the same year, Arnold participated in experiments conducted at Fort Riley, Kan., to direct artillery fire by means of radio from the air. Here he is shown (second from right) convincing a skeptic by showing him diagrams to assist in correcting his aim.

9 Back to the Philippines in 1913 as an Infantry officer after his two-year duty with the Aviation Section, Arnold still retained his great interest in aircraft. He had a chance to inspect this Army pusher-prop amphibian during a visit to Corregidor Island.



10 The Liberty engine was America's great contribution to aviation in World War I, but of more significance to our aviation future was Arnold's reassignment to the Aviation Section in 1916. During the war, he established an air defense for the Panama Canal.

MISSION ACCOMPLISHED (Continued) trickle; of his unheeded pleas for a training program that would turn out a safe margin of reserve pilots and mechanics; of his desperate appeal, a year before Pearl Harbor, to aircraft manufacturers and civilian training schools to get on the job when he could promise them no contracts; of his impassioned plea made during our prosperity years that "while we are training in obsolete planes our air service does not compare favorably with foreign services"; of the occasion, during the 1925 court-martial of Brig. Gen. Billy Mitchell, when a flight of Army planes flew over downtown Washington, and he pointed upward with the remark, "There goes all our air force — thirty-five planes — the largest number we could muster to defend our capitol!"

From his retirement, General Arnold will be able to look back with satisfaction on his long struggle to promote and build American airpower. It was a day-to-day fight from the beginning, but it was a worthwhile fight that resulted in the mightiest air force the world has ever known. The part the AAF played in the war against the Nazis and the Japs is a matter of record.

General Arnold might well have considered his job finished on VJ-Day. But by the time an event for which he has planned takes place, General Arnold is far beyond it, thinking and planning for the future. Four months before Germany was defeated and seven months before Japan called it quits, he summoned his top staff officers and told them: "We've got to think of what we'll need in terms of 20 years from now. For the last 20 years we have built and run the air force on pilots. But we can't do that any more. . . ."

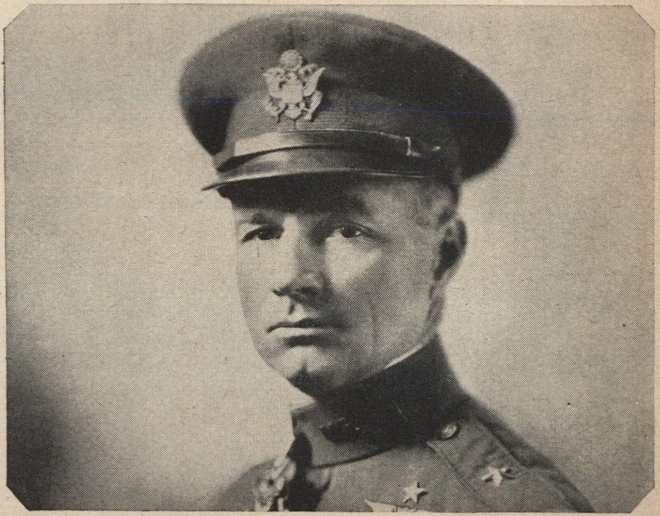
There was silence. Virtually every man in his audience was a command pilot or a senior pilot, and the blunt statement that the heritage of the air force would not be all theirs was startling to say the least.

General Arnold already was projecting himself into the air force of the future. He was thinking not only of the "long-haired" scientists, but of the technicians and specialists of all sorts that would be the life blood of the atomic-energized, jet-propelled, electronic-controlled, rocket-powered air force of tomorrow.

In fact, of the unbeatable air force which he regards with paternal affection, he says, "The great aerial armadas of World War II are as outmoded as the Macedonian phalanx."

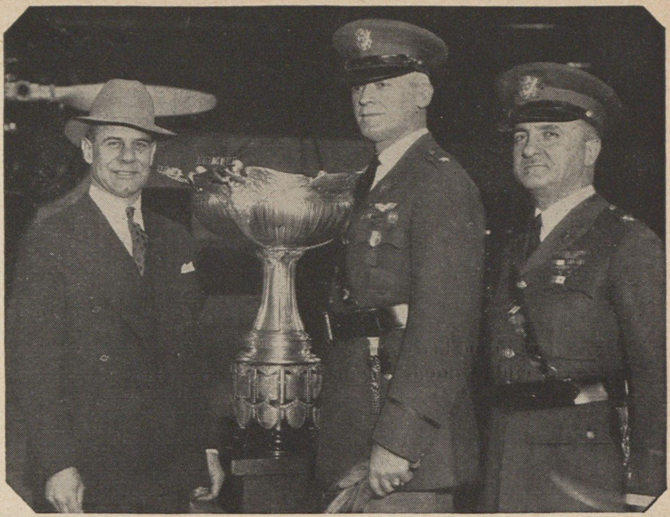
A phrasemaker might bow out on that line. To General

11 Lack of funds following the war didn't stop Arnold from helping keep military aviation active and in the news. One of a number of flights he aided was a refueled speed record set in 1923 by Lts. L. H. Smith and J. P. Richter, with whom he is shown here.

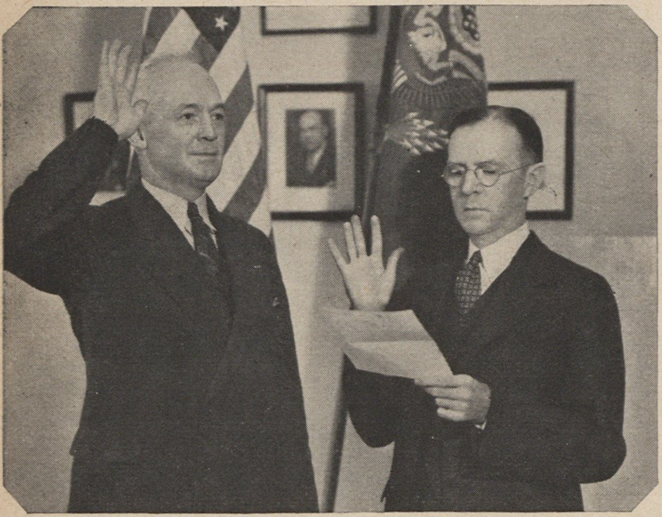


12 Brig. Gen. Billy Mitchell (above), writing prophetically of his 1925 trial, said: "Fighting by my side was an officer (Arnold) whose conviction and courage may help to bring our air force to its required strength before America is faced with a new war."

13 Relieved of his duties in Washington in 1926 for "attempting to influence legislation," Arnold kept plugging military aviation. Commanding officer of March Field in 1931, he is shown here with Will Rogers shortly after taking the famed humorist for a spin.

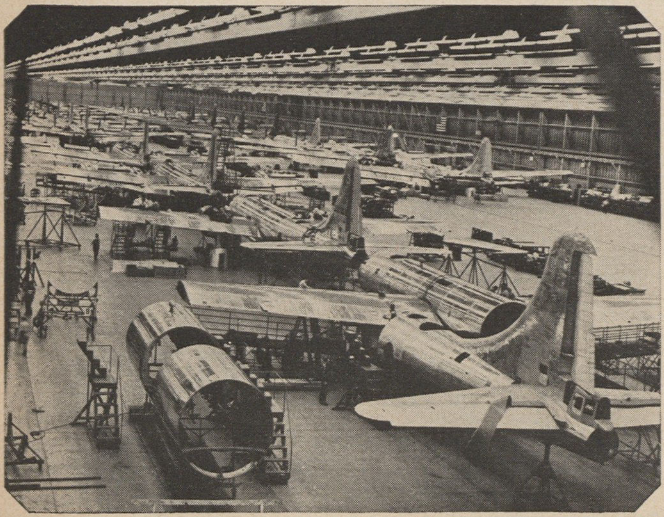


14 For leading a flight of B-10 Martin bombers from Bolling Field to Fairbanks, Alaska, and back (8,290 miles), Brig. Gen. Arnold was awarded the Mackay Trophy in 1934. Present at the ceremony with Arnold were Jimmy Doolittle and Brig. Gen. Oscar Westover.

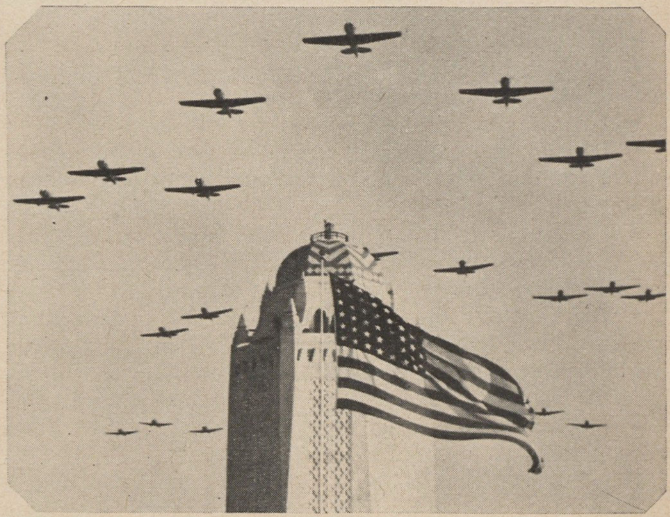


15 Twenty-eight years following his first airplane ride, Maj. Gen. Arnold was administered the oath of office as Chief of Air Corps by Chief Clerk John J. Mullaney. General Arnold succeeded General Westover in 1938 when the latter was killed in a plane crash.

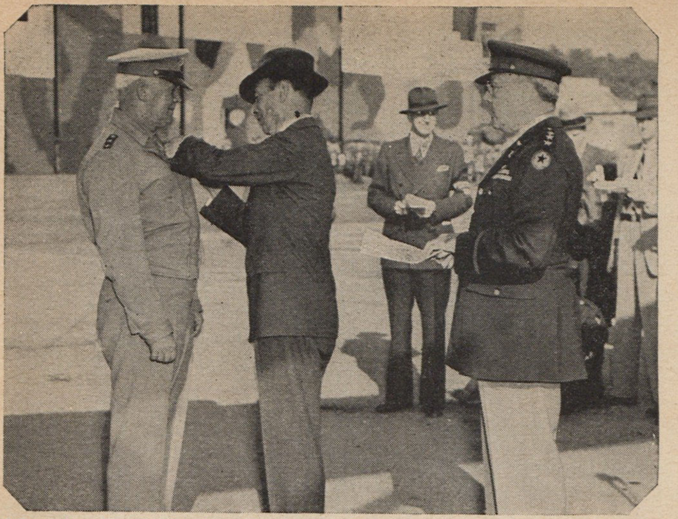
16 Shortly after assuming his new office, General Arnold accepted Collier Trophy, an award won for the first successful flight of a pressure cabin plane, the XC-35 (above). General specifications for the B-29 Superfortress began to take form in the next year.



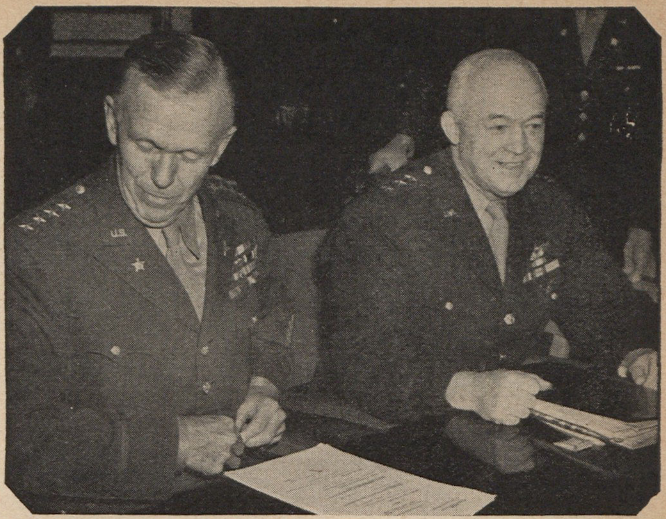
17 Wartime production scenes such as this date back to 1938, when Arnold requested manufacturers to expand their facilities even though he had no contracts to offer them. His conviction in the future role of airpower did much to win their full cooperation.



18 Early in 1939, Arnold, addressing operators of civilian flying schools, said, "There's going to be a war and we must build an air force." He knew it would require more than a Randolph Field (above) to train the pilots he was convinced America must have.



19 After Pearl Harbor, Gen. Arnold was needed at home. In mid-1942, however, he resumed his on-the-spot inspection trips. Above, he is shown being presented with the DFC by Assistant Secretary of War for Air Lovett after a record flight from Australia.



20 Gen. Arnold and Gen. Marshall are shown at Casablanca Conference in January, 1943. Out of this meeting came the vital combined bomber directive which gave AAF the green light on daylight bombing at high altitudes, which helped to doom the Reich.

MISSION ACCOMPLISHED (Continued) Arnold it is only an introduction to what our air force of the future must be, to his argument that we must take steps now to formulate an airpower doctrine that will safeguard our national security.

On retirement from active duty, General Arnold will leave a legacy to the AAF and to the American people, a legacy that is also a grave responsibility, that blueprints an air force second to none. As he puts it, "A second best air force is like a second best hand at poker—no good at all."

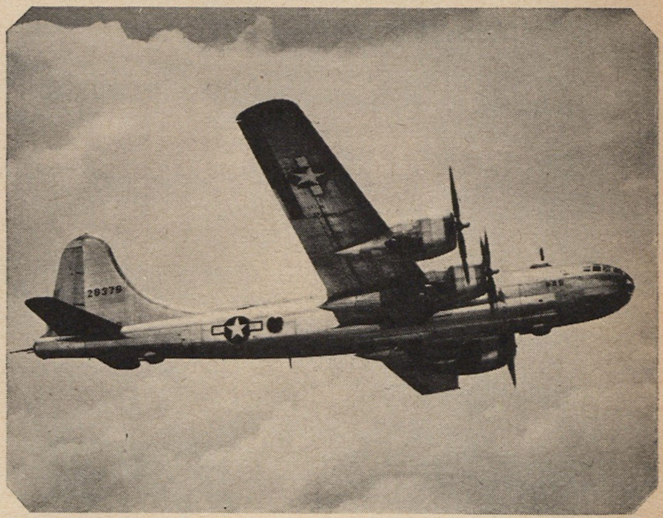
These Arnold blueprints for a permanent air force are solid, sound, concrete. They contain the sum of all we have learned since the Wright brothers first flew their plane at Kitty Hawk, learned through failures as well as successes, during two world wars, and an intervening peace that held some of the bitterest experiences of all.

That it may not happen again, General Arnold warns of our past weakness in being caught in a war with equipment and doctrines used at the end of a preceding war. A repetition of this error, he points out, could mean annihilation. Therefore, the AAF must depend on scientific and technological advances requiring us to replace about one-fourth of our equipment each year.

Speaking in practical terms of the future, General Arnold sets forth his air force doctrine as a determination:

- To maintain a striking arm in being.
- To keep the AAF and aviation industry in position to expand harmoniously as well as rapidly.
- To maintain well-equipped overseas bases.
- To support an alert and aggressive system of commercial air transportation—one of the foundations of American airpower.
- To remember that it is the team of the Army, Navy and Air Forces working in close cooperation that give strength to our armed services in war or peace.
- To make available to the United Nations Organization, in accordance with the provisions of its charter, adequate and effective air force contingents for possible use by the Security Council in maintaining international peace.
- To promote scientific research and development, and to maintain a close contact with industry.

General Arnold calls for a permanent air force that is prepared to make immediate use of its inherent striking power and mobility, in the firm belief that such potential striking airpower is the nation's best insurance that peace will be perpetuated. ☆

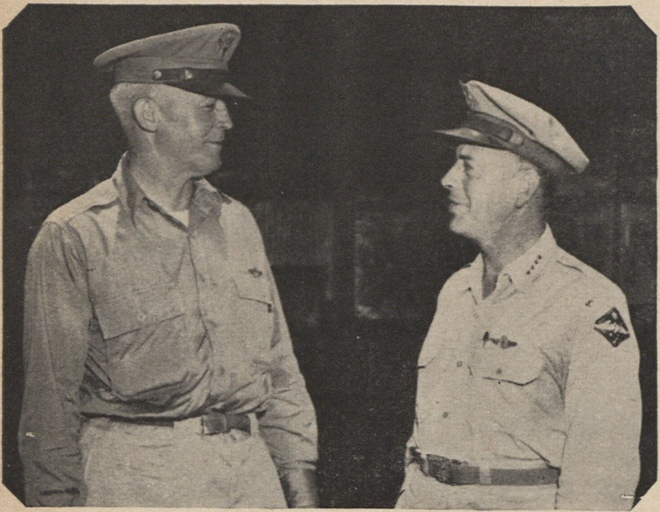


21 When the first B-29 wing was activated in June of 1943, Arnold was wearing four stars. Later, as chief of the global 20th Air Force, he stated that "the Superfortress (above) will strike at the sources of Japanese strength and pave the way for victory."

22 Toward the end of the year, Arnold flew to England to look over the AAF's preparations for the big winter blitz, after which he visited Mediterranean front enroute to Teheran Conference. He is shown with President Roosevelt at an airport in Sicily.

23 Also on the Mediterranean agenda was a visit with Gen. Dwight D. Eisenhower (left) who had just completed plans for the Italian offensive. The discussion was devoted to air-ground problems of the campaign. Picture was made at Castel Vetrano Field, Sicily.

24 Illness prevented Arnold from attending the conference at Yalta but as soon as he was pronounced fit, the travel gleam was once again in his eye. Above, with Lt. Gen. Omar Bradley, he strolls along a French beachhead during inspection trip in June, 1944.



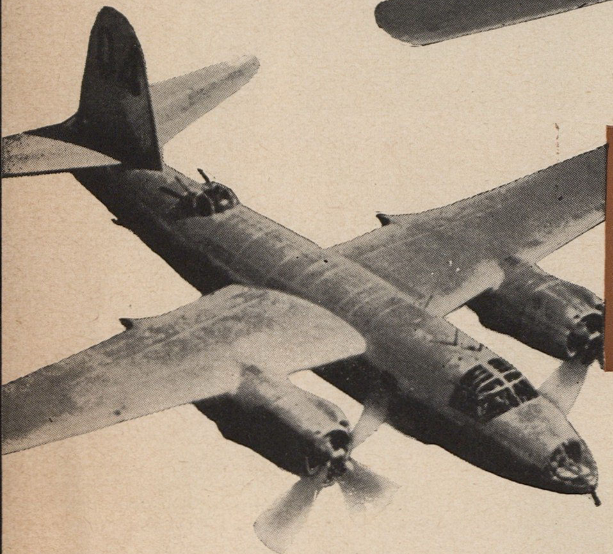
25 A year later, with the war in Europe over and most of our airpower moving to the Pacific, General Arnold flew to Manila for a meeting with Gen. George C. Kenney, FEAF chief, before visiting Okinawa where he predicted "no Jap targets left to hit by 1946."

26 General Arnold also called on our important B-29 installations in the Marianas which were running missions against Japan day and night. He is shown discussing B-29 maintenance problems with S/Sgt. Leo F. Fleiss, Sturtevant, Wis., a Superfort crew chief.

27 A few weeks later, he was back in Europe—this time to attend the conference at Potsdam, Germany, where the final steps to end the war with Japan were decided upon. Here Arnold is shown with his son, Lt. Col. Henry Arnold, Jr., at Gatow Airport, Berlin.

28 As a climax to his active AAF career, General Arnold received two oak leaf clusters to his DSM from Pres. Truman recently. In the presentation, the President cited General Arnold's "great personal leadership, driving spirit and professional genius."

BY T/SGT. DOUGLAS J. INGELLS
AIR FORCE *Staff*



AIRPOWER

Wartime technical achievements in perfecting aerial weapons

In a New York department store brightly colored family planes stand on display along with gas ranges and refrigerators; in California the infantryman on the hospital cot still boasts about his one plane ride, a 7,000-mile evacuation flight from Okinawa to 'Frisco that saved his life; in an Iowa schoolhouse sixth-graders are absorbed with an arithmetic problem which challenges them to compute the area of an airplane wing; in Kansas the ex-gunner of a B-17 who has learned to fly his own plane since leaving the Army begins a small airport business with the help of a GI loan; in Chicago the line forms in front of the airline ticket window for the flight to New York that is $4.70 less than first-class rail fare; in Washington the statisticians report that Sunday skyflivver traffic is 10 times the volume of 1938 and growing rapidly.

Signposts of the postwar air world are everywhere. Yet, most of us have seen only the military side of that world in the making—even though it included such diverse activities as carving airfields out of jungle and coral, spanning oceans and continents with greater precision, flying faster than sound, and learning to live in the stratosphere. Let's look at the other side—at the technological events that have helped make this new world possible.

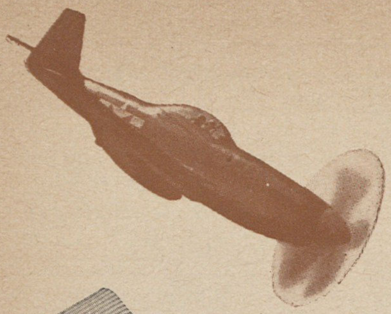
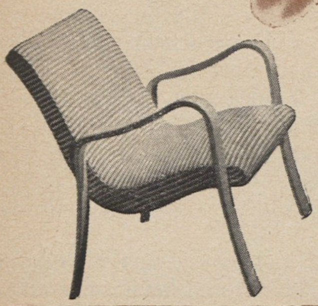
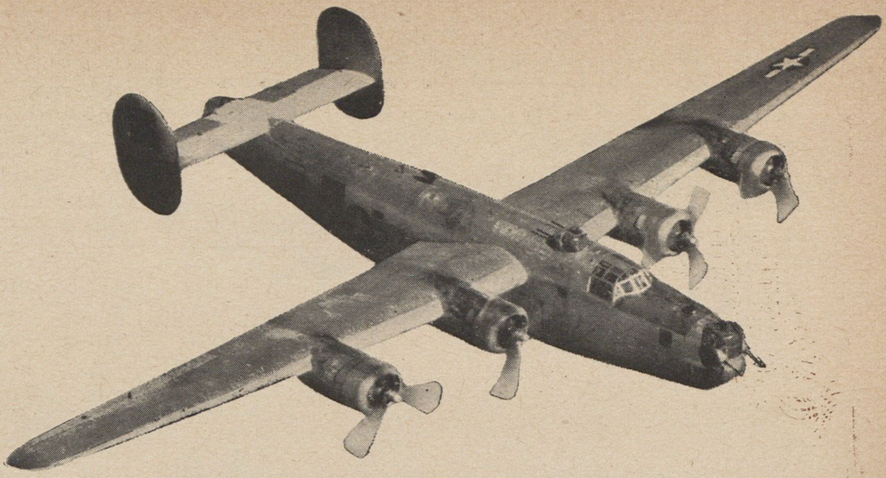
In the 37 years from the Wright brothers' flight at Kitty Hawk to 1940, less than 40,000 airplanes were produced in this country. In the 44 months from Pearl Harbor until the Jap surrender on August 15, 1945, American industry turned out 274,674 planes of all types for the Army and Navy and our Allies.

While our prewar planes were the product of a hand-stitch method, turning them out at the wartime rate meant redesign, refabrication, retooling. It meant working to 10,000th of an inch with metals lighter and thinner than paper. It meant building up a storehouse of new ideas—and new factories, new research facilities, new wind tunnels and "X" planes to try out those ideas. It meant cooperative enterprise as never before: B-17s designed by Boeing and built by Lockheed, powered with Wright Aeronautical engines built by Studebaker, equipped with General Electric turbo-superchargers built by Allis Chalmers. It meant automobile, radio and refrigerator manufacturers making aircraft and aviation accessories along with brassiere and artificial limb companies. It meant the pooling of the scientific thought of the nation, the formation of research organizations such as NDRC and OSRD, and the participation of NACA and dozens of educational institutions and laboratories.

Yet, even though billions were spent in building bombers, virtually every time a contract was issued for a new experimental bomber, a paralleling contract was signed to build a cargo version of the same plane. When we improved the bomber we improved the future transport plane, and when we improved the trainer and fighter we improved the future lightplane for private flyers.

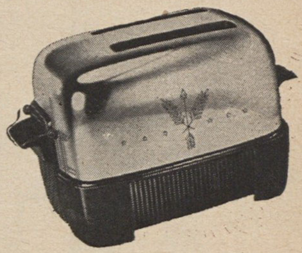
And that was only part of it. In building airpower, America restyled the radio and the automobile, your postwar furniture, the cut of your clothes, and the quality of your food.

The airplane, itself, has changed. In size and power and utility it compares with pre-war planes like a Lincoln Zephyr with a Model T. Outwardly, it is not radically different. But inside it has been newly furnished with built-in comfort and scores of gadgets and little magic boxes that make it safer, easier to fly. It can fly faster and higher and

. . and the kitchen sink

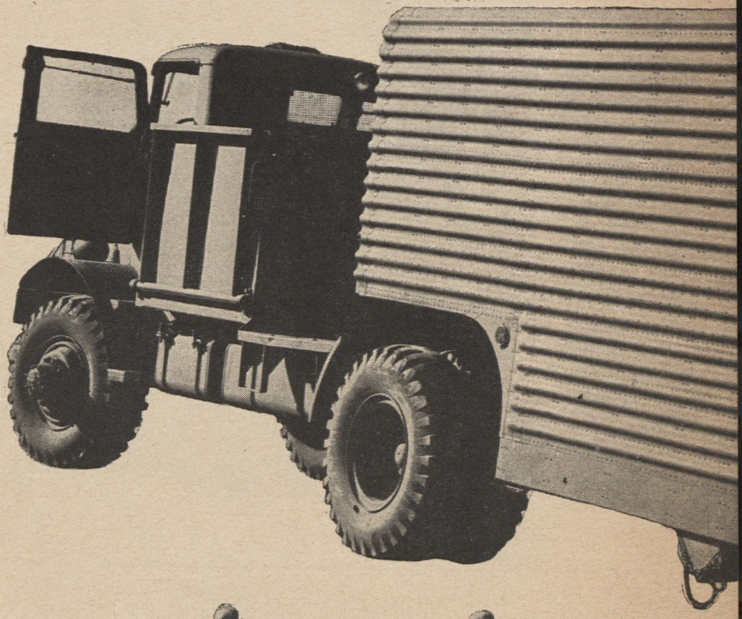
put us years ahead of our time in peacetime living

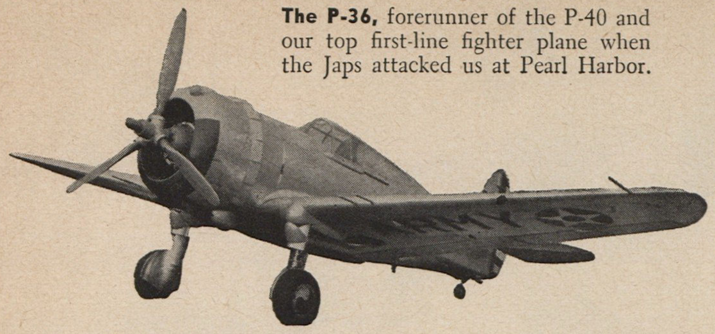



farther, can carry heavier loads. It is more versatile: fighters have been successful bombers, bombers have made deadly fighters, cargo planes have served as ambulances, flying radio stations, flying workshops.

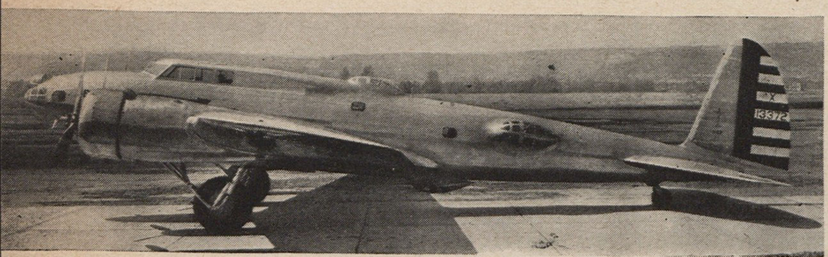
The war gave us the planes of 1965 in 1945.

What happened, then, that twenty years of progress should be gleaned in four? Let's look at aviation in 1939 just before World War II was touched off in Europe. The Army Air Forces (then the Army Air Corps) had approximately 1,000 planes, 2,000 officers and 20,000 enlisted men. The Air Corps' budget was roughly $75,000,000, which covered all experimental work, all planes and gasoline, oil, maintenance and housing, plus a sum for training new pilots and crewmen. In 1939, there were 265 commercial airliners flying over 35,213 miles of domestic and foreign air routes. Approximately 61,264 persons held licenses to fly, ranging from a student's permit to a transport license. Flying the ocean was still something of an accomplishment. At Hickam Field in Hawaii, where the Japs struck less than two years later, there were several lines of fighters, Curtiss P-36s—low wing jobs, two guns in the nose (one .50, one .30 caliber) and the top speed was about 240 mph. At Buffalo, N. Y., the Curtiss Airplane Co. was turning out another design, the P-40. It was the newest and fastest plane we had in production. In a rain-soaked ravine of a Long Island golf course lay the twisted, tangled wreckage of an unusual fighter design that showed promise—the Lockheed P-38. It was the only one of its kind (limited funds prevented us from building more), and there wouldn't be another for at least six months; something had gone wrong at the end of a record-smashing cross-country flight. On the flight line at Wright Field was another powerhouse, the Republic

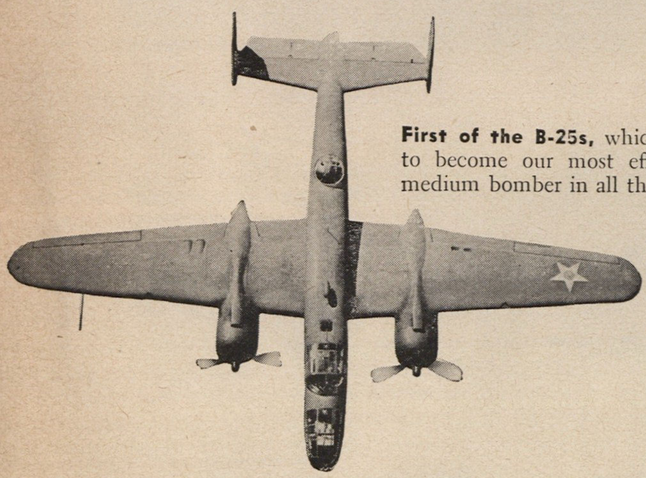


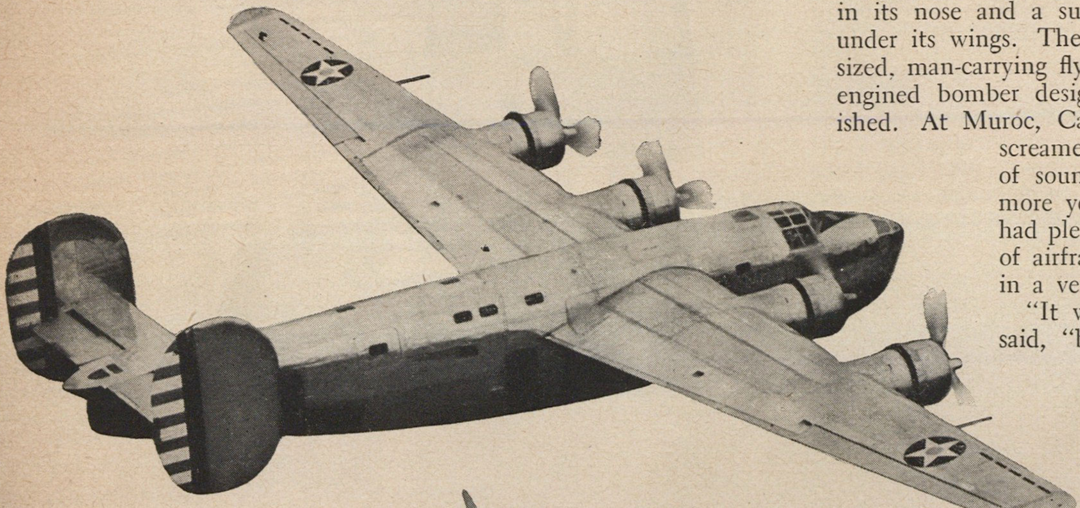
The P-36, forerunner of the P-40 and our top first-line fighter plane when the Japs attacked us at Pearl Harbor.

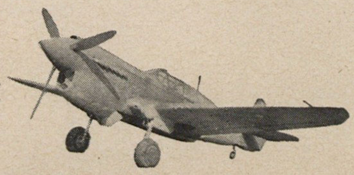


The Boeing "299," ancient (1935) ancestor of the Flying Fortress.



First of the B-25s, which was to become our most effective medium bomber in all theaters.





A winning combination: above, the B-24 made itself felt early in the war; below, the P-40.

XP-42—a prototype of the Thunderbolt which was still on paper. The Bell Airacobra (P-39), with a cannon in the nose and tri-gear, was ultra new and untried. The Mustang was hardly a gleam in anybody's eye. The cumbersome Douglas B-18 was the biggest and fastest twin-engined bomber in service. There were only 18 Boeing Flying Fortresses; 58 more were on order. The B-17 had not yet flown above 25,000 feet and its speed was below 260 mph. An over-sized Fortress, the XB-15, the biggest thing flying at this time, was so slow and cumbersome that engineers shook their heads about the future for big planes. A still larger plane, the Douglas XB-19, was nearing completion against heavy betting that it wouldn't fly at all. One or two experimental models of Consolidated's B-24, Martin's B-26 and North American's B-25 were in process. The line-up in face of what we know today was a third-string combination, if that.

Compare this with the victorious "first team" on V-J Day: The AAF was 2,300,000 strong, having operated with a peak budget of $30,000,000,000 in 1944. It had bases all over the face of the earth. There were 26 different types of planes flying and in production the day the Japs quit. B-29 Superfortresses were over Japanese cities, 800 at a time. A speeded-up production program and test routine had produced more than 3,500 of these super-bombers. More than 15,500 P-47s had been built. Lockheed had turned out 9,352 P-38s of which more than 500 were photo-reconnaissance planes. The P-51, born of war, had been designed, engineered and flown in the amazing period of 145 days and thousands were in Europe and the Pacific. The Liberators, Marauders, Mitchells, Havocs and Invaders had left their mark on the enemy. The helicopter, which had never flown successfully before 1939, had played important rescue roles in combat and was operating in the Pacific from floating maintenance depots as a courier for the B-29s. The XP-59, first American-built jet-propelled airplane, had been made obsolete by P-80s moving down an assembly line at Burbank. For the first time in aviation annals, a plane had flown faster in level flight than 500 miles an hour. Crews were flying in pressurized cabins at altitudes close to 10 miles and they were going higher. The .30 caliber machine gun for aircraft had long been replaced with a power-slamming .50 caliber gun. Some bombers carried 75-mm cannon. One experimental fighter had four 37-mm cannon in its nose and a supply of armor-piercing rockets slung under its wings. The Flying Wing had arrived in a full-sized, man-carrying flying model (N9M) and a giant four-engined bomber design, the XB-35, was 80 percent finished. At Muróc, Calif., a rocket-propelled fighter plane screamed through its test runs. The speed of sound was no longer too fast; in a few more years it would be too slow. The AAF had plenty of muscle—2,483,304,900 pounds of airframes alone. It had come a long way in a very short time.

"It won," Lt. Gen. William S. Knudsen said, "because we smothered the enemy in an avalanche of production the like of which he had never seen nor dreamed of." There was also this to be said: our engineers did quite a job, too.

Technologically, they had made the airplane a finer piece of machinery. The tricycle landing gear which was revolutionary in 1939 was almost universally used in 1945. The 1,100-horsepower engine which had a top rating at the war's start had been jumped to 3,000 horsepower, and there were mocked-up engines capable of producing 5,000 horsepower, not to mention the tremendous advancement achieved with the success of the turbo-jet and the gas turbine. The Laminar-flow wing provided high-lift, high wing loading with maximum safety and minimum drag. Flaps and slots shortened take-off and landing distances, permitting high speeds in flight but low landing speeds for utility. Tires that once could stand only 10 landings now could hold up for 100. Electrical systems weighed half as much and produced four times as much power.

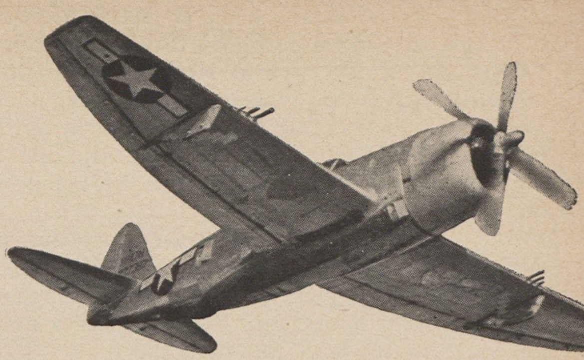
There were instruments that made flying blind as simple and safe as contact flying and there were others that could serve as robots—could takeoff, fly and land a plane without a human occupant. The improved supercharger allowed an engine to draw as much power at 40,000 feet as it normally could at sea level. There were oxygen systems that kept a man breathing automatically. Propellers which took bigger bites of air to accelerate forward thrust also had reversible pitch mechanisms to serve as brakes and permit a plane to taxi backwards. Fuels were 300 percent more powerful. A hot-wing system made it possible to fly in icing conditions heretofore dangerous and sometimes fatal. And there were other things such as sound-proofing, simplified control combinations, pressure cabins, cabin-heating and communications that made the airplane more practicable.

Consider the first production P-38s, for example. In the early months of 1940 there were about 36 of these twin-tailed fighters in existence. Empty weight was about 11,800 pounds. They could carry 3,700 pounds useful load—pilot, bombs, fuel, guns and ammunition. Their twin Allison in-line, liquid-cooled engines at take-off produced a total of 2,300 horsepower. They could streak along at 25,000 feet at 390 mph. If pressed, they could climb and fly at 39,000 feet top. Maximum range, which was obtainable at about 10,000 feet at 200 mph, was 975 miles or about the airline distance from St. Louis to New York.

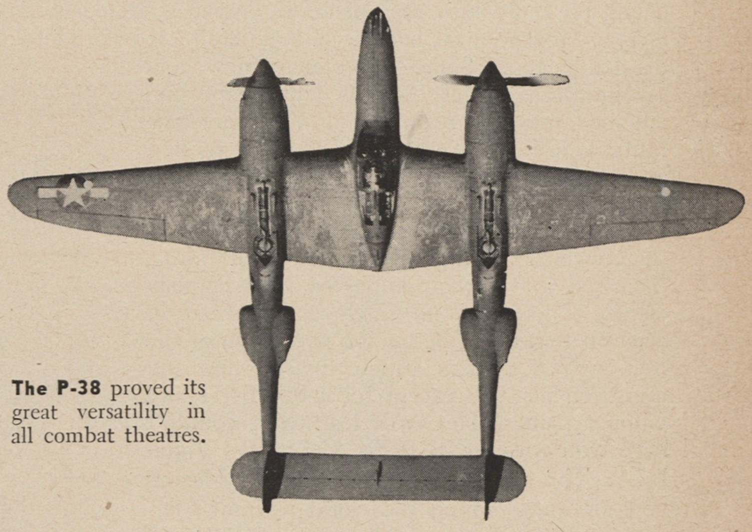
Ten models later, the P-38Ls which were on the line when General MacArthur was accepting the Japanese surrender weighed, empty, half a ton more than the first of their type. Structural changes, internal tanks and the like, accounted for the difference. These new planes could hit 414 mph at 25,000 feet. Wing tanks boosted maximum range at the same speed (200 mph) and altitude (10,000 feet) to 2,600 miles, or from New York to Los Angeles. Take-off horsepower had increased to 2,850 and war emergency rating (a combat reserve of power) was 3,200 hp. The ceiling had skyrocketed to 44,000 feet. The load they could carry was doubled. One P-38 carried 4,000 pounds of bombs plus armament, as much as the first B-17s could carry.

The ratio of gains was also true for the Flying Fortress. Early B-17C and B-17D models had gross weights of 41,000 pounds and could fly 2,000 miles at 280 mph at 25,000 feet. In the waning months of combat, late models were grossing 65,000 pounds, could lug it 3,400 miles at 220 mph at 10,000 feet. Or they could keep the 2,000-mile range with 48,725 pounds gross weight at 35,600 feet.

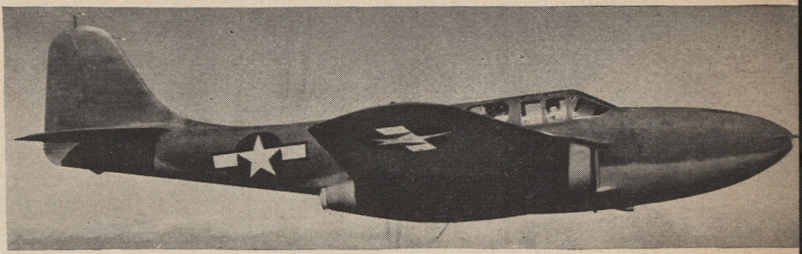
There also was engineering progress evident in the B-29s which came into existence during the war. Early models drew 8,800 horsepower from their four Wright engines,



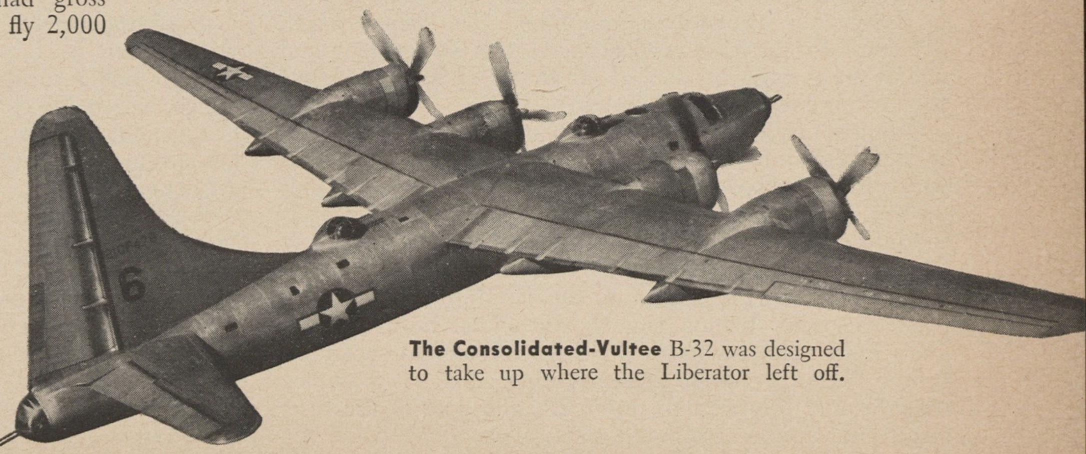
With the P-47, we had our most powerful single engine fighter.



The P-38 proved its great versatility in all combat theatres.



Bell Aircraft's P-59 was the first of our jet-propelled fighters.



The Consolidated-Vultee B-32 was designed to take up where the Liberator left off.

grossed 120,000 pounds, could fly with 105,000 pounds at 372 mph at 30,000 feet and had a maximum range of 5,600 miles at 220 mph at 10,000 feet. In the last days of battle, B-29s were grossing 141,000 pounds, horsepower had increased to 9,280, and they were flying 2,500 miles to targets with four-ton bombloads. In one instance, a Superfortress carried 44,000 pounds of bombs on a short run.

The P-80 was representative of even greater strides. The only U. S. jet plane in quantity production, it had attained a ceiling of 48,500 feet. It could fly at better than 400 mph with externally hung tanks for 1,200 miles non-stop. Its top speed at sea level was near 560 mph. Its jet turbine engine produced 4,000 pounds of thrust at 11,500 rpm—equal to the power of four P47s.

The war had paid off with improved performance that could be built into any plane if engineers followed the recipe. How to do it had become old stuff. It paid another dividend, too. Some completely new and revolutionary aircraft designs took shape and emerged into the realm of, or near, practicability. Oddities like the XP-55, tail-first pusher, and the XP-56 half-wing, half-fuselage all-magnesium fighter were flying in tests to prove new ideas. But the important gains were in the conventional airplane—better streamlining, increased horsepower, improved propeller efficiency. There was no single achievement in aviation that could better the perfection of the four-engined airplane which was still new and unproven in 1939 except for a few B-17s and Clipper planes. The AAF learned it couldn't have won without its B-29s, C-54s, B-17s and B-24s. The airlines today wouldn't be blazing new air routes round the world without four-engined safety, either. Other things happened that made the airplane more useful.

When commercial airliners went to war as army cargo planes, they couldn't haul jeeps and howitzers as readily as passengers and express. The planes were big enough and could carry heavy army equipment, but they couldn't be loaded quickly and bulky freight was difficult, sometimes impossible, to get aboard. A completely new type of air transport, a freighter, was needed. First to fill the bill was the Fairchild C-82, a twin-engined, boom-tailed cargo plane. It could carry heavy, bulky equipment, and rear-door loading made this job as simple as filling a moving van with furniture. A large truck trailer could be backed up under the C-82's boom-tail and transfer of freight from highway van to skyway van was easily accomplished. The value of such a feature to the commercial operator is self-evident and already airlines have pounced on the C-82 as a good buy for their proposed freight routes.

Another new, but larger, cargo plane was Douglas' C-72, so large that into its interior can go three complete P-51s with wings knocked down. But its important feature is not its size (it is slightly larger than the C-54); rather, it is a built-in loading mechanism certain to play a part in any commercial freight airline's operations. Two electrically-driven hoists lift the cargo into the vast interior which has greater capacity than a large boxcar. One hoist operates like a freight elevator to lift the cargo through a door in the belly. The other works like a loading crane on a surface freighter and brings cargo through a side door in the fuselage. The elevator hoist also runs an overhead crane the entire length of the fuselage to move the cargo to desired tie-down spots. With such designs the AAF had pioneered a new field; the day of the sky freighter had arrived.

Vertical flight was also here. In 1939 the helicopter was a flimsy mysterious craft hedge-hopping around Bridgeport, Conn., where its inventor, Igor Sikorsky, was trying to interest Army officers in his whirligig machine. It could only get a few hundred feet off the ground and its control was doubtful. But in it the AAF saw a potential liaison craft and rescue vehicle; we backed an extensive helicopter experimental and production program. There were several different models—the Skorsky R-4s, R-5s, R-6s, the Platt-LePage XR-1, the Kellett XR-8. The strange machine with the rotor on top was no longer just a fancy; it even looked like an aircraft.

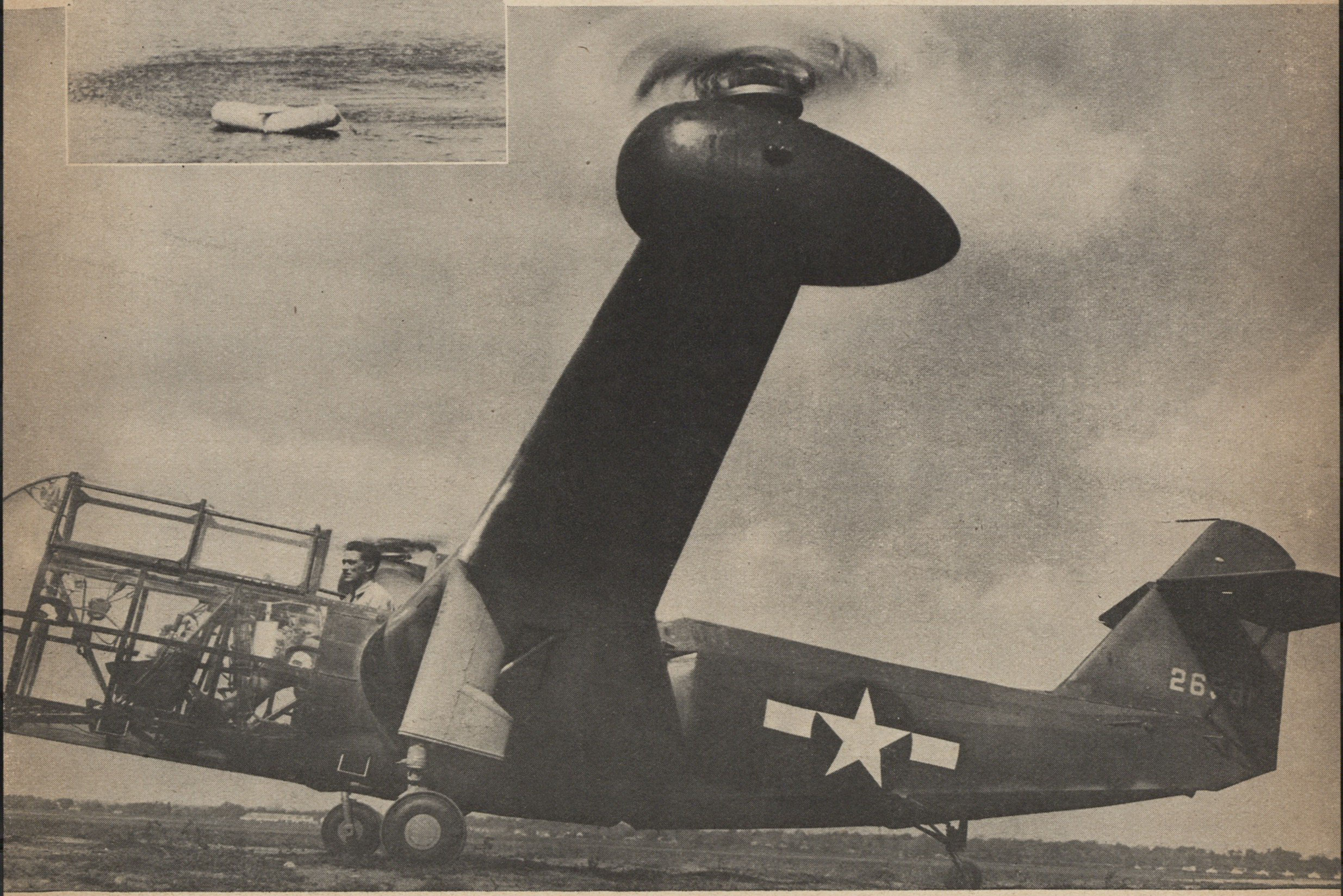
There was a 12-passenger-helicopter nearing completion, the Kellett XR-10. It was the feeder bus-line airway vehicle. The AAF had it built as a flying ambulance, but it was also the nearest thing to a passenger-carrying helicopter. Embodying the principles and lessons learned about rotary-wing aircraft by the AAF was a private helicopter design built by Bell Aircraft. It was a plush-job with modernistic design and simple controls, and it came from what the war had taught. Yet, even its builder, Laurence Bell, doesn't hesitate to comment: "There are going to be plenty of fatal accidents before the average man gets in his backyard helicopter and hops over to the golf course." But he quickly adds: "Fifteen years from now the helicopter industry alone will be as large as the airplane industry."

The potentialities of the helicopter were exploited by the AAF. Shown here is one of the vertical craft equipped with pontoons, ready for air-sea rescue missions.

This additional prospect is outlined by Hall Hibbard, vice-president and chief engineer of Lockheed: "With 10 to 15 years of development a jet propelled helicopter will become the standard form of travel for all Americans. In such a craft the turbine engine will be located at the middle of the fuselage. It will drive the rotor on the same prin-

Much of the helicopter's fine work for the AAF was performed over the rugged terrain of India and Burma. Above, native villagers indulge their curiosity.

One of the first test pick-ups (left) from rubber life raft helped prove the value of the Vickers hydraulic hoist.



The Platt Le-Page XR-1, one of many AAF experiments with helicopters which led to their successful use as rescue and liaison craft.

ciple that your rotating lawn sprinkler is driven by the force of water jets. Control will be insured by an auxiliary adjustable jet nozzle in the rear of the plane replacing the rear rotor. This helicopter can be operated simply and safely. Cruising speed will be in the neighborhood of 200 miles an hour. Its range will be roughly 500 miles. It will land and take off with no forward motion whatever. Should an engine failure occur, the ship will settle gently to a landing with no power. It will be sold for the price of an automobile."

Jack Northrop, whose name has been associated with the flying wing idea for 20 years, is not the least hesitant to say that the war, especially with the accompanying farsightedness of AAF higher-ups, made possible the development of this unusual type of aircraft. The proof lies in the huge, bat-like XB-35 soon to make its first test hops at the Northrop plant in Hawthorne, Calif. As far as design and airframe changes are concerned, it surpasses any war-spirited development. It is the big gun for the new offensive against drag—that force which for years has retarded the speed of airplanes in much the same manner a loose stitch in a baseball slows up a pitcher's fast one.

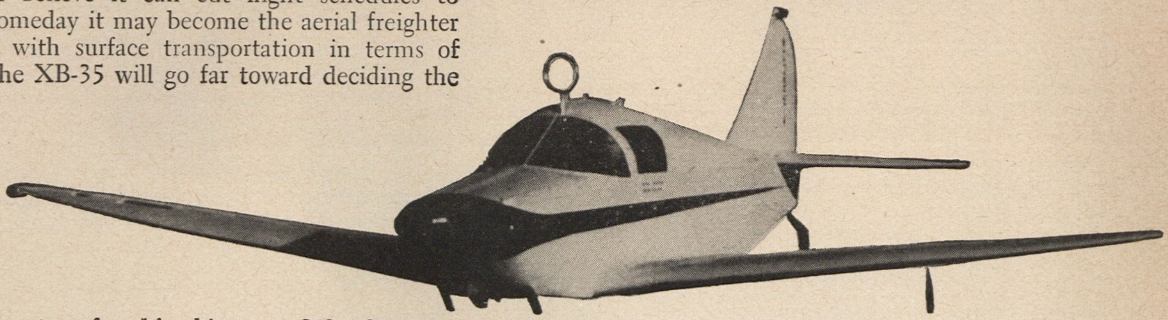
Designers have known for a long time that if they could put all the payload inside a wing it would eliminate about one-half the amount of drag. That would mean increasing speeds without increasing horsepower. It would mean heavier payloads and cheaper operation. These latter potentials are what the airplane needs to reduce ton-mile costs. And engineers believe they have whipped the control problem by a system of "elevons" that combine the functions of aileron and elevator with special wing tip rudders.

"The flying wing," Mr. Northrop points out, "has numerous applications as a commercial carrier both for freight and passengers. I believe it can cut flight schedules to Europe and that someday it may become the aerial freighter that can compete with surface transportation in terms of bulk products." The XB-35 will go far toward deciding the issue.

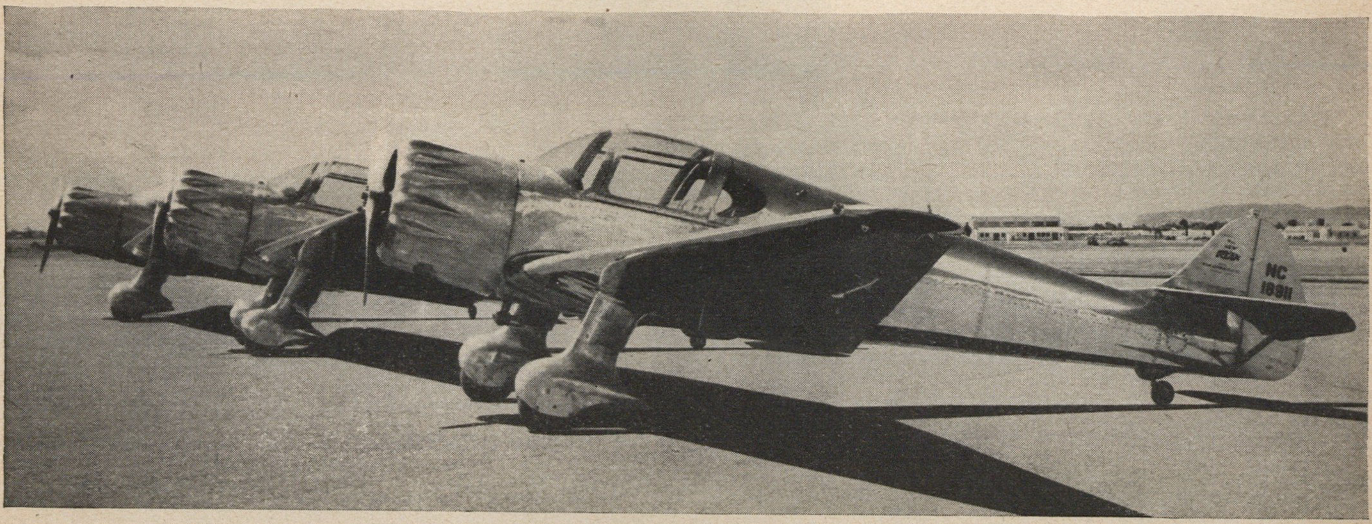
Northrop's P-61, incidentally, contributed another progressive step in airplane designs—the full span flap. It provided superior control at low speeds in a high-speed airplane. It was just the ticket for the night fighters that had to operate from small fields and in darkness, on the deck over varied obstacles and in all kinds of weather. Projected to its fullest utility in peacetime airplanes, it is the first fully proven, fully practical lateral control measure. Likewise, Boeing's fight for the high-lift wing and the flap arrangements on the B-29 will provide for structural benefits, higher speeds, greater carrying capacity and safer, cheaper operation of commercial aircraft. Boeing also put the first pressurized cabin into a production airplane—the B-29 Superfortresses.

Wellwood E. Beall, vice president in charge of engineering for Boeing states: "Comfort as a factor in reducing the fatigue of both pilots and crew members has been definitely recognized, and many of the developments for increased comfort will be directly applicable to postwar airlines. Pressurization has decreased fatigue at high altitudes and the unpleasantness associated with ascent and descent."

He points encouragingly to other advancements: "The reduction of propeller noise by the utilization of lower propeller tip speeds and the better sound-proofing materials developed during the war have done much to decrease the airplane noise level. Much effort has also been expended in solving various engine and propeller vibration problems. Perhaps unconventional power plants may also contribute much toward the comfortable journey of postwar passengers because of the inherent noise and vibration characteristics of most present engines. Much work also has been done on air conditioning; heat exchangers of either the engine ex-



Ready army employment was found for this prewar Culver low-wing.



This Ryan cabin plane, with room for several passengers, lent itself before the war to use as a feeder line craft and was also used extensively as a private plane. Employed as a personnel transport by the armed forces, its postwar possibilities have been enhanced.

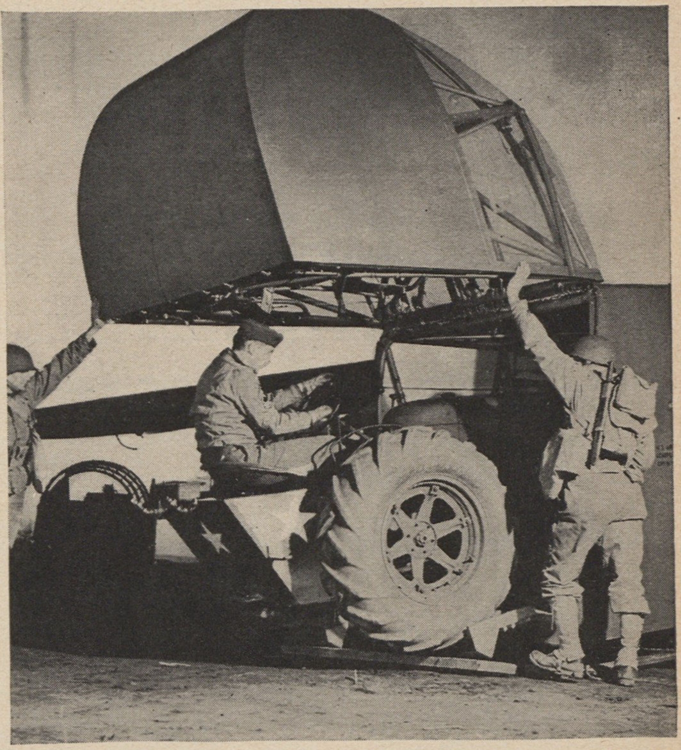
haust type or separate combustion type are now actualities."

Progress was evident in still another field — gliders. Gliding was a sport in 1939. It was an invasion technique in Sicily, Burma, Normandy and the Rhine. Now gliders are expected to enter the air transport field. We started out with light training gliders and wound up with big powerless giants that could carry half-ton trucks and jeeps. We also learned to snatch gliders from the ground with an ingenious pick-up system. Essentially, it was the same system developed by All-American Aviation before the war to pick up mail from rural communities. It was improved to pick up heavier loads, and the idea currently is part of a proposal by an airline which plans to operate on the West Coast.

In addition, our engineers took a C-47 and removed its engines, making it a glider. They took a glider and put engines on it and made it an airplane. The latter was most practical. The product was a low-powered transport plane that could carry a sizable payload cheaply over a short distance in fair weather. A survey shows that a powered PG-3 (CG-4A with engines), which is capable of taking off and landing under its own power from a small field, can carry truck produce from a farm to a city market place as economically as the goods can be shipped by rail or truck. The survey also reveals that the produce which is flown loses less vitamins than that which goes by surface means.

The light plane was also affected. There was one single-place model that could land and take off in less than 90 feet. It was being modified as a two-place design. There were controllable pitch propellers for the small engines that would mean better overall performance. There were more powerful engines, new and simplified control techniques and maintenance simplification. New production processes have led light plane manufacturers to believe that the future will bring the costs down to $1,500 a plane or less. Developments such as these are bringing the private plane closer to the average man.

Cargo and troop carrying gliders such as this CG-10 demonstrated during the war their potential usefulness in postwar commerce.



Plans for the commercial use of gliders may make scenes like this commonplace as the products of peacetime replace military vehicles.

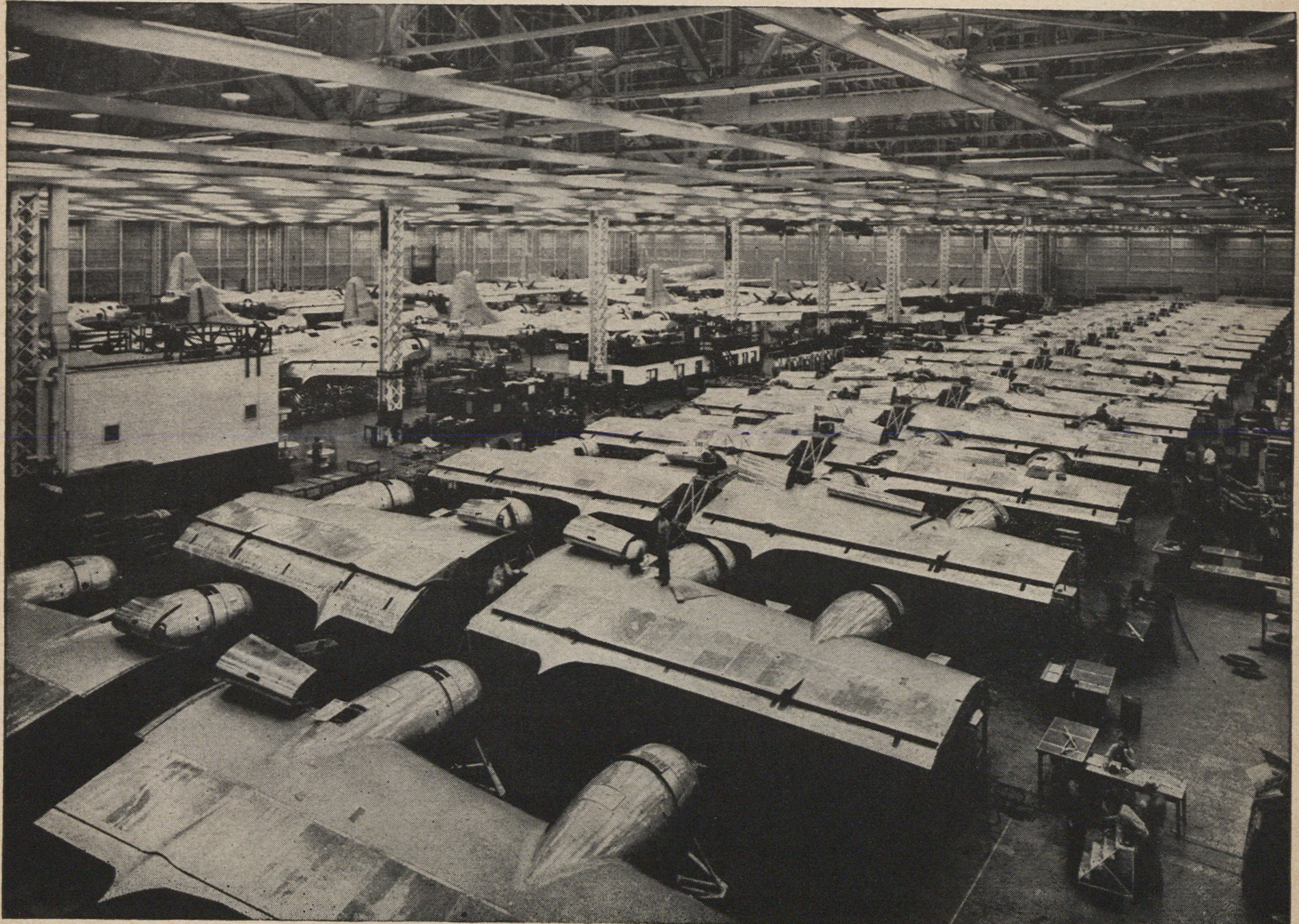
Thousands of GIs, returned to civilian life, remember rides such as these men are about to receive aboard the Sad Sack.

In building a mass-production aircraft industry we accelerated our country's technological 'know-how' at a rate considered impossible by prewar standards

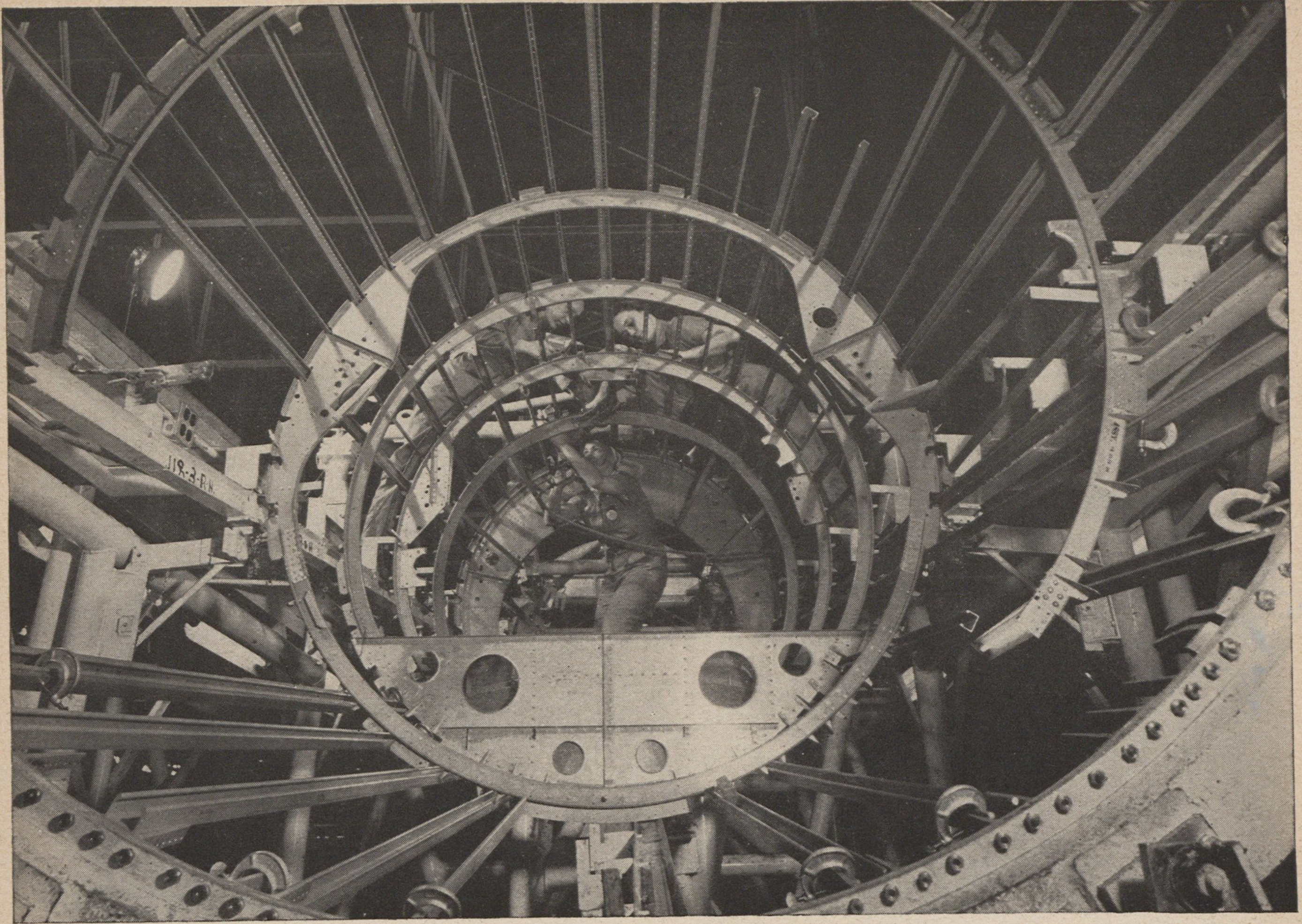
By the end of 1944 there were approximately 50 plants engaged in fabrication and assembly of airplanes and under prime contract to the government. These plants comprised a total of more than 100,000,000 square feet of floor space; equipment and factory facilities were valued at more than a billion dollars. More than 1,000,000 persons made up the working force and a third as many more were engaged in fabricating for subcontractors. Their product was the airframe alone — aluminum and steel and allied metals twisted and turned and finished into wings and fuselages. In addition, other workers had to install engines, landing gear and auxiliary equipment. And in a typical fighter there were 10,000 parts, 3,417 feet of wiring, two miles of hydraulic tubing, 36,700 rivets. A bomber had 16,000 parts, almost six miles of wiring, 334,250 rivets.

The general process was this: draw-up designs, build a mock-up, make lofting templates, produce an experimental airplane, complete a production article. Studies indicate that it took an average of three years to get a production airplane after the experimental project was initiated. It took longer for larger planes like the B-29, less for planes like the P-47. The plant where the work was done had to have special features. It was virtually a mammoth hangar; mounting wings and empennage sections onto fuselages meant whole airplanes moving along an assembly line under one roof. There had to be airport runways ribboning out from the factory and these had to be strong enough to carry the landing weight of the airplane. Some loads would be as high as 300,000 pounds to provide for the big babies that were under construction. There still isn't a runway in the U. S. that will support such a load, but our construction engineers have learned enough during the war to provide one when the time comes.

We learned certain generalities about airplane production: The layout of a plant had to provide for ready receipt of raw materials and a steady flow through sheet metal preparation, machine shop, bench, sub and major and final assembly. Plants located in the northern portion of the country required considerable heating facilities in order to maintain satisfactory working temperatures. Plants throughout the south usually had to be equipped with air conditioning. It took about 18 months to build the average airplane plant. The production capacities of the plants were not fully demonstrated because of schedule changes



Assembly line operations like this one at Boeing's huge Renton, Wash., B-29 plant added much to the country's technological "know-how."



Three of the thousands of civilian women employed in aircraft plants from Maine to California work on this B-29 fuselage in Wichita, Kan.

and cutbacks. Figures taken from an official survey show that one plant of 4,700,000 square feet produced 460 heavy bombers a month with 35 percent sub-contracting. At maximum capacity conditions, the report states, the same plant could probably have produced over 800 bombers every 30 days. Experience indicated that for every square foot of factory space an average of 1½ pounds of airframe was produced.

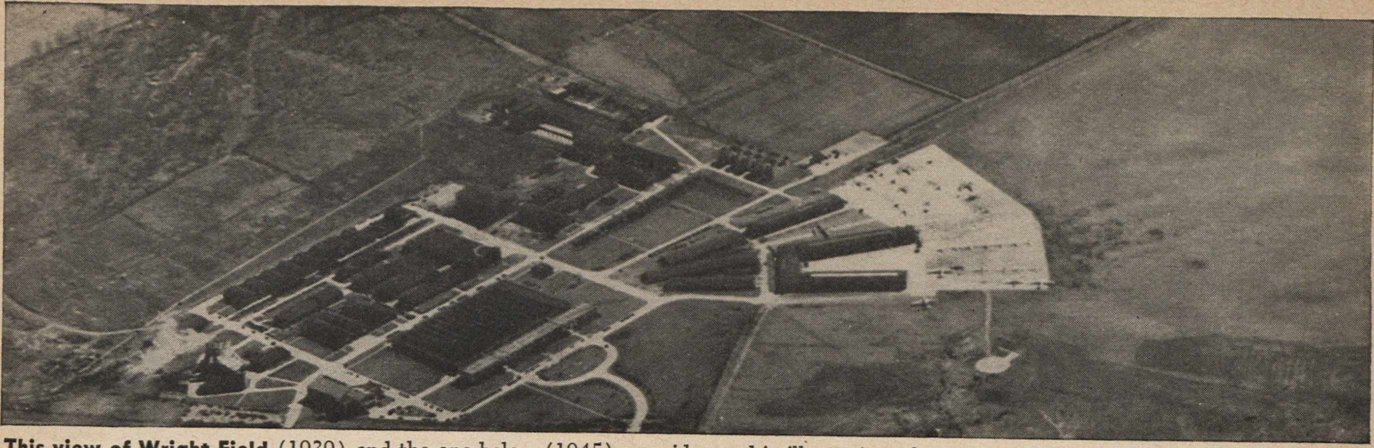
Tooling was the major problem. Integrated manufacturing of airplanes required a balanced distribution of standard tools such as lathes, milling machines, formers and drill presses. These were machine shop tools, easy to get. High production, however, also required turret lathes, multi-drillers, forming, punch and hydraulic presses, and there were special tools needed such as stretch presses, extrusion benders and leading edge rollers. These were not so easy to find. Nor was it easy to produce the great jigs wherein the bomber's fuselage or keel is laid and built up.

Materials were another obstacle, especially the light-weight metals that go into aircraft. Prime metal, of course, was aluminum, and the mills that sprang up brought a new kind of industry to many localities. The mills were needed because aluminum represented 70 percent of all materials used in plane construction. Fifteen percent was steel alloy and five percent was magnesium. The other ten percent comprised miscellaneous materials such as bronze, brass, wood, plexiglas, rubber, copper and nylon. The importance of aluminum is evidenced by the quantity of that metal which goes into a B-29—more than 11 tons of sheet aluminum, 1,418 pounds of forgings, 618 pounds of castings and six tons of extrusions.

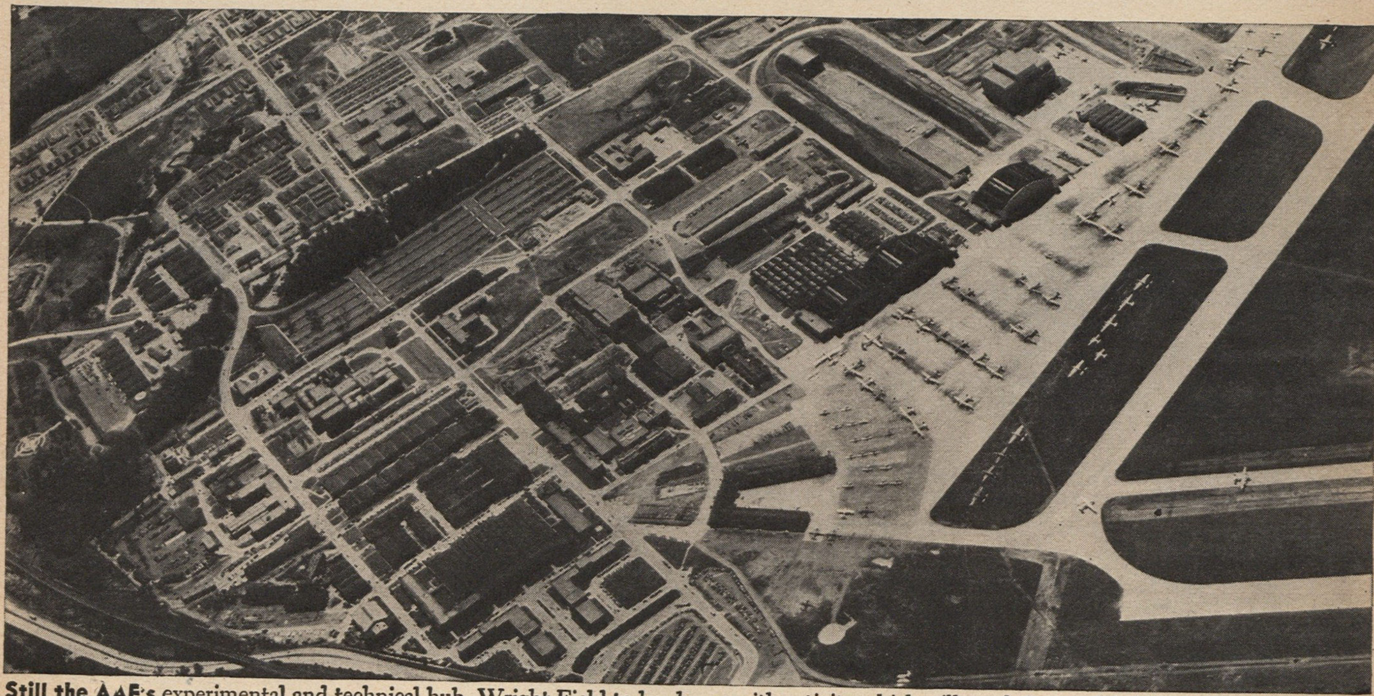
The wood airframe industry also came in for consideration, especially at the time we thought aluminum would be scarce, when it looked as if many of our planes would have to be made of wood—not merely a few trainers such as the AT-21 and the PT-19. Spruce was the prime wood, but we soon learned in the face of scarcity that Douglas-fir, yellow poplar, western hemlock and Port Orford cedar were worthy substitutes. We learned to appreciate the value of our vast timber resources when the British demonstrated the prowess of the all-wood, high-speed Mosquito bomber. Our scientists found many ways of strengthening wood to make it as strong as metal, resistant to temperature changes and readily adaptable to mass production.

As a result of our endeavors along these lines we discovered new glues. The glue of World War I which held together the DHs and other planes was used both for plywood and structural gluing but it was not water and mold resistant over a prolonged period. It wouldn't serve in a global war where a plane might have to operate for weeks in a tropical rain. So chemists went to work and produced synthetic resin adhesives like phenol formaldehyde and resourceinal formaldehyde, and the result is that today's wooden airplanes are held together with glues of durability equal to the life of the wood itself That can mean something, as well, to the furniture market.

Labor felt the impact of the demand for thousands of planes and the effect reached out into the home and the

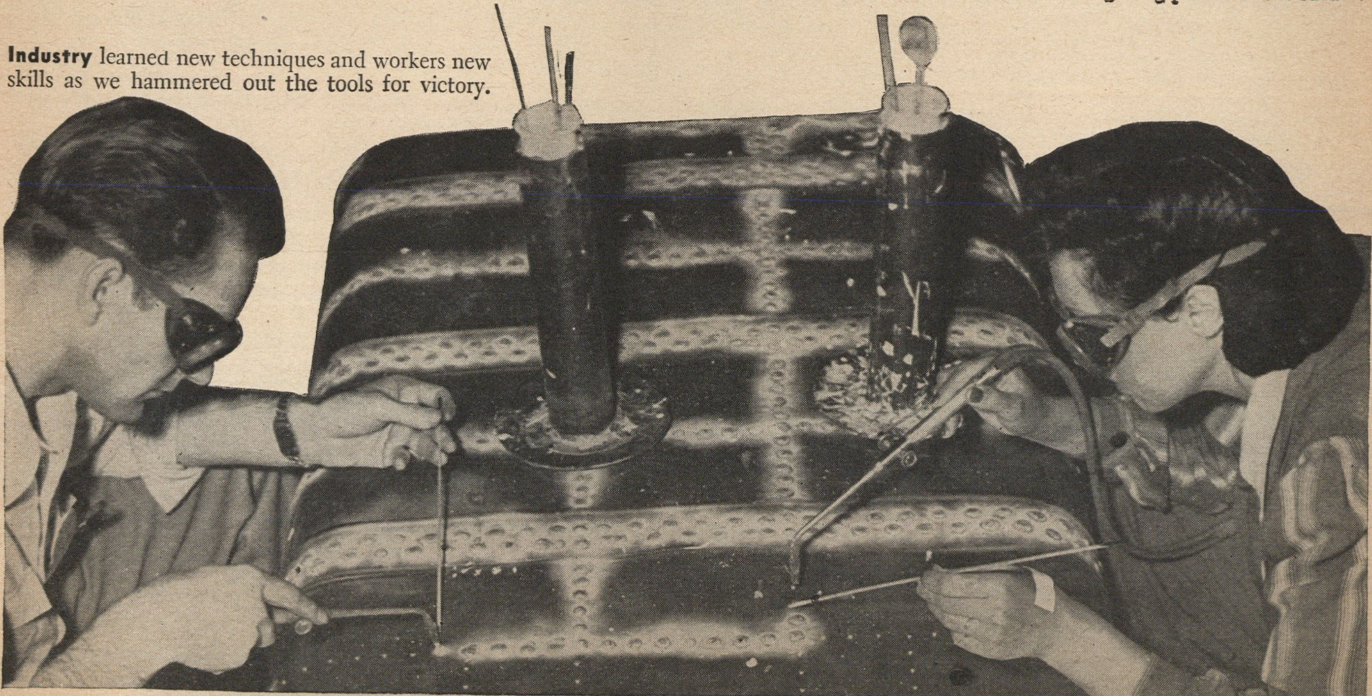


This view of Wright Field (1939) and the one below (1945) provide graphic illustration of tremendous growth of the AAF in war years.



Still the AAF's experimental and technical hub, Wright Field today hums with activity which will result in our fighting planes of the future.

Industry learned new techniques and workers new skills as we hammered out the tools for victory.



classroom. It was routine between Pearl Harbor and VJ-Day for the kid sister to be a welder; many a mother learned how to handle a rivet gun. Employment in the airframe industry alone rose from 59,000 in January, 1940, to more than 900,000 in November of 1943. Because of this situation, a volume of knowledge was accumulated about recruitment, training, supervision, morale and labor relations and working conditions as well as community problems of housing, child care, transportation and other facilities. A direct result was a reduction of the man-hours required to produce a given aircraft. Take the B-29, for example. In its early stages of production a Superfortress required 336,000 direct man-hours; by the time 1,000 of these planes had been built at the same plant, 33,065 man-hours did the job.

Turnover of workers in the airframe industry increased considerably during the war years. In 1941, about 30 workers out of every 100 left the job, were drafted or changed jobs. In 1943 it was 50 percent. With an ever increasing demand for workers, it became necessary to draw in housewives, farmers and people from service trades. These groups of unskilled workers necessitated specialized training programs. Out-of-plant training schools, with courses running from two to six weeks, were utilized to supplement on-the-job training. Suddenly we found out that a woman who never was closer to a sheet of aluminum than the pots and pans in her kitchen could deftly slide aluminum sheets through a machine that stamped out bomber parts. A crippled person could run a machine that spewed rivets into a line of holes on a wing bracket; they could do the job because of a trend toward job simplification and specialization to permit rapid absorption of unskilled labor. Statistics show that a worker totally unfamiliar with a turret lathe could be taught in about eight weeks how to set his work in a fixture, the sequence in which to use the tools in the turret, and the count of the work that determines whether or not his tools are sharp. After eight weeks he could be left alone to run the lathe. On the other hand, a router who follows a jig could become proficient in a couple of days even if he had never seen one before. Millions of Americans became more technically minded than ever before. As a result, the average customer may demand a better product, may force manufacturers to turn out not only better planes, but better automobiles and radios and sewing machines.

The task of running such a vast production program necessitated a control center. This became the Air Technical Service Command, largest organization of its kind ever attempted. It was the AAF's contracting agent, procuring specialist and the trouble shooter. It was also an engineering research center where the theories and the unknowns were tried and tested and proved, where the designs and performance specifications were established; ATSC's job was to see the need for the development of a piece of equipment, find a builder, assist in its perfection, test it, prove it and get it to the fighting air forces—and do it yesterday, not today. ATSC engineers went everywhere the AAF went, and they came back with a list of the needs and requirements. Sometimes they failed to fill these needs; more often they succeeded. They prodded and pushed, skimped and scraped, insulted and eulogized industry into doing the things that had to be done.

Manufacturing methods changed and the systems that were evolved will be reflected in peacetime in the great fleets of silvery "parlor-car" airliners and in the Sunday driver's sky flivver and in hundreds of other ways.

Here, from the official report, "A Technical and Statisti-

B-29 production was farmed out. Here at the Hudson plant in Detroit, electricians work on one of the fuselage sections turned out there.

cal Analysis of the United States Aircraft Industry," is a description of the long secret process of airplane fabrication that enabled our nation in a few short years to mass produce the airplanes that overwhelmed our enemies:

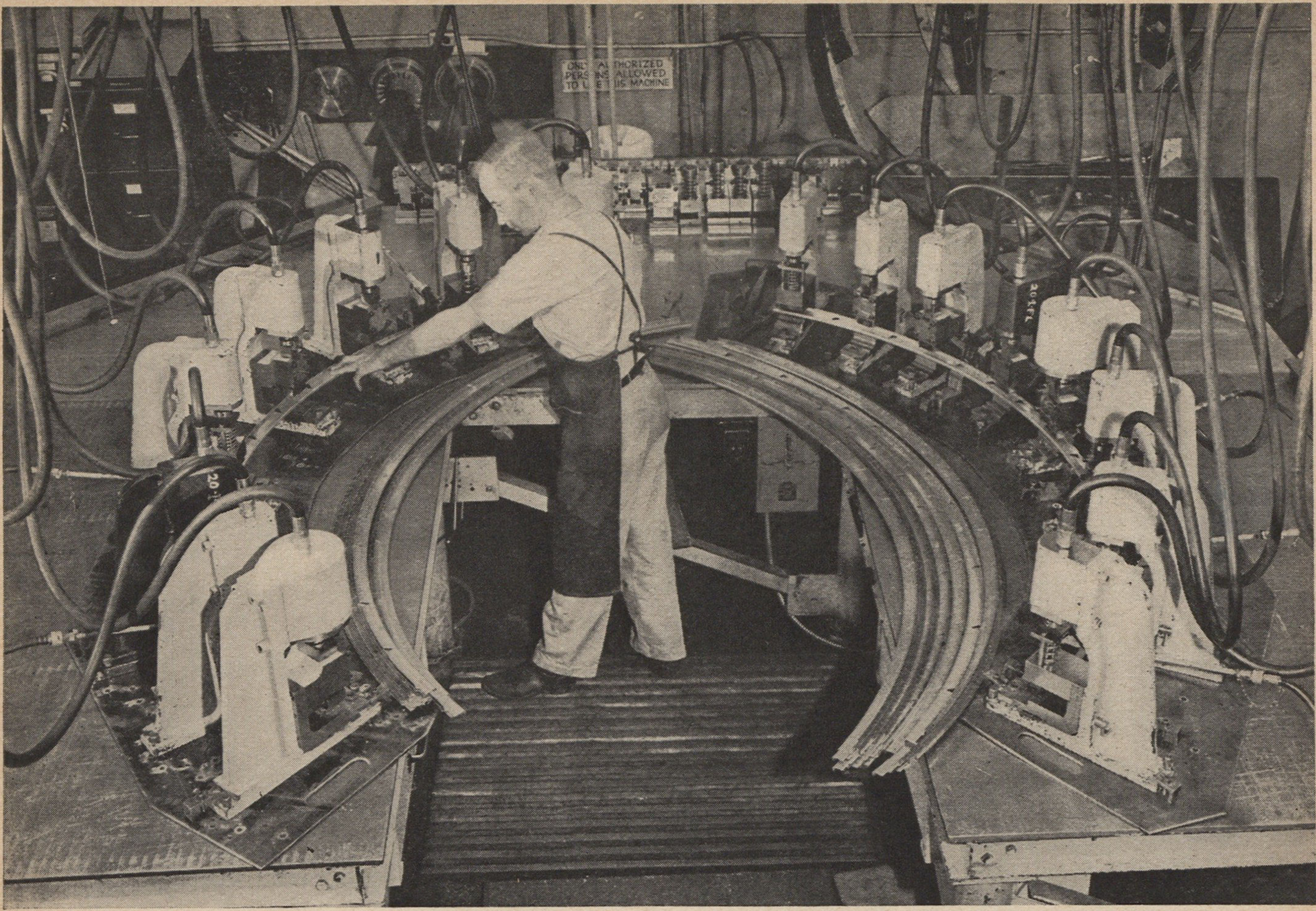
"Massive sheets of aluminum, carriaged from the stockroom, started with the shearing operation on standard metal shears, ranging from three to sixteen feet. They were then routed or profiled to special sizes by radial arm routers. Other sheets were formed into various convex and concave surface-skin parts by drop hammers—huge machines that weighed from 500 to 600 tons; or were formed into wing ribs, cowl sheets, by large hydraulic presses having, sometimes, a capacity of 5,000 tons. (The drop hammer dies were made of soft metal such as Kirksite, rather than of steel. The hydro presses used only one metal die with rubber in a heavy casting to force the desired shape). Leading edges were formed into the required curvatures by a special rolling mill. Stretch presses were used to obtain contour forming of the skins and other sections. Small parts were bent into angles by power brakes and blanked out of sheets by punch presses. Other parts ran through engine lathes, turret lathes, screw machines for drilling, reaming, boring, facing. There were grinders, broachers, honers, swages and drills that performed other operations. Special fixtures insured proper tolerances and alignments at major assembly stations where the empennage, fuselage and wing panels came together. Cranes and hoists and other machines put in engines, propellers.

"Even with the wood trainers it was the same continuous flow; only the materials and tools were different. The all-wood airframe factories possessed large brick drying kilns for seasoning wood. Large batteries of infra-red lights or baking ovens were adjacent to assembly areas and glue stations were dotted strategically throughout the plant. Tools are peculiar to all other wood-working industries—circular saws, routers, electric planers, sanders, hammers. But the airframe industry made use of autoclaves—large molds for baking plywood covers and fuselage sections. Designed purely for aircraft work, they can be modified to make boat hulls or automobile bodies."

Apply this know-how, as one airplane manufacturer did, in aero-engineering a trailer and you will see how far afield it reaches. This company's aeronautical engineers took a conventional refrigerator trailer, engineered it the way they would an airplane, using aircraft materials and workmanship, and the result was a trailer that was far lighter, with an equal cargo capacity, greater unit strength and lower maintenance costs. Using a revolutionary type of rubber spring, inflated like a pneumatic tire, they replaced heavy metal springs. Body and chassis were integrated like a plane's fuselage sections. The application of lightweight, high-strength metals such as aluminum alloys in place of the original trailer's 14-gauge carbon steel sheet and oak timbers also reflected routine airplane practices. Originally the trailer weighed 14,700 pounds; new production methods cut the weight down to 7,118 pounds.

Another example is evident in an aircraft company's executive offices. The ultramodern desk, showcase, settee and paneling in the reception rotunda represents a plywood process that was perfected in building a giant flying boat. The all-wood construction of this plane taught workers new tricks in applying thin veneer and resins. It was no trouble

These B-29 tail sections were high over Tokyo, above cascading salvos of fire bombs, not long after this photograph was taken in 1944.



This multiple pneumatic drill jig was one of the cogs in the production miracle with which we achieved our goal of 50,000 planes a year.

at all for these workmen to adapt the process to furniture-making. It was expensive, but it produced a polished product. The same method also went into the construction of a highly-streamlined, rough, tough dinghy which will take an outboard motor and zip around the lake.

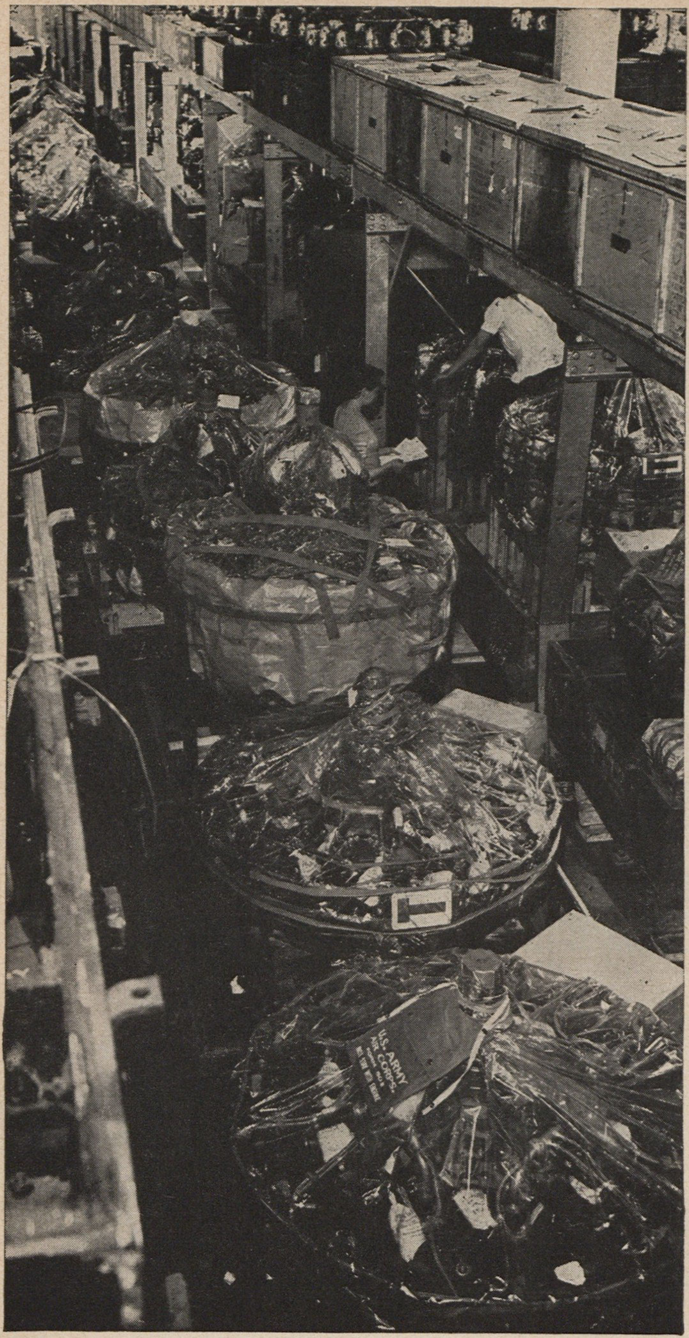
In addition to the advances in airframe design and fabrication methods, we emerged from the war with more powerful and more efficient engines. By war's end we had close to 1,500,000,000 horsepower pulling our planes across the world's skies. This accomplishment resulted from taking early model engines and building into them more horsepower, from developing entirely new engines, and from improving fuels which must be considered as much a part of the reciprocating engine as the crankshaft or the pistons. There was one propeller-driven airplane, the Republic XP-47J, which could fly faster than 500 mph in level flight at 35,000 feet—fitting proof of the job done with the conventional engine. That plane probably would have been produced by the thousands if turbo-jet powered plants hadn't come along when they did, and it represented what could be done with horsepower if it were used properly.

The engine industry rapidly expanded after January, 1941, when it employed about 36,000 persons and produced 3,407 engines a month. Production reached a peak of 24,219 engines or about 42,000,000 horsepower a month by August, 1944.

Engineers likewise progressed. They had in production a 28-cylinder, radial, air-cooled engine having four banks of seven cylinders each, a revolutionary step over the twin-row design; and they had a double "V" in-line, liquid-cooled engine capable of developing in excess of 2,600 horsepower, almost double the output of the in-line engines at the start of the war.

It would require a book to tell in detail how we got more horsepower. But here's a sample: When it was first brought to Wright Field for testing, the Wright 3350 radial engine which powers the B-29 developed a take-off horsepower rating of 1,800. It rates at close to 2,600 horsepower today. Many changes were responsible for the gains. Reduction gears were altered, a new impeller drive installed; cylinder head shapes were revamped and made thicker with increased fin area; the two-speed integral supercharger gave way to a single-stage internal supercharger and the additional turbo-supercharger for high-altitude performance; the induction system was redesigned, exhaust valve assembly was revamped, vibration dampers were added. These changes meant strengthened construction, more uniform heat flow, more circulation of air for cooling, less roughness at high speeds and, of course, more horsepower output.

Yet for all the improvements made in the engines themselves and in the superchargers, two new methods of water injection and fuel injection have been responsible for increasing horsepower ratings as much as 50 percent. In the water injection process, which in principle has the same effect on the aircraft engine as wet weather on your car engine, a fine spray of water is shot into cylinders, surpassing detonation and permitting more economical fuel usage. In the engineer's language it eliminates "ping," the vibrating sound which occurs when fuel burns in one part of the cylinder more rapidly than in another part. When water is injected into the fuel induction system between the intake manifold and the carburetor, it enters the cylinder as a



Engines destined for all parts of the world are covered with Pliofilm before shipment from the AAF service depot at Fairfield, Ohio.

liquid and passes out as a vapor, taking off undesirable heat which previously caused fuels to burn quicker than was desired. The water also allows a leaner mixture with a saving of fuel. In a P-47 this saving was more than 28 percent.

Fuel injection, on the other hand, has given power increases by a direct and more even distribution of fuel to the cylinder. A series of small pumps—one to each cylinder—injects the exact amount of gasoline that each particular cylinder needs at its critical spark moment to get the most efficient operation. This eliminates clogging of fuel in spark plugs as a result of uneven distribution, a fault which often necessitated a complete change of spark plugs after every mission. Both systems, according to engine authorities, will make their appearance in the world of wheels for ground vehicles as well as airplanes.

Carl Friedlander, vice president and co-owner of the Aeronca Aircraft Corp., says: "The lightplane owner may consider the direct injection engine because it offers improved fuel-air mixture, better engine stability, more fuel economy, reduced backfiring, improved cooling, increased power rating, increased altitude and ice immunity, smoother engine operation and improved starting and acceleration. But all of these are, perhaps, overshadowed by the fact that the injection system would weigh slightly more and increase the initial and maintenance costs appreciably."

Speaking for the commercial airline operator, Jack Frye, president of Transcontinental & Western Air, Inc., comments: "To the airline operator the direct injection engine is most attractive. The somewhat higher initial cost is not so important proportionately to commercial operators as it is to individual plane owners and with the big planes flying higher and faster the advantages are more marked, particularly the freedom from carburetor icing which has long been a hazard to operation."

New super fuels also contributed to better engine performance. Operating on 100 octane fuel, for instance, one engine developed only 1,000 horsepower at take-off. Fed the new 130-performance number fuel, it attained a 1,300-horsepower take-off rating. Another fuel, 115/145 performance number (secret until war's end), enabled a plane the size of the B-29 to carry 1,000 gallons less fuel on a 4,000-mile trip. Since that much gasoline weighs approximately three tons, it might mean an additional payload, certainly a boon to commercial aviation.

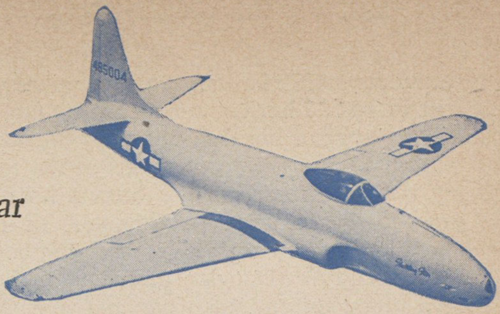
For commercial use, however, power is secondary to safety. Tests run with the high-octane gasolines accomplished wonders. The Standard Oil Co. of New Jersey, for example, came up with a special safety fuel to meet the demand of Pan American Airways. The fuel in tests proved immune to the spark of a welder's torch and static electricity. It must be heated to 100 degrees Fahrenheit to produce enough vapors to ignite.

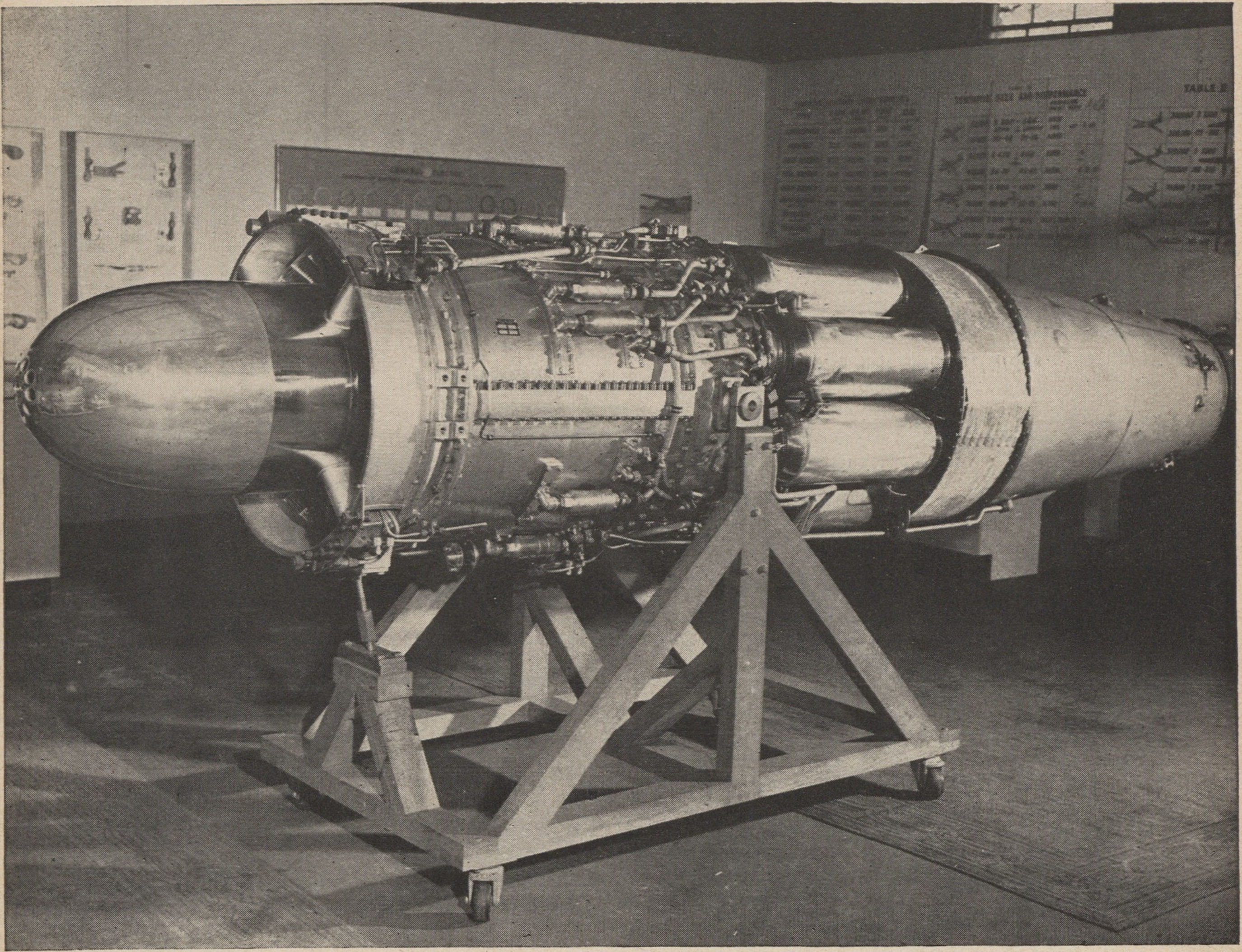
And we harnessed a new kind of power. Jet propulsion, as far as aviation is concerned, is unquestionably the greatest single step forward to come out of the intensive research

One of the giant Wright Cyclone engines, packing 2,200 horsepower, gets a going over at Paterson, N. J., plant where it was made.

Development of jet propulsion marked the greatest

single advancement of aviation during the war





In the principal of the jet propulsion engine we had the first major change in the airplane since the Wright brothers took to the air.

and development of the war years. The urgent need for faster planes to meet those of our enemies brought the jet engine into existence far sooner than it would have come in peacetime. It has placed man on the doorstep to the final phase of his efforts to propel himself through space.

Jet propulsion is really much closer to our daily lives than the jet-propelled airplane. Gas turbines will be adaptable as power units for railway trains, buses, electric power generators and doubtless even for the automobiles of the future. On the latter, however, men like Knudsen and Kettering will not commit themselves. Kettering explains: "When we get a truly successful gas turbine engine with a cheap fuel, then we'll start finding a way to put it in the automobile. A school kid can do that."

The advent of the turbo-jet engine, which eliminates the propellers and takes advantage of a new principle for disturbing the air and obtaining forward thrust, is the only major change in the airplane since the Wright brothers proved mechanical flight possible.

In configuration and in power plants, virtually every airplane built since the 1903 Kitty Hawk model was basically the same; the new method of propulsion promises to change that. And newer still is the use of the gas turbine engine to drive a propeller, the principle incorporated in Consolidated-Vultee's XP-81 which uses a pure jet engine, as well as the propeller, for thrust.

At war's end the turbo-jet engine showed promise of doing to the conventional engine what the automobile did to the horse and buggy. It weighed less, had one-tenth as many parts and could produce twice as much power. That meant heavier loads could be carried and it meant extra boost for take-off, a safety assurance which defeats the danger point of all flying. By this time, engineers have more than doubled the turbo-jet's own power output with refinements and modifications; jet engines with thrust equivalent to 10,000 horsepower are in the fabrication stages with the prospect of limitless power in the future.

At the same time proponents of the reciprocating engine say that jet propulsion has been a boon to their field because it has spurred development of higher horsepower radial and in-line engines to meet the competition. A man like Donald W. Douglas, president of the Douglas Aircraft Co., whose fortune was made and is at stake in the DC-6s, DC-8s (commercial versions of the C-54 and XB-42), puts it this way: "Until the designers of the jet propulsion engines make their power plants cheaper to operate, the reciprocating engine will power most airplanes." He believes that for the next 10 years, at least, commercial airlines will stick to the carburetor engine. The fact is that Pan American, American Airlines, TWA, Eastern, United and others have already backed up Douglas with plenty of cash, investing upwards of $100,000,000 in the conventional power plants for their four-engine airliners. To pay off that initial investment the planes will have to last at least a decade as the DC-3s have done. By that time the "bugs" will be whipped in jet propulsion; it was that long or longer before the piston engine could run for 100 hours without a skip.

But the fact remains that at the end of the war there was hardly a bomber or fighter on the drawing boards that wouldn't be jet powered. And by virtue of its simplicity, jet is gaining in favor. As one grizzled old line sergeant puts it: "The damned thing will run on tobacco juice." What happens in the jet propulsion "era" from now on is anybody's guess, but the principle has a world of applications.

Hall L. Hibbard, whose company engineers at Lockheed to date have built our most successful jet-propelled fighter, the P-80, is willing to do a little forecasting. "In 10 or 15 years," he predicts, "the turbo-jet engine driving a propeller will appear on all airplanes designed to travel at speeds under 500 miles an hour and at altitudes under 30,000 feet. For higher speeds—500 to 1,500 miles an hour—there will be pure jet engines without propellers. At 25,000 feet and above, these engines will compare very favorably in efficiency and economy with our conventional engines. The future transport will be of the pure jet type. It can be as large as necessary to meet the demands of the traveling public, for there will be plenty of power available to fly it. The cabin will be pressurized for flight above 50,000 feet. The luxurious comfort of this aircraft will surpass anything we have known in the transportation field. In such a transport traveling faster than the speed of sound, 10 miles above the earth, there will be no noise, no vibration and no sense of speed. Weather will make no difference at all since you will be flying over storms. The cockpit will be enough to make an airline pilot of 1945 blink his eyes and start an inventory of missing instruments. He will see the conventional flight instruments, but most of the complicated engine instruments will have disappeared. He will have no complicated fuel-setting adjustments to be watched or manifold pressures to be maintained. The plane will be able to use any airport that is large enough to handle our big bombers of today."

Col. T. B. Holliday, one of the AAF's foremost electrical engineers, looks for an all-electric airplane. "It will be entirely possible," he says, "to use the gas turbine engine to drive generators for supplying a powerful electrical current which, in turn, will drive electric motors that turn propellers at high rpm rate. Motors small enough to fit into the propeller hubs themselves already are being considered."

Engineers also agree that a small gas turbine powerplant can be placed in the basement of your home to run electrical gadgets such as stoves, refrigerators and irons—and they believe it can be done more cheaply than you can buy the power under present conditions.

One company, which has never entered the aviation field, has a jet engine the size of a potato masher that produces the power of a motorcycle engine. It plans to adapt its midget power package to a small boat, a runabout and a machine shop lathe.

Light plane manufacturers are planning "distant designs" around a small turbine engine. One ambitious designer has already adapted a jet engine (on paper) to the Ercoupe. About all the small plane builders are waiting for is the switch from fabric and wood to all-metal construction for the flivvers; then they'll think seriously about jet power.

Beyond jet power is rocket power. The Germans developed an ingenious application of the rocket principle in their V-2 bombs. This weapon reached a speed of 2,500 miles an hour and an altitude of more than 60 miles. With some structural changes—the substitution of a cockpit and devices for steering, slowing down and landing for the warhead—we see the possibilities of turning such a weapon into a man-carrying craft. The V-2 carried a warhead of 2,000 pounds of HE. Substitute more fuel for the warhead and you reach a top speed of 3,200 mph, an altitude of 175 miles. And if hydrogen were used instead of alcohol, the rocket would travel 250 miles above the earth at a speed of 4,000 miles an hour. With such a device, New York would be less than 30 minutes from Los Angeles.

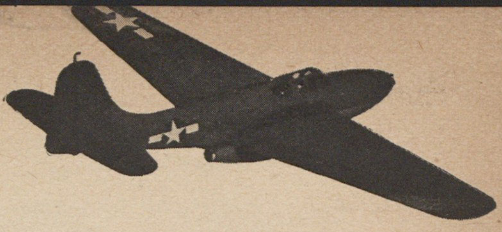
Nothing could be more simple than a rocket motor. Fuel (gasoline or alcohol) is carried in tanks, just as in our present airplanes, in addition to a supply of oxygen in liquid form. The fuel passes from the tanks and serves as a coolant as it flows through the outer jacket of the motor into combustion chambers. Here it mixes with the oxygen. A violent continuous explosion takes place. The hot gases exhaust through a nozzle to the rear. Such an engine powered the Germans' ME-163 fighter. It is also the power unit for several of the AAF's future planes that are being built by different companies.

An "age of rocketry" is certain to come. The scientists tell us that planes traveling within the earth's atmosphere will not be able to fly faster than about 1,500 mph because the friction of the air will heat them above the point where cooling is practical. At that speed a temperature rise of some 400 degrees F. would be experienced. To avoid this eventuality, we will have to go much higher with our rocket airplanes, outside the atmosphere, where there is no air to create drag or cause excessive heating of the structures.

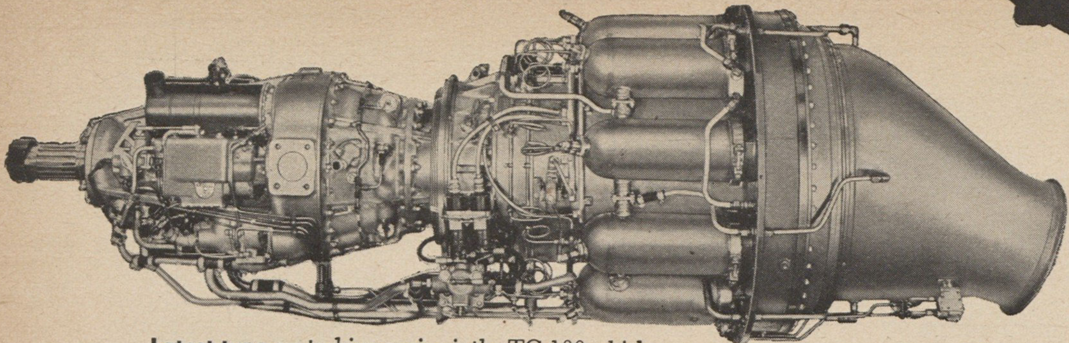
In the opinion of our own engineers, who now are engaged in extensive rocket-fighter and rocket-projectile experimental programs, there is no limit to the speeds that can be attained. There is no reason why we won't be able to travel 10,000, even 100,000 miles an hour. It is no longer so much a question of *how*. More pointedly, it is *why*. For the time being, at least, jet propulsion will be the intermediate step.

The airplane, where jet propulsion found its first great practical use, likewise forced into reality many things that never before were ours, and its utility and auxiliary products have had a definite influence in such fields as medicine, agriculture, education, meteorology and electronics. Not since the advent of the steam engine has any machine creation promised to have such an affect on our living conditions.

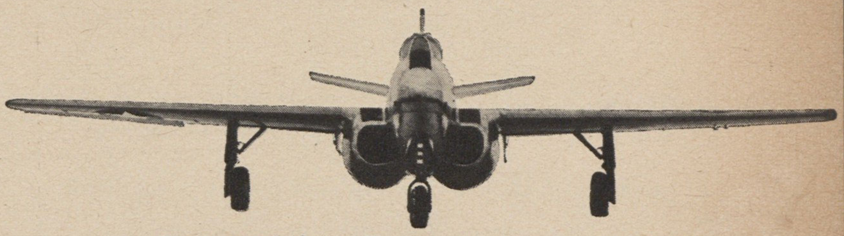
This progress is most evident in the work done in aviation medicine. A comparatively new science in 1939 (the first aviation school of medicine was established at Randolph Field that year) it has grown to be a great new pro-



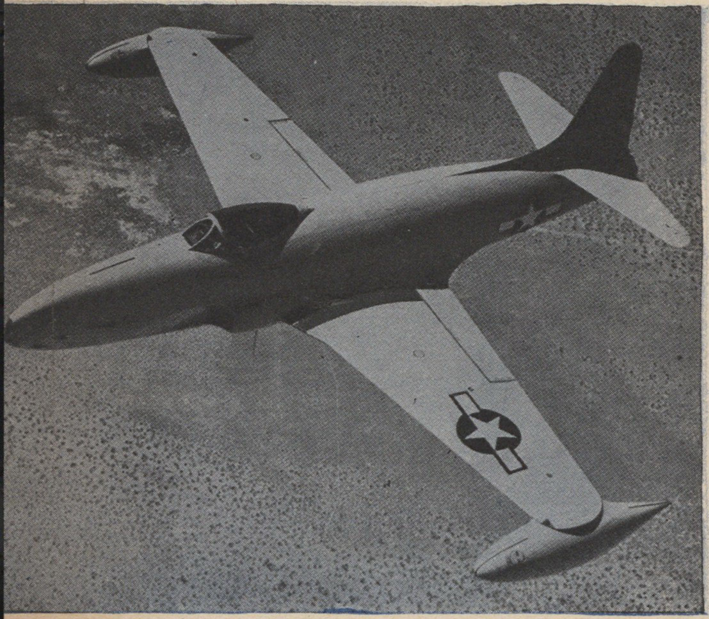
With the advent of the P-80, the P-59 (above) became jet trainer.



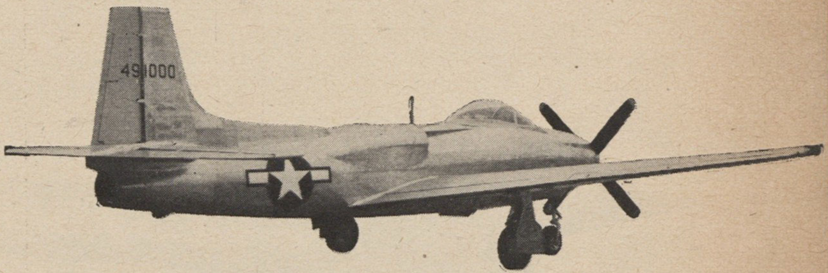
Latest type gas turbine engine is the TG-100 which drives propeller and also boosts with jet thrust.



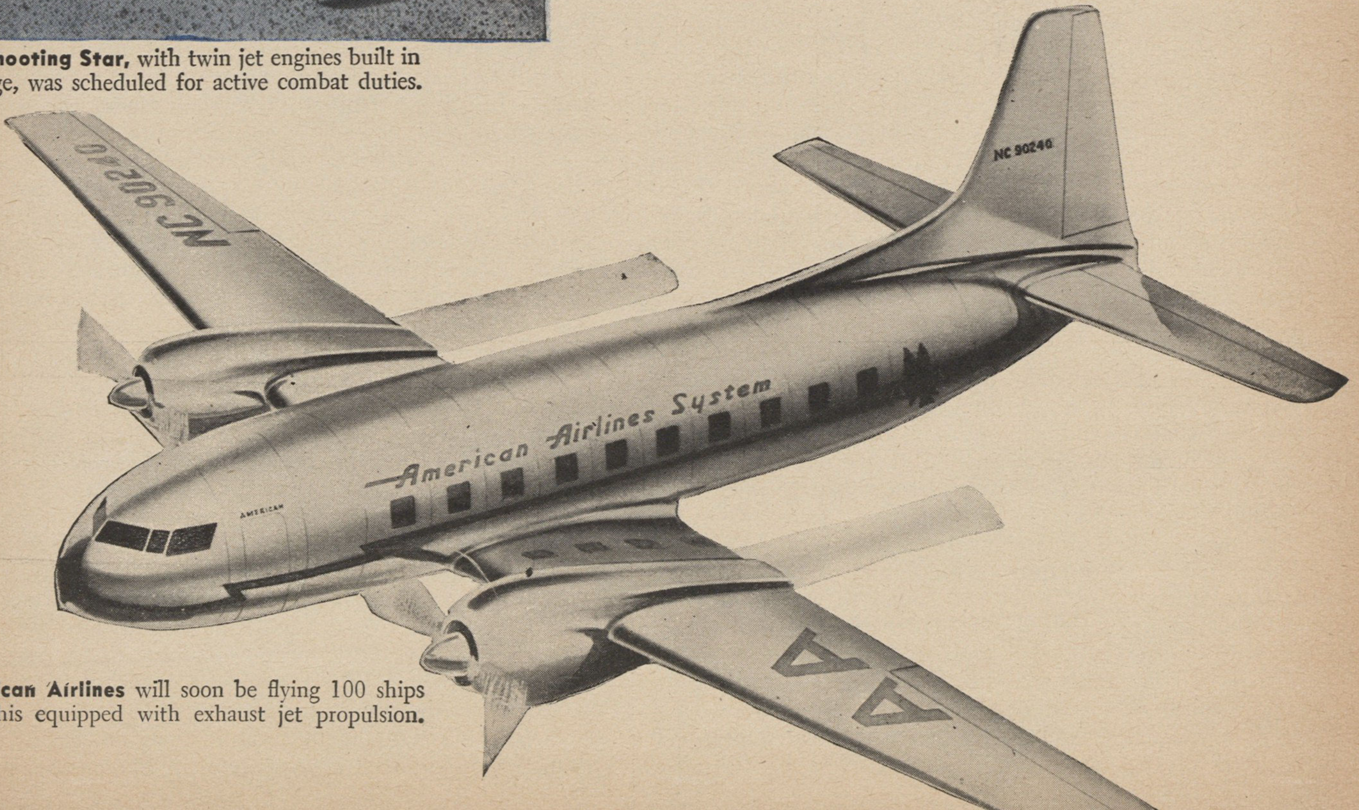
The XP-83 is the AAF's newest jet propulsion job.



The Shooting Star, with twin jet engines built in fuselage, was scheduled for active combat duties.



XP-81 uses both jet thrust and conventional prop.



American Airlines will soon be flying 100 ships like this equipped with exhaust jet propulsion.

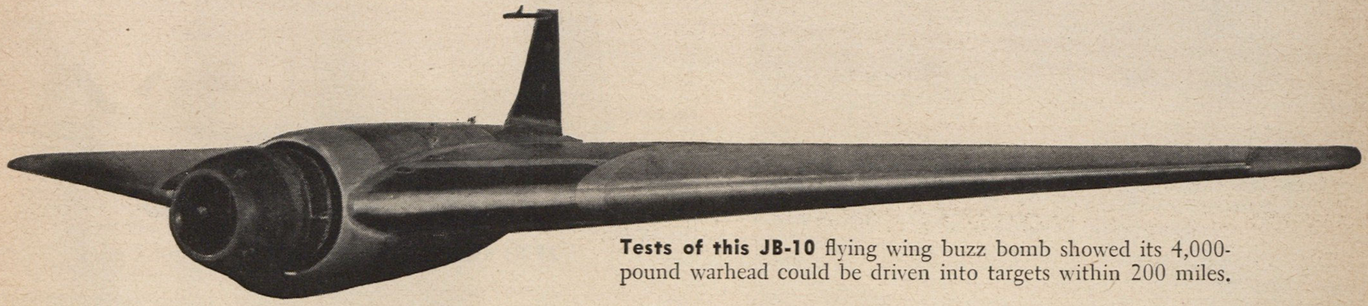
fession and the flight surgeon has become as important to the airman as Dr. Dafoe was to the quintuplets and for the same reason—keeping them alive. According to Dr. A. J. Heim of the Aero-Medical Laboratory at Wright Field where the majority of experiments with the human body in flight were carried out, the greatest contribution of this new science can be attributed directly to the airplane itself. "Because of its space limitations and the necessity to keep weight at a minimum," he says, "the airplane forced us into a complete new study of anthropology. Man dictated the new designs. His physical limitations made us change the shape of cockpits and cabins, of goggles and oxygen masks and the design of clothes, and in trying to find out the body's reactions to the characteristics of flight we learned many new things about the human machine."

The result of these experiments to fit the airplane to man reached into many fields. It was seized with a great deal of interest by industry, which now is carrying on extensive experiments to remake the workshop to utilize workers' greatest energy with maximum comfort. It is reflected in the changed design of theater seats and the chairs in railroad coaches, in the relocation of control devices for factory machines.

There were experiments in the centrifuge, the whirling machine that simulated dive pull-outs and sharp turns on the ground before grinding cameras and the scrutinizing eyes of experts so they could record what happened to the man in the cab at various G-forces. This led to the anti-G suit which gave our pilots an advantage in combat and our flight medics a corresponding advantage in research since it enabled development of new charts and "know-how" pertaining to G-tolerance and the human body. In pressure chambers men went to simulated heights above 70,000 feet and stayed there for longer periods than ever before, and we accumulated new knowledge of how high we could go and live. These tests produced a new pressurized oxygen mask which introduced pressure breathing and made flying at altitude safer. In decompression chambers we found out that a man could ascend from 9,000 to 30,000 feet altitude in 75,000th of a second without too serious effects on his system. Where there was danger, we did something about it—and what we did will mean a lot to the average passenger who intends to fly in one of our super airliners in that "smooth flight level" we call the substratosphere, from 30,000 to 40,000 feet. In hot rooms or "ovens" we learned that man could stand temperatures of 150 to 155 degrees Fahrenheit for 30 minutes or more, and in cold rooms and at high altitudes we carried on studies to prevent frostbite.

Other scientists delved into the field of hydroponics, a chemical process that will make plants grow without soil. The process lay hidden in the laboratories and in yellowing reports until the AAF brought it out, put it to work to feed our air crews and ground men at isolated bases. By the end of the war chemical gardens were flourishing on the desolate volcanic rock islands of the Atlantic and on the barren wastes of several Pacific bases. On Ascension Island, for example, during the week of V-J Day, the GIs harvested 487 pounds of tomatoes, 110 pounds of peppers, 332 pounds of lettuce, 90 pounds of radishes and 1,301 pounds of cucumbers, substantially enough greens and fresh vegetables to supply 1,000 men for a week. It was a welcome health premium for men who had to live on packaged foods. It was also typical of the problems the AAF had to solve in its effort to keep its hundreds of thousands of men healthy and safe.

The same problem existed in aircraft. In general terms you can say that more horsepower, better design and improved structural fabrication meant safer operation. But we created other devices. Take the attitude gyro, for example, a small gyro-stabilized instrument that has replaced the gyro horizon indicator in most aircraft. Unlike the former instrument, it doesn't "tumble" and that means true indication at all times of the aircraft's axial position whether it is in a roll or a loop; it means no more flying upside down without knowing it, a predicament in which many pilots have found themselves. The new redline airspeed indicator tells a pilot his exact airspeed relative to the maximum speed that the airplane will stand structurally, all on the face of a single dial. New and better automatic pilots relieve pilot fatigue, a known cause of many accidents. In the engineering and development of these "robot pilots," weight was slashed to a minimum, thus offsetting the prewar commercial objection to them Already the Civil Aeronautics Board asserts that these robots will ride with the new commercial air carriers on all transoceanic flights.



Tests of this JB-10 flying wing buzz bomb showed its 4,000-pound warhead could be driven into targets within 200 miles.

Weight and balance studies established new rules for loading procedures which were translated easily into safety measures. Fire extinguishers were built into engines and aircraft. Wherever possible our engineers took away the human element and substituted the machine. They even provided an automatic landing system that would "take over" an airplane in its approach for a landing and bring it in on a runway which a pilot couldn't even see.

But we didn't stop there. We took it for granted things would go wrong. The word "ditching" became a training course. Structural changes in our land planes and practice techniques permitted pilots, with the law of averages on their side, to set a land plane down in the water to provide maximum protection for the crew members. We provided life rafts and vests and survival kits which for years to come will play major roles in life-saving at sea.

In our search to make flying safer we ventured into radar. It was the war's worst kept secret. The word itself at war's end, by virtue of its common usage, was ready for the dictionary. The Germans had it, the Japs had it, we had it. And by all reports our radar was best. The U. S. spent $2,700,000,000—more than was spent for the atomic bomb—on its development, perfection and produc-

Progress in commercial radio was pushed years ahead

of itself by wartime research and development in radar

Radar—"the war's worst kept secret"—was a $2,700,000,000 baby, more than was spent for the atomic bomb. Here an operator tunes a radar altimeter. Its postwar commercial application is assured.

tion. On V-J Day the radar industry in this country had outgrown by far the radio industry. At the same time radio, more specifically that part of it previewing television, jumped years ahead of itself because of the knowledge learned and the results achieved in radar experiments and application.

The British and our Navy used it first, then the airplane made it airborne. In the air war it was used to identify friend or foe, plane-to-plane. It was an expert and unfailing navigational aid. It kept a thousand bombers and a thousand fighters in the air at the same time, flying in all directions, with a minimum of collision hazards. What it means in peace is the difference between flying and not flying at all; between life and death.

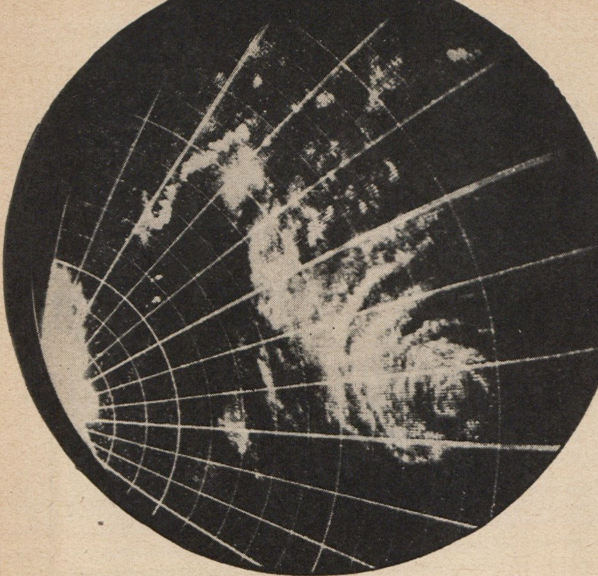
Take this situation: You are a passenger on an airliner grounded at Cheyenne because the weather is bad at Salt Lake City. Your plane can't even take off because the field at Salt Lake City is closed in and you wouldn't be able to land there. You sit and sweat it out just as someone else is doing in Chicago, trying to get to Cleveland. That's *without* radar. Put a radar system in the commercial transport and a pilot can safely feel his way through the thickest fog or smoke, land the big airliner with the same assured safety you would have if he could see the field in the bright sunshine. Or, consider the traffic problem: There are 30 airliners stacked at different levels over LaGuardia Field. One by one they get their signals to come in. There is evident danger of error—human or instrument—which might cause collision. With tail warning radar and forward searching radar and absolute radar altitude indication, pilots are always able to tell the nearness of other planes, and the danger of collision is minimized.

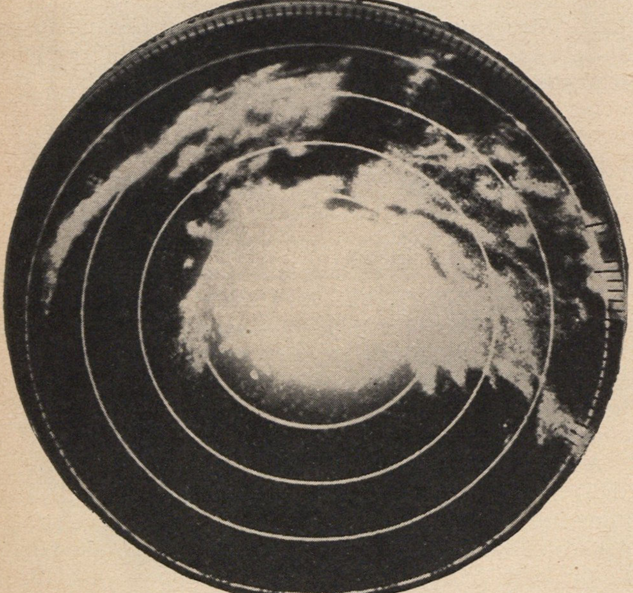
A radar altimeter, perfected in war, gives positive altitude above the ground, practically eliminates the hazard of ramming into mountain peaks during storms or fog, which, the records show, has been the cause of most airline fatalities in the past decade. This instrument tells a pilot the roll and elevation of the terrain over which he is flying. Literally he has a depth dimensional map with him in the cockpit. The safety-contributing factor is obvious.

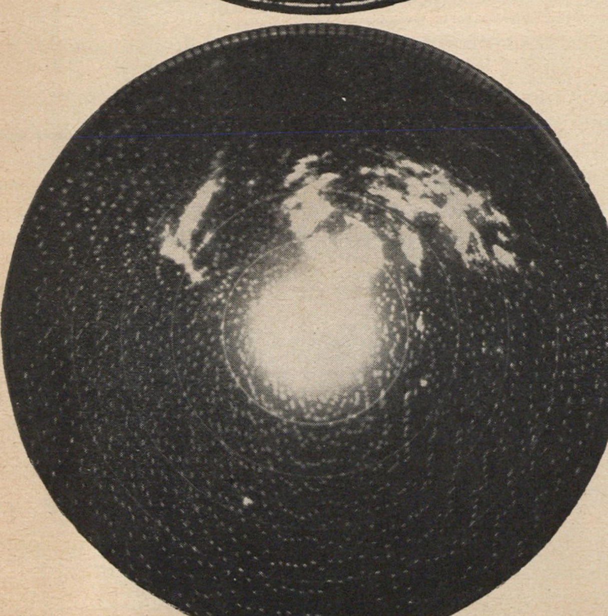
Another type of radar called Loran (long range navigation) enables planes to fly over thousands of miles of markerless water regions and hit a small island field right on the nose. Furthermore, other types of radar can reach out and detect storm clouds and weather fronts, enabling meteorologists to plot a weather curve so accurately that they conceivably could tell a Missouri farmer days in advance when a storm building up in the Pacific is due to hit his crops.

Thanks to radar experimentation, television is closer to the home and vastly improved. No two things are more closely related yet so generally different than radar and television. The latter transmits what the eye can see; radar records what the eye cannot see. But the cathode-ray oscilloscope in a radar set is virtually the same as the scope or screen in a television set. Television engineers worked for years to get it to work so they could build up the "pulse" without distorting its shape. The radar technicians borrowed this idea and perfected it.

The airplane, too, will play a direct role in television







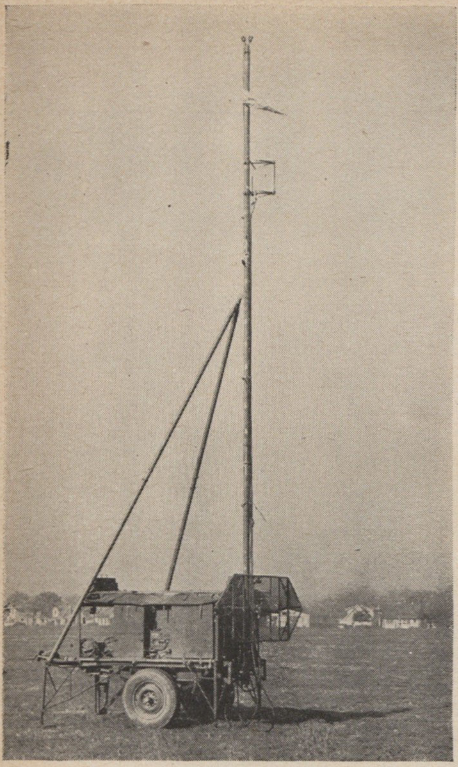
Radar is a big boon to weather forecasters as evidenced by these photos which show the progress of a Florida hurricane on a radar scope. In top photo storm and dense clouds are approaching coastline. Twelve hours later the storm appears as a large white area in the radar scope (center) and then loses its violence as it passes the radar station. The storm breaks up producing the scattered clouds and polkadot effect in bottom photo.

according to our engineers. There is already a new word—"Stratovision." It came about when Westinghouse and Glenn L. Martin, plane builder, decided to pool their efforts to set up a television transmitter in a plane flying in the substratosphere. A special plane is being planned to put the television transmitter six miles up in the sky. It may be a key to successful broadcasts because present transmitters—the one atop the Empire State Building, for example—can send out television and FM radio waves only for limited distances because the waves stop at the horizon. Stratovision will put the antenna and transmitter in an airplane flying in lazy circles 30,000 feet up and cover a cone-shaped area large enough to encompass New York, Pennsylvania and New Jersey—an area never before reached by a single television broadcast. The project also would eliminate interference and distortion caused by reflected ground waves. It may mean that a coast-to-coast network from New York City to Hollywood could be set-up with eight strato-planes flying over strategic areas. Such a network would cover 51 percent of the nation, 77 percent of the nation's population. According to Westinghouse engineers, the proposal shows promise of being the most economical way of putting television into the radio business on a full scale. It would preclude city-to-city, small-town to small-town growth and put television in the rural homes years ahead of its time.

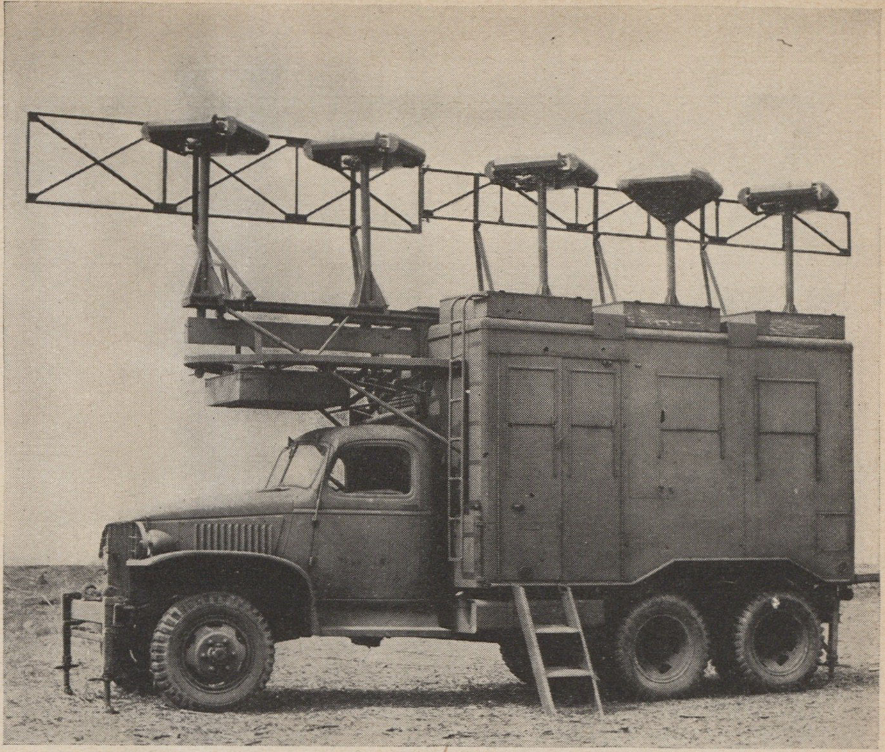
Paralleling the development of radar and its many applications was another accomplishment in electronics—airborne communications. The greatest stride forward was the transition from high frequency radio to very high frequency radio. VHF did much to eliminate weather interference, atmospheric static and precipitation. It was good only for short distances, up to 100 miles, but transmission and reception were clearer than they had ever been previously. It led to the development of omni-directional radio range distance indication which meant that pilots could approach a range from any direction instead of having to hit a four-legged range. VHF led to other developments:

"In our utilization of the very high frequencies we perfected a midget two-way radio transmitter and receiver," says Vernon Weihe, chief engineer of the Communications and Navigation Laboratory at Wright Field. "This little gadget we put in a man's shirt pocket. It was particularly effective in air-sea rescue work since a stranded airman, alone in a liferaft, could be located easily by planes within a 75- to 100-mile range because they could 'home' directly to his location on radio frequencies. With the device he also could talk with the pilots in the planes—a two-way system." In addition, Weihe points to use of VHF radio for harbor control, ship's pilots being able to direct boats through navigational channels with simplified procedure. Already one boat builder has adapted the system to his craft, with a portable electronic control that enables a skipper to steer his craft remotely from a position in the bow where he can see more clearly any obstacles in the ship's path. Bendix, which did much of the pioneering and building of these radio devices for the AAF, also is making a set for railroad communications, and many railroads are installing the system within trains as car-to-car-to-engineer contacts as well as between trains to help prevent collisions.

The switch to high frequency and VHF also helped in



This mobile mast affair is a glide path radio transmitter which guides planes down through overcast for automatic approaches and landings.



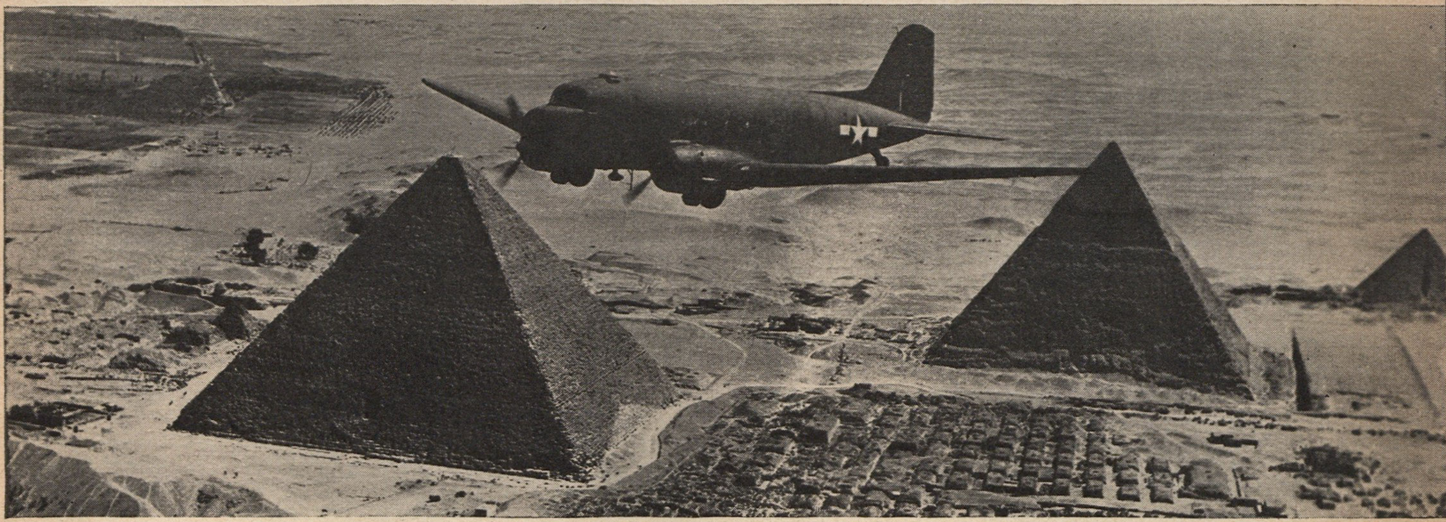
Heart of the AAF's instrument landing, glide-path approach system which enables planes to land safely when the ceiling is zero-zero is this mobile localizer transmitter. Mounted on a truck near upwind end of runway, it can be moved quickly when wind changes.

setting up the greatest teletype system the world has ever known. It practically made obsolete direct wire teletype machines. Radio teletype, built around a special electronic relay switch, enabled messages to be sent out in flash code and picked up at far-off stations by special receivers that turned the "flashes" into mechanical energy and produced teletype messages. During the war millions of words traveled in this manner. It was common practice for the AAF every Thursday to hold teletype conferences between Guam and Washington and other points.

Such progressive developments we put to use not only as a fighting force but as a transportation facility, encircling the globe with an airline, an aerial railroad to everywhere. We called it the Air Transport Command, and the engineering work done in building the required bases makes construction of the Panama Canal look like peanuts. Think of the scraping, grinding bulldozers, the snorting steam shovels that hacked and blasted and chewed airfields out of

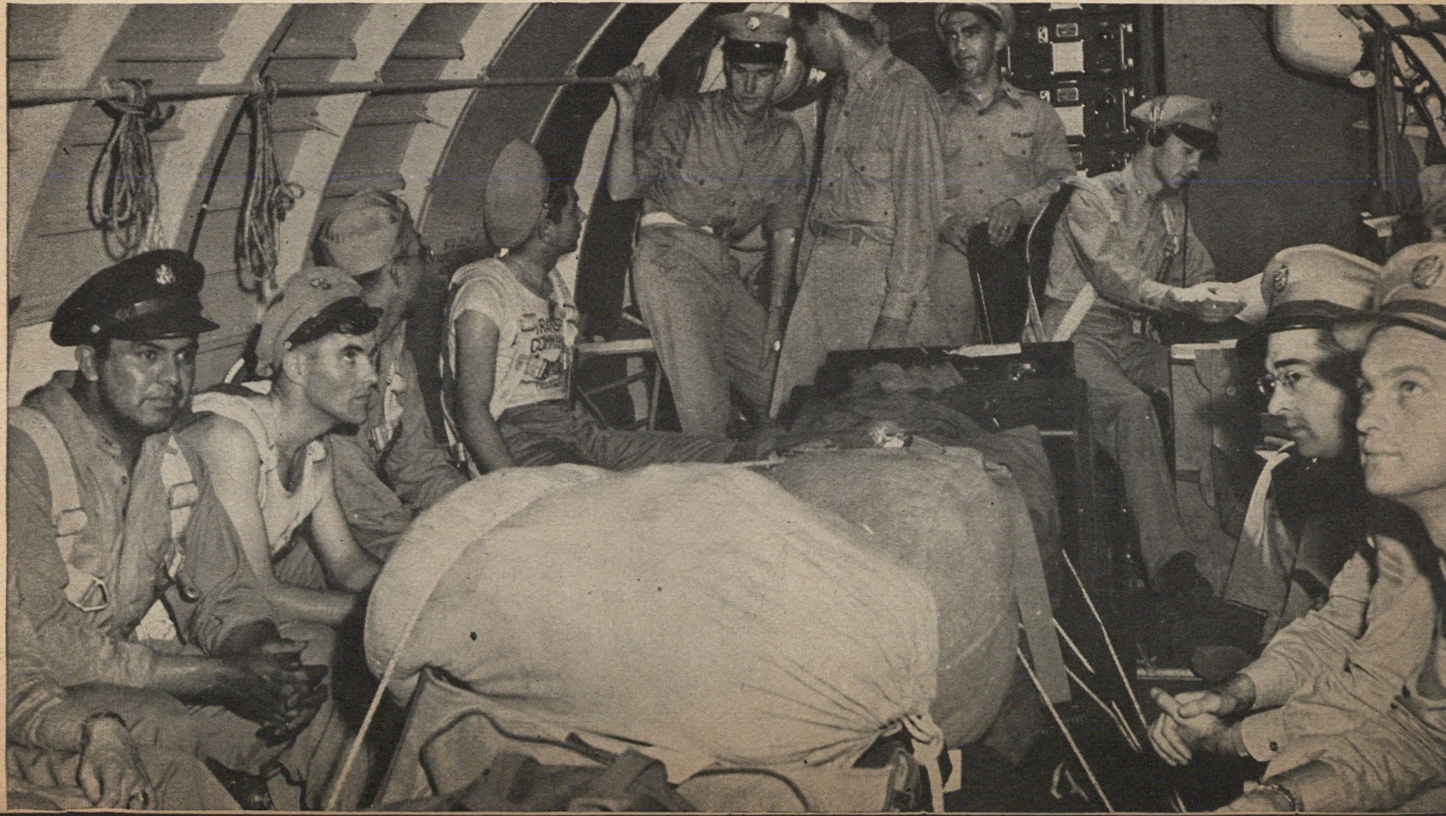
GIs kept teletype machines tapping in far off places as the AAF introduced radio teletype systems that circled the globe.

Airports grew up all over the world. Here a group of native workers in China smash rock in making a landing strip for B-29s.



An aerial railroad to everywhere, ATC made the Egyptian desert a skyway with planes like this C-47 over the Pyramids.

The soft, plush-cushioned airliner will be in demand by these GIs who learned about air travel in freight-jammed cabins (below).



With its Air Transport Command, the AAF established

the greatest transportation system in history

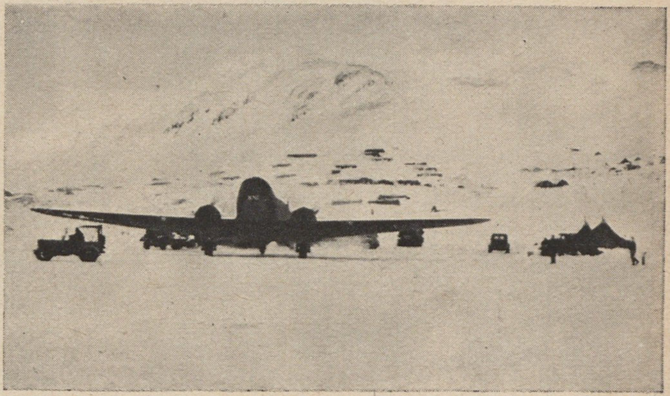
solid coral rock on Canton Island; of the tons of concrete that oozed into runways at Fairbanks and Anchorage in Alaska and at Naudi in the Fiji Islands; of the sweating, burned-skin natives and the tired Americans who literally dug airfields with their bare hands in China, and you get an idea of the task that was accomplished. Perhaps, too, it is well to compare the ATC to the Panama Canal for, as the "big ditch" changed the commerce of the world, so will the airline that now encircles it.

We created the greatest and most flexible transportation system in history. The airplane made it so because it could go where ships and trains couldn't; the oceans, the mountains and the deserts it left far below. By the war's end this military airline was operating over something like 180,000 miles of air routes, four times the criss-crossing airline mileage in the U. S. before the war—which then was the world's largest. The record was equally impressive. In 1944, the 2,000 planes of the ATC flew more than 300,000,000 miles, carried 1,250,000 high-priority passengers and lugged 600,000 tons of freight including mules, gasoline, gold, light tanks, jeeps, blood plasma and anything that would fit and was needed.

By V-J Day 10 commercial airline companies—holding contracts with the Government—were flying these routes. Civilian pilots thus picked up four-engine experience and navigational over-water flying knowledge that will pay them well in commercial operations. The airlines were paid handsomely for their work, thus building up a financial backlog that already is showing in terms of new equipment—plush-lined Skymasters, Constellations and Stratocruisers. When you travel in these planes, you'll ride with veteran pilots who know the way to Cairo like they used to know the run between New York and Cleveland. Your airline will know other things, too: How to provide the facilities needed in far-off places to accommodate passengers; how passengers react to long flights over water; what to do to keep them occupied; what effects flying at high altitudes in rough weather has on passengers and how to care for them.

What we learned during the war about weather would fill volumes. The success of our entire combat air effort depended upon forecasting the climatical and pressure changes around the world—and this applied equally to our ATC operations. The AAF established weather stations in the remotest places on earth—atop mountains in Tibet, in the Arctic, in the desert—and it linked them with a global communications network which fed data to meteorologists and enabled them to keep a continuous record of storms, pressure areas, cold waves and climatical changes everywhere. Our airmen flew in hurricanes to bring back instrumented data about their physical features. They flew in icing conditions and learned for the first time how and what kind of ice accumulated under various conditions.

Circumnavigating the globe was important to victory and to peace. Flying five miles up was an achievement, too. So was the B-29. But it was also a war where little things counted—a gadget war. Airmen wanted to be comfortable. They wanted the temperature at 40,000 feet to be the same as it was in a living room before the fireplace on a wintry night. If they were to fly for eight to ten hours alone in the cramped quarters of a fighter cockpit, they wanted an



Planes had to operate in all kinds of weather. At bases such as this one where temperatures hovered around zero the year round we learned major innovations and procedures in cold-weather flying.

In amassing our knowledge of weather phenomena, workers such as these operated stations in remote parts of the world. Our airmen knew climatic conditions all along their route hours before take-off.

"easy chair" so they could relax. If they had to bail out, they wanted a parachute that would open with certainty. They wanted and they got a thousand little things that make flying easier, safer and more practical. Because there was the demand, inventors worked harder. Many of the things they devised and perfected serve a purpose for civilian living, and will be available over the store counter.

The life-raft is a good example. During the war boats literally were put into packages. A one-man raft would squash down to a canvas carrying kit only 18 inches square, and a five-man raft made a package the size of an ordinary suitcase. They were originally devised to fit on the rump seat of a seat-type parachute back or in a small compartment in the fuselage of a bomber. The former you could carry in a briefcase and the other would easily fit in the

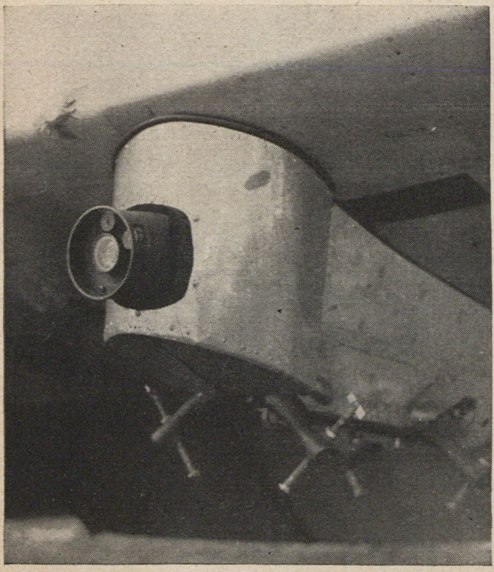
The cushion this officer is sitting on is a one-man life raft. Packaged to fit into small suitcase, this item will make an ideal piece of sports equipment.

Inflated by a pressure cylinder such a collapsible craft will easily support the weight of a large man. Oars, sail, rudder and radio come with the raft, making an ideal kit for a fisherman, and it can weather high seas.

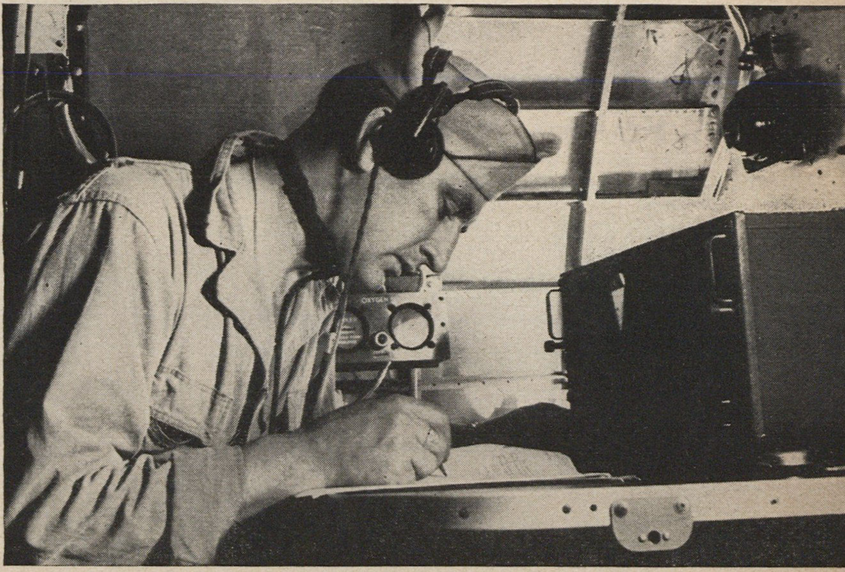
trunk of your car. Today you can buy them and the sales talk is pointed for sportsman who like to drive up to the lakes for a week-end and take their own boat along. The rafts come complete with oars and sail and radio and compass, if you like. In addition, a small lightweight one-cylinder, one-horse-power outboard motor, perfected with mounting attachments for the rafts, will put-put you across a lake at three miles an hour.

Our engineers not only packaged boats; they packaged airports as well. The Brodie system (named after its inventor Capt. Jim Brodie) made it possible to land a plane on a wire strung between bridle towers. It was a simple device consisting of a hook atop a lightplane that engaged a trolley which ran along the wire, an arresting gear that held the plane back when it landed and a hoist to lift the plane into take-off position. The whole device could be loaded into a big truck. With it a landing field could be set up almost anywhere—over the trees of a forest, on the side of a mountain, atop a building, on the side of a steamship.

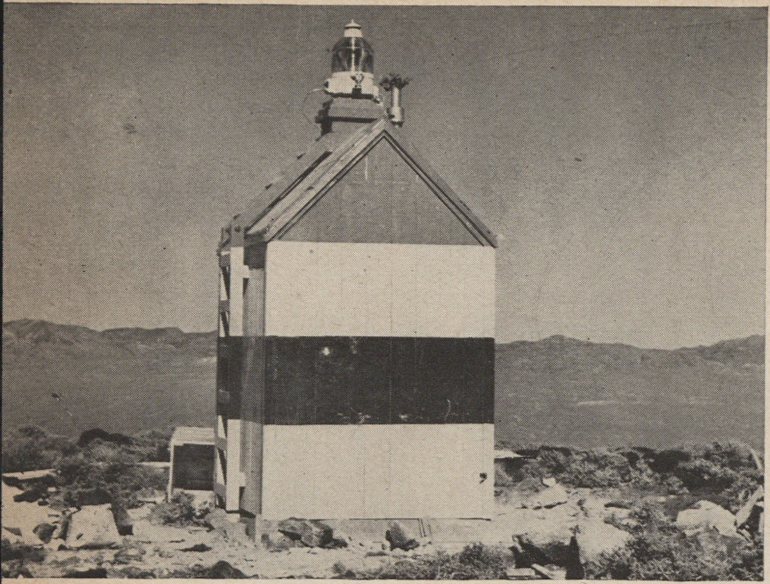
Consider the case of our aircraft heaters. It was quite simple to take the heat from the engine and duct it back into the cabins to keep the temperatures normal inside even up three or four miles where the outside air is 50 to 50 degrees below zero. But our engineers did more than that. They perfected lightweight heat exchangers which could be built into a plane's fuselage and throw the hot air in beefed-up quantities through ducting in the wings to make them so hot that you could fry an egg on the leading edge. Thus, ice simply couldn't form and the danger of "icing up" which had plagued flying for years was licked. And the engineers used the same heat exchangers to keep the cabin warm. In fact, two of these heaters operating off a 2,000-horsepower engine, at full capacity



High speed cameras such as this one in a P-47 provided engineers with photographic techniques, which resulted in new type non-military lenses.



With radio's important part in aerial warfare, our engineers developed many devices that will greatly improve household radios. AAF operators, such as the one in this photo, used these developments in air and ground control of mass air fleets.

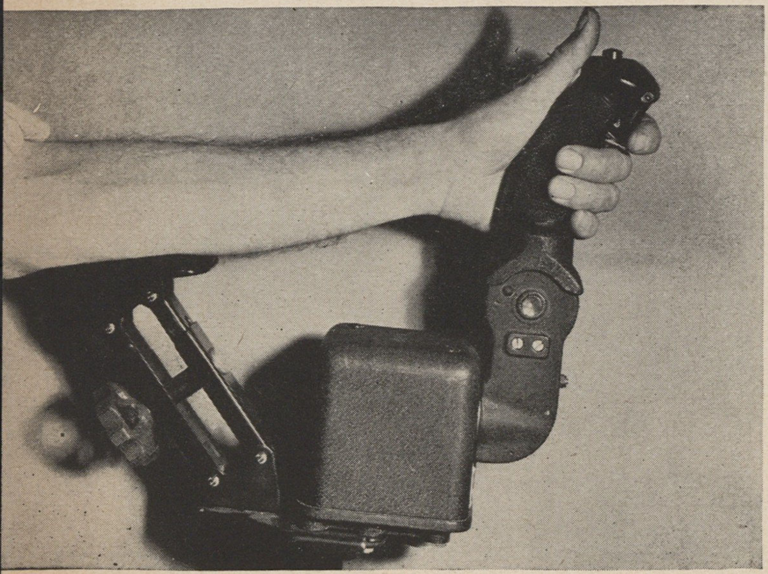


The light that burns for a year, this aircraft beacon atop a mountain serves as warning light. It is turned off by the sun at daybreak and throws light at night for miles.

produced 1,000,000 BTU (British Thermal Units) per hour —enough warmth to heat 20 five-room bungalows with an outside temperature of about 45 degrees F.

Our engineers also developed a light that burns for a year to serve as an aircraft warning beacon. It was automatically turned off by the sun in the daylight hours, snapped on at night by a heat-reactive element. This light could be placed in a lighthouse on some isolated cape and go unattended for 365 days. Black light, which illuminated the instruments on the panel before the pilot without creating glare, also was developed. It has its application on the dashboard of an automobile.

A deodorizer used in ambulance planes helped keep purified air underneath patients' blankets. It sucked the sub-blanket air through a purifier, sent it back fresh and pure into the cabin. Medics agree that with some slight modifications it will be just the thing for a hospital ward in which crowded conditions prevail.



The formation stick shown above enables a pilot to control giant bombers with the flip of his wrist. It operates the automatic pilot which flies the airplane, affording the pilot considerable relief.

The throat microphone was an innovation. Snapped on the throat it picked up voice sounds and transmitted them as "voice" into headsets, leaving an airman's hands free for other duties. These mikes might mean more freedom for actors in a radio drama and the end of huddling around a stand mike.

The formation stick gave a pilot control over a 120,000-pound airplane with the flip of his finger. A uni-lever throttle-supercharger-propeller control enabled a pilot, with a single operation, to rev the motor, set the turbo-supercharger and adjust the pitch of the propeller. A single 400-cycle AC generator gave an airplane enough electricity to furnish light for a town of 3,000 people for 24 hours.

A thin diaphragm disc used for measuring the flow of air over a plane's surface was made so small it conceivably could be swallowed like a pill to measure the pressures in a man's stomach. Tiny cameras inside long tubes enabled engineers to snatch snowflakes out of the air and photograph them to show sizes and shapes in a scientific study of ice formations. A new plastic discovery used in goggles kept the sun's glare out of a pilot's eyes might also be applied to the automobile windshield. Development of a pulsating seat cushion to relieve pilots of numbness from sitting so long in one position might well relieve a driver of a car on a long cross-country ride.

Special heated lenses such as these were developed to help prevent mist forming on flying goggles at high altitude.

In searching for a new coolant at sub-zero temperatures, engineers found a new heating device; in testing anti-freeze they found a new cooling device.

The AAF put the camera to a variety of uses. A gunsight aiming point camera was developed to record fast-moving combat technique, both the enemy's and our own. We needed a camera to photograph terrain from altitudes up to 30,000 and 40,000 feet, and before the war's end we had one that would do the job so accurately you could count the number of railroad ties in a strip of track shown in the picture.

Flash photography permitted taking photographs at night from altitudes three and four miles up, and we perfected color techniques that put night photography in natural color years ahead of its normal development. Strip cameras became so accurate that a fast-flying airplane at 300 feet could "stop" an automobile on a highway so thoroughly that you could read the gas sticker on the windshield and the name of the tire manufacturer on the spinning wheels in the resulting print. A process called Gasparcolor, pioneered by the AAF, will make color prints a home-shop hobby.

We came out of the war with clothing that was more rugged than any apparel ever before in existence. New high tenacity yarns were produced to give longer life to suits and helmets in any climate. Heavier fabrics that practically eliminated tears and rips came into being. A nylon summer flying garment, for instance, was estimated to be three times stronger than the same creation before

Exposure Suit

Electric Suit

Sheep Shearling Suit

Lineman's leather suit with boots.

Parka-type 3-piece tackle-cloth Suit

Arctic parka

This suit made of light-weight chicken feathers has buoyant characteristics which enable it to keep occupant afloat and warm for hours.

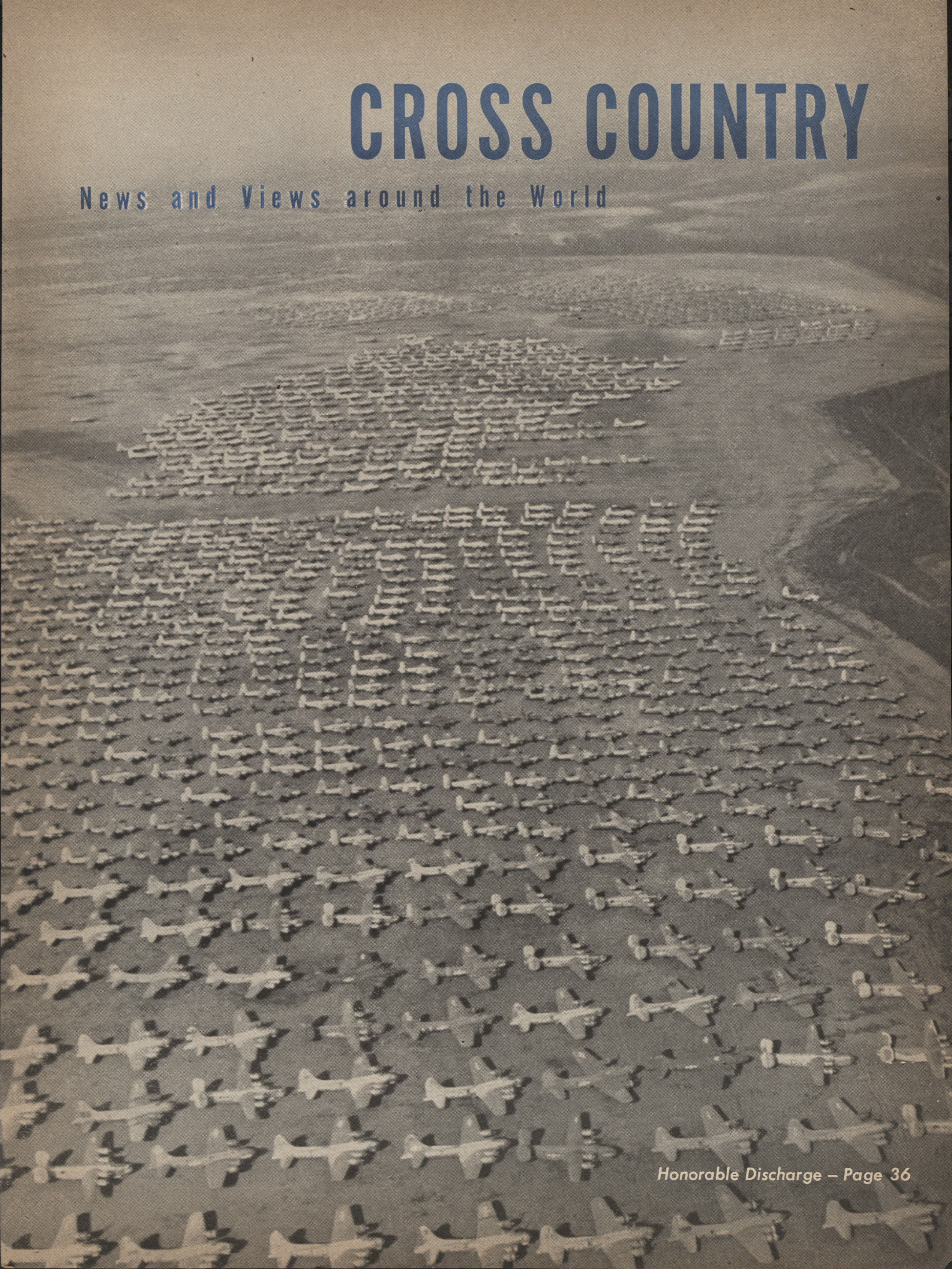
the war gave the garment industry a shot in the arm.

A nylon suit would stand rough treatment of a GI laundry. It would dry quickly, retain its shape more satisfactorily. Shrink-proofing progressed to a point where engineers foresaw the time when a woolen suit could be tossed in the tub instead of dry-cleaned. A laminated fabric not only made materials water repellent, but it permitted permanent creasing of trousers and suit pleats that would defy even cleaning and washing.

As a direct and indirect result of airpower, there was no end to man's thinking and ingenuity during the war. Airpower forced him into accomplishments which had been considered impossible but which now are entering his life as routine in peacetime living. ☆

CROSS COUNTRY

News and Views around the World



Honorable Discharge – Page 36

Walnut Ridge—last resting place

To the Scrap Heap

When AAF aircrews finished their battle tours, they were rotated to new Stateside assignments, many of them to return immediately to civilian living. Not so with thousands of bombers and fighter aircraft whose fighting days stopped with Japan's surrender. There was only one new assignment for them, only one last traffic pattern to circle before making their final landing at a disposal storage field to await complete retirement.

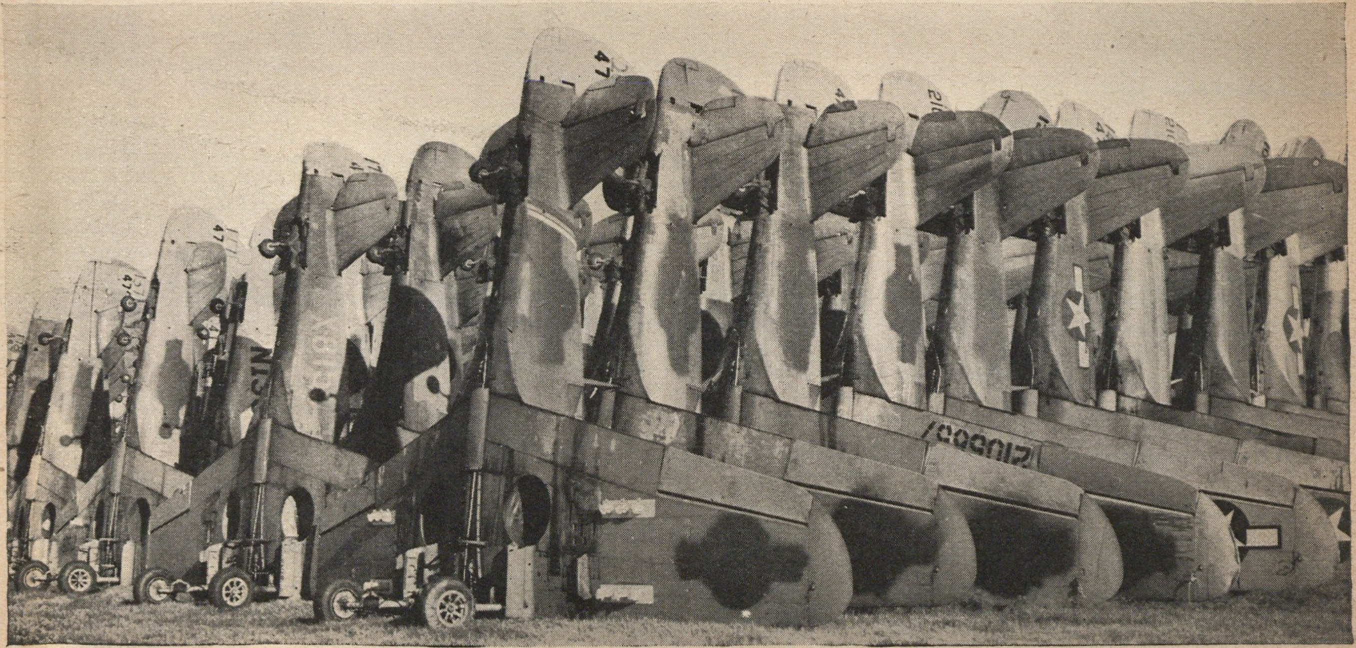
In growing numbers, they are passing under the bulldozers and torches and through the smeltering processes, shorn of past glory, many of them forgotten by the men who once flew them through the hell-torn skies of the war theaters.

Headquarters decides which planes are surplus to the diminishing requirements of the AAF. The Navy and the Marine Corps are given the chance to salvage any that they need, and the rest are destroyed. In the case of old planes, parts of which can be salvaged for use on serviceable planes, a dismantling may take place right at the home field, but comparatively new aircraft are flown to one of the two main disposal bases at Kingman, Ariz., or Walnut Ridge, Ark.

When the ATC ferrying crews step out of the planes, the AAF has made its official farewell. From then on, the planes are entirely in the hands of the Reconstruction Finance Corp. Some of the transports are salable but, for the most part, the fighting ships have no market. Even the wealthiest of our civilians would hesitate before supplying a B-24 with 180 gallons of gasoline for every hour of flight, and the CAA is rather reluctant to permit civilians to buzz around the country in P-51s.

When the first news stories concerning the planned destruction of our fighting planes began to appear in the newspapers, AAF Headquarters received a flood of indignant letters from well-meaning but misguided civilians who protested that the nation was being stripped of its airpower, and the taxpayers and bondbuyers were being duped. Suggestions ranged from continued use of the planes to 10-year storage. Officials tried to explain that the war production effort had been accelerated in order to avoid "too little, too late." Consequently, the sudden end of the war found the AAF in possession of thousands of new and old planes for which it had no possible use in peacetime. Storing these excess planes against the possibility of a future war would be akin to storing cannons after the Civil War for use in World War II; planes become outmoded in a matter of months. Ten or fifteen years hence today's planes will be of no more use than the original Wright crate.

Kingman Field has destroyed as many as 300 incoming planes a day, while Walnut



Out of the fire and into the frying pan

Ridge expects to "rub out" a total of 20,000 aircraft within the next few months. Approximately 75,000 planes of the AAF and the Navy are scheduled to be disposed of within the next year.

The "Memphis Belles" and "Susie Qs" pour out of the melting pot indistinguishable from the anonymous PTs, BTs and AT6s. The next time your little woman brings home some new pots or pans, eat your food in reverent silence. It may have been cooked in battle-consecrated metal.

L-5s Over the Hump

One of the last but most unusual stories of rugged Hump flying during the war is that of the hazardous flight of 30 L-5s last summer from Chabua to Kunming. Led by Maj. William Hawkins of Pixley, Calif., the group of liaison planes battered their way through the elements for one week, losing wingtips and one complete plane, before they reached their terminal point on the great Kunming plateau.

Three years ago, the thought of a fragile liaison plane crossing the dread Hump would have been considered a product of monsoon fever. Yet so vital was the need for these aircraft in the vast and primitive reaches of China that the group of enlisted pilots cheerfully pitted themselves and their tiny planes against what has been acknowledged as the roughest flying weather in the world. The flight stands as a tribute to their daring and their skill and fittingly symbolizes the complete knuckling-under of the once unconquered Hump.

Operation Cards

Col. George E. Price, chief of the Aircraft Projects Section, ATSC, announces that new flight operation cards have been prepared in limited quantity for 20 types of military aircraft. Only those 500-odd holders of the plastic cruising guides are eligible for these new improved models which may be obtained by writing to CG, ATSC, Attn: Flight Data Branch, TSESA-8, Wright Field, Dayton, Ohio.

Under New Mangement

The world-wide Army Air Forces Weather Service, numbering 857 far-flung units manned by 18,000 officers and men and representing an initial investment of over $40,000,000, is reconverting to a peacetime basis. The wartime network of stations was the closest approach in history to a coordinated system of universal weather reporting. Although the end of the war makes it necessary to bring home the men from these weather stations and to turn the bases themselves over to the countries from which they were requisitioned, the AAF is reluctant to see a general return to the lackadaisical weather reporting of prewar years. Accordingly, it is encouraging the various nations now possessing the bases to set up their own weather services. In France, meteorological classes were conducted for French replacements long before VE-Day. Down in Brazil, American weathermen have trained 50 Brazilians to take

QUESTIONS

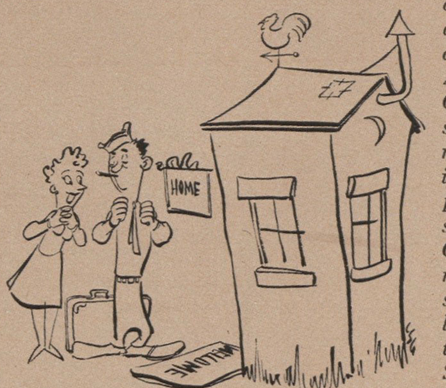
on Policy and Procedure

Q. Has V-mail service been discontinued?

A. *Microfilming service for V-mail has been discontinued. Letters written on V-mail sheet forms are transmitted in the original form. However, because of the light weight of the V-mail forms, their continued use is encouraged as long as the supply lasts (Sec VII, WD Cir 323, 1945).*

Q. Can a veteran buy a home under the GI Bill of Rights without making a down payment?

A. *A veteran is granted or refused a loan from a bank, savings and loan association, or any other loan maker, on the basis of his ability to repay the loan. Ordinarily, he would get the loan on a home only if he could make a cash down payment ranging from a few hundred to a couple of thousand dollars. But now the Veterans Administration will guarantee part of this loan, so the veteran may have to pay little cash—perhaps none—out of his own pocket for a down payment.*



Q. For how long a period may an officer be granted oral leave?

A. *An officer authorized to grant leaves of absence may grant oral permission for absence over week-ends, holidays, other similar periods, and for absence during any period less than 48 hours at other times, except that oral permission for absence may not be granted at the beginning or termination of ordinary leave (Sec III, WD Cir 312, 1945).*

Q. How is the enlistment allowance computed for Regular Army enlisted men who re-enlist under the provisions of WD Cir 310, 1945?

A. *Where enlisted men of the Regular Army have been appointed to temporary grades in the Army of the United States during the present emergency, the enlistment allowance should be computed on the basis of the temporary grade held at the date of discharge, rather than on the basis of the permanent grade held in the Regular Army (MS Comp. Gen. B-51047, 7 September 1945).*

Q. Are military personnel serving outside the continental limits of the U. S. still entitled to overseas pay ?

A. *Yes. The overseas pay differential for military personnel while serving on sea duty or on duty outside the continental limits of the United States or in Alaska has been continued indefinitely. (WD Cir 310, 1945, par. 18).*

Q. May a National Service Life Insurance policy which has lapsed be reinstated?

A. *Yes. A policy which has lapsed (as distinct from surrender for cash or paid-up insurance) may be reinstated upon written application by the insured as outlined in Par 20a, AR 600-110, as amended.*

Q. May enlisted personnel be employed in Army exchanges during off-duty hours?

A. *Yes. Employment on a voluntary basis, during off-hours, is authorized (par 236B, AR 210-65, CI, 16 Oct 1945), provided such employment does not impair or diminish the efficiency in performance of assigned military duties. Compensation will be made at fair and reasonable rates established by the chief of the Army Exchange Service, or in the absence thereof by the commanding officer, or exchange council. However, compensation for this voluntary employment will not exceed $60 per month.*

Q. May a squadron operate a soft drink dispensing machine in its dayroom as a minor profit making activity under the provisions of Par 11b (1) (b), AR 210-50?

A. *The chairman of the board of directors, Army Central Welfare Fund, has stated that the operation of such a machine as a minor profit making activity of a unit fund is contrary to the provisions of par 10d (1), AR 210-65, and is, therefore, unauthorized.*

Q. How much interest is paid on soldiers' deposits? How are such deposits made?

A. *Soldiers' deposits draw 4% interest. Any enlisted man of the Army may deposit his savings, in sums not less than $5, with any disbursing officer, who will furnish him a deposit book if he does not already have one, and will enter the deposit in the book. The soldier may make his deposits in cash, or he may have deductions entered on the pay roll. (AR 35-2600).*

PREPARED BY THE OFFICE OF THE AIR INSPECTOR

NEW BOOKS

WAR

BIG DISTANCE. *Capt. Donald Hough and Capt. Elliott Arnold.* From the fall of Bataan to the Battle of the Bismarck Sea, a narrative of the fighting AAF which conquered climate, weather, water, terrain, jungle and the big distance to lick the Japs. DUELL, SLOAN & PEARCE, N. Y., 1945.

I'VE HAD IT: THE SURVIVAL OF A BOMB GROUP COMMANDER. *Col. Beirne Lay, Jr.* Escape account of our flyers and our French Allies. HARPER & BROTHERS, N. Y., 1945.

WINGS FOR THE DRAGON: THE AIR WAR IN ASIA. *Alice R. Hager.* An exciting story of the CBI—the Biscuit Bombers, the Air Rescue unit, the flying nurses, the Photo Reconnaissance, Hump flyers, Chennault's fighters and the 20th Bomber Command. DODD, MEAD, N. Y., 1945.

HISTORICAL

ARMS AND POLICY 1939-1944. *Hoffman Nickerson.* A survey of military strategy employed in the war theaters from 1939 through 1944, together with discussion of post-war military policy of U. S. G. P. PUTNAM'S, N. Y., 1945.

THE WAR: FIFTH YEAR. *Edgar McInnis.* Continuing the day-by-day history of the war down to 30 September 1944, and describing Allied progress in Europe, the Pacific and CBI. OXFORD UNIVERSITY PRESS, N. Y., 1945.

POSTWAR

ATOMIC ENERGY IN THE COMING ERA. *David Dietz.* Explains atomic energy and describes its function in the future of America and the world. DODD, MEAD, N. Y., 1945.

PROSPECTS AND PROBLEMS IN AVIATION. *L. S. Lyon and L. C. Sorrell,* ed. Comprehensive review of the history and development of aircraft manufacturing and air transport with an analytical study of the post-war problems and outlook for both of these phases of aviation. CHICAGO ASSOCIATION OF COMMERCE, CHICAGO, 1945.

TECHNICAL

AIRCRAFT PRODUCTION DESIGN. *James E. Thompson.* Data to assist aeronautical draftsmen and designers to understand better the tools and processes used to manufacture designs. AVIATION PRESS, SAN CARLOS, CALIF., 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 bookstores.

their places and maintain the high standard of proficiency established during the war. Australian and New Zealand meteorologists are moving into American installations in the Solomons, the Fijis and other South Pacific islands. Thus, the foundation is being laid for a continuation of an international string of weather stations comparable to those now operating in the United States.

Think It Over

For all AAF men the time comes, either before or after separation, when they must decide how much the air force is worth to them as a future career. The easiest course to the men still in the service is to join in the mad rush to the separation centers, but a little forethought may save them a lot of headaches. Many might well take heed of the experiences of hundreds of earlier separatees who are now seeking reenlistment. These men discovered the hard way that the comparatively hidden benefits of Army food, shelter, clothing, medical care, insurance, retirement provisions and exemption from income taxes become expensive realities in civilian life.

Just a few weeks ago, two ex-gunners returned to their old jobs with a well known New York insurance company. The boss welcomed them with the news that their annual salary increases had accrued to a total of $400 a year more than they had been making in 1942. So it was with a rosy feeling of security and well-being that they went back to their desks. Came the first payday, and their illusions were shattered abruptly when they found that their take-home pay was actually less than that which they had received before the war. The boss patiently pointed out the deductions for Federal and State income taxes, unemployment insurance, hospitalization insurance and retirement fund. Added to those drains on the paycheck were the high costs of civilian clothes, rent and groceries.

It is better to consider the relative values of making the Army Air Forces your permanent career while you are still in uniform and able to make an unhurried decision. Peacetime life in the Army holds few, if any, of the disadvantages of wartime living that have made so many men grab for their discharges. Aside from the financial benefits, the steady security and the worthwhile career, the permanent AAF transports enlisted men's families with them when they go overseas, provides quarters, requires no uniform to be worn during off-duty hours, offers a five-day week and thirty full-pay vacation days a year, gives medical care to you and to your family, furnishes a wide scope of high school and college educational opportunities and freely gives a multitude of services which in civilian life would cost money.

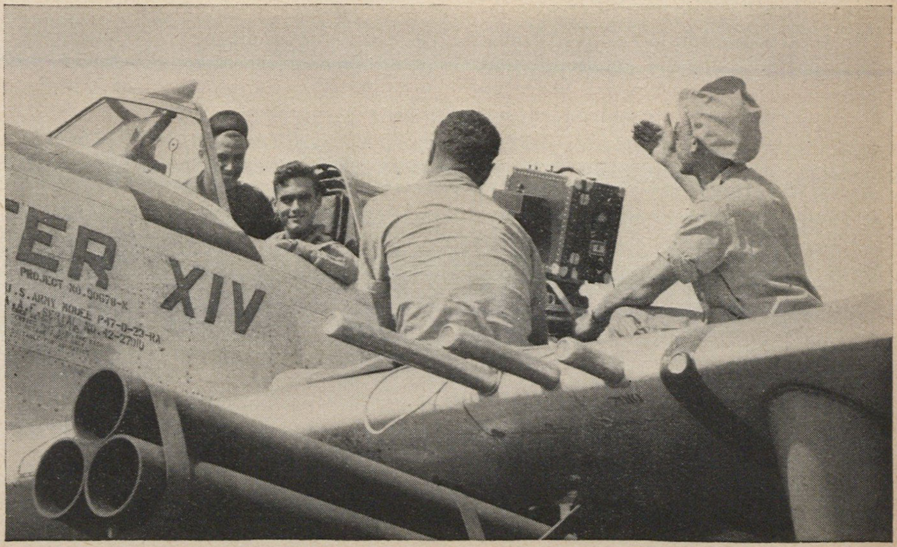
It is a great air force with a great future. Take your time in deciding how much it means to you. Add up the advantages and the disadvantages. You may find that you need the air force as much as the air force needs you.

Yo-Ho-Ho and . . .

For well over two years, the Air Transport Command owned and operated an FS-138, a 187-foot Higgins sea-going freighter. Manned by frustrated airmen, the vessel sailed a short, island-hopping route out of Palm Beach, Fla., to the Caribbean islands and back, taking supplies and mail to desolate islands where ATC men operated radio checkpoints and air-sea rescue stations. None of the crew had ever been down to sea before assignment to the Higgins supply ship, and, at last report, none of them will ever go again.

Thunderbolt

One of the oldest and most experienced AAF fighter units—the 57th Fighter Group—has been glorified in a technicolor film, "Thunderbolt," which records the combat and daily life of the group during its participation in "Operation Strangle" in Italy



P-47 heads all-star cast of "Thunderbolt" during the summer of 1944. Directed by Lt. Col. William Wyler and Capt. John Sturges, "Thunderbolt" was filmed entirely in the combat zone by cameramen of the Mediterranean Allied Air Forces and by pilots of the 57th Group who operated automatic nose cameras during missions against the enemy. Distribution of the film is still pending.

Down Under

An accidental remark dropped by a Jap guide to an Air Technical Intelligence Group major led to the discovery of the most ambitious aircraft factory ever attempted by the Japanese, according to a report received recently from Lt. Harvey Yorke, AIR FORCE correspondent in Japan. Almost all Jap aircraft factories, both on the surface and underground, had been painstakingly listed by Army Intelligence long before Japan was surrendered, but during the course of a routine inspection of the Atsugi underground factory, when the inspecting major exclaimed in astonishment at its size, his guide replied that the one at Utsunomyia far outclassed any of the others. The existence of such a factory had never been suspected. The major instigated an immediate search of the area which uncovered a factory geared to receive raw material at one end and turn out finished airplanes at the other.

Before the war, Utsunomyia had been a popular tourist resort and served also as the chief source of the limestone which for centuries has gone into the numberless shrines, temples and public baths of Japan. Instead of open-pit quarries, the Japs had tunneled into the sides of the hills and carved huge underground rooms, some measuring 50 to 80 feet in height and 100 to 200 feet in length. Built on three levels, the Utsunomyia factory extended down to a lowest level of 300 feet below the surface of the ground and included tools shops, engine production rooms, engine assembly shops, airframe construction sections and final assembly rooms. So well hidden were the approaches to the factory that the major who discovered its existence walked straight into one of the shafts without seeing it.

The Air Technical Intelligence Group estimated that full production would have meant at least 300 fly-away planes a month, but the Jap war effort collapsed after only five planes had been finished.

How to Be Cozy

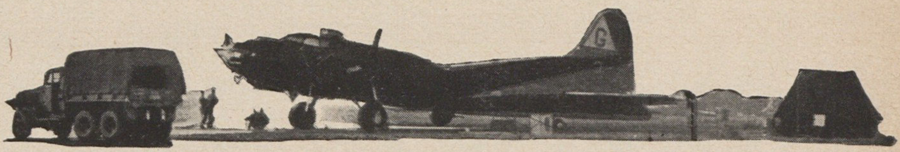
We have the word of Capt. James J. Sherry, Jr., for the method used at an 8th Fighter Command base to beat a temporary fuel shortage last winter.

"One day as I huddled before our office stove warming my shins and rubbing my back to keep it from freezing until I was warm enough in front to turn around," he writes, "I figured there must be some way of utilizing all the coal dust which was about all that remained in our once full bins.

"So I called one of the sergeants, who called one of the corporals, who called one

PLANE BONERS

Analyzed by Veteran Pilots



PUERTO RICO—Fire in No. 4 engine forced a B-29 pilot to ditch his Superfort in the sea off Puerto Rico. Eight crew members failed to escape and the airplane snapped in two when the nose struck the water with terrific force. The pilot, who survived, said he brought the airplane in without flaps at about 150 mph.

Comment: This Superfort would have had a better chance for a safe ditching if it had been landed with full flaps at a normal landing speed of 100 mph or less. The airplane broke in two when it hit the water partly because it was set down at the excessive speed of 150 mph.

ALAMARORDO, N. M.—A student pilot was being given a B-29 check ride. At approximately 200 feet with airspeed at 130 mph, the check pilot retarded No. 1 throttle and called for a three engine go-around. Student pilot brought up flaps 30 degrees and applied power to remaining three engines. The airplane started veering slightly to the left as a result of the added power on No. 3 and 4 engines, then began to settle. The student raised the nose to maintain altitude but the bomber started to stall even though full power had been applied to all four engines and gear was coming up. The instructor pilot at no time handled controls and was oblivious of the bomber's low altitude as he devoted his entire attention to watching his student's reaction to the go-around order. The airplane hit ground tail first and skidded for 100 yards.

Comment: The student pilot in this case showed an inability to maintain directional control on a three-engine go-around. Full rudder should have been used and power balanced on remaining engines to maintain directional control. After the pilot gained control, he might have increased power—as long as the rudder would hold the airplane straight and level. The pilot giving the check ride concentrated on the attitude of the student. This is as it should be, but not to the extent of allowing his attention to be distracted from the airplane's altitude and position and permitting it to get beyond the point where he could take over and maintain safe flight.

SAN ANTONIO, TEXAS—A B-29 became fenced in during an unscheduled go-around and collided with a telephone pole. The bomber managed to make the runway and land. The plane was piloted by a student practicing take-offs and landings under direction of his instructor. After the student had turned into the approach his instructor warned him twice that he would overshoot if he did not pull back power on the engines. The airplane was between 100 and 150 feet above the ground when the instructor decided a landing was dangerous and ordered a go-around. Student called for half flaps and attempted to nose the bomber down to gain airspeed. By this time it had reached the runway's end. The instructor brought up flaps to eight degrees to see if he could gain some airspeed. The telephone lines and pole were in front of the plane and the attempt to clear them failed.

Comment: Although the instructor warned his student that he would overshoot, he failed to take precautionary steps to make sure a go-around could be executed. Altitude and airspeed were beyond safe limits when a go-around became necessary. By stopping flaps at eight degrees the instructor only increased drag. Flight tests have proven that use of no flaps is the safest and surest way to maintain airspeed and directional control.

MARIANAS—A B-29 had taken off on a routine training mission and the wheels were just coming up when No. 4 engine failed. The pilot ordered the copilot to feather the engine but he had to repeat the order before it was executed. After No. 4 was feathered, the pilot ordered the copilot to ease back a little on No. 1. The copilot half-closed No. 1 throttle and the airspeed dropped dangerously. The pilot called for 50 inches on Nos. 2 and 3, but the copilot gave him 40 inches on No. 2 and 45 inches on No. 3. The crew was standing by for bailout, but the airplane crashed before its occupants had a chance to jump.

Comment: Failure of No. 4 started the whole thing, but prompt feathering of No. 4 would have helped pilot retain control without losing too much airspeed; excessive power reduction on No. 1 aggravated an already dangerous condition; uneven application of power on Nos. 2 and 3 didn't help any, and when a crash appeared inevitable, the crew should have been warned to stand by for a crash landing, not a bailout.

PREPARED BY THE OFFICE OF FLYING SAFETY

PARACHUTES

LOST

43817B	42-455194H	42-675377A
191421I	42-465694A	42-814580B
814654B	42-477161B	43- 868B
41-713228A	42-519348D	43- 9814D
42- 4506D	42-519504D	43- 34167B
42- 5283G	42-524449E	43- 47139D
42- 52889D	42-528829D	43-746059D
42- 92572F	42-528946D	44- 50758F
42-372637D	42-528953D	44- 51056F
42-372661D	42-529231D	44- 29528F
42-372690D	42-529256D	44- 51080F
42-372742D	42-529301D	44- 51229F
42-372797D	42-529609D	44- 51271F
42-372810D	42-533349D	44- 51372F
42-372813D	42-533360D	44-154664F
42-372832D	42-533657D	44- 51610F
42-372850D	42-565955D	44-159070F
42-372876D	42-572188D	44-159082F
42-372901D	42-636484A	44-159188F
42-372904D	42-638067A	44-170473F
42-373055D	42-639332C	44-183214F
	42-649722F	

Return to field indicated by letter after number as keyed below

A—Army Air Forces Western Flying Training Command, Orange Country Army Air Field, Santa Ana, Calif.
B—Roswell Army Air Field, Roswell, N. M.
C—Hill Field, Ogden, Utah
D—Smyrna Army Air Field, Smyrna, Tenn.
E—Coffeyville Army Air Field, Coffeyville, Kan.
F—Lockbourne Army Air Base, Columbus 17, Ohio
G—Perrin Field, Sherman, Texas
H—Abilene Army Air Field, Abilene, Texas
I—Douglas Army Air Field, Douglas, Ariz.

of the privates and we laid some plans for the project. First, we constructed out of salvage lumber a combination mold and mixing platform, five feet long, three feet wide and three inches deep. We filled the mold with one of the following mixtures:

"1. Ten parts coal dust to one part cement.

"2. Three parts coal dust and one part powdered clay.

"3. Seven parts coal dust, two parts chalk and one part cement.

"Although all the formulas worked, the first one turned out best. We mixed that compound thoroughly and wetted it down with about six gallons of water and mixed it again. The mixture was packed and tamped very firmly into the mold and allowed to dry for a short time, before we marked it off into three-inch squares. Then we let it dry for a week.

"Finally, we broke the hardened mixture of coal dust and cement into three-inch square briquettes and put them in our small office stoves, and they gave out a great deal of heat with little or no ashes."

Hand Made

When his instruments went out on a precision instrument bombing test run over a water target in the Gulf of Mexico, 1st Lt. Jack R. Cropper, Eglin Field bombardier with the AAF Proving Ground Command, switched over to manual controls with his Norden bombsight. He was flying in a B-29 at 35,000 feet and was aiming at a raft only 28 feet in diameter. He scored a direct hit in the center of the target.

Four-Engine Angels

The Army Air Forces get a good deal of official applause, but it is not the common occurrence to receive letters of appreciation from individuals. An exception is the following digest of a letter received by 1st Lt. E. J. Halbesien, pilot commander of a B-29 which dropped the first white-man's food to the Allied POWs at the Jap Omine Machi prison camp. It was written by Capt. Benson Guyton who spent three frustrating, miserable years in Jap hands.

"When the first stick of 'chow bombs' were dropped, the men literally went wild. None of the parachutes opened completely . . . and many of the drums broke away from the chutes. The men . . . were like so many hogs. They crawled around on hands and knees; there were cut fingers, cut lips; they pulled open busted cans of peaches and gulped them down. When one is ravenously hungry, one doesn't eat; one just swallows things whole. There isn't time to eat or even drink. It's just a kind of 'wuff' and the food is down. Many men pulled broken cans of fruit juice out so fast they were able to get a few drops before the liquid gold ran onto the ground. Candy was smeared all over men's faces. Don't ever pack chocolate and shaving cream in the same containers again!

"Do you realize that you dropped more food than we had seen in over three years? You wasted paper telling us not to overeat. We had bellyaches by the score . . . Every patient was grinning from ear to ear with a very guilty conscience.

"All prisoners of war must fare rather badly, but you couldn't have dropped supplies to a group that appreciates and needs them any more than we do. Before your arrival the average American weighed 120 pounds. Now our weights are soaring. Fortunately we lost only eight Americans here the past year, but over twenty men who were critically ill are now staging a comeback. With luck we should get them all home. Too bad for us that the B-29s couldn't drop us chow in Bataan. It was food that licked us there and cost us 1,500 men the first month as prisoners. I still can't realize that I shall never be hungry again.

"Nothing would please me more than to pass through Saipan on the way home personally to thank you for helping us. Also I would greatly appreciate a ride over Tokyo to throw out a monkey wrench. Here's hoping you get to return to the States soon."

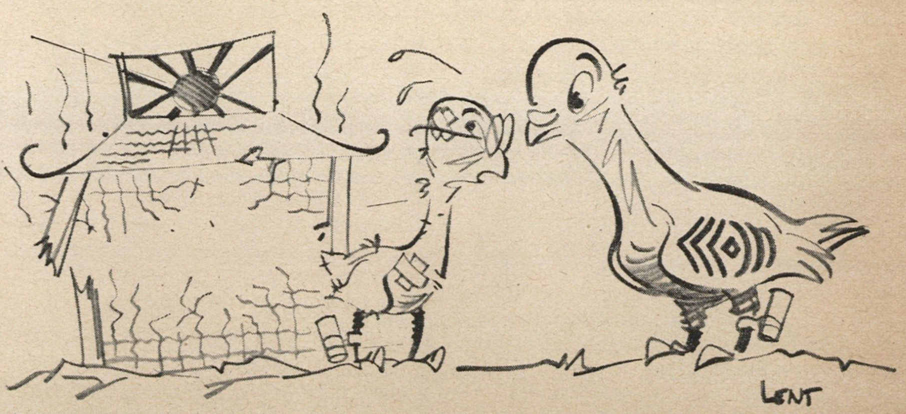
For Better Food

At a recent AAF food conference in San Antonio, attended by high ranking quartermaster and air officers, the men charged with the responsibility of feeding 2,300,000 flyers and ground personnel pooled their wartime experiences of the past three years. They sampled C-rations, K-rations, D-rations, 10-in-one rations and all the overseas fare prepared for fighting men. Part of the program was an airborne demonstration of how whole kitchens are delivered by glider.

One exhibit table had a steady stream of samplers. It was a display of jungle chow, including tasty strips of steak from such undomestic creatures as sharks, alligators and armadillos prepared by representatives of the jungle survival course, AAF School, Orlando, Fla. Other tasty tropical tidbits prepared for the airman who becomes isolated from his outfit included Hibiscus salad, sea purslane and boiled green papaya which, after ripening becomes a fruit, but may be served in its green state as a vegetable. Dessert items included Ceylon gooseberries, governor's plums, prickly pears. Boiled coconut juice and watered cactus juice made palatable beverages.

Purpose of the conference was to evaluate past accomplishments, to pass improvements on to all commands and to lay the groundwork for future betterment of food service to all elements of the AAF. ☆

HOMER



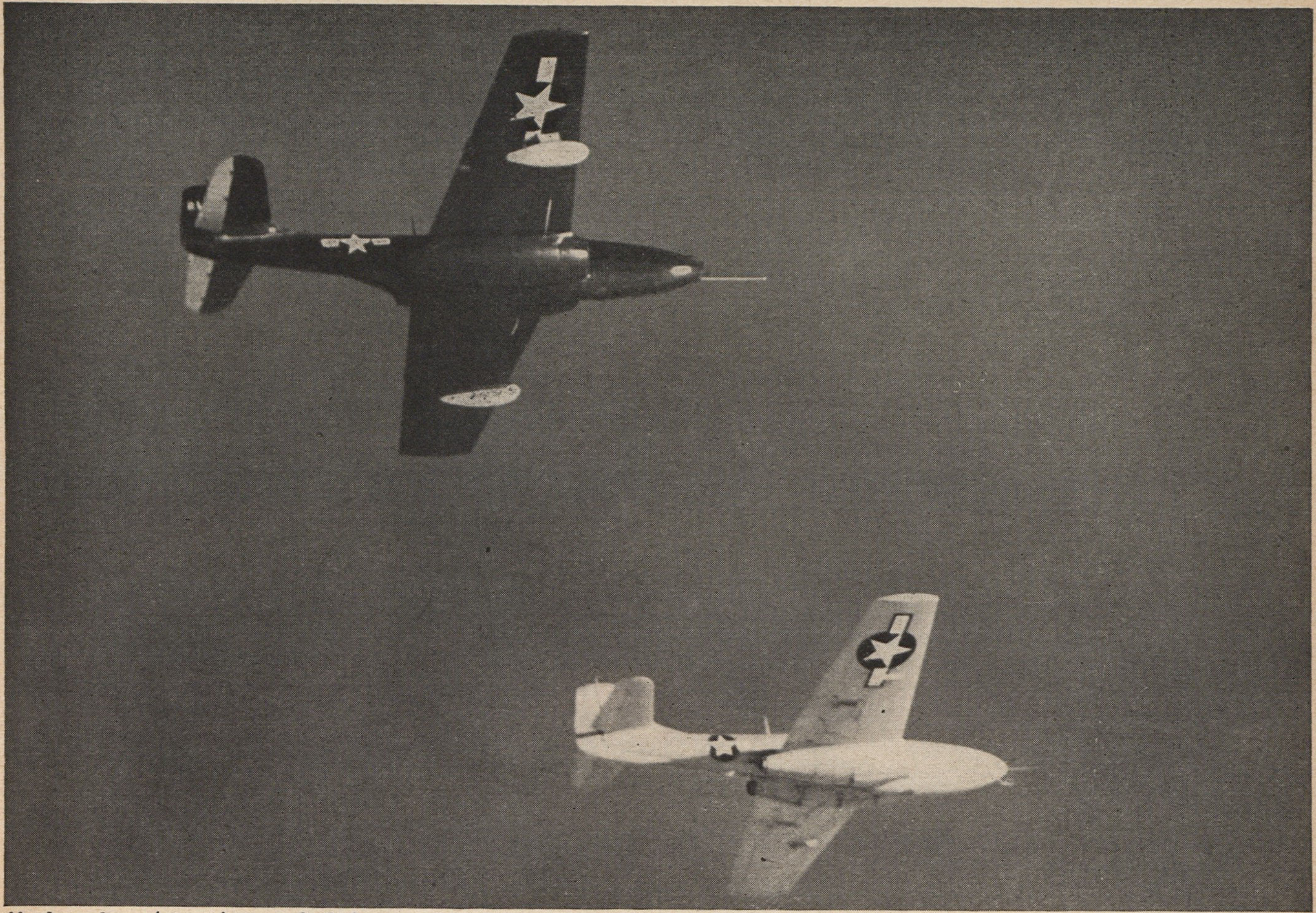
AIR FORCE MAGAZINE

"Our present status is about equal to your K-ration."

Development, Maintenance and Supply of Aircraft and Equipment

technique

XB-42 — Pusher type Bomber — Page 44



Mother plane (at top) controls flight attitudes of robot plane by means of radio, and sends data to ground unit by special instruments.

Radio-Controlled Aircraft

ATSC engineers, cooperating with the Bell Aircraft Corp., have developed new equipment which makes possible remote radio control of full size high speed aircraft, as well as simultaneous transmission of flight data to automatic recording instruments by means of both television and telemetering. Thus, if an experimental plane were to crash, there would be no danger to anyone's life, nor would important data on speeds and stresses be lost.

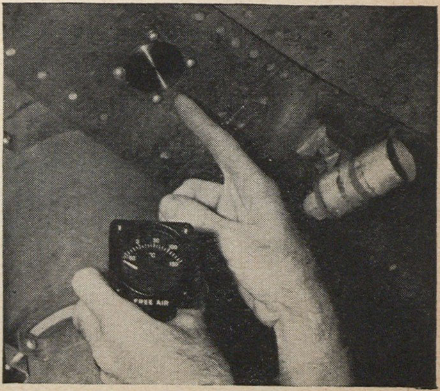
Radio control is achieved from a "mother" plane which is able to direct the robot even while it is on the ground during take-off and landing. A panel truck houses auxiliary equipment. A feature of the radio controlled craft is a "rate" autopilot which functions effectively at diving attitudes or in sharp maneuvers, while such parts as throttle, flaps, landing gear, brakes, etc. are actuated by servo motors which derive electrical power from circuits controlled by the radio receiver.

In the mother ship, a miniature stick is mounted on the regular stick, while a third stick is installed on the ground operator's chair which is secured to a platform built on top of the truck. By proper coordination of these controls, the robot plane can be directed from the ground or from the air.

New Instrument Developments

A gyrosyn compass, which gives the pilot or navigator an indication of true magnetic heading at all times, and an externally-mounted free-air thermometer, which eliminates the drag characteristics of previous models and does away with the possibility of ice formations, are two of the most recent innovations in the instrument development program of ATSC's Equipment Laboratory.

The compass is a simplified system of direction indicating which combines the operations of a magnetic compass and a directional gyro into a single instrument. The gyro unit integrates the effect of oscillations produced by normal flight disturbances, and the position of the plane with relation to its direction is "sensed" by the magnetic element which transmits the information electrically through the amplifier for indication on the face of a dial. The reading may be duplicated on as many as four repeater dials located elsewhere in the plane, so that other interested personnel may have the required knowledge. With magnetic North as a fixed reference, the airplane's azimuth position with respect to the magnetic meridian is visually indicated at all times, so that any change in the pointer position on the dial would show true heading of the craft.



Externally-mounted free air thermometer is in form of disc to reduce drag and icing.

The new thermometer, operated electrically, uses a disc instead of a tube, thereby permitting the sensing element to be mounted flush with the skin so as not to disturb the airflow. By flush-mounting the disc parallel to the airstream, ice formations are avoided. Placing the instrument on the underside of the wings or fuselage will also prevent the sun's heat from affecting changes in temperature.

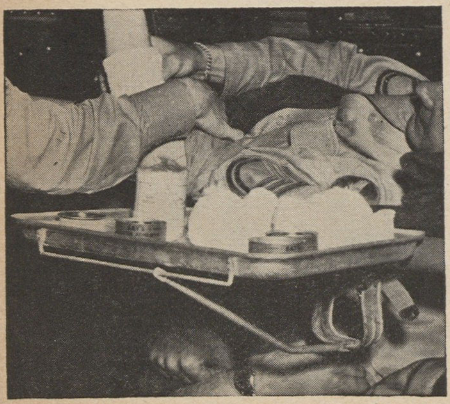
XR-9 Rotorcycle

Looking like a smaller version of the Sikorsky XR-5, the AAF's latest helicopter design, the XR-9, is a lightweight, low-powered craft having a three-bladed rotor, cleaver-shaped fuselage and a long boom that supports a tail rotor. Its principle of flight is also similar to the Sikorsky model, except that its rotor hub can be unlocked to "float" and thus lessen vibration. The main rotor blades are 28 feet in diameter and its top speed at sea level is around 90 mph, with maximum ceiling being estimated at 10,000 feet.

Built by G&A Aircraft, Inc., the craft is powered with a 125 hp engine which burns auto gasoline and has an endurance of approximately three hours. Its weight, empty, is about 1,250 pounds —only half as much as any other military helicopter.

Evacuation Plane Food Tray

In order to permit the flight nurse on evacuation planes to devote her full time to nursing care, food trays have been devised which can be attached to the litter and used by the patient without special assistance. In one type, two prongs fit into eyelets in the litter where they are secured by a wire pin. Another type has two spring metal clasps that clip the tray to the litter. In this model an insert provides openings for paper containers in which the food is served.

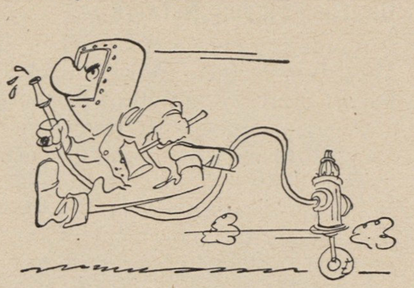


New type food tray can be attached to the litter and eaten from by unaided patient.

tech topics . . . about aircraft and equipment

Low-flying planes that lay down smoke screens in the face of enemy fire won't have to do the job any more, even in peacetime maneuvers. The AAF has developed a chemical dispensing glide bomb that is launched from a mother plane, dives to gain speed, then levels off over a predetermined area spraying the ground with a smoke screen or any desired chemical. The missile is designed to carry a standard aircraft chemical tank and discharges the chemicals through automatically operated valves.

A new lightweight flying suit will have a parka incorporated into the collar of the garment. . . . Latest flying jacket is fabricated with a boat-cloth body, byrd cloth shell and a mouton collar. . . . New heat-resistant linings have been developed for Bunkin-type firefighters' coats. . . . Also



under test is a new design heat-resistant protective helmet for use by aircraft crash-rescue personnel.

The advent of large jet-propelled aircraft which use AC electrical current for ignition systems and fixed frequency radar requirements has produced a lightweight inverter that turns DC into AC current and gives controlled frequencies of 400 cycle power. The new unit is 18 pounds lighter than any present type. . . . Electrical engineers also have developed an improved retractable landing light for high-speed aircraft. The new light which has a built-in lamp circuit to permit control from the cockpit also is brighter than present types and can be extended from its flush-wing well at landing speeds up to 250 mph in case planes ever land that fast. Previously lights malfunctioned at speeds above 170 mph. . . . At Newark airport AAF engineers have installed experimental all-weather lighting systems to aid low-visibility landings. One system features 248 sealed-beam lights at the approach end of the instrument runway. Another system uses 22 high-intensity floodlights.

For classroom instruction of maintenance and operational personnel, plasticized models of the gyro flux gate compass have been produced. The transmitter, master indicator, amplifier and caging motor have been put into plastic to show internal mechanisms and operation. . . . An instrument flying and landing trainer has also been plasticized as a demonstration for flying personnel and ground crewmen. The trainer has a fuselage covering of transparent cellulose sheet permitting clear and vivid demonstration and display of all working parts, thus increasing teaching efficiency. . . . Plastics are also playing an important role in pressurized cabin aircraft. A plastic patching kit which consists of circular clear plastic patches, toggle bolts and adhesive tape can be used to repair holes in pressurized aircraft during flight. The kit has now been released to standard.

Tests are being conducted with a new type of two-stage winch that will allow aerial pick-ups of weights up to 310 pounds using the two-stage pick-up systems recently perfected for light planes. The winches are to be installed in C-47 airplanes for conducting a series of two-stage pick-ups with heavier aircraft at varied speeds and weights.

A P-63E has had its empennage section redesigned. The plane's rudder has been replaced with a "V" type horizontal stabilizer and elevator section. The "V" tail has also been applied to a twin-engined Beech training plane.

Proposed jet fighters which will fly at extreme altitudes have led to experimentation with a new pressure suit to sustain life in case of cabin pressure failure. Present pressure-demand systems are considered adequate up to 50,000 feet, but altitudes above that level probably will call for a pressure suit. The suit under development is lightweight and is designed to be pressurized automatically upon loss of cabin pressure, with normal operation as an air ventilated suit. A new feature will be a pressurized full face mask and standard helmet which is expected to overcome the clumsiness of "fish-bowl" diving helmets.

A two-bladed, two-position, controllable pitch propeller has just completed successful tests on an electric test stand at Wright Field. The prop is designed to provide controllable pitch features for use on light planes. . . . Reversible-pitch, automatically synchronized propellers have been installed on some C-54 aircraft for tests.

Detonation Detection

Through the use of an engine detonation indicator which causes a light to flash in the cockpit when detonation is encountered, much progress has been made toward determining detonation-limited power output and toward establishing the fuel requirements for any given engine and airplane installation.

The indicator consists of an electromagnetic pick-up attached to each cylinder of air-cooled engines and to vital sections of liquid-cooled engines transmitting detonation vibrations through an electronic amplifier to an indicator lamp mounted in front of the pilot or flight engineer. These devices have been mounted on at least one model of almost every Army airplane employing engines of greater than 400 horsepower.

XB-42—Pusher Type Bomber

With a cleaner aerodynamic design, engines housed in the fuselage to eliminate the drag of large nacelles, and pusher props installed in the extreme tail to do away with thrust disturbances over the laminar-flow wing, the XB-42 is the AAF's first pusher-bomber to reach the flight test stage in the last three decades. Of unique design and not much larger than an A-20, the plane will fly faster than any bomber of its size and will cover non-stop distances of 5,000 miles as exemplified by its recent coast-to-Washington hop during which it covered 2,295 miles in 5 hrs., 17 minutes and 34 seconds, averaging 432 mph. A special emergency feature for bail outs is a detonating switch which sets off charges that blow the whole prop installation off the fuselage, so that crewmen need not fear tangling with the twin, three-bladed counter-rotating props when they leave the plane.

A normal gross weight of 35,000 pounds rests on the craft's tricycle landing gear, and a capacity bomb load of 8,000 pounds may be carried. Power comes from two Allison V-1710 engines mounted side-by-side in the fuselage just behind the crew's compartment in the nose, and long drive shafts are geared to the propellers in the rear. Hinged hoods similar to those on an automobile provide ready accessibility for maintenance, and since each engine is mounted with only four bolts, a complete power plant change may be effected in 45 minutes.

The XB-42 carries a crew of three, with pilot and gunner sitting side by side in a nose compartment, and the bombardier being situated in a forward well. Wing guns mounted to fire rearward are an unconventional feature, and an interchangeable nose may be installed to accommodate several forward-firing caliber .50s, a 75 mm gun or a 37 mm cannon.

Direction Finding Network

A military plane took off from a West Coast airfield for a flight over the Pacific every 15 minutes. In the CBI area, cargo planes passed over the Hump about three and a half minutes apart. At Saipan, control tower operators cleared B-29s for landings every 20 seconds. To regulate the movement of this tremendous volume of air traffic, a vast amount of radio messages and plane-to-ground communication was required, and this global electronic nerve system of navigational aids and airway markers was operated and maintained by the Army Airways Communications System. By these facilities, including low and medium frequency radio transmitters, radioteletype and automatic sending and receiving systems, it is possible for military aircraft to fly in greater safety from point of take-off to destination at all times and in all weather.

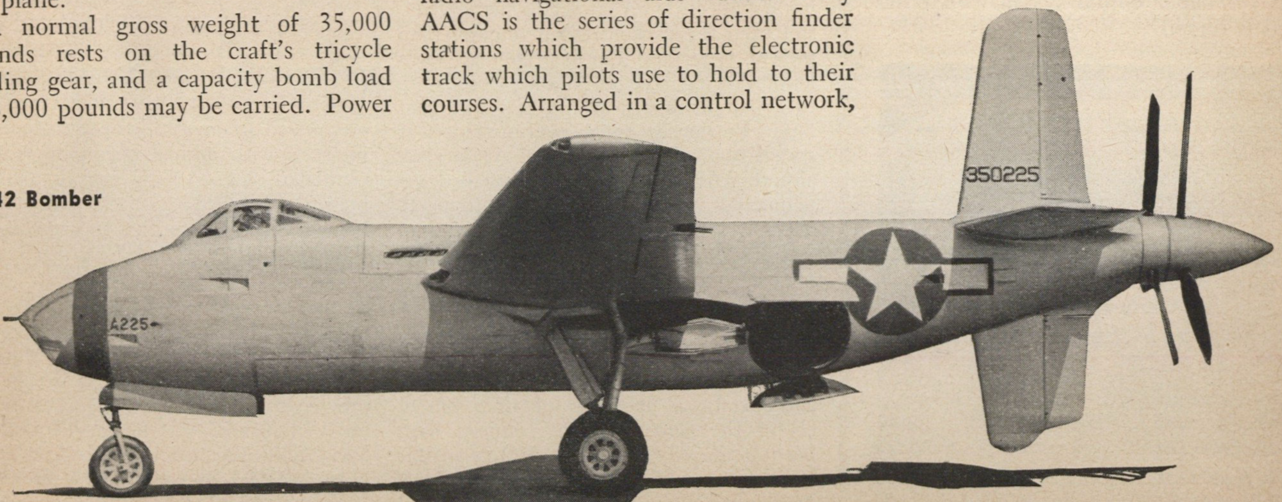
One of the most important of the radio navigational aids furnished by AACS is the series of direction finder stations which provide the electronic track which pilots use to hold to their courses. Arranged in a control network, several of these DF stations and a master station can readily cover an operational area 1,000 miles in diameter. Should a pilot want a bearing, his radio operator advises an airways station which immediately alerts all DF stations within the control net. The operator in the plane then sends his identification signal and any other required signal at established intervals, while each direction finding station takes a directional bearing on these signals and transmits it to the central station. Here, all bearings are evaluated, and the position of the plane at the time the signals were received is radioed to the craft. The pilot flies a set heading during this period and upon receipt of the bearing, adds the distance traveled within the time of three to four minutes, and established his correct position. Having tuned the signal in, the radio operator in the plane reads the visual trace pattern, determines the true direction by pressing the sense switch and enters his findings on a chart for evaluation into a fix.

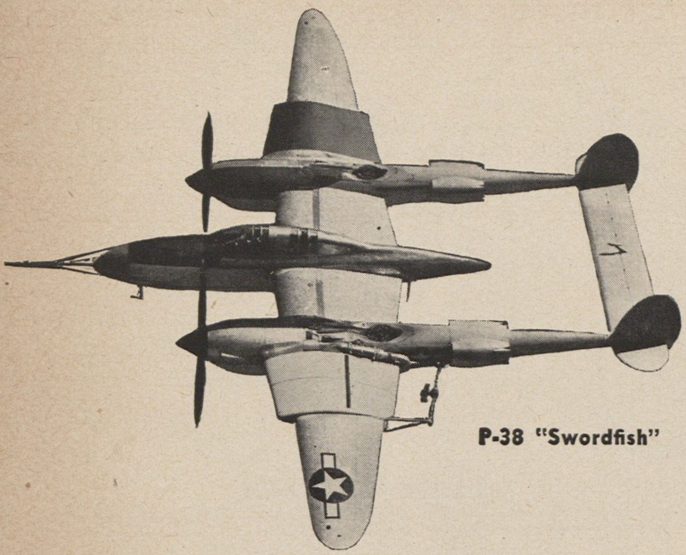
Dive Bomb Computer

To eliminate the need for mental calculations by pilots during dive bombing operations, ATSC armament engineers have developed an automatic bomb release which continuously feeds in altitude, dive angle and air speed during the dive and then drops the bombs at the correct release point.

Officially designated the Type K-2 Dive Bomb Computer—and informally referred to as the "Peanut"—the device is linked directly to a conventional reticle-type gunsight which the pilot uses for lining up his target. Component parts are a gyro, a depression weight, a contact switch and a caging mechanism—all built into a compact instru-

XB-42 Bomber





P-38 "Swordfish"

ment case and wired so that a light flashes on the pilot's instrument panel when bombs are away.

Lightning "Swordfish"

Distinguished by a five-foot yaw meter that protrudes from its nose to indicate skidding or slide slipping, a P-38 test plane called the "Swordfish" is providing important data on wing designs for superfighters and transports with speeds of more than 525 mph. Superimposed wing sections cover outboard wings between nacelle and aileron, and these are constructed with airfoil contours in exact proportion to any experimental wing proposed, so that in flight the superimposed "envelope" reacts to the plane's special instruments precisely as would a full-scale wing. Rows of static tubes are installed behind such wing sections to measure airflow, while recording instruments in the nose, plus cockpit instruments for visual observation during flight, provide full records of each test made. An engineering observer's station is located back of the pilot's cockpit.

Propeller Vibration Control

Increased performance for several fighters and bombers has been made possible by a simple little device which controls propeller blade vibrations set up by engine firing action in flight. Consisting of a solid steel ball weighing less than eight ounces and a socket seat, the device is known to reduce vibration stresses to less than half of their former intensity.

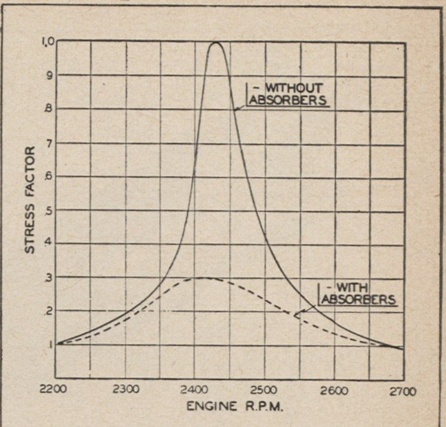


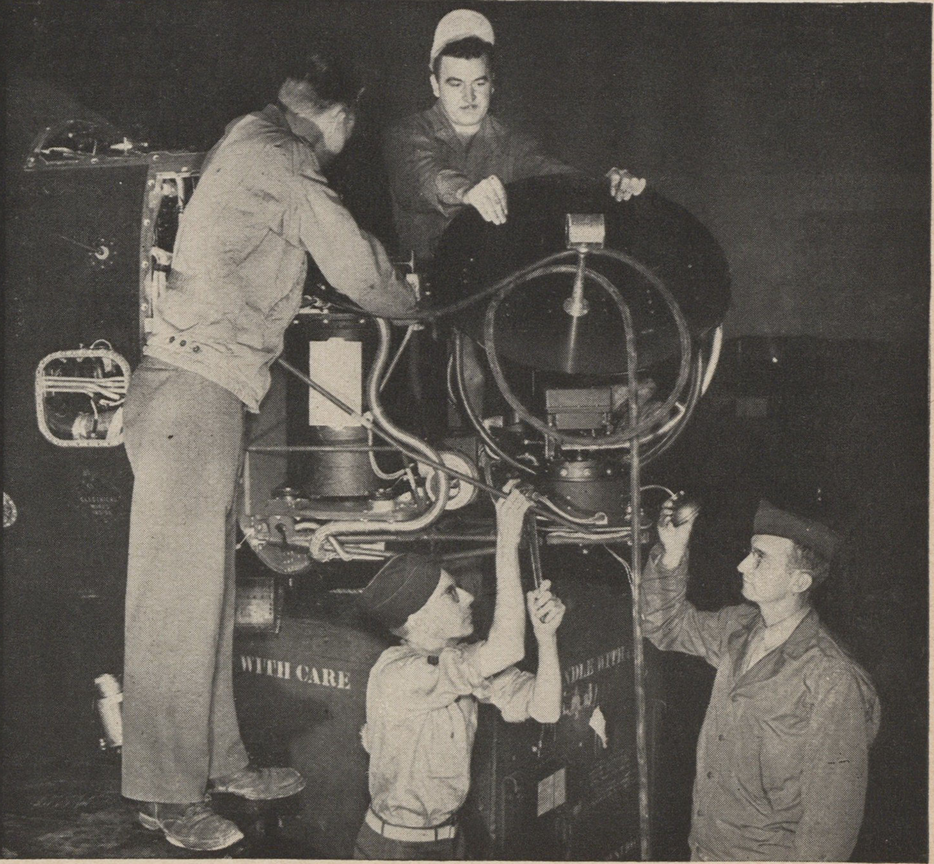
Chart shows the extent to which absorbers on propellers are able to reduce vibration.

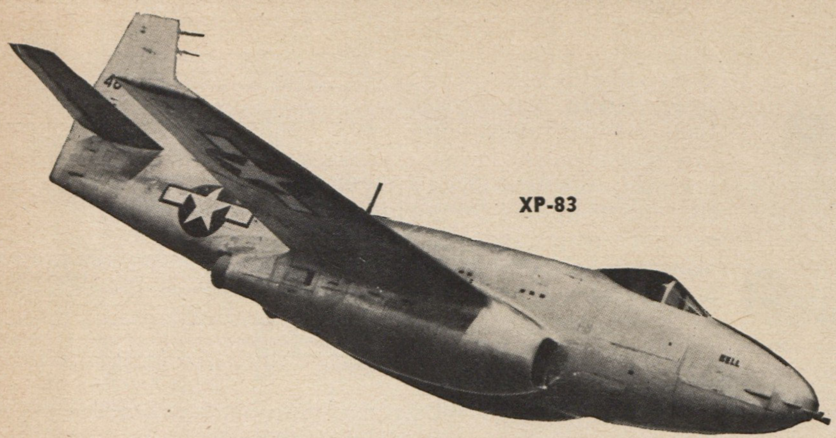
The steel ball is smaller in diameter than the socket in which it rests, thus permitting it to rock back and forth at increasing speed as the engine rpm increases. This motion sets up forces which oppose the vibration and exert pressure directly through the ball seat to the sides of the blade.

Although used at present only in Hamilton Standard propellers, wider applications are anticipated in order to effect reductions in prop weight.

what's wrong with this picture?

Searching is the job of this aircraft interception radar antenna, normally found in the nose of a P-61, and searching is what we suggest you do in order to find the five errors demonstrated here. AN-08-5FB-1 will help you locate them, but don't follow your nose to Page 47 until you've discovered a few boners we haven't listed. Participating in this game of hide-and-seek are (left to right) Pfc. Robert Ullum, Sgt. William Bartok, Cpl. Warren Thacker and Cpl. Robert Morrison, all of the 4000 AAF BU, Wright Field, Ohio.





XP-83—Newest Jet Fighter

Although it resembles the P-59 in its overall configuration, the AAF's latest experimental jet plane, the Bell XP-83, is larger, faster, more powerful and is capable of greater range at higher altitudes. The twin engine fighter is an all-metal midwing monoplane of semi-monocoque construction with tricycle landing gear, a wing span of 53 feet and a fuselage length of 44 feet, 10 inches. The tail is upswept to clear the powerful jet blasts of its G.E. I-40 power plants, and is 15 feet, three inches high at the top of the fin. The plane's full fuel load weight is more than 27,000 pounds.

The XP-83 has an exceptionally high speed at an extremely high ceiling and its large built-in fuel capacity affords greater range than was possible with previous jet-propelled airplanes. Fully loaded for combat—with kerosene fuel, crew, bomb load, and armament—its rate of climb is considered superior to that of many conventional fighters.

A well arranged, roomy cockpit covered with a bubble canopy provides new comfort for the pilot and affords excellent visibility, while a minimum of control instruments makes the XP-83 remarkably easy to fly.

Collision Warning Device

An electronic unit installed in the cockpit of a plane, to afford rear "vision" and thus prevent another plane from crashing into its tail during flights at night or in fog, has been developed by the AAF's aircraft radio laboratories and the Radio Corporation of America. Originally designed to warn fighter pilots when an enemy plane was making an attack from the rear, the detector activates an indicator light and a warning bell that tells the pilot when evasive action is necessary.

The equipment projects a flat radio cone from the tail of the plane, and, although it is impractical at very low altitudes because of ground interference, the device has proved very reliable at altitudes above 3,000 feet. Lateral formation flying does not interfere with operation.

Combination Prop-Jet Plane

A propeller loses its thrust efficiency at high speed, while a pure jet engine becomes more efficient. Because of this aerodynamic principle, the AAF is now flight testing a new fighter plane — the Consolidated Vultee XP-81 — which employs a propeller in the front and a jet engine in the rear to obtain the maximum benefits from each method of propulsion.

The craft is a low-slung, tricycle-gear all-metal monoplane with a laminar flow wing and standard cockpit controls. Wing span is 50 feet, 6 inches, and fuselage length is 44 feet, 8 inches. Two large airscoops in the midsection provide air for operating the rear-mounted I-40 jet engine, which exhausts its gases in a tail-pipe arrangement similar to that of the P-80. A conventional four-bladed prop is mounted in the nose and is driven by a TG-100 gas turbine engine which converts jet power into rotational energy, while giving additional thrust from an exhaust jet. Since this engine is an axial-flow compressor turbine as compared with the centrifugal type compressor used in the I-40, its smaller diameter permits a streamlined nose shape and smooth cowling effects.

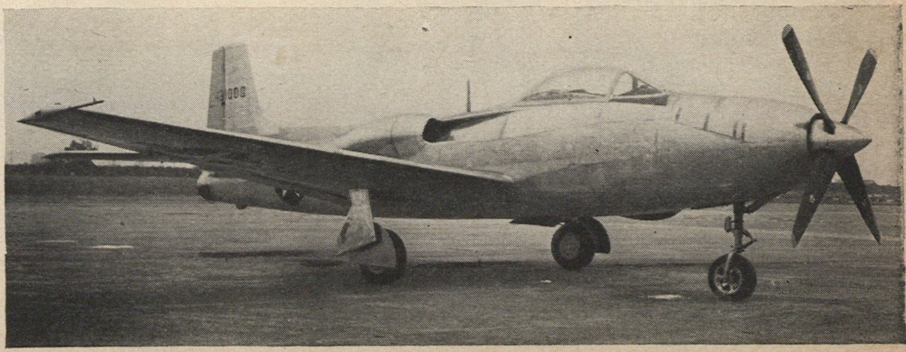
Figures are secret, but it is known that when prop and jet engines are operating together, the new plane can travel faster than any conventional fighter yet designed. The cockpit is well forward of the wing to provide superior visibility, and engine instrumentation is extremely simple.

Sea Anchor for Life Rafts

A new improved sea anchor for life rafts has been developed and approved at the AAF Center, Orlando, Fla., which will serve as an added safety measure in trans-oceanic air travel by supplementing vital air-sea rescue equipment. The device consists of a hemispherical nylon pouch, 23½ inches in diameter, weighted with a small piece of lead, strong and durable. It is dyed a mottled yellow-green.

Parachute Shock Tests

Bailing out of a plane at speeds of 500 mph seven miles up—necessary in many modern aircraft in the event of an emergency—has put new emphasis on parachute studies at Wright Field. Using rubber torsos and cloth-covered dummies, the Aero Med Laboratory and the Personal Equipment Laboratory have been conducting numerous drop tests to investigate opening shock forces at various altitudes with different kinds of fabric and patterns of construction, aneroid-controlled automatic parachute opening devices, and the use of radar to find rate of free fall. In experiments on shock forces experienced with silk and nylon chutes, shock forces on both 24-foot and 28-foot diameter parachutes have been recorded on tensionometers, and parachute openings



XP-81, new fighter plane, has a prop in front and a jet engine in rear for added power.

have been photographed by cameras in the bomb bay of a B-17, from which the dummies were dropped on static lines.

The data obtained has been of great value in aiding technicians to find a parachute cloth light enough to make a 28-foot chute of the same weight and bulk as the present 24-foot pack. Also on the "target" list is a chute that will have a low vertical landing velocity of from 8 to 12 feet per second, a minimum opening shock at whatever altitude the airman releases the canopy, an automatic rip cord release at proper altitude to decelerate a man even though he may be unconscious, and one which will provide a minimum exposure to anoxia and cold by offering maximum velocity at altitudes above 15,000 feet.

Bicycle Landing Gear

As part of an experimental program to determine the most efficient undercarriage for high-speed aircraft in which thin wings and the elimination of large nacelles has made it difficult to house retracted landing wheels, a "bicycle" landing gear has been fitted to a B-26 for landing and take-off tests. A pair of standard-sized main wheels mounted on regulation shock struts are arranged in tandem—one in the rear bomb bay and the other in the nose—while smaller outrigger wheels, one mounted in each nacelle, help to provide lateral stability. These smaller wheels are standard B-17 swiveling tail wheels mounted on modified main gear shock struts. They are completely retractable.

WHAT'S WRONG with the picture on Page 45

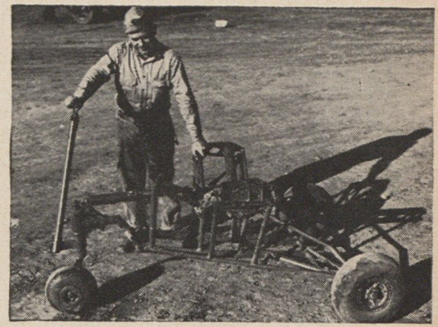
1. The mech at left using an air pressure hose apparently does not realize that there is a good possibility of overpressuring the system and blowing the plexiglas shield off the dipole. A tire pump will do.
2. And while we're about it, the hose is wrapped around the dipole and may damage it. Keep dipole free.
3. The paraboloid that the man in the rear is pulling on must always be free of dents, cracks and holes so that the returning radar waves hitting the dish can be picked up properly by the dipole. It won't be smooth very long at the rate he's tugging on it.
4. The man with the wrench is murdering the amphenol connectors. Use fingers only.
5. The slip rings shown getting an oil treatment should never have lubrication.

on the line

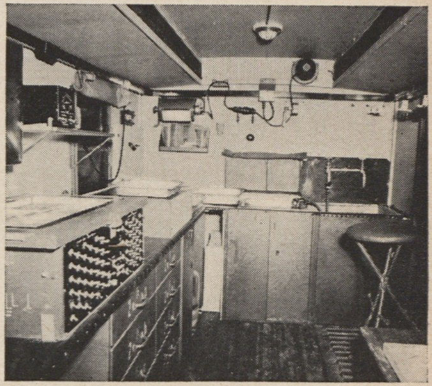
with mechs around the world

At the time when he was an instrument shop chief at an 8th Air Force Service Command strategic air depot in England, Sgt. Gailen W. Gaiser, Hamilton, Ohio, improvised two devices which helped to speed up operational instrument checks on P-38s. Shown above is one of his developments—a testing panel for Selsyn calibrating landing gear and flap position indicators, which permits checking the units in the shop without transporting test equipment to the plane itself. The device operates on 24 volt DC and has four manually operated transmitters, a master indicator, a test indicator and up-and-down lock switches mounted on a sheet metal panel. Sgt. Gaiser had also made a testing panel for operational checks on P-38 calibrating fuel level gauges.

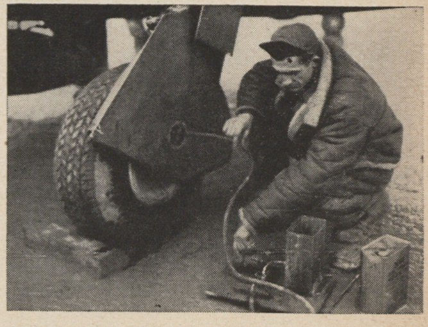
Recalling that "for want of a nail a kingdom was lost," S/Sgt. Kenneth D. Lee, Alliance, Neb., decided to help alleviate a critical nail shortage at his Air Service Command depot in the United Kingdom, and devised a simple magnetic sweeper which recovered hundreds of nails daily which had been torn from shipping crates and been lost in the sawdust on the floor. His device is composed of three salvaged aircraft magnetic coils, a few sheets of fiberboard and a small portable generator —mounted on two small wheels for traction across the floor.



As a means of saving full jettisonable tanks from damage on removal, S/Sgt. Granville Fannion, Paintsville, Ky., built this hydraulically operated drop tank remover from a Spitfire, a P-40 and salvage parts at his 15th Air Force base in Italy.



Recognizing the need for an adequate mobile photo trailer that would suit the purpose of his AAF service group in Germany, S/Sgt. Maxwell R. Higden, photo section chief, and his assistants, Sgt. Kalix Doron, Cpl. Frank Livingston and Pfc. Jack R. Yost, constructed a trailer from abandoned enemy equipment. Easily towed by a 2½ ton Army truck, the trailer has sinks and tanks made from German sheet metal stocks, and has a supply of fresh running water. Ample drawers are available for the complete storage of equipment and supplies, and electric fans cool and dry the interior. Developing room is shown above.



A BTO in the ETO, M/Sgt. Alfred J. Gouba, Shenandoah, Pa., is shown above operating his brake bleeding machine on the brakes of a P-47. The device was constructed out of salvaged material.

Rendezvous

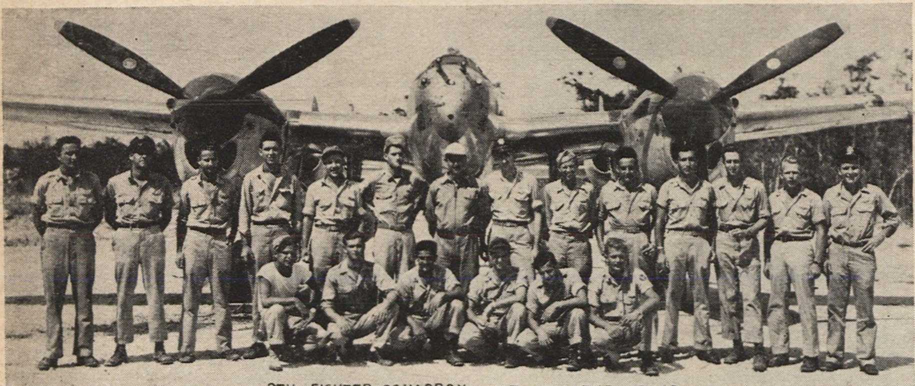
(Continued from Page 1)

W. Scott, Jr., did not take the first "Snoopers" to the Pacific and he did not develop the first successful tactics of radar night bombing and long range search because he was still training his crews at Langley Field, Va., six weeks after the Wright Project, which left Langley Field, Va., on August 5, 1943, flew the first radar mission on August 22, 1943. About three days later, the Wright Project bombed and sank the first Jap ship to be so destroyed in the Pacific area by radar equipment. The crews who later made up the 63rd Squadron of the 5th Air Force, which are now known as "Snoopers," did not arrive in the Pacific until the latter part of October.

On August 10, 1943, Col. Stewart P. Wright commanded a provisional squadron of 10 radar-equipped airplanes and crews which were sent to the 13th Air Force. These 10 planes and crews were known as the "Wright Project" and were directly under the 13th Bomber Command, although attached to the 5th Bombardment Group for housekeeping and maintenance. The 868th Bombardment Squadron (consisting of the Wright Project) was activated January 1, 1944, and served directly under the 13th Bomber Command. They received little publicity due to the fact that they were not connected with any group. . . .

Three former members of the Wright Project and the 868th Bombardment Squadron would sincerely appreciate AIR FORCE clearing up this matter.

Lt. Col. Francis B. Carlson,
Capt. Crowell B. Werner,
Capt. Clarence L. Harmon,
Wright Field, Ohio.



9TH FIGHTER SQUADRON, 49TH FIGHTER GROUP.
THE FIRST A.A.F. PILOTS TO LAND AND OPERATE IN THE LIBERATION OF THE PHILLIPINES.
LANDED ON LEYTE 26 OCTOBER 1944.

Leyte Firsters

Dear Editor:

On page 20 of the December (1945) AIR FORCE you write: ". . . the first land-based fighters did not land at Tacloban until October 28." Wrong. The 9th Fighter Squadron, of which I was commanding officer, landed in Tacloban Strip at 1200, October 26, with 24 P-38Ls and started operations immediately. "Dick" Bong was one of us. The welcoming committee consisted of General MacArthur, General Kenney and cheering GIs. In fact, General Kenney said every GI on Leyte was so glad to see us that the shooting stopped temporarily while they stood in their foxholes cheering our arrival. General Kenney, in person, had been helping to lay runway mats that morning prior to our landing. The accompanying picture was taken at Biak while the invasion was in progress and we were awaiting orders to move up.

Maj. Robert M. McComsey,
Headquarters, Army Air Forces,
Washington, D. C.

Our Lt. Col. Herb Johansen, who was there to help out with the cheering, says both ours and Major McComsey's dates are incorrect. He contends, as he wrote in his article "Back to the Philippines," AIR FORCE, December, 1944, that the first P-38 touched Tacloban strip at noon on October 27.—Ed.

'Adequate Testimonial'

Dear Editor:

Congratulations to you and Maj. Arthur Gordon on the splendid article "Three Years Over Europe." It is the type of history I'm sure AAF personnel will be most interested in saving.

The foreword to the story was well written also. Your story of the "plain unvarnished truth" is more than adequate testimonial to the importance of airpower.

Capt. Warren L. Syrerud,
435th Fighter Squadron,
8th Air Force.

Already There

Dear Editor:

I have just finished reading the article "Guerrilla Lightning" by Cpl. Harry A. Center. No doubt Capt. E. M. Thompson and his detachment on Cebu did a wonderful job but let's get a few of the facts straightened out.

In the first part of October, 1944, a party of technicians set out for Negros Islands, P. I., myself included. We landed there by submarine October 18, 1944. We split up and our party of eight forced the way through Negros Island on a four day and night march. We crossed Tanon Strait in fishing boats and landed at Malabyuc, Cebu. From here we made our way to Colonel Cushing's headquarters overlooking Cebu City.

Corporal Center states: "Ours were the first new American faces to be seen on Cebu in three years. It was February 15, 1945." Our landing was made approximately three and a half months before this date. Five of us were evacuated at Taburan Strip on January 23, 1945. The C-47 that came after us was the first to land on Cebu during its occupation. Smoke signals were sent up to guide the plane to the strip. We had air cover from four P-38s and two P-47s.

Taburan Strip was taken from the Japs by Colonel Cushing's fine Guerrilla Army for us. Our other three men were left behind with Colonel Cushing and greeted Captain Thompson and his men. They were Sgt. Edward Hunter, Sgt. Quincy Knight and Cpl. John Kunkel. Corporal Center failed to mention Colonel Esperitu's 85th Regiment covering Babag and vicinity above Cebu City. I was present with him when his men were firing a homemade mortar, constructed from a piece of pipe. . . .

I hope this will serve to retract "The first American faces on Cebu" and save face for us.

Sgt. Eugene F. Dunat,
Sgt. William P. Randolph,
Tokyo, Japan.

The Real Father

Dear Editor:

Realizing that it was not with malice aforethought nor arbitrary omission on the part of AIR FORCE's editorial staff, we attribute your failure to mention the name of the real father of the Frangible Bullet in the April issue to a lack of information on the subject.

We in no way wish to discredit the work of AAFTC, NDRC and ATSC because without them the project would not have reached fruition, but on the other hand, had it not been for Maj. Cameron D. Fairchild, who conceived the idea at Laredo Army Air Field over two years ago, there would not have been any project.

1st Lt. J. Eugene Hoover,
Laredo Army Air Field,
Laredo, Texas.

Hereby deserved though belated credit is given to Major Fairchild, father and most ardent protagonist of the project.—Ed.

Kind Words Dept.

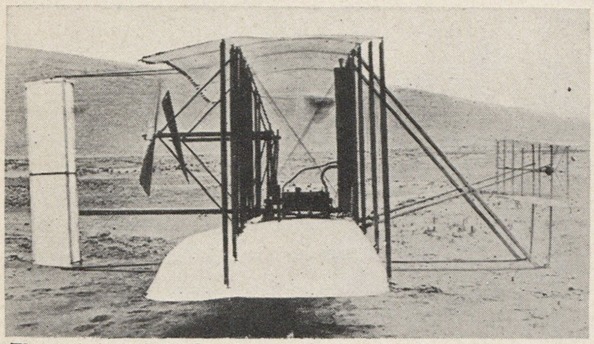
Dear Editor:

On December 1, 1945, a large number of patients here were transferred via hospital train to other General Hospitals. Many of them were standing in the hall in front of my office and the Air Corps men were dropping in to say goodbye.

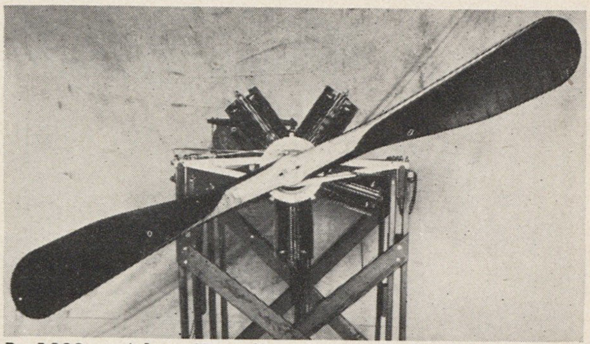
T/Sgt. John D. Parker, former 8th Air Force B-24 engineer-gunner, who was wounded in combat and is now on crutches, came in to get an AIR FORCE magazine. We gave him a handful and asked him to distribute them to the men on the train. He walked out of the office and the next thing we heard was, "Get your magazine, 10 cents to see who won the war." You could hear the jingling of coins. Of course Sergeant Parker did not take the money, but it was remarkable how the men in the other branches of the service fell for his little ruse. They all enjoy reading AIR FORCE.

Capt. Robert J. Lynn,
AAFPDC Hospital Liaison Officer,
DeWitt General Hospital, Calif. ☆

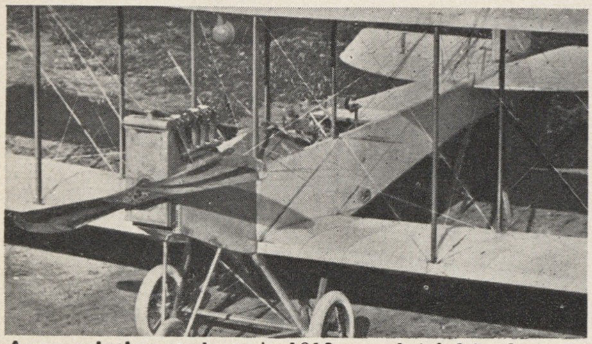
The Album POWER PLANTS



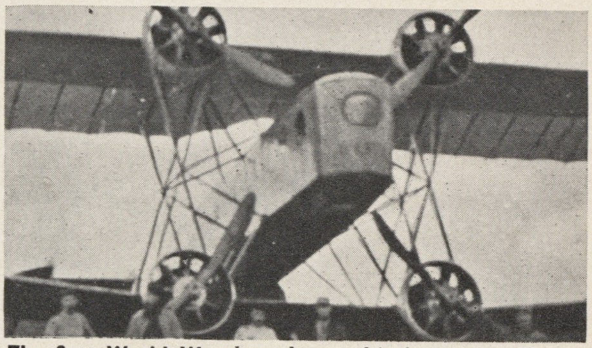
The original Wright plane, circa 1903, sported an engine rated at 8 hp, but which surprised all by generating 12.



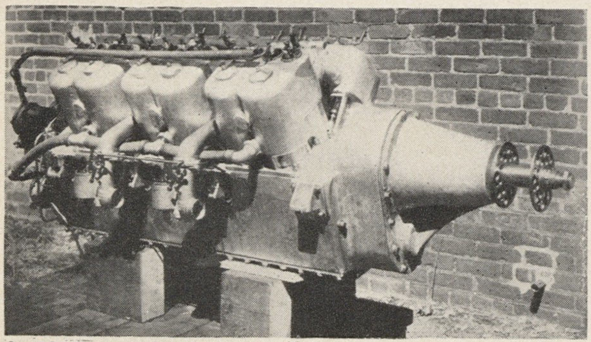
By 1909 an Adams Farwell engine was built which featured variable compression and was able to develop fully 36 hp.



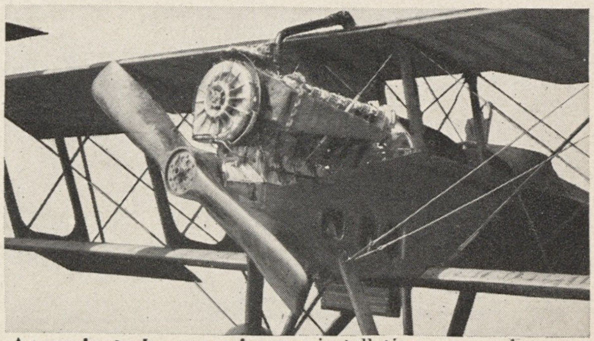
Army aviation students in 1913 were briefed in the care and handling of this Curtiss 60-hp tractor-type engine.



The first World War brought on this four-square Bleriot having a pair each of 110-hp and 120-hp Rhones engines.



In 1915 came development of the Aeromarine power plant, a 12-cylinder, inline job that furnished all of 165 hp.



An early turbo-supercharger installation was made on a Packard 300-hp engine in 1919. Craft is LePere biplane.

put wings on your future ...in the AAF

Now that the war is over, where do you go from here? In reaching your decision, consider seriously the advantages offered in the Regular Army Air Forces: An attractive career, education, advancement, security, good pay, early retirement . . . and service with the world's greatest Air Force. **(Further details appear on Page 38.)**

SEE YOUR BASE RECRUITING OFFICER