AIR FORCE

THE OFFICIAL JOURNAL OF THE AIR FORCE ASSOCIATION, DECEMBER, 1946

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VOL. 29 NO. 11 DECEMBER, 1946

AIR FORCE

OFFICIAL JOURNAL OF THE AIR FORCE ASSOCIATION

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Air Mail

Why AFA?

Gentlemen:

I am writing this letter to see if I can't get a little detailed information about the Air Force Association. You see, after I got my pin, which I think is very nice, lots of fellows kept asking me just what good the Association would be. Well, I tried to give them a good answer, but to tell you the truth about it, I'm not sure myself. This is why I'm writing this letter, to find out what the Association can do for you after you get out of the Air Corps.

I would also like to know about the formation of squadrons and wings.

When I get the answer to this letter, I'll be able to give the fellows who ask me what good the Association will do them a good answer.

Cpl. Ralph P. O'Neal,
Schweinfurt, Germany.

The Executive Director's answer:

We welcome your letter and are glad to have the opportunity to assist you in spreading the message among your associates as to exactly what the mission of the Air Force Association is and what it can do for its members.

It's a big subject to cover in one letter because it is a big mission. In its simplest form, it is a much needed organization to provide a means for uniting in permanent form all the people who believe in the necessity for making the AAF the cornerstone in the Nation's defense.

As you must know, the world's once most powerful and effective fighting force is now only a shadow and a skeleton of its former self. Through the haste to get out of the Army and back to civilian life and through the subsequent measures of economy and through the competition of other branches of the Armed Forces for the lion's share in budget appropriations, the AAF today is only a minor factor in the whole defense program and may be permanently relegated to a minor role unless public opinion can be educated to the necessity for its restoration as the first line in the Nation's defense. No one in uniform can do this job, and it can be done only by those who ardently believe in military air power and its co-equal status with land and sea. That is only one step, though naturally the most important and immediate, in our long-range program of service to and for the Army Air Forces.

As you know, the Association now publishes the Air Force *magazine, which is the only magazine of the AAF and its former members. It now resembles in every way its wartime status and we plan to make it even bigger and better as time goes by. Its editorial pages will always be directed primarily to matters of interest to the active members of the AAF, but in addition will devote space for the Air Reserve, the Air National Guard, the Civil Air Patrol, the Aid Society, the activities of the local squadrons of the AFA and interesting developments in the field of civil aviation.*

The Association will act, I hope, as the most effective means of public relations for the Army Air Forces with the general public and a watchdog for developments that might be adverse to the best interests of a strong national defense.

Right now we are actively interested in two main projects: first, to aggressively support the movement in the coming Congress for unification of the Armed Forces and autonomy for air; and secondly, to promote a greatly expanded Air Reserve Training Program.

There are many minor services less spectacular but of immediate interest to individual members which we perform as daily routine. Our daily mail, which amounts to several hundred letters a day, brings us requests for help and assistance in a variety of fields. They include such things as helping to locate former buddies that served overseas together, permission to bring wives overseas, to locate graves of relatives missing in action, location of and repatriation of prisoners of war and many other allied, varied types of personal service.

The forty-eight states have been organized as wings with local squadron activities being established in cities large and small throughout the country, wherever as few as 20 former Air Force people wish to get together and organize.

If thoughtful people like you all over the world where the Air Forces are deployed could realize and appreciate the opportunity for national welfare and individual service that this organization affords, the necessary support in numbers will be forthcoming and in that way only can its purposes be fully realized.

We appreciate your interest and hope that this may be of help to you in informing your associates.

Very sincerely yours,
Willis S. Fitch,
Executive Director.

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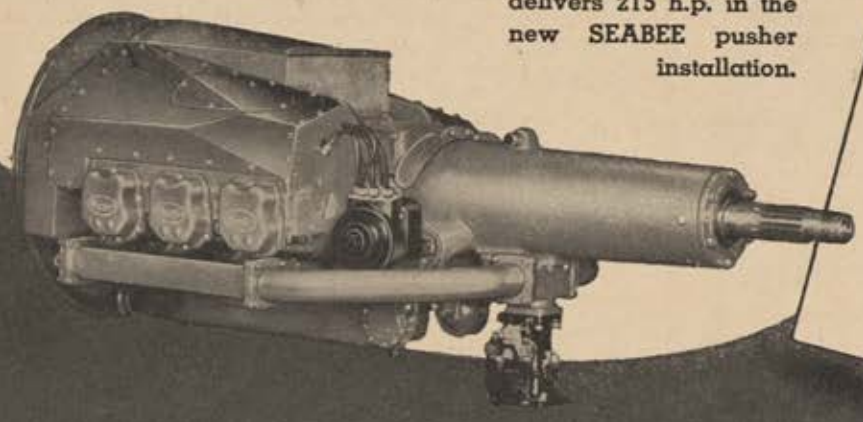

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In This Issue

Lest We Forget

"One Damned Island After Another" (p. 11) and "Air Industrial Planning—A Key to U. S. Security" (p. 21) were both contributed this month by the Personnel Narratives Division of Headquarters AAF. AIR FORCE readers who know from personal experience what it's like to fight a war will recognize "One Damned Island" as one of the most gripping and realistic war documents yet published. It purports only to be the saga of the 7th Air Force, but in reality it's the story of every guy—bookkeeper, mess sergeant, pilot, or file clerk—in every air force. The chapter in this month's issue is the story of what happened at Hickam Field on December 7, 1941. If anything can yank us back from the complacency into which we are drifting, this is it.

"Air Industrial Planning" is the Air Forces' idea of how to avoid production lag in the event of another conflict. While we're thinking about Hickam Field and Pearl Harbor, it is well to remember that our losses there were seriously aggravated because it took us so many long agonizing months to replace the equipment destroyed. Had an industrial preparedness program such as Charles Villency has outlined in his story been in existence at that time, the recovery period would have been substantially lessened. Like "One Damned Island," Villency's industrial planning piece is food for thought for those who haven't forgotten that it happened before and it could happen again.

If national security is to be anything more than an overworked phrase, stories such as these two cannot be told too often or in too many ways. An informed and interested public is the best insurance in the world against another national catastrophe. It is when we become lethargic and lazy in our thinking that we also become vulnerable.

For this reason the assigned mission of the Personnel Narratives Division—to prepare and place stories with magazine and book publishers—is of the utmost importance at this time. The idea for the Division was conceived in 1926 by Col. Hans Christian Adamson. Both as a journalist and as a man who had grown up with aviation, Adamson was intensely interested in human interest accounts of the Air Arm in World War I. He realized that the great mass of the American public could be reached only by this type of writing. But search for these stories proved fruitless. He could find only dry factual information, without action, humor, or spirit.

With the advent of World War II, Adamson's determination to see that the human interest accounts of any future conflict were prepared on the spot was ready to be put to the test. PND was established in New York in the spring of 1943. Teams of civilians and AAF personnel were sent overseas to gather firsthand accounts of various Air Force exploits. Writers and researchers were instructed to tell the story of the particular air force, but to tell it from the point of view of the man on the ground and in the air, the big men and the little men, and the "blood, sweat, and tears" of their combat.

Some of the well-known professional writers who served with the Division at one time or another are: Jack Kirkland, whose play "Tobacco Road" ran on Broadway for 7½ years; Lucien Hubbard, Hollywood writer and producer ("Wings," "Gung-Ho," etc.); Walter D. Edmond, internationally known historical novelist ("Drums Along the Mohawk," "Chad Hanna," etc.); Henry F. Pringle, Pulitzer Prize biographer of "Theodore Roosevelt"; Bogart Rogers, Hollywood writer and steady contributor to the national slick magazines; Vilhjalmur Stefansson, Arctic explorer and author; and Clayton Knight, one of the foremost aviation artists.

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says Frank S. Pittenger

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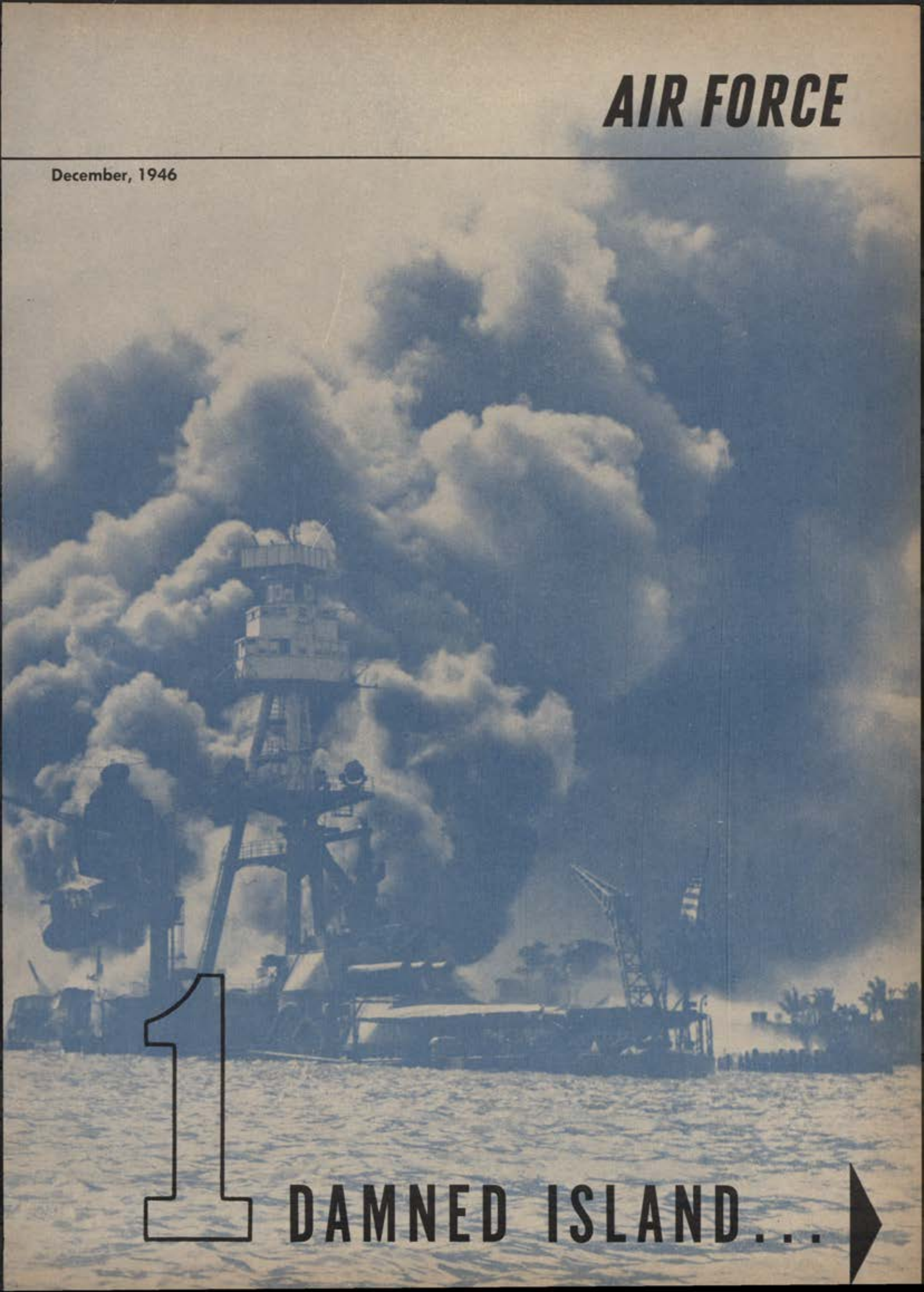
AIR FORCE

December, 1946



1 DAMNED ISLAND...

It was five years ago this December that the "long thin line" of planes with red suns on their wings swooped down on Hickam Field

AFTER ANOTHER DAMNED ISLAND

BY CLIVE HOWARD & JOE WHITLEY, *ex-Staff Sgts. USAAF*

ONE DAMNED ISLAND AFTER ANOTHER, *Chapter II of which is reprinted here, will be published by University of North Carolina Press on December 7, 1946. Price: $3.50.*

IN the brief moment when men felt the paralyzing impact of the first bomb; when they heard the first staccato bursts of machine guns; when they saw for the first time the flame and smoke of burning buildings, crumbling planes, and sinking ships; in the brief moment when the first dead sprawled in lifeless chunks and the first wounded stared at their own welling blood with dazed surprise—in that quick, terrible second, eyes did not believe what they saw, ears did not believe what they heard, and men's minds were unable to translate the sight and sound and smell, on earth and in the sky, into the simple, solid fact that This Was War!

Breakfast had just started in Hickam's big Consolidated Barracks, built to house 3,000, when the first explosion was heard.

Frank Rom, a private first class, ran to the window, expecting to see a plane that had crashed. Instead, he saw planes streaking by with red suns on their wings.

"Japs!" he screamed, "Japs!"

"Pipe down! Wise guy!"

The chorus of jeers was interrupted by a bomb that crashed through the mess hall roof. Trays, dishes, food—and men—spattered in all directions.

Colonel Farthing, Hickam's Base Commander, clattered down the narrow control tower steps with one thought in mind, to disperse Hickam's complement of 37 bomber planes, massed at the seaward end of the strip. There they were—parked wingtip to wingtip. Drop a bomb on them, sweep them with machine-gun fire, and they would collapse like tenpins falling before a bowling ball. It was as simple as that!

In the Bachelor Officers' Quarters of the Fifth Bombardment Group, Lieutenant Karl E. Forsythe was listening to an argument about whether Japan would attack America without warning, when he heard one big explosion, followed by another. He decided they were the big 16-inch guns at Fort Kamehameha.

"There'll be a third," he said to himself.

There was. And so close it shook the building. Forsythe ran to the end of the corridor. He saw a dense column of smoke shooting up from the hangar line. A plane streaked through the smoke and dived on the repair dock of the Hawaiian Air Depot, the biggest machine shop for the Army Air Forces in the entire Pacific.

"The whole depot seemed to jump into the air as I looked at it," Forsythe said.

A section of the room sailed through the air like a blown leaf. The depot burst into flames.

The bomb that exploded the repair dock came from a line of planes which Colonel Farthing, running now across the open expanse runway, saw coming in from the northwest. The planes swung out to sea, losing altitude, flew back over Hickam, and dove across the bows of ships in Pearl Harbor, bombing as they went.

They reached the parked bombers ahead of Colonel Farthing. Finally, a formation of Jap bombers came in from the southwest toward objectives so specific that they, as Colonel Farthing expressed it, "seemed to have the names of their targets written on the bombs."

Unopposed, they cruised down Hickam's double line of steel and concrete hangars and, with infuriating deliberation, lobbed their bombs through the broad roofs. Some of them veered slightly out of formation and darted toward the big concrete barracks.

Their bombs went through sidewalls, through the great gaps in the concrete made by the attackers who had preceded them; even through open windows, bringing more death and destruction to the five-story building which—even as the echo of the first bomb explosion still rumbled through the dormitories and corridors—had become a mass of writhing, panic-driven humanity.

The broad staircases bulged with a tide of screaming men fighting their way down to the lower floors. Other men, believing that safety lay on the open roofs, fought and clawed against the tide and were swept out of sight. Men, some of them naked, ran headlong from the building into the storm of bullets and shrapnel.

In the mess hall, 32 cooks and kitchen men had stayed at their posts through the sound and fury of exploding bombs. They were busy making sandwiches (which they knew would be needed that day) when the second wave of bombers struck. Bombs started hitting near by.

Some of the cooks and kitchen help headed for the huge iceboxes and crowded in them in the unfortunate belief that they would find protection there. Then came a direct hit, which turned the mess hall into a shambles.

The iceboxes were split open like eggshells. The concussion, rather than direct bomb wounds, killed the men huddled inside.

Master Sergeant Theodore B. Harman, the mess sergeant, was on his way into the bakery when he saw a great, blue flash. He was blown through a window and, the next he knew, was "coming to" on the ground outside. His head ached with the terrific, ringing clatter that hundreds of steel trays made when the bomb blasts hurled them against the steel rafters. There were about 2,000 trays in all and, Harman said, the weird sound they made whirling through the air was worse than the explosion of the bomb.

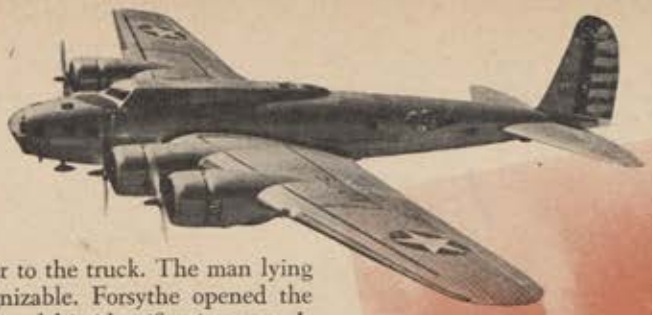
Lieutenant Forsythe, a mild looking, slight young man, his mind still on the pre-attack argument about whether Japan would strike without warning, ran through the streets of Hickam Field toward the hangar of the Headquarters Squadron, Fifth Bombardment Group, of which he was adjutant. Several times he dodged Japs strafing the north end of the officers' quarters area. Above him, torpedo planes circled lazily over Pearl Harbor. The fire house, as Forsythe ran past it, was a mass of flames. The big repair hangar at the Hawaiian Air Depot was a blazing hulk.

But with all this, nothing seemed real, nothing seemed true and final, until—as he turned in toward his hangar—a soldier ran up, yelling:

"Dixon! Where's Dixon? Dixon!"

Forsythe noticed a man lying beside a truck.

"Is that Dixon?" he asked.



"At the peak of the attack, the loudspeaker in the Hickam Control tower crackled into life. The B-17s had arrived from the Mainland."

With the soldier, he ran over to the truck. The man lying there was dead and not recognizable. Forsythe opened the dead man's bloody shirt and found his identification tags. It was Dixon.

The soldier collapsed over the body of his friend, crying bitterly. And for the first time that morning, the full, terrible impact of the word *war* settled on Lieutenant Forsythe.

Gradually the shock and panic and mob paralysis gave way to order and action. Older, cooler heads took charge. Young, unafraid leaders emerged from the chaos. Noncoms plunged into the terrible maelstrom of humanity in the barracks.

"Disperse! Disperse!" they commanded. "Don't gang up!"

Ernest E. Field, acting first sergeant of an AAF ground defense company, was one of the first to recover. At the height of the attack he ran through the barracks buildings to break up clusters of men who had huddled together.

Under the mess hall, already in a shambles, he found forty men huddled together. Field knew that a single direct hit would kill them all.

"Get out and scatter!" he ordered.

Young, frightened, and feeling the instinctive human impulse of safety in numbers, none of them made a move. Silently they sat, not defiantly, but in a daze.

Field yanked his .45 out of its holster, released the safety. He pointed the gun into the crowd.

"Now, dammit, scatter!"

The boys scattered. Among those who dashed for safety was a quick-thinking GI who stuffed himself into the steel chamber of a steam roller on the Hickam Hospital lawn; another who dove headfirst into a metal garbage can so only his legs thrashed the air; two men who dove under a small truck and who found themselves a few seconds later, looking at nothing but broad daylight and a skyful of Japs—someone with a better idea had jumped aboard the truck and driven it off to safety; and the panting, out-of-breath corporal who said that he was not afraid, and that he was not running—but observed, grinning, that he "passed a heap of fellows who were."

One unidentified lieutenant hauled the heavy iron cover of a manhole off just outside the mess hall door. He wasted no time arguing, but tripped man after man as they ran out the door and pushed them into the manhole. A bomb struck and blew the lieutenant and the manhole cover into oblivion. But every man he helped into the hole was saved.

And gradually, there grew among the men—the unarmed, and unprepared men—the will to fight back, to kill, if they could, the men killing them; to stop, if they could, the holocaust of airplanes, ammunition, gasoline, oil.

Few weapons were at hand. What guns there were were locked in racks at unit headquarters. The men who reached the racks first had no keys so they broke the locks with axes or tore down casings with their bare hands.

Most of them had never been taught how to assemble the guns, how to mount them, how to shoot them in the peacetime Army. And yet, through some sort of miracle, they learned.

They stood their ground, these men. They did the best they could with what little they had. Their best was a pitiful little but their deeds form a great and moving story—the bloody chronicle of the AAF in the battle of Pearl Harbor.

Corporal Charles H. Young wears a Silver Star as a sequel to that Sunday morning. He was in the barracks when the attack began.

"I don't know how I got out of the barracks, or how I got to the Base Armament School," he said. "There was a machine gun there; it was in three pieces."

Private Edward Finn, a buddy of Young's, helped him lug the gun out to the baseball diamond. Somehow, they got it together.

"A fellow who came along showed us how to start the ammunition belt in it. When I pulled the trigger it started going."

More accurately, the gun "started going" at Japanese planes which roared back and forth over the ball diamond on shuttle runs between Hickam and Pearl Harbor. One of the Japs, who was making a low-level run at the big barracks, was caught in a spray of bullets from the chattering gun and dropped his bomb harmlessly in centerfield of the ball park.

Sergeant Stanley A. McLeod of the 19th Transport Squadron—a Regular Army soldier with two years in on his second hitch—was one of several men who took guns and ran across the open parade ground to the center, where other men were stacking ammunition.

McLeod and the men with him were still loading their guns when several Japanese planes dove in from various directions.

The other men ran for the nearest palm tree. They saw

AFTER ANOTHER DAMNED ISLAND

. . AFTER ANOTHER DAMNED ISLAND . .

McLeod crouching on the parade ground, firing his submachine gun at a plane 150 feet over his head.

The other planes dove on McLeod and the men hiding behind the palm trees broke and ran for better shelter. While they were still running, they heard a terrific blast and, looking back, saw a great crater, and debris climbing into the sky about 25 feet from where, seconds before, McLeod had been firing. That was the end of McLeod.

Still another man from the 19th Transport Squadron died that day with a machine gun in his hands, Staff Sergeant Doyle Kimmey, a flight engineer from Texas. Kimmey got a submachine gun from the squadron supply room. Taking cover under a small truck, he began firing at the low-flying planes which were bombing and strafing the area.

Private Gustave R. Feldman, armed only with a .45 automatic pistol, crouched under the truck with Kimmey. Three Jap planes dived on the parade grounds in front of them.

"That .45 of yours is no good here," Kimmey told the private when the first wave had passed over. "No sense risking your neck."

The private, following the noncom's instructions, ran across the street and burrowed under the Post Exchange building. In the midst of the attack he saw Kimmey's gun cease fire, out of ammunition. As he watched, Kimmey emerged from under the truck, ran out into the open and picked up an abandoned submachine gun and several clips of ammunition. He reached the truck safely, ducked under it, reloaded, and resumed firing.

The Thompson continued its stuttering fire until a direct hit blew the truck into a thousand pieces—the tough sergeant with it.

Not all the names of the men who died heroes that morning were preserved out of the chaos. Not all these names could be listed anyhow, in a chronicle of this sort.

The names of the men, for instance, in Second Lieutenant Ansel B. Vaughn's battery of machine guns, spotted there in the open sun of the parade grounds. The names of eight men in two crews cut down by the Japanese guns; the names of the men—the untrained and unprepared men—who ran forward and took their places.

Lieutenant Vaughn was assigned to command the five little machine guns on tripods set up on the parade grounds.

The boy who was trying to fire one of the guns was unfamiliar with it and was having his troubles.

"Here, let me show you," said Vaughn, and got into the harness. He had just stepped away from the gun again, and the gunner had settled into the harness, when a diving plane swung a spray of bullets, cutting down every man in the gun's crew and that of the gun next to it.

Only the Lieutenant survived.

Not all of the attackers got back to the ships which had launched them.

During one attack, a Jap dove on the gun manned by Staff Sergeant Charles R. (Chuck) Middaugh, heavyweight boxing champion and a football star of the 7th Corps Area.

The sergeant stood fast and followed through with the .30 caliber machine gun. He grunted with satisfaction as he saw smoke trail from the plane.

The wounded Jap banked over Pearl Harbor and wobbled off crazily toward the ocean, apparently out of control.

Middaugh was wounded a little later, but stuck to his gun through the attack.

Improvised machine-gun mounts were common that day. One enlisted man dragged a typewriter desk out of a hangar, opened it and placed a .30 caliber machine gun where the typewriter belonged. The drawers he filled with belts of ammunition.

Most of the men at the guns were green, their fire erratic. But the curtain of bullets thrown up by that impromptu battery of guns, spotted in the open on the parade grounds, on the ball diamond, on the lawn in front of the barracks, in the places where the bombs and bullets were thickest, caused more than one Jap to waver from his course.

No men on Oahu displayed more courage that Sunday than the soldiers who, after the first attack, ran to the hangar line to halt, if they could, the spreading destruction. Forty per cent of the men in Hickam's fire house had been killed during the first attack; most of the fire-fighting equipment was smashed beyond use.

So the clerks and crew chiefs, the desk officers and pilots—and even the men set free from the guardhouse after the first bomb struck—worked in as deadly peril as was to be found anywhere on the island that morning.

While the airplane tanks exploded in the flame and heat of the hangar infernos, they lugged out cases of ammunition from stacks that were already burning. While explosions that would have blown their soot-blackened bodies into eternity were only seconds away, they pushed and pulled bombers and fighters to safety. They unloaded dynamite and fully-fused cannon shells while bombs exploded around them, while rifle and machine ammunition banged away like deadly firecrackers in burning boxes.

Lieutenant Forsythe—the argument about whether Japan would or would not attack without warning completely forgotten now—joined a group of men inside a burning hangar. An old B-12, useless as an aircraft, had been bombed and set afire. They tried to get the old plane outside the hangar so the flames would not spread to a B-17 and a B-18 parked next to it.

"The big hangar doors had been sprung by the concussion. We tried tractors, trucks, and our bare hands," Forsythe said, "but we couldn't open them. While we were heaving away, somebody yelled:

"'Here they come again!'

"This time it was high-level bombers," Forsythe said. "We

"Hickam's B-17s were parked wing-tip to wing-tip. Drop a bomb on them, sweep them with machine-gun fire and they would all collapse.

. . AFTER ANOTHER DAMNED ISLAND . .

stood outside the hangar door watching them with our jaws hanging, until we saw the bombs leaving them.

"Then, in a flash, there just wasn't anybody standing there at all."

Forsythe darted back into the hangar and ran for the supply room, which was in a lean-to at the side of the main hangar. Before he arrived, there was a tremendous explosion. A bomb had come directly through the hole in the roof made by the first one. The concussion snuffed out the fire of the B-12 in a flash. Forsythe was blown 20 feet back against the sprung hangar door.

He got to his feet and started for the supply room again. He made it just as a dive bomber blew in the outside wall of the lean-to. Forsythe had managed to squirm under two steel desks and remained there until the attackers had passed.

Most of the officers and men in the hangar had been killed. One lieutenant had his leg completely blown off. A water main in front of the demolished fire house had been ripped open by a bomb and water was rushing out in a torrent. The wounded lieutenant was lying half in and half out of the water and his leg was floating away as Forsythe got to him.

"I grabbed the leg and hauled it ashore, then tightend my belt as a tourniquet around the man's stump and sent the man and his leg to the hospital together in a truck," Forsythe said.

"I don't know why I grabbed the leg. I guess I had some sort of confused idea they could do something with it at the hospital!"

Wounded men were all around.

The Consolidated barracks across the street had been hit again and men were staggering out upon the lawn. The whole expanse, an acre or so, looked like one mass of writhing, struggling humanity. Some men were half in and half out of the water and others, less badly hurt, were dragging them out.

Mingled with the outcries of the wounded was the insistent wail of an automobile horn which had apparently been jammed down by concussion. Someone ran out during the lull and smashed the blaring horn with a rock. Many men said it was the most nerve-wracking sound heard during the whole attack.

One of those wounded by the bombers which had driven Lieutenant Forsythe under the steel desks was Corporal Herbert J. Roseman, who—according to the custom of peacetime soldiers—had spent the night of December 6th standing at the bar of the Royal Hawaiian Hotel dressed in a maroon tuxedo.

Roseman survived the first attack on the barracks and ran to the hangar line, where he joined a group trying to pull a medium bomber out of a burning hangar. A bomb exploded on the roof and Roseman was pinned under the falling wreckage. Six men who had been pushing the bomber with him were killed instantly.

The wing of the plane crushed Roseman's chest, snapping two ribs. A footlocker, which he fell next to and which stopped the fall of twisted steel girders, gave Roseman a few inches of clearance. Thirty minutes later, a rescue party got to him and laid him out outside the hangar to wait for an ambulance.

Helpless to move, he saw a Jap plane flash overhead and heard a bomb explode. A piece of shrapnel laid open two inches of his scalp. Another Jap strafer put a .31 caliber bullet in his arm.

Roseman was lifted into the ambulance—a command car with the rear seats torn out—and another soldier was laid beside him. As they rounded the parade ground, Roseman caught a glimpse of a soldier running toward a gun standing on a tripod. Strafers cut the man down in his tracks. Roseman turned to say something to the man beside him. As the other soldier replied, his face was riddled with bullets. The same burst gave Roseman his fourth wound, this time in the leg.

At the peak of the attack, the loudspeaker in the Hickam Control Tower suddenly crackled into life and above the sound of Japanese engines and Japanese bombs and bullets, the men in the tower heard an American voice calmly ask for landing instructions.

A flight of B-17s were coming in from the Mainland!

There were 14 Fortresses in the formation, now arriving singly and at ten-minute intervals, over Oahu. They were in command of Major Truman H. Landon—later a general—one of the best bomber pilots in the world.

Forty miles from the coast of Oahu, Landon had brought his bomber down through the overcast—right in the middle of a flight of nine divebombers, headed north. Landon, who at first thought the bombers friendly, was surprised to see them making runs at him.

"Hell, they're Japs!" shouted Cadet-bombardier Erwin P. Cihack.

The B-17 was doing around 230 miles an hour. The Japs were doing around 170 in old-style, fixed undercarriage planes. Landon pulled the control column back into his lap and climbed easily out of range.

The bombers were unarmed.

At a last minute conference between Major Landon and General Arnold, it had been decided that the guns would be mounted and ammunition would be checked out in Hawaii for the flight to the Philippines. Between California and Hickam, the longest leg of the flight, gasoline was more important than guns and ammunition. As it was, many of the bombers were scraping the bottom of their tanks when they arrived over Oahu. A minor miscalculation in navigation had carried them 100 miles off course, which accounts for Landon's approach from the north instead of east.

The first B-17 to arrive over Hickam came in on a downwind approach. Captain Gordon Blake, base operations of-

"Unopposed, the Japs cruised down Hickam's double line of steel and concrete hangars, lobbing their bombs through the broad roofs."

"The 75 shiny, new P-40s had been parked so close together that a man climbing onto the plane at the head of the line could have walked to the last plane without once dropping to the runway."

ficer, had taken charge of traffic control. Because he had a poor radio voice, he relayed orders through a towerman. Blake saw the bomber coming in with the wind at its back and told the pilot, Lieutenant Bruce Allen, to make another turn and come in upwind.

Allen, with too little gas to make the turn, managed to make the landing anyhow, but burned out the brakes and tires trying to bring the bomber to a stop.

At the same time, another plane, making the conventional upwind approach, came in. The plane's wheels had almost touched the ground when Blake shouted:

"Tell him to goose his engines up and get the hell out of here. There's a Jap on his tail."

The man at the mike shouted a warning, but it was too late.

Colonel Farthing, directing the dispersal of salvageable aircraft on the runway, witnessed the tragedy.

Farthing saw the bomber settle on the runway. Over the heavy burbling of its four engines, he heard the high-pitched hum of a diving fighter. The Jap was hurtling down on the Fortress in an almost vertical dive. Farthing saw red darts spurting from the guns in the Jap's wings, and heard the heavy, hollow sound of the cannon in the Jap's nose.

The Fortress collapsed on the runway and broke in two. Flames roared up from broken gas tanks and Farthing saw men running from the plane. Most of them ran to the left, but two men, one of whom was Flight Surgeon William R. Shick, ran to the right. Shick was hit and later died.

In his eagerness to destroy the bomber, the Jap flew into trouble. Farthing saw him shoot toward the ground and prayed he would crash. The Jap hit the ground, bent his prop, and smashed in his fuselage, but somehow managed to regain the air and flew away.

The Jap plane was so close to Colonel Farthing, and the scene so vivid, that he read and remembered the last three digits of the number on the plane—197. A Jap plane with a number ending in 197 was later found on the slopes of Koolau ridge.

The pilot of another of the incoming B-17s was Captain Frank P. Bostrom, who later flew General MacArthur out of the Philippines. Passing Diamond Head, Oahu's famous landfall, he broke radio silence and called Hickam.

"Land west to east," came the level-voiced instructions from the tower, with no hint of what was happening.

Bostrom flew on serenely into pattern. It wasn't until he was close enough to see the columns of smoke that he realized something was wrong. Then the antiaircraft batteries around Pearl Harbor cut loose and shrapnel began to burst around the plane. The gunners had never before seen a Fying Fortress and they were taking no chances.

Bostrom banked sharply upward and ducked into a projecting cloudbank to think it over. He milled around in the cloud for about fifteen minutes and then, with gas running dangerously low, called Hickam again. He was told to stay away.

Six Jap fighters jumped Bostrom's big bomber as he turned to circle the island again. The fuselage was pierced in many places and two engines were shot out. But the Fortress stayed in the air and Bostrom called the tower to say he would try a landing on a fairway at Kuhuka golf course. Captain Blake, remembering the course as nothing more than a not-yet-reformed cow pasture, advised the pilot against it. But Bostrom put his wheels down and got away with it.

Another B-17, failing to get in at Hickam, landed at Bellows Field on the eastern side of the island. The pilot, Lieutenant Robert Richards, saved the lives of everyone aboard—including two men wounded by gunfire over Hickam—by landing downwind on a 2600-foot fighter strip.

Still another plane landed at Wheeler Field, northwest of Hickam and almost in the center of the island. The bomber raced into the landing with six Japs on its tail, all spewing bullets as fast as their guns could fire. Miraculously, bomber and crew made it intact.

Meanwhile, the rest of the B-17s were landing at Hickam. As Captain Blake brought them in, he directed them to disperse on the other side of the field, shoving their noses into the brush as far as possible.

One pilot, Lieutenant Karl T. Barthlemess, after fighting his bomber to a halt in the bushes on the far side of the field, still did not know that he had flown into a war.

"Hot ziggity, these maneuvers are realistic," he said as he came across the hangar line. "Who's got a cigarette?" He was lighting the cigarette when a piece of shrapnel whistled past his ear and embedded itself in the concrete wall of a hangar.

Sometime during the first hour of the attack, Sergeant Max Butterfield suddenly remembered an argument he had had on his way to breakfast that morning with Staff Sergeant Charles M. Judd, his pal.

Charlie Judd believed the Japs had a lousy air force, and he had a magazine article to prove it. If the Jap air force was no good—like the magazine article said—how in the hell could they ever attack us, Charlie wanted to know.

After the first attack, Butterfield ran back into the barracks, wondering what Charlie Judd thought about the Jap air force now.

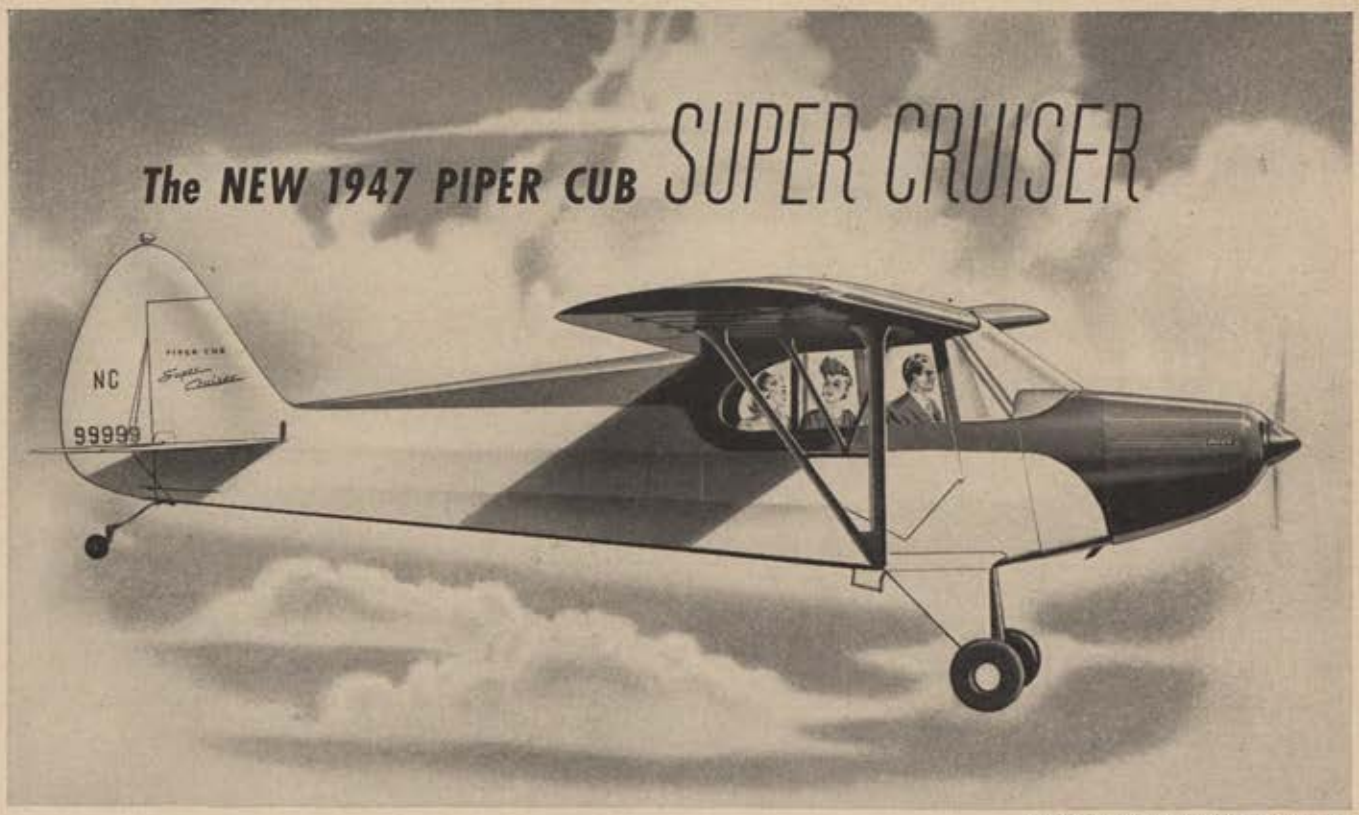
Charlie was stretched out on his back, the same way he had been when he stopped Max on his way to breakfast. Only, Charlie was dead. There was a Jap bullet in his head.

Still clutched in the dead man's hand was the September, 1941 issue of an aviation magazine, opened to an article called "Japanese Air Power."

Charlie Judd, a few minutes before seven o'clock on Sunday morning, December 7th, had been reading it aloud to Max:

"Isolated from her Axis fellow aggressors . . . her air force of low offensive strength . . . Japan, if engaged in a great air war, would crumble like a house of cards."

. . AFTER ANOTHER DAMNED ISLAND . .



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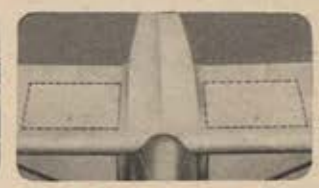

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LOOK TO THE LEADER FOR GOOD SAFE PLANES YOU CAN AFFORD TO BUY AND FLY

PIPER

Playground AIRLINE

BY MERWIN EBERLE

A NEW kind of sky writing is being blazoned over the west. In letters stretching from Canada to Mexico and from Minneapolis to Los Angeles, Western Air luxury liners are spelling out the words "Skyway to the Nation's Playgrounds."

That the public is paying attention is attested by the fact that Western Air Lines and its subsidiary, Inland Air Lines, flew more than seven million revenue miles over the west's most beautiful scenery in 1945.

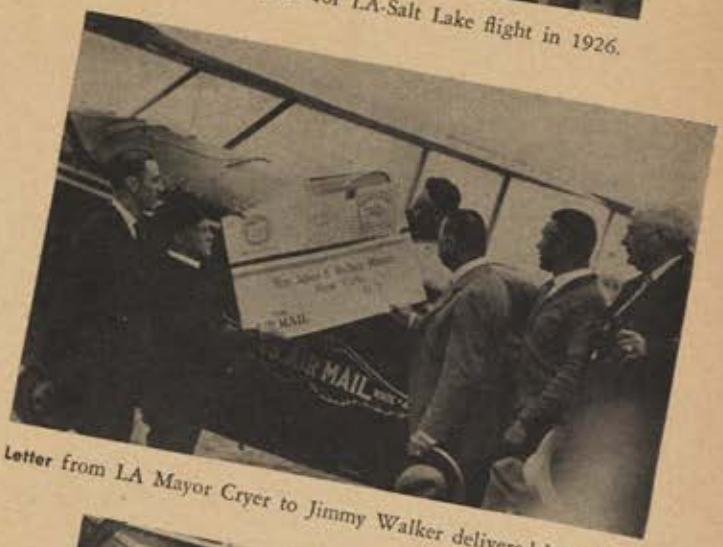
After two decades of pioneering the airways between the Rocky Mountains and the Pacific, Western now finds itself in a position to serve the influx of vacationists who are swarming out to the great open spaces.

Almost all the major national parks and playgrounds west of the Rockies lie along the routes that Western Air has flown and popularized since 1926. Summer and winter, with skis or fishing tackle, camera and slacks, the aerial vacationist can climb aboard the sky lounges for two days to two weeks of fun on a broad geographical scale never before possible. Snow-weary residents of Montana or South Dakota can spend the Christmas holidays on the beaches of southern California. Play-conscious southern Californians, can week-end in Denver or they can go to Las Vegas for an evening and return the same night. The extent of territory that can be covered in a day or a week startles the imagination of those who are used to herding their family jalopy over the desert at 50 miles per hour.

It is possible in two weeks, by using Western Air and national park sight-seeing facilities, to make a grand loop from Denver through the Colorado Rockies, Glacier National Park, Waterton Lakes, Banff, Lake Louise, and return to Denver, getting both bird's-eye and car-level views of the famous beauty spots.

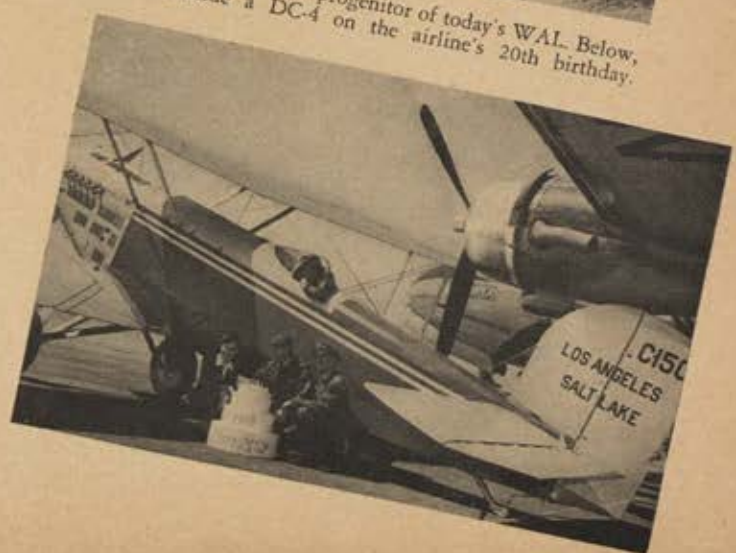
Western Air Lines learned before the war that when Mr. & Mrs. Traveling America go vacationing they like to dispense with bothersome details. They want their holidays delivered to them neatly wrapped up so all they have to do is enjoy them. It was this fact that prompted Western to introduce the "package" air tour which was merchandised through

A. B. Nault and C. Kerr prepare for LA-Salt Lake flight in 1926.



Letter from LA Mayor Cryer to Jimmy Walker delivered by WAL.

Western Air Express (above) was progenitor of today's WAL. Below, a Douglas M-2 beside a DC-4 on the airline's 20th birthday.



L. D. Pat Carlson, veteran pilot-executive of Western Air receives Medal of Freedom for Alaskan service from Brig. Gen. T. M. Lowe.

travel agencies. Before the war interrupted, Western had set up thirty-eight different tours, all of which were highly successful. They are being re-established now that the war is over, on a grand scale. The number of such all-expense and, in some cases, personally conducted tours will be limited only by the amount of equipment available, not by places to go.

To meet the growing demands of an air-minded public and an "aerogenic" west, Western and its subsidiary have contracted for approximately $25,000,000 worth of postwar equipment. This includes thirteen Douglas DC-4 Skymasters, seating 43; ten of the larger, faster, and pressurized DC-6s, capable of carrying 54 passengers; and twenty Convair 240s, a new type designed by Consolidated Vultee especially to meet western flying conditions. One feature of the 240 will be greatly increased visibility for passengers who fly the scenic routes. These planes will carry 40 passengers at a cruising speed of five miles per minute.

The airline's postwar program also includes a new $1,500,000 hangar and maintenance facility building now under construction at Los Angeles Municipal Airport. This will be Western's home port, and the huge structure—one city block wide and two blocks long, filled with model repair shops, and manned by 600 workers—will stand in sharp contrast to the first little grain-field airport used by Western Air during its infant days.

Western Air Lines, the first commercial air transport organization in America to reach the 20-year mark, takes its years lightly. With its wings thoroughly tested, it is reaching out for new air trails equal to the distance around the world.

It has asked the Civil Aeronautics Board for permission to extend its scenic routes south through lower California to Mexico City and South America; north from the present terminal at Lethbridge, Canada to Nome, Alaska; west to Hawaii; and east to Chicago. It also is seeking permission to fill in many gaps in its present 4,016 miles of routes that blanket western America.

If these applications are granted, there will be an uninterrupted aerial highway between the Land of the Eskimo and the Land of Mañana.

The history of Western Air is a saga of commercial aviation in this country. A recently published book, "The Flying Years" by Jack and Peggy Hereford, tells the almost fiction-like story of how a great aerial empire was built up in the west only to topple, and then, from the fragments, stage an amazing comeback.

Flushed with the success of its Los Angeles-Salt Lake City run in the middle twenties, the young Western Air Express, as it was then called, looked around for more routes to fly and more frontiers to conquer.

Richard A. Dick (left) Western's General Traffic Manager is also an AFA member. William A. Coulter is the airline's genial president.

Fred Kelly (left) has long been Western Air's Chief pilot. Charles N. "Jimmy" James is the company's Vice President of operations.

Under direction of Harris M. "Pop" Hanshue, first president of the line, Western entered the race for supremacy in the air by outright purchase of Pacific Marine Airways in 1928. Later Hanshue maneuvered through interlocking directorships for control of the West Coast Air Transport Company. Western Air Express and Hanshue next helped organize and start the Mid-Continent Air Express for purposes of obtaining new routes. Soon the Aero Corporation of California and its subsidiary, Standard Air Lines, came under Western's control. Pop Hanshue's supreme bid for empire came when he and his associates bought, as a source for equipment, the great Fokker Aircraft Corporation of America, later to become North American Aviation, Inc. In 1930, Western Air Express and its affiliates practically owned the sky over western America.

Then came hard times. The Federal Watres Bill of 1930 gave the Post Office dictatorial powers over air mail rates, route extensions, and consolidations. Hanshue lost out in the rough-and-tumble game of politics.

Many air-mail contracts were cancelled or lost to lower bidders. Subsidiaries were swallowed up by huge aviation holding companies. Badly weakened, WAE was forced to merge with TAT, an air transport company backed by railroad interests. The merger organization was known as Transcontinental & Western Air, Inc.

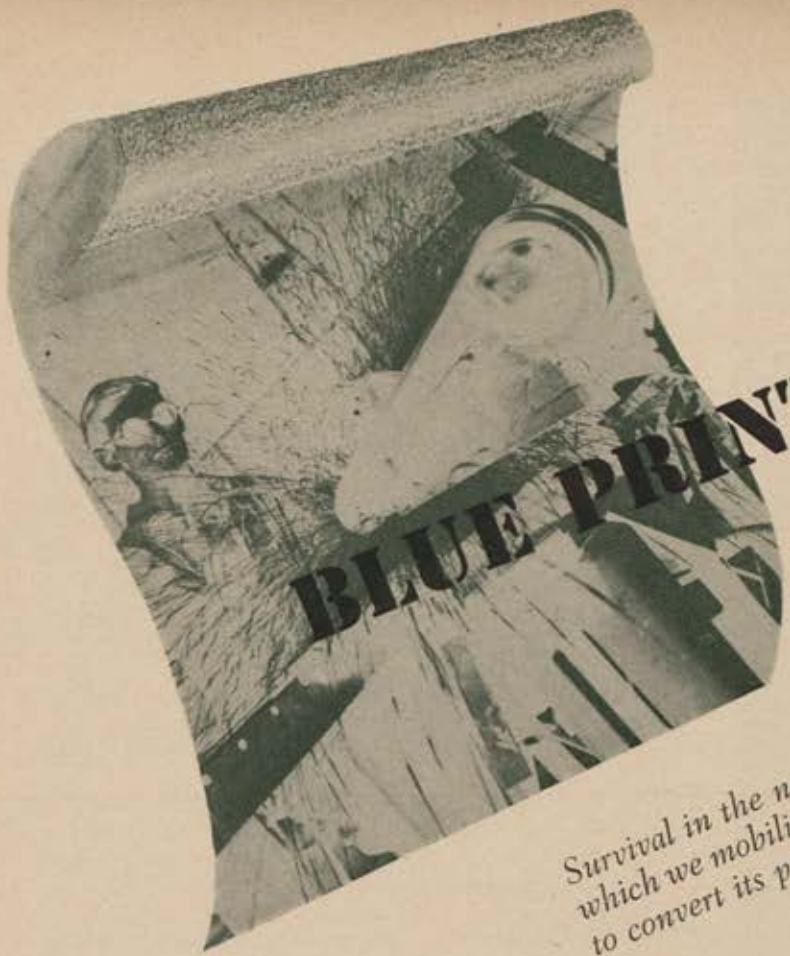
Four years later, the Black-McKellar Bill ordered dissolution of interlocking directorates and ownership, and Western Air Express—with a handful of its original employees—found itself again on its own, flying the San Diego-Los Angeles-Salt Lake City run.

It was back where it had started eight years before, but it was still a going concern. It had the most important asset for a fresh start—eight years of invaluable experience.

Then came a gradual comeback. Hanshue retired from the company in 1934 and died soon afterward. New men took over. Profiting from the lessons of the boom decade past, they embarked once more upon a program of community service, the rock upon which the organization was originally founded. The company's name was changed from Western Air Express to Western Air Lines, to dispel any impression that only express was carried.

In 1937 the National Parks Airways was purchased and, subsequently, other routes were added, all with the basic idea of catering to the regional needs of the businessman, farmer, rancher, miner, and vacationist, as well as establishing Western Air as a main north-south trunk line in the west.

Newest of Western's routes is the Great Circle Cut-off between Los Angeles and Denver, which slashes two hours of transcontinental flying time from southern California.



BLUE PRINT FOR PEACE

Survival in the next war may depend upon the speed with which we mobilize our resources. Industry must be prepared to convert its production to wartime purposes immediately

BY CHARLES VILLENCY, *Hqs AAF*

EIGHT months after the Nazis invaded Poland, Americans read in their newspapers that the United States was undertaking a procurement program that would produce 50,000 planes. We had a nice, comfortable feeling reading that big figure and assumed that in finger-snapping time, thousands of military aircraft would be standing by to defend our shores in case war enveloped us.

But what actually happened made that comfortable feeling evaporate into the uneasy conclusion that there was a wide gap between intention and performance. The frightening rub lay in the fact that while the goal of 50,000 planes was an ambitious one, the aircraft industry was only geared to a target of some 5,500 planes. Circumstances were such that the infant aircraft industry was ill equipped to cope with the magnitude of the job that lay ahead.

When war did come, and as it progressed, the aircraft industry gave a heroic account of itself in the face of many obstacles. The result is well known. American air power played a major rôle in the defeat of the Axis and brought into sharp focus the fact that air supremacy was a deciding factor in our victory. By the same token, the AAF realizes today that air power can be a potent influence towards the achievement of a stable peace.

The problems of yesterday were overcome with tremendous work and sacrifice among soldiers and civilians. But we are now in the age of the atom bomb, the guided missile and supersonic speeds. The Air Forces must be geared to meet that new challenge.

Some of the bitter lessons learned from the 1940 situation —one that nearly became a "too-little-and-too-late" situation —are warnings to heed for the future.

Mindful of the need to avoid being "caught short" in event of a new emergency, an Air Coördinating Committee was established and in October 1945 submitted a report to the Senate Military Affairs Committee on Industrial Preparedness Planning. On the committee were the Assistant Secretary of War for Air, the Assistant Secretary of the Navy for Air, the Assistant Secretary of State, the Assistant Secretary of Commerce and the chairman of the Civil Aeronautics Board.

The phase of the committee's plans dealing with industrial mobilization relating to the aircraft industry became official Army Air Forces policy, subject to revision from time to time in view of the rapid changes in development of such weapons as the atomic bomb and guided missiles and the strategy of air warfare.

The Air Coördinating Committee's report developed four major points, which may be called the "Keys to Industrial Planning." They call for:

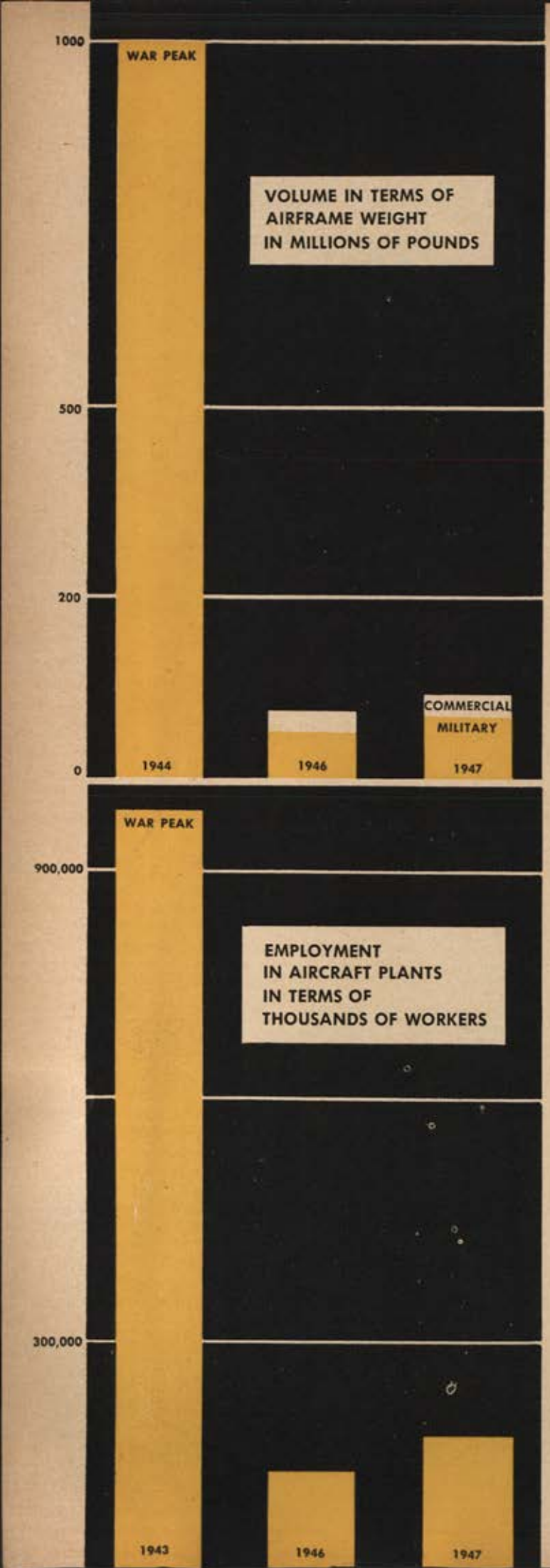
1. Research and development carried through limited production.
2. A healthy nucleus in the peacetime aircraft industry.
3. Industrial preparedness planning by the services and industry.
4. Industrial reserve of plants, equipment and materials.

Going back to that fateful 1940 we find the AAF was engaged in a program of "emergency expansion" designed to raise its strength over a period of years to the total of 5,500 planes! That figure eventually was to be one-half of a single month's production of military and naval aircraft.

When the 50,000-plane procurement program was announced, only 13 modest-sized airframe companies and three aeronautical engine and propeller firms provided the major nucleus for the intended expansion to meet the Axis threat. In the middle of 1940 only 85,000 persons were employed in the airframe industry and 29,000 in the engine and propeller industry. A peak of 950,000 aircraft workers was reached by the end of 1943.

Although 1940 production was multiplied many times within the next four years, it was a herculean task against time. Within that four years, aircraft expenditures had expanded to over 16 billion dollars. Total aircraft production in World War II amounted to 43 billion dollars.

But that race against time could have been avoided if an industrial preparedness program like the one now being



activated had been in existence. The new plan calls for a production expansion in two years which took three and a half years to accomplish in World War II.

This expansion, which would be "on tap" when the need arises, would follow the thesis that the present conception of an Air Force's need is not radically altered by the atomic bomb, guided missiles and other developments. This conception, the Air Coördinating Committee states, includes all the developments which are taking place in new methods of propulsion, in the use of electronic devices and the attainment of supersonic speeds. These new factors would be taken into account in all Air Industrial Planning.

Maintenance of a healthy nucleus in the peacetime aircraft industry, one of the major points stressed in industrial planning, is a condition that the AAF stresses should be implemented by action as soon as possible.

In this connection, President Truman has declared that "it is vital to the welfare of the people that this nation maintain developmental work and a *nucleus of an aircraft industry capable of rapid expansion* to keep the peace and meet an emergency."

How would the peacetime aircraft industry meet mobilization requirements? AAF plans call for greater emphasis on rapid acceleration of production in the early stages of mobilization. To achieve this, careful consideration would be given to maintaining the latest models of air weapons and related equipment in a state of readiness for volume production.

It's important, the AAF explains, to have a plane in production and to make ready for mass production. Without a plane in production, many additional years would be required to reach volume output. For instance, design work for the B-29 began in January 1940. It wasn't until September 1942 that its prototype was first flown, and volume production was not reached until May 1944. That's a total of four and a half years from time of design of the B-29 to big production. Similarly, it was five years and three months for the P-38 and seven years for the C-46 Commando plane. Even under favorable conditions, this is true. The P-47 was a development of an earlier Republic fighter and yet it required almost four years to reach volume production.

To avoid that long design-production stage, the Air Forces recommends that at least one model in each critical type be in production at all times: very heavy bomber, attack bomber, fighter, troop carrier transport and pilotless aircraft.

Since making ready for mass production is a time-consuming process, dependent on such factors as detailed breakdown of aircraft plans, plant layout, determination of parts to be sub-contracted, tooling design, processing and fabrication, labor, training and control systems—advance preparation would slice the time between the "go ahead" signal to volume production. In terms of airframe output on an industry-wide basis, the rate of production expansion through advance preparation shows that within one year, 20 million pounds of airframes per month would be produced as compared to slightly over 5 million pounds produced without advance preparation. On a cumulative basis, the first year's output would be 120 million pounds per month, compared to 60 million pounds without preparation.

However, even with advance preparation, the Air Coordinating Committee report claims, the peacetime aircraft industry would fall short of requirements in the second year.

This is where the problem of plant space enters the mobilization picture. Plant space could be furnished in three ways—through conversion of non-aircraft plants, construction of new plants or retention of standby plants. Conversion would make only a very slight contribution to industrial mobilization and new construction would take too long, air industrial planners contend. They aver the answer lies in retention of standby plants for the following reasons: Title is vested in the War Department; they can be "recaptured" in 60 days; no major

structural alterations are necessary, and each plant would be assigned to a peacetime aircraft manufacturer for mobilization planning.

The factor of standby plants is dealt with in a report of the Surplus Property Administration, dated January 14, 1946, in connection with aircraft plants and facilities. It states, in part:

"The Army and Navy have proposed the retention of 10 large airframe plants and four large engine plants as a peacetime standby reserve. These plants will not be sold but will be made available on a lease basis to aircraft and other operators."

Mentioning the Air Coördinating Committee's report dealing with standby plants, the Surplus Property Administration report states that "about 40 million square feet is involved . . . over one-fourth of the airframe and engine space built by the Government during the war."

Standby plants would greatly reduce diversion of vitally needed labor, material and effort that would otherwise go into new construction, the Air Coördinating Committee believes. World War II plant construction diverted two million workers and vast quantities of material and management effort at a critical period.

A reserve of standby plants would be effective because it would:

1. Provide additional plant area when needed and save 6 to 12 months over the time required to construct new plants or convert civilian industry.
2. Provide virtually all additional plant area under current plans.
3. Avoid a large drain on construction resources at a critical period in mobilization.
4. Provide a flexible program that can rapidly be adapted to changing weapons and strategies.
5. Enhance the security of the aircraft industry by providing readily available dispersed plants, strategically located.
6. Cost a maximum of only three million dollars a year, but less if the plants are leased.

Sale of what would serve as standby plants would, in the opinion of Air Industrial Planning proponents, react disastrously to reconversion of such plants if an emergency arose. Should they be sold, it is pointed out, their reconversion to aircraft production would involve all the difficulties and delays associated with conversion of peacetime industry to war work. Standbys represent a "stock pile" of materials, labor, power, transportation and management effort.

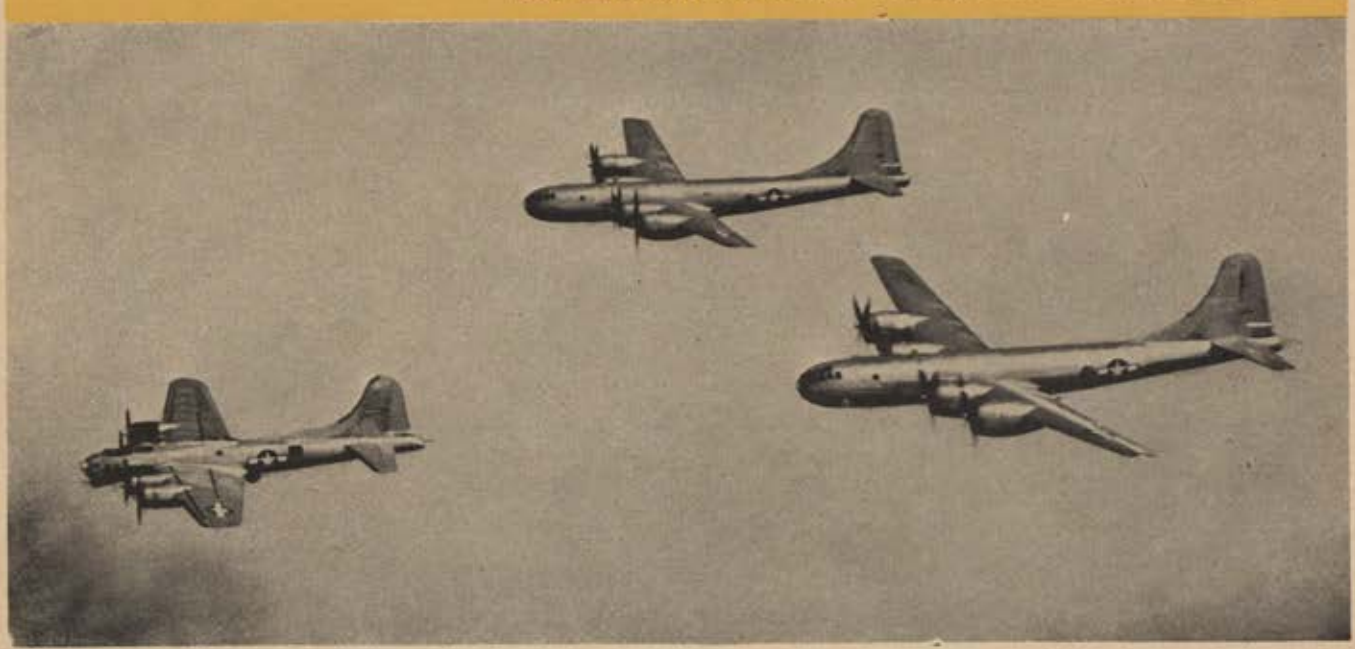
Equally important with standby reserve of aircraft plant space is mobilization of tools and equipment. Three methods of equipment mobilization are open—conversion, new procurement and standby reserve. The AAF plan eliminates the first two, on the grounds that conversion would provide some general purpose tools and equipment but almost no special purpose types, and that under a new procurement method, the AAF would have to requisition 300 million dollars worth of tools or three-fourths of the entire output of the machine tool industry, leaving only one-quarter for the combined needs of the Navy, Ordnance, Signal Corps, etc.

Since the AAF cannot rely on conversion or new procurement to meet its total requirements of production equipment, reserve of standby tools would provide 40,000 tools, or 200 million dollars worth, for the AAF. The requirements of the AAF would thus be reduced to 100 million dollars worth of tools, or one-fourth of the machine tool industry's production.

Air industrial mobilization would require a tremendous quantity of materials—requirements which could be met by going peacetime basic industries, a standby capacity in basic material industries, and stock-piling of strategic and critical materials.

In addition to plants, equipment and materials, large numbers of skilled and semi-skilled workers will be needed to meet the mobilization program if a new "M-Day" arrives. Highly skilled personnel such as aeronautical engineers, aircraft designers, etc., are not trained overnight. Means must be found to encourage training in these fields during peacetime. Manpower requirements to meet mobilization schedules must be carefully computed and the tight labor market areas determined in advance to allow a readjustment to schedules to conform with potential local labor supplies. The AAF advocates large-scale, government-financed training programs for mass workers in coöperation with Federal and state educational

Design of the Boeing Superfort was completed by 1940. But it was September, 1942 before the prototype ship was built. Volume production was reached in May 1944.



agencies prior to mobilization. Each major manufacturer included in AAF mobilization would have to develop a detailed training program for his labor force.

Since the foregoing outlines what the AAF needs for emergency mobilization, it is also vital to plan use of such production resources. In that connection, the AAF plan for mobilization of the aircraft industry must:

1. Be based on requirements that truly reflect current strategic plans.
2. Provide for procedures and control which will enable the rapid and effective implementation of the plan.
3. Integrate the engineering, procurement, supply, maintenance, intelligence and personnel functions of the Air Force, and,
4. Encompass detailed mobilization planning by industry.

After careful review of the Air Coordinating Committee's report, the Army Air Forces has established the following as the current AAF industrial planning policies and assumptions (from Headquarters Air Materiel Command, directive issued June 20, 1946):

1. The development of pilotless aircraft and the realization of supersonic speed make it imperative that this nation be prepared for sudden air attack at any time. Therefore, AAF planning will be based on the assumption of attack without warning.
2. Preferential treatment will not be requested by the AAF for aircraft manufacturers in the disposal of surplus war plants or equipment.
3. The geographical relocation of the present aircraft industry will not be part of the AAF program.
4. It is to the best interest of the national economy to have all industrial installations and equipment placed in civilian use during peacetime to facilitate reconversion and full employment. When present contracts are completed, all plants earmarked for standby will be declared surplus when an AAF requirement no longer exists, subject to certain conditions in order to insure that they will be readily available to the AAF in the event of a future emergency.
5. In AAF planning, greater emphasis will be placed on obtaining rapid acceleration of production in the early stages of mobilization. To this end, careful consideration will be given to maintaining the latest models of air weapons and related equipment in a state of readiness for volume production.
6. All possible measures for enhancing the security of the aircraft industry, including the use of underground plants, will be studied and evaluated in order to protect our industrial establishment from damaging blows that may result from sudden air attacks.

As commanding general of the AAF, General Carl A. Spaatz has stressed the need for industrial planning.

"To insure a maximum of production of weapons in a minimum of time," says General Spaatz, "production to meet any contingency must be planned in advance. This is especially true for military aircraft and related components, which cannot be stockpiled because they become obsolete quickly in an era of rapid technical advancement. The high operational mobility of the Air Force must be matched always by corresponding logistical mobility. Unless an organization attains logistical mobility, its attainment of operational mobility is nullified."

Responsibility for making a decision regarding standby plants rests with the Army and Navy Munitions Board, which received a directive from the President shortly after the surrender of Japan to begin work on an industrial mobilization plan. In a recent interview, reported in the New York *Herald-Tribune* on Sept. 29, 1946, the board's chairman was quoted as promising that an industrial mobilization plan will be completed "some time in 1947."

Although reconversion has been undertaken with its drastic setbacks, no level of production of military-type aircraft, or the productive capacity of air industries to be maintained in standby condition, has been decided on. The Senate special committee investigating the national defense program has revealed that no concrete action is being taken to keep the United States in front in future aviation research and production. Until "forthright and objective action" is taken, this committee reports, the future preparedness of the aircraft industry is out of the question.

Since the United States is now faced with the unescapable fact that concepts for world peace are still in the nebulous stage, the AAF believes that now is the time to put Air Industrial Planning into effective practice.

Latecomer in battle was the A-26. We needed it much earlier.

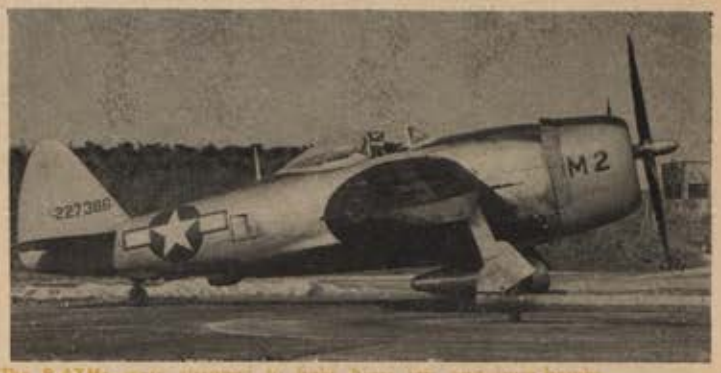
Great Planes of the War — Second in a Series

Republic P-47 Thunderbolt

P-35 was Thunderbolt's direct ancestor. It topped 320 mph.

Frank Seiler won the Bendix Trophy twice in the Republic RP-1.

P-43 lacked the climb and firepower needed for modern combat.



The P-47Ms were stripped to fight Nazi jets and buzz-bombs.

The only E built was an experiment with sealed pressure cabin.

In the D-25 series, the bubble canopy was added.

By 1940, the handwriting was on the wall. Air Materiel Command took stock and discovered that there was not a single fighter design in production in the U. S. that could be considered modern according to known military combat standards. The newly completed Republic P-43 Lancer was deficient in speed, in climb and in firepower. The proposed XP-44 was little better. Republic had, in mockup stage, a liquid-cooled interceptor in the Spitfire class, but there was no indication that Allison engines could have been provided for it. So the AAF wrote a set of performance demands which sounded like a formal demand for the impossible . . . "a fighter aircraft able to defensively succeed anticipated ceilings of hostile bombers, outgun them offensively, to escort and provide competent cover for American bombers flying in the substratosphere and outfight enemy interceptors."

By May, 1941, a craft known as the XP-47B was test flown at Farmingdale, L.I., powered by a 2800-cubic-inch Pratt and Whitney, boosted by a General Electric supercharger.

The 56th Fighter Group was the first to be equipped with Thunderbolts. It was composed of three squadrons: the 63rd at Farmingdale, the 62nd at Hartford and the 61st in Bridgeport. They flew the original B's.

The 56th and 78th groups were the first P-47 outfits to be shipped over from the states. Their original jobs were high-altitude escort, rodeos, participation in broad-scale operations and fighter sweeps. At first, the P-47's were operated without auxiliary tanks, and were able to penetrate only to the hook of Holland. Even there, the enemy in FW 190's and Me 109's went after fights with what were then "green" kids. It was in these brushes though that the qualities of "Gargantua," as a British cartoonist nicknamed the 47, be-gan to show up.

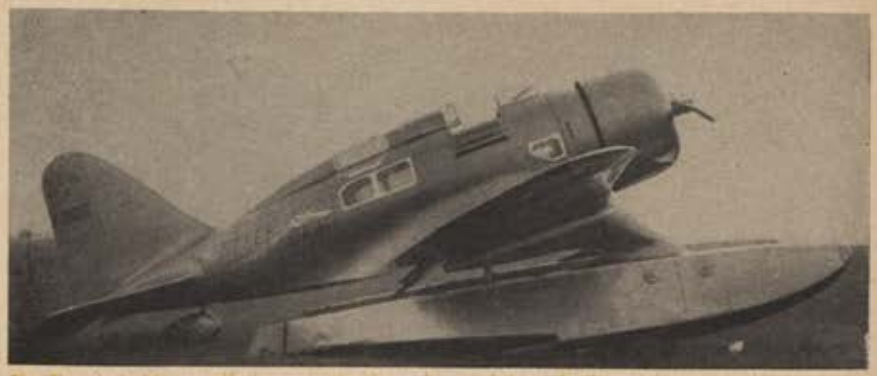
Veteran RAF pilots had advised the new men simply to stay away from the enemy. That was asking a little too much of the habitually incautious Yanks, and, in the first few encounters, it was in many cases only the incredible toughness of the P-47 that brought some of the kids home. Then some of the FW pilots got cocky about how well their air-cooled fighters could dive. That gave the Yanks ideas, and the funerals in the Luftwaffe soared. It seems that the P-47 could dive even faster.

P-47 Aces: Col. H. Zemke, 17.70 kills

Capt. J. L. Egan destroyed 7 Germans

Lt. Col. F. S. Gabreski topped with 31

Capt. R. S. "Bob" Johnson, most with 28



The Thunderbolt's grandfather was the Seversky amphibian, built as a fast executive transport.

Seversky's XP-41 was the first Thunderbolt forerunner to be used in any number by the air forces.

That began the slow retreat of the Luftwaffe. By pulling in their circle, the Luftwaffe hoped to get their fighters out of the way of the Yanks. The result was a series of changes that finally took Thunderbolts over Berlin.

The original idea was that 47's needed a fighter escort below 20,000 feet. This idea started to vanish when fighter pilots, coming back from missions, started to strafe in order to expend ammunition. They shouldn't have done that, because they eventually got the job wished on them. As the Luftwaffe pulled back, drop tanks were added to the early D's, first Thunderbolts to have water injection.

The first Thunderbolts that went into the Pacific were early D's. Col. Neil Kirby's 348th was the first to fly them against the Jap. While their original duty was escort out of Brisbane, they also did milk runs against Moresby, Lye, Salamoa and Finchhafen. In the field, the D's were rigged with adapters that could be used for wing tanks, 1000-lb. bombs, rockets or the like. The D's, particularly in this theater, tackled the enemy at any lovel he could be found.

Back in Europe, the British had developed the bubble canopy for the Hawker Typhoon. In combat, it was considered healthy to be able to see 360 degrees without fishtailing the plane. The razor-backed D's which were the pride of the 8th Air Force admittedly were about 20 degrees blind directly behind the pilot. To experiment with the British designed canopy, a single B was custom rebuilt, its razor back shaved off and the all-plastic canopy attached. The type was arbitrarily assigned the serial XB-47K. From the data gathered from this ship, the D-25 series was created. Many of the combat pilots did not like the bubble canopy job as well as the old razorback. It seems that the system of fairing the cockpit into the fuselage with the aerodynamic turtleback produced a fin effect that made the ship beautifully directionally stable. The early D-25's had some tendency to hunt on ground. To make up for this surface loss, a dorsal fin was added later.

In the Mediterranean, the first 47's appeared in Sicily. From the very beginning, their function was ground target rather than air-to-air combat. The Thunderbolt, for one thing, put more enemy tonnage on the bottom than any other weapon, over, on or under the water in "Mare Nostrum."

Republic P-47 Thunderbolt

Thunderbolt's successor was to be the 3000-hp 6-gun XP-72.

Fastest of the Thunderbolts was the fan-cooled XP-47J.

Weight-carrying N with its long wing, was the last of the 47s.

TP-47G, a two-place transitional trainer, similar to the C's.

XP-47H, test bed for Chrysler's 2500-hp experimental engine.

The J was powered by fan-cooled Wasp R-2800 with CH-5 supercharger.

Later in the D-series, two combat changes were made, both of them combat dictated. The great strength of the 47 was always its dive—eight guns spitting, it could come down on a surprised enemy from great heights. However, on pulling out, two things showed up. One was the fact that the sharp leading edge of the aileron would catch too much air and move to an extreme position, making recovery difficult. The contour of the aileron section was reworked and a "blunt-nosed" section was substituted. However the major change was the incorporation of the compressibility recovery flap. This was a hinged section a couple of feet long and a hand-span wide, hinged in front and installed in the middle of both wing panels. When the 47 got into full dive, the controls naturally stiffened, and pulling out took a lot of stick pressure. With this flap, the pilot merely had to flip a switch, and the compressibility flap was electrically activated, pulling the ship out.

The D-series constituted the bulk of the 47's. They did the damage in France, busting bridges and wrecking rail communications, sealing off the area in preparation for D-day. D's knocked heck out of the Brenner Pass, and slaughtered the trapped Nazis in the Po valley. D's plastered Hollandia, Wewak and New Britain. Catapulted from a carrier, 47's first neutralized a Jap landing field in the Marianas, strafing and bombing it, but leaving room to land. This incidentally was the first time in history an armed land base was ever taken without the use of ground support.

Out of Pacific and European experiences, several ideas were tried out, which never hit combat. For instance the XP-47E was a B airframe, equipped with a pressurized cabin. The XP-47-F was a B-fuselage with laminar flow wings. In this case, the improvement in performance didn't justify a change. The early G-series was built by the Curtiss-Wright Corporation. The latter numbers in the series were assigned to a two-place job, used as a transitional trainer, the TP-47G.

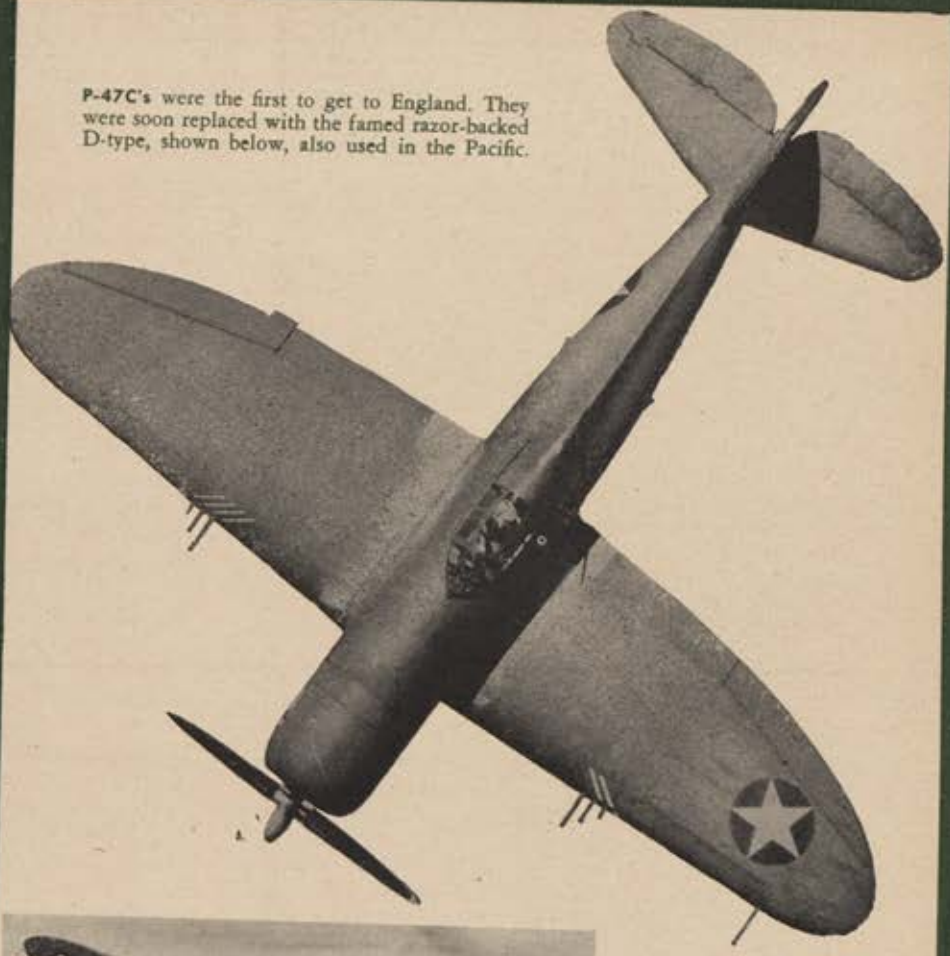
The H-series (two planes in all) was built to act as a test-bed for a 2500-hp liquid-cooled engine built by Chrysler. These were modified D-15's. The J was the first propeller-driven airplane to exceed 500 mph. Powered by a fan-cooled Wasp R-2800 with the CH-5 turbo supercharger, it hit 504

Ex-Gridder Col. R. Stecker flew a 47.

Maj. Walker Mahurin scored 19.74.

Lt. Col. G. W. Johnson had 17 kills.

P-47C's were the first to get to England. They were soon replaced with the famed razor-backed D-type, shown below, also used in the Pacific.



mph in August of 1944. This is still believed to be tops for anything but a jet plane.

When the jets started to worry us in England and France, the M-series was built. In this craft, the CH-5 supercharger was used, all external racks, etc. were stripped off. The craft could catch a V-1 bomb in a shallow dive. There was little opportunity to try it against a jet fighter.

The last important 47 was the N. This was designed for long-range operation, particularly in the Pacific. There were field modifications of the D-series, where the wings were clipped to increase the rate of roll. This feature was retained in the N; 22.7 square feet of wing surface were added, along with internal wing tanks. This is the ship onto which a large drop tank, two rockets and two 1000-lb. bombs could be hung without impairing performance seriously. In its initial distance test, a fully combat loaded N was flown from Farmingdale, L. I. to Eglin Field in Florida. Here it did ten minutes of war-emergency boost fighting maneuvers and then headed back for New York. While the craft made an intermediate stop because of mechanical difficulties, it had adequate fuel left for the return trip. In action, the N made tactical flights over Japan from Saipan.

When the 47's capitulation is made, several things show up. First is that the big craft did bring the boys home. All ten of the top Thunderbolt aces survived the war. Many of the pilots who finished combat in other craft owe at least half of their victories to the big fighter. P-47's have an overseas record of 1,934,000 hours of combat flying. Two-thirds of all Thunderbolts built got overseas. While 54% of the aircraft sent were written off due to enemy action, only 0.7% failed to come back from combat missions against the enemy.

In the ETO, from D-day to V-E day, P-47's were the major vector in an air-to-ground campaign which accounted for 9,000 locomotives, 86,000 railroad cars, 68,000 motor vehicles, 6,000 armored vehicles and 60,000 horse-drawn vehicles destroyed or damaged.

While the Pacific capitulation has not been made public, the ETO figure is 7,067 confirmed victories against enemy planes for the Thunderbolts.

NEWS

AFA Headquarters Report

The Air Force Association's plans to participate in the National Aircraft Show at Cleveland, November 15th through 24th, are now taking shape. AFA will have a large booth within the Army Air Forces' pavilion at the Show, and will use this space to reproduce a Combat Ready Room, complete with target maps, charts, and all the trappings which AAF men so well remember.

November 23rd is to be set aside as Air Force Association Day at the Show. On this date, President "Jimmy" Doolittle will be guest of honor at our booth and will present a Samurai sword to Captain George Barr, last to be rescued of the original Tokyo raid survivors. Other surprise events are being programmed for various dates throughout the Show.

The Cleveland District of the Ohio State Wing, under the able chairmanship of Arman L. Merriam, is handling all details, with the full coöperation of national headquarters.

College and University Squadrons

During the past month, an intensive campaign has been carried on for the establishment of AFA squadrons on college and university campuses throughout the nation. In addition to such chapters already established at Columbia University, University of Texas, and University of Kentucky, units are now being formed at Northwestern University, University of Pennsylvania, Temple University, University of Maryland, The Citadel at Charleston, S. C., and Georgetown, George Washington, and Catholic University in Washington, D. C.

Northwestern's squadron will be set up formerly at a rally to be held on the campus October 16th. Brig. Gen. Walter R. Peck, Hq. 2nd Air Force, Fort Crook, Omaha, Nebraska, will be guest speaker at this meeting, together with Col. Ray W. Ireland, Wing Commander for Illinois.

Chester E. Willard, Coordinator Veterans Education at the Evanston, Illinois school, has done a splendid job in making all arrangements for this rally. Our warmest thanks to Mr. Willard for his generous contribution.

Overseas Members

Our membership among overseas AAF personnel has been swelled by 150 of the boys at Station Headquarters of the European Air Transport Service at Wiesbaden, Germany, home of the Occupation Air Force in Europe.

First Lieutenant Jacob J. Muller, Personal Affairs Officer of the Hq. was largely responsible for the successful membership campaign there.

Maryland News

John Marshall Boone was named Commander of the Maryland Wing of the AFA at a recent meeting of the executive committee of Squadron 1. Joseph B. Browne was elected Secretary-Treasurer of the Wing.

Wing Commander Boone is a veteran of both world wars, having served in the latter overseas for approximately two years in the European-African-Middle East Theater with the 92nd Bomb Group of the Eighth Air Force. He has returned to his position as an investment banker, governor of the Baltimore Stock Exchange, a trustee of the South Baltimore General Hospital, and a commissioner of the Department of Recreation. He is also a member of the American Legion, Veterans of Foreign Wars, and Finance Officer of the Maryland Veterans of World War II.

Mr. Browne also served in the European Theater with the 66th Fighter Wing of the Eighth Air Force, and was awarded the Bronze Star and the Air Medal for outstanding service while participating in the Second Shuttle Mission, England

Lt. Col. J. Myer, representing AFA presents "Sleepy Joe," the G. E. copperman with an honorary AFA membership at an NAA meeting in Los Angeles. V. A. Kemmerrer, president of the Southern California Chapter of NAA looks on. Copperman was designed by G. E. and Wright Field technicians to test electrically heated flying suits. Built of copper and wire intricately to simulate human reactions to changes in temperature, he spent the war years in testing chambers as cold as 60 degrees below zero. When he was discharged from the army he flew to Hollywood to make a picture and join AFA. He can boast of having been kissed by both Goddard and Lamour.

Two AFAers who have accepted executive positions in civilian aviation, are Arthur F. Kelly (left) and H. R. Oldfield. Kelly, a Lt. Col. with the European division of ATC during the war, has been named general traffic manager of Western Air Lines. In his new post Kelly will direct all traffic throughout Western's 6,000-mile system. Oldfield, who served as a Major General during the war, and as special assistant to General Arnold, has joined the Boeing Aircraft Co. engineering staff. He will serve as a project supervisor and will act in an advisory capacity on future trends of aerial combat. Kelly is secretary of the California Wing of the Air Force Association.

to Russia to Italy. Mr. Browne is assistant vice-president of Union Trust Company and a member of the American Institute of Banking, and the Baltimore Chamber of Commerce.

There are three additional posts to be filled in the near future: deputy wing commanders for the eastern and western part of the state, and an adjutant to work in the headquarters of the Wing Commander.

The work of the newly formed wing will be to coordinate the work of the various squadrons in the state, each squadron commander representing his squadron at wing meetings.

To date, there are seven squadrons in Maryland besides Baltimore, which received the first charter in the country from Gen. Doolittle on June 21. They are located at Middle River, Hagerstown, Cumberland, Frostburg, Easton, McHenry, and Riverdale.

New York Notes

The first New York State squadron was set up in Buffalo, October 16th. Buffalo was selected because, as Casey Jones, state commander, explained, "Buffalo is to be a key spot in the Army's future training program."

To the hundreds of AAF veterans who gathered in the Buffalo Downtown YMCA, Major General Robert Douglas, commanding the First Air Force, disclosed the training plans for the National Guard and Reserve.

In addition to Mr. Jones, Ed Curtis, AFA Vice-President, and "Woody" Vosler, director, attended the meeting.

Jones, pioneer test pilot, indicated at the rally that he's right in there pitching for 1946 aviation, as he pitched for pioneer flying when he came out of World War I as a pilot and instructor. His principal interest now, he says, is to see that "the best air force in the world doesn't disintegrate as it did after World War I."

Ninth Air Force Pictorial Record

Major Milton R. Marx's collection of action paintings of the Ninth Air Force has been made available in book form to all former members of the Ninth free of charge. The book, composed of over 60 color paintings, was done by Marx "on the spot" at the direction of Lt. Gen. Hoyt Vandenberg, the Ninth's Commanding General. It is true that "neither brush nor pen can adequately record the heroism of those who served so well their country," but Marx's effort comes close. Ninth vets can obtain a copy by writing to Office of Public Relations, Room 3D-1050 Pentagon, Washington, D. C.

Champion, famed mount of the screen's singing cowboy Gene Autry, shows off his non-aerodynamic wings at the annual rodeo at New York's Madison Square Garden. In honor of AFA (boss is a charter member) pony was renamed "Mr. Pegasus, 1946." Having "sprouted" wings the rodeo management barred him from competition.

Sergeant Glenn Darwin, an AFA member formerly of the Metropolitan Opera Co., is featured on radio series "On Wings of Song."

On Wings Of Song

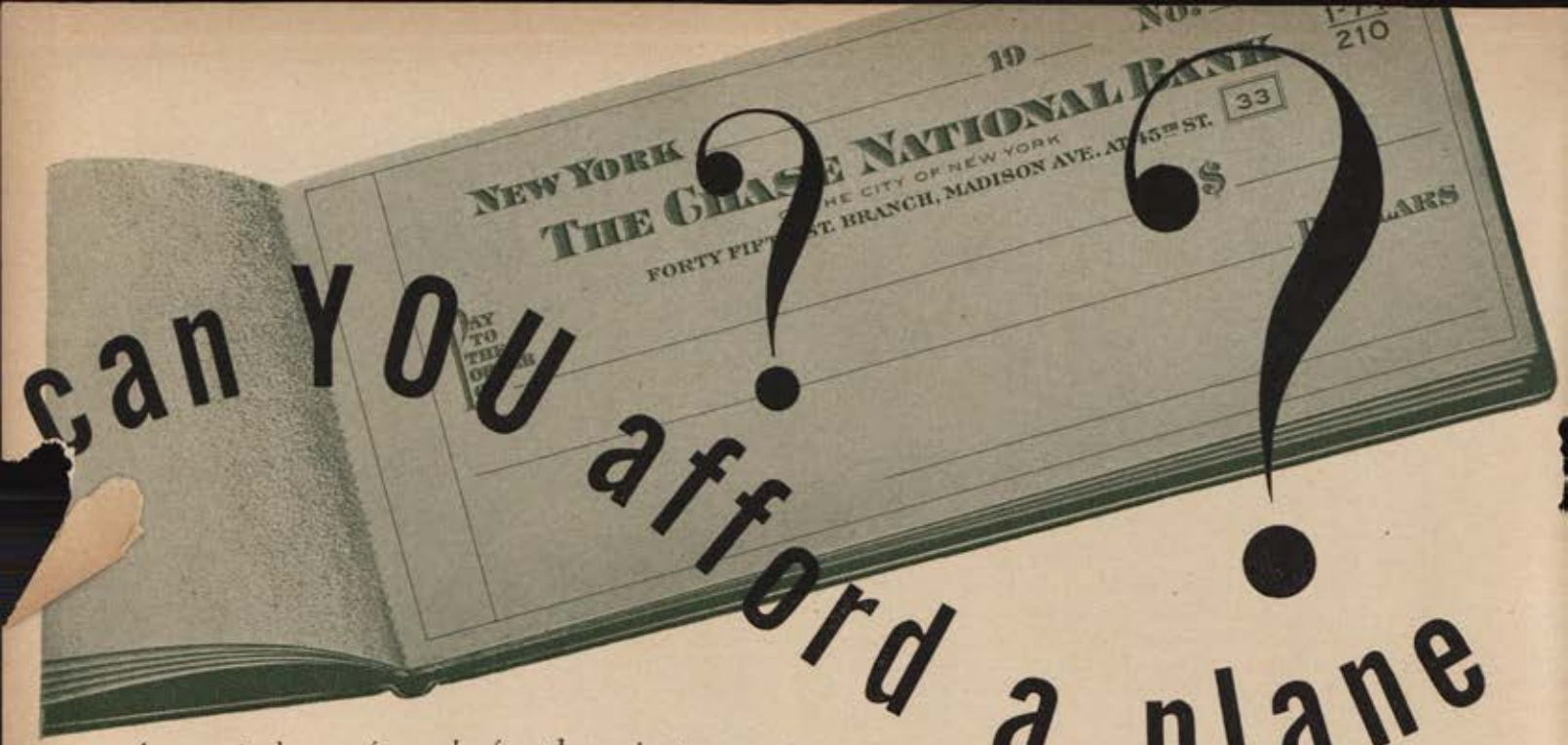
A new Army Air Force radio show "On Wings Of Song" is making its bow on leading stations from coast to coast this month. Featuring the baritone voice of ex-Master Sergeant Glenn Darwin, formerly of the Metropolitan Opera Company, and the music of the official Army Air Forces Band, conducted by Major George S. Howard, the series devotes a portion of each program to an explanation of the objectives and benefits of the Air Forces Association. The series, which is 15 minutes in length and covers thirteen weeks, will be carried as an official radio program of the Army Air Forces on 180 of the country's leading stations including WMCA, New York; KNX, Los Angeles; WGY, Schenectady; KSL, Salt Lake City; WHAM, Rochester; WTAM, Cleveland, and WBT, Charlotte, N. C. Air Force Public Relations Officers have placed the series at radio stations serving their areas.

The series permits Sergeant Darwin to demonstrate his remarkable versatility and range as he performs a large group of songs especially arranged to appeal to the family. These selections range from operatic arias like "Il Lacarito Spirito" by Verdi, to "Begin the Beguine," and "Night and Day."

The Army Air Forces Band performs such popular selections as "Flight of the Bumble Bee," and "The General Spaatz March" under the direction of Major George S. Howard, who has been widely acclaimed for his work in developing the Air Forces Band into one of the finest musical organizations of its kind in the country, capable of playing music from Bach to boogie-woogie.

"On Wings of Song" was transcribed in the radio studio at Bolling Field in Washington—the home of the AAF Band. It was written and produced by Captain Robert Keim and Sgt. Arnold Wolf who were formerly associated with Compton Advertising, Inc., New York, and RKO Pictures, Hollywood, respectively. The series is an operation of the Radio Branch of Air Force Public Relations which is currently producing an AAF series based on the United Nations on the Mutual Broadcasting System, five days per week.

Variety, "bible" of the entertainment world reviewed the program as "a good musical bet for late evening relaxation."



Can YOU afford a plane?

A practical cost formula for the private owner

BY NEIL B. BERBOTH

ABOUT A YEAR AGO, while engaged in comparing performance characteristics of various private-owner aircraft, I discovered that there was no established method of calculating operating costs for various aircraft under varying operating conditions. Investigating, it became obvious that too little attention had been given to the problem of nailing down these costs. And costs are important, because high cost is probably the greatest deterrent to the rapid development and widespread use of the private airplane.

We wanted to know what it actually cost to operate a plane, why it cost so much, and further, what possibilities there were for decreasing this cost. After considerable investigation and analysis, a formula was developed which you see here as Table B. It is quite flexible in that it makes allowance for the many variables, such as, hours flown, horsepower, size, and selling price; and it will apply to any privately owned plane up to about 5,000 pounds gross.

As a result of using this formula for various purposes, it seems safe to assert that, even with the high costs prevalent today, the private-owner airplane is capable of producing more passenger miles of travel per dollar invested than any other form of transportation, bar none. The only catch is that the required investment is greater. The reason for this good showing, of course, is the airplane's greater speed, making it possible to cover more miles while spending the same dollar.

The immediate significance of this is that our private planes today are economic and efficient from the cost standpoint when used by persons who count cost on a per-mile basis, that is, executive owners, commercial users and operators, and well-to-do persons who can afford the necessary investment. That's encouraging. However, by far the greater majority of potential plane buyers, personal users, will not count costs in terms of cents per mile but in terms of dollars per year, per month or per hour, as well as being aware of the purchase price. And it is in relation to this potential

Fairchild 24 is the typical four-place private craft, balancing performance with operating cost.

TABLE A

EFFECT OF VARIOUS COST COMPONENTS ON TOTAL OPERATING COST—HYPOTHETICAL AIRPLANE

Estimated Selling Price	$6763.
Estimated Cruising Speed	163 mph
Rated Horsepower	185 hp
Cruising Horsepower (75% Rated)	139 hp
Number of Passengers	4

PERSONAL OWNERS—PROBABLE ANNUAL AVERAGE UTILIZATION 210 Hours, 30,000 Miles

	Actual Annual Cost	% of Total Cost
Variable Costs:		
Fuel & Oil	$710.	21.6%
Maintenance & Replacement Parts	392.	11.9%
Sub-Total	$1102.	33.5%
Fixed Costs:		
Hanger Rental	$360.	10.9%
Depreciation	913.	27.7%
Complete Insurance	917.	27.9%
Sub-Total	$2190.	66.5%
Total	$3292.	100.0%

CHARTER & SERVICE OPERATORS—PROBABLE ANNUAL AVERAGE UTILIZATION—500 Hours, 71,500 Miles

	*Actual Annual Cost	% of Total Cost
Variable Costs:		
Fuel & Oil	$1394.	35.1%
Maintenance & Replacement Parts	775.	19.6%
Sub-Total	$2169	54.7%
Fixed Costs:		
Hanger Rental	$ 750.	18.8%
Depreciation	1051.	26.5%
Complete Insurance		
Sub-Total	$1801.	45.3%
Total	$3970.	100.0%

*Operator's costs based on 17.5% fuel & oil discount, 17% labor & parts discount, 18% aircraft discount, and actual insurance increase of 14.6%.

In the same field, the prospective owner must weigh increased initial cost for an all-metal craft like the Luscombe, as compared with the added maintenance on fabric-covered craft, like the deluxe Taylorcraft. Relative cost of airframe repairs is also a factor.

TABLE B

PERSONAL AIRCRAFT DIRECT OPERATING COST FORMULA

$$C_a = (F + M)P_{cr} + U + N90 + C.135 + (I \times CD) + 22.50 + (N\ 12.50)$$

$$C_{hr} = \frac{C_a}{U}$$

$$C_m = \frac{C_a}{(V_{cr}\ 1.15 - 12)}$$

WHERE:

C_a = Annual Operating Cost ($).

C_{hr} = Hourly Operating Cost ($).

C_m = Operating cost/plane mi. ($).

F = Fuel cost/hp. hr. ($0.0243).

M = Maintenance cost/hp. hr.: 1st yr., new $0.0134; 2nd yr., $0.0175; 3rd yr., $0.0216; 4th yr., $0.0257; 5th yr., $0.0298

P_{cr} = Engine cruising hp. required to maintain cruising speed.

U = Annual utilization (flight hr./yr.).

N = Number of passenger seats.

V_{cr} = Cruising speed (mph.).

I = Hull insurance rate (¢); Aircraft with weight empty less than 2,000 lb., .125; over 2,000 lb., .105.

C = Original selling price.

D = Depreciated value of airplane: 1st yr., new 0; 2nd yr., .80; 3rd yr., .68; 4th yr., .58; 5th yr., .49.

TABLE C

EFFECT OF WEIGHT, HORSEPOWER AND QUALITY ON COST

		A	B	C	D
Gross Weight	lbs.	2150	2587	2862	3221
Empty Weight	lbs.	1260	1507	1697	1931
Useful Load	lbs.	890	1080	1165	1290
Payload	lbs.	611	718	750	800
Per Cent Useful to Gross		41.3	41.7	40.7	40.0
Horsepower	(Rated hp)	143	185	214	250
Power Loading	lbs./hp	15.0	14.0	13.4	12.9
Cruising Speed	mph	142	153	159	166
Range	hours	5	5	5	5
Takeoff Over 50' Obst.	ft.	1115	1051	1198	1216

SELLING PRICE ESTIMATES

	A	B	C	D
Estimated 2-year production	2500 units	1500 units	900 units	400 units
WEIGHTS:				
Structural Material lbs.	630	795	923	1060
Purchased Mfd. Material lbs.	318	318	318	318
Engine & Propeller lbs.	312	394	456	533
COSTS:				
Engine & Propeller	$ 775.	$1000.	$1155.	$1750.
Structural Material ($.50/lb.)	315.	398.	461.	540.
Purchased Material ($2.29/lb.)	728.	728.	728.	728.
*Fabrication & Assembly	$1025.	$1415.	$1868.	$2120.
Labor & Overhead ($2.00/hr.)	160.	267.	445.	1000.
Engineering & Tooling ($400,000)				
Manufacturing Cost	$3003.	$3808.	$4657.	$6138.
Sales & Administration (15% Wholesale)	$ 605.	$ 759.	$ 931.	$1225.
Profit (10% Wholesale)	403.	506.	621.	817.
Distributors Discount (25% Sales)	1300.	1690.	2065.	2725.
SELLING PRICE	$5311.	$6763.	$8274.	$10905.

*Fabrication and assembly labor and overhead based on learning curve of 80% efficiency: Airplane A, .539 hrs./lb.; airplane B, .636 hrs./lb.; airplane C, .752 hrs./lb.; airplane D, .979 hrs./lb.

High performance jobs like the Globe Swift have flaps and landing gear system to raise maintenance costs.

market, the greatest from the standpoint of numbers, that the private plane has its greatest shortcomings. It is an expensive proposition from the point of dollar costs. Admittedly, this is a difficult problem to solve especially under today's conditions, but it's not insurmountable. And we won't even approach plane sales volume that the optimists talk about until we do.

Table A shows the effect of the various components of cost on total operating cost, using a hypothetical 4-place plane as an example. As expected, the table shows that, for personal owners with characteristic low utilization, the fixed costs represent two-thirds of the total cost, with depreciation and insurance the heaviest. To see what can be done about reducing costs, let's briefly analyze each cost component.

Fuel and oil costs are directly a function of horsepower and indirectly of fuel selling price. The cost of fuel, of course, represents, by far, the larger expense of the two. One important answer to the problem of reducing fuel, as well as other costs, lies within the province of the designer: For example, improved design can make it possible to carry the same payload package at a higher rate of speed with the same horsepower, thus reducing per-mile cost. However, the annual cost and selling price will not reflect an equal reduction, if any at all. The same improved design, of course, may make it possible to carry the same payload package at the same rate of speed with less horsepower. Now the annual cost and selling price will be effectively reduced on the basis of a similar number of operating hours per year. First of all, the fuel bill will be lower. Second, maintenance cost will be somewhat lower. Third, depreciation and insurance, both heavy costs, will be lower for the simple reason that the smaller engine and supporting structure will cost less, thus making the selling price less.

Another important factor in reducing fuel costs is the use of the same fuel for both lightplanes and automobiles. One oil company has circularized all the aircraft engine manufacturers on this subject and has received the unanimous opinion that there is no technical reason why their lightplane engines cannot use the higher octane automotive fuels, which will be available as standard, with but few, if any, modifications of the airplane power plant or fuel system.

Coordinated air-auto service stations, airparks, and private fields could use their high-grade automotive fuels for aircraft; and for an airplane which uses six gallons per hour for 200 hours, the saving would amount to upward of $120 per year, about 10 per cent of the total operating cost for such a plane. In addition, increased profit opportunities for airport operators would become available; and greater safety would also result, as rapid turnover and volume handling means less danger of contamination and deterioration. Seasonally balanced volatility of automotive fuels would be another advantage gained.

To achieve savings of this sort, one important thing needed is the entry of many more capable and aggressive businessmen into the business of operating airports and service stations. The problems of reducing maintenance costs are somewhat similar to those of reducing fuel costs, namely, doing the same job with less horsepower, simplifying design wherever possible with an eye to maintenance, and the exhilarating effect of competition of many more far-sighted and

clever managements, which would probably result in more standardized inspection and service practices and prices, better parts distribution and in the end fairer trade practices.

That latter point is most important. Greater competition is the answer to at least half our problems in reducing costs of fuel, maintenance, and hangar rentals. As the number of planes in operation increases, it will be possible for airport operators to spread their large overhead costs over more business and thus decrease unit charges; but at the same time, they must learn to take advantage of the many revenue-producing opportunities around them and, especially, many must acquire a sounder form of grass-roots thinking and get rid of some of the gold-plate thinking that has helped retard progress in this direction.

Before mentioning selling price, let's examine Graph A, which shows the effect of component cost reductions upon total operating costs. For a hypothetical personal-owner plane, this shows that a 50 per cent reduction in *fuel and oil* costs would result in a 10.9 per cent reduction in total cost; but more striking is the fact that a 50 per cent reduction in *selling price* would reduce the total costs 26.4 per cent.

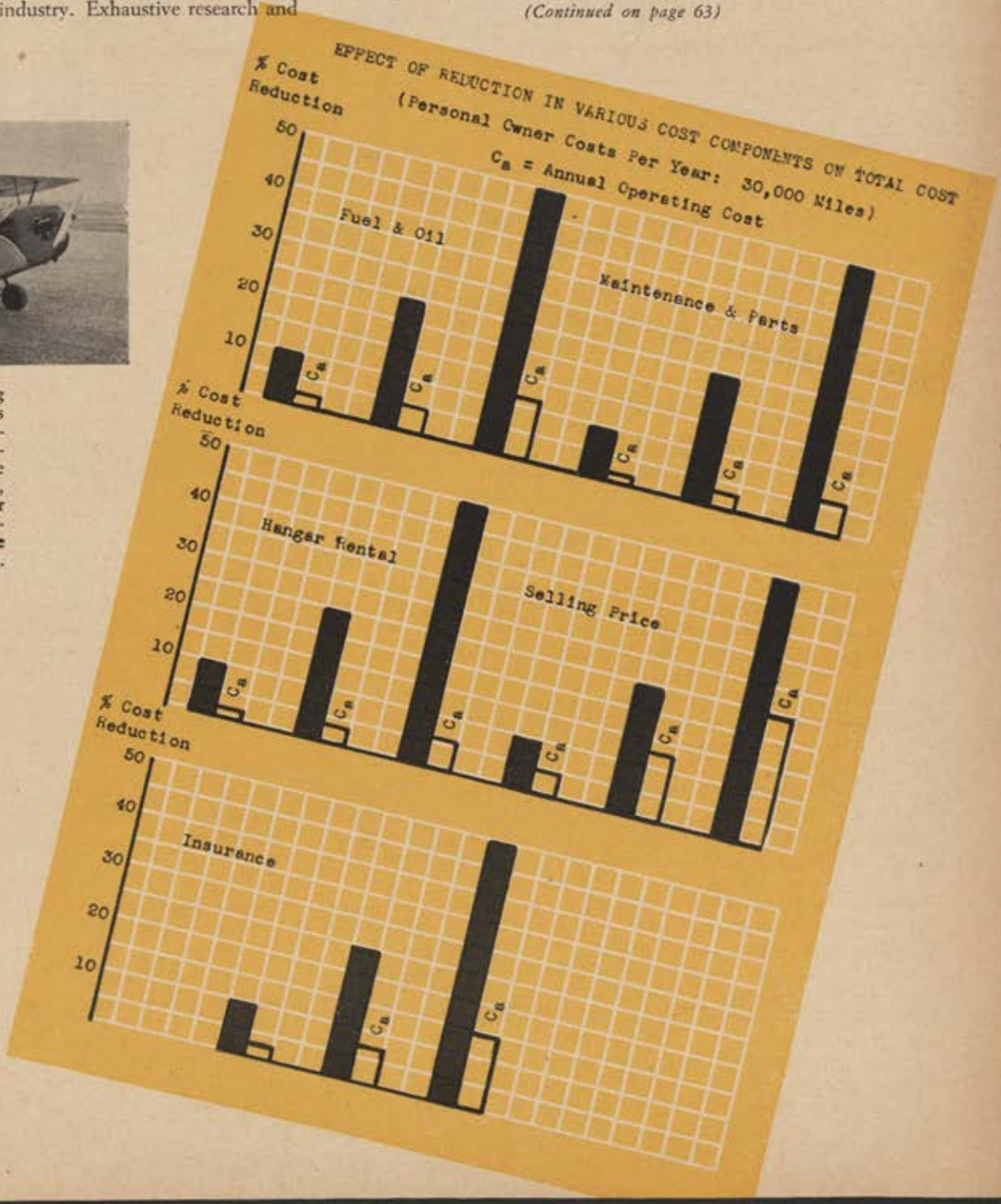
That brings us to selling price, the biggest bugaboo faced today by the private plane industry. Exhaustive research and investigation have been conducted in an effort to determine how the family plane that everybody wants can be built and sold for $1,500, which is what everybody wants to pay for it. To make it worse, according to the many consumer-market surveys on the subject, they want performance of 150 miles per hour, a five-hour range with full load of four passengers and baggage, all-metal construction, retractable gear, complete instrumentation and radio installation, and many other advancements. And all for $1,500.

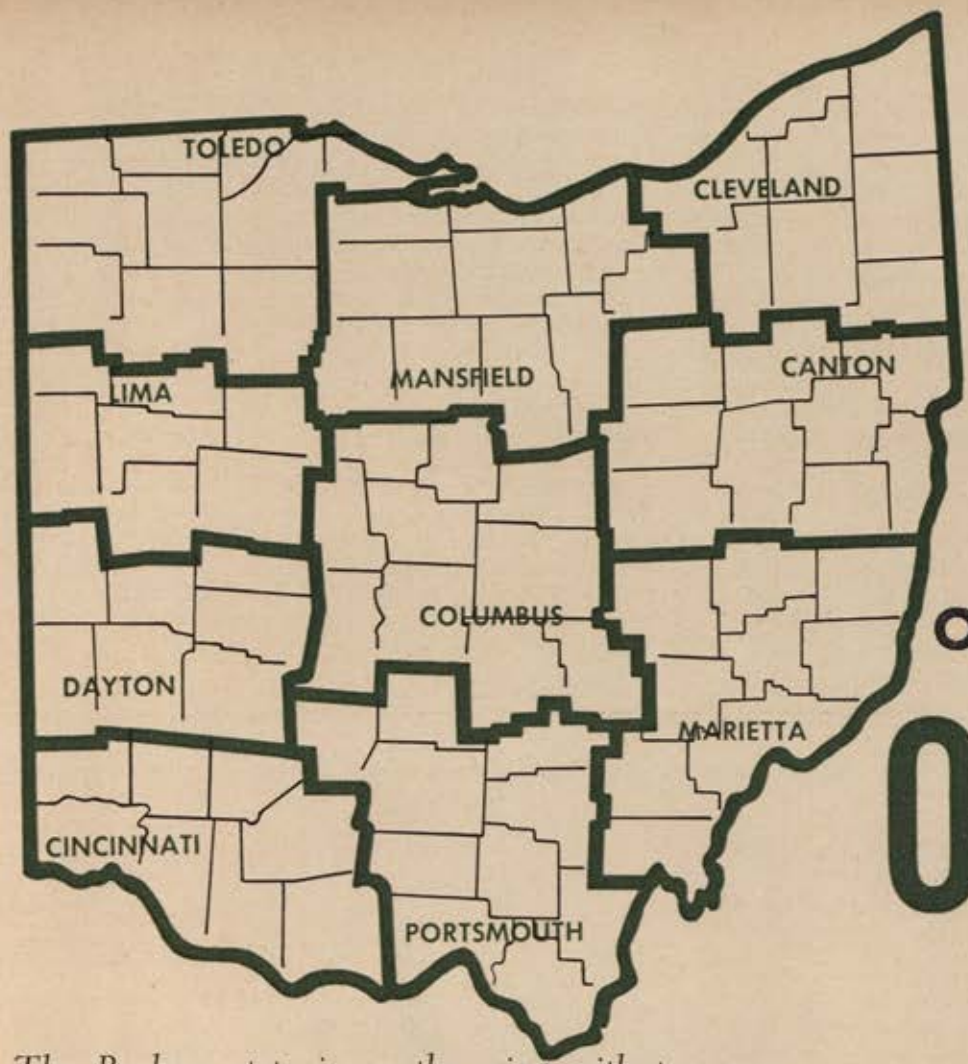
It is most regrettable that many people have been led to believe that this paragon could come to pass in the immediate postwar period, because in the industry's present stage of progress, it can't deliver the goods and remain in profitable business. The aircraft it can build and sell today for $1,500 is far from being the advanced plane consumers would like.

In Table C, there are shown four hypothetical airplanes having the general characteristics the consumer surveys say are desirable. Airplane A is a very marginal four-place, and under full range conditions, is practically a three-place. B just makes the grade as a four-place under ordinary operating conditions, but is marginal on baggage. C is a substantial four-place plane with plenty of baggage. D is a real family

(Continued on page 63)

Minimum outlay and operating expense is typified by the Ross Sport. This craft has the simplest possible wing and fuselage structure, a 65-hp engine and a rigid landing gear, which uses full-air wheels for shock absorption. It is considered by some to be the last of the true light airplanes.





operation OHIO

The Buckeye state is on the wing with ten new AFA Groups. New Squadrons are being airborne daily

BY HAROLD W. CARLISLE, *Major A.C.Res.*

THE OHIO WING of the Air Force Association, which has the distinction of being one of the most efficiently organized units in the Association, was activated in true "by the numbers" Army fashion—but good.

Credit for the job of giving life to a unit that had previously existed more on paper than in flesh and being goes to Richard S. Wolfe, prominent Columbus banker, who started the activation wheels rolling at the request of Gen. Jimmy Doolittle, AFA president.

With a background of having assisted in the rapid expansion of the Civil Air Patrol during the war, Wolfe's first step after accepting Doolittle's assignment was to sit down and establish specific objectives. He decided that to be as effective as possible, the Wing should be organized along lines closely approximating those of the Air Force itself. Accordingly, he divided the state into ten districts, each of which was approximately the same as the other from a population standpoint. The districts he called Groups, and each of them was set up to have a group commander. Under the groups, Wolfe's organization chart called for the formation of squadrons located in individual cities or counties. As it does in the army, the chain of command was to go from the squadron to the group to the wing. Wing headquarters were to be located wherever the newly elected wing commander happened to live.

With his objectives clearly delineated, Wolfe's next step was to assign responsibilities. He selected two men to visit all of the districts in the state, using his own Beechcraft C-45 for the purpose of finding men who would take an active interest in organizing group headquarters and who would then assist in the organizing of squadrons.

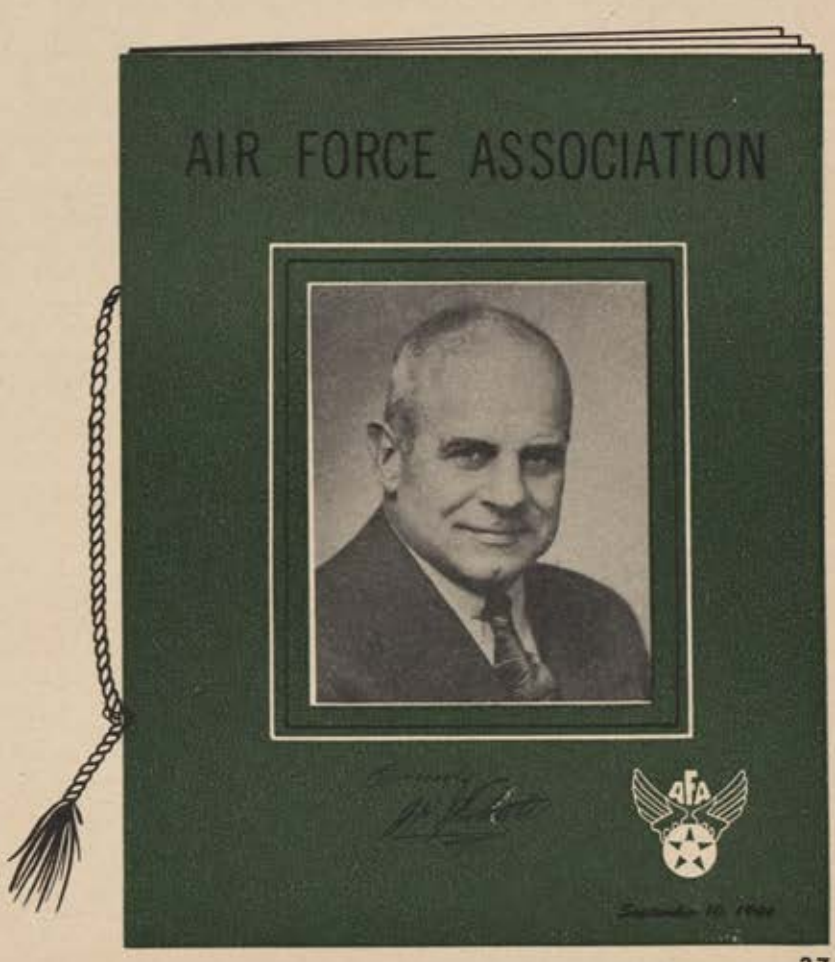
The two men selected for the missionary assignment were John P. Biehn, Vice President of the Ohio National Bank in Columbus, who served as a private in the Air Forces, and the writer of this article, who ended his service as a major after assignment to the 8th Air Force, part of the time while it was under command of Lt. Gen. Doolittle. With the transportation problem reduced to a minimum, it was possible to visit two or three cities a day, interviewing many prominent citizens. From the people interviewed ten were invited to head up group areas. They all accepted.

Next, an organization meeting, attended by the newly chosen group leaders, was held in Columbus at Wolfe's country estate. The tentative organization plan was enthusiastically approved, and Alan P. Tappan of Mansfield was elected permanent Wing Commander. Tappan, president of the Tappan Stove Co., served as a colonel in the AAF during the war.

Appointed as Deputy Wing Commander was Fred J. Milligan of Columbus, a well-known Ohio attorney. During the war Milligan was an AAF major.

After the election of officers the new officials began at once to map out a program of activities including the organizing of AFA squadrons. Thanks to the energetic planning of one man, the Ohio wing had gotten off to a flying start.

These are the men who met in Columbus to elect AFA officers. A. P. Tappan was named Wing Cmdr. R. S. Wolfe, bottom left, led organization program. J. P. Biehn, center, did much of preliminary work. Gen. Doolittle, bottom, autographed programs for meeting.



over the TOP

There was more to the Boeing Dreamboat's flight than the headlines told

BY NED ROOT, *Lt. Col. A.C., Res.*

ONE OF THE most valuable lessons we learned in the years between World Wars I and II was the fact that new conflicts do not begin where old ones leave off. France, for example, learned the hard way when their 1918 type defenses crumbled pathetically before the modern blitz techniques of the Nazis. During twenty years of peace they had contented themselves with perfecting weapons and tactics of World War I. They forgot to consider the possibility of any change in the strategic concept of battle. They paid for their oversight with the rout of their armies and the devastation of their country.

When World War II ended we were on the brink of a new philosophy of warfare as radical in its departure from 1940 techniques as those were from the battle methods of 1918. Even while Germany and Japan were trying to worm their way out of "complete surrender" it was apparent to our military leaders that the next war might easily be fought from a strategic pivot in the Arctic. The development of long-range aircraft, rockets, and guided missiles which could strike at the heart of any of the major nations on earth from a polar launching site gave birth to the theory that the country which controls the Arctic in another war will also control the tide of battle.

It is for this reason that the October flight of the Boeing Pacusan Dreamboat from Honolulu to Cairo was of greater significance than is immediately apparent. From the standpoint of front-page headlines, it was anticlimactic. It fell short, by seventeen hundred miles, of matching the record-breaking cruise of the Navy's Truculent Turtle the week before. But the flight plan for the Dreamboat was charted with greater purpose than to make news.

The pattern of the Air Forces' planning—of which the Pacusan flight was a part—is revealed in a series of recent Washington releases. On August 1 of this year, the AAF announced that guided missiles, modern aircraft, and air warning systems would be tested in the Arctic next winter and the following summer. On October 6 General Spaatz's Headquarters disclosed that a Boeing B-29 group and a North American P-51 squadron would leave the States shortly for six months' training in Alaska, to be followed by other groups and squadrons, on a rotating basis.

And then, on October 6, the Dreamboat landed in Cairo after a 9500-mile hop over the top of the world. The practicality of long-range operational missions in which all climatic extremes are encountered was definitely established. As Colonel Irvin and his Dreamboat crew stepped from their ship at Payne Field, it had become crystal-clear that, while the Air Force is pitifully lacking in planes and men and money, it is not lacking in the energy and intelligence to plan against an eventuality which everyone hopes will never come to pass.

The strategic significance of the Arctic in any future struggle can best be visualized by careful study of a polar projection of a map of the world. Except for parts of Africa, South America, Australia, New Zealand, and the Netherlands Indies, all of the great nations of the world—those most likely to get themselves embroiled—lie within its perimeter. The North Pole, of course, is smack in the middle. From there, or from any other spot in the Arctic, strategic attacks utilizing rockets or long-range aircraft could be launched against the United States, England, Russia, China, France, etc., with devastating effect. From Reykjavik, Iceland, for example, to Berlin it is only 1,480 miles. To Moscow it's 2,055, to Lisbon 1,835, and to London 1,175. Compare these figures with the Dreamboat's 9500-mile hop and it becomes apparent that, even with equipment in existence today, round-trip operational flights from the Arctic to any major military target on earth are entirely practical. The rockets and guided missiles of tomorrow would make the utilization of these take-off areas inevitable.

With this in mind, America is faced with two responsibilities: (a) it must prepare to defend itself against attacks from this region, and (b) it must be ready to launch its own Arctic offensive. In both instances the Air Forces play a predominant rôle. The Arctic is impassable to land and sea forces. It is only by air that an enemy attack could be thwarted, or a counteroffensive initiated. The Navy's ships can skirt an iceberg, but they cannot penetrate the Arctic's ice pack. In a broad sense, therefore, the future security of the nation rests squarely on the shoulders of the Air Forces. With operations such as that of the Dreamboat, its leaders have demonstrated that they are not asleep to this fact.

Before take-off time in Honolulu the crew of the Boeing Pacusan Dreamboat looked like this. When they arrived at Payne Field in Cairo beards were longer and uniforms less neat.

Boss of the Dreamboat's flight was Colonel Bill Irvine (above). After passing over Arctic storms, the heavily loaded Boeing ship sped over Greenland, Iceland, the Atlantic, the British Isles, France, Switzerland, Italy and the Mediterranean. For significance of flight put finger on Reykjavik and pretend to swing extremities of flight line east or west.

How to cure an aviation oil of blowing bubbles

Which of these beakers, do you suppose, contained the most oil before they were both pumped full of air?

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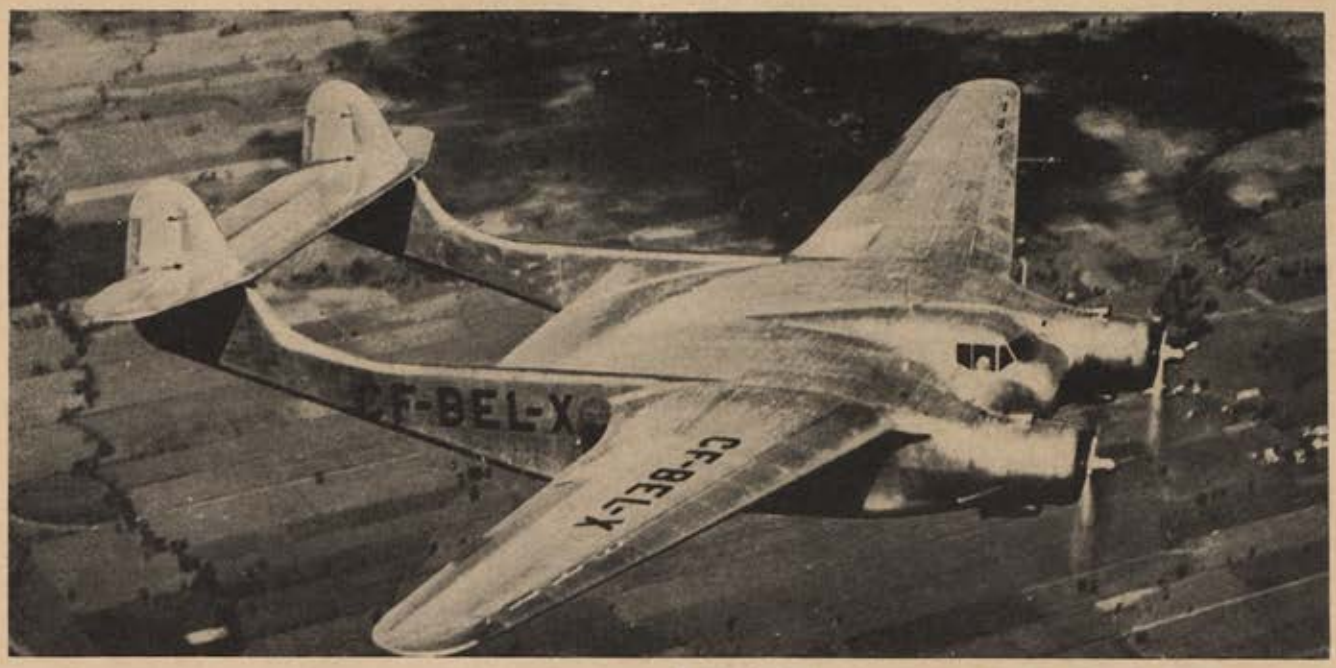
Air Tech

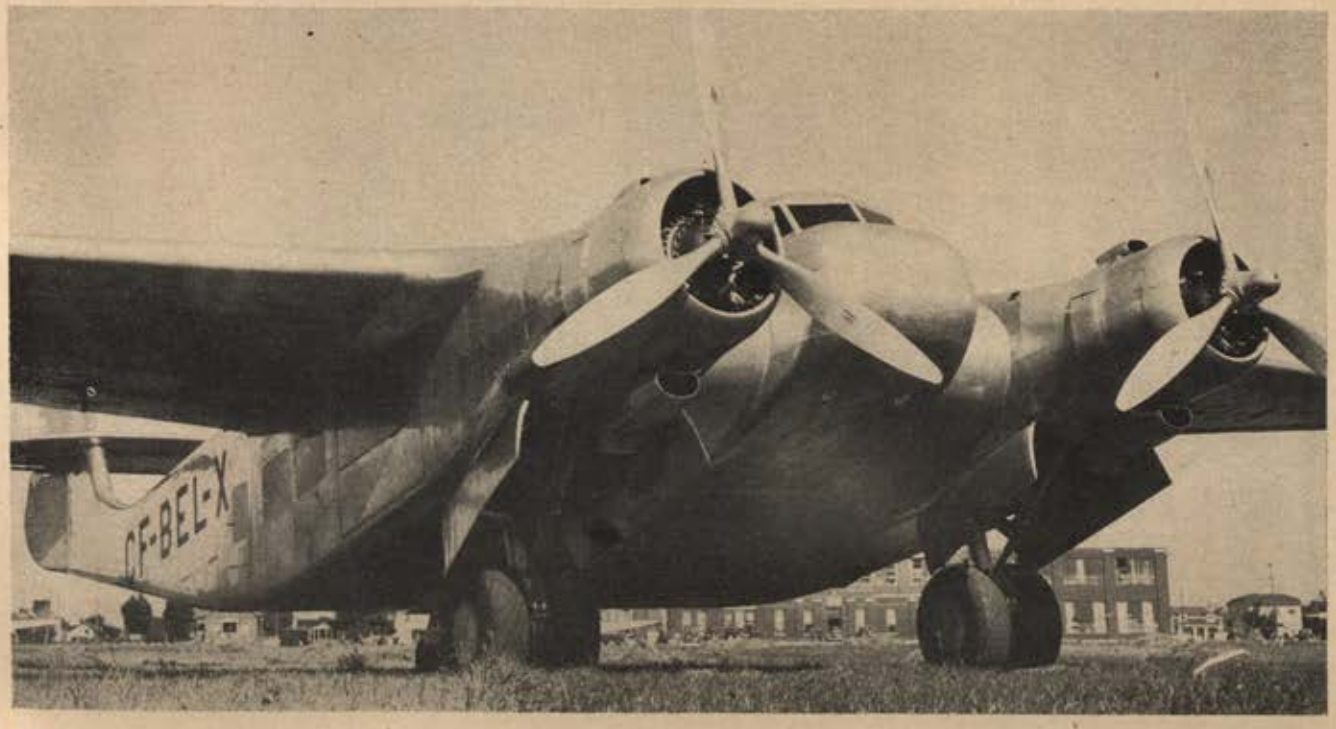
Scimitar blades, like swept-back wings, permit closer approach to transonic speeds in Curtiss-Wright's new electrical propeller for the P-47.



Flight view of the Burnelli CBY. This version, built in Canada, is rigged to carry cargo and passengers for back-country type operation.

getting a Lift without a DRAG

Forward ground view, showing how the heavy portion of the structure, engine mounts, spar, and landing gear protect passenger cabin.



BY WILLIAM S. FRIEDMAN, *Sgt., A.C.Res.*

On the conventional airplane, the fuselage is a shed designed to house the crew, the payload, and most of the accessories. It is a form to hold the cockpit and controls. It is an extension to support the tail surfaces in proper space relation to the power source and the rest of the airframe. Aerodynamically, it is a dead loss, and the designer's major problem is to create a form which will include the proper volume, have adequate structural strength, and offer the least possible resistance to flight.

A quarter of a century ago, a young Texas-born designer named Vincent J. Burnelli finished barnstorming the nation in a giant twin-engined biplane which he designed as the first passenger transport the nation had ever seen. A conventional design, it was strikingly efficient for its time, but it still hauled a box-like fuselage almost the size of a freight car through the air. Burnelli thought the fuselage should be made to carry its own weight. The result was the development of the airfoil-sectioned fuselage, first built in 1920. Since that time Burnelli has undergone a long uphill battle to sell the idea of an aerodynamically useful fuselage on the basis of better performance, greater safety, and increased flat space, usable for cargo and passengers.

The lifting fuselage offers several obvious advantages. In the first place, nearly half of the lift required to keep the plane air-borne even at slow speed can be derived from the fuselage itself. A smaller airplane can therefore do the same work. This point was best brought out by a study made by a British airplane company which built several freighters on the Burnelli principle early in the war. They were considering both a Burnelli design and a conventional clean low-wing monoplane. Both designs were to carry engines of the same output and an identical payload, 14 passengers, a crew of two, and 1,000 pounds of mail. The designs were to have the same range and landing speed. Development proved that, in order to achieve the performance, the conventional airplane would have had to have a span of 85 feet, an over-all length of 65 feet, and weigh 12,000 pounds empty. Its top speed would have been 210 mph.

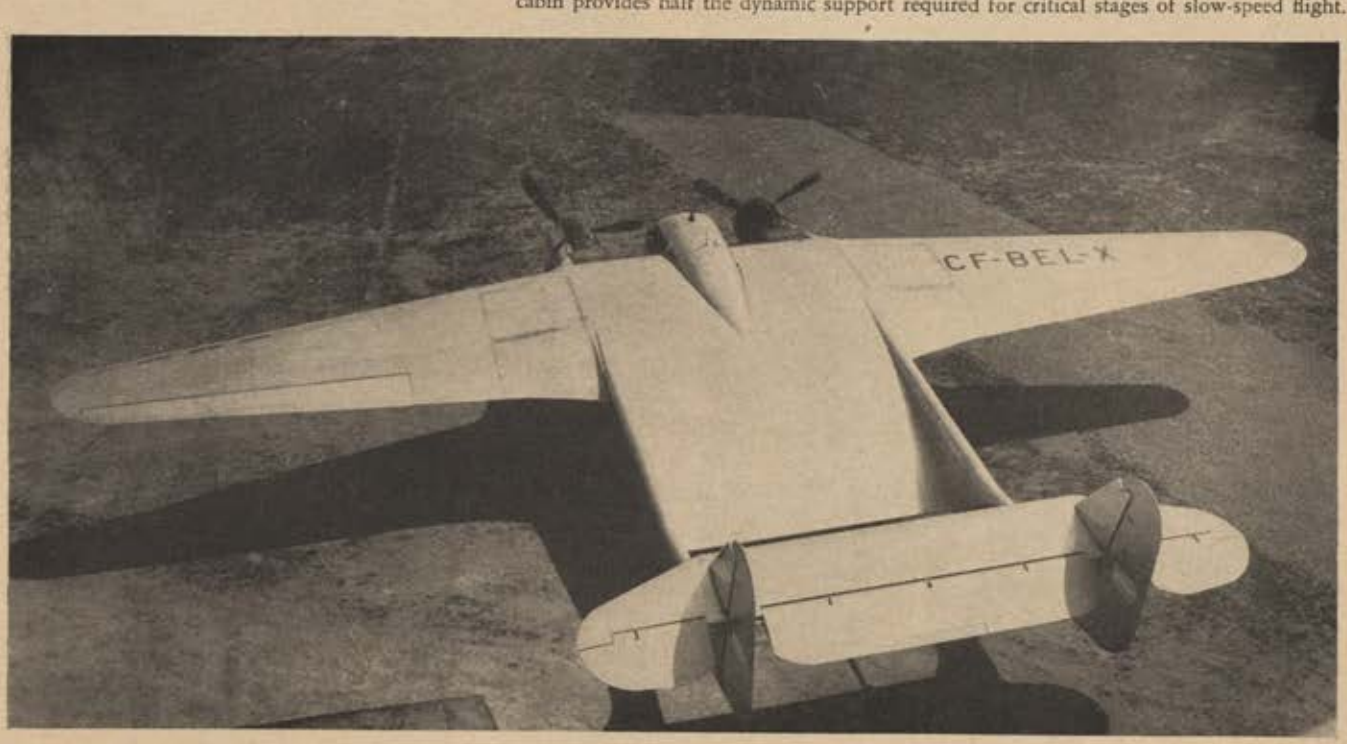
The comparable Burnelli design would have spanned 73 feet four inches and measured only 45 feet six inches in length. It would have weighed but 9,320 pounds empty and have had a maximum speed of 245 mph. In short, the same job could be done with a smaller package, weighing fewer pounds.

The study also indicated other advantages for the lifting fuselage. The conventional non-aerodynamic fuselage contributes no lift, and therefore imposes a dead weight on the wing panels. The lifting fuselage, however, carries a large portion of its own weight, thereby reducing the bending forces imposed on the main span. In the conventional design, in order to get a wide wheel tread, it is almost always necessary to attach the main legs of the landing gear to the wing, in part or whole. This means that the wing structure has to be beefed up to carry landing shocks, a stress better carried by a thicker member. As ships grow larger and multi-wheeled trucks are needed, it will become increasingly difficult to find depth required to accommodate this installation in thin high-speed wings. In a lifting fuselage airplane there is enough span-width in the main cabin to allow wheels to be attached to its outer periphery and still retain the wide wheel tread required for adequate ground control. At the same time, adequate depth is available for dual-wheel trucks or any other multi-shoe arrangement that may become necessary. Furthermore, the landing gear system can be made accessible in flight for emergency adjustment and release.

Accidental Evidence

One of the major safety advantages of the flying wing theory was given dramatic evidence when one of the flying wings cracked up in 1938. The mishap was caused by faulty maintenance, and the ship hit the frozen ground outside Newark airport at a speed exceeding 120 mph. Sufficient impact occurred to throw one engine 140 feet and tear the other one loose from the mount. The outer panels were crumpled, the tail surfaces were destroyed. Nevertheless, the

Top view of the CBY showing the proportion of fuselage and wing surface. The lifting cabin provides half the dynamic support required for critical stages of slow-speed flight.



fuselage remained virtually intact, and the crew members walked away uninjured.

This happened for a series of reasons. The impact was taken by the broad, flat surface of the airfoil fuselage, which, for its volume, proved stronger than the tubular form of the conventional transport. The engines were at the head of the structure, and the massive power plant and engine mount structure absorbed a portion of the impact.

The broad fuselage was surrounded by all the highly stressed members: the wing-beams across the ceiling, the landing gear structure at the sides, the engine mounts in front, and tail-boom members in the rear. The box-like structure had greater resistance to telescoping than the tubular fuselage shape.

With these obvious advantages the question arises as to why the Burnelli theory has not been applied to the construction of transport and cargo aircraft on a larger scale. The answer probably lies in a conservative engineering trend that is inherent in the industry. Remember that aviation hung on to bestrutted and cross-wired biplanes for a couple of decades after the cantilever monoplane was proven more efficient. Controllable pitch propellers, flaps, variable camber wings, hydraulic shock absorbers, wheel brakes, superchargers, and any number of devices considered vital today were created during the first World War or immediately afterward. Yet they were not popularly adopted until the middle thirties. In a business where profits are short and risk is high, it is too easy to build what has been proven before, no matter how good the new idea looks.

Another thing that may have held back the development of the lifting fuselage is the fact that Burnelli held one of the few broad basic patents since the Wright Brothers, and the outside building of a lifting fuselage would have been a direct infringement. In addition, Burnelli holds over 60 patents applied to the principle and detailed arrangements of design for the employment of body lift which is the basis for the all-wing design, and the aviation industry does not have a first-rate record for "paying off" for the originators of ideas.

The plane currently being built under the Burnelli patents is a twin-engined cargo craft known as the CBY-3. The aircraft branch of Canadian Car and Foundry is completing licensing flights for type approval. The same design will be built shortly in the United States.

The CBY series is a twin-engined high wing monoplane, powered by two R2000 series 1200-hp Pratt & Whitney radial air-cooled engines. The wingspan is 86 feet, over-all length 54 feet six inches, clearance height 13 feet four inches. Of the total lifting area of 1,234 square feet, almost half is contributed by the fuselage.

The lifting fuselage is divided into two sections. Practically at the center of gravity is a 750-cubic foot unobstructed cargo compartment, accessible from either side of the fuselage by an accordion-type door set at tailgate height. The doors are six feet wide. Behind this compartment is the passenger section which can accommodate 24 passengers. An all-passenger version of the design carries 18 additional persons in the forward section. The cockpit is conventional, resembling most transport type twin-engine cockpits.

The landing gear on the current prototype is conventional in position, using double wheels all around. While a tricycle landing gear is optional, the current CBY design is made to operate from short, unsurfaced fields. In these operations it has been proven better to have the heavier landing members lead, both in take-off and in landing. In the new transport, the wheel wells are accessible in flight for adjustment and repair.

Despite the craft's small size, the performance figures, calibrated by noted test pilot Clyde Pangborn, are rather startling. The craft, which weighs but 15,365 pounds empty, has a payload of 10,000 pounds. It has a maximum speed of 225 mph at sea level, and a cruising speed of 212 mph. At 28,500-pound gross weight the stalling speed is 68 mph. On 850 gallons of fuel its range is eight hours.

There are several variations on this design. One is an all-passenger express design, made for short-haul and feeder

(Continued on page 64)

CBY cockpit, designed for pilot comfort, has porchlike visibility. Situated behind the engine, it is protected by the heavy structure.

Wheel wells on the Burnelli are accessible in flight through a hatch leading from the cockpit. On later models, the engine can be reached.

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CITY & ZONE STATE

let's get Chummy

Quiet, comfort and visibility feature Aeronca's new two-control spinproof light plane, the Chum

BY SANFORD A. WOLF

BACK IN 1909, when Santos-Dumont built the ancestor light plane "Demoiselle," he prophesied that personal flying would always be limited by the cost of aircraft and the ease of operation. Since then airplane builders have consistently fought against custom-type production methods in order to achieve lower prices, but they have been able to do little about the ease of operation because tradition has worked against any departure from the conventional stick-and-rudder system of control. Now for about the first time, advocates of a two-control system, which allows an airplane to be "steered" through the air without the usually required close coordination between stick and rudder, are making a dent in the private airplane field. Aeronca, long a builder of conventionally controlled light airplanes, has announced that line production of the Chum, a spinproof two-place side-by-side job using a two-control system, will begin early in 1947.

The Chum is a tricycle low-wing monoplane, built entirely of riveted aluminum alloys. The only structural deviation is the chrome-molybdenum steel tubing used in the engine mount and landing gear. The wings also are metal covered. The fuselage is made in five major assemblies, center fuselage, fore and aft cabin, roof, and doors and tail cone. These sections are joined by bolts and screws to facilitate easy repair.

The cabin is designed for ample head and leg room, and all plumbing, electric and accessory lines are concealed by interior panelling.

The control system is similar to that of the Ercoupe (licensed under ERCO patents), with linkage of ailerons and rudder. Even cross-wind take-offs can be achieved by steering the airplane along the runway as an automobile would be steered. Cross-wind landings are achieved by the same relative technique.

The Chum is powered by the usual choice of opposed-four 85-hp air-cooled engine. With a useful load of 540 lbs., it has a top speed of 115 mph and a cruising speed of 105. Landing speed is calculated at 49 mph. The wingspan is 28 feet 8 inches, and over-all length is 20 feet. Gross weight of the aircraft is 1400 lbs.

Special care has been given to interior comfort. Noise has been reduced to the lowest possible level by such devices as engine mufflers and soundproofing. Cabin ventilation has been carefully engineered, using an adjustable scoop in the roof and no-draft ventilators forward of the door and in the door-windows themselves. Cabin heaters are provided.

Visibility in the Chum is unusually good, due in part, to the pilot position in a tricycle plane, and partly to the slanted design of the engine cowl. An electric starter is another popular feature. Cabin doors are unusually wide to allow easy access to seats. Outside doors are so designed as to make it impossible for a passenger to step forward over the leading edge getting out of the airplane.

The production of the two previous designs, the Champion and the Chief, will continue at top pressure; 1946 production is expected to reach 10,000 units, 9,000 better

The Chum incorporated the ERCO two-control system eliminating the controlled rudder. Below, the Chum's roomy coupe-type cabin with extra-wide doors for easy entry. Note slanting instrument panel.

than the best prewar year. Despite holdups in materials and shipment, the halfway mark on this schedule was reached by Aeronca in mid-September.

The cover picture on this issue has a new side-by-side seating Chief in the background. While this design will essentially satisfy the same operational need as the Chum, it is a thoroughly conventional airplane. It provides some interesting comparative figures for the benefit of those who think that the two-control design makes an unreasonable demand on a plane's over-all performance.

	Chief	Chum
Power	65 hp	85 hp
Maximum speed	100 mph	115 mph
Cruising speed	90 mph	105 mph
Useful load	525 lbs	540 lbs
Range	420 miles	400 miles

The demand for light trainers for primary instruction under the GI Bill of Rights has created an unusual demand for the Aeronca Champion, 65-hp Continental tandem-sport often used as trainer.

Production will continue on conventional Aeronca designs. The side-by-side Chief still holds popularity in the 65-hp field because of its 90 mph cruising speed and 420 mile range, and electric starter.

BY MAJOR GENERAL DAVID M. SCHLATTER

Deputy Commanding General, Air University

WARS are fought on the battlefield with a degree of success directly proportionate to the thoroughness with which they are planned and thought out beforehand. The officers and men of the U. S. Army who are charged with the responsibility of maintaining national security must plan in peacetime what weapons they will use in war, how they will use them, and against what targets. They must keep abreast of the enemy's potential and they must be ready on an instant's notice to direct the utilization of the instruments and techniques of war which they believe are the most efficient.

Technological advances have become so rapid and far-reaching in their effect on weapons and doctrine, that the possession of sound up-to-date concepts by the leaders of any nation may well be the difference between survival and loss of national existence. Unsound ideas of air employment in Germany and Japan spelled defeat for them in World War II. Relatively correct concepts enabled Allied airpower to be decisive in both theaters. Future tempo will be greatly accelerated, hence there is a need for better doctrines, continuously revised in the light of technological progress.

It was with responsibilities such as these in mind that the Air University started classes at Maxwell Field on the third of September. The cadets and flight instructors of wartime days are gone. Maxwell is no longer an undergraduate school. It is a postgraduate institution where the cream of Air Forces personnel will strive for mastery of principles and techniques. The Air Forces, whose only tradition has been the lack of one, has declared open season on reaction and dogma. It may or may not be true that the AAF "couldn't fight its way out of a paper bag" at this moment, but it must be remembered that wars develop by stages. The planning period comes first. It is followed by mobilization and fighting. We may be pathetically ill-prepared to fight, but such things as the establishment of the Air University prove that at least we are not forgetting our first responsibility.

The importance of the university in the Air Forces scheme of things is indicated by the fact that it has been designated as one of the eight major commands directly under Gen. Spaatz' jurisdiction. As a Headquarters it ranks above any of the 12 numbered air forces, and on a par with such activities as the Air Transport Command, the Training Command, the Air Matériel Command, the Air Defense Command, etc. As an institution of military learning, it is "outranked" only by The Armed Forces College, which deals with Joint Staff operations on a theater level, and The National War College, which deals with the direction of war on a national scale.

The mission of the Air University is delineated in AAF Regulation 20-61 as follows:

(1) To operate the Air War College, the Air Command and Staff School, the Air Tactical School, the Special Staff School, and the School of Aviation Medicine.

(2) To exercise broad supervision over the Air Institute of Technology.

(3) To make a continuous survey of the over-all educational system, submitting appropriate plans and recommendations to Headquarters AAF.

(4) To continuously survey and recommend civilian courses to round out the instruction offered by AAF schools.

(5) To train, indoctrinate, and supervise AAF instructors presenting Air Force instruction at non-AAF schools.

(6) To review, revise, and prepare Field Manuals and Staff Studies; to monitor tactical service tests; to review and evaluate all antiaircraft matters other than the strength required for air defense.

The tenets which will guide the University staff in the accomplishment of its assigned mission are these:

(1) That the ultimate objective of air power is to force the capitulation of an enemy nation by air action applied directly against the vital points of its national structure.

(2) That armed forces exist primarily to preserve peace.

(3) That all instruction and doctrines must be keyed to the future.

(4) That the education offered by the Air University should be divided into two phases: first, instruction designed to furnish officers with the factual knowledge, skills, and techniques essential to them as commanders and staff officers; second, instruction to guide the future thinking of the Air Forces.

(5) That instruction must in general be oriented globally and the utmost use made of polar projection maps.

(6) That technical developments must be given continuous study and presentation to keep abreast of scientific developments and to project doctrines toward the future.

As indicated in AAF Regulation 20-61, the University is composed of Headquarters (commanded by Major General Muir S. Fairchild) and five subordinate schools. Supervision is exercised over a sixth.

The Air Tactical Field at Tyndall Field, Florida is the foundation upon which the rest of the University's educational system is built. Some emphasis here is on a broadening, stimulating orientation designed to guide future thinking. The courses will stress the responsibilities of a squadron commander and comparable staff officers in leadership, tactics, and techniques, intelligence, communications, administration, supply, personnel management, methods of instruction, public relations, civil affairs, and new developments. The courses will be oriented secondarily on the group level and broadening subjects for orientation such as geo-politics, higher organization, ground forces, and Navy.

The staffing of the school with instructors was accomplished after a great deal of study and review of records of officers throughout the Air Forces. The project had a very high priority in requisitioning officers for duty assignments. War heroes such as Col. Hubert Zemke of the Eighth Air Force Fighters, Col. Delmar Wilson of the Eighth and Twentieth Air Force Bombers, Col. Richard A. Logg, veteran fighter pilot of the Pacific and the ETO, are typical key instructors of the staff. Commanding General of the Air Tactical School is Brig. Gen. Joseph Smith of Scranton, Penna.

The curriculum of the Air Command and Staff School is designed to train selected graduates of the Air Tactical School, and certain others, to command Groups and Wings, and for comparable staff positions. Instruction is divided between teaching the necessary skills and techniques and the broadening phase designed to shape future thinking. Emphasis is placed on how to apply air power at the level of the group, the wing, and the air force, and the responsibilities of the com-

manders. Orientation is designed to lead more and more toward careful thought on why, when, and where to apply air power. The staff of instructors, all carefully selected senior officers is headed by Brig. Gen. Earl W. Barnes.

The Air Institute of Technology now being organized at Wright Field, Ohio by the Air Matériel Command has as its mission providing instruction to assure scientific technological development of AAF equipment, and efficient operation of procurement, supply, maintenance, and engineering responsibilities assigned to the AAF. Its level is about the same as both the Air Tactical School and the Command and Staff School on the technical side. Initially, emphasis will be given to develop young officers scientifically educated to act as links between the Air Force and the scientific world.

Special Staff School courses are given at both Craig and Gunter Fields in Alabama. The school will provide specialized instruction not otherwise available in the University to prepare selected officers for administrative and technical assignments on the staff of groups and higher units. Courses include air communications, public relations, senior intelligence, military management, advanced air inspectors' course, and general air inspectors' course.

The School of Aviation Medicine, which has been operating for years at Randolph Field, will continue to do so under the over-all guidance of the Air University. At present, courses are being conducted for aviation medical examiners, aviation nurses, air evacuation, with a basic and advanced course for Air Force Medical Officers. Technical supervision will remain as heretofore with the Air Surgeon.

The top echelon of the new Air University is the Air War College, commanded by Major General Orvil A. Anderson. Its assignment is to prepare selected senior officers for command and staff duty of higher Air Force units. The student officers study organizations, strategical and tactical employment of Air Forces and larger units, the selection of target systems, targets, and aiming points, strategic considerations concerning defense against air attack, and the effects of the application of atomic energy in aerial warfare.

Conducted along the lines of current and future trends, the Air War College encourages the study of new developments and their implications concerning future aerial warfare, involving both offensive and defensive measures. It is a deliberative agency whose function will be to consider and present solutions to broad problems affecting the Air Forces.

The first class of the Air War College as well as the faculty consists of the top senior officers of the Air Forces selected from thousands of highly qualified, combat-wise, and experienced officers available for this enviable assignment. This course of study will vary from the other schools of the University in that the students will work as committees on various problems along with the instructors.

C.G. of the Air Univ. is Maj. Gen. M. S. Fairchild (right) who started career as private.

Maj. Gen. D. M. Schlatter, of Ohio (left), University's Dep. C.G., is young, progressive.

Brig. Gen. J. Smith (right) heads Air Tactical School. Switched to AAF from Cavalry.

Col. H. G. Armstrong (left) commands School of Aviation Medicine at Randolph Field.

Air University comes directly under jurisdiction of Hqs AAF and Gen. C. A. Spaatz (below).

Maj. Gen. O. A. Anderson supervises Air War College which is the top echelon of the Air University.

Brig. Gen. E. W. Barnes, top man at Air Command and Staff School, is native of Nebraska.

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It can ice up safely and fly inverted without even leaving ground

'tronic trainer

ONE OF THE FIRST radical departures in the design of flight trainers was demonstrated recently at the Curtiss-Wright Propeller Division in Caldwell, New Jersey. Under instrument conditions the Dehmel trainer "flies" upside-down, ices up, and generally gets itself into any trouble which might confront its prototype plane. The great advantage, of course, is that the student can make a final landing several feet below surface and still walk out of the trainer.

The Dehmel unit differs from previous devices in that it is entirely electronic in operation. It simulates exactly the flight characteristics of a particular airplane as expressed in instrument readings and in the sounds the pilot hears. Although originally the Dehmel trainer had angular movements, these were eliminated to prevent the student from trying to fly "by the seat of his pants."

The Curtiss-Wright trainer is based on an electronic computing system which continuously, and instantly, solves the differential equations that express the motion of the airplane in space. The circuit employed is principally a multi-servo system in which the variables are introduced as potentials, obtained from voltage dividers actuated by the controls.

These dividers are shaped potentiometers, contoured to produce voltage variations corresponding to the moments of thrust created by each airfoil or engine control. The factors expressing these variables are of the same form for any conventional fixed-wing airplane, so that any one electric computing machine can be adjusted to simulate the characteristics of other types of aircraft in the same general class.

When the controls are operated, the interacting effects of lift, drag, thrust, and the other varied moments and forces acting on the airplane are developed as electrical voltages. These signals are sent to the computing machine which derives the correct solution to the differential equations and sends them to the proper instruments, where they are expressed as changes in speed, climb, turn, pitch, or roll. The same impulses are also used to vary the control load and the sound simulating device, and actuate the course-plotting unit and the radio navigational aids.

The entire Dehmel trainer is contained in a single unit requiring floor space of only 3⅓ x 8⅚ feet. It will operate on ordinary house current, 15 amperes, 115 volts. The servo motors are the type used widely in antiaircraft gun directors and bomb sights. All of the electronic tubes are of the common commercial type and can be obtained in any good retail supply store.

The trainer can be set up to simulate any range in the U. S., adding such occurrences as icing, cross-wind, and rough air. The course of the plane during any specific problem is traced on a rotating disc. While the presence of an instructor is desirable, it is entirely feasible for the student to set up his own problem and fly it.

Currently, trainers for the AT-6 and P-38 are being built. However, special trainers are being created for Pan American Airways to provide ground instruction facilities for the crews of Republic Rainbow transports. This setup includes posts for two pilots and a flight engineer.

Dr. Dehmel, inventor of the Curtiss-Wright electronic trainer (below), checks the recording stylus on the special setup for P-38s. The device reproduces the characteristics of the airplane by means of electronic circuits controlled by potentiometers. The arrangement of the electronically controlled mechanism which computes the instrument indications for the new trainer is shown at left. Picture shows the technician pointing out one of the automatic servo-mechanisms.

ELECTRONIC TRAFFIC control

Navar, Navaglobe, Navaglide and Navascreen apply radar to the problem of all-weather flight operation

THERE ARE two prime problems in the expanding air traffic picture. One is long-range navigation, and the other is reducing the weather bogey to the point where airmen will be able to fly heavily loaded airways and use busy airports under almost any meteorological extreme. Methods for solving these problems were outlined recently by engineers of Federal Telecommunication Laboratories, associate of the International Telephone and Telegraph Corp. The proposal applies four interrelated systems known as Navaglobe, Navar, Navaglide, and Navascreen.

The solution to long-range navigational problems is proposed by means of Navaglobe, which involves the use of low-frequency transmission stations, each of 1500-mile range, strategically positioned over the earth's surface. Sixty stations would be needed to position all ocean areas, and no more than 75 to cover the earth, with the exception of the polar caps. These would be omnidirectional stations, somewhat like the CAA omnidirectional range stations, which operate on Very High Frequency and have very limited range. The setup would permit a pilot to determine his horizontal angle, relative to the station, and his true bearing relative to North. By tuning in on two such stations, the pilot could obtain cross-bearings, from which a fix could be determined. These bearings could be obtained from two dials on the instrument panel, which give him at a glance the direction in degrees and the azimuth. Used in conjunction with a magnetic or gyro compass, the system permits the pilot to fly a correct, errorless course.

In normal overland flying, the system of radio ranges and other aids to navigation give the pilot adequate information on course and location under normal visibility conditions. It is when the weather closes down that air traffic must know exact locations of airports and obstructions and the position of other planes in the vicinity. The Federal system proposes to solve this by use of Navar and Navascreen.

Navar is an application of radar principles which provides the airways control point with an electronic "moving picture" of all traffic in the area, reporting the exact position of all aircraft in altitude as well as azimuth. A condensation of this picture is then retransmitted to the airplanes equipped with a special instrument known as a Navascope.

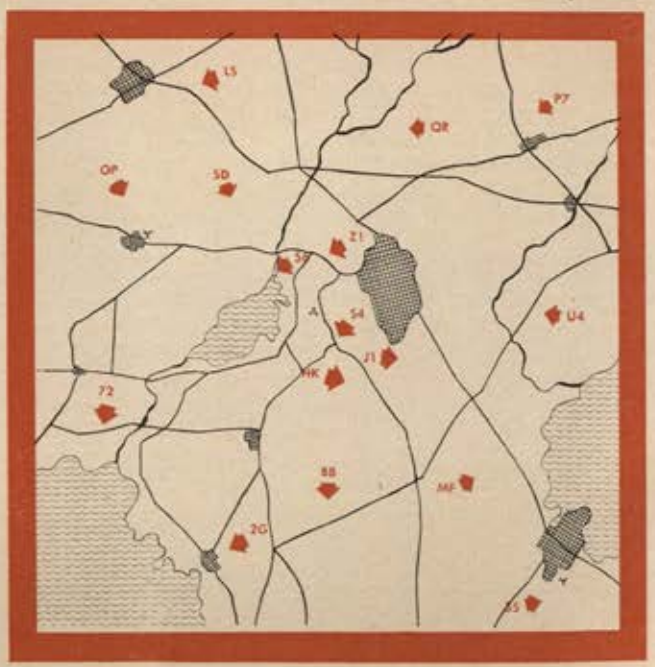
The Navar control points will be able to account for all aircraft within 80 miles of the station, whether or not they are equipped with Navar. Aircraft in the control area are classified in three categories: *member* planes, which are in the area and tuned to the particular frequency; *guest* planes, which are Navar equipped, but tuned to another frequency; *strangers,* planes whose Navar is not operating.

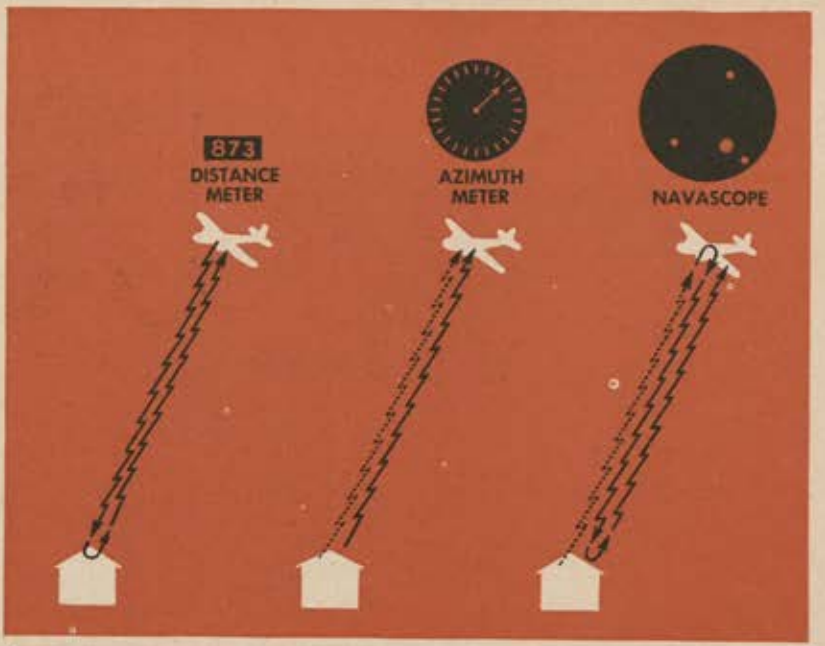
Ground station equipment includes three units, each of which picks up planes of a particular category on its scope. Each scope has a projector which throws a dual image, one on the face of the scanner, the other onto a large map of the area, which acts as a screen on the wall. A small figure is focussed on each airplane in the scope, which in turn is projected in correct relative position on the screen.

Once this adjustment has been made, it is taken care of by a semi-automatic machine, which keeps the number moving along with the airplane image, and only requires periodic

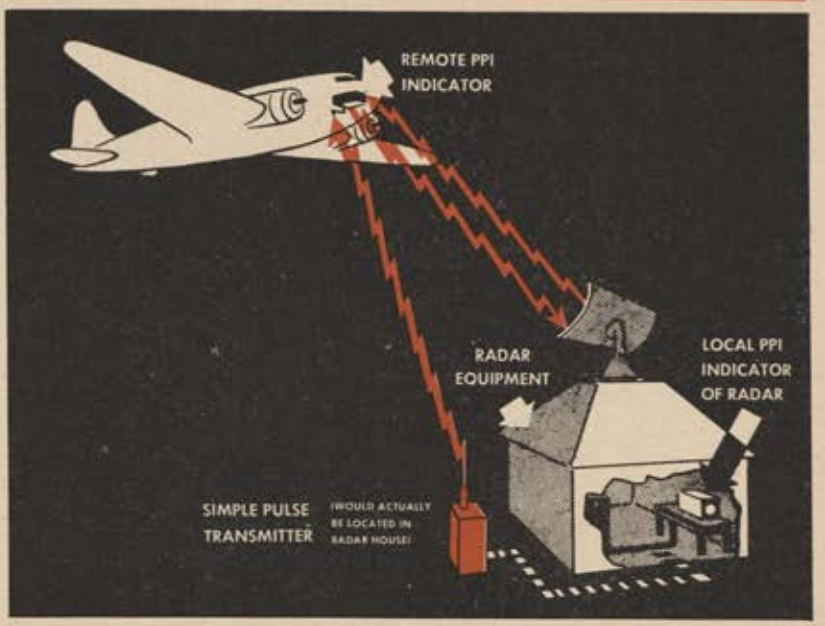
(Continued on page 64)

This is how the ground display of the Navascreen looks to operators.

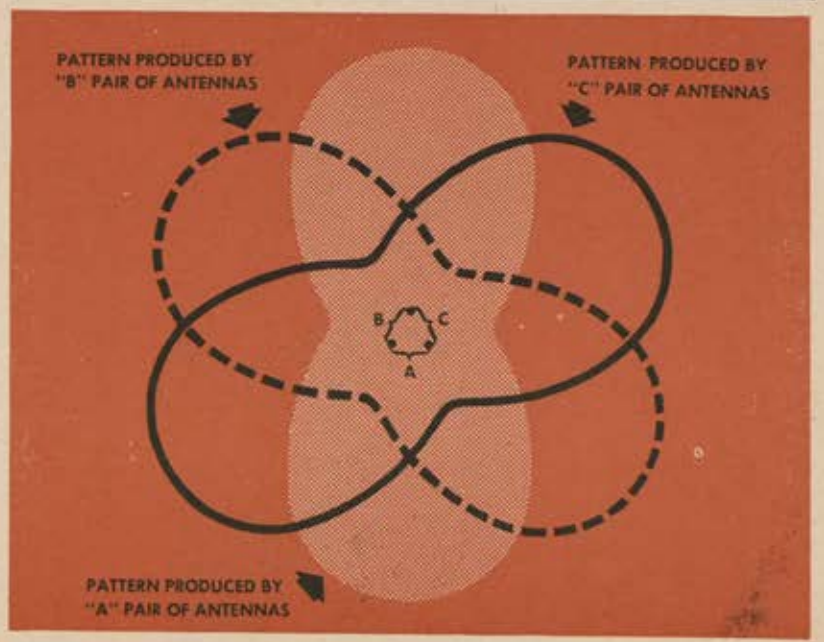




Three functions of Navar which provide ground PPI on the position of planes within 75 to 100 miles of the station. Indications are in distance, in azimuth as well as a comprehensive picture which shows all aircraft in the area with responders.



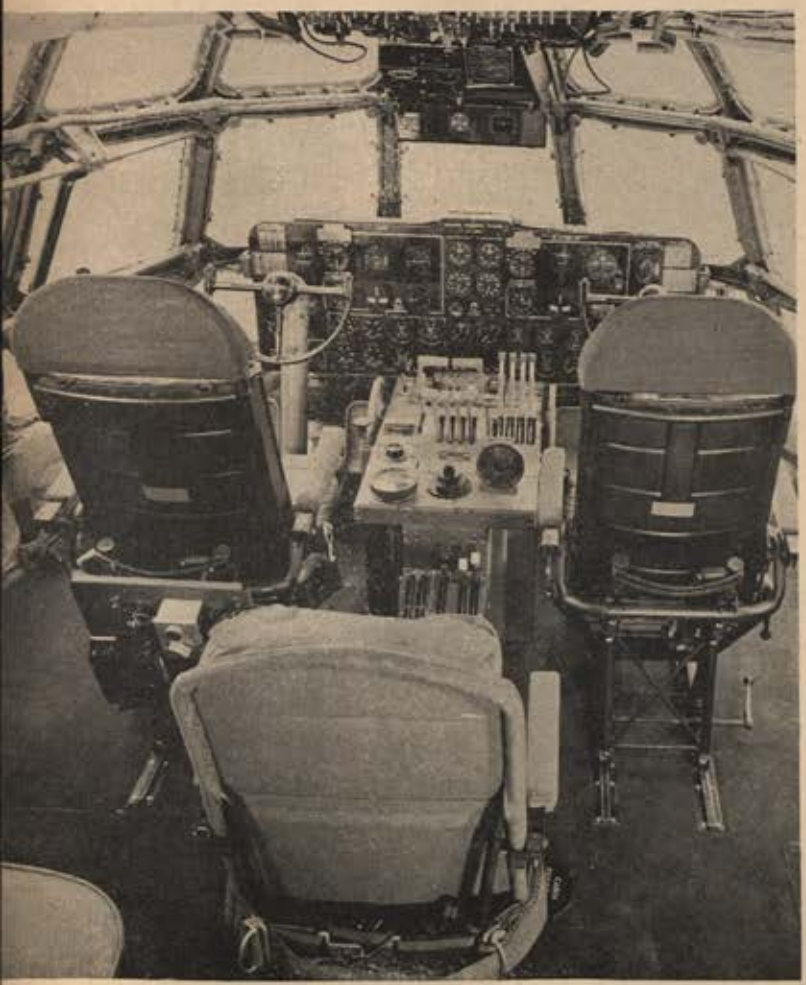
Schematic of the operation of the Navascope, which determines the position of the airplane and transmits the impulse to its PPI indicator together with appropriate synchronizing signals for controlling the rotary and radial sweeps of the indicating unit



Radiation patterns for the Navaglobe system, which calls for a universal system of marker stations from which aircraft can obtain constant navigational positions. A network of seventy-five stations can cover the globe with the exception of the polar caps.

HOW TO FLY the C-97

Cargo-Passenger version of the Superfort, Boeing's Stratocruiser combines efficiency with ease of operation



COMMERCIAL AVIATION inherited a lot of valuable things from the military—radar, water injection, and fast wing sections, to mention just a few. Among the most valuable was a military cargo-transport called the C-97, whose ancestor was the Superfort. Mustered out, it is called the Boeing Stratocruiser, and is destined to make its appearance shortly on the world skyway system. This article will not concern itself with the passenger accommodations, for the commercial phases of its performance are well known. Previous publicity has already emphasized its 43 per cent useful load, its 340-mph cruising speed, and the fact that the entire fuselage is pressurized to allow overweather operation. It has also been widely publicized that great care was exercised in extracting the maximum in passenger comfort by ultra-modern soundproofing, luxury seating, galley and lavatory facilities, and the like.

From the pilot's point of view, there are still a lot of questions to be answered. First, what are the handling characteristics of this high wing-loaded airplane? There have been heavily loaded planes in the past that were inferior in handling. This inferiority, however, stemmed not from loading but from lack of correct design for the craft's particular job. The development of special wings in the Boeing 117 enables the airfoil to do more work for its surface and weight than was previously considered practicable. When the pilot sits down at the controls of the Stratocruiser, he gets an impression of space and order. Seats are adjustable to and from the control column, in height and in back angle. Rudder pedals are adjustable in height. Unlike many previous four-engined designs, the Stratocruiser allows the flight engineer forward vision. His position is behind the engine control console, which is set between the pilot and co-pilot. This makes the engine controls available to all three members of the crew, eliminating duplication of engine controls and engine instruments.

In the control system itself, surfaces are aerodynamically

balanced so that, by the application of properly placed friction reduction, power-boosted controls are made unnecessary. This means that the pilot can still "feel" the airplane. The overhead switch panel marshals all secondary functions such as auxiliary power, hydraulic pressure, and starting configurations. Among the navigational instruments utilized are the drift-sight and ground-speed indicator, Pioneer fluxgate compass, Gyrosyn compass, radio compass, and autopilot.

Flight Procedure

The cockpit arrangement for the C-97 offers great latitude in operational responsibility. Ordinarily, the pilot starts all four engines, with either the co-pilot or the engineer assisting on mixture and throttles. After starting, engines are run at 1,000 to 1,100 rpm until oil temperature reaches 40°C. Then it is raised to 1600 revs, where prop governors and feathering switch checks are made. Then the warm-up speed goes to 2100 for magneto checks. From here the run is made up to take-off power and turbos are set. All pilots go over the printed check list before taking off.

After getting tower clearance and taxiing to the runway, the flight engineer sets the cowl flaps, and the co-pilot depresses the flap to 25° for take-off. The nose wheel, on a vertical pivot, centers automatically. Two methods for take-off are possible. On a long runway, power is applied gradually, with differential throttles used to maintain course in the early stages. For short fields, brakes are applied and throttles are opened, then brakes are released gradually. A straight course is maintained by using both brakes and rudder. The control wheel is eased back at 90 mph to clear the nose wheel from the runway. The airplane will fly itself off at 100 to 120 mph depending on the load.

Once the ship clears the ground, brakes are applied to stop the rotation of the wheels and the landing gear is retracted. At 140 to 160 mph indicated, the flap is pulled up, and power is reduced from a manifold pressure of 49 inches of mercury to 43.5 inches in the first stage. At about 1,000 feet, cruising climb power reduction is made, cutting to 39 inches. The flight engineer sets the cowl flaps to "cool" after the first power reduction.

The C-97, like every other airplane whose design was influenced by the late Edmund T. Allen, is easy to control. One hand on the wheel is enough for any maneuver. There is a minimum unbalance when the gear is down or the flaps are extended, and no trim set change is required.

In flight the engineer, who handles the fuel system, shuts off fuel boost pumps one at a time, checking the fuel pressures carefuly as the change is made to engine-driven pumps. Intercoolers are adjusted to about half open, to give proper carburetor air temperature. Since the aircraft is so large, the flight engineer can simply go downstairs and check landing gear and flap position from a window in the lower deck. At 10,000 feet, the C-97 will indicate 200 mph at 60 per cent of power, 1,200 hp per engine. After leveling off, the flight engineer cuts back to auto-lean for the remainder of the trip. At cruising altitude, the plane is turned over to the automatic pilot, and the navigator becomes the hardest working member of the crew.

During descent it is good practice to build up a little speed to make up for time lost in climb to altitude. In going up or coming down, the flight engineer handles cabin pressure controls. While the actual pressurization is automatic, his job is to check its operation and make sure that doors and hatches are closed. He also checks temperatures for passenger comfort, operating the regulator on the co-pilot's panel.

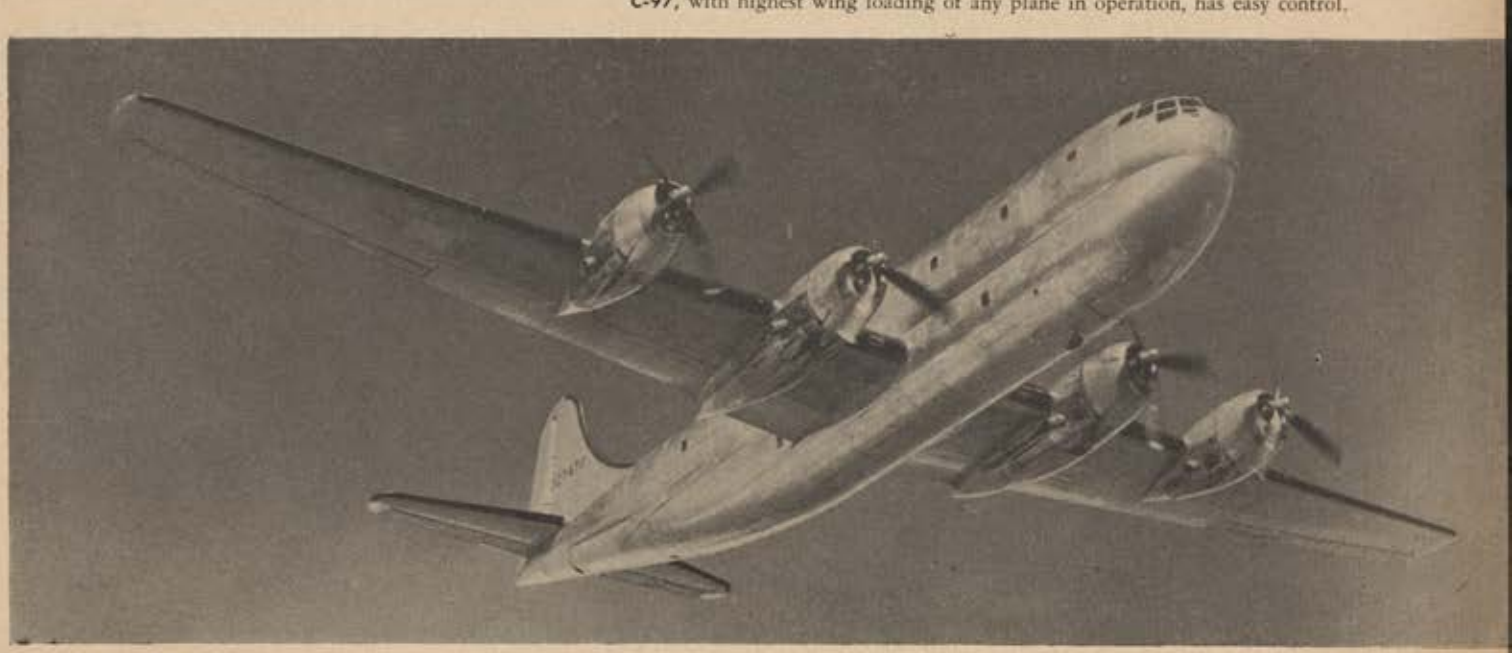
In actually coming in the co-pilot lowers the landing gear at 190 mph indicated, on the downwind leg of the approach. On the base leg, flaps are lowered to 25°. The approach is made at 150 mph, and full flap is lowered two or three miles away from the field. Because of the connected trim tab system, no manual adjustment is required in lowering flaps.

While the pilot is making power adjustment, the co-pilot gets tower landing instructions. Final approach is made at 125-130 mph. Props are set at 2400 rpm, and manifold is set for full take-off horsepower, just in case. The Stratocruiser lands at 100 mph, and can be flown in or flared out before it touches down.

Normally the nose wheel is kept off the ground for the first thousand feet, but it can be dropped immediately for cross-wind landings. Full brakes can be applied for short stops, and on both the late series C-97 and the commercial Stratocruiser reversible pitch propellers are available to cut the run even further.

Once on the ground, the flaps are pulled up by the co-pilot. Except on abnormally hot days, the cowl flaps are kept closed during approaches.

C-97, with highest wing loading of any plane in operation, has easy control.



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DC-3 EXECUTIVE

For over a decade, the Douglas DC-3 has been the wheel horse of U. S. air lines. During the war, hundreds were built for Troop Carrier and Air Transport Command, and used wherever the Armies moved. As a postwar project, Douglas has repurchased some of the best C-47 transports, put them through a factory rebuild and refurbished them as executive transports for sale to individuals and companies.

Two general floor plans are offered, one calls for four 3-seat couches, facing inward, in the forward part of the cabin, plus a grouping of four seats on either side of a table on right side of the plane, as shown in the upper picture. On the left side, opposite the aisle from this group are two seats, one facing a desk. Better-than-airline buffet and dressing room facilities are provided.

The second arrangement is generally similar, except that there is only one set of couches, as seen below, right. This version has a console on either side of the settee, one used for storage, the other containing a radio, as shown below, left. The couch can be converted into a bed by removing the arms and lowering the pullman-type curtains stored in the drop-rack overhead. Executive-type transports can be serviced almost anywhere in the world. The ships are being marketed at $115,000, a fraction of their contract cost.

For the Record

For future reference—last month's entries in aviation's personal ledger

22 September

Army-Navy Liaison Committee on Medical Research, decides that under present conditions, around 750 miles per hour is the safe speed limit for the human body. Mechanical safeguards rather than super-selection and training of airmen is decided on for safety at supersonic speeds.

23 September

CAB announces a new regulation under which airline and large private aircraft must be fireproofed. Non-inflammable hydraulic fluids, fireproof bulkheads, fire resistant hoses are among the changes required.

25 September

TWA shows first flying post office at Washington Airport. Mail is sorted, cancelled and made ready for distribution in flight on this converted C-54, as it is on a mail car on ground.

An approved type certificate is issued by the CAA on a JATO (Jet Assisted Take-Off) motor—the first rocket device to be approved for commercial use. Manufactured by Aerojet of California, it will be used to boost DC-3's and DC-4's out of short fields.

Thirteen nations participating in PICAO decide to maintain a chain of 13 vessels in the North Atlantic to act as weather stations. U. S. will maintain 8, one jointly with Canada.

29 September

General Carl Spaatz announces that competition for several aviation awards and trophies, suspended during the war, will be revived. The prizes to be revived during 1946 included the Mackay Trophy, the Collier Trophy, the Cheney Award, Frank Luke Junior Memorial Trophy, Edward S. Evans Glider Trophy, Daedalian Trophy and the Columbian Trophy. The Mackay Trophy is the oldest, dating back to 1912.

Aircraft Industries Association announces a backlog of 27,795 private airplanes in U.S. Two to three place light planes lead in popularity.

1 October

Air-mail rate goes down to five cents an ounce.

Navy Lockheed Neptune, Truculent Turtle, sets world's distance record, Perth, Australia to Columbus, Ohio, 11,236 miles in 55 hours and 15 minutes.

5 October

Icelandic parliament ratifies agreement giving the U.S. use of the Reykjavik airport.

6 October

Boeing Superfortress "Pacusan Dreamboat" completes flight from Hawaii to Cairo, 9500 miles over the North Pole in 39 hours 33 minutes, proving feasibility of flights over polar cap.

(Continued on page 61)

"What does she look like, Joe...?"

"I wish I could see again, just for a minute . . .

"But when a Jap grenade has taken your eyes away, it's no use wishing. And I've been blind for fourteen months now . . .

"It's funny, though. In some strange way, she *has* helped me to see. Helped me to see a lot of things I wasn't so sure of . . .

"Hearing her voice has made me see something of human kindness, and basic human goodness.

"It's not just that she and the other USO folks are here to 'entertain'—though God knows that means an awful lot when you're shut into a military hospital . . .

"It's the fact that we're not *forgotten,* that counts. That you people outside these hospital walls *do* remember us. I think a man can somehow stand *any* sacrifice so long as folks *remember* what we did.

"What I see when she sings is—*America.* I see you folks out there trying to help us. I see you giving money to the USO so that our lot *will* be a little easier to bear.

"And I see you—through your giving — doing more than you'd ever believe to reopen the doors of life to us. I see you shaking us by the hand, and saying: 'Don't worry . . . we'll *never* forget!'

"So . . . *please* . . . *keep* giving to the USO! I know you *will*—right now!"

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FOR THE RECORD

(Continued from page 59)

7 October

The United States Court of Appeals questions the authority of the Civil Aeronautics Board to reopen the West-Coast-Hawaii Air Routes case which allowed United Air Lines to start such service but denied the right to five other companies.

10 October

Control of research on remotely guided missiles is put under the Air Force, thereby ending a two-year dispute within the War Department.

13 October

Six light planes land in the heart of Oklahoma City as National Aviation Clinic opens.

AAF starts work on $25,000,000 to $35,000,000 project to turn 70-square-mile region at Muroc Dry Lake into airport for rocket and jet aircraft.

14 October

AAF high command considering plan to transform heavy bombers into guided missiles to be directed against targets by remote control. Such missiles could fly 3,000 miles or more, and act as stop-gaps until long-range rockets reach production stage.

15 October

Navy holds first public demonstration of radar-guided "bat" bomb; will train all air units in its use.

16 October

CAA announces that it will install radar ground control approach systems at Newark, Chicago and Washington, D. C.

AAF, with the backing of General Eisenhower, is again planning seventy air groups.

18 October

Floyd Bennet Airport, used by the Navy since before the war, is returned to the city of New York for commercial use.

General Carl A. Spaatz, C.G. of the AAF congratulates Colonel C. S. Irvine (left) who commanded the Boeing Pacusan Dreamboat (see page 38) after the planes return to Washington, D. C. from Cairo. WAC Captain Ruth Saltzman of Washington, D. C. made the long flight from Honolulu to Cairo as the Dreamboat's mascot.

LIFT WITHOUT DRAG

(Continued from page 44)

service. Another is a flying mailcar, equipped with twin pick-ups and a full mail-sorting arrangement.

Future Design

Probably the most discussed of Burnelli's designs is a four-engined craft currently being considered by one of the major foreign carriers. This CB-7 design will be built for 3,000 mile ocean trips, carrying up to 72 passengers, depending on the cargo-baggage proportion.

Like all previous Burnelli designs, the CB-7 will be a lifting fuselage craft with appended tailbooms carrying the tail surfaces. It will span 115 feet and have an over-all length of 71 feet 6 inches, and will be powered by either four 1710 Allison engines or two 3000-hp Pratt & Whitney Wasp Majors. If the Allisons are used, the power plants will be placed one behind the other, with the rear units slightly inboard. Power will be fed through shafts into a unitwin gear-box, which will deliver to six-bladed contra-rotating propellers. The system will be equipped with an emergency throw-out system which will allow any single engine to be disconnected automatically in case of power failure.

If the air-cooled units are used, they will be completely buried in the fuselage, and cooling air will be ducted in line with the indirect cooling system patented by Burnelli almost a decade ago. One of the major concerns of ocean operators of transport landplanes is what might happen to their planes in the event of ditching. Anyone who flew with Air Transport Command during the war remembers the briefing on this subject before each overwater flight. While this problem is alleviated by the absence of military risk and by scrupulous airline maintenance, the possibility of having to set a landplane full of passengers down in the ocean is always present.

Safety Feature

Burnelli's oceanic design incorporates a bulkheading system which would turn the lifting fuselage into a float-scow. Because of the flat bottom, the craft could be set down on the ocean without the usual risk of breaking up which dogs the average fuselage airplane. By the use of a patent device, the outer wing panels can be jettisoned, making the fuselage a hydrodynamically stable object which could float and shelter its passengers until aid came.

A cargo version of this design is also planned, which will have a cargo capacity of 5,500 cubic feet and 800 square feet of reinforced floor space. The ship will be rigged to allow easy loading from either side, or through a split ramp in the end of the aerodynamic fuselage. A part of the trailing edge clamshells up and down, the lower portion forming a loading ramp that can be lowered to any desired height.

In either version, the CB-7 is calculated by its designers to have a top speed of 375 feet, and an economical cruising speed of about 300.

Future design possibilities in the lifting fuselage class of airplane have been enhanced by the recent development of 40 per cent thickness wings in the laminar flow class. Proof that a wing section whose depth is 40 per cent of the chord can have top-rate efficiency gives the Burnelli idea one of the features it has always needed—more head room inside the center cell. While this is beneficial to the larger designs, their size has allowed use of previously known thick sections to advantage. The introduction of these 40 per cent curves to the flying wing will allow their use in feeder and charter planes, and may eventually introduce the lifting fuselage into the private flying field, where structural safety might show to advantage in compensating for the mistakes of the Sunday pilot.

AFFORD A PLANE?

(Continued from page 35)

plane with provisions for five passengers, at medium range, and, incidentally, would be efficient for charter and executive use. The estimated selling prices of these four examples are shown on the last line, illustrating the marked effect of increased performance, load capacity, and quality upon price, the range being all the way from $5,300 to over $10,000.

These estimated selling prices weren't just taken out of a hat. They were developed carefully and in detail. If anything, the estimated sales units for two years and the 80 per cent learning curve tend to be optimistic. For purposes of illustration, the hypothetical Airplane B was taken as the smallest practical four-place plane in this performance class, and it was assumed that 100,000 units would be manufactured in two years, just to see what effect substantial production would have on its selling price. Optimism was the guide in estimating various costs. The selling price of this very desirable ship comes out $2,860, quite a substantial reduction. It shows what may some day be expected when increased production is possible.

But $2,860 is still a long way from the $1,500 large numbers of consumers might be expected to pay. Surely no one could expect to sell 50,000 such planes per year even at the low price of $2,860, with lightplane utility as low as it is.

However, this is not a too discouraging picture. Rather, it is highly encouraging. The only discouraging thing is that many people, especially outside the industry, have gained the idea that the airplane everybody wants will be here next week or at the latest five years from now. Most people in the private plane industry will agree that the day will come when we can give the consumer what he wants at the price he wants to pay, but they would not venture a guess as to when.

Lower initial costs, which have such a tremendous effect on operating costs, will be the culmination of a long period of intensive technical research and development in partnership with the breaking up of the vicious economic circle we find ourselves in today. Customers have kept faith and bought large numbers of private airplanes even though they haven't much utility for them, making the first opportunity to break that circle. The next step is to provide more airports in more places, many of which should be a means to an end instead of an end in themselves like our present approach, thus improving utility. That means more customers will keep their planes and more will buy. More airports and more planes will provide the opportunity of spreading overhead costs and provide competition, both of which will react to reduce direct operating costs. That means more buyers.

Manufacturers will enter this cycle too. More customers buying and retaining airplanes will mean larger production orders which, when combined with improved design for performance with less horsepower, design with attention to maintenance detail, and design with emphasis on simpler construction detail, will result in lower manufacturing cost. Some producers will pass this saving along to the customer in the form of lower selling price for substantially the same product. Other producers will pass it along to the customer in the form of an advanced product at substantially the same price, for example twin-engine safety and performance in the small airplane, less noise and vibration, greater comfort, appearance and convenience, higher performance, greater instrumentation including radio and radar navigation facilities, and greater safety. Both approaches will be beneficial, and will result in still more buyers.

By the time we complete that cycle 10, 20 or maybe 30 times, we will have owning and operating costs low enough and utility high enough to start attracting enough customers to really get into mass production.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933,

OF AIR FORCE, published monthly at Richmond, Virginia, for October 1, 1946.

State of New York }
County of New York } ss.

Before me, a Notary Public, in and for the State and County aforesaid, personally appeared R. Fay Pangburn who, having been duly sworn according to law, deposes and says that she is the business manager of Air Force and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, executive editor, and business manager are: Publisher, Phillip Andrews, 545 5th Ave., New York 17, N. Y.; Editor, Phillip Andrews, 545 5th Ave., New York 17, N. Y.; Executive Editor, Ned Root, 545 5th Ave., New York 17, N. Y.; Business Manager, R. Fay Pangburn, 545 5th Ave., New York 17, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Phillip Andrews Publishing Co., 545 5th Ave., New York 17, N. Y.; Phillip Andrews, 545 5th Ave., New York 17, N. Y.

3. That the known bondholders, mortgagees, and other security holders, owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

R. FAY PANGBURN, Business Manager.

Sworn to and subscribed before me this 10th day of October, 1946.
(SEAL)
NATHAN GREENBERG.
(My commission expires March 30, 1948.)

ELECTRONIC CONTROL

(Continued from page 52)

checking to ascertain whether the airplane has made any changes in speed or course. This gives the ground observer a complete picture of the airplanes in the area, their speed, their altitude, and their course. Member planes are fitted with a means of spot-checking with the member ground scope. This enables them to transmit by radar their altitude and direction and answers to certain routine questions concerning flight conditions. This equipment resembles the old wartime IFF and requires no attention from the aircrew.

The assembled radar picture, the airplanes, member, guest and stranger planes, with their accompanying numbers, are sent back to the equipped planes along with basic flight information. These appear on the Navascope through a translucent map of the area on which plane patterns and numbers are displayed. Proper maps for the areas are placed in front of the Navascope semi-automatically, when the frequency channel for the station is selected.

A selector device is incorporated in the airborne section of Navar, which allows the pilot to see only planes in his general altitude level. This selecting machine keeps planes above and below from appearing as collision possibilities.

The AAF's instrument landing system (SCS-51) is applied to aid instrument landings. This system uses two intersecting radio-formed planes in space, one vertical, the other almost horizontal, slanted at 2½ degrees to contact the runway, making a "landing beam" which can be followed in poor visibility. A cross-pointered instrument is followed to keep the craft on the beam, the intersection of the electronic planes.

This system, known as Navaglide, is not new. It allows, through recent improvements, the simultaneous operation of several runways in a consolidated system, working on a single frequency. A precise distance indicator along the beam of the runway has been developed.

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Dear Former Member of the AAF:

The war against Germany and Japan is over, but the kind of peace we fought for has not been won. Every day's headlines tell of trouble, tension and unrest throughout the world. We who were a part of that great team, the Army Air Forces, are well aware that this is no time to relax our vigilance.

And yet, today we are as vulnerable to surprise attack as we were in the years preceding Pearl Harbor. General Spaatz has said "we are an Air Force in memory only." General Stratemeyer, who is charged with responsibility for our national air defense, has stated that "the present AAF couldn't punch itself out of a paper bag." Relegated to a secondary rôle, the AAF this year received less than $1¼ billion out of the $12 billion appropriated by the Congress for national defense. As a consequence, air research and the air reserve training program have been seriously hampered.

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