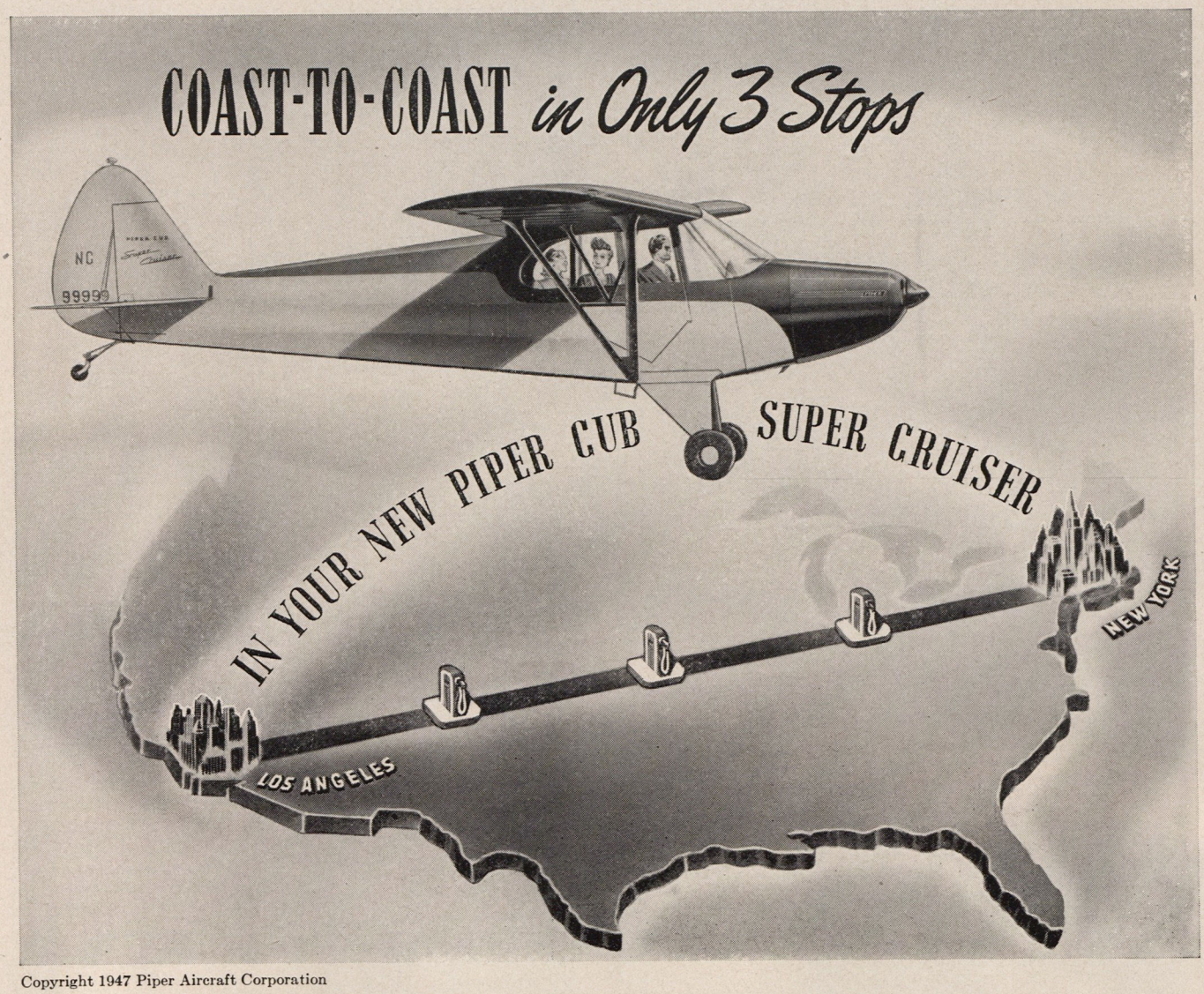
AIR FORCE

THE OFFICIAL JOURNAL OF THE AIR FORCE ASSOCIATION, MAY, 1947



YES, you can fly the distance from Los Angeles to New York in just *three stops for gas* when you own a new Piper Cub Super Cruiser! With its 38-gallon gas capacity, this easy-to-fly personal plane will take you more than 600 miles without refueling. Think of flying from Denver to Boston in *two* stops . . . New York to Miami in *one* stop . . . Minneapolis to New Orleans in *one* stop. Or from your home to any place within 600 miles—non-stop! And if you fly at the economy cruising speed you can enjoy a maximum range of 700 miles!

This superior cruising range is but one of the many advantages you'll find in the Piper Cub Super Cruiser. It seats *three* passengers, one more than any other personal plane in its price field. It has a muffler-equipped, 100-horsepower engine for a top speed of 115 miles per hour. As *standard equipment*, it brings you an auto-type electric starter and generator and a two-way, two-band radio . . . features that add to the safety, convenience and enjoyment of your flying.

See the Super Cruiser now at your dealer's . . . enjoy a free flight demonstration. Ask him for the full-color Piper Cub literature and the new, revised edition of the popular book . . . *How to Fly a Piper Cub*. Remember—only Piper makes the Cub, that good, safe plane. Piper Aircraft Corporation, Lock Haven, Penna., U.S.A. . . . In Canada: Cub Aircraft Corporation, Ltd., Hamilton.

SEE YOUR PIPER CUB DEALER FOR LOW-COST FLYING

Your Piper Cub Dealer offers you the opportunity to learn to fly at the lowest possible cost. If you already have a pilot's license, he will rent you a plane to fly yourself . . . also at lowest possible cost. And, he has planes for charter for vacation or business trips. See your Piper Cub Dealer always for good, safe, low-cost flying.

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

PIPER

JUST WHAT THE DOCTOR ORDERED....

... for All Assemblies!

FORM-A-GASKET No. 1 (a paste) sets fast . . . but not too fast for use on large surfaces. It dries hard, but does not become brittle. It's a swell product for making pressure-tight, leak-proof unions . . . even if surfaces are warped.

FORM-A-GASKET No. 2 (a paste) sets slower than No. 1. It dries to a tough, pliable layer with plenty of "cushion". It resists high pressures, continual vibrations and disassembles very easily.

AVIATION FORM-A-GASKET No. 3 (a brushable, self-leveling liquid) sets into position and dries to a tacky paste. It will not run, even when heated to 400° F. nor become hard or brittle at temperatures down to 70° F. below!

ALL TYPES OF FORM-A-GASKET PRESERVE ALL TYPES OF GASKETS!

PERMATEX COMPANY, INC., BROOKLYN 29, N. Y.

VOL. 30 NO. 5 MAY, 1947

AIR FORCE

OFFICIAL JOURNAL OF THE AIR FORCE ASSOCIATION

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EDITOR
PHILLIP ANDREWS

Executive Editor, Ned Root (Lt. Col.); **Technical Editor,** William S. Friedman (Sgt.); **Assistant Editors,** M. A. Bugnon, Janet Lahey.

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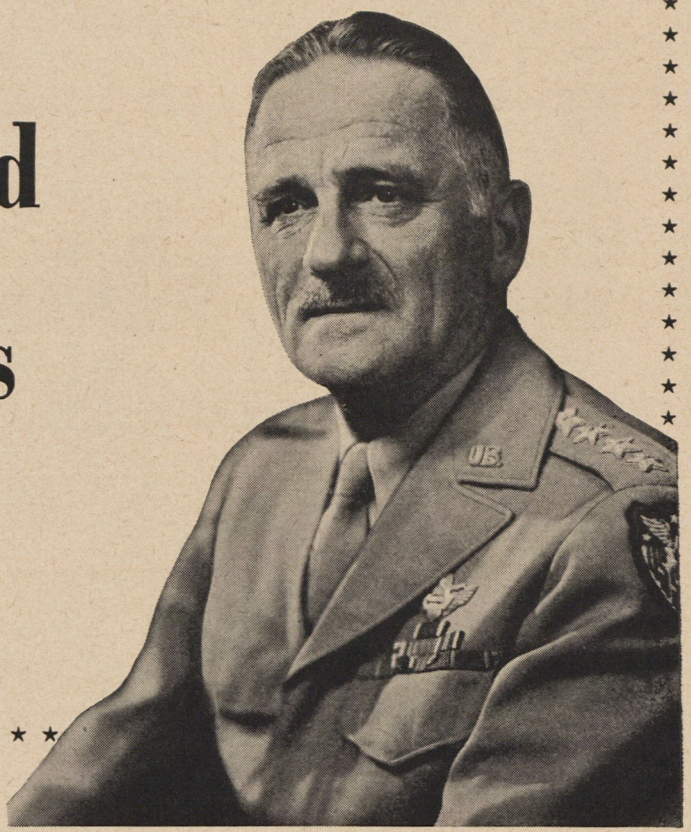
Why a word from you is important



Members of the Air Force Association:

You have agreed to support the nation-wide campaign for interesting young men in duty with the Regular Army. Few groups are better qualified for this vital mission than the Air Force Association, for its membership includes thousands of men who have served the nation in war and peace.

You are the counselors to whom today's young men naturally turn. They seek you because they want contact with men whose advice is based upon close-up experience. That is why the recommendation you give is so important.

You know the benefits. You know the satisfaction that comes from having done your part in keeping the nation secure—of having served ends above and beyond selfish interests. If you feel as most men do, you are glad you served—proud of an experience which enriched your life. Young men will listen when you tell them.

In addition, there are many material advantages available to today's ambitious soldier . . . pay, higher than ever before . . . excellent training in valuable skills and trades . . . opportunities for promotion . . . security, travel, and a retirement plan unequaled anywhere.

These are among the benefits you can point out to young men who measure up. By doing so, you contribute greatly to the building of a strong, well-balanced Army—one capable of preserving the peace for which you fought so well.

Carl Spaatz

COMMANDING GENERAL
ARMY AIR FORCES

U. S. ARMY RECRUITING SERVICE

This Month

Wing Commander Asher Lee, above, is the author of this month's feature "The German Air Force," a condensation from the current book of the same name published by Harper & Brothers, New York, N. Y.

A graduate of London University, Lee was on the Air Staff of the RAF from 1940 to 1945, part of which time he was attached to G-2 of the War Department in Washington, D. C. He speaks French, German and Russian, and is one of the few people who has received both the Order of the British Empire and the Legion of Merit.

For further introduction to Wing Commander Lee and his book, we refer you to the following by Carl Spaatz, Commanding General of the United States Army Air Forces:

Long before America entered the war, soldiers everywhere were agreed upon one estimate of it. It was the German Air Force which dominated world diplomacy and won for Hitler the bloodless political victories of the late thirties. It was the German Air Force which subsequently led Hitler's armies triumphant to the North Cape of Norway, the Bay of Biscay, the gates of Alexandria and the shores of the Volga. It was a sober military estimate that the war could not be won until that air force was destroyed.

Hitler's declaration of war upon America was, for us in the Army Air Forces, an automatic assignment to add our power to that of the Royal and Soviet air forces in that common, imperative purpose.

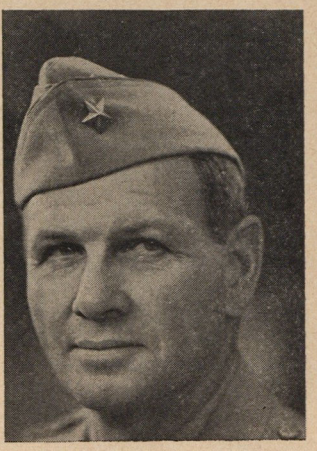
We faced the task of initiating offensive warfare against a veteran air force, flushed with the confidence of its victories and securely entrenched in the continent of its conquest. We needed all the information we could get of this enemy. We knew that brains could save blood. Our first missions to England sought information as avidly as they sought bases for our future operations.

The high command of the Royal Air Force was as realistic as it was modest. They told us they had a man, Asher Lee, who knew more about the German Air Force than Goering. By then Goering had become a dangerous man to inform. He knew more of what his subordinates thought safe to tell him than of the current state of his affairs.

Gen. Carl A. Spaatz

Wing Commander Asher Lee knew what his own judgment told him about the German Air Force. Phenomenal as the accuracy of this judgment always proved, there was nothing occult about it. In civil life Asher Lee had been a scholar and schoolteacher. When the war turned him to study of the German Air Force he came by his knowledge as men must, by tireless energy, sweat, long hours and patient practice in applying the experience of the past to the problems of the present and future.

This knowledge, his records and the brilliant mind that illuminated them were, from the very first, placed at our disposal by his generous commanders. Asher Lee himself welcomed the added work as additional opportunity to help strike the enemy he knew so well. Night or day, early or late, for question, consultation, estimate or opinion he was always available, sympathetic and eager to help. When we sent our own people to the Air Ministry to work and study with him Lee and his staff accepted the burden with a cordiality and patience we shall never forget.



Brig. Gen. Samuel D. Sturgis

Now he has written his knowledge and judgment of the German Air Force in this book. No such comprehensive study of any air force has yet been made publicly available. It is a milestone of military analysis which will be carefully studied under every flag in the world.

Yet it seems to me that this book has a vaster importance to our world than that. Soldiers, sailors and airmen have to fight the wars but it is the people, the civilian people of all nations who have to provide the armed forces. It is the people who have to equip and support them. It is the people who mourn the casualties. It is the people themselves who are doomed to sustain, perhaps even more than soldiers, the actual bomb blows of the future now that air power has so irrevocably altered not only the nature of war but the potentiality for existence of every person on this earth.

This book is a somber record of how Germany nearly achieved world domination.

It undoubtedly will be closely studied by the military. My hope is that it will also be studied, in time, by the civilians of all countries. It is they who must understand the lesson that it took the three most powerful nations on earth nearly six years to overcome the start which a relatively primitive air power gave Germany. It is the civilians of the world who must face now and from now on in their relations with each other the responsibility for preventing another holocaust in the age of atomic energy. It is the civilians who must strive for peace among men with the same accord, perseverance and affirmative action that brought us victory in the war.

It is the civilian people who must decide and then make the effort to assure that air power is henceforward to become the servant of man and not the scourge it became in the hands of the German Air Force. This book can help mankind toward that purpose. It is my earnest hope that it may.

CARL SPAATZ.

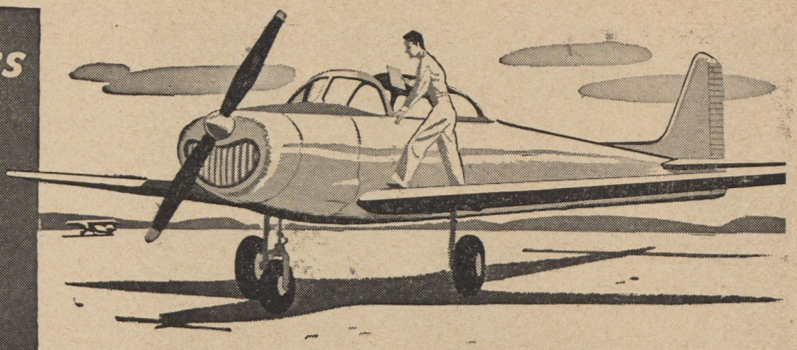
Engineers

In these days of diminishing budgets and interim tables of organization, it is difficult to define and give shape to the Air Force in terms of what it is doing or what its objectives are. Confusion is not confined to those who try to set such things down on paper. Our top air commanders are likewise baffled by the necessity of having to reevaluate periodically the position of the Air Force in our system of national de-

(Continued on page 8)

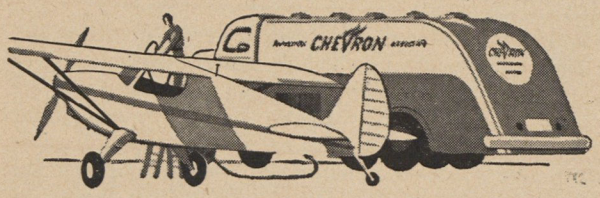
STANDARD OF CALIFORNIA'S

PLANE FAX



A page of service tips for private flyers and fixed-base operators

Lead deposits cause of frequent spark-plug fouling

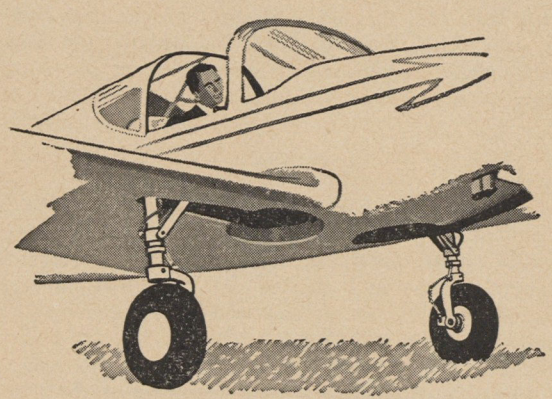


In order to boost octane rating of some aviation gasolines to 80, tetraethyl lead is added to the fuel. In light plane engines this sometimes results in lead fouling on spark plugs. As a result spark plugs must be cleaned frequently to prevent failure. To eliminate this and other difficulties, Standard of California was a leader in producing unleaded 80-octane aviation gasoline which was enthusiastically welcomed by light plane operators. Chevron Aviation Gasoline 80 is recommended for virtually all engines under 450 horsepower.

"RPM" reduces costs for Alaska Coastal Airlines

"Since changing to RPM Aviation Oil our engines are in much better condition at overhaul time than ever before," writes O. F. Benecke of Alaska Coastal Airlines. "We have also found that we may operate our engines for longer periods between overhauls on RPM Aviation Oil. We have been able to increase this time to over 800 hours and find engines in such excellent shape that overhaul periods may be extended to even longer periods . . . oil consumption remains low, starting is readily accomplished and there is a noticeable lack of foaming."

How to pick the right hydraulic oil for your plane



Standard of California has perfected three petroleum oils for hydraulic systems, struts and brakes with synthetic rubber seals. RPM Aviation Hydraulic Oil No. 1 has proper viscosity to minimize leakage, and is recommended for personal planes. RPM Aviation Hydraulic Oil No. 2 is lower in viscosity and is designed for use at temperatures below minus 40° F. RPM Aviation Hydraulic Oil No. 3 is similar to No. 2, but its anti-corrosive compound makes it valuable in protecting hydraulic systems in storage.

CHEVRON NATIONAL CREDIT CARDS are good at airports throughout the United States and Canada. Ask your Standard Airport Dealer in the West . . . or write to Standard of California, 225 Bush St., Room 1618, San Francisco 20, Cal.

"LET'S KEEP THE GANG TOGETHER"

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.

Today we are as vulnerable to surprise attack as we were in the years preceding Pearl Harbor. General Spaatz says "we are an Air Force in memory only."

I'm sure that you will want to help remedy this situation, and you can help by joining the Air Force Association today. In addition to the personal satisfaction of participating in the program to achieve for the Air Forces equal status with the ground and sea forces, you will receive:

1. **A year's subscription to *Air Force*.**
2. **An embossed membership card.**
3. **A distinctive lapel insignia.**
4. **The opportunity to continue service friendships, perpetuate AAF traditions, and commemorate those who did not return through the formation of state Wings and local Squadrons.**

We'll be proud to have you with us in the one big organization restricted to present and former members of the AAF. Annual dues are just $3.00. If you are already a member, won't you pass the word along to a friend.

MEMBERSHIP APPLICATION

Date.....

I represent that I have been honorably separated from, or am now on active duty with, the U. S. Army Air Forces and hereby apply for membership in the AIR FORCE ASSOCIATION. Please send me membership card and lapel emblem. I enclose $3.00 ($2.00 of which is to cover a year's subscription to AIR FORCE).

Name..... Rank.....
Please Print

Present Address .....
Street City Zone State

AAF Unit ..... ASN.....

Please Mail to .....
SIGNATURE

AIR FORCE ASSOCIATION 1603 K Street, N.W. Washington 6, D. C.

(Continued from page 6)

fense. The picture changes so fast that in recent months Headquarters AAF has not even printed an AAF Organizational Chart. The reason is that it would be a waste of valuable paper to publish a chart which would be obsolete in a matter of days.

But in spite of the worries which beset the top level directors, the Air Force in the field somehow goes on with its job in an astonishingly efficient manner. Evidence that this is true is indicated in the story "In Line of Heavy Duty" by Brig. Gen. Samuel D. Sturgis, The Air Engineer. Being an engineer, General Sturgis points out, is not the most glamorous job in the world. But it is one which is essential to the waging of any war. It is in stories such as this, that those of us who have concerned ourselves with the "shape" of the Air Force can take heart. When the interim is over, and the T/Os are made firm, we will probably find that the Air Force has more texture and body than we had thought.

VE Day

As will be remembered by all who were in uniform at the time, May is the month in which we observe the anniversary of VE Day. Several months ago, in anticipation of the occasion, we asked MacKinlay Kantor, one of the war's most able correspondents, for a story in memoriam of the European air effort. One of the Air Force's best friends, he responded with the lead article, "This Dread Fate" which begins on page 11. Aside from being a magnificent document of a war just past, "Dread Fate" is also a stirring challenge to do something about a war which might lie just ahead. The appearance of Mr. Kantor as an author in AIR FORCE is doubly appropriate in that "The Best Years of Our Lives" which was adapted from Kantor's book "Glory for Me," has just won the Academy Award for being the best picture of the year.

Dr. Greene's Safety Gremlin

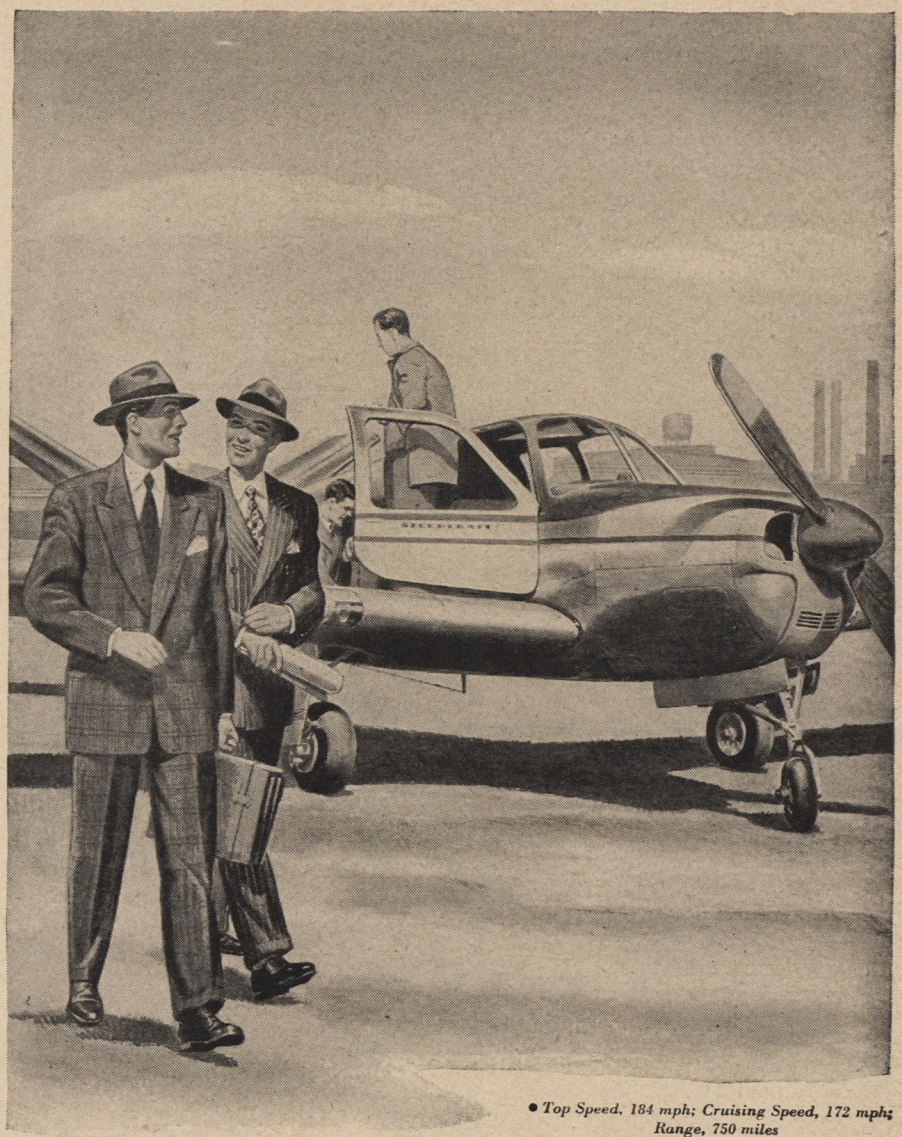
Our Technical Editor, Bill Friedman, can get more excited over some new aeronautical gadget than most guys can over Lauren Bacall. His enthusiasm sometimes reaches a point where cold compresses are indicated. Such was the case this month when Bill "discovered" the Greene stall-warning indicator, a little gimmick which, in his words, is "infallible" in warning pilots of impending stalls. "Greatest thing since flaps," Bill proclaimed, "worth at least six pages." It was the toughest job of the month for the editor to take Bill aside and explain that because of paper shortages and things like that, it would be necessary for him to confine his piece to two pages. For three days, "Blimp" acted like a little boy who has been told that he must shoot his pet dog. But he did the story "Quit Your Stalling," and when it was finished, Dr. Greene commented that it was one of the best presentations of the subject he had read.

Capital

Twenty years ago, Clifford Ball Airlines accepted Air Mail Route 11, Pittsburgh to Cleveland, from the Post Office. This was part of the national plan for turning over the air-mail system to private enterprise after a decade of development first by the Army and then by the Post Office, using chiefly Army-trained personnel and much surplus military equipment. The theory was that a healthy air transport industry was a necessary auxiliary to a working air defense plan.

How Cliff Ball's three Wacos grew into one of the nation's Big League operators, Capital Airlines, is told in Phillip Andrews' "Persistence Is Spelled with A Capital" on page 22 of this issue. It tells, among other things, how the needs of Air Transport Command stripped the line down to six airplanes in 1942, forcing them to create a new conception of equipment utilization. It was also a vindication of the 1925 Kelley Bill that made a profitable air transport industry possible in the US.

You save . . .
Man-Power
Man-Hours
Money
with a company owned
BEECHCRAFT
BONANZA



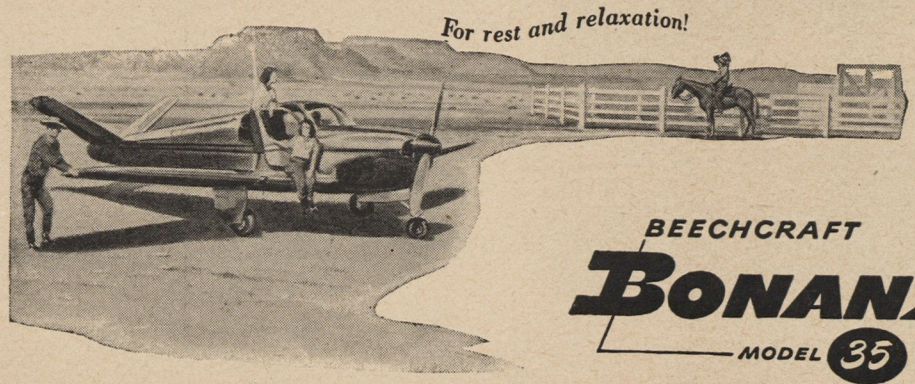
• *Top Speed, 184 mph; Cruising Speed, 172 mph; Range, 750 miles*

TRAVEL TIME, including all the "waiting around," is a dead loss to productive effort—and an expense in addition. With the 172 mph, 4-passenger Bonanza, one to four executives or other personnel can go and come—in luxurious comfort and free of fatigue—at a tremendous saving in time and money.

The Bonanza is the first thoroughly economical 4-place plane for business. In regular use, the Bonanza's direct operating cost runs as low as one cent per passenger mile. And this is so because its payload, speed and range require but 165 horsepower—*less than half* the horsepower formerly needed to do the same job, which is no mean aeronautical achievement!

The Bonanza is fully equipped for travel any time, anywhere, with two-way radio, landing lights, instruments and heater. Because of scientific soundproofing, the cabin noise level is remarkably low—scarcely that of an open-window car traveling at 55 mph. Standard also are electric retractable tricycle landing gear, landing flaps and controllable propeller.

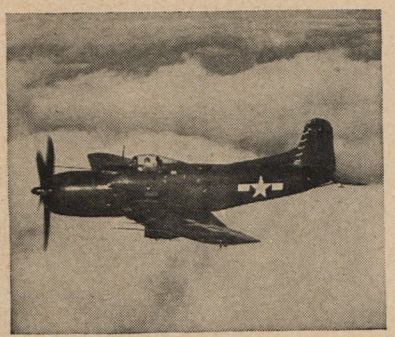
There is a Beechcraft distributor near you who'll give you more facts and figures. We are now delivering Bonanzas on the large backlog of firm orders created by the heavy demand for this airplane. Additional orders will be filled in the sequence received. Beech Aircraft Corporation, Wichita, Kansas, U.S.A.



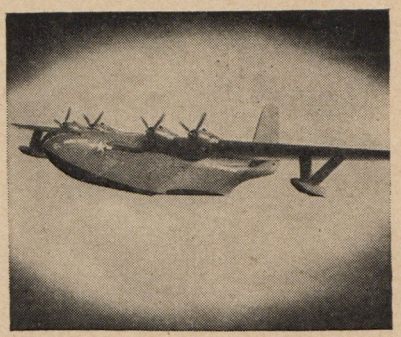
BEECHCRAFT
BONANZA
MODEL 35

Only with unsurpassed aerial strength can America assume her peacetime obligations of maintaining security and freedom from fear. Only through research can America remain first in the air. Today, Martin research gives you these ultra-modern new planes incorporating the great advances in design made during the war years. Tomorrow, look to Martin for daring new developments that will measure up to the future requirements of America's Military Services.

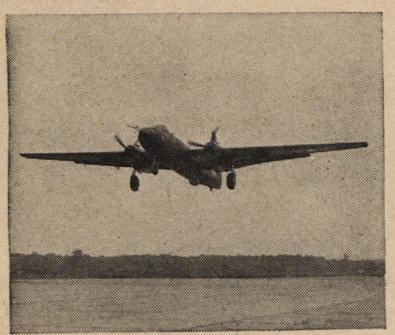
America's Military Services Set the Standards . . .



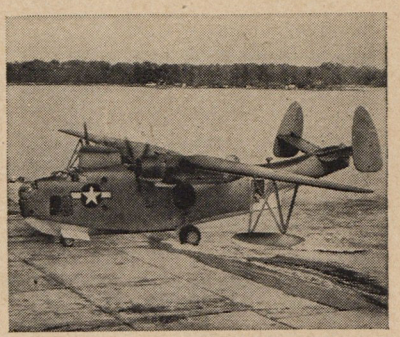
WICKED WALLOP is packed by the Navy's new AM-1 Martin Mauler carrier-based bomber. Heavy bomb-load is carried at unprecedented speed for this type of aircraft.



LONG ARM of the Navy is the Martin JRM Mars—world's largest flying boat. These giants speed mail and supplies to distant bases—evacuate sick or injured men

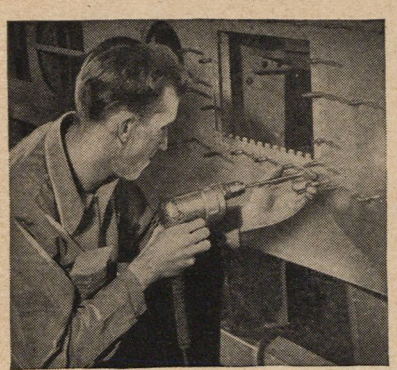


NAVY'S NEWEST reconnaissance plane, the high-speed Martin XP4M-1 utilizes 4 engines tandem-mounted in 2 nacelles. Two engines are reciprocating, two jets.

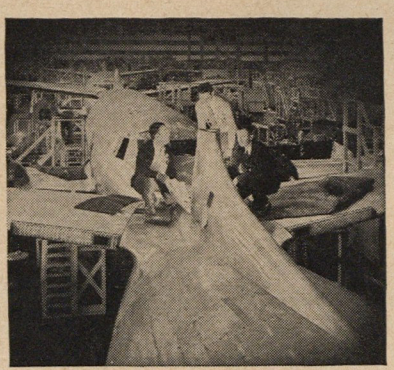


WORLD'S LARGEST amphibian, this 30-ton version of the Navy's Mariner patrol bomber is at home on land, water or in the air. Now in production at Martin plants.

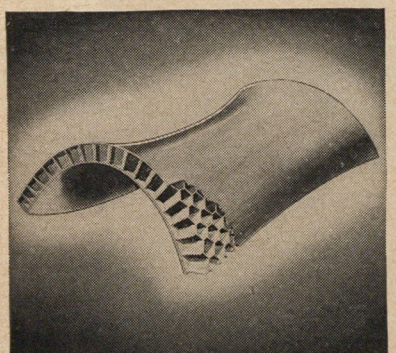
AND MARTIN RESEARCH DELIVERS!



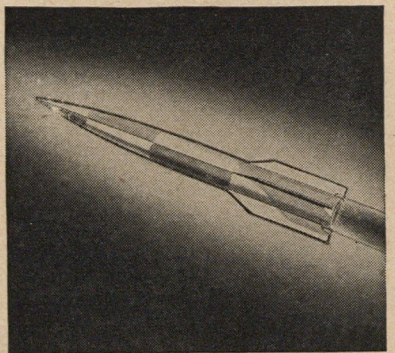
NEW XB-48, Army's most advanced bomber, is powered by 6 jets—will fly at exceptionally high speeds. Details of this new Martin bomber are restricted.



STANDARD FOR AIRLINES are the new Martin 2-0-2 and 3-0-3 . . . last word in speed, comfort, dependability, readily adaptable for military transport uses.



MARTIN "HONEYCOMB" construction material, combines great strength with lightness. Used in new Martin planes, holds great possibilities for many diverse fields.



GUIDED MISSILES and new forms of propulsion are being developed by Martin under Army and Navy contracts. Research also includes electronics, pilotless aircraft.

America's Military Services issue the call—and in peace as in war, Martin research responds! Since the first Martin plane flew with the Army in 1913, it has been our task to meet the exacting requirements of the most forward-looking Military Services in the world. The task has never been easy . . . and for this we are grateful. For only when perfection is the rigid standard by which we are judged, can we hope to achieve the desired objectives.

In response to the call of the Military Services, since V-J Day Martin research has continued to drive onward—through the sonic barrier—into the sensational realm of guided missiles and man-made satellites—and into other projects now being subjected to intensive, unremitting study. And solution of these problems is only a beginning. Martin research is bounded only by the daring of man's imagination! THE GLENN L. MARTIN COMPANY, BALTIMORE 3, MARYLAND.

Martin
AIRCRAFT

Builders of Dependable Aircraft Since 1909

AIR FORCE

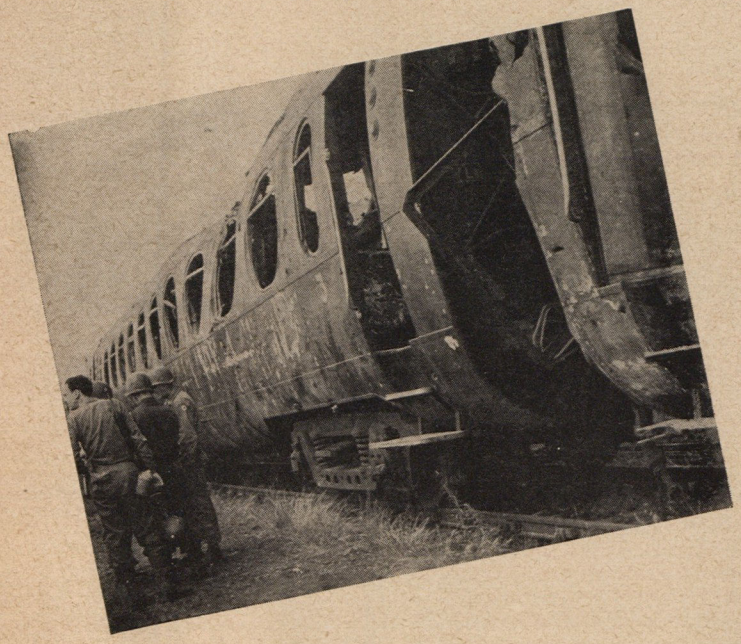
May, 1947

THIS DREAD FATE

THIS DREAD FATE

BY MACKINLAY KANTOR

Standing in the mere shadow of what was once the greatest air arm in history, a crack war correspondent reviews the AAF's part in forging the final victory and asks some pointed questions about its future



"Reinforcements of enemy troops . . . were compelled to scramble along on weary feet because no trains existed to carry them . . ."

As I write these lines on a cold winter morning, we are well into the second year which has followed the defeat of our most recent active enemies. Before me is a copy of today's New York *Times,* with a headline: "Eaker Sees Nation In Imminent Peril. Our Air Arm's Plight Is Worse Than Between 1919-1939, He Says In Talk Here."

To us who still carry in our recollection the spectacle of what happened in the European Theater of Operations during the recent war, General Ira C. Eaker's words are ominous and appalling.

There is a growing tendency on the part of the American public to collapse spiritually before the problem created by the injection of nuclear fission into our scheme of living. And yet, were the atom still unreleased and unbroken, the knowledge of the existence of air power, employed as it was employed before the first atom bomb sank through the air above Hiroshima—this recognition alone should be enough to cause every responsible American to take cognizance of the past, and measure the past against the future.

Now, I am no military or aeronautical expert. I don't always quite understand the professional patois in which high-ranking airmen sometimes engage to tell their story or state their case. I am merely a man who, in the late war, was privileged to fly in combat along with the crews of our own heavy and medium bombers, and with the Royal Air Force as well.

It would be a rhetorical understatement to say that I loved the boys who went into the air—that I respect their skill, and hold admiration for their accomplishments. It goes much deeper than that. I am convinced that our Air Force was *the decisive factor* in beating our German enemies into the dusty death which so richly they deserved.

This statement is made in the hope that it will not be misunderstood. It would be absurd for anyone to minimize or attempt to dispute the courage and effectiveness of our navy and our land forces. Air power ALONE did not lick Germany. But, without the airplanes which with toil and sacrifice we marshaled and sent aloft, Germany could never have been defeated. Instead, she would have defeated Great Britain and the United States—singly or together. A lot of us who are happily alive now, would be dead. Our wives would be stumbling in degradation and slavery; our children, if still extant, would be wailing in filthy pens at Buchenwald.

Please think it not impertinent if I, a civilian tempered by war experience, tell briefly how we wielded the mightiest weapon in our arsenal. This tale is one which I think certain vanished young gentlemen would wish to have told. I cannot quite escape the illusion that they are looking over my shoulder, urging me to state the fact, the grim detail, the brief summation.

Here is an acknowledgment, then, of the debt which America owes to the wings and the prayers and the people who used them.

The whole structure of American strategic air operation was predicated on the assumption that we could fight Germany successfully by high-altitude, daylight, precision bombing of vital targets. None of the other air forces of the great nations had planned to do this to their enemies.

Germans thought that their air arm should be a glorified army support force rather than a separate entity with an effective strategic plan of its own. The Royal Air Force of Britain was, in keeping with British tradition, dedicated almost entirely to the defensive. As for the Russians, they had never planned or at least never carried out a program requiring the use of a long-range offensive bombardment force. Their fighters and dive-bombers, neither so capable nor so numerous as the Germans', were quickly battered from the skies, and the Red armies were left practically undefended by any air cover whatsoever. Had Russia been geographically a smaller nation than she was, she would have been knocked out of any reckoning in the war. She was able, because of her size, to painfully but stubbornly absorb the shock of protracted German invasion. Like a vast, flat sponge, she sopped up the German strength.

We Americans had to hurry up and fight in Europe if we didn't want to fight in New England or in tidewater Virginia. Our first necessity was that of basing a heavy bomber force in the United Kingdom to attack Germany from there. If the Germans had had a good bombsight and a planned strategy of one by one reducing key targets in England, they would have been based in Britain long before we were. Instead they relied on the effectiveness of a submarine blockade which didn't turn out to be effective enough. Their air force was designed for campaigns on the Continent. Had not the Luftwaffe knocked out the entire Polish air force in a week?

But their attempt to soften up England for invasion was not carried out properly—it had neither the shrewd, original conception of strategy nor the prolongation of effort necessary for the task. Perhaps, as some contemporaneous historians

believed, and as many Britons dolefully suggested, Germany very nearly knocked England out of the ring with her muddled though ferocious attack. If so, Germany herself nearly sprawled through the ropes doing it.

First the Luftwaffe threw airplanes against shipping in the Channel and harbors on the English Coast. They tried airfields. Then they started blasting away at London itself, and in the daylight. Men of the RAF, working like slaves and dying like gods, mutilated so many of the lightly armed and lightly armored German bombers that daylight attack had to be given up, in order for the Reich to conserve its strength and still be able to fight at all.

Suppose that, early in the war, we Americans, magically based in Denmark or Sweden or on the island of Bornholm in the Baltic, had tried to whip Germany by hurling all our bomber strength at Unter den Linden and the Wilhelmstrasse and the residential sections of Berlin—and especially if we had tried this without relying on Flying Fortresses and Norden bombsights to do the job. Such a program would have been entirely too expensive in its cost in planes and personnel. No important military objective would have been achieved. Like the Germans, we would have had to content ourselves eventually with fire blitzes carried on under cover of darkness, or with occasional nuisance assaults by twenty or fifty night bombers—just what the Germans were doing over Britain when we moved in.

We didn't have a very large force to move in with, but the RAF and indeed all the British were perfectly swell. They gave us every aid, every help and encouragement which an understanding ally could give, although they didn't approve of our daylight precision bombing plans. With characteristic frankness the British said they thought we were wrong and that it couldn't be done; but no professional jealousy or natural wartime rivalry prevented them from giving us carte blanche with their resources. They had a lot of experience in air fighting which we didn't have. They told us, and demonstrated to us, what they had learned. Supplies—food, dinghies, oxygen, sparkplugs—were given to us in the process of reverse lend-lease. Air bases were built for us and turned over complete. Other, older RAF bases were provided for special operations.

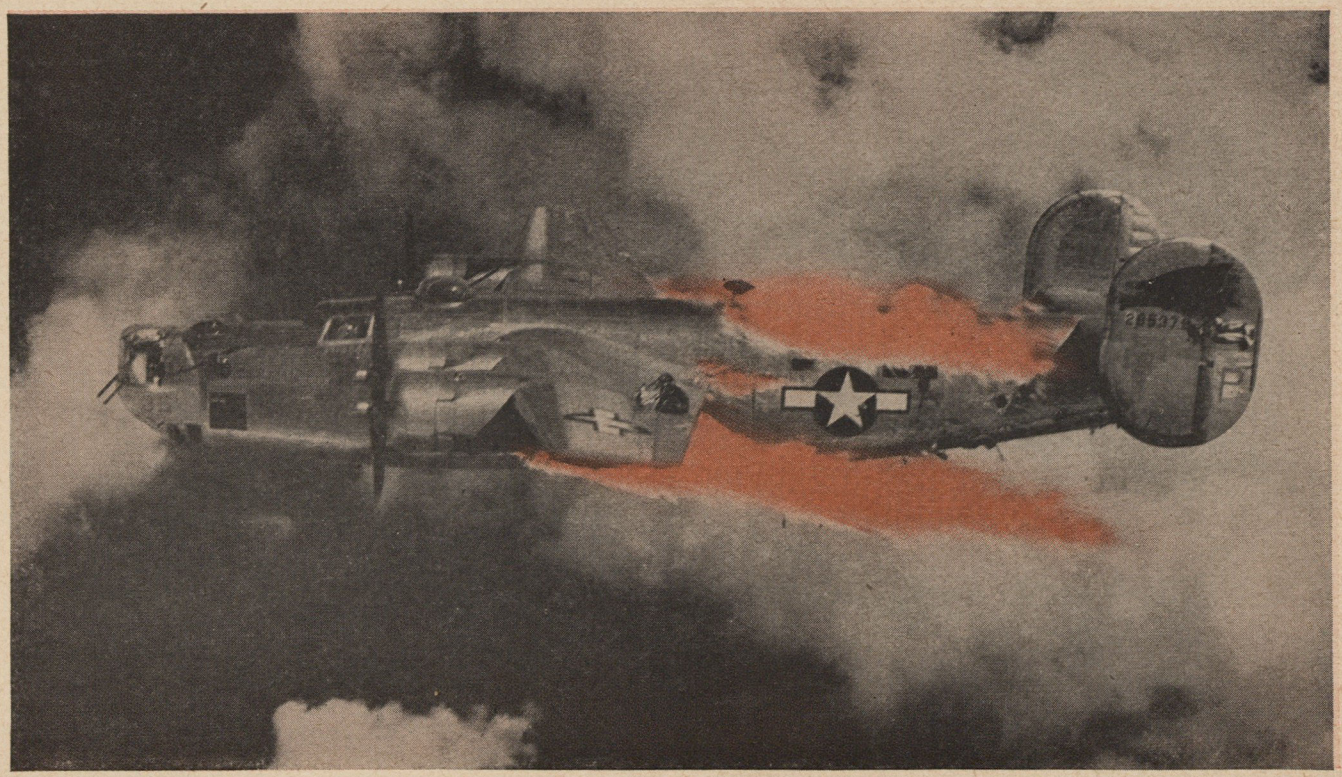
Intelligence information was made available to us, and our splendid joint development of radar made us hope that we and the British could work together as happily amid the fruitful sciences of peace. Weather, photo interpretation—all of these seldom-mentioned but essential adjuncts of an air force program were carried on jointly. And, in the early days, our bombers were often escorted by Spitfires. We didn't have enough fighters of our own as yet in the European theater to cover our own bombers.

It is axiomatic in warfare to strike your enemy with the strongest force which you can muster, in the most vital spot, and at the most propitious time. And airplanes carry destructive medicine into the belly if an enemy nation, far beyond the range of any orthodox artillery yet devised. With fatal precision, they release their loads upon chosen targets, in a refined saturation of explosive strength which solid divisions of howitzers could never achieve.

There evolved, as a natural antagonist of the bomber, the fighter plane, traveling at two or three times the bomber's speed—armed with machine guns—and later, with cannon and rockets—with which the bombing plane might be shot down. But in accordance with our plans for accurate destruction of important enemy objectives, we Americans had carried the project of the bomber somewhat further than other nations. This was in the construction of the B-17 and later the B-24—the Flying Fortress and the Liberator—in which a certain amount of the possible bomb load, in weight and space, was sacrificed to the urgency of machine guns and strong metal plating. We had produced an instrument at once offensive and defensive, and in so doing we won a momentary advantage in our war against Germany.

The ordinary lumbering bomber was incapable of defending itself against enemy attack in the daytime. As witnessed in the Battle of Britain, this drove enemy bombers into the cover of darkness where obviously their destructive

"**. . . flak and fighters** assailed us with fearful cunning and persistency, many of our planes were destroyed. . . . Survivors always kept on going, to the pride of living and dead."



"I can tell him where the German air force was. It lay scattered in blackened bits all over northern France and western Germany. It lay gestated but unborn in the rusting factories of Marienburg."

capacity was impaired. But our heavy bombers struck boldly at the citadel of German-occupied Europe by daylight.

There were twelve bombers in that first Eighth Air Force mission of August 17, 1942. They carried eighteen tons of bombs. They hit the railway yards at Rouen, and they all came home. The Germans seemed confused and puzzled by this small attack and by the assaults in slowly increasing force which followed immediately. Our enemies had for the first time come up against a bomber which carried a terrific fire power of its own.

We had thirteen machine guns mounted in the typical Flying Fortress of that period, and thirteen 50-caliber guns can make the air unhealthy for enemy fighters for five hundred yards in any direction around the plane from which they are being fired. Besides this, we adopted a combat box formation for our planes. They were staggered through the air horizontally and vertically; in this way the maximum fire power of not one airplane, but of many, could be brought to bear on the vengeful Messerschmitt or Focke-wulfe which closed in. It worked out pretty well. Our heavy bombers alone destroyed two thousand and fifty enemy planes in aerial combat during the first year of our attack on Germany.

Our initial objective was to win air supremacy. It was not possible to successfully invade Europe from the sea, landing vast armies on the Continent, until we had nullified the effectiveness of the Luftwaffe. To do this we had not only to ruin as many as possible of the enemy's aircraft which rose to give battle, but to ruin his ability to put those ships into the air. We had to burn up airplane factories, munitions works and above all, the fuel which was the lifeblood of our highly industrialized and ferocious foe.

Obviously it is less important in war to slay individual enemy riflemen than it is to fire a blazing arrow into the powder barrel which supplies their guns. This is exactly what we did in attacking Germany.

Quickly the Germans shook off their amazement at our daylight attacks and became very busy doing something about it. More and more fighters appeared in the air around us as we drilled our way remorselessly from target to target. It will be observed that our first operational months, when the only American planes in Europe were based in Britain, constituted a period of testing and probation. That first attack on Rouen is solely of historical significance now. Twelve bombers, in the ordinary course of events, can't do much harm to an enemy. We envisioned a mighty armada of perhaps a thousand bombers and a thousand fighters, but we didn't achieve that total for another year and a half. It is difficult to build good airplanes in haste when they are urgently needed. It would have been happier for us if we had had them to begin with.

All this time the British were slamming away at our foes; but, as I have pointed out, they were dedicated to night operations: area bombing of targets noted but mainly unseen by the men who dropped the bombs. With no desire to reflect on the tenacity and power of the RAF, let it be said that nothing in the British experience caused us to swerve from our original purpose and the means by which we had decided that it must be achieved.

In the month before the invasion of North Africa, in the autumn of 1942, we were able to put larger numbers of bombers over the enemy installations in occupied countries, and thus we made a good case for ourselves when the future use of allied air power came under consideration at the Casablanca conference. It was agreed there to let our daylight bombing force develop as a complement to the RAF night bombing strategy.

We managed our first onslaught against Germany itself late in January, 1943. We bombed the naval base at Wilhelmshaven; this mission inaugurated a prolonged series of attacks on the Nazi war machinery and the industry that supplied it. The Germans were withdrawing fighter planes in large numbers from their other fronts and concentrating them in Western Europe, hoping to make our air campaign too costly to us in that theater. This war of attrition took a painful toll of our striking force, but now replacements were flowing from the United States in a steady stream. Also, we were producing infinitely more fighter planes than previously. Experimenting with auxiliary gas tanks, we increased the range of our fighter cover.

At the start, submarine bases had come first on the target list. They were more readily attacked at that stage of the game because of their nearness to our own British bases. By midsummer of 1943 our protecting Thunderbolts could fly round trips of six hundred miles, and we were enabled to make the historic attacks on Schweinfurt and Regensburg. It is significant that immediately after these operations, the Germans decided to quadruple their fighter production; and we decided just as fervently that we must pare down the rising curve of their fighting strength.

In October we demonstrated through our long-range assault on Danzig, Gdynia and Marienburg that no spot in Germany was now safe from our attack. Our Twelfth Air Force in the Mediterranean was slugging violently at enemy shipping and providing air cover for successive landing operations down there. Our medium bombers based in Britain were already plastering the German rocket and buzz-bomb sites with explosives. But a more concerted plan of attack was necessary if we were to make the fullest and most effective use of our resources.

Thus, immediately following the Teheran conference, the US Strategic Air Forces in Europe were created, whereby in centralized command the operations of the newly activated Fifteenth Air Force in Italy were harmonized with those of the Eighth in Britain. This provided the first global bombing force operating from both ends of Germany and it also gave an opportunity for shuttle bombing to and from the Russian bases, until the rapid advance of our Red allies through the Balkans and southeast central Europe made this form of activity no longer of any great strategic value.

Top priority in USSTAF's plan was given to the knock-out of German air force factories. At the end of February, 1944, the weather became favorable for our plans; during the week of February 20th to 26th inclusive we knocked out three-fourths of the German fighter factory production. After that, the upbuilding of German fighter craft was necessarily dispersed throughout their nation.

Underground shops and assembly lines were established, tiny plants were set up in barns and sheds in a thousand places. It was no longer practicable for us to concentrate our attack upon an industry so widely dispersed, but neither was it practicable for the Germans to work in that fashion. American aircraft production and number of planes in operation rose in a steady curve; the German production, heavy though it was, never threatened us with numerical superiority, save in occasional local operations, again. We were beginning to rule the skies of Europe.

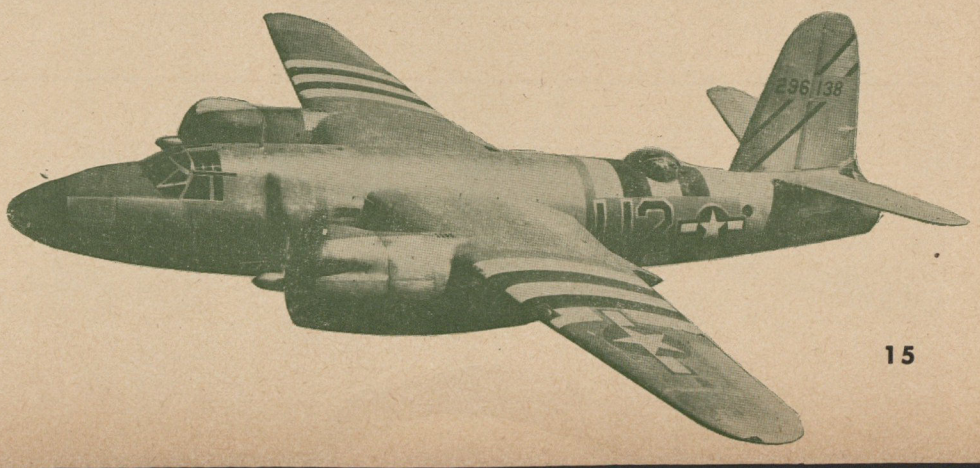
We had to destroy the Teutonic will to fight if we could do so. We began attacking industrial Berlin in the daylight, and there was panic among the Luftwaffe high command as our first long-range fighters appeared over their capital. Eventually Berlin was to become the most bombed city in the world.

With increasing forces at our disposal we were able to spare bombers for other less spectacular but vital tasks. We devised a special leaflet bomb, and began to pound the grim facts of the situation into the thick heads of the German public. By the same means we instigated and encouraged uprisings and sabotage in the occupied countries. One B-17 group was set up for the special function of supplying the French Maquis by air; we dropped supplies and agents and arms where they were needed by the resistance forces.

Our Ninth Air Force planes were hacking at bridges throughout northern France, preparing to isolate the Normandy battlefield when our troops should first swarm over the shores there. With brilliant technique they performed this task, made doubly difficult by the exigency of our strategic purpose: we must not let the enemy know just where we intended to land. For every bridge destroyed at some vital point in northwestern France, we had to destroy another bridge at some to us unimportant point in northeastern France or in the Low Countries.

Besides this very necessary job of misleading the enemy and upsetting his supply and reinforcement applecart in advance, our bombers, together with the RAF, were whittling down the strength of the V-bomb attack even before it developed. At least one hundred launching sites along the Channel coast were knocked out in the nine months preceding the invasion. The buzz-bomb menace would have risen six months earlier than it did, and would have proceeded on a scale to delay and even forestall indefinitely the invasion of the Continent, had the German construction of V-bombs, experimental stations and V-bomb sites been allowed to continue unabated.

D-Day came, and with it the greatest concentration of air energy which the world has ever seen. Thousand on thousand, our planes struck out across the Channel to carry troops to battle, to flog the enemy's concentrations, to blast his established positions and to disrupt the traffic of supply and reinforcement behind his lines. Thousand after thousand, those airplanes raced back to Britain, refueled, loaded on fresh freight of bombs or men, and tore back to the job again. Our landing barges churned up to the French coast unhampered by enemy blows from the air. Our infantry and tanks swept across the beaches and up the embankments in a roaring tide. Poland, 1939, demonstrated the hell of defeat where an enemy rules the air above embattled ground forces. D-Day showed what can happen when we ourselves, and not our enemies, control the air.



It is impossible to exaggerate the ridiculous stupidity demonstrated at that time by certain opponents of air power. I remember the remark of a nationally read columnist in the United States, who solemnly stated that *the successful landings in Normandy proved for all time the absurdity of our devoting any effort to the continuation of high alitude strategic bombing!*

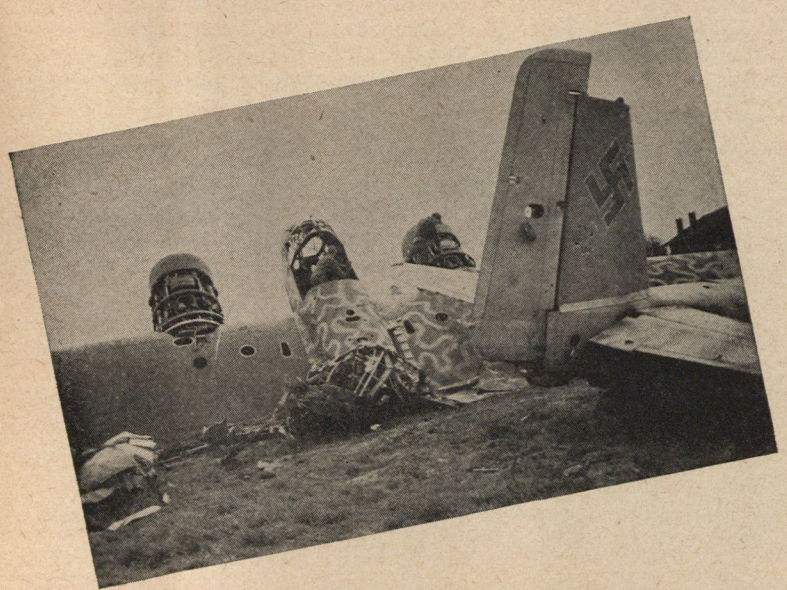
Where, in the name of Heaven, did that man think the wolves of the Luftwaffe had gone? Is it possible that he believed the German air force was capable of assaulting our attacking barges and troops, and yet deliberately refrained?

I can tell him where the German air force was. It lay scattered in blackened bits all over northern France and western Germany. It lay, gestated but unborn, in the rusty womb of the mother factories at Marienburg and Regensburg and a dozen other *burgs*. It smoked beneath smoldering wastes at Schweinfurt, where the ball bearings should have come from, but from whence they came in quantity no longer. It fretted, anchored miserably to the grass of remote airfields within the comparative safety of Reich boundaries—earth-bound because there was no gasoline available to take it aloft.

There were indeed attacks by German planes upon our troops throughout the operations in Normandy and the campaigns which followed; but they were not attacks in sufficient force to cause us, because of prohibitive losses in tanks or artillery or personnel, to deviate from our course. As a matter of fact, at no time in the European theater did enemy defenses in the air or on the ground turn back our bombers and compel them to abandon their mission. Early in the war, when German flak and fighters assailed us with fearful cunning and persistency, many of our planes were destroyed before they could drop their bomb loads. The survivors always kept going, to the eternal pride of the dead and the living.

Snatching at any idea which might conceivably aid him, the enemy resisted with every aerial weapon he could devise. He tried air-to-air bombing, rocket projectiles and, soon after, jet planes travelling at unheard-of speeds. No one of these attempts to rout us was successful; although the enemy jet program, carried to the extreme, might have proved a terrible deterrent to our cause. Stubbornly we attacked jet fields, factories and laboratories. We had too much aggressive strength to be defeated by this new and revolutionary means.

(Jet planes in our own hands have undergone steady improvement in design and in the methods of attack. It is now recognized that they are an indispensable factor in our future air strength.)



Throughout the campaign in France, the fighters and fighter-bombers and medium bombers of the Ninth Air Force and the First Tactical Air Force (Prov) were conducting the most brilliant harassing and supporting operations ever accorded a mobile invading army in the world's history. We had been hitting at oil targets ever since April. The mass of the Luftwaffe was tied to the dirty soil of the nation which created it, because there had not been sufficient oil at hand to make sufficient gasoline to train sufficient pilots to fly against us. And fortunately for the Allies, jet propulsion required such a prodigious outlay of fuel that the Nazis found it increasingly difficult to put up the ME-262 and other aircraft of this type in numbers sufficient to turn us back.

We prevented the shipment of quantities of oil into the battle areas; and oil was becoming increasingly important to the Germans, as the Eighth and Fifteenth Air Forces drilled angrily away at distant refineries, storage depots, and synthetic plants all over central and southwestern Europe. The Ploesti fields, supplying at their peak twenty-six thousand tons per day, melted to ruin under repeated blows by the Liberators. Our planes found the oil, no matter how painstakingly camouflaged. The sky above the Reich was black by day and red by night with the fumes if exploding fuel.

Thus our long-range bombers were getting at the roots of the enemy military structure and our tactical air forces were deflowering the plant itself, leaf by leaf and branch by branch. This latter process is called by military terminologists, "isolating the battle area." Tactical planes flashed in a never-ending, death-dealing stream around the districts chosen by ground commanders for their advancing operations.

German food and German fuel and German ammunition couldn't be brought into the areas of attack in any quantity. Reinforcements of troops, rushed from the Reich or from southern France, were compelled to scramble along day after day on their weary feet because no trains existed to carry them to the front, and because roads were untenable under the flailing our fighters and medium bombers gave them.

As American tanks and armored columns and landborne infantry gushed forward through the battle areas, they began to encounter quantities of Nazi tanks and mobile guns and wheeled troop transport, unscathed perhaps by gunfire, but abandoned solely because there was no gas for them and no way to bring in any gas from the rapidly dwindling supply dumps farther east. The French air was crammed with our planes, blistering the German armies all the way from St. Lo to the Siegfried Line.

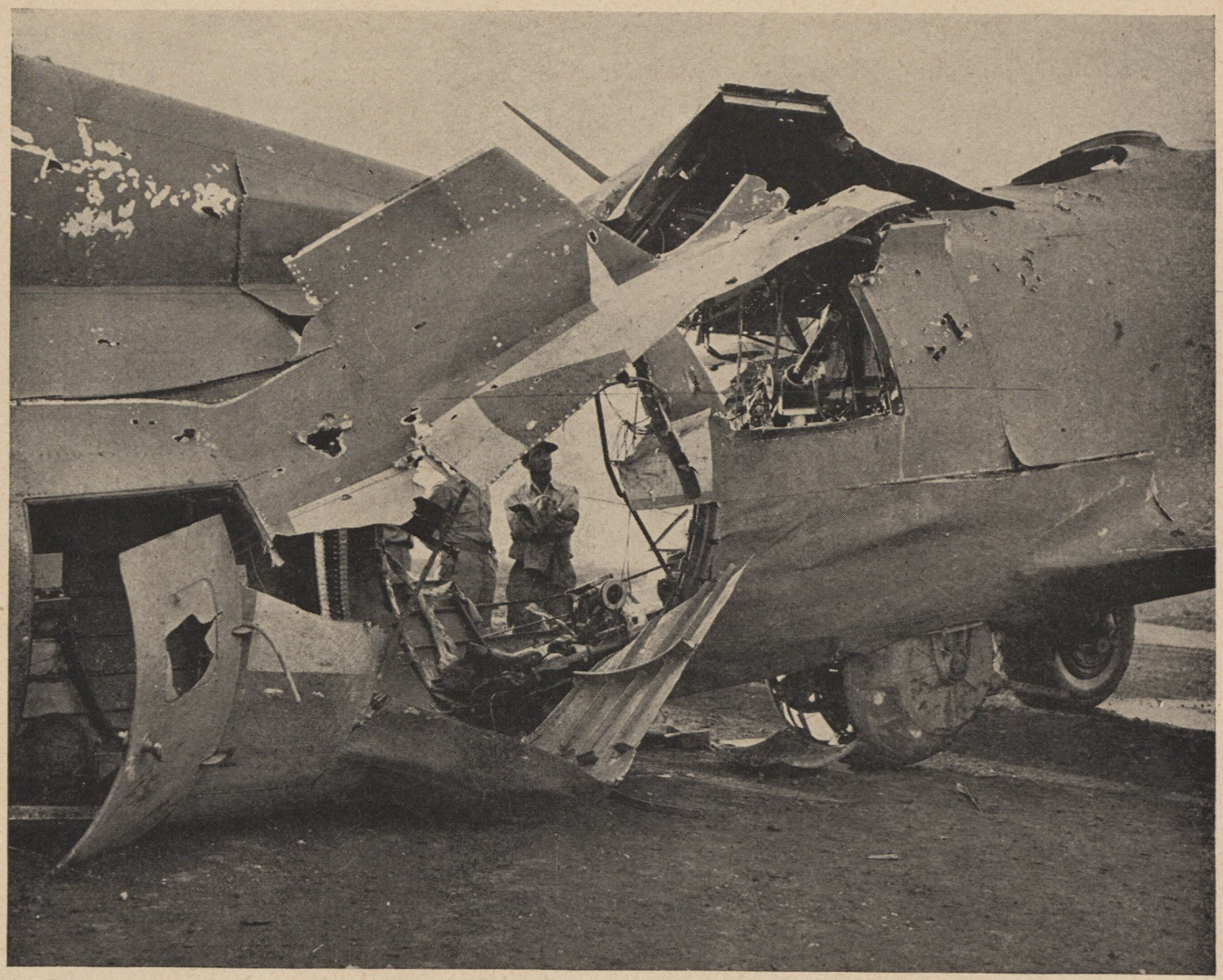
And now, if one needs further demonstration of the advantage of preponderant air power in tactical cooperation with an army, he finds it in the German counter-thrust of midwinter—the Battle of the Bulge—the break-through across Luxembourg and Belgium.

Weather was vile, for our purposes, in early December. Sometimes a week would go by at an air base when literally no plane could rise because of ground fog, drizzle, sleet and icing conditions. Perhaps there would be a day or two of limited operations; then once again the clammy soup filled the air and covered the ground and masked any repair and movement of enemy supply or reinforcement.

They struck at us the night of December 16th. The next day was clear, and our airplanes rushed to attack the dark rivers of tanks and trucks which were streaming up to aid the German advance. But we had not more than perhaps thirty hours of decent weather.

Wretched conditions prevailed day after day. Many of our troops were surrounded and massacred by the advancing enemy, who struck with savage cunning and strength under

"Planes lay like moths with their bodies burned out against a hot light . . . that was once the metal thorax of a dangerous enemy . . ."



". . . **in the construction** of the B-17 and later the B-24 . . . a certain amount of possible bomb load was sacrificed to the urgency of machine guns and strong plating . . ." This B-17 got back.

the protecting blanket of gray mist. Only in the day or two before Christmas were our planes able to roar out on operations again. On December 24th, with a cold sun staring in a cloudless sky, we clenched the fist of our air arm and struck the Third Reich a blow from which it never recovered.

Gone from the target area were the solid clouds which had risen sometimes to thirty-two thousand feet. Gone—from at least some British bases—the icy ground-fog through which pilots had peered and had not even in midday been able to see the landing-lights along their air strips as they waited to take off. Whatever the operational hazard, exactly two thousand and one American heavy bombers were airborne on that day before Christmas.

They went out to do a tactical job. Oil targets had for the moment been superseded by something more urgent. Their brothers of the Ninth Air Force raced ahead of and beneath them. That day our air forces went to work along the German lines and up and down the transport columns which fed them. No one brought home any unexpended bombs or ammunition that night. In continued good weather, the tactical planes demolished the bridges leading to the area, and once again a German army was in the death throes of strangulation. Our ground forces put the squeeze on them from every side; the Bulge collapsed like a burst bladder.

Not once again was the enemy enabled to make a counter thrust which might impair our position on his western borders, although bad flying weather of midwinter and late winter kept our planes fastened to their home fields oftener than we might have wished. Still, in one week, the Ninth Air Force alone flew twenty thousand sorties against the Hun. Magnificently and tirelessly, allied ground forces pushed ahead, forcing their way through sleet and snowdrifts which were agonizing enough for them, but a sodden hell for those hapless Germans with their supply and transportation systems being steadily shattered beyond repair.

Examining the bodies of Nazi officers who had found their last *Lebensraum* measured in inches, our soldiers produced further evidence of the enemy's fuel starvation, if such evidence were necessary. In letters and diaries, in penciled instructions, resounded frantic cries for help, desperate attempts to requisition the gasoline and food and ammunition which the Reich could not furnish to its reeling divisions. Perhaps ten per cent—perhaps only six per cent—of the gasoline and oil necessary for the support of the German armies was now being furnished them.

"Advancing armies found twenty-seven German tanks abandoned by 11th Panzer Division on way to attack Remagen bridgehead. Nothing wrong with them except gas tanks dry." The language of the official reports was dry, too, but it told the story.

And far back of the lines German airplanes sat parked wingtip to wingtip, as futile and ineffectual as so many box-kites. There was nothing to feed them on.

Guarded and covered and facilitated by overwhelming air superiority, our forces polished off the small enemy groups

(Continued on page 61)

Honeymoon Isle

Famed semi-tropical island in Gulf waters is transformed into unusual airport development for enjoyment of private plane flyers

BY M. A. BUGNON

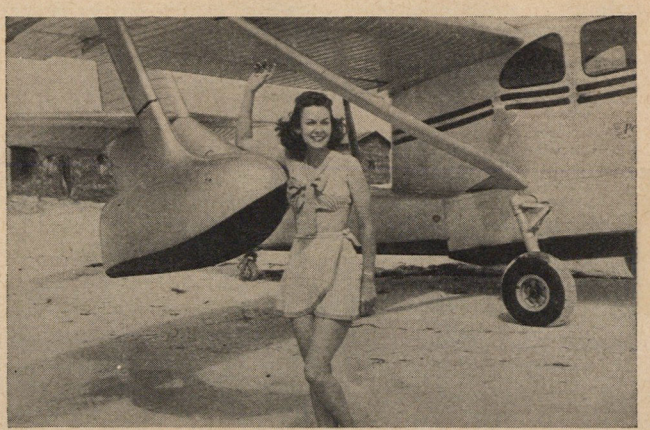
MAYBE you've dreamed of a place to which you could fly from the dreary, daily routine. A place where you can "get away from it all." Or perhaps you're planning a honeymoon, and don't care to join the crowds at Niagara Falls or Lake Tahoe. If the place you have in mind combines a deep blue sky, warm breezes blowing, fishing, swimming and sailing, the Honeymoon Isle Association has just the spot for you—and you can fly right to it!

Honeymoon Isle is a semi-tropical island in the Gulf of Mexico, two miles off the west coast of Florida and twenty-five miles northwest of Tampa and St. Petersburg.

For the past month, Cubs, twin-engine Beechcrafts, Navions, Fairchilds, have been landing and taking off from its 3,000-foot runway. Just recently, a United Airlines DC-3 stopped at the island with a number of aviation officials who were curious to see what was going on.

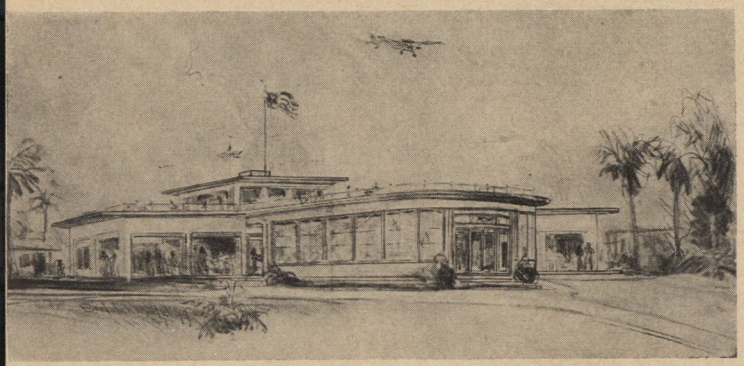
The completion of this airstrip was the first step in a $10,000,000 development schedule which will create a private flyer's sporting center. Construction of thirty, two-room guest cottages, a seaplane base, a hotel and other recreational and aviation facilities is scheduled to follow immediately.

The aim of the Association is to make Honeymoon Isle



Top photo shows aerial view of the Isle, Florida's sportsman pilot center, two miles off mainland in the Gulf of Mexico. Betty Skelton (above), aerobatic pilot and racing champion, alights from SeaBee which she flew in from Coast to Honeymoon Isle. Three thousand foot airstrip at upper end of island permits landing of all types of aircraft from Cubs to DC-3s. US Airlines plane (left) brings passengers in on airstrip which will be sod covered when completed. After a day of flying, swimming, fishing, or sailing, Honeymoon Islanders (right) gather round glowing campfire and toast marshmallows.

Stretch of beach (right) with airstrip at upper end. Huts in foreground will be replaced by spacious two-room bungalows. Drawing (below) shows the proposed clubhouse and dining room.



the funneling point for all private flyers coming to the Everglade State. When finished, it will furnish complete airport operation with individual hangars for 300 planes. Storage, gasoline and mechanical services will be available for the exclusive use of private plane owners.

According to the Association's Vice President, H. R. Wolfe, the private flyer will be able to fly in, land, taxi to the edge of the field, and in a matter of minutes be either swimming, fishing or enjoying whatever sport has attracted him. It will give him some place to go and something to do when he gets there. For his plane, there will be every modern hangar device and mechanical facility it is possible to obtain.

The official opening of the field will be announced in the Fall. Now, guests are using several of the thatch-roofed cottages which housed vacationing Jack & Heintz employees during the war.

You won't have to own a plane to enjoy this paradise. Airline travellers can fly in from New York or Chicago in a little more than five hours. It's only eight minutes by plane from Drew Field in Tampa to the Isle—a short trip from wherever you've come to enjoy swimming in the surf, fishing for pompano, watching the herons—or just honeymooning.

in line of HEAVY duty

BY BRIG. GEN. SAMUEL D. STURGIS, *The Air Engineer*

Since war's end the AAF engineer can go about his job without a carbine on his back. Otherwise things are about the same

THE last shot fired in World War II was fired in the Pacific, ending the most desperate, costly struggle in the history of the world. For most soldiers, that last shot meant the end of the task for which they had been trained, but for Air Force Engineers it meant only what they laconically described as "better working conditions."

For these airmen, the end of battle meant that for the first time in four years they could work without a carbine slung over their shoulder. It meant that they could now bump along on a roaring bulldozer or scraper without glancing up at the sky every few minutes to see if some Jap or German was coming in to clobber the place. That last shot meant, for the first time, that the landing strip hacked out of jungle or blasted out of coral today, wouldn't be full of shell or bomb craters tomorrow.

The end of combat meant relaxation of a sort, but it meant no lessening of work for Air Force Engineers. They had an idea that there would be a lot of work to be done now that they had a little time. They weren't wrong.

Today, serving in conquered lands and building strong ramparts of America in key outer defense areas, the Air Force Engineer continues, in peace, the hard task of airdrome construction and maintenance. Wherever American planes land and take off, he is at work; wherever the American flag flies over an Air Force station, it flies over products of his labor.

Back in 1941, Air Force stations outside the zone of the interior were few and far between. When war came, this situation was of grave concern. Aircraft were growing larger and heavier and a soggy cow pasture, adequate for aircraft in World War I, would not stand the pace of multi-ton landing impacts of World War II.

There was only one answer—build adequate airstrips wherever and whenever they were needed and the Air Force organized its Engineers to do the job. In the developing pattern of over-all strategy, the High Command selected strategic sites for advanced airstrips and the Engineers went to work. If the terrain was swampy, they drained it. If it was a jungle, they hewed their way through it. If it was coral, they dynamited, scraped and 'dozed the strip into shape. If the site was a shell-chewed battlefield, they put the earth back together in the shape they wanted it.

The first Air Force engineering unit to go overseas was the 807th Aviation Engineers Battalion, which descended on Alaska's Aleutian Islands early in the war with a full supply of bulldozers, fortitude and ingenuity. It built the first air base west of Dutch Harbor in the Aleutian chain. From this base, built despite roaring blizzards and supply difficulties, American air power rose to turn back a surprised enemy and to guarantee the security of Alaska.

From here, the "fighting-building" engineers moved out to the island of Attu where they were given twelve days to lay a landing strip in virgin country. They did the job, establishing a record that still stands. In the continued development of the Attu base, these Air Force earth movers stopped work

One of the bulkiest pieces of AAF engineering equipment is the semi-mobile asphalt mixer which turns out 150 to 200 tons of road material hourly. AAF uses it for landing strips.

The students at Geiger Field are a brawny crew, proud of the work they do and jealous of the many blisters they acquire in doing it.

only once in fifteen months of construction. The break came when a blizzard became so thick that men could not see their hands.

The cold of Attu was unknown to Aviation Engineers at work in New Guinea, but there were times when it would have been welcome. On one occasion down there, orders were given for the construction of a double landing strip 6,000 feet in length in the heart of the sweaty jungle. With the aid of nineteen bulldozers, numerous scrapers, rollers and graders, the strip was completed and accepting aircraft within fifteen days.

This, Engineers recall, was a big deal.

Material for the strip was flown in by transport planes which landed—somehow—on improvised strips hacked out of the jungle. Large concentrations of Jap forces were in the neighborhood and the Engineers expected heavy fire at any moment, but they slugged the job on through. They thought it more than worth the effort when the strip became the point of origin for slap-down attacks against the enemy on Wewak and Lae Islands.

Ground troops were still mopping up fanatical Jap holdouts on Saipan when Air Force Engineers began piling ashore with their equipment. An occasional shot still rang out as they began laying down a new strip just 1500 miles from Tokyo. There were still some remnants around when the strip was finished—but it was finished and in a hurry.

These airmen knew how to work fast even before they went to war. There was, for example, the job that still has citizens of Enterprise, Ore., shaking their heads in wonder. A B-24 Liberator had made an emergency landing on the Enterprise golf course and it seemed destined to stay there unless ripped apart and shipped away piecemeal. A contingent of Engineers from Geiger Field, Spokane, Wash., home of the Air Training Command's Aviation Engineer School, refuted the "impossible" in 61 hours, building a 3,200-foot runway under simulated combat conditions.

There were other practice missions. The US Forestry Service needed a landing strip in the wilderness of Idaho and an Aviation Engineering Battalion, the 1886th from Geiger Field, went to work. It first widened out a primitive road leading to the airstrip site, then moved in the heavy

equipment. In fifteen days they had a strip 2400 feet in length and 250 feet wide and it was already handling air traffic.

The mission of Aviation Engineers during the war was the construction, maintenance and camouflage of air installations. These vital bases ranged from large airdromes far behind the fighting lines to advanced landing strips hastily constructed right up front. The Engineers made their mark from one end of the war-torn world to the other. While their brothers in the sky destroyed everything that stood in the path of American victory, the Aviation Engineers followed the advance, patching things up.

Air Training Command, preparing Aviation Engineers for the exacting task of building and maintaining peacetime defense bases, operates today one of the toughest training curriculums of the postwar era at the Geiger Field school. Lieut. General John K. Cannon, Commanding General of the Air Forces training echelon, says the program is one of the toughest under his control. Aviation Engineers, who readily admit that their training is tough—"but so is our work"—pride themselves on this bid for brawny distinction.

In training and in operations, Engineers traditionally work with giant-sized heavy duty machines, but the Geiger Field school also develops talents in other fields of engineering. The Geiger-trained Aviation Engineer, whatever his specialty, is adept at handling the tools of his trade, whether they be a bulldozer, a sprawling asphalt mixer, welding machine, precision surveying instruments or drafting tools.

The Geiger Field school currently conducts training in twenty-eight separate engineering specialties. A complete school is maintained for each subject, with the entire field presenting an establishment similar to the university system of scholastic administration.

Each school is administered through a "Section," and the "Engineering Section" is considered one of the most important in the curriculum. This Section includes schools for the training of such specialists as the construction technician, the draftsman, structural steel worker, photolithographer, photographer, surveyor, water supply technician and camouflage experts.

Draftsmen are surprisingly important to Air Force Aviation Engineering teams. They prepare detailed drawings of working plans from sketches and notes provided by surveyors and engineers. The photolithographer is also essential, for his machines produce military topographical maps and drawings, notes and documents in quantity.

Construction of airstrips, one of the most familiar combat

(Continued on page 58)

In Geiger's Water Drilling course, Air Force engineers learn first where to find the H_2O and then how to get it where it can be used.

In two decades, three open biplanes and 127 route miles grew into air transport's "little giant" that links the key cities of our nation's industrial heartland

PERSISTENCE

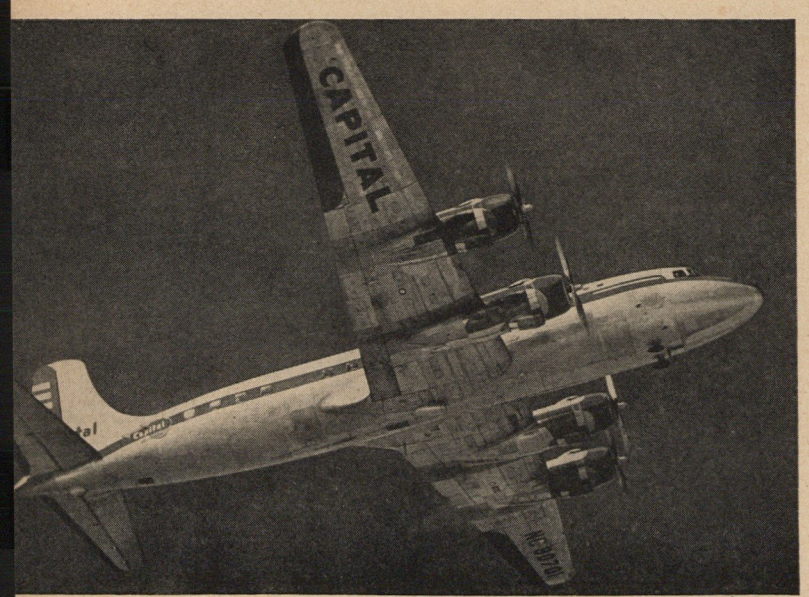
BY PHILLIP ANDREWS

If further proof be needed that the nation's airlines comprise a relatively young industry and thus are to be forgiven their occasional transgressions, there is ample evidence in the analogy that the second oldest of the lot still lacks a year of being old enough to vote. Capital Airlines, until recently known as Pennsylvania Central, and prior to that by various other names (some of a distinctly uncomplimentary nature bestowed by disgruntled competitors) was born through a series of mergers in the spring of 1927. Twenty years old this month, Capital appears determined to face the uncertain future alone despite some talk of an impending marriage of convenience.

Like most pioneer air transport organizations, Capital got its start with the 1925 Kelley Bill, an Act of Congress which provided for the letting of air mail contracts to private companies. The following year, one Clifford Ball of Pittsburgh, seeing in his pasture airport the ephemeral vortex of an aeronautical spiderweb, bid for and received that which is all too frequently and erroneously termed an air mail "subsidy." In the days of surplus DeHavillands and bargain-counter J-1 Standards, Ball demonstrated his faith in the future and himself by laying down some thirty-five hundred hard round dollars for three 90 horsepower (OX-5) Waco Nines. From here on it was all very simple. From Cleveland you called somebody in Pittsburgh and asked, "How's the weather there?" If the fellow in Pittsburgh said "O.K." you relayed this cryptic information to your pilot, Dewey Noyes. Then you would throw a sack of mail into the two-place front cockpit and Dewey would take off. With a good tail wind the Waco could make all of ninety miles an hour and before you knew it Dewey would be settling down gently in the Pittsburgh smog.

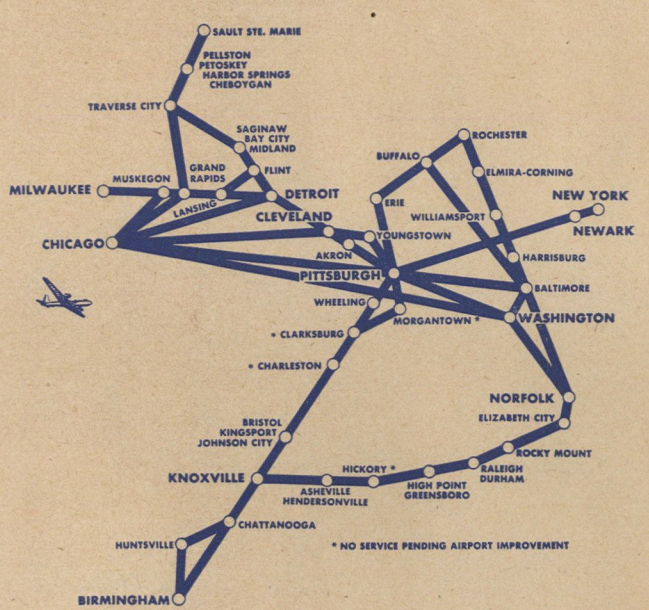
At first the line hauled only mail, and because people were indisposed toward risking their valuable correspondence, much less their necks to the vagaries of air transportation, there wasn't even very much of that for a while. But as Dewey Noyes and Trow Sebree, now Capital's chief of operations, maintained their schedules with all the regularity and aplomb of a couple of street-car motormen, people who, for one reason or another were in a great hurry to get from Cleveland to Pittsburgh or from Pittsburgh to Cleveland eagerly proffered their twenty-dollar bills for the privilege. To accommodate this adventuresome trade Ball acquired three 5-place Fairchild monoplanes, a Ryan and a Pitcairn Mailwing, each powered by a 220-horsepower Wright J-5.

This was in 1927, an eventful year. Charles Lindbergh coaxed his Ryan Monoplane across the Atlantic and the world looked up. A young English professor at the University of Pittsburgh, name of C. Bedell Munro, quit his job and went into business with his brother-in-law. Together they formed a sky-writing company and although the young professor found it somewhat more exciting than the college classroom he had left, it was hardly more lucrative. Then, as now, "there was money to be made in aviation," but some water was needed to prime the pump, say a million dollars worth. With George R. Hann as chief catalytic agent, some two hundred well-heeled, public-spirited Pittsburghers chipped in to form Pittsburgh Aviation Industries. PAI, which was later to have a financial hand in the forming of TWA, first opened a flying school. Following this modest beginning,



Douglas DC-4s were added to Capital's fleet as soon as four-engined equipment became available. These supplemented the DC-3s returned from service with the AAF's Air Transport Command.

Capital's system grew from the original Pittsburgh-Cleveland run which the Post Office turned over to Cliff Ball Air Lines in 1927 in accordance with policy laid down by Kelly Air Mail Bill.



IS SPELLED WITH A CAPITAL

Herbert Thaden was imported from California to supervise the construction of his "Tin Gosling" under the aegis of the Pittsburgh Metal Airplane Company, a PAI affiliate. But the big idea was to establish an airline operation with Pittsburgh as the hub of a wheel that would encompass Washington, New York, Cleveland and other important cities in the area. Inevitably the alert corporate eye of PAI fell on Clifford Ball who, by now, had crossed the Alleghenies into Washington. With the revenue from carrying more than 50,000 pounds of mail during the second year of his operations, Ball was meeting a 16-employee payroll with a little to spare and already had written off the cost of his OX-5 equipment. But he was beginning to find himself in an early convolution of the cycle that was to become a pattern for other airlines wherein profits were forever being postponed in favor of expenditures for additional equipment to accommodate increased traffic. Ball saw the handwriting and it was in large round letters. He sold out to PAI and a new company, Pennsylvania Airlines, was formed.

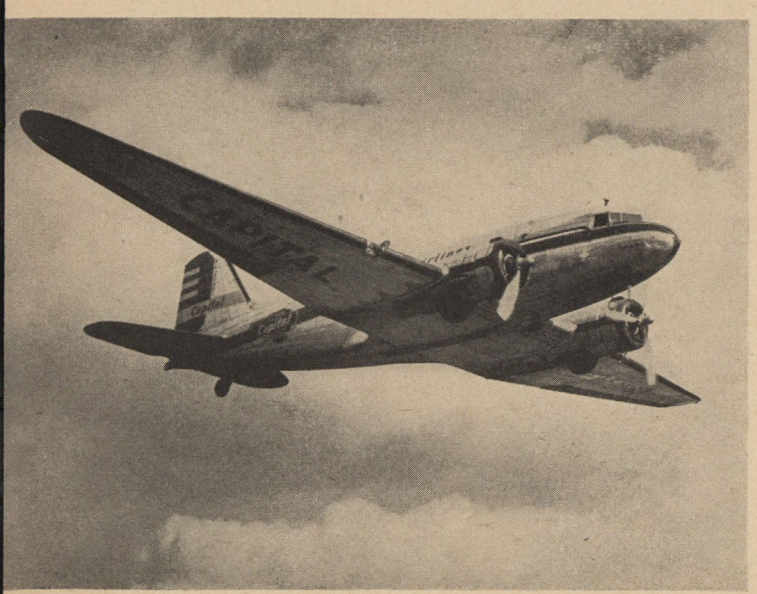
The Fairchilds, the Ryan and the Pitcairn had earned their keep but they weren't quite up to the job ahead. Pennsylvania's financial report for the year 1930 showed a monthly average of but 95 passengers and a scant 22,600 plane-miles of operation. With $100-thousand worth of Stinson trimotors, 685,000 plane-miles were flown in the following year on a three-a-day schedule. The addition of Ford Trimotors to the fleet, two-way radio equipment, and co-pilots (one of whom was the late Helen Richie, only woman ever to fly a scheduled transport route in the US) pushed the annual mileage total to nearly a million.

Came the depression, and then the dark year of 1934 with its wholesale cancellation of air mail contracts. Central, a rival line, successfully bid on the Cleveland-Pittsburgh-Washington run, then added Detroit as a port-of-call. Pennsylvania had the choice of taking a quick, though at least calculable, loss or continuing on in a costly, interminable passenger-rate war. Pennsylvania's professor-president chose the lengthier, more expensive course and the fight was on. Freed from the restrictions of air mail schedules, he took over Kohler Airlines and its small fleet of Loening Amphibians which had been operating over Lake Michigan from Detroit to Milwaukee.

In the ensuing battle, Pennsylvania trumped Central's efforts repeatedly with its Ford Trimotors on floats, an acquisition which led eventually to the awarding of air mail contracts to Pennsylvania for the Detroit-Milwaukee route. When in 1935 Central acquired its own Fords, Pennsylvania countered with a fleet of 180 mph Boeings, a move which tripled their previous year's passenger record to a new high of 45,000. Central answered this challenge with low-wing Stinsons, the operational costs of which were somewhat lower than that of the Boeings. With little to chose between the two lines on a basis of performance, the result was a bitter and crippling rate war, culminating in a merger of the two lines in 1936. The result was Pennsylvania Central Airlines, a name which was to be retained for the next ten years.

At first, there was the inevitable problem of integrating personnel. Bedell Munro retained his position as head of the new company. Central's J. H. "Slim" Carmichael became chief pilot and later Executive Vice President. Otherwise the

The addition of DC-3s to Capital's fleet gave the line room for such luxury additions as stewardesses and powder rooms. Still the air line's wheelhorse, they are to be replaced by Martin 202s.



At a recent dinner given Capital's million-mile pilots, C. Bedell Munro (left) gets his Short Snorter Bill autographed by AFA's Jimmie Doolittle, as Vice-Pres. J. H. "Slim" Carmichael looks on.

Central partisans maintained that they fared none too well in the reshuffle.

As internal dissension subsided PCA looked toward further expansion. In the next two years, Baltimore, Buffalo, Norfolk, Chicago and Charleston, West Virginia were added to the route. In 1939 the old Boeing 247s gave way to fourteen new Douglas DC-3s complete with hostesses, the first to be employed on short-line operations. In 1940 the Washington-Norfolk run was stretched to Knoxville with intermediate stops at Elizabeth City, Rocky Mount, Raleigh, Greensboro, Hickory and Asheville. PCA was adding new names to the nation's airline map.

Traffic flourished in the spring of '41 and PCA noted the trend by adding de-icing equipment to all its planes, by linking the great steel centers, Pittsburgh and Birmingham, and by moving into its new headquarters at Washington's National Airport. Business was good throughout the summer and fall. Then the Japs bombed Pearl Harbor and the period of expansion for airlines in general, PCA in particular, was at an end.

Because its service was concentrated in major industrial centers PCA's facilities were severely taxed. During 1942 many of its operations were marked "temporarily suspended." By 1943 PCA's fleet had been reduced by military requisition to six DC-3s and more than 200 of its prewar personnel had been released to military service. Despite sharp curtailment of its facilities, PCA held to within 5% of its prewar normal passenger traffic and remarkably, somehow managed to show an increase in mail and express poundage.

By 1944 production had begun to match the demand for military air transport and PCA was allotted sufficient aircraft to increase its fleet to a total of fourteen. With an additional number of DC-4s on order the company was awarded the Chicago-Detroit and Pittsburgh-New York routes. Passenger-mileage, most of it on high-priority, rose to more than 100-million.

By 1945, PCA, although now with more than 600 employees on loan to the armed services had over 2500 on its payroll. More DC-3s and a dozen DC-4s were acquired. Operating revenue for July topped a million and monthly passenger totals neared the 100-thousand mark.

With the acquisition of new equipment, the suspended routes were reopened and all-cargo operations were planned. By October the line was awarded intermediate stops at Elmira, Corning and Rochester on its Washington-Buffalo run. PCA became the first line to use 59-passenger DC-4s in domestic operations. In 1946, the first full year of peace, major alterations in the company's corporate structure were proposed. A suggested merger with Northwest Airlines was approved by the stockholders of both companies and is still pending before the Civil Aeronautics Board. The extension of service from Chicago and Milwaukee to Minneapolis and St. Paul, from Birmingham to Mobile, from Asheville through Georgia to Jacksonville and from Chattanooga to Memphis were recommended by CAB examiners and three regional vice-presidents were appointed in order to facilitate the expansion.

In co-operation with Veterans Administration, an extensive on-the-job training program has been instituted, into which numbers of ex-AAF GI's have been absorbed.

During the war, air cargo became a major phase of PCA operations. Experience indicated that air-freight could be hauled at a profit, providing suitable aircraft and handling facilities were provided. PCA placed four DC-4s into all-cargo operations. In February of this year to supplement the all-cargo DC-3s which were used for war-freight expediting. Converted by Glenn L. Martin from AAF, C-54s these four engined freighters will carry 18,000 lbs in their 3600 cubic foot hold. The interior contains special handling systems and convertible cargo bins. Like most other domestic airlines PCA has international ambitions. These have been stymied by the denial of applications by CAB, although a proposal

Capital Airlines was born in 1927 at a converted cow pasture known as Bettis Field, McKeesport, Pa. This is the original combination office terminal building, typical of that trail-breaking period.

Dewey Noyes flew the original run in his 90 mph OX-5 engined Waco 9, Miss Pittsburgh. Line's other planes were named after the remaining cities on route, Miss Cleveland and Miss Youngstown.

to extend its services across the border to Canada, is still pending. As for future equipment, Martin 202s and 303s are on order, and the line hopes to be among the first to receive the new super-twin transport.

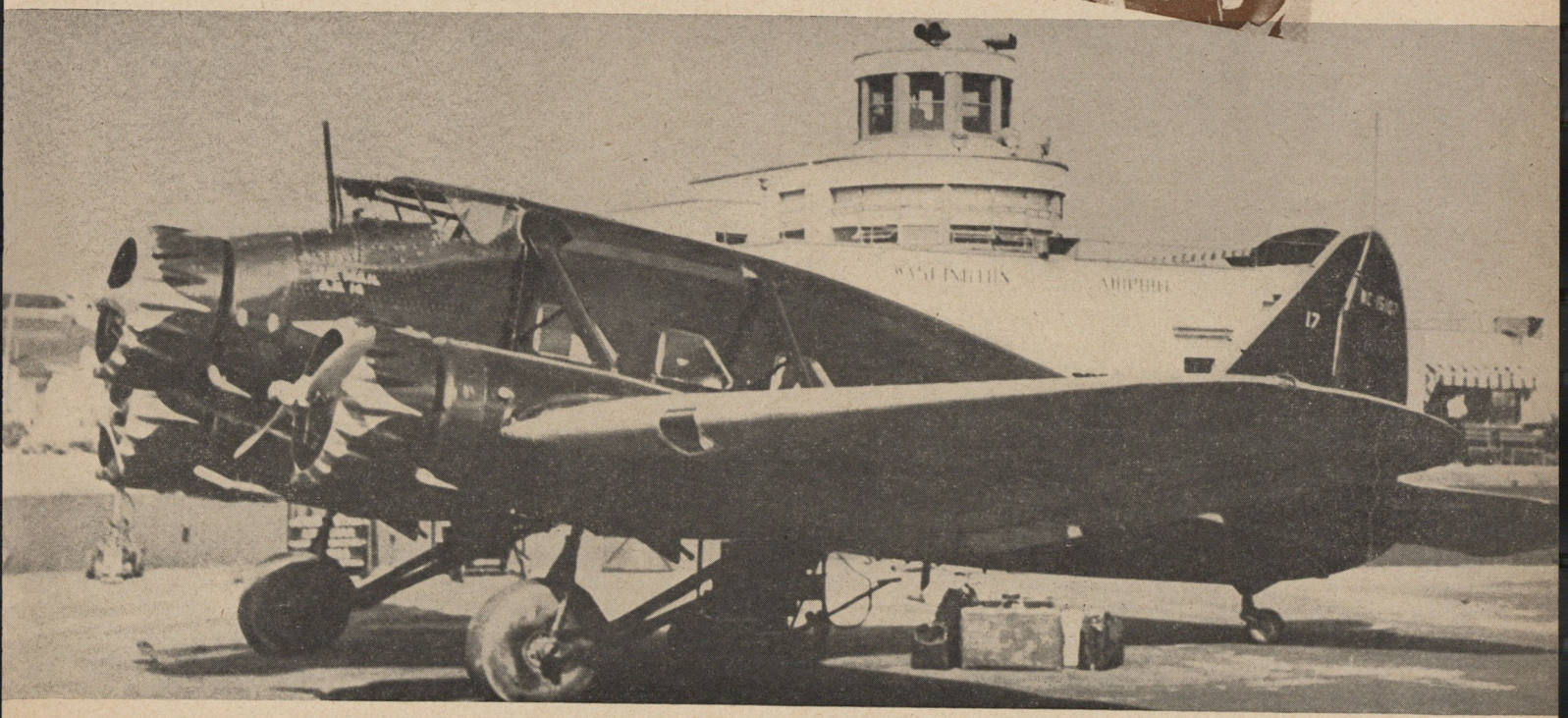
In changing its name, Capital has given notice that it no longer can be considered a purely sectional airline. With the nation's capital as its new terminus, PCA selected "Capital" as a less confining, more appropriate title under which to operate and chose the occasion of its twentieth birthday for the re-christening.

But whatever its name, the company headed by Bedell Munro has accomplished much in its brief history. Accomplishments measured in increased operational mileage, better equipment, improvements in safety, comfort and service.

The situation, Mr. Munro admits, is still none too good. Neither is it as bad as the calamity howlers would have us believe. "But we do need to get away from those wild promises," he says, "away from those rosy and unrealistic predictions, those talks of aircraft larger than ocean liners, speeds in everyday commercial travel of 750 to 1000 miles per hour, of operations that can be continued despite fog and every other known form of weather which prevent the other forms of transportation from completing their schedules."

Those who travelled in Cliff Ball's Fairchilds, paid twenty dollars to fly the old Route 11 from McKeesport Air Field to Cleveland. The Current price—tax, higher wages and all, is $7.30. Munro doesn't think it's enough and that passenger fares could be increased sufficiently to allow the airlines a modest profit on the realistic load factor of say 65 or 70% rather than the higher wartime figures. Further, he feels that the average passenger won't mind paying the few additional dollars to get where he wants to go safely, comfortably, quickly. As usual there are a number of people who, for one reason or another, don't quite agree with the former college professor, which means that the battle is on. Win or lose, it's a better-than-even-money bet that Bedell Munro, and Capital (or whatever its name may be at the time) will be there at the finish.

Ten years ago, passengers got into 180 mph Boeings by wooden ladders, as shown at right. Original PCA hostesses (top) wore bellboy hats. Below, Stinson trimotors came from Central Air Lines.



More Ways to Skin a Cat

One of the newer methods of making a living was revealed last month in Washington where AFA members Milton and George Gould initiated the first class in their new school for training typewriter mechanics.

The idea was born accidentally when the brothers Gould decided to buy a few surplus typewriters for resale. Problem number one was having them repaired. But the harder they searched for competent repairmen, the tougher it was to locate properly equipped men.

Looking further into the problem, they learned through the US Employment Service that there is a shortage of typewriter mechanics, especially in typewriter-burdened Washington.

Now accepting students under the GI Bill, the Gould brothers have retained an experienced serviceman and offer a course of 900 hours of instruction covering thirty-six calendar weeks.

Operations Scientific

Scientific organizations are being aided by the AAF in a resumption of basic research which had been interrupted by the war.

In its forthcoming expedition to conquer the pinnacle of Alaska's Mount McKinley, the New England Museum of History, Boston, has enlisted the aid of the Alaskan Air Command. Inasmuch as the equipment which will be used to gather cosmic ray data is both heavy and bulky, the AAF through the Alaskan Air Command, will drop two tons of supplies and equipment to the expedition's camp. Transport aircraft stationed in Alaska will use special parachutes provided by Air Matériel Command. Wright Field also is providing some equipment which will be cold-weather tested by the expedition.

At about the same time the New England Museum's expedition gets underway, an AAF B-29 "cosmic ray flying laboratory" will reinforce the National Geographic-AAF eclipse expedition in Brazil. This latter expedition will probe into the mysteries of the cosmic ray as well as the eclipse phenomena. In one of the most elaborate attacks on the mysteries of astronomical behavior, the AAF will contribute largely to the eclipse expedition's success by providing aircraft which will carry delicate scientific instruments to extreme heights over the interior of Brazil, affording science an opportunity to take cosmic radiation measurements in territories formerly impenetrable due to the size and weight of the equipment.

The Massachusetts Institute of Technology, Cambridge, recently completed a series of cosmic ray flights in a specially equipped B-29 provided by the AAF. In flights out of Bedford AAB, Boston, Dr. Bruno Rossi and his staff were able to carry their equipment to heights up to 35,000 feet in order to study the "slow meson," a by-product of the original cosmic ray. The cosmic ray is described as having energy many thousands times that of the atomic bomb, but has never been harnessed.

Currently, the AAF has provided three B-29s, modified to ascend to over 40,000 feet, to the Office of Naval Research for its "Project Apollo." Sponsored by the Navy, the project combines the coöperative efforts of four organizations—the AAF, Naval Research Laboratory, Johns Hopkins University, and the US Weather Bureau—in a study of upper atmosphere, including research on the cosmic ray, and "sky brightness." Practical application of the sky brightness tests will be the development of a suitable instrument for navigating at high altitudes by the stars in daylight.

On a recent flight, a modified Air Force camera, the K-20, took pictures of Boston at 35,000 feet. This camera was modified and mounted in a special shock-proof case and will be inside the V-2 rocket which is being tested at White Sands, New Mexico.

Weight-Lifter Extraordinary

Recently, the XB-36, Convair's six-engine superbomber, set an unofficial world's record for airplane weight lifting when it took off at a gross weight of 278,000 pounds. That's equivalent to lifting eleven DC-3s at one fell swoop. The plane itself weighed 130,581 pounds; water ballast added 34,135 pounds; fuel, 79,380; oil, 6,645; testing equipment, 25,259; and crew members and personal equipment, 2,000.

Aside From That

Secretary of War Patterson has approved principal recommendations for overhauling the Army courts-martial system made recently by his civilian advisory committee on military justice. Some of the proposed recommendations include making provision for enlisted men to sit on general courts-martial; removing the mandatory death penalty for rape, and giving the Judge Advocate General broader courts-martial review powers.

Nor Gloom of Night

The AAF's All-Weather Airline is proving that the Post Office Department's credo, *"neither snow nor rain nor heat nor gloom of night, stays these couriers from the swift completion of their appointed rounds,"* can apply also to scheduled flight operations.

The airline recently completed 171 round trips between its Wilmington, Ohio, home base and its eastern terminus, Andrews Field, Washington, D. C., without a single cancellation in its established schedule. On at least thirteen occasions, landings were made under conditions which had forced the CAA to cancel traffic in that area.

Each flight of the airline is made under simulated instrument weather conditions of "under the hood." Thus, when actual instrument conditions prevail, flying through the

"soup" is no novelty to the crewmen of the airline. To prove further that bad weather is no "bogey man," a night schedule has been instituted where operations continue under the same conditions practiced in the day runs.

All-weather landing aids used during the first six months of operation are used for night flights. These aids include the AAF's war-proven GCA and a more recent development of the Air Matériel Command for traffic control, the CPN-18 long-range radar traffic control unit.

Gen. Smith Named CAP Commander

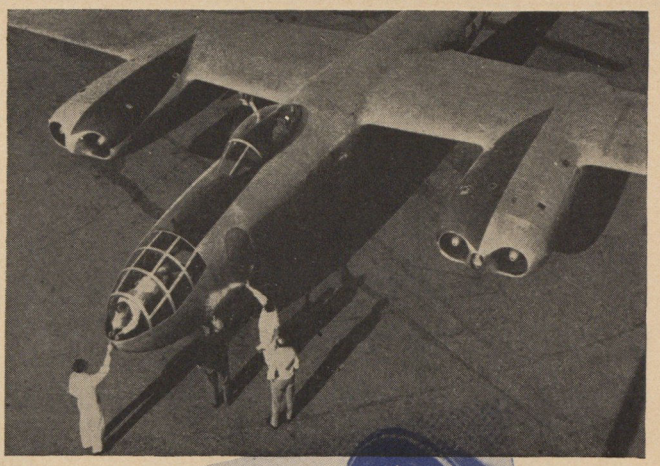
Brig. Gen. Frederic H. Smith, Jr., Chief of Staff of the Strategic Air Command at Andrews Field, Washington, D. C., has been appointed national commander of the Civil Air Patrol, succeeding Col. Earle E. Johnson who was injured fatally when the C-45 he was piloting crashed in Cleveland.

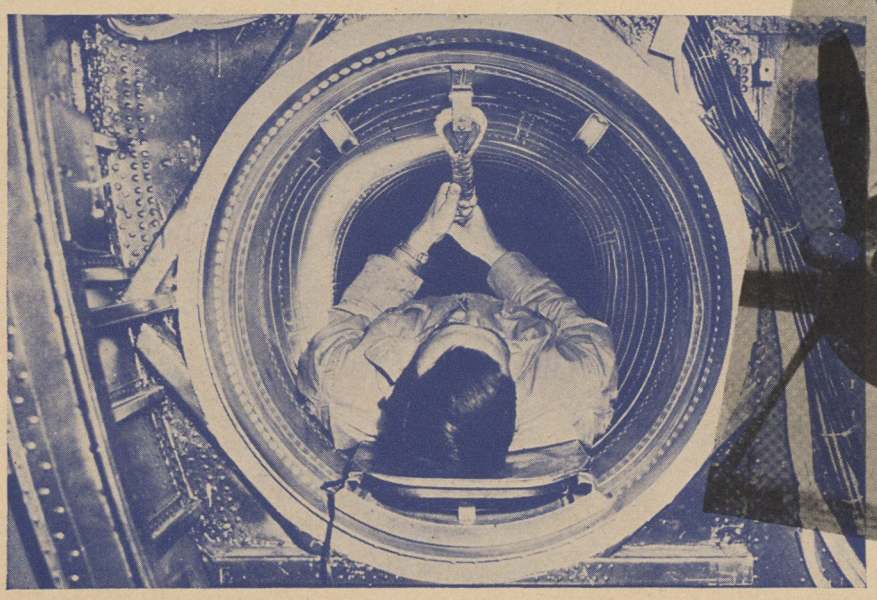
One of the youngest generals in the AAF, thirty-eight-year-old General Smith is a veteran of more than seventeen years of Army service. Commissioned a second lieutenant in the Field Artillery after training at West Point, he transferred to the Air Corps a year and a half later.

A month after Pearl Harbor, he was sent to the Southwest Pacific, where he spent two years as deputy chief of staff and later as chief of staff of the Fifth Air Force. In February, 1944, he was transferred to the ETO as chief of operations of the American component of the Allied Expeditionary Air Forces.

General Smith returned to Washington in the fall of 1944 as deputy chief of air staff at AAF headquarters, but went back to the Pacific a few months later as Commanding General of the Fifth Fighter Command.

After the war ended, he was assigned to duty in AAF headquarters, and last April was named chief of staff of the Strategic Air Command.





High performanced North American B-45 (top), first four-jet bomber actually delivered to AAF makes its initial flight at Muroc, Cal.

Marge Hurlburt of Painesville, O., (right) holds trophy won in clip-winged Corsair setting international women's record of 337.-635 mph. Former Wasp broke Jackie Cochran's 10-year-old record.

When he flies, Johnny Seal (lower right) is always behind the 8-ball. Chief test pilot for Cornell Aeronautical Labs, Seal uses A-26 fitted with special instruments for advanced armament study.

Crew member lies on "tray," pulls himself through 85-foot-long pressure tunnel (below) connecting crew quarters in Convair's B-36.

IN RESERVE

Notes and comments on activities of the Air Reserve and Air National Guard—a new Air Force department

Vacation Plus Leave

Bosses willing, Reservists may be able to arrange periods of military leave for training purposes each year, in addition to regular vacations, as an aid to building up enlisted strength of the Air Reserve. Though nothing official has been announced on this as yet, business concerns and industrial firms are being queried for a reaction.

You Can Fly

Both enlisted and commissioned Air Reserve personnel, on inactive status, are authorized to ride as passengers in Army aircraft in connection with Air Reserve activities. Carrying correct identification as a Reservist and completely uniformed, ex-servicemen may use space that is available provided the flight is a regularly scheduled mission. CO or high authorities of the Air Reserve Training Detachments must clear such requests for flights. Only in the Air Defense Command may flights be scheduled solely for transport of Reserve personnel on Reserve business.

Get it By Mail

"Mail order" courses being prepared by the Air University will enable ex-servicemen to maintain their Reserve status. Credits from these extension courses will apply toward annual requirements. Though the number of training hours necessary for both air and ground Reservists has not been determined as yet, those participating in Reserve training functions at the present time, should receive and record credits on individual records.

Uniform Changes

Several changes in uniform regulations were announced by the War Department recently. To be "in uniform" these days you can't wear the campaign hat and cord made famous by Vinegar Joe Stilwell. The lyre superimposed on the US, worn by bandmen, is no longer GI. Nor is the crossed arrow emblem of the First Special Service Force and the blue star on the OD disk which marked excellence in ASTP. Inverted blue tabs which once designated AAF specialists, in armament, weather, communications, photography and engineering have left the sleeves. No Airborne tab, formerly worn above the patch, will be permitted, and flying instructors will give up the golden orange wings which were embroidered on their right sleeves.

Instead of sleeve or pocket patches, bomb disposal personnel will wear their insignia on a dark blue brassard.

National Guard troops have been authorized to wear a state stripe with the full name of the state on the left shoulder below any patch authorized by the Guard unit. Guardsmen may also wear their choice of patches of overseas units in which they served during 1941 and 1945.

Members of the Organized Reserve Corps and the AUS, not on active duty, will wear the patch of the Reserve unit to which assigned or the AAF patch. On the right sleeve, they may wear the patch of an organization in which they served overseas during the war.

Room for Others

Reserve officers of other branches of the service may apply for Air Reserve assignment through the CO of the Air Reserve Training Detachment in his area. About the only hitch is that officers of other arms and services will not be assigned to a T/O vacancy if there is an available, qualified Air Corps Reserve officer for the spot.

Call for the Chaplain

"Sky Pilots" are as necessary to the Air Reserve Training Program as they were during the war. Chaplains who participate in the Air Reserve Chaplain Training Program will be authorized a certain number of annual flights and take a training program prepared by the Chief of Chaplains.

No Dough, So

Because of fiscal limitations to the 1946-47 budget, Headquarters AAF has announced that the Air Reserve Training Program will be discontinued at twenty-nine bases. This reduces the present active Air Reserve Training Detachments to forty-one. The twenty-nine bases where Air Reserve operations must be discontinued are: Niagara Falls, N. Y. Municipal Airport; Grenier Field, N. H.; Topeka, Kansas AAB; Smoky Hill AAB, Salina, Kansas; Portland, Ore. AAB; March Field, Calif.; Mather Field, Calif.; Great Falls, Montana AAB; Luke Field, Arizona; Bergstrom Field, Texas; Fort Worth, Texas AAB; New Orleans, La. AAB; Biggs Field, Texas; Goodfellow Field, Texas; Tulsa Okla. Municipal Airport; Langley Field, Va.; Olmsted Field, Pa.; Phillips Field, Md.; Lockbourne AAB, Columbus, Ohio; Lunden Airport, Cincinnati, Ohio; Jacksonville, Fla. Municipal Airport; Morris Field, N. C.; Columbia, S. C. AAB; Morrison Field, Fla.; Warner Robins, Ga.; Keesler Field, Miss.; Lawson Field, Ga.; Spokane, Wash. AAB; Orlando, Fla. AAB.

Air National Guard activities will be the only AAF operations at the following seven bases after the Air Reserve operation is discontinued: Luke Field, Arizona; Jacksonville, Fla. Municipal Airport; New Orleans, La., AAB; Niagara Falls, N. Y. Municipal Airport; Morris Field, N. C.; Tulsa, Okla. Municipal Airport and Portland, Oreg. AAB.

The German Air Force

BY ASHER LEE

Wing Commander, Royal Air Force. Condensed from the current book "The German Air Force" by special arrangement with Harper & Brothers, Publishers.

Versailles to Munich

THE powerful and well-organized German Air Force which existed at the time of the Munich Agreement in 1938 was no mushroom growth. It was the result of some fifteen years of careful military planning, punctuated by a series of air developments in Germany specially designed to evade postwar treaty restrictions and to create a military air force.

As in the political and economic spheres, the aviation terms in the Treaty of Versailles were never really observed by Germany. When one remembers that the Heinkel 111, Junkers 52, Dornier 18, Junkers 90, Junkers 86, Focke Wulf 200 and other Luftwaffe operational aircraft were originally classified as civil aircraft, one realizes how Allied indulgence in the 1920s helped in laying the foundation of the German Air Force. According to the Versailles Treaty Germany was forbidden to possess military aircraft or indeed to subsidize sporting flying. In spite of legal restriction the Luftwaffe was able to muster in 1935, 1,000 first-line military aircraft and 20,000 officers and men.

The Deutscher Luftsportverband, founded in 1902, grew steadily in strength after the war of 1914-1918 and by 1932 had an active membership of over 60,000. It controlled sporting and private flying in Germany, and if it was not officially subsidized by the German Government, it was at any rate heavily patronized by German air officialdom. Moreover the German civil air-lines which survived the Treaty of Versailles were amalgamated in a new and heavily subsidized company called the Deutsche Lufthansa. From 1926 onward the Lufthansa enjoyed a complete monopoly in the sphere of German commercial aviation, and soon established a network of air-lines which gave Germany the paramount position in civil aviation in Europe. The Lufthansa undoubtedly contributed much to create the nucleus of the Luftwaffe. It developed civil aviation resources by every means open to it and kept a grim and persistent eye on the military possibilities.

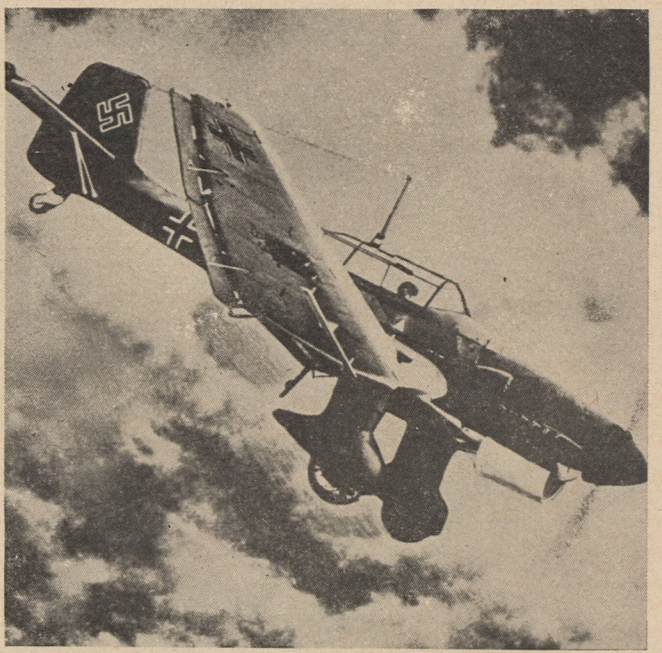
As in aircraft production, so in military flying, Germany, in spite of the terms of the Versailles Treaty, gained useful experience in the pre-Hitler period. She was forbidden to send any air missions abroad or to give instruction to foreign air forces at home, but ways and means were found to attach many German officers to the air forces of other countries. Many individual German pilots went abroad to get flying experience.

Thus in spite of Hitler's thunderings against the restrictions imposed on Germany by the Versailles Diktat, as he called it, the dictatorship proved to be extremely benevolent for the German Air Force. Versailles did not prevent Germany from centralizing her flying schools, from building large numbers of civilian versions of bomber and reconnaissance aircraft, from preparing a large number of useful aerodromes, from creating a signals and ground crew organization readily adaptable for military purposes or from building a fleet of transport aircraft.

The policy and program of the German Air Force in the important early years from 1935 to 1938 was largely the product of the minds of Göring, Milch and Udet. What kind of men were these, and what were their views on the use of air power?

Ernst Udet, born in 1896, flew in 1914-1918 with the Richthofen circus and claimed over 60 Allied aircraft shot down. After the war, he did as much as any German to nullify the provisions of the Versailles Treaty. A long series of air racing successes, culminated in his winning of the world's speed record in the Heinkel 112 at over 400 miles an hour in 1938. Appointed Director of the Technical Department at the German Air Ministry in 1936, he was no armchair bureaucrat. He made a point of testing all the new prototypes being made for the Luftwaffe; for instance, he won the race around the Alps in the Dornier 17 and flew the Messerschmitt 109 at Zurich in 1937. At the beginning of 1939 Udet was given a newly created post as Director-General of Equipment and Supply. This gave him a large measure of control over German Air Force aircraft production, development and research, as well as the power of deciding which types of aircraft and equipment were to be allocated to the various Luftwaffe squadrons. Udet's personality and ideas on air strategy were, therefore, all-important at this vital period of the Luftwaffe's development.

If Udet, the cosmopolitan, amusing, *bon viveur,* was the technical brain behind the German Air Force, it was the



Because of its productibility, the Junkers 87 dive bomber was selected for wide use in favor of cleaner, better performing designs. It began to appear in numbers over Norway and the Low Countries.

ruthless, energetic and brutal General Milch who was the organizing brain.

Milch, born at Kiel in the late 1890s, flew with very little distinction in the 1914-1918 war. In the postwar years, his ambitious energy was directed to civil air-lines and to helping in the formation of Lufthansa. There is no doubt that when G.A.F. was officially created in 1935 his appointment as Secretary of State for Air was partly political, partly aeronautical. In 1938 he became the official deputy to Göring, and in 1939 Inspector-General of the Luftwaffe. Technically, tactically and strategically Milch did not exercise a major influence on the German Air Force in the prewar period. His influence was rather on the personnel and organizational side.

And what of Hermann Göring, Commander-in-Chief of the German Air Force, Air Minister, Prime Minister of Prussia, President of the Reichstag, Chief Game Warden of the Reich, Economic Controller of the German Four-Year Plan, etc.?

Born in the early 1890s of a noble German family, Göring flew with the famous "Richthofen circus" in the 1914-1918 war. On Richthofen's death he commanded the Richthofen squadrons, and though lacking some of the qualities of his predecessor he showed courage, ruthlessness and the ability to handle men. He never shrank from a heavy casualty list, an ideal quality for a man who was to command an air force planned for the short, sharp air Blitzkrieg, but scarcely ideal for the commander of an air force engaged in the long war which was forced on the Luftwaffe by the Allies. He was possessively jealous of the independence of the Luftwaffe and intervened constantly to maintain it as a completely independent arm of the German Armed Forces. This in no way prevented him from supporting the German Army in the field and the German Navy at sea in the fullest measure that circumstances permitted.

These three men, Göring, Udet and Milch, undoubtedly shaped the major prewar destinies of the German Air Force.

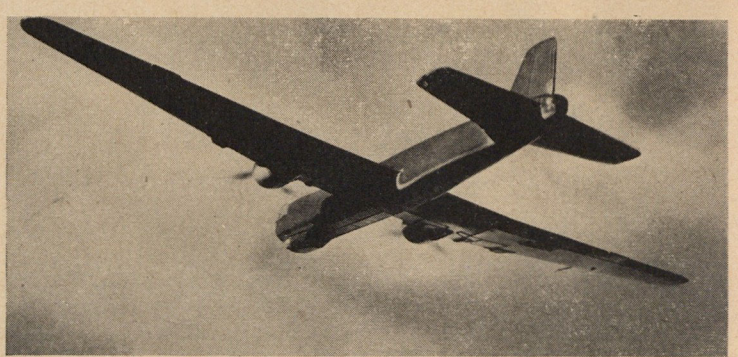
What kind of aircraft did prewar Luftwaffe squadrons have to fly?

The German long-range bomber force of the 1938-1939 period consisted entirely of twin-engined medium bombers, most of them Heinkel 111s and Dornier 17s. The Heinkel 111 was designed as a ten-seater passenger plane for the Lufthansa in 1932, but by 1933 three separate bomber versions were under construction. The Dornier 17, also known journalistically as the Dornier 215, was a lighter bomber of the type of the British Blenheim or the American Maryland. At the Zurich competition in 1937 it performed well, and Udet had high hopes that the "Flying Pencil" would develop into a really first-rate medium day bomber. Udet's faith in the aircraft under war conditions was short-lived and after the Battle of Britain, in which it suffered more casualties proportionately than any other type of German long-range it was gradually discarded.

The other long-range bomber in use in the German Air Force in the 1938-1939 period was the Junkers 86. Like the Heinkel 111, the Junkers 86 was originally a peaceful ten-seater civilian passenger plane in use with the Lufthansa European Air Service. By 1935 a bomber version was being produced by the Junkers firm equipped with two Jumo Diesel engines of about 600 hp each. With the Diesel engine the top speed was less than 200 mph but later radial engines increased the speed to about 230 mph. It had a bomb-load of about a ton for a range of between 750 and 1,000 miles. A failure as a bomber when tried in training, army maneuvers and in the Spanish war, it was offered more liberally on the export market than most German aircraft types.

The most outstanding omission from the German long-range bomber force of the prewar period was, of course, a heavy four-engined bomber. The genius, prototypes and raw materials were all there, but apart from Udet's personal predilection for fast medium bombers, the Germans were trying to expand their bomber force to a first-line strength of some 1,500 aircraft as quickly as possible. More man-hours and material were required to produce, service and repair four-engined bombers and they could not be spared if the program of expansion was to be achieved in time. The Luftwaffe, moreover, was developed in the main to support the German Army in the field in a series of short, sharp, victorious wars: the four-engined bomber, designed primarily for long-range and long-term strategic bombing, had little place in German prewar military strategy.

German fighters in the 1936-1939 period were in a transitional stage. The two single-engined biplane types, the Arado 68 and the Heinkel 51, were being rapidly supplanted by the Messerschmitt 109. Nevertheless, they formed the backbone of German single-engined fighter strength in the first two or three years of the Luftwaffe's existence. The Arado 68, equipped with a radial engine of about 750 hp, had a top speed of about 210 mph, was armed with two fixed machine-guns firing through the airscrew. The Heinkel 51 in its early form was similar in performance and armament.



German planning regarded aircraft as winged ordnance. As a result, support types, like Stuka (below) were mass produced; heavies, like Heinkel 177 (above) were neglected. Junkers 90s had paved way for the Ju-89 bomber, which never saw wide action.

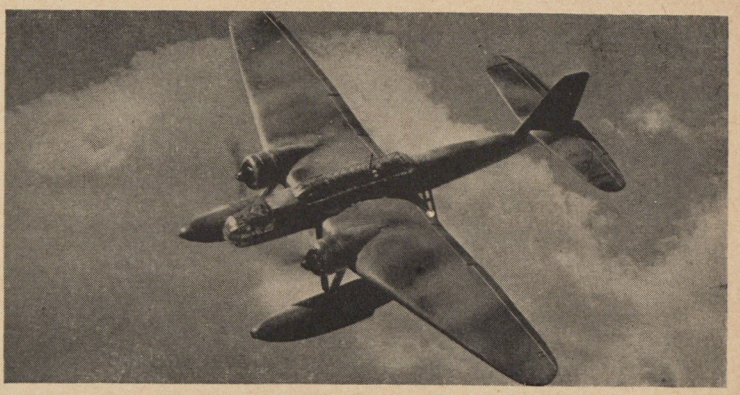
To the aviation world of the 1935-1936 period it was manifest that a single-seater monoplane would have to be developed. No one would be more aware of this than the Luftwaffe air staff, on which so many ex-fighter pilots were holding prominent positions. From the inspiration of the Messerschmitt 108, a fast low-wing monoplane sporting aircraft, which won the London-Isle of Man race in 1937, came the Messerschmitt 109, which, in its various forms, was the mainstay of the German single-engined fighter force from 1938 until the Luftwaffe broke up in 1945.

The only German long-range twin-engined fighter of this period was the Messerschmitt 110, of which, by 1938, the Germans had only a few squadrons. As a long-range day escort fighter it was to fail, but its later multiple employment as a night fighter, as an interceptor day fighter equipped with mortars, as a day bomber and as a reconnaissance plane is perhaps some justification for the Luftwaffe's continued faith in the aircraft.

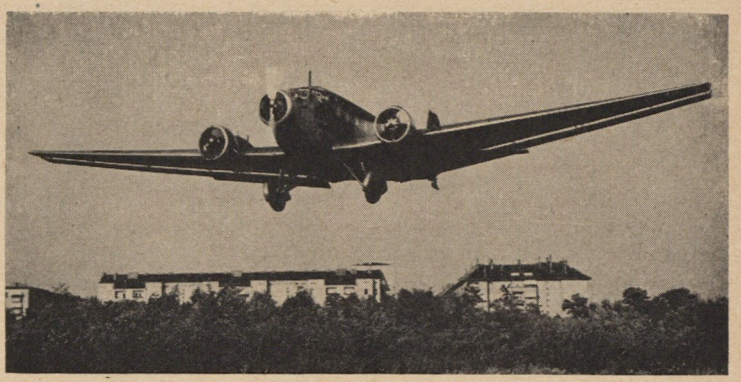
The Luftwaffe had two dive-bomber aircraft in squadrons in the 1936-1939 period, the Henschel 123 and the Junkers 87. The latter was undoubtedly the most publicized aircraft of the war, was first tried out in 1936. With a top speed of about 200 mph, which later increased to about 240, its normal bomb-load was only about 1,000 lbs, and its practical radius of action about 100 miles. Fitted with good diving brakes, it was, however, a real precision bomber of vital value for hitting small targets.

Organization of the Luftwaffe

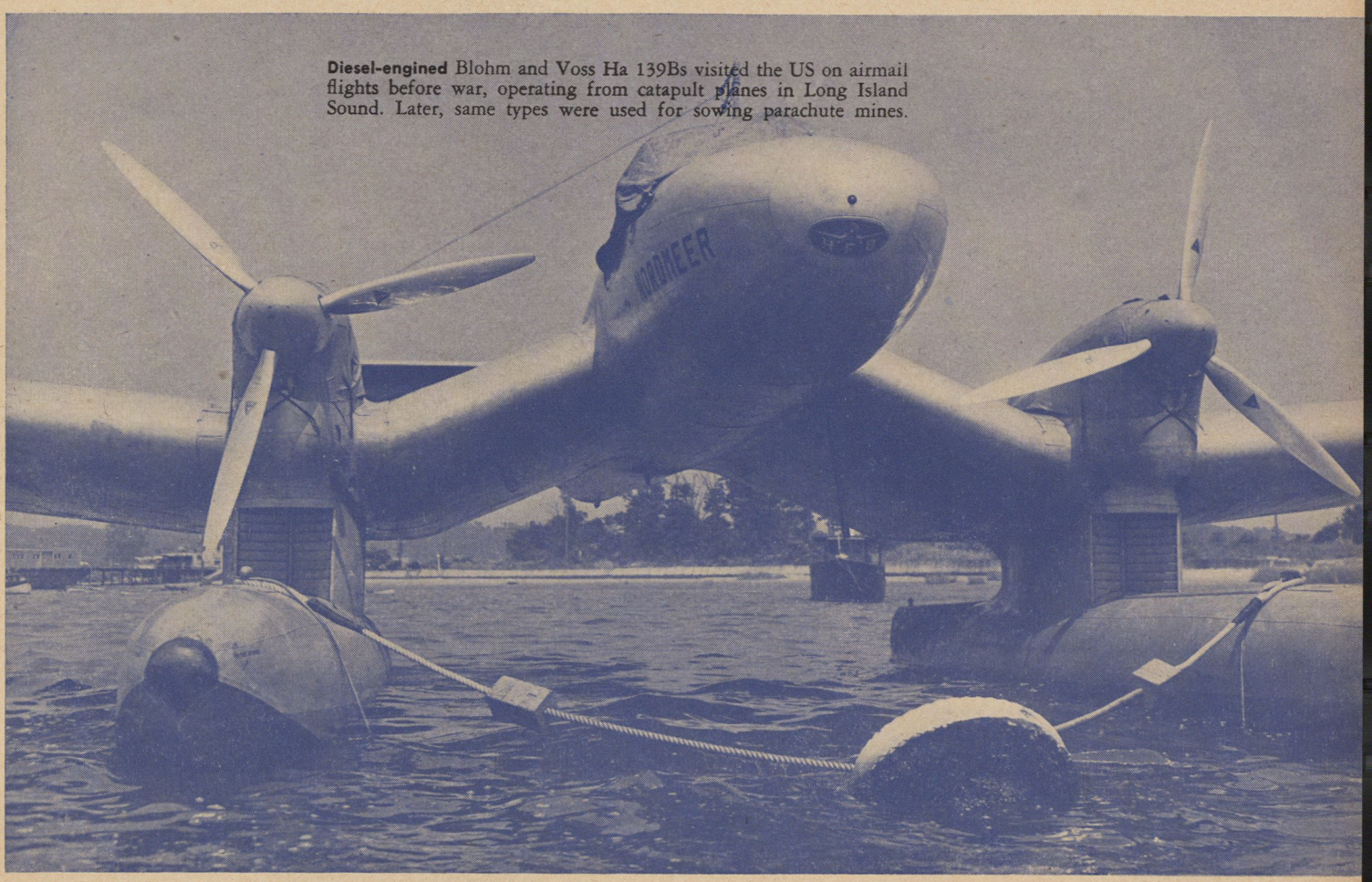
The German Air Staff in Berlin was fundamentally organized much on the lines that any air staff would be. At the top was Göring, with Milch as his deputy, Jeschonnek as his Chief of Staff and Udet as Chief of Aircraft Design and Supply. Göring had a directing operational staff



Heinkel's 115, prewar design, was used to some extent for dropping parachute mines in North Sea and off the English Coast.



Ju-52s, workhorses of the Lufthansa for a decade, became the backbone of Luftwaffe transport. They were Erhardt Milch's pet type.



Diesel-engined Blohm and Voss Ha 139Bs visited the US on airmail flights before war, operating from catapult planes in Long Island Sound. Later, same types were used for sowing parachute mines.

called a Fuehrungstab. The Air Ministry exercised most of its control over Luftwaffe units in the field through a series of inspectorates, all directly subordinated to Milch.

In brief, the broad role of German Air Ministry inspectorates was to see that German Air Force Units in the field implemented the policy of the German Air Staff.

The Luftwaffe was organized territorially into air fleets (Luftflotten). There were four immediately before the war. As the German armed forces occupied or withdrew from territory outside the Reich, so the territorial boundaries of the Luftflotten were expanded or contracted. A German Air Fleet normally consisted of a balanced force of between 500 and 1,000 operational aircraft comprising bomber, fighter and reconnaissance units. Its operational strength naturally varied according to its commitments, and from 1942 onward according to the squadrons which could be spared for it.

Within the Air Fleet the flying units were organized into two or three air divisions with a normal strength of between 250 and 500 operational aircraft. These air divisions were rebaptized in the spring of 1940, being called air corps (Fliegerkorps). In a bombastic speech, Göring implied that the reorganization of the Luftwaffe into air corps meant a huge expansion in front-line air strength, a typical German attempt to impress the democratic powers by pretending that the Luftwaffe was much greater than it was.

The German Air Staff never appeared satisfied with the air corps or air division of 250 to 500 aircraft as a unit of operational command, and from 1941 onward were constantly experimenting with smaller tactical commands. Thus Rommel in Africa had not an air corps to support him, but a highly mobile and smaller tactical command under an air Fuehrer rejoicing in the name of Fliegerfuehrer Afrika.

The individual flying units of the German Air Force were fairly constant in size, the bomber, dive-bomber and fighter units being normally divided into formations of about 100 aircraft and subdivided into three groups of about thirty aircraft each. The reconnaissance units were divided into squadrons (Staffeln) of about ten aircraft each.

The defensive policy of expanding the fighter force and conserving the bomber force, which the German Air Staff was compelled to adopt from 1942 onward, made them begin to reorganize on a functional, instead of geographical basis. Gradually a huge Fighter Command was created for the defense of Germany, France and the Low Countries. It was divided into fighter sectors each under a Fuehrer, each with its individual operational control room. With an efficient radio and radar organization and radio-telephony control of squadrons in the air, fighters could be quickly switched from one sector to another.

In addition in each German Air Fleet an air officer for bombers was created in 1943 to control the operations of the Luftwaffe long-range bomber units. The appointment was similar to that of General Spaatz in the American USAAF in Europe at the end of 1943. The main difference was that General Spaatz was appointed to command strong US Army Air Forces to bomb Germany in strength and support invading armies, whereas the German Air Officer was appointed to husband Germany's dwindling bomber resources.

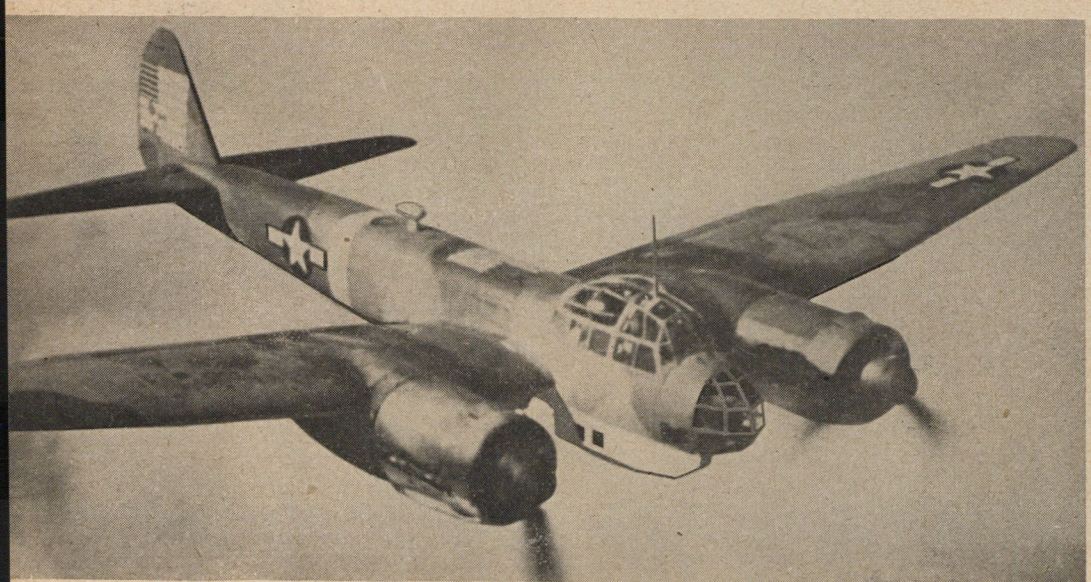
It may seem strange that the Luftwaffe air-transport organization lacked systematic efficiency. Germany had had very extensive experience of the employment of transport aircraft in her civil air-lines. She also laid great stress on the mobility of her air forces by the employment of large numbers of transport aircraft. In practice the Luftwaffe was compelled to employ about half her transport aircraft in training schools and draw on them when she needed to employ large numbers for major transport and air-landing operations.

There were a number of specialist air corps and divisions organized during the war, including a Ferry Command, a Night Fighter Command and a special Anti-Shipping Command in France and the Low Countries.

The organization of German anti-aircraft units constituted a substantial part of Göring's empire. In the 1939-1945 period it varied in strength between three quarters of a million and a million men, about half the total personnel strength of the German Air Force. The German Army and Navy controlled only about ten per cent of Germany's over-all anti-aircraft resources.

The organization of the Luftwaffe in the second world war was subject to much change, as anything organic would be in the face of war. Like any organization it worked best when it worked at its own pace, and got frayed and tattered in the face of heavy pressure. One point emerges: whatever reputation the German nation has for rigidity and inability to improvise is not one which the Luftwaffe should share. In its adaptation to changing war conditions, in the varied uses it made of its aircraft, the German Air Force showed great elasticity of thought and action.

Junkers Ju-88, the Luftwaffe's star performer. Fast and adaptable, it did well at every job it tackled, from night fighter to dive bomber. However it lacked load necessary for a major offensive weapon. This specimen was surrendered by its pilot in North Africa.



Three men and three errors. Goering wasted the flower of Luftwaffe in mass raids against England. Udet put too much production accent on fighters and light bombers. Milch, the former Lufthansa chief, robbed bomber production for transports.

Luftwaffe Training

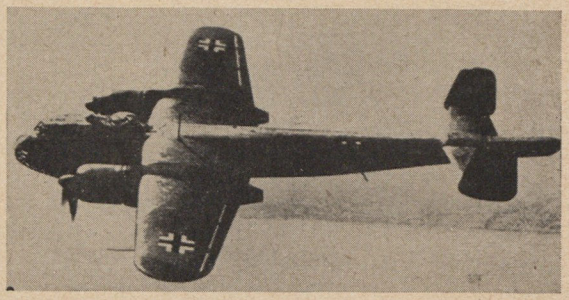
The National Socialist Flying Corps, regarded at first by many German aviators as a mere political stunt, became a preliminary flying training organization based on the ancient principle of getting them young. From the tender age of eight German youth was encouraged to join. They learned to make model aeroplanes and gliders and to watch their older brothers fly sporting type gliders. The rest of the time was spent in boy-scout-like activities, interspersed with adoration of the Fuehrer. At the age of fourteen the young aspirant airman might join the Hitler Youth, where he would be taught to build sports gliders which he would actually fly, acquiring at the same time some small amount of theoretical knowledge about aero engines and aeronautics.

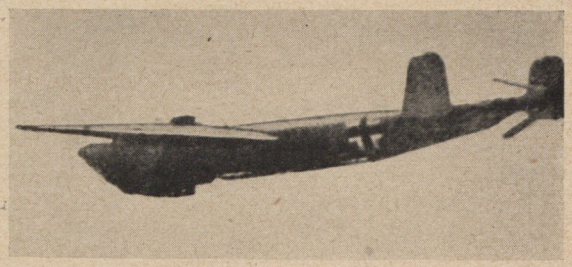
The general opinion amongst the older hands of the Luftwaffe was that pre-training with the National Socialist Flying Corps did not make any real contribution to the breeding of a better race of German Air Force pilots. At the beginning of the training course, at the regular German Air Force flying training schools, the young Hitler embryo pilots held a certain slight advantage over the officers in theoretical knowledge of aircraft, but more particularly in political prestige. As the young pilots reached the later stages of flying training, the effects of the National Socialist Flying Corps training wore progressively thinner up to the time the average pilot received his wings. It seems that, on the whole most very good pilots are born and not made, and that most average pilots have to fly in order to become pilots.

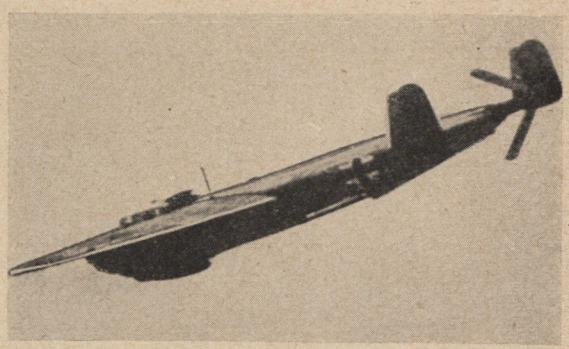
In the normal Luftwaffe training scheme the actual flying training was preceded by a six months' course of infantry and physical training that was intended to toughen the young German Airman and give him a dose of Prussian discipline.

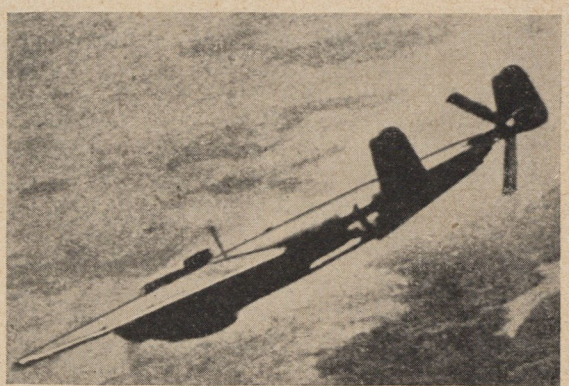
After this initial disciplinary course the air force candidate might go direct to an elementary flying training school or might have to take a further two months' course studying general aviation subjects.

From 1942 onward shortage of suitable advanced trainer aircraft, local fuel shortages and unexpectedly high pilot and air crew battle casualties compelled the Luftwaffe to push increasing numbers of first bomber and then fighter pilots into operational squadrons before they had completed the final and vital stages of their training.









This tail drogue diving flap arrangement was added to Dornier DO-217 in attempt to increase its performance as dive bomber. This is another example of constant pressure to overcome errors in basic policy by engineering switches as Allied power increased.

In actual training establishments the Luftwaffe was abundantly rich throughout the war. Had the required human and aircraft material always been available, these schools could have turned out some fifteen thousand pilots a year.

The twin-engined fighter pilot followed a similar training course to that of the single-engine pilot, except that he did a blind flying course varying in length from six weeks to three months, according to the individual pupil's aptitude.

It is significant that there was no organized prewar night fighter training. This gap in the system is partially explained by Göring's overconfidence in the abilities of his anti-aircraft units to cope with Allied night bombers, and partly by the fact that the technique of night fighting was little understood by any air power at the beginning of the second war.

German Aircraft Production 1920 to 1942

The production of modern military aircraft follows no smooth natural code. It is a question of the individual aeronautical genius, experimenting intensively with conflicting factors. It is quite normal for a modern military aircraft to take two or three years before it passes from the babyhood of the blueprint stage to the adulthood of being ready for use in flying units.

The German aircraft industry was no exception to this general scheme of things. In the 1920s Germany was endowed with all the main requisites which go to make a successful aircraft production. In Dr. Hugo Junkers, Dr. Claude Dornier, Professor Willi Messerschmitt, Ernst Heinkel, Professor Heinrich Focke, Fritz Siebel, Hans Klemm, George Wulf, they had a constellation of brilliant and ardent aircraft engineers and designers. The Treaty of Versailles was never intended to give fresh and vitalizing impetus to German aircraft production, but history was in her most ironic mood when this fateful treaty was made. The banning of the production of military aircraft in Germany sent the Reich's leading aircraft designers into foreign countries, where they developed not only their native aeronautical genius but absorbed that of the foreigner. The surrender or destruction of Germany's aircraft in 1918 meant that all current and obsolescent material was gone and a fresh start had to be made.

By 1922 the scholarly Professor Hugo Junkers was preparing to build a factory near Moscow. He had formed an aircraft company at Dessau in Central Germany in 1918, and by 1919 the F.13 was already on the market.

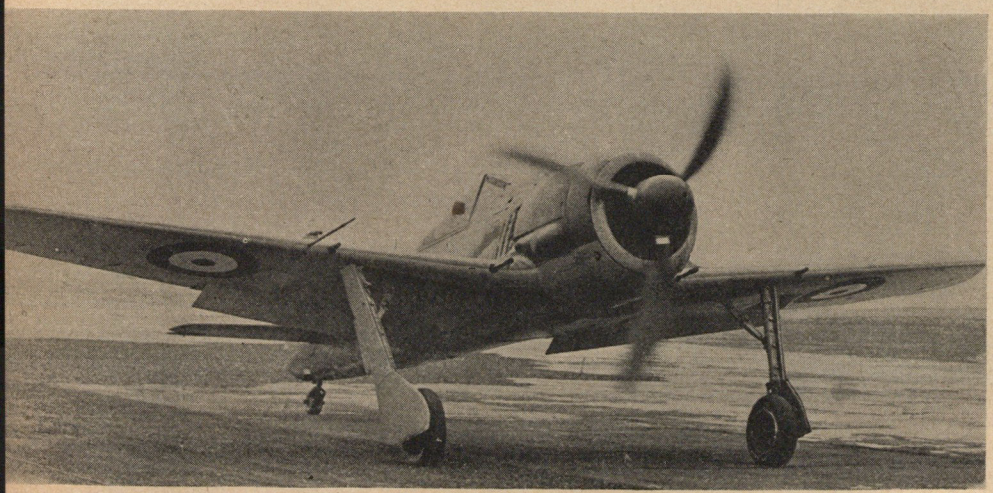
Second to Junkers in the production of large German aircraft was Dr. Claude Dornier. During the years after the Treaty of Versailles Dornier went to Switzerland and to Denmark to set up aircraft factories. The failure of his four-engined bomber, the Dornier 19 (like that of the Heinkel 116), was due principally to the general prejudice against four-engined bombers which existed at the German Air Ministry before the second world war. His Dornier 217, intended to be a heavier torpedo and high-level bomber, also proved to be only an average performance aircraft, and by the end of 1943 quantity production had ceased.

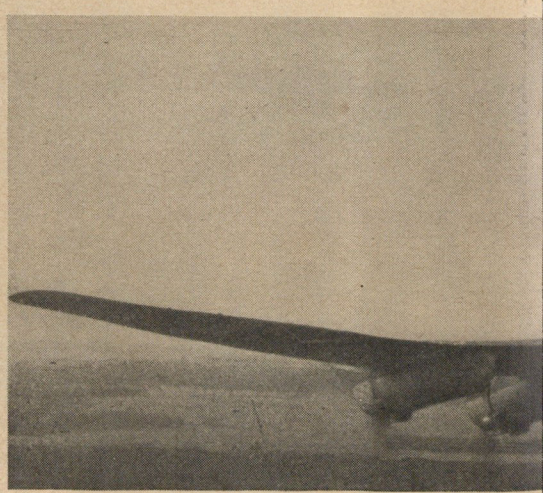
Willi Messerschmitt was a fiery genius with a maggot in his brain. He believed in sacrificing security for performance. His work with single-engined fighters, however, was eminently successful and the maggot hibernated dutifully after some initial eruptions. In his twin-engined fighter designs, Messerschmitt was less successful, although his Messerschmitt 110 was the main twin-engined fighter in the German Air Force right up to the summer of 1944. The Messerschmitt 210, also a twin-engined fighter, had a period of preliminary promise, but developed every kind of teething trouble and was never really hatched and launched on any scale. The Messerschmitt 410 might have been a great success but it was not in regular production until 1943. Messerschmitt also produced the most successful jet-propelled aircraft of the war, the Messerschmitt 262.

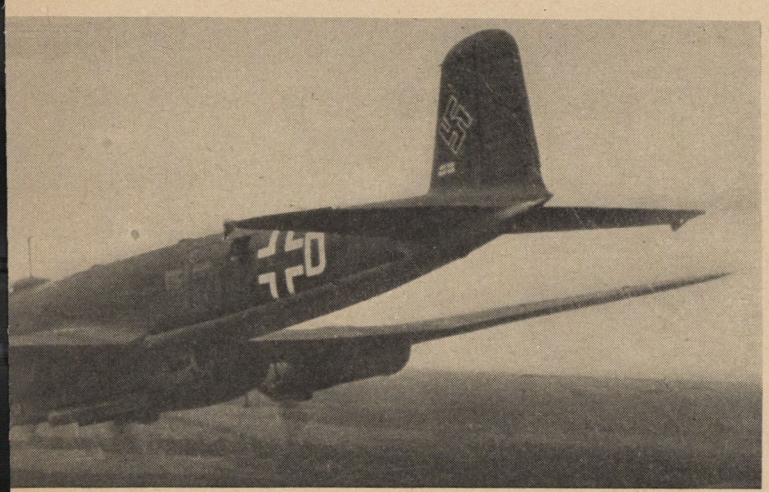
Bespectacled Ernst Heinkel had designed military aircraft even prior to the 1914-1918 war. In the second world war his single-seater fighters were to be out of the limelight. The single-engined Heinkel 112, although it broke the world's record in 1938 piloted by Udet, was to be produced in only small numbers. The jet-propelled Heinkel 162 fighter lacked range, and although produced in some hundreds was never operational. Heinkel's efforts with bombers and floatplanes were more successful. The Heinkel 111, a commercial transport plane with the Lufthansa air-lines, was used as a Luftwaffe operational bomber from 1937 to the end of the second world war; the Heinkel 115 was a floatplane version of the Heinkel 111. Later during the war, Heinkel produced the heavy four-engined Heinkel 177 bomber and a fast twin-engined night fighter, the Heinkel 219, which was the German reply, albeit unsuccessful, to the British Mosquito night bomber.

The Focke Wulf firm at Bremen was originally founded in 1924 by Heinrich Focke and George Wulf. But in 1927 Wulf was killed in a crash and Focke himself was not interested in military aviation so that the single-seater radial-engined fighter, the Focke Wulf 190, and the four-engined transport bomber, the Focke Wulf 200, and the Focke Wulf 189 ground-attack reconnaissance plane, all of which were successfully employed in the air war of the 1940s, were produced and designed by a staff of German Air Ministry engineers and technicians and not by Focke or Wulf.

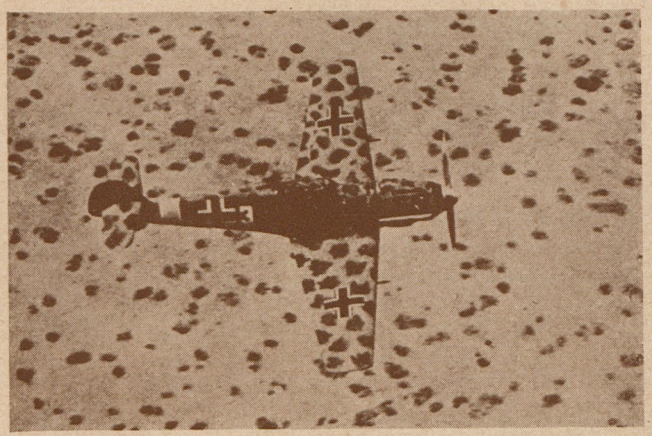
There were weaknesses in German aircraft production, as there would inevitably be in such a highly organic and complicated organization, geared to meet the needs of war. The first was the habit of putting aircraft types into series production and giving big contracts for them, when the early

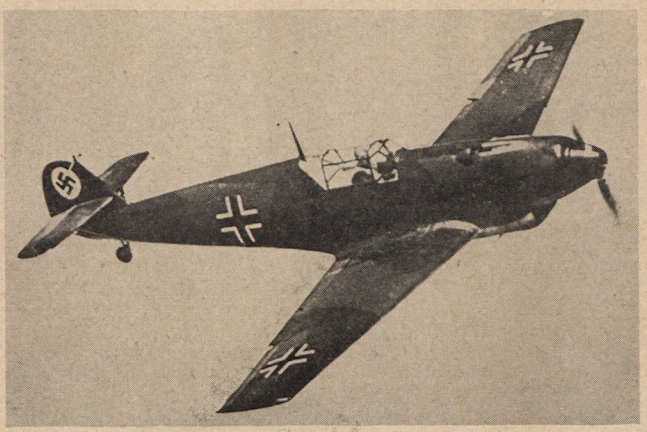






Messerschmitt Me 110 was the Luftwaffe's main hope in Battle of Britain. A swift, maneuverable machine, it possessed neither bomb load to make it a top-flight bomber, nor defensive fire power to make it a match for Spitfires and Hurricanes. It was eventually withdrawn, to be replaced largely by Ju 88s for operations over England. Some were used almost to war's end as radar-bearing defensive night fighters. The Luftwaffe was not only one to make strategic errors. Germany's Navy depended on submarine to choke off supply lines to England and Russia. The Wolf-Packs reduced flow somewhat, but not enough to affect the tide of battle. To pick up the slack, long-range commerce raiders, like the Focke-Wulf 200 (center) were operated in North Sea, against Murmansk-bound vessels, and out of France against shipping coming up coast. Patrol aircraft, like the Bristol Beaufighter limited their effectiveness to a great degree. The Luftwaffe started war with Me 109 fairly well standardized. Experience in Spain, they thought, had proven their superiority. However, earliest brushes with the RAF in France proved the vulnerability of the liquid-cooled engine in fighter aircraft. As a result, Kurt Tank's FW 190 design, which had "been around" for several years, was put into greatly accelerated production.





Willy Messerschmitt's personal popularity with high Nazidom was major factor in keeping Me 109 design in production until it was displaced by jets. Left, a good camouflage job, blending with the Libyan desert. Right, the B-series used early in war.

prototype models had not reached the level of military performance required in the German Air Ministry specifications. This was more noticeable in the earlier period before the outbreak of war in 1939, when for political reasons the Luftwaffe had to be expanded at a maximum possible speed so that it could become a big political weapon in Hitler's hands. The Junkers 86 and Dornier 17 and 23 bombers are perhaps the best example of this type of forced production.

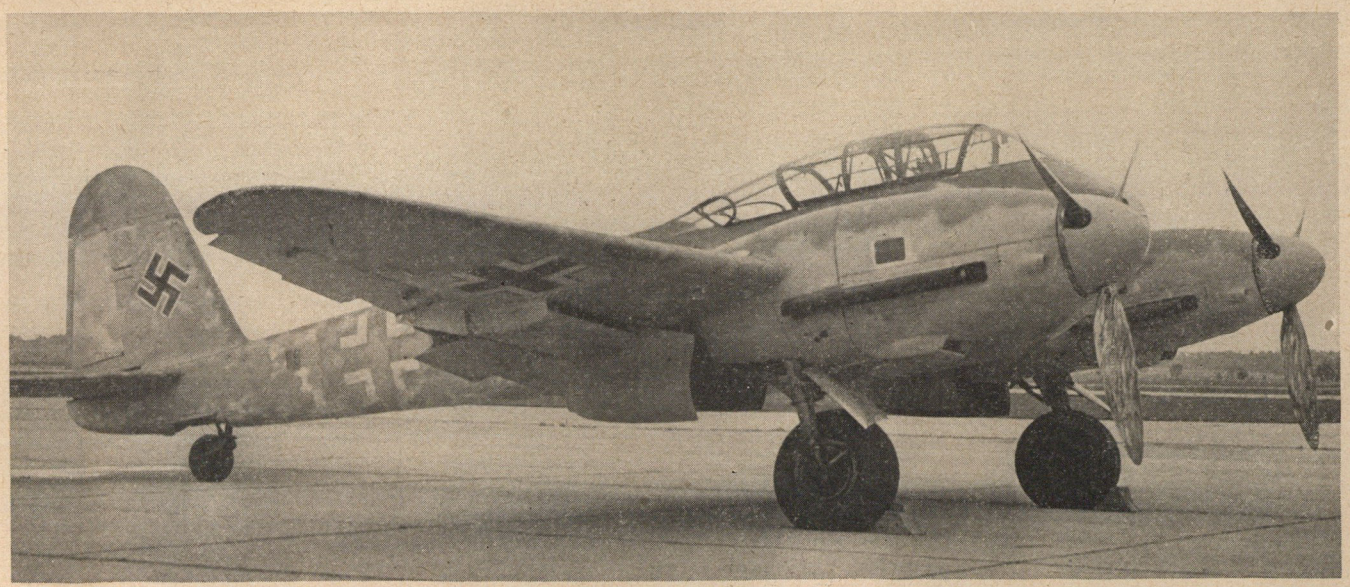
An equally radical weakness was the German failure to create a satisfactory aircraft repair organization on sound industrial lines. The problem of repairing German aircraft at home and in the field was a Luftwaffe issue in which Milch and Udet, who were never the best of friends, took violently opposite views. Milch asserted that the war would be won by a series of short, sharp German Blitzkrieg successes and that new replacement aircraft could always be found. With his greater contacts with democratic countries, the much-traveled and keen-minded Udet realized the possibility of a long air war, in which the careful organization of supply, maintenance and repair of aircraft might be a major factor.

In 1940 and 1941 the occupation of new territories in Norway, France, the Low Countries, Austria, Poland and the Balkans looked at one time as though it might provide the Luftwaffe with enormous facilities for expanding their aircraft production by offering a huge new reservoir of skilled labor, factory space and raw materials. But the aircraft production of France, Holland, Czechoslovakia, Poland and the other occupied territories did not prove to be more than a modest asset. Non-German workers either in the Reich or occupied territory developed a tortoise-like genius and were, in any event, inexperienced in the handling of German machine tools.

The disasters of the Russian campaign in the 1941-1942 winter, galvanized Milch into rather belated action, though he cannot be entirely blamed for the inadequacy of German aircraft production in 1942. His predecessor Udet, must share the responsibility, as well as the atmosphere of perennial optimism which pervaded the German General Staff. At this vital stage they seemed blissfully unaware of the significance of America's entry into the war and of the Soviet industrial recovery in relation to their own need to expand aircraft output quickly.

Milch's gigantic scheme for increasing German operational aircraft output was launched, however, in 1942, and some expansion inside and outside the Reich was achieved. But the main value of Germany's newly acquired territories was in providing aircraft and aero-engine repair depots near the front line.

The Germans had not merely increased their aircraft output by over 50 per cent. They had laid the foundations of much greater future expansion. The whole German aircraft industry was being reorganized on sounder mass-production lines. Instead of a large number of scattered firms



Impressed by personnel losses in Me 110 due to lack of armor and rearward fire power, the Luftwaffe succeeded the type with Me 210, and higher-powered Me 410 shown below. These had heaviest armor load in Nazi history, and two 13mm flexible guns.

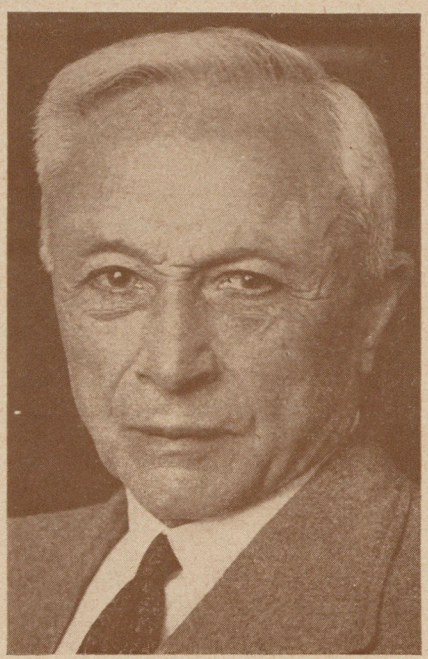
producing components and spare parts, the production was concentrated into smaller groups of firms situated within a radius of about fifty miles of each other, which fed the bits of aircraft, wings, fuselages, etc., in a finished form into the local assembly plant.

As a result of this reorganization, the number of man-hours required to produce German aircraft types was drastically reduced. The Messerschmitt 109, for instance, which required at the outbreak of the war between 7,000 and 8,000 man-hours to produce, was turned out by the end of 1942 in roughly half the time.

German Aircraft Production 1943 to 1945

From 1943 to 1945 Allied operational planning exercised much greater influence on German aircraft output than German industrial planning. In this period the same Messerschmitt, Focke Wulf and Junkers fighters which were to defend the Reich from round-the-clock bombing by the Anglo-American air forces were also intended in the main to support the German armies in the field in reconnaissance, ground strafing and fighter-bomber work.

Dr. A. Lippich, designer of rocket fighter planes, was unpopular with top Nazis.



Dr. H. Junkers, pioneer in metal aircraft, was a figurehead in his giant plant.

Willy Messerschmitt, leading Nazi in air industry, profited largely by connections.

Prior to the opening of the first big attacks in the summer of 1943, the German aircraft industry had come under assault at the hands of the British Bomber Command. The attacks had been directed against the Focke Wulf works at Bremen and the Heinkel works at Rostock. Both sets of factories were well and truly hit. The production and assembly of the Focke Wulf 190 was transferred from the dangerous confines of much-bombed Bremen to the rarer atmosphere of eastern Germany and East Prussia, where alternate accommodation was found at Marienburg.

But the over-all effect on the German aircraft industry was negligible. If German production was to be drastically reduced, nothing short of a series of heavy daylight precision attacks, repeated at intervals of a month or so, would achieve the purpose. Even after the most punishing raid production can be restarted within a few weeks, if the restorative repair facilities, machine tools and raw materials are available, as they certainly were for the German aircraft industry in 1942 and 1943.

No one understood the gravity or the urgency of the matter more than General Fred Anderson, commander of the American 8th Bomber Command, whose scale of bomber losses in the early American raids on Germany was rising in almost exact response to the rising German fighter strength. Many of the most important factories were actually beyond reach of the earlier types of Fortresses and Liberators, but the so-called Tokyo tanks were putting extra petrol into the wings and range of the Fortresses. General Anderson hoarded his maddeningly slow accumulation of these and watched the weather.

The German first-line single-engined fighter strength, which had more than doubled since the outbreak of the war and stood at a peak strength of some 1,700 aircraft in July of 1943, started to decline. The Luftwaffe staff, which had been able to allocate Messerschmitt 109s to their Italian colleagues, were now not only withdrawing these aircraft types but were actually equipping some of their own squadrons with Italian Macchi fighters.

At the turn of 1944 it looked as though the expansion of the German aircraft industry, now almost recovered from the 1943 attacks, might well be resumed. If this expansion had taken place the Luftwaffe might have mounted, as it was so obviously endeavoring to, an air force in the west strong enough to make Allied assault on the Continent in the summer of 1944 a very dubious operation indeed.

The situation was critical for the Allies. The flying weather over Europe in the first months of 1944 was bound to be adverse and the risk of operating large forces of bombers in treacherous weather is a very serious one. The ground commander can almost always stop an unsuccessful attack short of disaster, cutting his losses as his judgment advises. The air commander, dispatching large forces across unfriendly water, carries always in his mind the spectre of the freak gale that could force his entire command down into enemy territory from unexpectedly high petrol consumption.

In one glorious week (February 20-26) of concentrated attack on the German aircraft industry the United States Strategic Air Forces, attacking from both Britain and Italy, dispatched over 8,000 bomber sorties and 4,000 long-range fighter sorties to cover them.

During this period of crisis for the German aircraft industry Speer had taken over the reins from Milch. Speer cut relentlessly through the frills of producing fighter sub-types

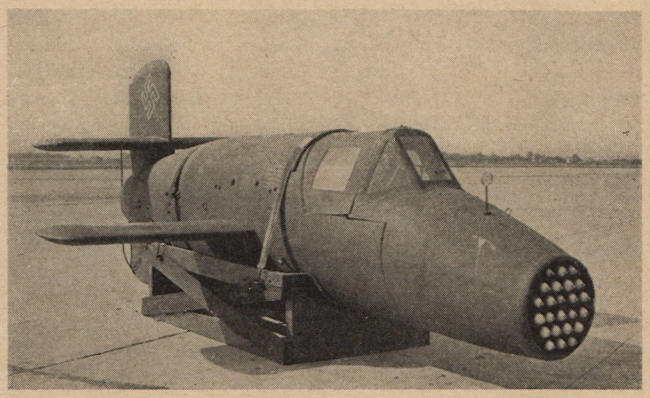
and highly finished aircraft. By giving the maximum priority to the repair of bomb damage, by dispersing more of the aircraft industry, by ruthlessly concentrating on single-engined fighter output, by frantic attempts at salvaging bomb-damaged aircraft and speeding up the repairing of others, Speer regained some of the lost ground.

The failure of the German aircraft industry to expand to and maintain the planned figure of some 4,000 aircraft a month, its frantic attempts to maintain an average production of about 2,000 to 2,500 aircraft a month, are a rough measure of Allied 1944 success in operational conditions which were only rarely favorable for precision bombing.

The final year of German aircraft production presents a strange mosaic of recovery and expansion on the one hand and dislocation and contraction on the other. As the result of the ruthless concentration on the Messerschmitt 109 and Focke Wulf 190, production was boosted temporarily in the early autumn of 1944 to a monthly output of 3,000 aircraft of which over 2,000 were single-engined fighter types. But before the Luftwaffe could enjoy the fruits of this stupendous industrial sprint, aircraft were being grounded through lack of fuel, and crash rates for the aircraft that did fly rocketed upward owing to the inexperience of the hastily trained fighter pilots.

Luftwaffe Aircraft and Equipment

Up to 1940, influenced largely by Udet's preference for fast twin-engined bombers and by the over-all conception of employing the Luftwaffe mainly as an army-support air force, the Germans failed to produce and put into operational use a single four-engined bomber, able to carry heavy bombs and operate beyond the normal 400- to 500-mile radius of action of a medium twin-engined bomber. In the prewar period four German aircraft firms produced a four-engined bomber aircraft—Heinkel, Junkers, Dornier and Focke Wulf. Only two of these, the Focke Wulf 200 and the Junkers 90, were in action at the beginning of the second world war and both machines were employed in their peacetime role of freight-carrying aircraft.



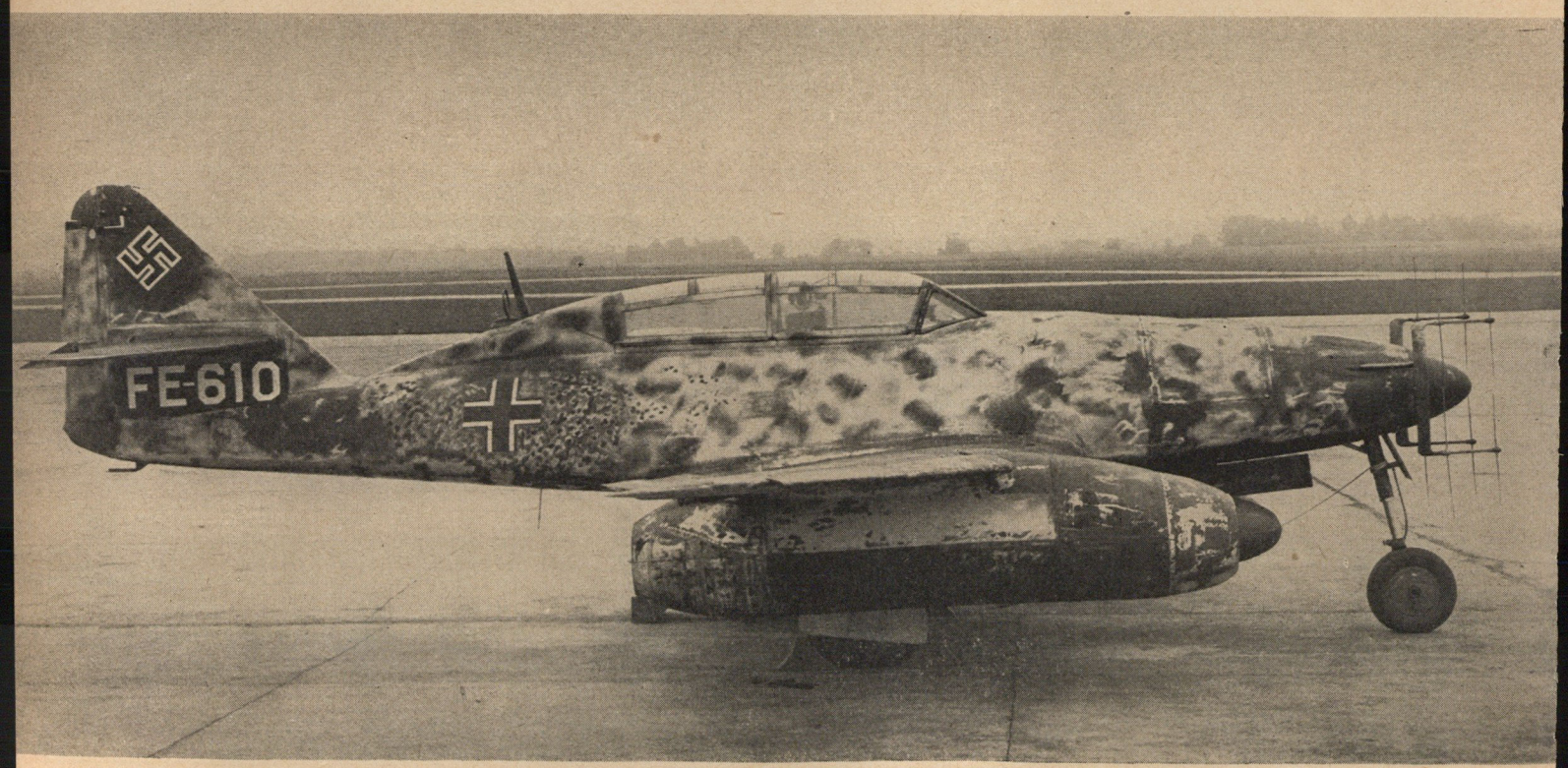
The Bachem "Natter," last of Germany's interceptors, was virtually shot up to enemy formations. Pilot was parachuted to earth.

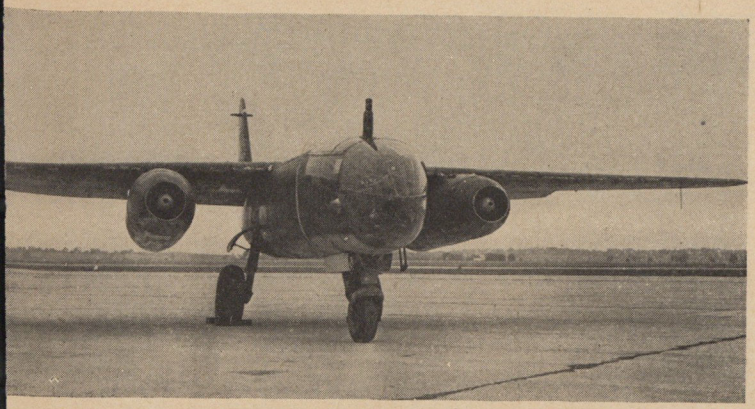
The torpedo-bomber units which had done so brilliantly against Allied Mediterranean convoys in 1941 and 1942 were, by 1943, manned by crews which, with few exceptions were lacking in that special combination of flying skill and courage required to make a successful low-level torpedo attack.

The Germans never developed a real torpedo-bomber. The Heinkel 111, the only German torpedo-bomber aircraft of the 1941-1942 period, was evolved from a transport-cum-bomber aircraft. The Junkers 99 which followed the Heinkel 111 as a torpedo-bomber was designed originally as a medium and dive-bomber. The Dornier 217 was the only German aircraft built primarily for torpedo-bombing; but it proved a failure under combat conditions in this role and was employed mainly as a minelaying aircraft in the second world war. A modified version was also used to carry the radio-controlled bombs. The Dornier 217 was also used as a communication and courier aircraft and as a night fighter. The Junkers 87 dive-bomber was also experimented with as a torpedo-bomber, but never operated in this role.

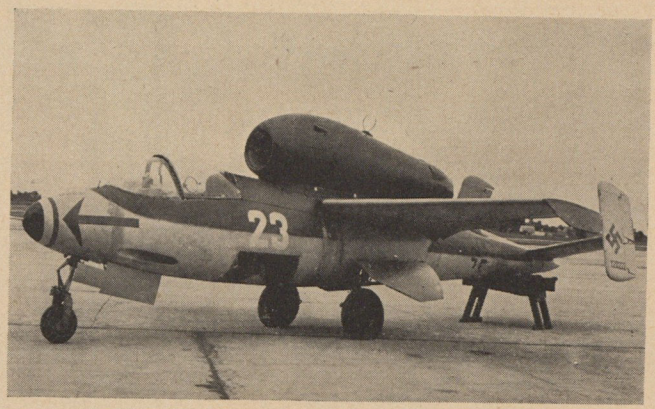
In view of the difficulty in finding trained experienced tor-

Messerschmitt Me 262A-2, two-place radar-bearing night interceptor version of famed jet fighter. Had Hitler not insisted on trying it as vengeance bomber against England and allowed its use against B-17s, the war's course might have been changed.





Arado 234 recon-bomber was a beautifully clean design that never saw large-scale use. This one was fast photographic conversion.



Material shortages and tactical desperation dictated the Heinkel He 162. Cheap and easy to build, they proved murder to pilots.

pedo-bomber crews, it is not surprising that two German radio-controlled bombs were pressed into service in the autumn of 1943, long before the projectile was really ready for operations. Had the Luftwaffe been able to use the 1,000-lb glider bomb (the Henschel 93) against destroyers and merchant ships with regular success, and also the 3,000-lb armor-piercing FX bombs against cruisers and battleships, the need to train special skilled anti-shipping bomber crews could have been practically dispensed with. Both these projectiles could be launched at a distance of four and five miles from the ship to be attacked. At this range a ship's anti-aircraft barrage could be avoided. Theoretically, all that was required to make an accurate attack was a trained wireless operator to steer the bomb by a special joystick installed in the aircraft.

The most novel bomb produced by the Luftwaffe was the flying bomb, christened and rechristened in England as the buzz bomb, the doodle-bug and the pilotless aircraft. These were first launched in June, 1944 when the second world war was playing out its final act. While the Germans called it V.1 (V. standing in German for reprisal), it was something more than a mere retaliatory weapon. With the declining talents of the German night-bomber force and the difficult man-power situation it was undoubtedly a cheap and fairly effective way of conducting air warfare against London and for a short spell against the ports of the British south coast and the Belgian towns of Antwerp and Liége.

The most successful side of the Luftwaffe in the second world war was undoubtedly its fighter squadrons. Up to 1941 the Germans clung to their theory of building fast lightly armed single-engined fighters for interceptor and escort work. They employed only the Messerschmitt 109 armed with one or two cannon and two machine-guns. This aircraft proved itself the equivalent, if not the superior, of any Allied fighter brought against it, including the Hurricane and the Spitfire. In 1941 the heavier Focke Wulf radial-engined 190 was introduced, armed in some cases with as many as six cannon. In 1943 some of the versions of the Messerschmitt 109 were also equipped with six guns.

The Germans started the war, like most major air powers, with no real night-fighter types. The night fighter per se grew out of the changing conditions of the second world war. The first adapted German night fighters were twin-engined, one a day fighter and fighter-bomber, the Messerschmitt 110, and the other a twin-engined long-range bomber, the Junkers 88, with its glass nose and bomb-aiming gear replaced by an armored snout with forward-firing guns. Except for about fifty special Heinkel 219s, fitted like the Messerschmitt 410 with two Daimler Benz 603 1,500 hp engines, and armed heavily with both 20mm. and 30mm. guns, the Luftwaffe used dual-purpose fighters for night-fighter work. The single-engined Messerschmitt 109 and Focke Wulf 190 and the twin-engined Messerschmitt 110 and Junkers 88 fighters were all employed on day and night work.

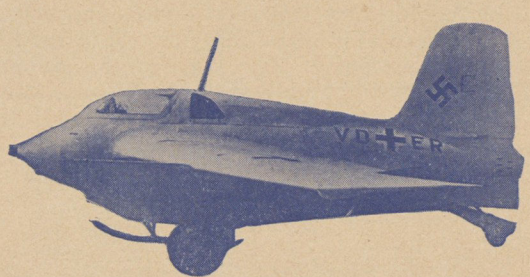
In the longer-ranged twin-engined reconnaissance category the original prewar Luftwaffe plan had been to rely on modified current long-range bomber types, the Heinkel 111, Junkers 88, Dornier 17, Junkers 188 and Dornier 217. By 1941 it was evident that against organized single-engined fighter defense these reconnaissance aircraft could not bring back vital information from important target areas. For meteorological or general oversea reconnaissance they were adequate enough, but in attempting to take important pictures of ports or key factories they were frequently shot down.

The Luftwaffe reconnaissance plight is perhaps best illustrated by their frantic pressing into service of one or two jet-propelled Messerschmitt 262 and Arado 234 in August, 1944, over the French battlefield at a time when the need to get even a fleeting glimpse of the over-all ground situation was vital for the overwhelmed Wehrmacht divisions.

But it was not only in the realm of reconnaissance that jet-propelled aircraft were prematurely pushed into service. The Luftwaffe in the face of the insoluble problem of American fighter domination over Germany in the spring and autumn of 1944 worked frantically on the business of rushing the jet-propelled twin power unit Messerschmitt 262 and Arado 234 and the rocket-propelled single power unit Messerschmitt 163 into squadrons. The firms of Heinkel, Dornier, Junkers and Arado had produced similar experimental jet types; but Willi Messerschmitt pushed his models ahead and won the 1943 jet-propelled race for his firm.

The Germans hoped against hope that the summer of 1944 might see a fair number of these squadrons operational. Had the plan materialized, and the aircraft reached the expected numbers and performance, things might have been bad for the Allies in daylight operations over Germany. Both the Messerschmitt 163 and 262 had a top speed of over 500 miles an hour and carried a heavy armament of 20mm. and 30mm. guns. Difficulties in finding the pilots, difficulties in the manufacture of the power units, American bombing of

(Continued on page 60)



Dr. Lippich's Me 164 rocket fighter was Germany's most successful interceptor. It used swept-back supersonic wing, no elevators.

NEWS

ALABAMA

The Mobile Squadron made a big splash in February when it entered a float in the Mobile Mardi Gras. The float featured a reproduction of the AFA emblem, pretty girls added a decorative touch.

ARKANSAS

Newest squadron in Arkansas is Monticello Squadron No. 1, with William E. Morgan, Squadron Commander; Dolph T. Wells, Secretary.

COLORADO

Denver's AFA Squadron No. 1 was chartered in February with Max H. Houtchens elected commander; Mary R. Nelson, Secretary. AFA members interested in joining may write to Houtchens at 2040 South York, Denver.

DISTRICT OF COLUMBIA

Another active university squadron of the Association, the George Washington University Squadron, received its charter last month. Ernest Alvey was elected commander; Richard A. Ballard, secretary.

GEORGIA

Added to the growing list of squadrons being formed at colleges and Universities is the Georgia Tech Squadron No. 1, where student engineers elected Robert F. Swinnie, commander; Howard C. Johnson, secretary.

ILLINOIS

Wilson W. Newhall heads the second AFA Squadron chartered in Chicago. The new unit, approved last month, includes membership of the local Air National Guard unit. Elmer C. Woehler is secretary of the Squadron.

NEW MEXICO

The Albuquerque Squadron held its first annual election of permanent officers. James T. Paulantis was elected commander, to succeed Arthur P. Gatewood. Jackson C. Ream replaces Frank Cronican as secretary.

NEW YORK

The New York State Wing, under the leadership of Casey Jones, sends in new charters regularly. Most recent is Bronx Squadron No. 1 commanded by James V. Falabella. Secretary Saul B. Schier, 315 E. 170th St., Bronx, invites members in the Bronx area to join in the activities.

Joseph A. Murek has been elected vice commander of the Buffalo Squadron to fill the vacancy created by the advancement of Maurice Fitzgerald to the post of squadron commander. According to John D. O'Neil, secretary, Murek has been instrumental in raising the membership to 300.

Dennison E. Judge has announced the opening of a temporary office at 170 E. 96th St., N.Y., to facilitate the formation of an uptown New York squadron.

OHIO

Two new squadrons in Ohio received charters in February. At Ohio State University, John L. Wesesky was elected commander; Henry S. Willard, secretary.

John W. Parker was named commander of the Sandusky Squadron, Joyce J. Dicken was elected secretary-treasurer.

B. E. Fulton has been chosen first permanent commander of the Akron Squadron, succeeding temporary commander Clark O. Thornton. Fulton, who had been temporary secretary, was succeeded by K. E. Banks, who would like to hear from Akron members not affiliated with the Squadron.

OKLAHOMA

Russell F. Hunt is commander of Oklahoma's newest chartered squadron. N. M. Hulings was elected secretary.

PENNSYLVANIA

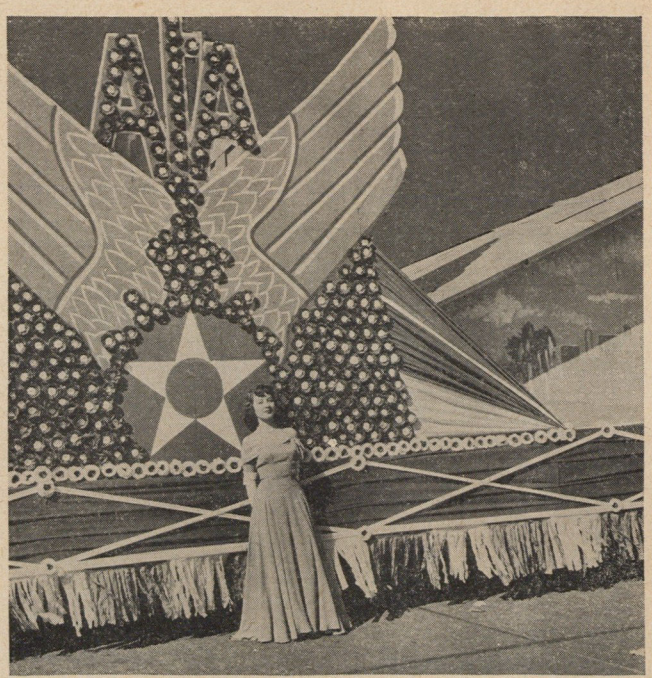
Three charters were granted to Pennsylvania squadrons recently. A charter was approved March 17th for Lancaster Squadron No. 1. Sydney W. Kistler is commander; W. F. Frantz, secretary. Association members interested in joining can reach Frantz at 136 North Lime St., Lancaster.

Frank P. Cummings was elected commander when Johnstown Squadron No. 1 received its charter in February. Merle C. Fitzgibbon is secretary.

The third squadron is the Greater Wilkes-Barre Squadron, a rapidly growing unit, with J. Henry Pool, commander; Howard D. Wiener, Jr., secretary.

RHODE ISLAND

Though Rhode Island is small in size, its enthusiasm for AFA activities is large. Providence Squadron No. 1 under the guidance of the energetic Wing organization has been very active and last month a charter was granted to North



This impressive float, replica of AFA emblem, was entered by the Mobile Squadron in Mardi Gras held at Mobile, Ala. last month.

Smithfield. Daniel B. Middleton is commander; LeBaron R. Briggs III, secretary.

SOUTH CAROLINA

Columbia is helping spearhead the formation of squadrons in South Carolina with the announcement of its own organization and the election of Albert L. Wardlaw as commander; Francis M. Cain, Jr., secretary.

TEXAS

Lt. Col. Vic Byers, AFA liaison officer, addressed San Antonio's Squadron in the municipal auditorium recently.

VIRGINIA

Blacksburg Squadron No. 1 is first of two recent squadrons which received charters in Virginia. J. O. Rowell, faculty member at Virginia Polytechnic Institute has been elected commander; J. P. Jacobs, Jr., VPI student, is secretary.

WISCONSIN

Arlie M. Mucks is commander of the new Madison Squadron; Rupert G. Cornelius is secretary.

IOWA

The Ames Squadron is the latest community AFA unit in Iowa. R. H. Jackson is commander; W. E. Boyd, secretary.

KENTUCKY

Strengthening the Kentucky Wing of AFA is a new Squadron at Covington. William C. Whitson is commander of the unit, Ray E. Caldwell, Secretary.

MARYLAND

Only problem of the Big Oyster Roast held in February by the Baltimore Squadron was getting the customers to go home. According to John Marshall Boone, Maryland Wing Commander, more than 200 AFA members came from all parts of the state in spite of icy roads to eat oyster fritters, oysters Rockefeller, fried oysters, just plain oysters.

MASSACHUSETTS

Boston Squadron No. 1 added ninety-three former AAF men and women as charter members at its last organization meeting. William F. Dwyer, Jr. is commander of the new unit. Dorothy F. Grassby, secretary, asks AFA members in the Boston area and former Air Force men and women to contact her at 11½ Revere St., Boston.

Another Massachusetts Squadron chartered in March is the Falmouth Squadron which elected Albert H. Fiedler, commander; Stanley D. Harvey, secretary.

MICHIGAN

Kenneth Hayes recently was elected commander of the Grand Rapids Squadron to succeed Clarence C. Case, who was active in the organization of the Squadron.

AIR FORCE DAY

The Air Force Association this year is the official sponsor of Air Force Day. At the request of the Army Air Forces, the AFA has accepted the responsibility of being the agency in charge of all arrangements for the fourth annual celebration of the establishment of a military air arm.

Air Force Day will be celebrated August 1, 1947—the fortieth anniversary of the assignment of one officer and two enlisted men forming the Aeronautical Division of the Signal Corps to "study the adaptation of the flying machine to military purposes."

Following official acceptance by AFA President J. H. Doolittle, national headquarters of the Association began to draft plans for a nation-wide observance, working in close cooperation with the AAF. In the near future, a general outline of the national program and suggested programs for local celebrations will be sent to all AFA Wings and Squadrons.

AIR FORCE DAY TO AFA

Dear Jimmy:

This year we again plan to celebrate Air Force Day on August 1st. ...Your organization, whose membership comprises the alumni of the Army Air Forces, appears to me to be the best possible choice to assume the sponsorship of Air Force Day.

I would like, therefore, to invite the Air Force Association to accept responsibility for sponsorship of Air Force Day. This can be an important part in educating this country to the role of air power in our national defense scheme. I will be delighted to hear from you upon your consideration of the problem and its implications.

Sincerely,

CARL SPAATZ
General, United States Army
Commanding General, Army Air Forces

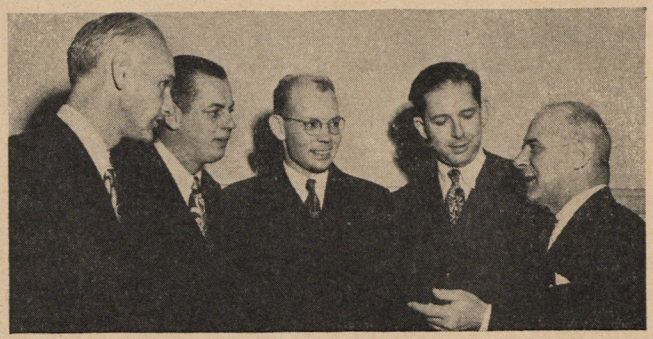
Dear Tooey:

We of the Air Force Association are honored to be the agency selected by the Air Force to sponsor Air Force Day and are delighted to undertake the responsibility. We will keep in close touch with your office on this matter and you may depend upon our best efforts.

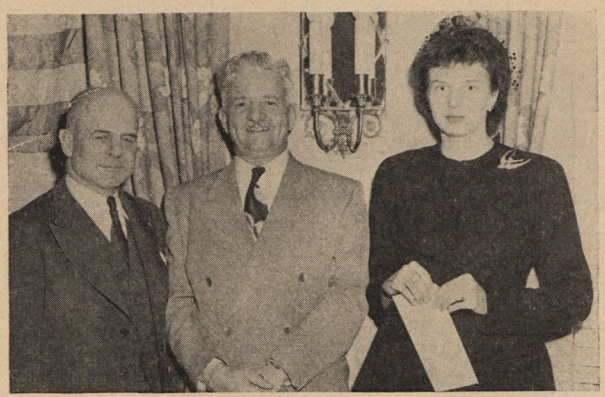
Sincerely,

J. H. DOOLITTLE

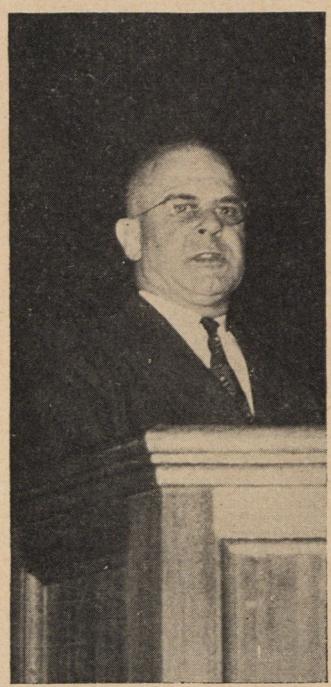
Maj. Gen. Hodges, Flying Training Command CG, speaks at AFA Rally in L. A.



Alumnus Gen. Doolittle talks with AFA members (left to right) Wally Thompson, Warren Hodgdon, George Mantell, Fred Waiss, U of C grads.



At University of Colorado, Mrs. Marjorie Walla, student aid director, accepts annual $500 Doolittle Scholarship award. With General and Mrs. Walla is Stanford Gregory, Colorado Wing Commander.



On the rostrum at Los Angeles, General Doolittle addresses 3,000 vets.

DOOLITTLE'S TRAVELS

Last month, "Jimmy" Doolittle, in the course of a trip to the West coast and back, arranged to meet with Air Force Association members and other air enthusiasts. He spoke in San Francisco, Los Angeles, Denver, Tulsa and Chicago.

At San Francisco, the AFA president told a full audience at the Veterans Memorial Hall that proposed cuts in the Air Force and other military appropriations would "court calamity" and weaken the air arm—the Nation's strongest defense agency.

"In the present condition of world unrest and insecurity," he said, "it is fundamentally unsound for us to reduce our military budget and in so doing, weaken our military establishment."

Another big turnout featured the Los Angeles rally, which also featured a talk by General Doolittle. Francis S. Gabreski, AFA Wing Commander in California, said the meeting was a complete success, was given wide newspaper coverage and was broadcast over the Columbia Broadcasting System Pacific Coast Network to several million listeners. The half-hour radio pro-

Illinois' Governor Dwight Green, World War I vet, receives AFA insignia.

Famed P-47 ace, F. S. Gabreski, AFA California Wing Commander, speaks to group.

Seated next to Gen. Doolittle at dinner given prior to Rally is Goodwin Knight (left), Lt. Gov. of Calif.; V. E. Bertrandias, Douglas Aircraft VP.

In San Francisco, General Doolittle is guest of honor at banquet given by group of AFA leaders in California preceding a rally there.

Frances Langford, favored AAF singer, entertains vets in Shrine Auditorium.

gram, sponsored by the Santa Monica Bay Squadron, was divided into ten-minute panels and included Major General James P. Hodges, Commanding General of the AAF Flying Training Command.

Governor Lee Knous of Colorado, State Adjutant General Shafer, W. J. Bain, Colorado State Director of Aeronautics, and Stanford Gregory, AFA Wing Commander for Colorado, were included among the guests of honor when AFA President Doolittle spoke at the dinner given in Denver.

The Tulsa Squadron of the AFA had a large group of former AAF men from Oklahoma to meet the AFA president when he came through there on March 1st. Prior to a reception held in the Hotel Tulsa, Mr. Doolittle was guest of honor at a dinner given by AFA members and Tulsa businessmen.

Two meetings were on schedule in Chicago, where the AFA Illinois Wing was host. Mr. Doolittle spoke at a luncheon meeting of the Executives' Club at the Hotel Sherman, and in the evening, along with Ray Ireland, Illinois Wing Commander and vice president of the United Airlines, explained the objectives and program of the AFA to Chicago members.

Illinois' Governor Dwight Green became the third State executive to join the Air Force Association when Mr. Doolittle signed him up during his visit. Governor Green's service in the first World War made him eligible for membership. Other AFA Governors are Maw, of Utah and Herbert, of Ohio.

AFA's National Director, Jimmy Stewart, addresses group as Rally Chairman.

tech topics

Parachute howitzers and electronic plumb lines feature this month's air technical progress

New Star

US jet development showed signs of growing up when the AAF let contracts for 134 Lockheed Shooting Star fighters at the wholesome peacetime figure of $8,681,960, the largest jet fighter order negotiated since the fall of Japan. The planes to be built will be P-80Bs, which will be a lot more practical fighting machines than their predecessors. For one thing, the armament will be boosted from four to six 50 cal guns. Skin will be thickened and bulkheads beefed up. Stainless steel will be used extensively in the engine section.

Power will be provided by an Allison-built G.E. J-33 turbo, fitted with water injection. All radio masts and antennas are strung inside the airframe to reduce external excrescences. Pilot ejection equipment will be standard, and a cooling system is being incorporated to keep the supercharged cockpit at between 70° and 80° despite the heat generated at high speed by the air rubbing the plane's skin. The smooth finish, a spectacular characteristic of the P-80As, will be eliminated, as the lacquer chips off in rain at high speeds.

Carbon Killer

One of the dirtiest jobs in aircraft maintenance may go down the drain (literally) if a new product called Lix Sol lives up to billing. According to the announcement the new metal cleaner will not only dissolve high temperature carbon on aluminum pistons, but disperse petroleum residue, lacquer, varnish and sludge. The process is simply to drop the part in warm solvent, agitate, flush off in warm water. This would eliminate scraping and buffing from overhaul procedure.

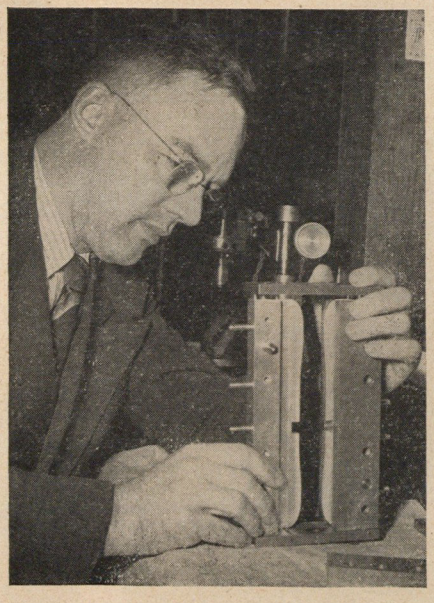
New Control Element

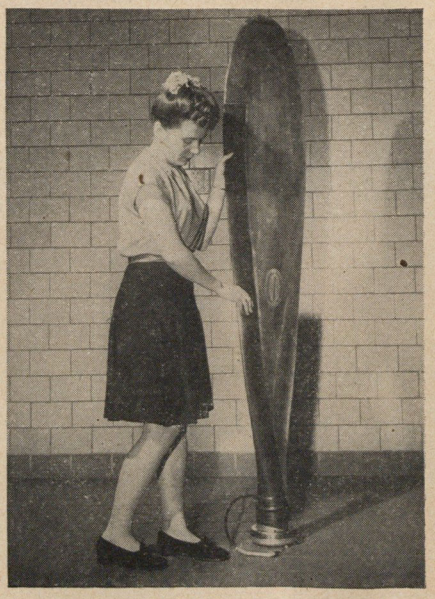
Electronic science takes another step forward with Eclipse-Pioneer's new method of determining verticals and horizontals, a function performed by means of the plumb-line and fluid level since time immemorial. The classic system had several shortcomings for aviation application. They oscillated before settling into a final position, they provided no simple means for obtaining suitable electrical pickup, and their centers of gravity shifted relative to their mounts.

The new product is called a Convectron. A non-emission type tube capable of giving considerable signal about the vertical, it consists of a sealed cylinder tube bent at a right angle in the center with grid caps on either end and at the base, is filled with argon gas, and contains a single nickel filament, which runs centrally through each arm to the spring support in the base which also acts as a tap.

The tube is used in a bridge circuit. The filament carries sufficient current to heat the filament to an average of 400° C. While some heat moves from the wire by metal and gas conduction and by radiation, the bulk leaves by gas convection. Convection lines are vertical under all conditions. This means that they will pass the wire at whatever angle the

Dr. R. G. Folsam of U. of Cal. shows the test chamber of wind-tunnel under construction, which will operate at three times speed of sound. The throat is 1 inch wide and ⅜ high. Center, new elevator-type servicing vehicle that can handle fuel for a variety of large aircraft. Right, Goodyear's new electric propeller de-icer sandwiches conductive rubber between regular insulating type.





Parachute delivery of a 2240-lb 75mm howitzer at Wright Field. Top, a ribbon chute extracts load from the C-82 transport. Center, lowering gun by means of a ninety-foot cargo parachute. The extraction chute carried part of weight. Below, the gun, safely landed in its specially built dropping cradle.

filament happens to be to the vertical. The relative rate at which it will lose heat to the convection current and consequently the wire temperature, is dependent on this angle. The filament is nickel. One of the characteristics of this metal is that its resistance to electricity will vary with temperature. This produces an unbalance in the bridge circuit when the tube is moved from the vertical position. This electrical signal can be fed into servo mechanisms and can be used for many mechanical jobs, such as monitoring gyros.

Drop Carefully

A study of wartime paratroop tactics indicated one basic weakness. Troops can be dropped so far ahead of the main body that they may require heavier equipment to maintain and expand positions, before ordinary ground supply can be established. In order to solve these problems, a series of joint experiments are currently being conducted at Wright Field by the Ground Forces and the AAF. One of these tests was the parachute delivery of a 75mm howitzer battery weighing 2,240 lbs.

The unit was loaded into a special ball-bearing conveyor belt in a Fairchild C-82, on a special cradle. One of the new ribbon-type high-speed parachutes, originally developed by the Germans for personnel use in high speed aircraft, was used to extract the load from the rear of the tail-boom cargo plane. Once the cargo was clear of the airplane, a ninety-foot cargo parachute was opened by a static lanyard. The two parachutes lowered the gun, which could have been in firing position in a matter of minutes.

Cross-Wind Caster

A possible solution for the nation's private airport dilemma appeared when the Civil Aeronautics Authority accepted the first of three experimental aircraft equipped with castorable landing gear.

According to John H. Geisse, the project head, the gear allows cross-wind operation under conditions which would be dangerous to conventional aircraft. The original craft was a re-equipped Fairchild PT-19.

in the AFA

INTRODUCING F. S. Gabreski

You might say it is only appropriate for California, one of the leading areas in the Air Force Association, to boast as its Wing Commander one of the most colorful wartime figures in the AAF.

Francis S. Gabreski (Col.)—"Gabby" for short, and not for loquacity—is an unusual personality in these or any other times. His army record indicates that he was the 8th Air Force's top fighter air ace, that he is credited with thirty-one German planes, and that he finally spent nine months in a Nazi prison camp before being liberated by the Russians.

It also said in newspapers throughout the United States during 1945 that he made bond tours and morale visits to war plants, was the object of much attention and adulation, was wined and dined, and there was even a fabulous story that he had been offered $500,000 to go into the movies. The Colonel says he's still looking for the man who made that offer!

You have to talk to the boys who know him to find out what sort of guy this legendary figure really is. Modest and quiet, Gabreski refuses to talk about himself unless backed into the corner. He doesn't consider himself famous, wants only to settle down and make a living for his pretty young wife and year-old daughter. He is as friendly as an old shoe, and just the type you like to sit down and shoot the breeze with.

He is now an assistant to the vice-president in charge of foreign sales at Douglas Aircraft Company, Inc., whose headquarters is in Santa Monica, Calif. Although he was born and raised in Oil City, Pa., Gabreski likes the West.

With 166 missions chalked up during the war, he has had plenty of flying, but he likes aviation and plans to stay with it. Active in the Air National Guard, he is now deputy commander of the 146th Fighter Group, 62 Wing, based at Van Nuys, Calif.

"Gabby" left pre-med work at Notre Dame University to enlist as an air cadet in July 1940, was commissioned a 2nd Lt. in March, 1941, at Maxwell Field, Ala., and rose to full colonel before he left the service.

Baptism to combat was prompt, but according to Gabreski the results were pretty dismal. He was at Wheeler Field, Hawaii, on December 7, 1941. "When we finally got into the air with the few planes we had left, it was too late." For some days following the attack he scouted around with an observation squadron looking for Jap submarines. Finally they saw the familiar black object they were looking for and blazed in for the kill. They made several runs and went home. Later on they learned that the only thing they had accomplished by this particular attack was to scatter whale blubber up and down the shore!

After a year and a half in the Pacific, he was transferred to England, where the twenty-four-year-old Polish-American was attached to the Polish Air Force. He flew with Polish squadrons for several months, and they pinned their Cross of Valor on him before he joined the 8th Air Force. The Luftwaffe file on Gabreski then began to bulge. In all, he shot down twenty-eight German aircraft and got three on the ground.

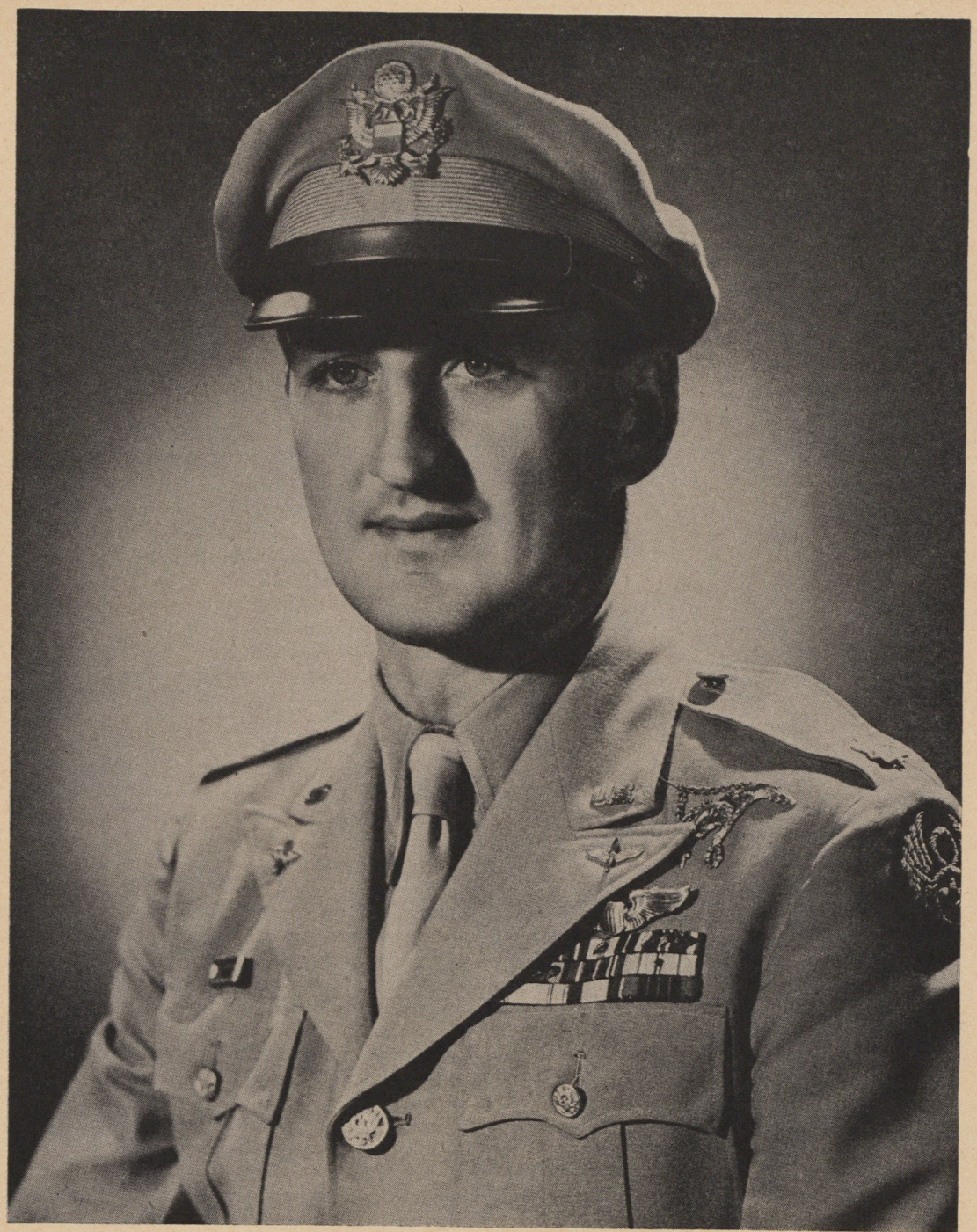
The one thing Gabreski talks about freely, and with a twinkle, is how he got shot down over Germany by doing himself what he had ordered his men not to do. And in retribution, he says, the mishap occurred on what was to have been his last mission before coming home after two years in the ETO.

"We took off on an escort mission early on July 20, 1944, with Frankfurt as our objective. But found no activity there, so we just went looking for trouble," Gabreski recalls.

"Near Coblenz we saw an air field with about fifteen Heinkels dispersed throughout the area. That was a perfect target for our sixteen fighters. As usual, there was to be only one strafing run per man.

"I made my own pass, but instead of breaking away and heading for home, I saw we had left a couple of the Heinkels and I wanted to make it a clean sweep, so I went down for a second and then a third pass. I guess I was so intent on the target that I lost my depth perception, and my tracers started going over the target. I nosed down a trifle and I got so low the propeller hit the ground. When I finally pulled up it was too late, and I had to make a belly landing at high speed in an adjacent wheat field which was the only clear spot

(Continued on page 66)



Formal and informal views of an American ace. Right, ground personnel crowd around to ask Lt. Col. Francis Gabreski about mission. On P-47's wing stands crew, Cpl. Felix Schacki and S/Sgt. R. H. Safford. Left, "Gabby" is reunited with his old basketball coach, Lt. Oscar Collins of Oil City, Pa. In the java session are squadron engineering officer, Capt. J. R. G. Ordwat and flight surgeon, Capt. George Honig.

control of GUIDED MISSILES

Inside view of the V-2 rocket's control system and how its development may affect the future of warfare

BY GIFFORD WHITE

Special Weapons Research Engineer, Sperry Gyroscope Company, Inc.

Most of the early experiments in rocket flight were concerned with the fundamental sciences of fuels and motors, of aerodynamics and control, and of instrumentation. The approach of World War II during the embryonic phases of the technology diverted the whole field into a tunnel of secrecy from which it has now partially emerged so that some information on the tremendous strides of the war years has been released. While in prewar years flights of a few miles with payloads of only a few pounds were considered highly successful, now it is known that rocket-powered missiles carrying payloads measured in tons can travel hundreds of miles. There is no limit to the estimates from the speculatively inclined.

A rocket motor is one of the most fundamental of the known means of obtaining a propulsive force. With no essential moving parts except the burning fuel, it works on the reaction principle familiar to everyone who has participated in Fourth of July pyrotechnics. The noise and flame of the rocket motor, strange new aerodynamic shapes, and imaginative predictions of flight into space and time immediately fasten attention on the more spectacular aspects of rocket design. Not so apparent is a problem which has dogged inventors and scientists from the beginning. That is the problem of controlled flight, for without added control means, the larger rockets are as unstable and unpredictable in flight as the powder skyrocket. For practical purposes, a military rocket must travel over a predictable path and arrive at a previously selected destination whether its payload be a warhead, propaganda leaflets, or passengers.

Smaller rockets can be propelled for a short distance after firing along a tube or rails to gain initial velocity in a controlled direction, and an arrangement of aerodynamic surfaces serves to maintain a measure of directional stability along a desired trajectory. The bazooka and the ordinary artillery rocket are of the type which gains initial velocity in its launcher so that air flow past its fins can give it usable accuracy of aiming and freedom from oscillation in flight. It is not this particular problem of design which interests us, but the application of a different principle of stabilization to the larger sizes of missiles of which the German V-2 is by far the best known example.

Large rockets, running to many tons of initial weight, have fired the imagination of serious thinkers and crackpots alike for many years, not only because of their devastating military applications, but because they may open up a new realm of transport in which independence of the atmosphere and unbelievably high speeds will be attained. The development of economical fuels and motors has been one of the paramount tasks in this field, but to these problems are added the technical difficulties of aerodynamic design and the analytical and experimental difficulties of controlled flight.

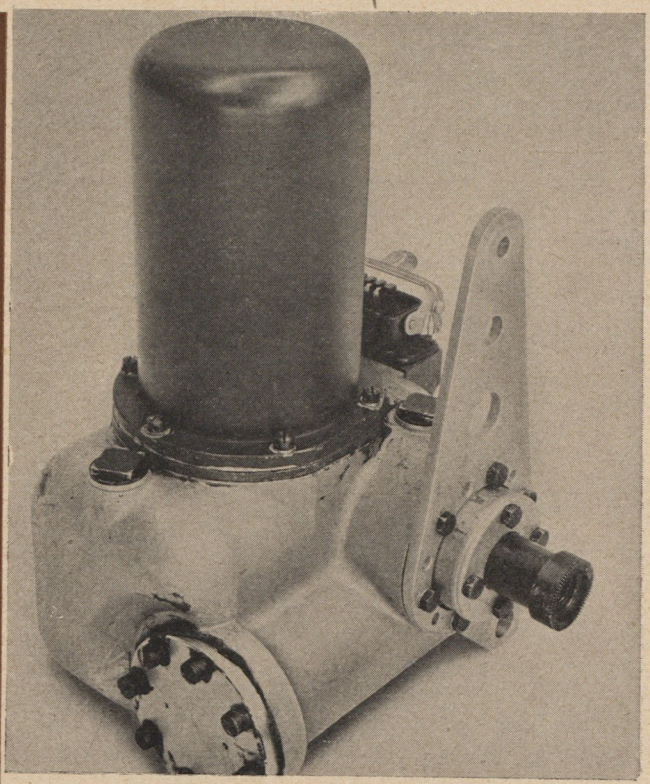
In these larger craft, the aerodynamic surfaces of the missile must be movable, as in an airplane, and a complete set of self-sufficient, internal control elements must be provided to actuate the control fins or wings. These controls must cause the missile to follow a previously selected path without wavering or oscillation and allow it to receive radio transmitted instructions after takeoff, if this is the system being used. The instrumentation to accomplish this action is often of a complex nature; yet the basic principles involved are simple and make use of no new concepts of mechanics or electronics.

Although the V-2 was not the first, and is emphatically not the last of the large rockets planned for long-range flight, its internal instrumentation can be taken as typical of the solution of rocket path stabilization. Because of its large size, the V-2 is required to take off under its own power without the use of a launching tube or guide rails, and a vertical position on its launching platform is almost a necessity. After the initiation of thrust by the firing of its motor, the rocket rises without any initial velocity and in a vertical direction. Since the total force available from the rocket motor is only about twice the weight of the rocket, the upward travel appears amazingly slow; and an important result of this method of ascent is that the external fin surfaces are useless because of the low relative velocity of the air. Without such control elements, it is probable that a large rocket like the V-2, if launched in this way, would make the first stages of its flight on a very irregular path leading to frequent accidents.

The problem of takeoff stability was solved by the use of carbon vanes paired with the movable surfaces of four symmetrically constructed tail fins. The vanes are inside the throat of the rocket motor, which makes up the tail section of the body. They are of a carefully constructed shape, and although they erode in the hot gases at a relatively rapid rate, their useful life is required to be only a minute. If one of the carbon vanes is deflected in the jet, it develops forces arising from the reaction of the hot exhaust gases. By appropriate movement of each of the four vanes, it is possible to cause the missile to roll, pitch, or yaw. During the takeoff period, the jet vanes can be operated by servo motors in such a manner that any attempt of the missile to fall over from a vertical position, or roll because of unpredictable dissymmetry, will be resisted by forces generated from the deflection of the high velocity exhaust jet as it passes the vane control surfaces. As the velocity increases, the aerodynamic forces from the external fins also become an appreciable source of control forces, which are available after the cessation of fuel burning.

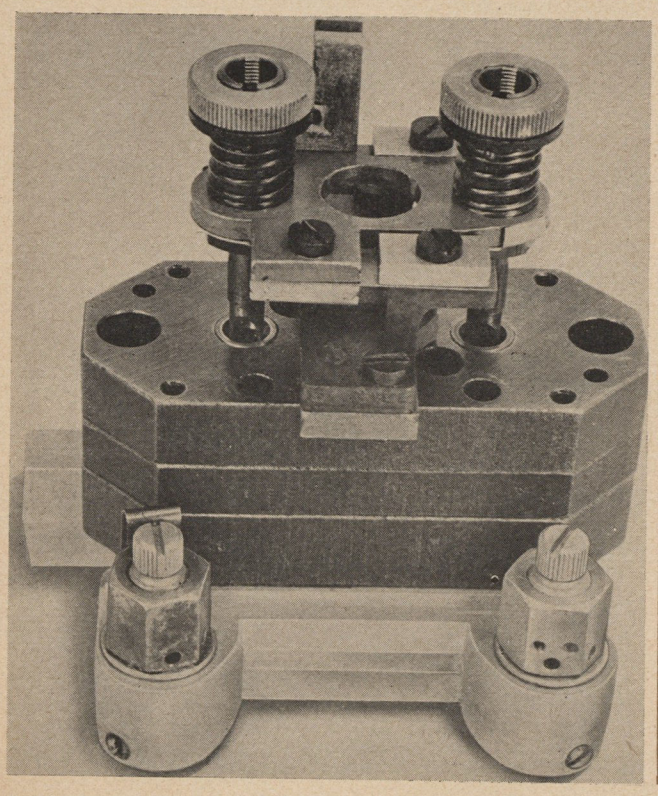
On the assumption that the control surfaces in the jet and in the air stream offer a means of controlling the direction of flight of the large rocket, let us review the fire control

GAPA (Ground-to-Air Pilotless Aircraft) a form of fast-climbing guided rocket, being developed to intercept other steerable missiles.

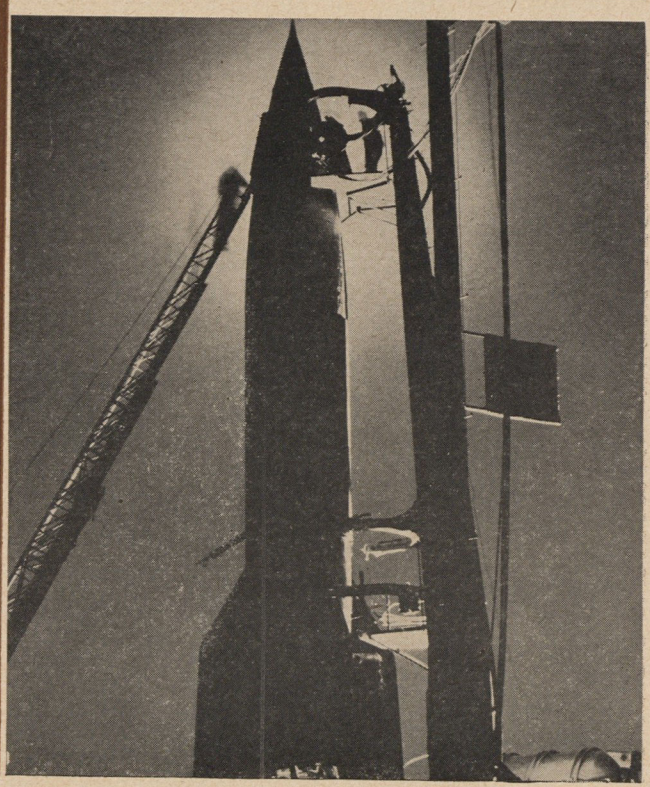


Control Servo from a German V-2. The power motor is under the black cylindrical cover, output shaft extends from right of casting.

V-2's complete hydraulic pump unit, shown assembled and mounted on block containing relief valves. These supply oil to servos.



Floodlights and moonlight illuminate a V-2 being rigged for launching at the White Sands, N. M. Army Ordnance Proving Grounds.



problem of the V-2 as being typical of the long-range ground-to-ground application.

In an ordinary artillery piece, it is possible to construct a set of ballistic tables or curves which for a given set of conditions relating to the gun, the ammunition, and the atmosphere will give the elevation and azimuth angles of the gun barrel in terms of the range and azimuth of the target. If the gun can release its projectile at a standard velocity in a specified direction, then the projectile will travel to its destination as predicted by its ballistic tables by acting as a freely traveling body affected only by the force of gravity and the reactions of the atmosphere. In the long-range rocket, the velocity of the missile is developed by continuous thrust in a time of about a minute. Even so, the concept of the artillery piece is useful. Suppose that we are able to control the flight path of the rocket during its thrust development period, keeping account of the several variables involved. If, at the instant of jet cutoff, it can be arranged that the missile has the proper velocity, direction and magnitude at the proper point in space, its subsequent motion will be similar to that of a gun-emitted projectile; and it will arrive at the impact point with the same degree of accuracy. A set of trajectory curves can thus be constructed for the rocket which will relate the initial azimuth angle and the shape of the path in the vertical plane to the thrust characteristics of the motor so that any desired range and direction of fire can be obtained.

The V-2 rocket motor develops thrust for about a minute. The rocket tilts from the vertical direction during that time so that at a height of 20 miles or so it achieves the desired angle analogous to the quadrant elevation of a gun. To obtain the maximum range, the final angle at the jet cutoff must be about 45 degrees, just as with a gun. It is the function of the internal control equipment to guide the rocket along this "20-mile gun barrel" so that the proper muzzle velocity, quadrant elevation, and azimuth direction to produce impact at the target are obtained.

The internal control mechanisms must first guide the missile in a vertical direction during the critical period of takeoff, automatically allowing for variations in the direction of motor thrust and accidental disturbances. As soon as takeoff has been effected, the rocket must be slowly tilted on a smooth trajectory directed toward the target, with the expectation that at the end of the burning period, the velocity vector of the missile will have the desired azimuth direction, the desired elevation angle, and the desired magnitude to allow the missile to proceed as a free body to the intended objective. The control mechanisms must include devices which will measure azimuth directions with respect to the earth and angles with respect to the true vertical to determine the trajectory in the vertical plane. Further, there must be a mechanism to prevent roll of the missile so that the first pair of fins can always control the azimuth direction or yaw angle and the second pair the elevation or pitch angle. Finally, there must be a means of controlling the fuel flow so that thrust is ended when the necessary velocity is obtained.

The gyroscope appears to be the only instrument capable of indicating an angle with respect to a direction in space without the use of external references. As is well known, a rotating gyroscope wheel has the property of maintaining its original orientation in space as long as no external torques are applied to disturb it. As commonly used in aircraft instrumentation, a well-balanced rotor, weighing perhaps a pound, is rotated at 10,000 to 20,000 rpm by pneumatic or electric power on low friction bearings. When suitably mounted on gimbal rings it can be made to indicate the angular position of its carrier with respect to the original setting of the gyroscope axis. By the use of pickoffs which exert no appreciable reaction on the gimbal rings, signals can be obtained which may be applied to a control system to maintain the missile on the desired heading. A single gyro can be arranged to indicate two angles, such as pitch and roll, in the two planes at right angles to its rotational axis. Thus the minimum instrumentation for three-axis control is two gyros, but for design simplicity an independent gyro for each angular axis is often used. These gyro instruments, along with many of the other control instruments, can be located at any point in the missile that may be dictated by design requirements. The emphasis for the construction of the control equipment is on lightness, compactness, insensitivity to acceleration, and reliability.

Assuming that a properly mounted gyro instrument can indicate deviations from the desired course direction, a control system must be designed that will apply corrective torques to the missile to bring it back to the proper heading. A simplified diagram of one axis for a theoretical missile is shown to illustrate this sequence of operations. In order to convert the gyro indications to control torques, a servo motor of considerable power (perhaps a horsepower or even more) must be controlled through a suitable amplifier. This servo motor may derive its power from electric, hydraulic, or pneumatic sources. As an example, the V-2 servo consists of a storage battery operating an electric motor which supplies high pressure oil through a hydraulic pump. This high pressure oil flows continuously and is by-passed when not needed. The output member consists of a piston operating a crank arm, and the direction of movement of the piston is controlled by a balanced reversible valve assembly. Exhaust oil is returned to the sump to be used again by the pump. The position of the two-way valve is controlled by an electric torque motor of excellent design which derives its signals from the electric signals obtained from the gyro equipment.

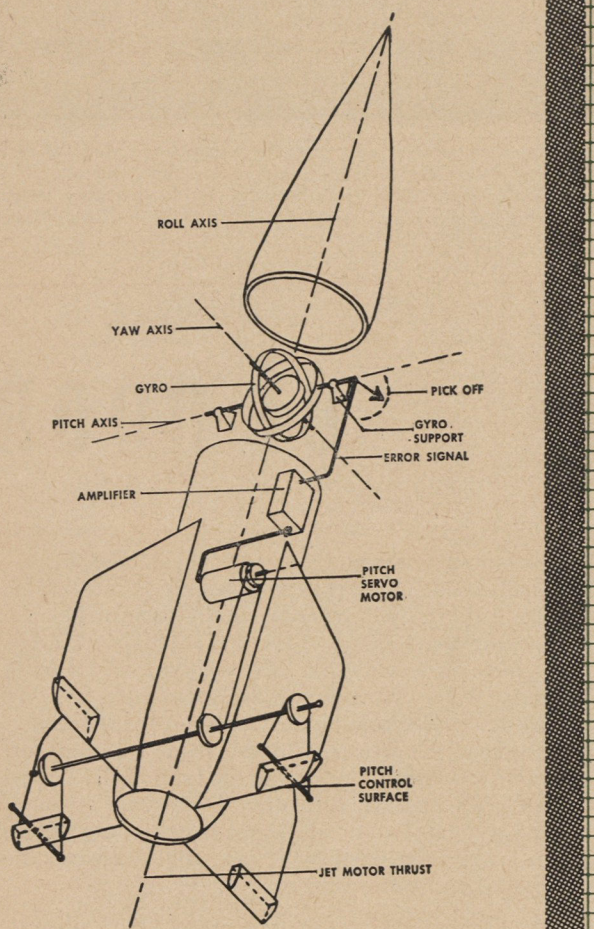
A torque motor is a commonly used device for the conversion of electric signals into liquid or gas flow by the operation of a multiple valve. It is designed much like a common motor except that its movement is restrained and its armature swings a small amount to the right or left according to the servo effort to be produced.

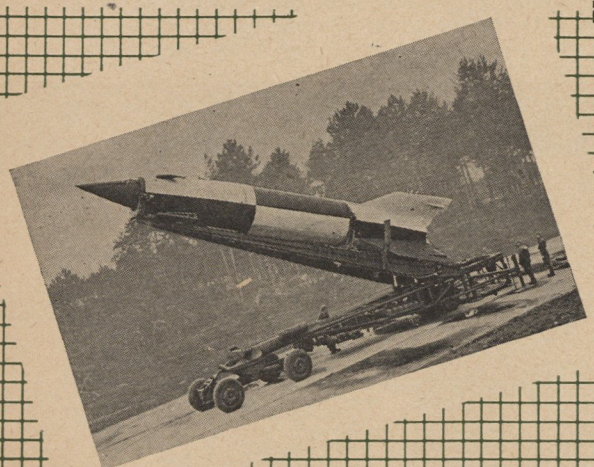
The servo motor must be connected to the movable fin surfaces by a cable or other mechanical gearing. The normal construction of a rocket motor requires that a separate servo motor be provided for each control fin. Each servo motor must be controlled so that it effects the needed corrections as calculated for it by the instrument complement. It will be obvious that the horizontal pair of fins controls pitch and the vertical pair controls yaw. In order to maintain these pairs in their proper horizontal and vertical positions at least one pair must also be arranged to respond in opposite directions to correct for any tendency to roll. This differential movement is added to any movement requiring correction about the other control axis common to that pair of fins.

In tracing the simplified control diagram, suppose for the moment that the pitch axis makes a fixed angle in space with the vertical. If the gyro rotor stays fixed in space, then any movement of the missile in pitch will result in rotation of the outer gimbal ring of the gyroscope relative to the rocket body. This rotation is measured by a sensitive pickup which produces a signal proportional to the angular deviation of the missile from the reference direction. This signal must be amplified (electrically, pneumatically, or mechanically, as the case may be) so that it can control the high power servo motor. The control motor then produces a torque on the control fin proportional to the deviation, or rotates the fin an angular amount proportional to the deviation or a combination of the two. As the fin is displaced in a direction to correct this deviation, the missile is brought back on its course, the deviation cancelled out, and the servo motor returns to neutral.

At this point, an important consideration comes into the design of the control system. It is highly probable that such a simple control loop as that sketched will be unstable; that is, it may oscillate violently. The design of the control is

Diagrammatic drawing of the simplified pitch control of the V-2 type rocket. Below, the German system for elevating and firing the missile.





complicated by the tremendous range of variation of the aerodynamic effectiveness of the fin as well as the complex behavior of the control vane in the jet (omitted from the illustration). The designer makes use of additional parameters in the servo system, using, for instance, the amplifier or an auxiliary device to measure rates of change of the deviation. In effect, this rate of change of angular position of the missile generates a signal as soon as any deviation begins and before its value has become appreciable. As an example, an airplane pilot can keep his craft on a straight heading by watching his rate of turn instrument. By keeping the rate of turn small, he prevents any short period wandering from the desired course. By reference to his compass or directional gyro, he can also prevent any long period wandering from the course. If the rate of change of heading of the missile is appropriately combined with the deviation signal, it produces the effect of damping the missile system and thus causes any oscillations gradually to disappear. Thus it will be seen that the properly designed servo will maintain short term stability and at the same time keep the missile along a chosen direction.

In the firing of the V-2 or a similar ground-to-ground missile, a definite time variation of the angle of pitch (elevation angle) of the missile is required to direct it along a precomputed trajectory. One simple method of accomplishing this is to rotate the reference index on the pitch gyro in accordance with the desired pitch schedule. When this is done, the deviation measurement pickoff applies signals to the servo system to keep the pitch angle of the missile set according to the schedule being generated at the gyro. This pitch schedule is, of course, varied to suit the range to the target and is a complex function of the design parameters of the missile and the retardation effects it will experience in flight.

It will be appreciated that the measurements relating to azimuth and roll must be made and applied to the control surfaces in the same manner as with pitch.

In order to have the control gyros provide angular references to the earth, their axes must be aligned properly with respect to the desired direction of flight before launching. In the V-2, the pitch gyro is started with a vertical axis, the roll gyro is oriented with respect to the two sets of control surfaces, and the azimuth gyro with respect to the direction of fire. This is accomplished by caging the gyros, that is, clamping the gimbals to the frame of the missile. The missile itself is then carefully set up to point vertically, the fins being aligned on the launching platform so that one pair points toward the target. At the moment of launching, when the gyros are rotating at their rated speed, the clamping devices are removed by remote control so that the gyros become directionally free in space. As long as they are free from outside torques, they will maintain this direction. Actually, all free gyros have an appreciable rate of drift because bearings are imperfect, masses cannot be completely balanced about the gimbals, and the pickoffs are not as a rule really torque-free. Drifts of perhaps 15 degrees per hour or more may occur but will not result in appreciable deviation in the critical minute in which the future trajectory is being determined.

The final variable to be controlled in this method of fire control relates to obtaining the proper velocity magnitude at the end of the controlled thrust period. One possibility was to load a predetermined amount of fuel into the tanks so that at the point of complete expenditure the velocity would have the proper relation to the direction of flight and the position. Since the process of burning is not under exact control, other means had to be devised for the V-2. If the velocity could actually be measured during the thrust period, a slight excess of fuel could be loaded and shut off from the motor at the proper moment. This was actually accomplished in several ways, one of which was to integrate the acceleration, taking into account several related variables. As soon as the inte-

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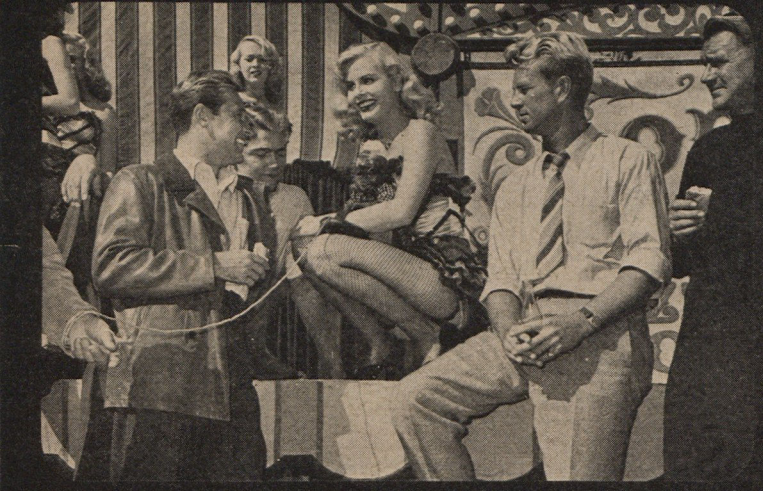
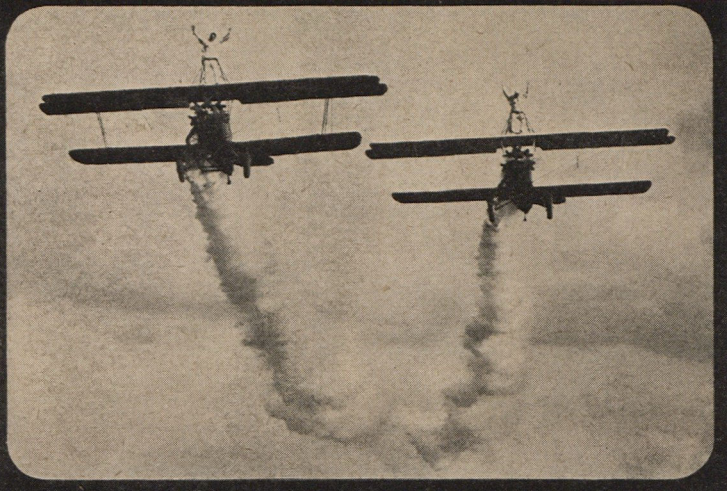


The four flying McDonalds have an aerial circus which tags after eastern country fairs in the early twenties. They have received an offer to fly the mails; Colin (William Holden) and Tad (Sterling Hayden) stop to discuss it with Colin's girl Poppy (Jean Wallace).



After a life of daredevil stunt flying, the prospect of flying the mail seems pretty dull. Colin decides to accept the offer, and after considerable debate the other three brothers decide that they would rather string along than break up their little quadrumvirate.

Actress Jean Wallace, Poppy in movie, bids Paul Mantz goodby prior to record coast to coast flight.

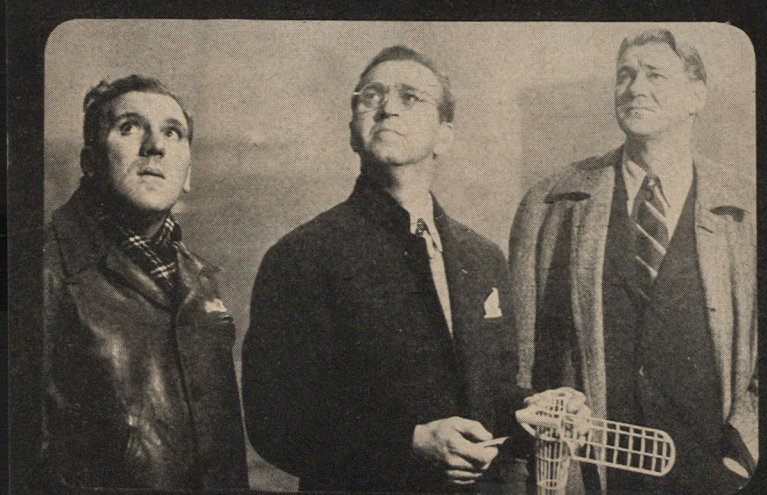
Blaze of noon

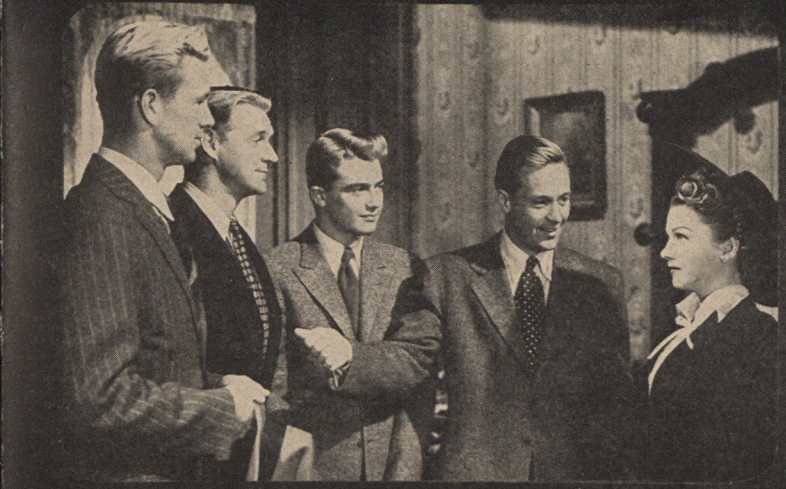
AVIATION enthusiasts who remember the days of the early airmail as one of the most romantic chapters in the history of the industry, will probably find "Blaze of Noon" a slightly inadequate chronicle of the period. With one eye on the box office, Paramount has cropped a lot of Ernest K. Gann's original story to make way for a romantic plot which has a tendency to interrupt rather than support the theme.

But in spite of this weakness "Blaze" is still a good picture. It is superbly successful in capturing the spirit of the pioneers who toiled over aviation with dirty hands and a staunch heart—who planted the seed of a gigantic new enterprise and then, like men who work with the soil, cultivated and coaxed and begged it to maturity.

Keith, the youngest McDonald, is killed when his plane crashes into a water tower while trying to land in a heavy ground fog. Porky, Roland and Gafferty, the airline manager (Howard Da Silva) stand beside runway, waiting. After crash Roland quits flying.

Later Colin meets a similar fate. En route to Newark he calls in to tell Tad that he is carrying the line's first passenger—a congressman, member of the committee on which the fate of the airmail bill rests. Ice forms on his wings and Colin never makes it.



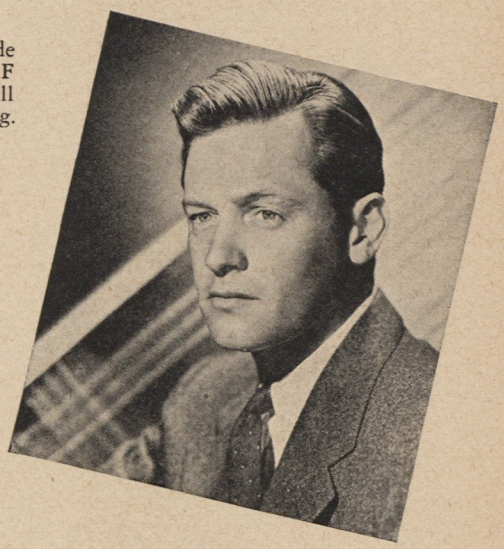


When Colin and Tad, with Roland (Sonny Tufts) and Keith, (Johnny Sands) report for physical exams they are met by a pretty nurse (Anne Baxter). Colin proposes immediately, is turned down. Next day in church pretty Lucille nods consent between hymns.

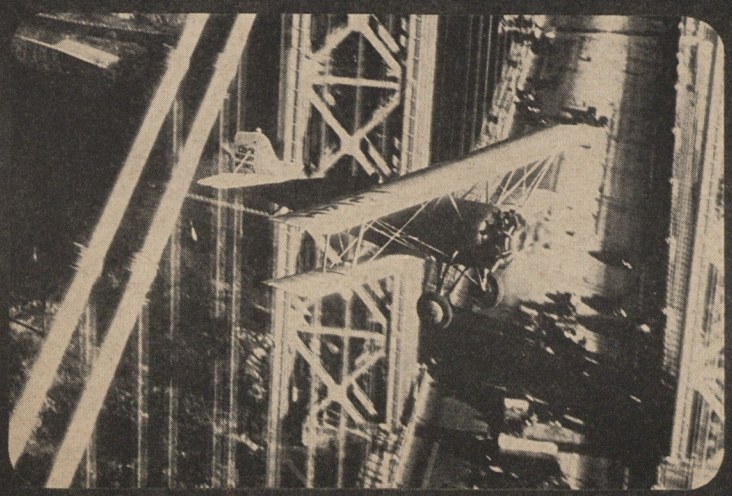
At headquarters of Mercury Airlines the McDonalds meet old friend Porky Scott (William Bendix) who has also abandoned barnstorming for the mail. Roland is first off to inaugurate the Newark-Cleveland run; soon all the boys are along the line somewhere.

Stars of the film are Anne Baxter, William Holden, Sonny Tufts, Sterling Hayden and William Bendix. It is Holden's first release since his discharge from the Army Air Forces and if he had worked at it for years, he probably would not have been able to turn in a more creditable performance. Holden's greatest attribute in pictures, as it was during the war, is his unmistakable sincerity. As a private (and later a captain), he was once referred to by his boss, Lt. General Barton K. Yount, as "the kind of soldier every commander wishes he had more of." It took a lot of work and an acute sense of responsibility to earn such a compliment, but the *genuine* performance he gives in his first postwar picture effort amply demonstrates that he is the kind of guy who comes by such praise naturally and honestly. Holden, incidentally, is one of the Air Force Association's most enthusiastic members.

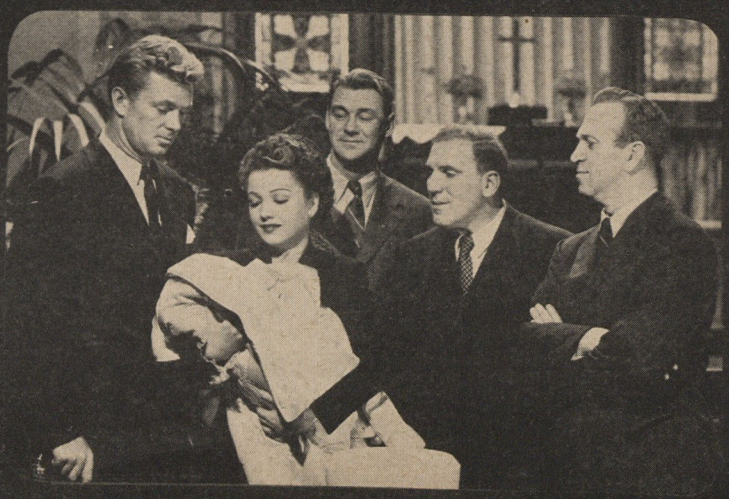
Another AFAer, former Lt. Colonel Paul Mantz, who served in the Pacific during World War II, is responsible for some of the film's most exciting moments in the air. Mantz, who recently established a new transcontinental speed record for prop driven planes of 6 hours, 7 minutes, 5 seconds, participated in all of the pictures hazardous stunt work.



William Holden has made two pictures since his AAF release. Dear Ruth will be released this Spring.



Some of picture's best shots were taken for sequence directly preceding Colin's crash. Paul Mantz flew an old Pitcairn Mailwing under a New York bridge sixteen times for a scene that lasted less than a minute. Bad weather was faked in after shots were taken.



Story ends in church where Lucille accepted Colin's proposal. Occasion is the christening of their son Keith whom Colin saw once before he was killed. Tad, Roland, Porky and Gafferty assume the responsibility of acting as co-godfathers to youngest McDonald.

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Book

First Over Germany. *By Sgt. Arthur P. Bove. Newsfoto Publishing Co., San Angelo, Texas.* $5.00.

On January 27th, 1943, a group of fifty-five B-17s pasted Wilhelmshaven. It wasn't a first-rate operation. Clouds over the primary target at the famed sub pens at Vegesack had shunted the group to a less important aiming point, and even there the weather was poor. Nevertheless, the 306th Bombardment Group made history and confirmed an important strategic theory. A group of heavy bombers had penetrated Germany by day, matched its mass fire-power against the Nazi fighters, and demonstrated that pinpoint, high altitude bombing by daylight was not only possible but highly profitable.

In this book, the battle saga of the 306th, is the story of human suffering, valiant endeavor and the day to day routine living away from home. Written with understandable pride by a member of the group, it has the intimate informality of a class yearbook and therein lies its charm. In leafing through its pages, one feels a little like an eavesdropper in a bull session. The story starts in March of 1942, when a handful of men under "Chips" Overacker moved out of Salt Lake City to the practice bombing target area at Wendover, Utah, a community generously described as containing "seventy-five inhabitants, one tree, three blades of grass and the Stateline Hotel." For a while, the Squadron's "equipment" consisted of a lone B-17E. Officers slept six in a room designed for two, enlisted men lived in proportionate state.

The book takes the Squadron to England, settles them at the sleepy town of Thurleigh, acquaints them with the populace, follows them on their missions, their dates, introduces their heroes, "Snuffy" Smith, who was taken off KP to receive the Congressional Medal of Honor, the Mad Russian, Michael Roskavitch, and Arizona Harris who went down in the Channel in his top turret, guns still firing.

Every man who served in the 306th should own at least one copy of the book, and those who didn't will find in it an honest account that is a welcome change from the usual high echelon war narrative.

Man's Fight to Fly. *By John P. V. Heinmuller. Aero Print Company, New York.* $2.50.

After the close of the first World War, airmen decided that new timepieces were needed for aviation. One of the men who helped develop them was the author of *Man's Fight to Fly*. In line with his work as the president of one of the world's largest watchmaking concerns, he was called on to reorganize the Timing Contest Board for the National Aeronautic Association. Mr. Heinmuller's connection with the timing of some of the most significant flights in history during the last two and a half decades, has given him an unique opportunity to observe aviation's flow of events at close range.

Out of this fund of personal knowledge, coupled with a keen historian's insight, has come an absorbing book. The golden era of aviation's progress, from Lindbergh to Howard Hughes, is brought into sharp focus and there are discerning personal observations on what has transpired mechanically, scientifically, and in the development of human skills. Appended to this series of recollections is an aeronautical chronology, in the form of paragraph biographies, from Leonardo da Vinci to the aces of World War II.

Reviews

Atomic Diary. *By Lt. Col. John F. Moynahan. Barton Publishing Company, Newark, N. J.* $1.00.

This is the story of the Atomic Bomb, as told by the press representative for Manhattan District Project. Between its red paper covers is an account of something historic and never before honestly told. That is, some of the human reasons for the friction between the atomic scientists and the atomic soldiers, and why this argument has to be resolved before the business of handling the bomb as an international entity can begin to be considered.

Today, Moynahan is neither fish nor fowl. A newspaperman turned soldier and restored to civilian status, he has had to look upon the face of the mightiest force ever put into the hands of man by a possibly not-too-particular destiny. The author sounds as frightened by the prospect of what it might lead to as any other citizen.

Part One of the book "Mission 13" is a well-written, personalized review of what happened to one man, the author, from the time he left the US with a top drawer secret and a pistol strapped to his chest, headed for Tinian. In some cases, it lifts the corner on hitherto unrevealed phases of the work that went on before Hiroshima and Nagasaki. But for the most part, all of this has been covered before.

The book's most important revelations are in Part Two, "Inevitable Impact." Here Moynaham goes over the less-widely-known struggle that went on between the scientists and the soldiers as long as the Manhattan District Project was in existence. In the days before Hiroshima, the magnitude of the job kept the two strange bedfellows in a shotgun marriage. When the pressure was off, the union was no longer possible.

While Part Two of the book is not what one would expect from the former public relations officer of the Project, it does furnish some insight into the fact that the current struggle for civilian vs. military control of the atom bomb has roots in human as well as philosophic conflict. It is the logical counterpart to John Hersey's *Hiroshima.* Certainly no person who wants a rounded background on the subject of the political impact of nuclear fission should fail to read this work.

The Aircraft Mechanic; A Manual for Certificate Candidates. *By Siegel Philip. Pitman, New York.* $4.00.

An exhaustive collection of typical questions and answers on all subjects required by the Civil Aeronautics Administration for the licensing of an Aircraft Mechanic. The text is divided into six chapters covering Civil Air Regulations, Techniques and Practices; Aircraft Propellers; Aircraft Hydraulics; Rigging and Assembly; Wood, Fabric, Covering and Finishing; and Sheet Metal, Riveting, Welding, and Soldering. Each group of questions is preceded by background information and discussion.

Bibliographies are included in each chapter and reference is made to the pertinent Civil Air Regulations and Civil Aeronautics Manuals to enable the reader to get the best results in his preparation for the examination.

The author is Air Carrier Inspector for American Overseas Airlines and holds an Aircraft and Engine Mechanic's license and also an Aircraft and Engine Instructor's license. He is a graduate of the US Army Air Force Technical School, Chanute Field, Illinois and served as a crew chief, flight engineer. Illustrations are included in the text.

quit your STALLING

Newly developed warning device actually tells the pilot when the complex stall phenomenon is about to occur

BY WILLIAM S. FRIEDMAN, *Sgt., AC Reserve*

You've got to watch your terminology when you're talking about airplanes. Certain phrases can be as deadly as a conked-out motor. Take for example, the term "stalling speed." Casey Jones Cyclopedia of Aviation Terms defines stalling speed as "the speed in steady flight attained by an airplane flying at an angle of attack corresponding to its maximum lift coefficient." The definition, when you figure it out, is correct. The trouble is that too many airmen have translated it as meaning that there is an arbitrary and fixed speed below which a stall will invariably occur. Some have even marked a red line on their air speed indicators as a danger signal. They have felt that between the "feel" and the air speed indicator, they could always tell when an airplane was about to stall. Unfortunately, this is not always true. The speed at which an airplane stalls is determined by a complex set of variables and those who have been indoctrinated with the idea that they can tell when an airplane is about to stall by the seat of their pants plus the air speed indicator had better examine the accident record. Half the fatal or serious injury accidents in personal aircraft involve involuntary stalls. Interviewed, most of the survivors will tell of the aircraft stalling without apparent warning. An honest examination of stall mishaps in the last quarter century, which is about as long as the phenomenon has been observed scientifically, shows that most stall accidents could have been prevented if some gremlin would have tapped the pilot on the shoulder and said, "Excuse me, Bud, but you are getting ready for a stall or spin."

Back in 1939, Dr. Leonard M. Greene, an aerodynamicist and pilot, made a study of stall phenomena. He observed that a lifting wing was like a deflecting vane. An increase in the angle of attack jacked up the lift until the stall was approached. Beyond that point, the reduced total pressure of the boundary layer adjacent to the upper surface of the wing, failed to overcome the adverse gradient pressure. This produced flow separation (turbulence) and the loss of lift characterized as a stall.

Green observed that these conditions were invariable aerodynamic properties of a particular wing. He selected one feature of these properties to create a true warning device which would actually give adequate alarm of an approaching stall, rather than measure one of its many components.

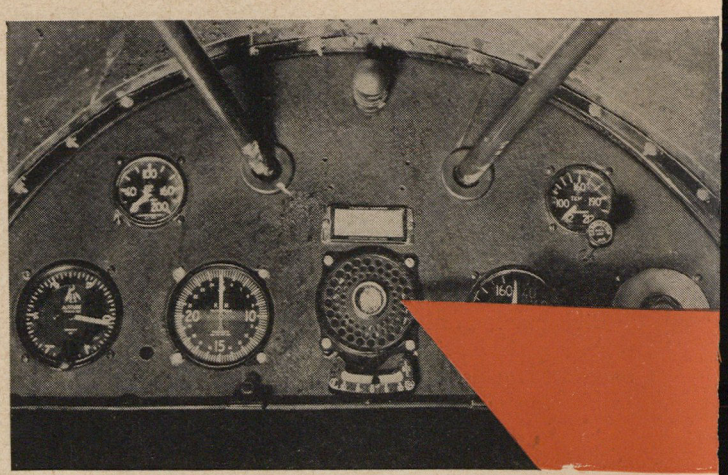
The device consisted of a tab or vane, located in the leading edge of the wing, adjusted to respond to change in airflow. The tab is located just below the point where the airstream separates to flow over and under the wing. In normal flight this dividing point will be above the tab, holding it in a "down" position. Near the stall, however, the point of separation is low enough for the airflow to change direction across the tab and the pressure is on the underside of the tab, pushing it up. This operates an electrical relay, which actuates a warning device in the pilot's instrument panel.

The device, now being manufactured by the Safe Flight Instrument Corp., White Plains, N. Y., consists of two units. One is the wing unit which contains the tab and the relay. It requires only a 1¾" by 1⅜" hole at the wing's leading edge. After the unit is mounted, the hole is covered by a face plate, through which the tab protrudes. In actual operation, the tab is held down not only by the airflow but also by a spring, which obviates the unpleasant characteristic of having the warning signal operative at all speeds below stalling. Thus, during take-offs and landings, the signal can be activated only when the airplane passes through the narrow critical zone.

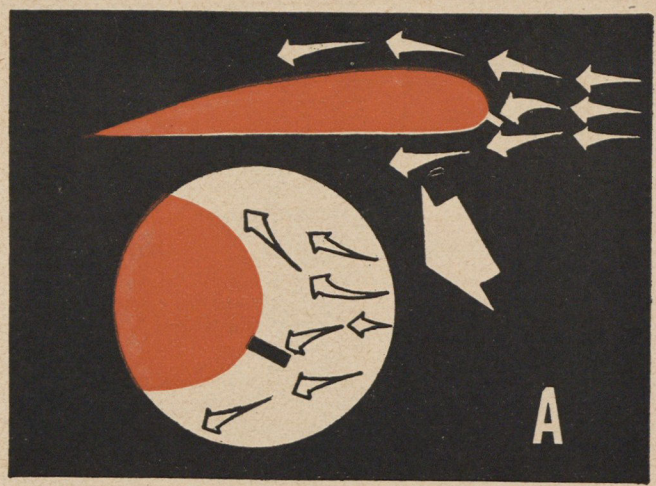
The warning indicator consists of a lightweight horn and light, set in the dashboard. Power is provided by the airplane's circuit. In aircraft not rigged with an electrical system, two six-volt lantern batteries will operate the circuit. The horn and light have separate wiring systems, so that failure of one will not affect the other. The entire outfit weighs less than a pound, and the installation of the warning indicator does not affect the weight and balance of the aircraft.

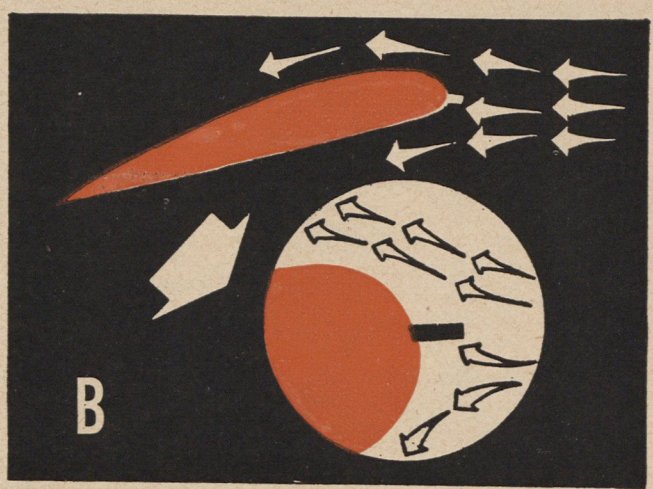
The speed at which the airflow around a wing breaks down is affected by many things. The first is how much the airplane has to lift to compensate for its weight amplified by turning or flaring acceleration. Any pilot knows that a heavy plane stalls faster than a light craft. Acceleration plays tricks with the load on an airplane's wings. Look at the instrument used to measure this factor, the accelerometer. It is simply a spring scale, carrying a unit weight. When the air forces on an airplane are increased due to changes in direction or in flaring out, the pull on the unit weight increases in a like measure, and the scale reads 2G or more. The airplane's lift at the moment increases in like proportion. Therefore, the stalling characteristics of the airplane at the time will be altered just as though the gross weight were increased in direct proportion to the increase in G's.

This factor shows up in unexpected places. For instance,



Typical installation of the Safe Flight indicator, which sounds a horn and lights a light when the airplane comes within ten per cent of the critical point. The instrument is easily mounted, and can go into the ash-tray hole in many of the standard airplane dashboards.





In normal flight, (A) the separation point of the airflow is above the sensitive vane of the instrument, which keeps the vane down and the circuit open. As a stall (B) approaches, separation point shifts upward. Airstream pushes the vane up, closing the switch circuit.

there is the phenomenon of secondary stall. A pilot can be coming in for a landing, note that his air speed is hitting close to critical, and stick his nose down to pick up speed. On flaring out, the G-factor rises. If the G-factor rises too much, and at low altitude, there is likely to be one of those unexplained crackups. Turns can have the same effect.

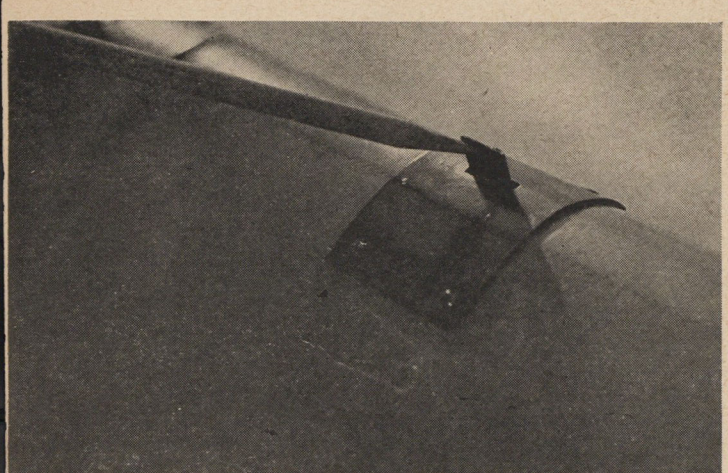
Flaps are another factor to be watched. Pilots have been known to make a really good approach at proper speed with flaps down. Suddenly something happens and he will have to go around again. He dumps his flaps. If he has a warning indicator, he would have gotten the horn, if not, . . .! The pilot forgot when he dumped his flaps that he threw away part of the airplane's lifting capacity.

Power, alterations in configurations, ground effect, turbulence in the air, Reynolds and Mach numbers also affect the stalling speed of an airplane. The second item, configuration, is a tricky one. This includes factors like opened cowl flaps, iced wings, opened windows, mud splashed wings, etc.

The most important conclusion to be drawn is that a stall is no simple matter. Under most conditions, when the pilot is on his guard he can recognize a stall. Then comes a big BUT. Stalls can occur suddenly under unusual conditions. Any complication of conditions can jack the stalling speed to the danger point. It takes a real aerodynamicist to be able to tell when a stall is coming on. To add this woe to the pilot coming in on instruments is asking for a lot.

The industry's concern over the problem of involuntary stalls is fairly old. It has produced such instruments as an angle-of-attack indicator, accelerometer, and the turbulometer. These, like the air speed indicator, have been unsuccessful in warning of stalls. The air speed, accelerometer, and angle-of-attack indicator, alone or en masse, have failed to satisfy all conditions, because they can measure only some of the factors contributing to loss of flow. The turbulometer has not proven too satisfactory because it can measure the phenomenon only after it has begun to occur.

The important conclusion drawn by outside observers is that there is nothing dangerous about a stall as long as the pilot is aware of its imminence. It is the stall that sneaks up on one's blind side that fills hospitals and sometimes cemeteries. The Safe Flight stall warning indicator is the first indicator ever offered commercially that will give adequate WARNING, about ten per cent before it happens. Because it is sensitive to the stall itself, not to one or more of its contributing factors, it will continue to be operative under any condition, even to high speed stalls on fighter aircraft.



Actual installation of the switch unit on the leading edge of the wing. Because the stall is a total wing property, only one instrument is required. Because the complete unit weighs less than a pound, its inclusion does not require a weight and balance recalculation.

The major note of confidence in the instrument's value was expressed recently by a number of prominent top aviation insurance companies who promulgated a policy of reducing crash insurance premiums for aircraft equipped with the stall warning device. A fair sized cut, it would cover the price of the instrument ($35.00) in the average private airplane in a year of operation.

Old-time pilots may not be too responsive to the suggestion that a stall warning indicator is essential. There was an "elder pilot" with a log total in the top four figures who took on the job for the CAA of trying out the Greene device. His job was to put the airplane through every conceivable stalling position, to determine whether or not he could make the aircraft fall off without setting off the warning circuit. For several hours, the pilot did his darndest, but he still couldn't cheat the horn and light. Finally, as he was coming in for his final landing, he leaned back and turned to the CAA representative in the rear seat. "It's OK," he said, "it will give a safe warning margin, but this sort of thing is only for students and tyro pilots. Any old-timer can tell when he's going to stall . . ."

But the old-timer forgot that when he leaned back he did something to the airplane's weight distribution, and the little safety gremlin on the dashboard stuck out its lighted red tongue, emitted a noise not unlike a Bronx Cheer as if to state, "Pardon me sir, but if you don't do something, this airplane might."

HEAVY DUTY

(Continued from page 21)

missions of the Aviation Engineers, is taught in the Heavy Equipment Section of the Geiger Field school. This section operates schools for the training of Diesel mechanics, crane operators, rock crusher operators, ditching machine operators, well drillers, power shovel operators, road graders, bulldozer operators, crawler tractor operators and other like specialists. The Heavy Equipment Section turns out complete teams of airstrip builders.

The soldiers who operate the rock crusher and asphalt mixer process the raw material for landing strips while other members of the team are bulldozing the terrain into shape. Dirt, trees and boulders are pushed aside. Scrapers and graders move on to the scene and prepare the foundation. Rock, cement or asphalt is laid down and the strip is ready.

Backing up the Heavy Equipment Section is Geiger's Utility Section, which "keeps 'em rolling" and provides the niceties to boot. This Section graduates blacksmiths, electricians, machinists, plumbers, welders, carpenters, etc.

These are the men who put the finishing touches on advanced air bases. Operations towers, weather observer stations, barracks, mess halls and office buildings are among the products of their building talent. Riggers move the heavy equipment and larger construction materials with their derricks, cranes, gin poles and chain blocks. Electricians rig base lighting systems and the installation takes shape.

Since VJ Day, Geiger Field has had, spasmodically, a capacity roster of 2300 men attending its various schools. Demobilization brought enrollment down to 1500 men at one time, but a new training priority has permanently established 25 Air Force engineering schools at the installation. In addition, three officer courses concerned with engineering skills have been transferred onto the base.

Present plans of the Air Training Command are to maintain a constant flow of approximately 2300 students in the engineering schools.

Schools graduating specialists in trades where only replacement forces are needed will receive a token flow of students, permitting the maintenance of a base faculty and preserving the over-all continuity of engineering training.

This application of mathematical formulas to student flow is consistent with the "maximum efficiency—maximum economy" rule guiding Air Training Command in planning and operations. Officials have pointed out that the flexibility of this type of planning will, above all, permit the Command to maintain its facilities, in peace, guaranteeing immediate response to varying training needs.

Prime among the postwar classes currently in operation at Geiger Field are the Air Installations Officer course and the Engineer Supply Officer course.

The Air Installations Officer course is a program of advanced technical training designed to produce engineers for use in key engineering positions at AAF installations. Special emphasis is placed upon the application of basic engineering factors and practices necessary for operation and maintenance of modern-day air bases. Post Engineer administrative procedures as well as operation and maintenance of vital utilities are important parts of the syllabus. Instruction includes such subjects as structural fire fighting, sanitary engineering, electrical, structural, civil and mechanical engineering.

The specialized Engineer Supply Officer course includes advanced study of receipt, storage, maintenance and issue of engineer supplies and equipment. The officers receive training in the operation of large storage facilities. The reconsignment and processing of intransient materials is studied in detail. Selected officers from throughout the nation are attending the school.

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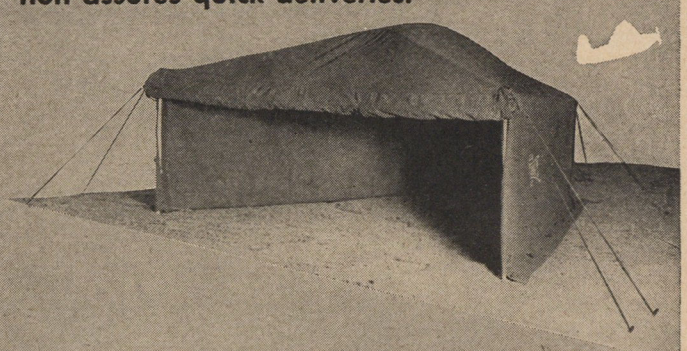

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THE GERMAN AIR FORCE

(Continued from page 39)

engine factories and airfields, all contributed to delay the appearance of these types in more than insignificant numbers. As in so many other instances after 1942 the Luftwaffe was fighting for time for jet-propelled development; but Allied air pressure allowed of too short a breathing space to do more than develop the conventional types of fighter aircraft in large numbers.

In the matter of aircraft armament a major point of interest was the German failure to develop power turrets for their bombers. In the case of both the Heinkel 177 and Dornier 217 this was catered for in the original design. But instead the Luftwaffe produced a twin free gun. This was the 20-inches-long M.G. 81, capable of firing over 2,000 machine-gun bullets of about .3 inch caliber per minute.

In the case of the 20mm. cannon the Luftwaffe was ahead of the Allies up to 1940. The cannon could fire 350 rounds per minute. In 1941 the Luftwaffe introduced a wartime improvement in the M.G. 151. This could fire 20mm. bullets at the rate of over 800 per minute. There the Luftwaffe seemed to stop, for the German 30mm. cannon, which would have outranged both the American .5 gun and the British and Soviet aircraft 20mm. cannon, never came into general use until the end of the war.

In spite of its reverses of the summer of 1940, the Luftwaffe went on in 1941 virtually to oust the Allied navies from the Mediterranean, just as it had driven them from the coasts of Norway in the spring of 1940. Malta was by 1942 all but blockaded. The Luftwaffe contribution to the Battle of the Atlantic was serious enough in 1940 and 1941 to make the hunting of Focke Wulf 200 aircraft a major operational headache for the British Air Staff for some time. On the Russian front in 1941 the Luftwaffe all but pushed the German Army into Moscow and in the summer and autumn of 1942 it pounded away successfully in the Ukraine and Caucasus, while the fate of Stalingrad hung in the balance. In the Mediterranean it almost held sway over Allied shipping up to the summer of 1942, and in the same period, helped by U-boats, it put a high price on the sailing of Anglo-American convoys to Russia by the northern route to Murmansk.

As with his army divisions, Hitler liked a long, impressive list of squadrons to show how strong the German Air Force was, but in the second world war, as early as the summer of 1940, he was compelled to merge a number of squadrons owing to lack of reserves and was constantly renaming his air units in order to give the impression of increasing strength. After 1940 for nearly every new Luftwaffe squadron birth there was a squadron death. But it was easier to convince people about the Luftwaffe's new units than to persuade them that they were simply old material hashed up with a new label. Of all the emotions which paralyze human judgment fear is the most potent and the most common. It was the fear of the Luftwaffe which was such a sharp psychological German weapon from 1935 to 1941, which made some people in the United States even in 1942 believe the propaganda story that the Heinkel 177 would and could bomb New York. To those who knew the small numbers that were available, the countless troubles in making the aircraft airworthy, the limitation of its range, the project, even as a suicide venture, was hardly credible. To those who suspected and doubted, the project seemed imminent and feasible. Allied and neutral ignorance and therefore apprehension was often the root of the Luftwaffe political blitz. In some quarters this apprehension remained right up to the end of the war, in spite of all the obvious weather signs of Luftwaffe decadence and bankruptcy.

The Luftwaffe never lacked scientific or intellectual brain power. Its quick comprehension of the principles of radar in 1940, its ingenious wireless sets and other equipment, its development of radio-controlled bombs in 1943, its employment of the flying bomb in 1944, its development of jet and rocket-propelled aircraft in 1944 and 1945, in which the Luftwaffe was well ahead of Allied air forces, all go to show that the scientific brain power behind the Luftwaffe was of high quality. Luftwaffe scientists all but staged a German Air Force revival in 1945.

The Luftwaffe did not always rely on overwhelming numbers. In the Battle of the Atlantic less than fifty Focke Wulf 200s did crippling damage to Allied shipping in the period from August, 1940 to April, 1941. It could be said of these German squadrons that never was so much achieved in anti-shipping successes by so few aircraft.

From 1942 onward the Luftwaffe was on the horns of a constant dilemma. It had to build more fighters to meet the growing Allied bomber attacks on the Reich. It had to build more bombers to meet the air-support needs of a three-front air war, particularly the growing ulcer of Soviet resistance. The bombing of Moscow meant that the bombing of London had to be almost stopped. Mediterranean shipping attacks were at the expense of attacks on Atlantic and North Sea convoys and United Kingdom ports. From 1942 onwards Luftwaffe commitments grew, but its available man power and aircraft production failed to keep pace with its war needs.

In the last year or so of its existence, by a huge tour de force in the production and application of new weapons and aircraft, the Luftwaffe made a great effort to restore the air situation. The appearance of jet-propelled aircraft flying at over 500 miles an hour and armed with heavy 30mm. cannon looked as though they might turn the tide for Germany. If the German bomber force had failed in 1943 and 1944 it looked as though the flying bomb, the jet-propelled bomber and the long-range rocket might take their place.

But, in any event, Anglo-American-Soviet air strength was much too great. Both the German jet-propelled program and the V weapon attacks reached only about 25 per cent or less of the planned figure. If there had been a few months' respite for Germany in 1945, if the Allies had been held at the Rhine and Oder, and if bad weather and the need to support the ground battle had clipped the Anglo-American strategic bombing program, the German Air Force might have staged a revival which would have amazed the Allies. But at this stage one is in danger of producing a long series of alibis. If Göring and Hitler had not been its reckless guiding stars, the Luftwaffe in the second world war might have been used with that purposeful economy for which it was famous in the 1914-1918 struggle, when, in spite of a huge numerical inferiority, it managed to give a good account of itself and was in no way responsible for Germany's defeat.

The Luftwaffe is now dismembered and buried, and with it many of the staff controversies and ideas of air operations which belong to the decade which followed the advent of Hitler to power. The work of the Allied Control Commission in Germany was to dismember and obliterate the remains of Luftwaffe equipment and installations. The captured records of the German Air Force will have been noted and then put away in a safe place to be perused only by a real historian and research student. The evidence will have been occasionally conflicting, for personalities and their whims enter so much into staff decisions and often leave an irregular and illogical pattern of events. It is hoped, nevertheless, that the broad lines of this volume have given the reader a fairly just verdict.

THIS DREAD FATE

(Continued from page 17)

west of the Rhine. They captured the Roer dams; they captured Cologne; they burst through enemy positions on the Moselle, and into the Saar. First Army troops trotted dry-shod across the Rhine at Remagen. For the first time since the days of Napoleonic conquests, invaders had swarmed over Germany's great natural barrier in the west.

Now the isolation of the Ruhr, with its surviving coal and industry, was immediately necessary. By March 24th, the Ruhr district was completely circled by a ligature consisting of broken bridges, sunken traffic spans, pulverized and twisted railroad tracks. The largest marshaling yards which might have carried traffic to sustain the Ruhr were so badly torn up that American strategists rubbed those names off target lists. The much-vaunted motor highways were thronged with frantic, ragged mobs of footsore refugees.

Both the Eighth and Ninth Air Forces plunged to the kill—not against the gangs of luckless civilians who darkened the roads—but against immobilized groundlings who had once ruled the air of Europe: Messerschmitts, Focke-wulfes, Heinkels, Ju 88s—planes which patterned their swastikas side by side at every air base in the Reich. It was an orgy of destruction necessitated by the exigencies of war, and if anyone doubts the enthusiasm with which our fighters and our mediums and our heavies alike sped to the task, he should have had a look at those German air fields.

Planes lay like moths with their bodies burned out against a hot light—silver fragments surrounding an ashy lump that once was a metal thorax of a dangerous enemy. Wagner never composed a death song to fit this widespread and summary cremation, but most assuredly it was the twilight of German air iniquity. In eleven days of early April the Eighth Air Force destroyed one thousand seven hundred and twenty planes on the allegedly sacred soil of the Fatherland. The Ninth Air Force destroyed one thousand and ninety-one in a fortnight. Men whose business it is to recapitulate the total of such losses rubbed their eyes; at the request of Intelligence they arbitrarily carved ten per cent from the total figures announced. They couldn't believe it; it was too good to be true. But it was true.

I flew with the 305th Bomb Group (H) in 1943. In 1945 I was permitted to accompany bombers of the same Group on a number of the final missions against Germany. The experience was a far cry indeed from the operations in which I participated two years before. The bands of enemy fighters who had lurked like Sioux Indians among the hills of stratocumulus in 1943, were nonexistent. Flak came up in feeble blots, accurate enough but not in sufficient quantity to be more than a petty annoyance to most of our crews. It was only a black whisper, a puny relic of that antiaircraft defense which at its peak had occupied the time and energy of at least one million seven hundred thousand Germans, and thus removed them from any aggressive effort in other capacities.

My last ETO mission was flown on Friday, April 13th, a bad luck day for almost no one except the Germans. We went to Neumunster, and we and other groups plastered the railroad lines leading south from Kiel. We were attacked by not one enemy fighter. A little flak puffed up, far wide of the mark, as we crossed the battle lines on the way home. We arrived at our British base with not one scar of battle damage on any plane; not one red-red flare fired to announce the presence of wounded aboard a plane; and that on a mission where our Group alone had put as many B-17s into the air as our whole combat wing used to put up in 1943. The German air force was beaten to a resistless pulp and so were the ground defenses. Three days later, General Carl A. Spaatz announced the end of strategic bombing in the European theater.

(Continued on page 62)

THIS DREAD FATE

(Continued from page 61)

I went back to Germany in a little unarmed C-45. For days we flew the length and breadth of that once dangerous lane, sometimes literally weaving our way among the charred chimneys of burnt-out factories. We saw a panorama of destruction which suggests the most lurid pages in the most fantastic of H. G. Wells' novels. Certainly nothing like this had ever been seen before. Ludwigshaven and Mannheim were gaunt, dry racks of fire-stained bones; debris clogged the cities' streets in ugly windrows sometimes five stories high.

War might be more pleasant if every bomb landed upon an essential military objective. Unfortunately for the civilian population, we might not always achieve such humane results. Area bombing by the RAF accomplished important destruction of military targets; but certainly a multitude of men, women and children—Germans and foreign slave laborers alike—were killed in the process.

Nor could American bombardiers invariably ring up a hundred-per-cent score in bomb patterns. Many salvos were bound to go wide of the mark; and then the dust and smoke drifted above a mangled carpet of humanity as well as above wrecked factories and railroads. When we attacked certain German cities we did so because of the industrial bull's-eyes contained in them. It was not our purpose to terror-bomb a noncombatant population, but a vast number of civilians in enemy towns were wiped out nevertheless.

This is no time for gloating over the collapse of a treacherous, bullying foe. It is instead a time for the most solemn appraisal of the means by which this dread fate was accomplished. In fervent testimony, General Eisenhower lifted a verbal toast "to the air forces, without whose great services all else would have been futile." No whit less convincing were the declarations of the conquered. After their capture, Goering, Von Runstedt and Von Kesselring all flatly insisted that allied air power was chiefly responsible for Germany's defeat.

Soon after he took office, President Truman stated that he believed in a strong and wise peace—not an insipid reversion to the notion that able armies necessarily breed dreams of world conquest and sadistic ambition. Judged by the Chief Executive's attitude displayed in his recent budget message to Congress, his ideal is unimplemented by act: a prettily decorated basket containing too little provender to sustain our fading strength. The eagles which pecked the life out of the Nazis have had their talons clipped and their feathers shorn away.

Already incapable of successfully resisting an assault which it would be wholly possible for an enemy to bring against us, we pick our way miserably into the forest of the future. We dare not estimate what beasts may be lurking amid those thickets where we have not yet walked. Our pioneer fathers had a dream when they turned their wagons to the West; but they had Kentucky rifles, too, just in case.

Air power is still the most wicked tool of warfare, despite all talk of rays, death-dust, germs and biologicals. It must be remembered that the only successful wartime application of atomic energy for military purposes came when it served as an adjunct of air power. The suitcase warfare, glibly prated about across America's bridge tables, has as yet no historical foundation; it was not the Navy nor was it Jeb Stuart's cavalry which hurled that nasty missile at Nagasaki.

No wonder those of us who saw the blasting of Europe by orthodox high explosives of the past, get up out of our beds at night and go restlessly to the window and smoke another cigarette. Air power might become in our hands the most compelling implement for peace ever devised. For the love of God, let us speed to sharpen the weapon our dawdling illusionists are now willing to let rust beyond redemption. Perhaps there is yet time; there will not always be.

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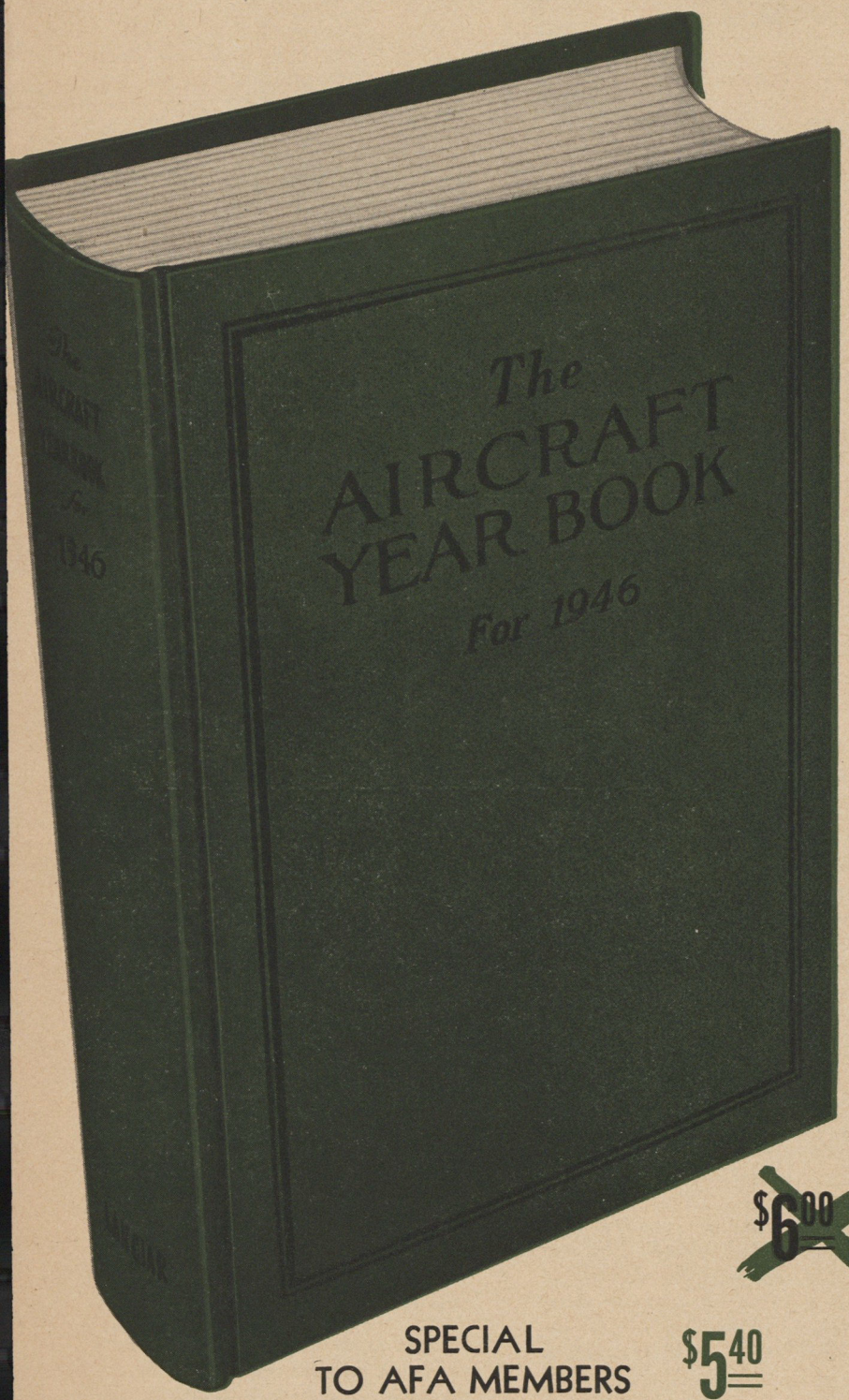

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PLANE BONERS

Analyzed by Veteran Pilots

A pilot in a P-51 was No. 4 to land from a flight of seven planes. The three planes which landed ahead cleared down the runway, but the No 4 pilot elected to turn off at the first intersection. However, he was going too fast when he unlocked the tailwheel and the Mustang turned through 180 degrees on the runway. Since another P-51 was on the approach, the pilot applied power in an effort to turn off the runway to the taxiway. The airplane nosed up and received major damage.

Comment: This pilot's few simple mistakes added up to a major accident. First, he did not follow his leader down the runway and, second, he attempted a turn while rolling too fast. Then, when he applied too much power, the Mustang nosed up. If they are to fly safely, pilots must realize what reaction to expect when they subject their equipment to unorthodox manipulations.

The first two A-26s of a three-plane formation landed without difficulty, but the third Invader came in for a perfect wheels-up landing. After the plane was hoisted and the gear handle placed in the DOWN position, the wheels extended and the plane was towed to the ramp.

Comment: The tower operator on duty at the time of the accident could not see whether or not the gear was extended. However, it was not his responsibility to make the necessary checks. The pilot failed to place the gear handle in the DOWN position and did not make the required "gear down and locked" check. This airplane suffered extensive damage as a result of the pilot's lapse of memory. Before-landing checks must become habit if they are to be effective. Check and double-check. It pays off.

A pilot in a PT-13 attempted to taxi from a concrete runway to a grass landing strip which was separated from the runway by a shallow drainage ditch. The sides of the ditch were muddy from recent rains. He applied power to help the plane up the slope on the other side of the ditch as the wheels began to slide sideways on the downslope. He cut power immediately, but the trainer nosed up because of an accumulation of mud in front of the wheels.

Comment: Pilots have been told time and again about the hazards of taxiing over terrain that has not been inspected carefully. In this case, there were two other taxi strips available for use in wet weather, but the pilot took the short cut. Much expense and many hours of labor can be avoided if pilots will remember a few elementary rules concerning safe operations.

While on the landing roll, the pilot of a C-45 noticed that the right brake was weak. He stopped on the end of the runway and called the tower for assistance. Without waiting, he attempted to taxi on the perimeter track and the right brake failed completely. The airplane swung to the left and crashed into a sodium light. The aileron, fuselage, and horizontal stabilizer were damaged.

Comment: Here's a pilot with more than 1000 hours who should have known better than to taxi an airplane with defective brakes. However, he was too impatient to wait for assistance and an accident resulted. The only safe procedure to follow in a situation like this is to call for a tow and wait.

A pilot and copilot were taking off in a B-25 with a crew chief kneeling between them. Just before the Mitchell became airborne, the crew chief noticed a movement of the pilot's hand which he interpreted as the "gear up" signal. He could not see the ground, so he pulled the landing gear lever to the UP position. The B-25 settled on the runway and skidded to a stop on its belly.

Comment: It isn't always the pilot who causes an accident, but some part of the blame usually can be traced to him. In this case, the crew chief actually pulled up the gear without receiving a direct order. AAF Regulations require a voice command in addition to a hand signal. However, the accident might have been avoided if the crew chief had been briefed properly about when to retract the gear. Instead, he assumed the pilot wanted the gear pulled, and a costly accident resulted.

GUIDED CONTROL

(Continued from page 51)

grated acceleration, which is the velocity, reached the critical amount, control valves were actuated to shut off the fuel and the thrust, thus insuring the correct final velocity.

The V-2 is an example of a missile which is navigated or controlled entirely by internal means, requiring no information transmitted from the ground. This is a most desirable design characteristic, making the rocket entirely independent of radar or radio communication channels which are always susceptible to jamming or interference. However, dependence upon a dead-reckoning type of internal control has its disadvantages, the principal one of which is the difficulty of obtaining a high degree of accuracy. Dependence is placed on gyros, which are never drift-free, and the effects of atmospheric vagaries can only be estimated at best. Needless to say, the development of this type of internal control for the long-range ground-to-ground problem will form one of the major problems for future research in the navigation of both occupied and unoccupied aircraft and rockets.

Guiding a missile to a moving target is one of the most difficult and fascinating of control problems. In the control of conventional antiaircraft artillery, the intended target is observed for a short period by optical or radar tracking so that its position, course, and velocity can be determined. With these quantities and knowledge of the ballistic properties of the gun and projectile it is possible to compute the direction in which the gun must be pointed at any given time. Unfortunately, the preliminary observations are often inaccurate, and more distressing still, the intended target may not continue in the expected flight path. The best that can be hoped for is the arrival of a few of the shells in the vicinity of the target. If the projectile could be guided after its release on the basis of later tracking information, the probability of a hit could be increased tremendously.

In general, a scheme could be imagined in which a stabilized and guided rocket or jet-propelled aircraft is launched toward the point in space calculated to obtain a collision with the desired surface or air target. The missile would fly stably toward its destination without outside assistance by the use of the type of controls already described. This ability of the missile to maintain its own internal stability, free from hunting or oscillation about any of its axes, will probably be a required characteristic for successful tactical flight. By observation of the missile and its target during the time of flight, information to change the trajectory slightly on the basis of refined estimates of the expected collision point could be transmitted to the missile through a radio or radar communication channel.

Such a system for antiaircraft use has been disclosed as a German development. A rocket-propelled missile carrying internal flight controls and signal-receiving gear could be launched toward an air target. Optical trackers would follow it in its flight and transmit path change signals to it. It can be imagined, of course, that a device of this sort might be designed to have homing characteristics by the inclusion of a sensitive head based on radar or other principles. In this way the navigation system would be required only to guide the missile to the vicinity of the target in such a way that the homing mechanism could control the critical portion of the course.

Speculating further, we encounter the problem of developing a device to combat or neutralize enemy rockets. The ground-to-ground missile is a potentially powerful offensive weapon and is doubly dangerous until a countermeasure is developed for it. If an enemy missile of a type which is not jammed by any known means approaches a vulnerable target from high altitude at higher than gun projectile speed, the only solution is to shoot it down before it arrives at a dangerous zone. The V-2 on its downward flight reaches a speed of approximately 5,000 feet per second. To fire at it with an artillery shell which moves much more slowly at the high altitude where the encounter takes place would be hopeless.

It is conceivable that an interceptor type missile might be developed which would obtain a hit, but on further consideration we come upon a baffling array of formidable engineering problems. First of all, warning of the approach of the missile must be obtained at ranges greater than those of present radar sets to allow time for defensive action. Position data on the enemy missile must be obtained and assimilated in a control center. Then a guided missile must be fired which reaches a higher velocity than its target and which has a comfortable margin of maneuverability over the enemy missile. The control mechanisms, both in the interceptor and on the ground, must be swift and accurate. Above all, there is not a single second of time to be lost.

Solutions to these problems can be demonstrated singly in some cases. To bring them all together into a cooperative system even on a proving ground basis will demand tremendous efforts.

CREDITS

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Proven Worth

Gentlemen:

My impression of the AFA was to help keep the "Old Gang" together and in the event of more trouble there would be a group of men with knowledge of most of the latest equipment and methods, to go forward en masse and again demonstrate to the world our air supremacy.

If this is the policy of AFA's magazine then I advocate a change in order to keep up the enthusiasm among the AAF mechanics. To do this I would suggest adding a few pages to the magazine, devoting them entirely to engineering, design and maintenance.

I have acquired the impression after reading several issues that the major part of the magazine is reserved for and devoted to "men with wings." Consider the fellow on the ground. During the war he proved his worth and the magazine should also help him to keep abreast in the field.

Leonard R. Hill
80 Oak Street
Lexington 73, Mass.

The editors of AIR FORCE *magazine have tried consistently to avoid featuring any single type of air force activity to the exclusion of any other. It most certainly is not a book devoted exclusively to "men with wings." Departments such as "Tech Topics," articles such as "In Line of Heavy Duty," page twenty, are featured specifically for the purpose of keeping ground personnel informed of developments in the field.*

Rusty Lads

Gentlemen:

Really, someone should write an article for former pilots, entitled "How to Retain What You Once Knew About Flying." Our Air Force could have the most ultramodern planes in the world but when the real showdown comes, who will fly this equipment?

Somewhere along the line of "Red Tape" there seems to be an oversight. My question is, why aren't there more facilities for keeping our hands on a stick? I live in Baltimore, one of America's leading cities, and all we have here is one Air National Guard Squadron for fighter pilots only. I belong to the Air Corps Reserve but in order to fly in that outfit I'd have to travel many miles to the nearest base. It appears to me that I'm not the only one in this fix, and I imagine it is true in most cities, both large and small. I firmly believe our Air Force should take more expanded steps toward keeping its so-called "valuable flying personnel" up to date. I, for one, would like to see some "brass hat" adopt a slogan like "Let's get our former Fly Boys Back Into the Air," or at least words, plus actions to that effect.

W. Stewart Thomas
Terrace Dale
Towson 4, Md.

Neither brass hats nor red tape is responsible for the deplorable lack of flying facilities for reserve pilots. The AAF which spent millions of dollars training Air Force personnel for World War II would like nothing better than to protect the investment by keeping the air reserve in fighting shape. But without money from Congress, its hands are tied.

New Uniforms

Gentlemen:

Now that a separate Air Force is almost a foregone conclusion, I would like to see the AFA through its membership, take action of some type to prevent our new Air Force from adopting a gaudy uniform covered with tin, brass, etc.

We had a tendency during the late fracas to hang ornaments, decorations and insignia all over our blouses. And to make it worse, I have noticed all Army personnel within the last few months decked out with two sets of collar ornaments.

The Royal Air Force uniform is good-looking and dignified. Why can't we adopt a uniform on the same order. Eliminate all brass insignia such as the "US" and branch insignia. There should be no metal on the uniform whatsoever. All rank insignia along with ribbons should be sewed on.

Deane R. Brandon
S/Sgt., AC Res.
609 Clayton St.
San Francisco, Calif.

Headquarters AAF says that it has no intention of adopting a gaudy or brass-splattered uniform—that when autonomy is achieved, consideration will be given to a "distinctive uniform, but one which does not violate good taste."

WHO'S WHO

(Continued from page 46)

in the forested area."

It must have been a good landing, though, because he wound up with hardly a scratch, and climbed out of the wreckage of his P-47.

He was hiding in a clump of bushes when the Nazis caught up. "My boots had rubbed blisters on my heels. I couldn't run, so there was nothing to do but go along with them."

After the usual interrogation, during which the Nazi intelligence officers said, "Where have you been, we've been waiting for you a long time," he finally landed at Stalag Luft 1. He remained there for nine months until the Russian forces arrived.

After returning to the States, Colonel Gabreski was stationed at headquarters of Air Matériel Command, Wright Field, Ohio, as chief of the fighter test section. First thing he did when he got home was to look up and marry his long-time sweetheart, Miss Catherine Cockrane of Prairie du Chien, Wisc.

When he left the service, Colonel Gabreski had amassed the small total of 218 points. His decorations include the Distinguished Service Cross, two Silver Stars, the Distinguished Flying Cross with nine clusters, Air Medal with four clusters, Bronze Star, British DFC, Belgian Croix de Guerre with palm, Polish Cross of Valor, French Foreign Legion of Honor, and French Croix de Guerre with palm. He is a lifetime member of the Army and Navy Legion of Valor.

Gabreski believes there is a great future for aviation, thinks that its potential has hardly been scratched. In his opinion commercial aviation and private flying have won their place in American life, and that within not too many years both will rank as major industries.

An active leader in the Air Force Association from its inception, "Gabby" is serving not only as State Wing Commander in California, but also as a council member for the energetic and fast-growing Santa Monica Squadron. It was this squadron which sponsored the recent and highly successful Los Angeles AFA Rally.

"The Air Force Association, composed of men and women who know from firsthand experience the importance of air power, and its relation to national security, can play a very important role in the welfare of our country," Gabreski says. "We could not have won the war without air supremacy, and I think it's our duty as air force veterans to see that our country stays ahead in the air, for the nation that does will keep its integrity and its freedom."

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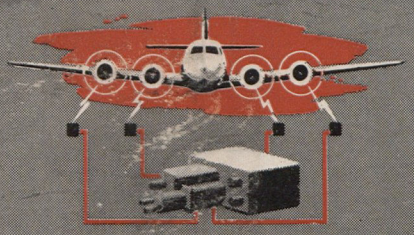

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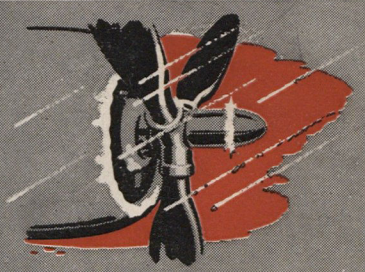

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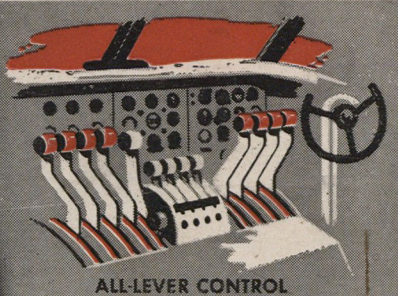

ALL-LEVER CONTROL

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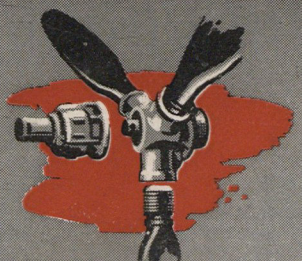
MR W HECKATHORNE
ROUTE 3
BEAVER FALLS PA

ALL-TEMPERATURE RELIABILITY



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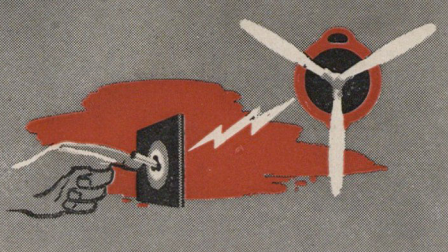

FLEXIBILITY OF ELECTRICAL CONTROL