AIR FORCE

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

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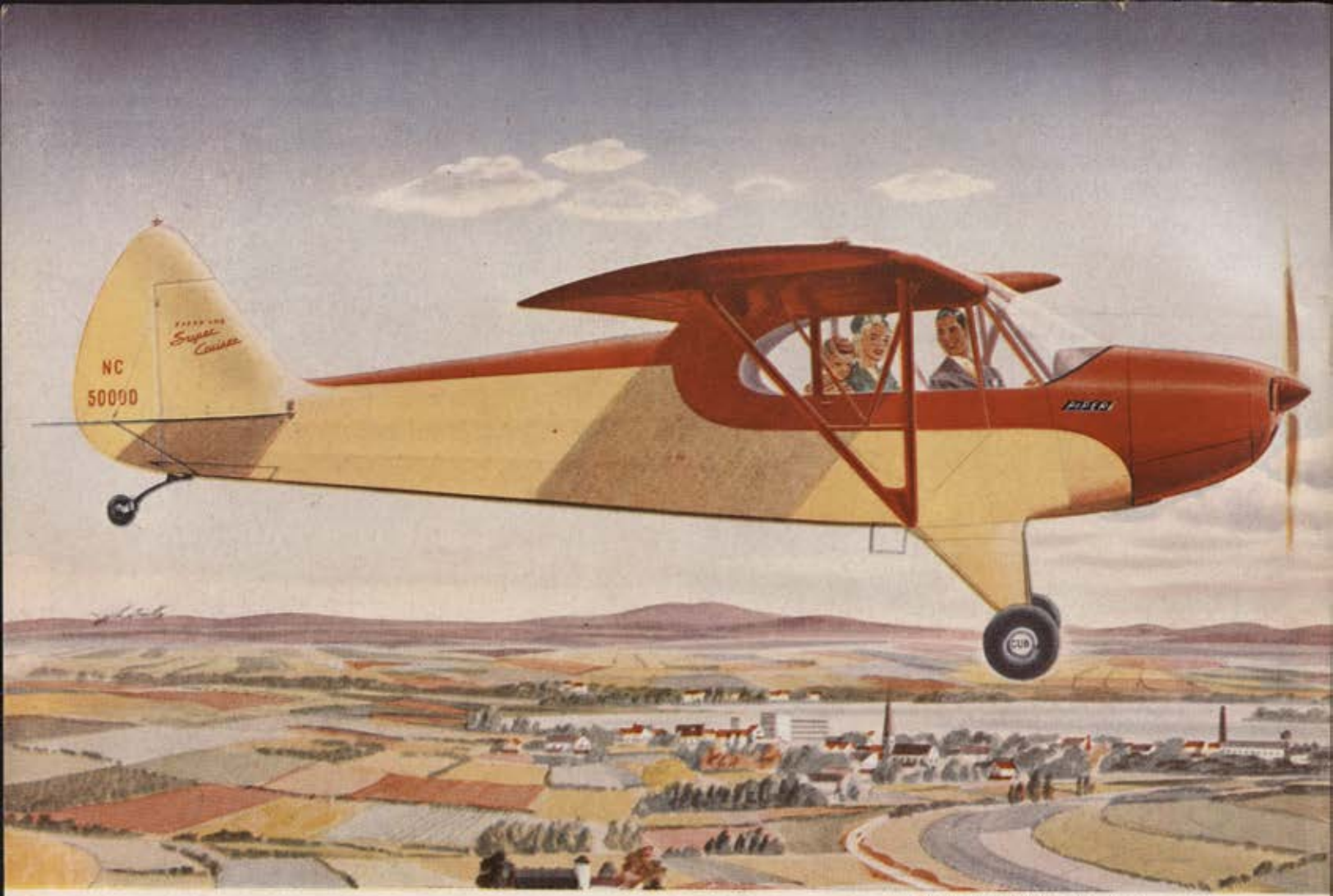

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VOL. 29 NO. 7 AUGUST, 1946

AIR FORCE

OFFICIAL JOURNAL OF THE AIR FORCE ASSOCIATION
National Headquarters, 1603 K St., N.W., Washington 6, D. C.

CONTENTS

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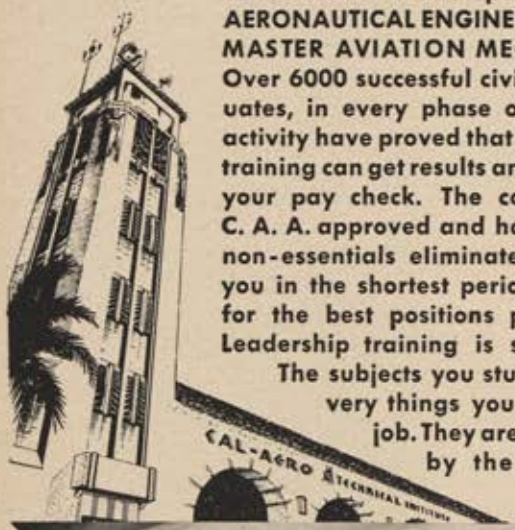

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UNDER PERSONAL SUPERVISION OF MAJOR C. C. MOSELEY, PRESIDENT AND FOUNDER SINCE 1929...ON OUR OWN HUGE AIRPORT—IN HEART OF THE AIRCRAFT INDUSTRY

In This Issue

The pretty lass on the cover is a member of the British land army who was caught in the lens of AAF Photographer Ben Rosenblatt's camera before he left the ETO. Ben did a long tour with the 8th Air Force and some of his aviation pictures appeared in leading magazines throughout the war. A few days prior to flying home, Ben paid a farewell visit to some of the air bases in East Anglia. There wasn't much left to see at these once-bustling aerial springboards to Hitler's European fortress. In a countryside that once shook with the constant thunder of vast bomber fleets, farmers and the land army girls quietly gather the crops, with only a few abandoned Flying Fortresses to remind them of the hectic period before V-E Day.

Fun on Floats

When we decided to do a story about float-plane flying (see Fun on Floats page 28) the most logical man to write such an article was Robert S. Fogg. Major Bob is just out of the Army Air Forces for the second time. He was a retread in this war, having flown for the Air Corps in 1918. After receiving his discharge at the end of World War I, Fogg wangled some financial backing from John Winant, our recent Ambassador to England, and purchased several surplus Navy planes. With these he started America's first seaplane charter service. During the years immediately preceding Pearl Harbor, the Civil Aeronautics Authority asked him to lay out a chain of some 300 seaplane bases stretching across the country. While working on this ambitious project Fogg acquired a firsthand knowledge of practically every body of water on the continental United States. At present he is an executive of the Edo Aircraft Corporation.

Rotary Wings

To the growing literature on rotary wing aircraft, Devon Francis has just added an exhaustive study entitled The Story of the Helicopter. Francis is one of the nation's ablest aviation journalists having served as aviation editor of the Associated Press and as a charter member and president of the Aviation Writers Association. He has been watching helicopter evolution for many years and still fumes when less-informed writers paint glib word pictures about the imminence of eggbeaters in every garage. One day he read a particularly fanciful but highly inaccurate magazine story about helicopters. Then and there Francis decided to blow his top—literarily so to speak. The Story of the Helicopter is the result. You'll find a digest of this authoritative work on page 24. Francis is now an associate editor of Popular Science Magazine where he is keeping an eagle eye on other aviation developments.

PRO School

Now that the AAF is operating a seminary for public relations officers (see PRO School on page 36) we think it appropriate to extend a belated salute to this much-abused clan. During the war, the lot of the public relations officer on combat bases was not always an easy one, what with censorship, unsympathetic correspondents and lack of coöperation by some of the high brass who seemed to have a congenital distrust for all newspapermen. Fortunately, the high command of the Army Air Forces has always appreciated the value of a sound public relations program and the indoctrination now being given PROs at the Staff School at Orlando indicates there will be even closer liaison between the AAF and the public in the years ahead. Throughout the war, the staff of AIR FORCE has leaned heavily on the PROs for assistance in reporting the story of American airpower. With few exceptions, the AAF's public relations officers and enlisted men did a splendid job. We would like to mention all the PROs who were particularly helpful to our magazine—men such as Max Boyd, Clarke Newlon and Sam Taylor of USSTAF; Tex McCrary and Ned Root of MAAF; Bill Westlake and Art Ennis at Headquarters; Jock Whitney, Les Lear, Ben Lyon and Bill Laidlaw of the 8th; Hal Leyshon, Revis O'Neal, Ben Wright and Bill Nuckols of the 9th; Rod Southwick and Dick Krolik of the Far Eastern AF; Bob Wistrand of the 5th; Joe Stehlin of the 13th and Bob Hotz of the 10th. This is a fragmentary list at best—there were many more, and to all of them we offer our sincere appreciation.

John Paul Andrews, executive editor of AIR FORCE and winner of a TWA award for his feature articles on air transportation, gives valuable pointers for the air veteran who plans to make a career of aviation in "Anytime, Anywhere Airlines" September issue.

test pilots on the ground

Telemetering — the instantaneous transmission of flight information to instruments on the ground — has opened new fields for obtaining scientific data on objects in flight. Whether piloted or pilotless, their exact behavior can be accurately determined during the entire flight, providing the engineer with information for further research and development. Combined with newly developed electronic control devices, this achievement of Curtiss-Wright research represents another advance in the era of supersonic flight.

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A.F.A. NEWS

World's Greatest Air Force?

"There are some persons who want to see disagreement between the Army Air and Ground Forces in an effort to maintain the present separation of the Army and Navy." These words, spoken by W. Stuart Symington, could scarcely be described as the keynote of the meeting but they fell on 700 receptive ears in Baltimore, Maryland, Friday, June 21, on the occasion of the first AFA Eastern Regional conference.

And this was not all the Assistant Secretary of War for Air had to say on the subject of unification. For example:

"Nine years ago, the chief of staff of the Army set the range of the airplane at 300 miles, the distance from Detroit to Louisville, to the delight of the Navy.

"A great military figure, who has gone to his reward, due perhaps to premature senility, stated that 'no airplane could win a battle.' Yet the Air Forces took Japan with its army in the field still intact. The problem of the Air Forces today is to get that message across to the people, so they can pass it on to Congress. The Air Force's future depends on the amount of money appropriated by Congress, and it is up to the people to let the Congress know how they feel about air power.

"We want and need a separate air force, coequal with the Army and Navy under a unified department of defense.

"The future of the Air Force is right here . . . you know the value of air power and it is up to you to inform the other people of its value."

General Spaatz, introduced at the meeting as the head of the greatest air force in the world, significantly qualified the introduction with the amendment "What *was* the greatest air force in the world."

Baltimore Charter

At the same meeting AFA president J. H. Doolittle presented John R. Mitchell, Squadron Commander with the charter for that city's No. 1 Squadron. Other officers are John Marshall Boone, Vice Commander; Stanley Fisher, Secretary; Julian A. Devereaux, Corresponding Secretary; and Samuel Hecht, Treasurer. Lewis M. Hess, Jr., Emmet C. Mac Cubbin, H. Riall Jackson, Mendes E. Morstein and Victor H. Poole make up the executive staff.

The Baltimore meeting also produced several hundred new AFA members and served as a trial run for other Wing and Squadron activations. Among those present in the role of observers were Casey Jones of the Casey Jones School of Aeronautics, Newark, New Jersey; James D. Landauer, Scarsdale, New York; William L. Day, Devon, Pennsylvania; Edwin E. Aldrin, Newark, New Jersey; Frank A. McHugh, Wilmington, Delaware; Colonel Robert L. Copsey, State Aviation Director for New Jersey; and Lewis F. Powell, Jr. of Richmond, Virginia.

Baltimore occupied the lead squadron position in AFA activities this month but other state and local elements were keeping in close formation.

Gen. Spaatz commissions Glenn Miller orchestra as the official AFA band. Tex Beneke (left) succeeds Don Haynes (right) as leader.

Montana Harvest

Wheat comes first in Montana, but as soon as the harvest is over Thomas D. Campbell will be host to an AFA powwow on his farm, one of the state's largest. "I thoroughly agree with you in regard to the need of the Association," writes Mr. Campbell in a letter to President Doolittle, "and greatly appreciate the benefits which will come from the organization of such a group of men."

Summertime in the Rockies

Thomas G. Lanphier, Jr., of the Idaho *Daily Statesman*, has taken to the air for a reconnaissance tour of Utah, Nevada, Wyoming, and the Dakotas. His target, 5,000 new AFA members. Lanphier is a member of the temporary Board of Directors now governing the national organization.

Spokane Speaks

"Thanks for the membership blanks," writes W. H. Truman of Spokane, Washington, "but why be stingy? They lasted just five minutes. I am interested in boosting the game by instituting a local Squadron. Please send me details."

(AFA headquarters, 1603 K Street, NW, Washington, D. C., has sent a complete kit on procedure for establishing a squadron. If you too are interested, write to 1603 K Street, NW, Washington, D. C.—Ed.)

A.F.A. Band

Shortly after D-Day, Major Glenn Miller of the AAF took off for a routine flight from England to France. His airplane never reached its destination and Miller and his companions are believed to have gone down into the icy waters of the Channel.

Last month at a special ceremony at Pottstown, Pa., home of General Spaatz, the Glenn Miller orchestra, composed of AAF veterans, was commissioned the official band of the Air Force Association. Major Miller organized a new orchestra soon after going into uniform, recruiting personnel from AAF ranks. During the war the band brought entertainment to hundreds of AAF installations and compiled a record of more than 15,000 flying hours. General Eisenhower awarded the band the Presidential Unit Citation. Members also received the Battle Participation Star for Northern France.

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Bill Eberhart, president of Louisiana Aircraft, operator Municipal Airport, Baton Rouge.

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Rendezvous

56th Flies Again

Dear Editor:

I read recently that the 56th Fighter Group has been reactivated. Do you have any further details?

Lt. S. W. Taylor,
New York City.

The famous 56th which probably destroyed more German aircraft than any other American fighter group in the ETO is now being reformed at Selfridge Field, Mich., under the command of Col. David C. Schilling. AIR FORCE *hopes to publish a complete report on the 56th's reactivation in an early issue.—Ed.*

Locate Your Friends

Dear Editor:

Congratulations on a swell reconversion job. The civilian version of AIR FORCE Magazine is tops. I would like to make one suggestion—why not start a sort of locator department in which ex-Air Corps buddies could get in touch with each other. Some of the magazines did this after the last war and it proved to be a real service to veterans.

Fred Wolanski,
Ex-Sgt. 5th Air Force.

AIR FORCE *appreciates Mr. Wolanski's suggestion. Requests by readers for information regarding the whereabouts of former friends in the service should be addressed to* RENDEZVOUS.—*Ed.*

Invader vs. Mosquito

Dear Editor:

Recently I ran across some statements regarding the relative speeds of the A-26 Invader and the British Mosquito.

I have decided that now is the time for all good A-26 crew chiefs to come to the defense of their ship. I was an Invader crew chief for almost a year and a half and if our British friends think the Mosquito can out-race our A-26s I'm afraid they are sadly mistaken. We had P-51s with us on our training missions and the fighter pilots all said that the A-26 could hold its power longer than the in-line engine on the Mustang. It seems reasonable that the Pratt and Whitney engines on the A-26 are a bit better than the in-lines on the Mosquito. The Mosquito is made of plywood while the Invader is exceptionally heavily armored. Thus the British plane should be able to run away from the Invader.

The fact that it can't proves the difference in the engines. I know the A-26 doesn't cruise too fast but after you get it above 30 inches—hang on to your hat.

Tom Hughes,
Cliffside Park, N. J.

Deliberate Crashes

Dear Editor:

Some time ago it was suggested that a very useful purpose to which the thousands of surplus aircraft could be put was to crash them deliberately in order to study the problems of fire following crash. The idea was very well received throughout the industry and CAA developed an excellent program which was submitted for approval. There has been practically no publicity given to the fact that the whole program has been turned down. Admittedly, the program would be expensive (this was the reason for turning it down). However, there will never again be another opportunity to conduct such research as inexpensively as it could be done at present.

The worst accident in the history of our domestic airlines, to date, cost 27 lives. Sixty-passenger transports are now common on our airlines and within a short time, 100-passenger transport will be just as common.

In the case of DC-3 aircraft, approximately 50% of the serious accidents resulted in fire following crash. In these fire-following-crash accidents only about 20% of the persons involved survived. Yet in those serious accidents in which no fire occurred, 50% of the persons involved survived. In order to gain some idea of the part that size, weight, and the amount of gasoline carried plays in the likelihood of fire following crash, we should note that in non-airline flying, less than 8% of the serious accidents result in fire following crash. What will happen when the size is increased from 21-passenger equipment to 100-passenger equipment, we can only guess.

In view of the above facts, it seems an almost criminal waste to break up surplus airplanes into scrap metal when they could serve such a useful and valuable purpose. The test program would be expensive, but in view of its value and the fact that the aircraft to be used would otherwise be scrapped, serving no useful purpose, the possible return on the investment to the Government, the manufacturers, the airlines and the public would be tremendous.

Edward B. Heyl,
Engineering Dept.,
AERO Insurance Underwriters,
New York City.

Personal Planes

Dear Editor:

Your story on new personal planes in the July issue was good except for some glaring omissions. What about such planes as Ercoupe, the Stinson Voyager and the Seabee, to mention a few?

Henry McEvoy,
San Francisco, Cal.

AIR FORCE's *monthly review of personal planes, because of space limits, necessarily is confined to newly announced designs or those models undergoing modification.—Ed.*

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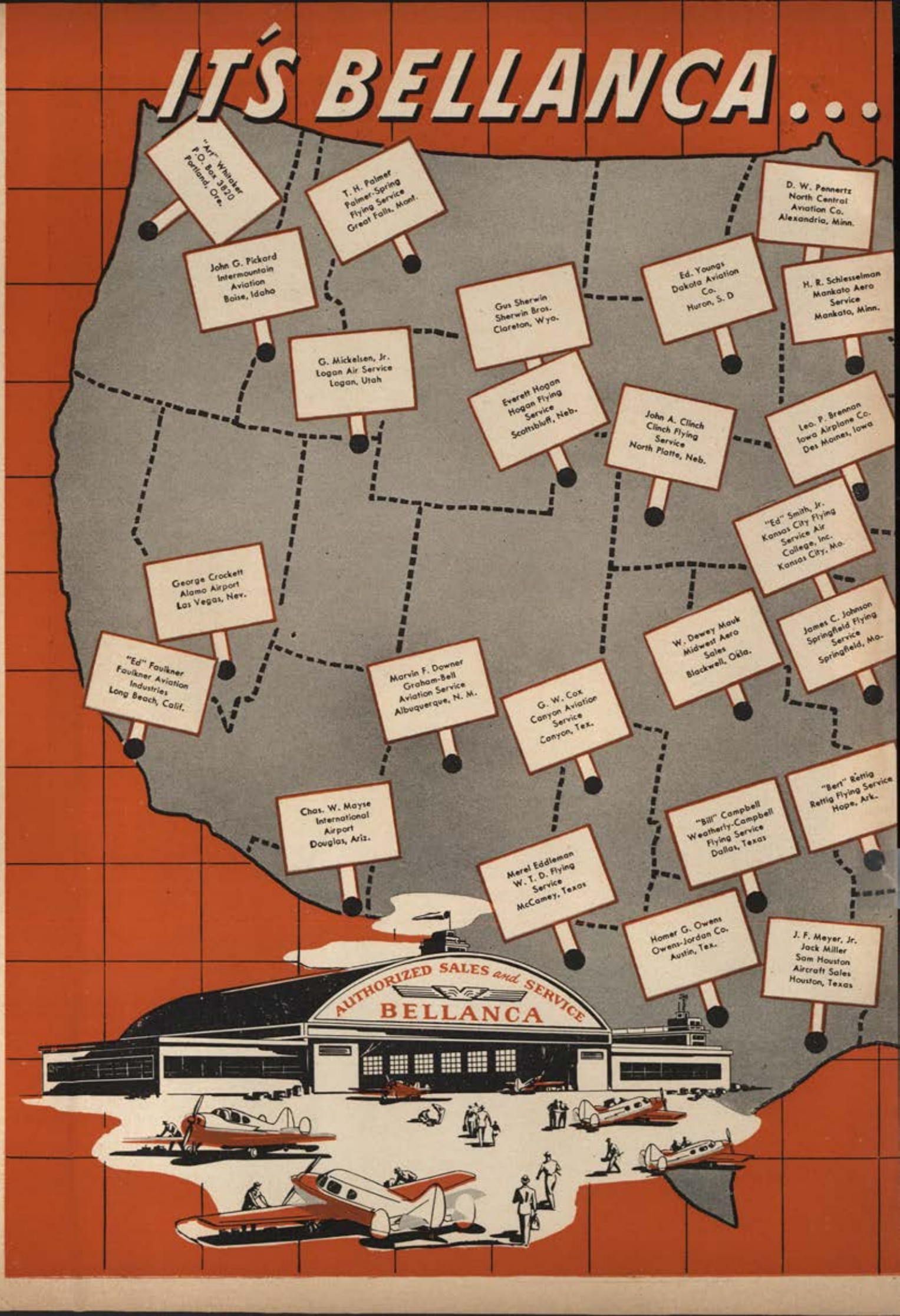

Coast to Coast!

Owners of the new Bellanca Cruisair Senior are assured of the best service by the nationwide Bellanca distributor organization. Under each authorized distributor named on these pages, there will be a network of accredited Bellanca dealers. Located on airports from coast to coast, these men of long standing experience and their staffs of experts, will render Bellanca owners complete and dependable service. Write your nearest Bellanca distributor regarding a demonstration flight, or communicate direct with Bellanca sales headquarters . . . Bellanca Aircraft Corporation, New Castle, Delaware. Dept. 000.

The new 1946 Bellanca Cruisair Senior is the most recent in a long line of historic Bellanca thoroughbreds reaching back to 1907. The four-place Cruisair is outstanding for its inherent stability, reliability and ruggedness — its remarkable 150 mph cross-country cruising performance and economy.

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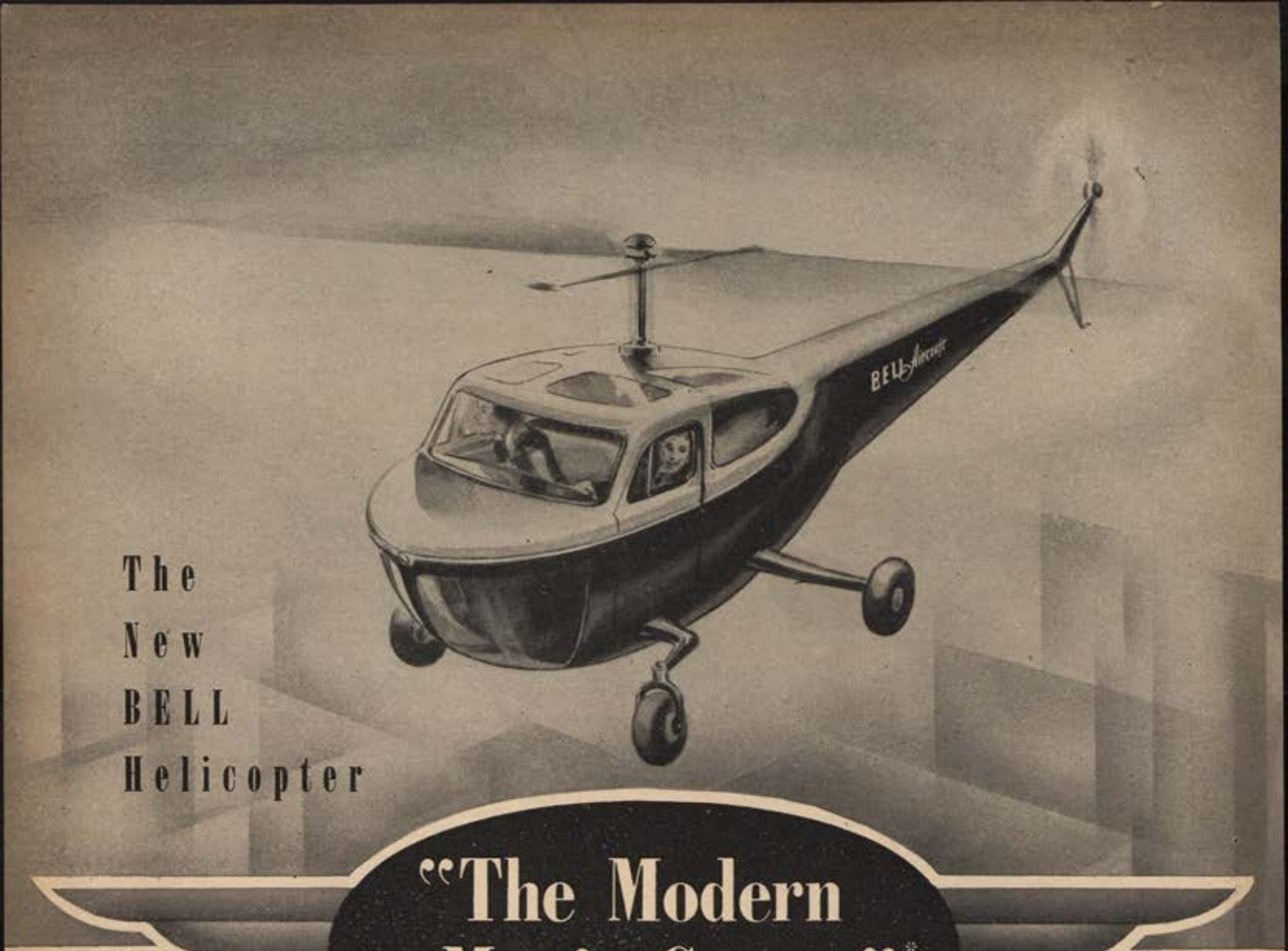

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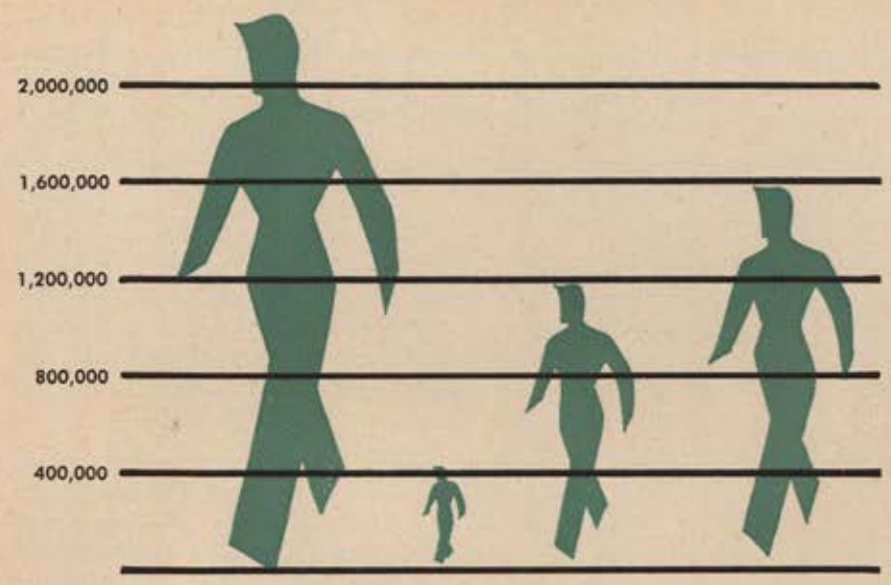
Minute Men of the Air

BY ERIC FRIEDHEIM

THOUSANDS of Air Forces veterans who volunteered for duty in the Air Reserve will be back in uniform before the summer of 1947. Their tour will be short—fifteen days to be exact—but the AAF High Command is moving rapidly to revitalize our military airpower which has shrunk to such an alarming degree that only a handful of squadrons can be classed as fit for combat at the present time.

According to Lieut. Gen. George B. Stratemeyer, the AAF must have a minimum of 1,500,000 trained officers and men to meet our national security commitments in peacetime and discharge our obligations to the United Nations organization. Under the peacetime structure of the AAF, Stratemeyer's Air Defense Command is responsible for the air defenses of the United States, the training of the Air Reserve, and the supervision of training of the Air National Guard.

Mindful of the fact that a few months before Hitler marched into Poland the Army Air Force had fewer than 3000 officers on its reserve rolls, of whom only 1500 were Class 1 pilots, military planners are determined to avoid any similar de-



Wartime peak for U. S. Army Air Forces was 2,400,000. Peacetime Regular Army Air Forces will be 400,000; Air National Guard and Air Reserve, 1,100,000; Army Air Forces troop basis: 1,500,000 men.

terioration of American airpower in the years to come.

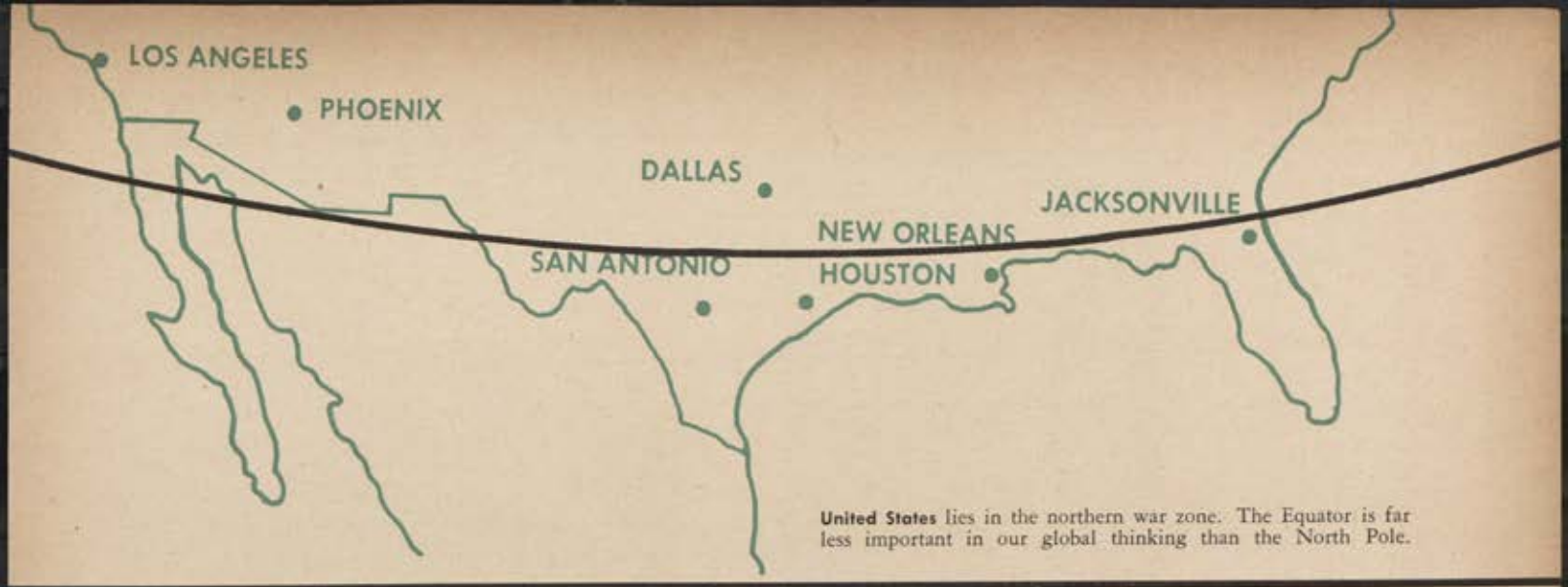
At this writing the AAF is aiming for an Air National Guard and Air Reserve of 1,100,000 men which would complement the projected 400,000-man regular Air Force. The blueprint for the new Air National Guard calls for some 3000 pilots, 3800 non-rated officers, and 40,000 enlisted men. As an auxiliary to this secondary line of our air defense, the AAF is also promoting further development of the Civil Air Patrol, whose 100,000 senior and cadet members seek to encourage air-minded citizens to contribute their efforts and resources to the development of aviation.

Since the Air Reserve is composed entirely of volunteers, military leaders are aware that reserve duty must be made sufficiently attractive to sustain the interest of participants. It is conceded that the reservist makes a considerable sacrifice in taking an active part in the program, even though the annual tour of duty is only two weeks. To be eligible for promotion, however, reservists in non-flying categories must complete a prescribed amount of classwork and extension courses on their own time. Existing law permits full pay and allowances only for the fifteen-day duty period.

The Air National Guard, on the other hand, will supplement the two weeks' annual active duty with weekly drills of two hours to give the guardsmen approximately 60 days' pay and allowances each year.

To maintain the *esprit* of air reservists, the AAF proposes to install up-to-date equipment and facilities at all training centers. Promotions presumably will be granted on a uniform scale based on such factors as length of service, time in grade, efficiency, and leadership. Headquarters expects to announce details of the reserve promotion system short-

Since this picture of a confident Marauder crew was taken our once mighty Air Force has dwindled dangerously.



United States lies in the northern war zone. The Equator is far less important in our global thinking than the North Pole.

ly. The Air National Guard initially will draw its personnel from veterans of World War II, and a reasonably liberal promotion system for both officers and enlisted men already has been adopted.

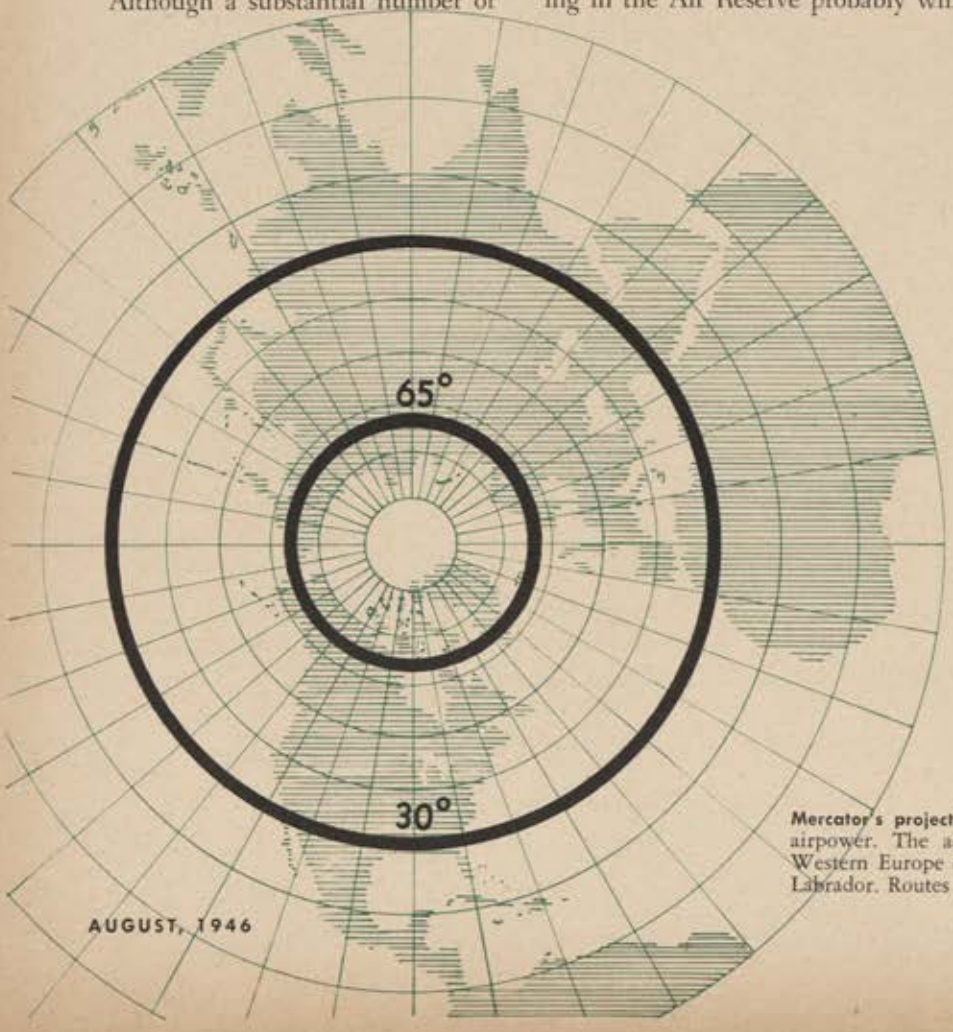
The AAF's Air Reserve program is developing speedily. Forty of the 130 proposed training bases have been activated. It is likely that flying training operations will get under way at some of these units within the next few months. The Air National Guard will train at 79 airfields throughout the country as soon as the various states complete their organizations.

Although a substantial number of Air Corps officers accepted reserve commissions upon separation from active service, it will not be possible to call up all of them for the annual duty tours before the 1948 fiscal year. Officials emphasize, however, that eventually everyone who desires to participate in the active reserve will be called. Tables of organization include position vacancies for every MOS with the exception of fighter pilots. The latter must take their training with Air National Guard units since the Air Reserve program concerns itself only with bombardment training. In actual practice, however, most fighter pilots remaining in the Air Reserve probably will continue to fly fighter planes even though they will be reclassified as bomber pilots.

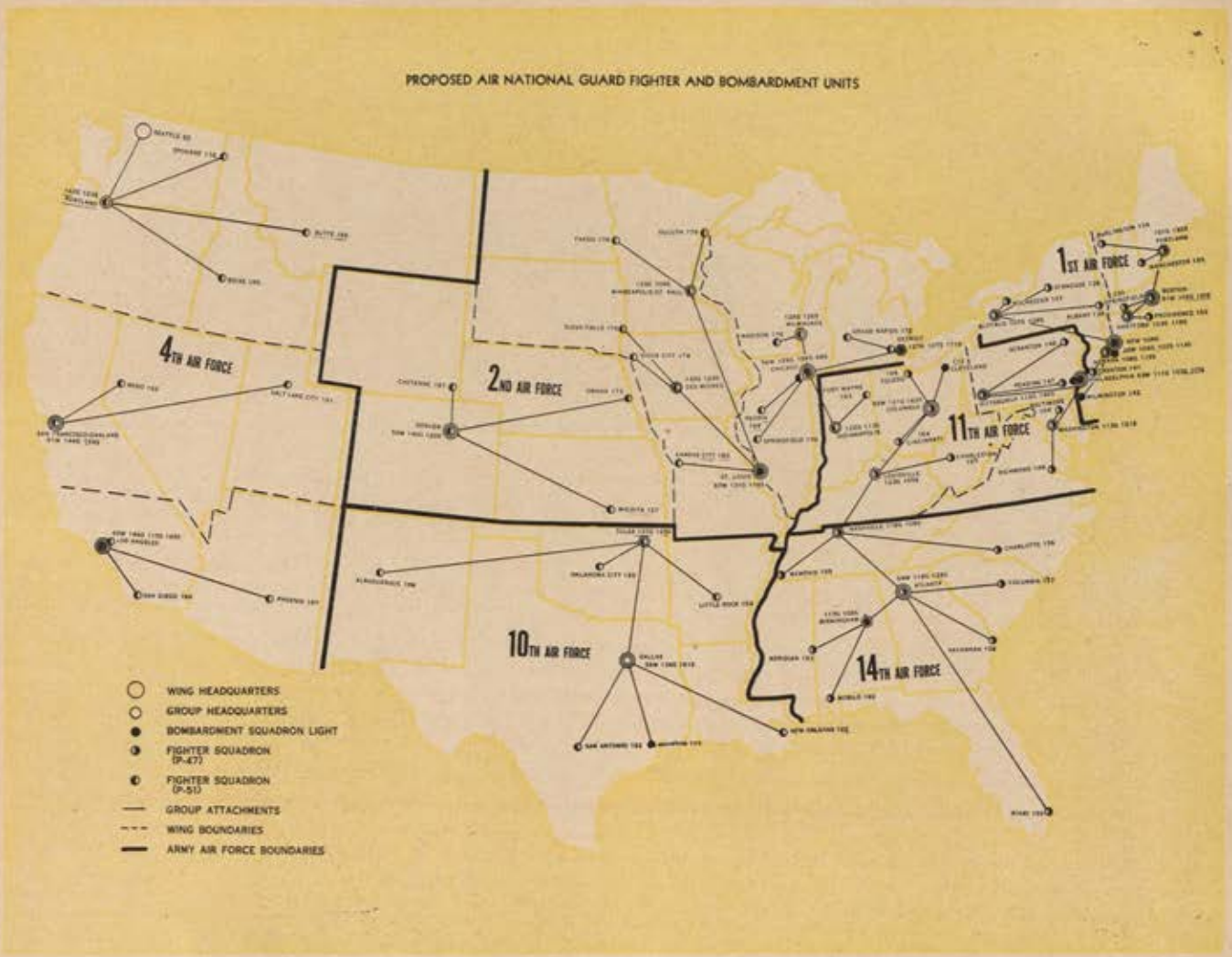
The Air Reserve will be divided into two divisions—the Active and Inactive Reserves. Individuals who do not meet the requirements for unit or individual training will be placed on the Inactive Reserve rolls and will not be eligible for promotion or active duty except on emergency.

Units formed in the Active Reserve will be so organized as to permit rapid mobilization, expansion, and deployment, and they will include both service and combat types. Training units fall into three categories: Class A units, composing a full complement of officers and enlisted men; Class B units, having a full component of officers with an enlisted cadre; and Class C units, having a full complement of officers only.

Unit reserve training will be conducted at air bases and will include both rated and non-rated personnel. Present plans envision weekly or semi-monthly training periods plus the annual 15-day active duty tour. There will also be individual training which will consist of extension courses, classroom work at Air Reserve bases, the annual active tour, and flying proficiency training for rated personnel. In addition, the AAF proposes to offer some reservists the opportunity for extended active duty with the Regular Air Force and for attendance at special service schools. Complete extension courses are expected to become available by January 1, 1947.



Mercator's projection of the world is obsolete in the geography of airpower. The aerial highway from New York to London and Western Europe does not run east but crosses the polar regions of Labrador. Routes to Tokyo and Asia extend across the Arctic frontier.



According to the Defense Command, rated officers will not receive flying training after they have held their ratings for a period of seven years or have become 31 years of age, whichever comes last. Exception is made, however, for rated officers who are considered especially qualified for command or staff assignments. These may continue to receive flying training up to the maximum ages for services in all grades.

The AAF's objective is to maintain the flying proficiency of the greatest number of its reserve pilots but only those who meet the physical qualifications for Class 1 flying may receive training. No officer who is piloting aircraft as a civilian occupation will be permitted to engage in reserve flight training.

Budgetary limitations dictate the initial use of AT-6, AT-11, and P-51 aircraft. Eventually the AAF hopes to maintain proficiency of reserve aircrew personnel by diversion of latest types of service aircraft to the Air Reserve bases.

Under present plans reserve pilots will fly an average of at least 80 hours per year. Other rated personnel are to be given enough flying time to maintain individual efficiency.

Responsibility for training the Air Reserve and the Air National Guard lies with six air forces, whose headquarters are now in the United States. These are the First, Second, Fourth, Tenth, Eleventh, and Fourteenth Air Forces. Air Reserve bases are being selected on the basis of population density, and permanent or interim Regular AAF installations will be used wherever possible. Municipal airports will be used if there is no AAF base available in a particular area.

Meanwhile the AAF is hopeful that the postwar Air National Guard will be built into a strong, well-balanced force. Although officials believe that Air Guard units should be located in large population centers, every effort will be made to establish additional units at smaller communities. Regular Army officers soon will be made available in increasing numbers to assist the states and territories in the formation of Guard units.

Regardless of what shape our aerial weapons take in the future, American military airpower will be no stronger than the men behind it. As General Stratemeyer expresses it:

"Never again will the United States enjoy the advantage of time. The unannounced lightning attack that would open another war would plunge us into the midst of conflict whether we were prepared for it or not. Long-range bombers bringing atomic bombs from many far distant bases would make the barrier of space and the dispersion of our industry meaningless.

"Each state, each community, in America is vulnerable to attack.

"Each state and municipality in America shares the responsibility for maintaining airpower adequate to meet and to avert attack.

"Air National Guard and Air Reserve units in each state must be strong to support the Regular Air Force.

"On their strength depends the security of America."

IF YOU ARE NOW A MEMBER PLEASE PASS THIS ON TO A FRIEND

AF2

MEMBERSHIP APPLICATION

Date_____

I hereby apply for membership in the AIR FORCE ASSOCIATION and represent that I am now on active duty with or have been honorably separated from the U. S. Army Air Forces.

Name_____ Rank_____
(PLEASE PRINT)

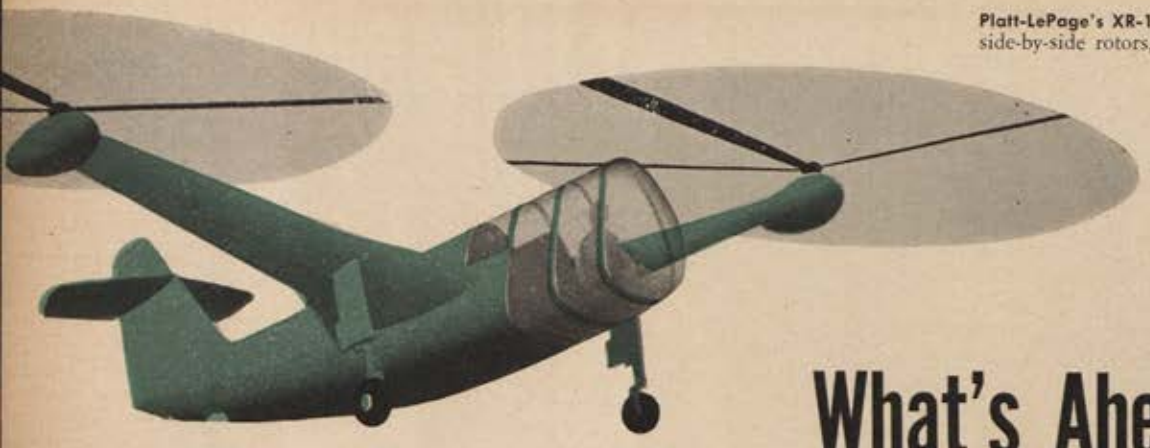
Present Address_____ Army Serial Number_____
STREET ZONE CITY STATE

AAF Unit_____ Date of Separation_____

Annual dues of $3.00 enclosed.

_____
SIGNATURE

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



Platt-LePage's XR-1, built for the Army, featured twin side-by-side rotors, like early German Focke-Achgelis.

What's Ahead for the

A GOOD DEAL OF WISHFUL THINKING on the subject of flying-for-everybody has been done since Igor Sikorsky's windmill aircraft first titillated newsreel audiences in thousands of theaters throughout the United States.

Picturing just what rôle the helicopter will play in the personal and common-carrier transportation scheme of the future depends on how loose a rein is given the imagination, and no man at the moment is qualified to gainsay prophecy of this character regardless of its extravagance. To venture the belief that millions will *not* fly helicopters in the next decade is to run the risk of being marked as an historical dolt.

To that mischievous property of the human mind to want to know what is coming next the experts on flight have fed a steady diet of optimism. William B. Stout, effervescent, tousle-headed designer of America's first all-metal transport plane, has said that he thinks the aviation industry in a matter of months can mass-produce and put on the market three types of personal flying machines, including his "Helicab," a helicopter. Personal aircraft, he believes, will cut the commuting time between country homes and large cities from forty minutes to ten.

In a magazine article, Igor Sikorsky indulged himself in one of the more lyrical foretastes of helicopter flying. It was, in effect, a declaration of faith in the principle of flying that he worked out in his guinea pig, the VS-300.

Anyone alive ten years after the second World War would see and use hundreds of short-run helicopter bus services, said Sikorsky. He would see hundreds of thousands of privately owned direct-lift machines carrying Americans about their business and their pleasures.

In the same year Sikorsky stated that, while it was impossible to predict how swiftly public demand would follow the supply of "small, safe, and economical helicopters," he was confident that manufacture of the machines in quantity would be an important factor in absorbing a gradually increasing part of the productive capacity of the aviation industry left idle by the drastic reductions in military orders after the war. He added that the helicopter would never replace the conventional airplane for fast, long-distance travel and for carrying heavy loads, "but it will be a very useful craft for all kinds of commuting, as well as between a person's home and the airport, and will be used to provide aerial transportation within the reasonably short range of the average person's travels."

All this talk, and the spectacular performances of helicopters in the newsreels, gave rise to a mild national fever over whirling-wing flight. For the first time, an aircraft incorporated a high degree of workaday utility. Questionnaires circulated among potential aircraft buyers showed preponderant sentiment in favor of the helicopter. Businessmen and officials of the federal government and of cities and towns were caught up breathless by the possibilities in a new kind of flying.

One of the major airlines became interested in the use of helicopters for short-haul transport and for carrying passengers from the centers of cities to airports.

New York's mayor said a helicopter shuttle service would link Manhattan Island rooftop landing fields with two great outlying airports.

Wichita, Kansas, approved "for the future" a fifteen-acre helicopter landing field near the business district.

The editor of a firemen's magazine saw helicopters as an aid to fire-fighting.

The owner of a mortuary applied to the federal Civil Aeronautics Board, dispenser of route flying certificates, for permission to waft the mortal remains of his customers to their final resting place by helicopter.

A transcontinental bus line sought authority to operate

Sikorsky's R-4B featured a fully streamlined tailboom behind a cabin designed for utility and maximum visibility.

The Story of the Helicopter, Copyright, 1946, By Devon Francis, Published by Coward McCann, New York. $3.00.

Aviation's ugly duckling has come a long way since Da Vinci toyed with rotary flight But in The Story of the Helicopter Devon Francis points to many obstacles that still must be overcome before the whirling wing flying machine achieves mass acceptance

helicopter?

BY DEVON FRANCIS

49,000 miles of helicopter routes, coördained with its surface lines. Raymond Loewy, the industrial designer, styled an interurban helicopter for just such use, and Igor Sikorsky himself appeared at a board hearing to testify to the feasibility of such services.

The machine, stated Sikorsky, would weigh between 6 and 6½ tons, provide room for 400 pounds of cargo and 4,200 pounds of "disposable load"—the weight of passengers, baggage and fuel. Fitted with two 600-horsepower engines, the craft would be able to land and take off in a space measuring 40 by 40 feet.

"This helicopter," testified Sikorsky, "has not yet been constructed, but from our knowledge and experience we believe it could be built immediately and would be practical and feasible in every way." He went further: helicopters of even 20 tons gross weight were possible, although his associates and he did not know as yet whether that size would be practical from a traffic standpoint.

Less than three years later a transport helicopter approximating Dr. Sikorsky's description had been constructed and flown. It was known as the PV-3 and was a project of the P-V Engineering Forum of Sharon Hill, Pennsylvania, hard by Philadelphia. Even its authors would not abuse the language by calling it a handsome flying machine, but it flew and flew well.

The special aviation assistant to the Secretary of Commerce stated publicly that hundreds of new towns would spring up in the coming years within air-commuting distance of large cities, served by helicopter busses and taxis.

Helicopter Costs

Somber evaluation of such forecasts raises the questions of initial investment in a whirling-wing flying machine by the private owner, the cost of upkeep, how many miles it will get to the gallon, how freely it can be flown hither and yon on daily trips consistent with other traffic in the air, and what rules will be established by political agencies for its operation.

Arriving at the answers is not a simple procedure.

Stout thinks that two-seater helicopters will sell in the beginning at $5,000 or so, but that the price will be "very much lower" as the demand expands. Sikorsky figures $1,500 as the eventual price for a four-seater. Affecting the prices of aircraft is the watchlike delicacy of aviation manufacturing processes. "Tolerances" in fitting part to part are ten times as close as those in automobile manufacture. Aircraft engines still cost from eight to ten dollars a horsepower as against a dollar a horsepower for the automobile engine. For years Stout has argued that airplane power plants should cost no more than a dollar, and weigh no more than a pound, for each horsepower.

Aeronautical Product's A-1 mounts engine forward instead of under main rotor as in other such craft.

Flying lessons probably will be thrown in with the purchase, but if a salesman must spend ten hours with each customer it is inevitable that the price tag on the bumper will be marked up accordingly.

Maintenance includes the cost of fuel and oil, repairs, and the price of the place where the helicopter is put when it is not in the air. Notwithstanding its relatively low efficiency, a comparison between the automobile and the helicopter on a miles-per-gallon basis favors the helicopter. If an aircraft can get ten miles out of a gallon of fuel, it will be as economical as an automobile getting eighteen to twenty miles. The flying machine, not tied to tortuous, winding surface routes, flies a straight line from departure point to destination, or the shortest distance between two points. It is not subject to fuel wastage at red-lighted intersections. The small, two-seater fixed-wing plane, costing from $1,500 to $2,500, gets not ten miles to the gallon, by the way, but as much as twenty-five and thirty.

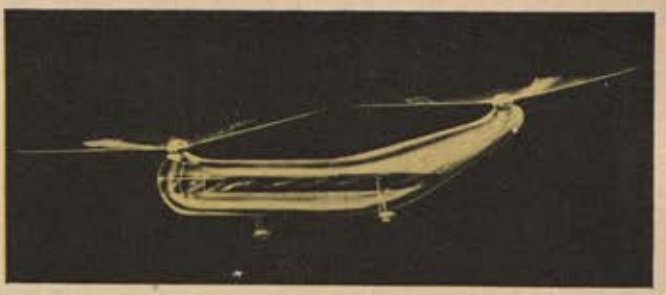
The flying machine will be equally economical of time. Given enough altitude, it flies above the crawling, halting traffic of cities just as fast is it flies over mountain and

plain. Proponents of the helicopter have a point here in their favor as against the fixed-wing: for distances up to 200 or even 300 miles the whirligig making 90 miles an hour is faster than the airplane making 150. That is to say, the helicopter pilot has ascended from his back yard and is well on his way before the airplane pilot has reached the airport to take off. He has landed at or near his destination while the airplane pilot is coming in from the airport.

Hangar rent for standard flying machines runs from eight and ten dollars a month in sparsely settled parts of the country to thirty-five and upward in congested areas. A plenitude of aircraft and competition among the owners of hangars for pilots' business ought to reduce those figures. If, as the Sikorskys and Stouts believe, the direct-lift machine can be housed in a personal garage, hangarage will be an inconsequential item of expense.

Mechanical maintenance and replacement of worn-out parts may be costly for the helicopter owner in the beginning. In the past a nut-and-bolt assembly that sold for a nickel at an automobile equipment store sold for a dollar in an aircraft equipment shop at a flying field. Barring accident, a helicopter should go several scores of thousands of miles without major overhaul; unlike the automobile, an aircraft is cushioned against shock by the very medium which sustains it.

Air traffic and its regulation will impinge on the growth of helicopter and airplane ownership. There is little question that scores of thousands of fixed-wing aircraft will be licensed for operation in the near future. Before World War II began, some 100,000 persons held airman certificates in the United States. An equal number was rated as students. They flew 24,000 licensed aircraft. A ten-fold increase in certificate holders is quite likely, with a commensurate increase in the number of conventional aircraft in the air. Better designs will accelerate the sale of airplanes. The same Henry Berliner who experimented with whirling wings two decades ago today has produced the Ercoupe, a plane that novices have learned to fly in as little as three hours of instruction. By making his plane incapable of "spinning," by fitting it with two controls—actuating the elevators, the rudder, and the ailerons—instead of three, Berliner and a limited number of other airplane manufacturers have widened the market for conventional aircraft.



PV-3, powered by 450-hp Continental engine, carries ten passengers. The first practical commercial size heliocopter used fore-aft rotors.

Legal Aspects

Because airplanes demand so much space per plane for safety, on government agencies, federal and state, rests the task of allocating air space for aircraft operation. And where the helicopter will fit in remains to be determined. If traffic soars, lanes and flying altitudes will have to be established to separate the operations of airplanes and whirling-wing machines. Just as a man cannot drive his automobile anywhere at any speed with impunity, so the owner of a helicopter will suffer a restriction on the utility of his aircraft through consideration for his neighbors. Periodic bad visibility and low ceiling conditions in congested areas may keep him aground. Airliners cannot run the risk of banging into stray flying machines.

Until flying makes pronounced changes in the architecture of cities, mid-city landings by privately owned rotary-wing flying machines appear to be on the side of wishful thinking. Already, with today's limited air traffic, it is advisable for an airplane owner to carry insurance covering property damage and hurt or death inflicted on persons he may hit inadvertently. Current government regulations forbid a pilot's flying at an altitude of less than a thousand feet over cities. If the helicopter bus idea should prove out, the machines would have to land hard by the center of town even in heavy rain or fog. To assure the safe operation of helicopters, be they privately or common-carrier owned, to and from the congested areas of cities, some provision will have to be made for protecting people beneath. That might take the form of flight lanes. The ground underneath such lanes would contain open spots here and there, or emergency landing platforms atop buildings where a flier in trouble could put down. Even so, city councils alive to property values probably would make haste slowly in granting permission to itinerant fliers of questionable piloting ability, or to heli-taxi drivers, to skim over Main Street at a height of twenty feet and settle onto the parking lot a block away. That consideration of property values will slow up everywhere the process of making mid-city airports available.

Backdropping the whole question of flight within the limits of cities is the fact that in negotiating the fluid medium of the air, a pilot can get blown from his course. His aircraft can become the plaything of severe updrafts and downdrafts that even a helicopter cannot smooth out, especially in the vicinity of tall buildings.

Business-district helicopter landings ultimately will come, but likely they will be limited to transport aircraft flown by men who know their business.

Plastic-fronted R-6 added cabin comfort and visibility to the older R-4B design. Right, a 14-place proposal, presented by Greyhound Bus Company, to CAB for operation on 49,130 route miles. Design is by Raymond Loewy collaborating with Igor Sikorsky.

A body of law and rules that have the effect of law, have grown into mountainous proportions in the last twenty years for regulation of aircraft operations. While states in many instances have instituted regulations of air traffic and the issuance of airmen certificates and the licensing of aircraft, control of the air is first and foremost a function of the federal government. That control can have a happy or an unhappy effect on the growth of helicopter ownership.

Oddly enough, under a democratic form of government, the airman in the United States is regarded as a ward of official Washington. To drive an automobile a person need have only a vehicle that is licensed and carry a personal license himself. Issuance of those are functions of the several states. The philosophy behind the licenses is to protect the mass of the citizens from the wrongdoing of the license-holder. For the airman the federal government crochets onto that philosophy the extraordinary principle of protecting the flier himself from his wrongdoing. The regulations protecting the pilot from himself—and his fellows from him—have grown by accretion. A medical examination is necessary to the procurement of various kinds of flying certificates—and nobody can fly without a certificate. To pass the written examinations requires days of advance preparation. To pass the flight examination requires weeks, often months, of diligent practice at the controls. Old-timers in aviation inveigh in vain against what they term this strait-jacketing of flying. Airplane manufacturers, suffering the presence of resident federal inspectors on their assembly lines, chafe under restraint. Every new model of an aircraft must have a new federally issued Approved Type Certificate before it can be sold. Every alteration, no matter how minor, in an ATC-ed plane must be approved.

Future Designs

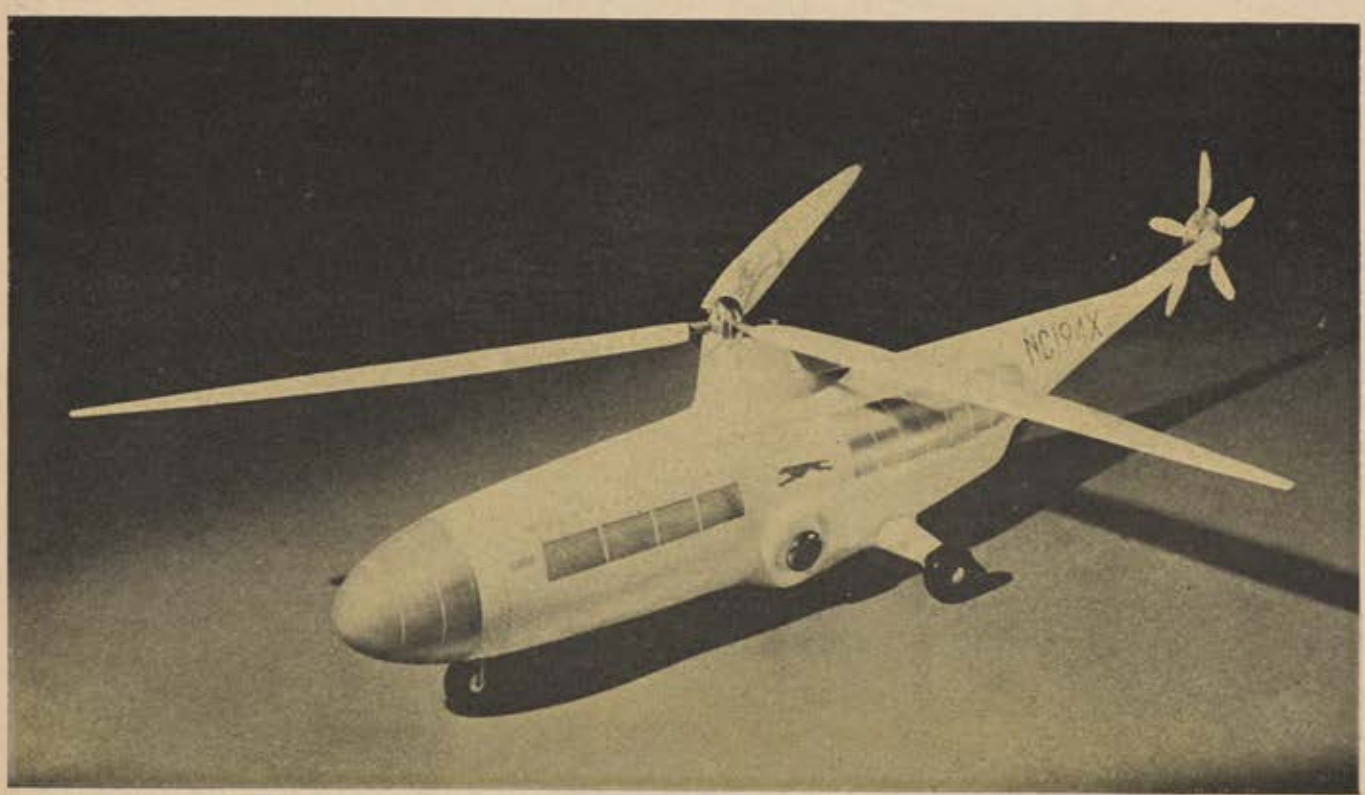
The question of the future popularity of the helicopter bears in part on the degree of government regulation to be imposed on its operation. People will not fly if it is too much trouble to gain the right to fly.

What the personal helicopter is going to look like as it emerges from the designer's chrysalis will depend on its functional form, modified only slightly in outward appearance for the sake of aesthetics. Inside it will contain such fluff as will break down the consumer's sales resistance. Chrome fittings and mohair upholstery, as in the automobile business, will be added for the distaff side.

The helicopter will have a teardrop-shaped fuselage to cut air resistance to a minimum and achieve more miles to the gallon. On Sikorsky-type machines, with torque compensated for by a tail rotor, a boom extending rearward will carry auxiliary control surfaces. Coaxial types will be shorter of body. It seems unlikely that helicopters with rotors laterally disposed will have much appeal to the private consumer; their mass is against them. Jet-propelled blades would, of course, not only reduce the mechanical complexity of helicopters but shrink their over-all size as well. It is possible to build as much sleekness into a helicopter as it is into an automobile sedan. The machine produced by Bell Aircraft, builder also of fighting planes and bombers, is a case in point.

In the consumer helicopter to come the pilot and his passengers will sit in front of the engine. Windows, of plastic, will be large. The instrument panel will be much like that of an automobile, but the functions of most of the dials will differ. In place of a speedometer there will be an air-speed indicator. (If a head- or tail-wind is encountered, the indicator will be no measure of actual ground speed.) The panel will contain revolution counters for both the rotor and the engine. It will have an altimeter, oil temperature and fuel gauges, a compass, and instruments to show when the aircraft is turning and banking, climbing or descending. Taking a leaf from

(Continued on page 63)



Most any millpond, lake or river serves as an ideal airport for the thousands who are learning that puddlejumping has unlimited possibilities for exhilarating sport.

Fun on FLOATS

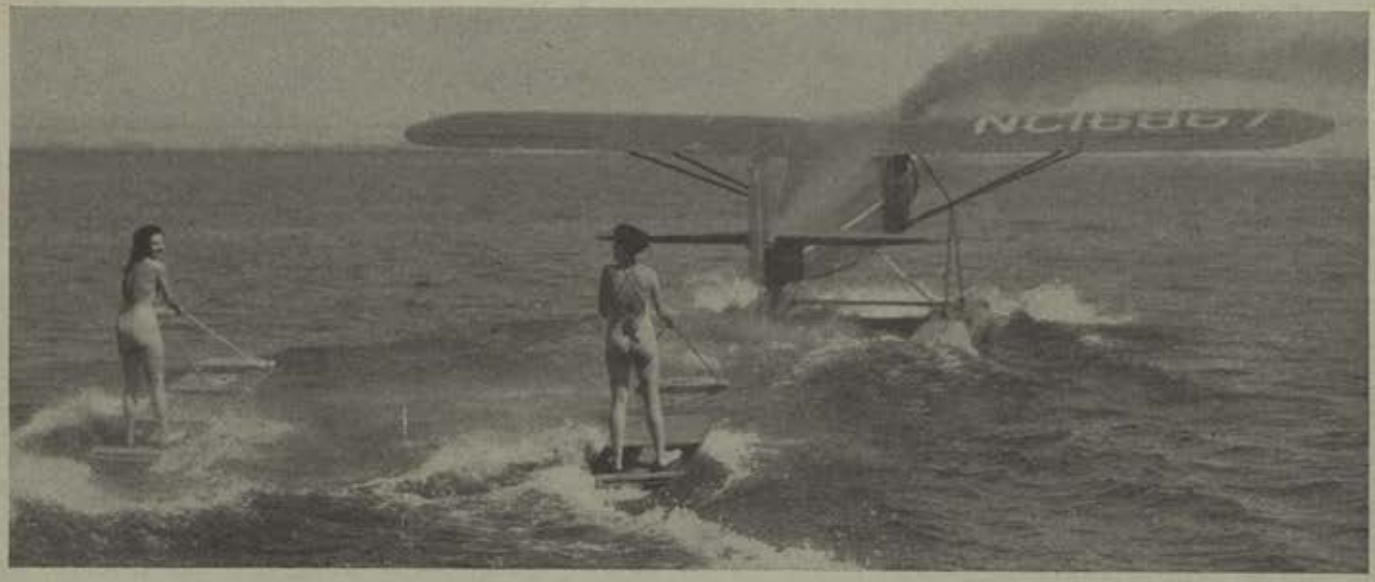
BY MAJOR ROBERT FOGG, *Air Corps Reserve*

FOR A LONG TIME, my Army friends have made light of my enthusiasm for water flying, even though web-footed airplanes have been serious business to me for at least twenty-five years. Sometimes the levity is directed at my planes by Army pilots who describe float-planes as "puddle-jumpers." More often, the comments are personal with my JN-4 colleagues addressing me as a "sea-going soldier." But whatever the remark, I could never produce a suitable retort until a hot-rock fighter pilot dropped in to see me at the Edo plant. He gave me an answer for all float-plane skeptics—himself included.

Like a lot of other Air Force veterans, my friend hails from California. He wanted me to lay out a transcontinental landplane route that would carry him to Los Angeles and back to New York in a 65-hp trainer during his two-week vacation in August. With fewer than 2,000 usable airports scattered across the United States, the limited speed and range of his ship dictated a roundabout routing that would give him little more than a week end at home. But several of my float-plane friends will be crossing the country during the same two weeks in August. Backed by the safety of 30,000 landing puddles which dot the American airscape, they will have their choice of several routes to California. Landing on rivers in the heart of large cities or at lakes in the resort regions, they will need no ground transportation to reach hotels and lodges. Flying direct routes, they will spend less money for gas, oil, and overnight lodging. If the float-plane offers nothing beyond safety, utility, and economy, it more than justifies the minor sacrifice in performance resulting from float drag. Actually, the case for the sea-plane goes far beyond these readily apparent advantages.

Water Unlimited

Right now, everyone is talking about the National Airport Plan and what it will mean to private flying. Unfortunately, Congressional action in May does not put airports into operation sixty days later. So cross-country



flyers this summer, and for several years to come, will still plan their trips to include existing airport facilities. But there are already 30,000 superb float-plane landing areas embracing all of the forty-eight states. Only a small percentage have landing floats, docks, and refueling facilities but the fact remains that every large city with the exception of Indianapolis has a water area close at hand and of sufficient size to accommodate the largest flying boats in service. So float-plane pilots can drop down for food, fuel, or foul weather safety wherever there is a river, lake or pond measuring a mile in length, a hundred feet in width, and a foot in depth. From the standpoint of communities now planning to use Federal airport funds, air harbors have several attractions. First of all, water areas are traditionally "public property"—which eliminates expenditures for airport "land acquisition." Secondly, the physical facilities represented by floats, beaching equipment, and similar appurtenances can be built inexpensively from noncritical materials.

From the standpoint of utility, airplanes which land on water have no peer in the transportation field. Summer, which is vacation time, makes trips to the lake or seashore almost mandatory. Float-plane pilots can fly almost anywhere they can swim. Spring and autumn mean hunting and fishing to most sportsmen. And float-planes represent the only practical vehicle to the best hunting and fishing regions of North America. In winter, floats can be exchanged for skis in three hours, to make every frozen lake and every snow-covered farm an airport. It is this year-round utility which gives float-plane owners a cost-per-hour challenged by few landplane or car owners.

Float-plane Flying

In the light of these operational plus factors, it is easy to understand why several thousand people have ordered the spectacular Republic and Commonwealth amphibians while additional thousands are ordering floats for their Pipers, Aeroncas, and Ercoupes. Perhaps the total of float-

With Edo metal floats, two-control Ercoupe (left) adds water utility to inherent flyability. Despite lack of rudders, ship is easy to taxi. Fairchild 24 (top) tows surf-riders in shadow of Milwaukee business district. Lightness of new Heath float, a glass-plastic product, is demonstrated by bather in seashore photo (right center). Amphibious Republic Sea Bee gives float-plane and land-plane advantages. Note clear approaches, diversity of water "runways."

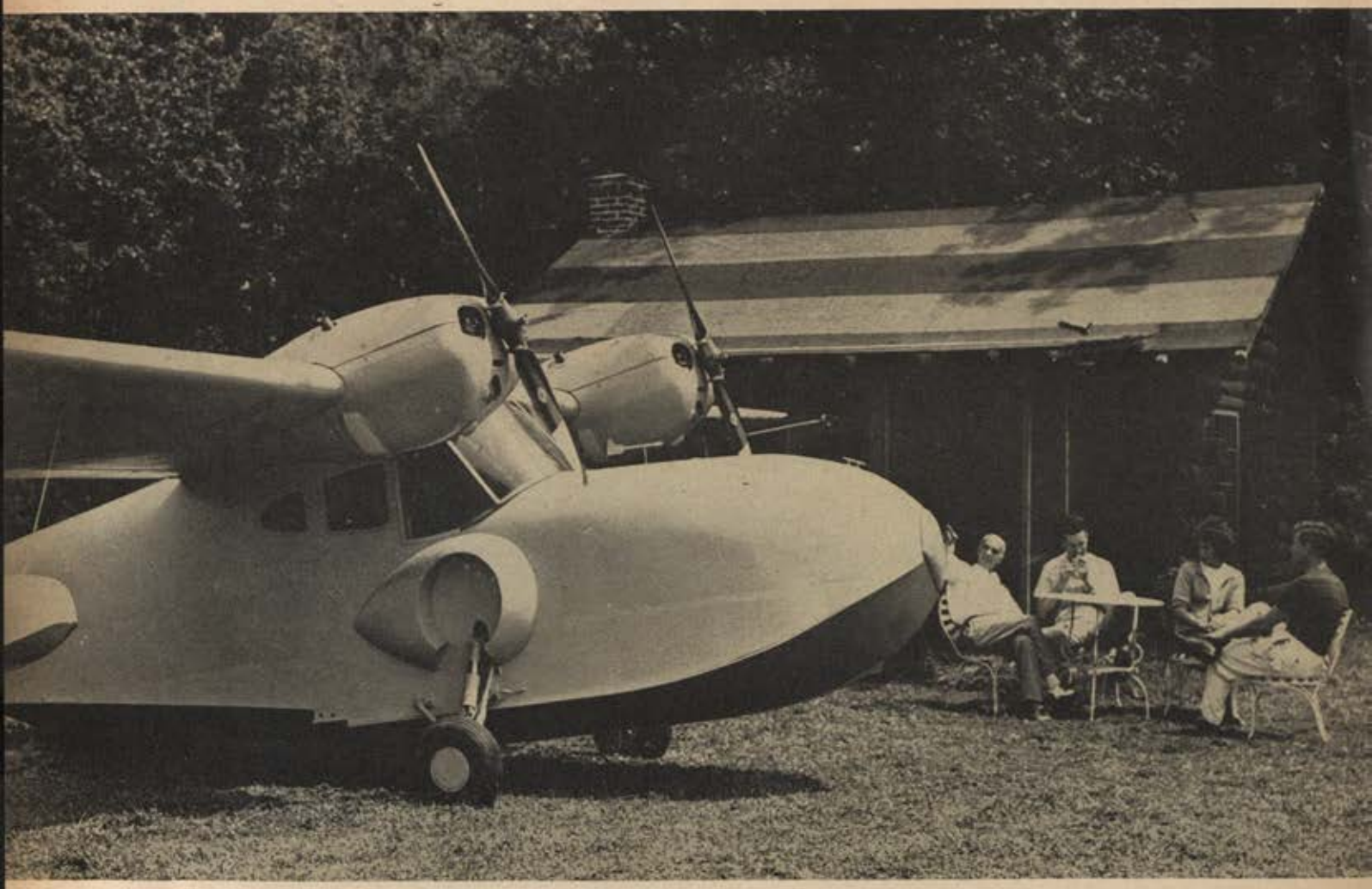
plane enthusiasts would be even greater if water flight technics were better understood by the average airman. Although it would be wrong to say that anyone can fly a float-plane, it can be said that float-plane flying is somewhat less difficult than most flyers realize.

At the outset, float-plane students can concentrate upon actual landing and take-off procedures, untroubled by constant appraisals of traffic, approach obstructions, and limited runway length. With lakes and rivers permitting several miles of "runway" for repeated take-offs and landings into the wind and cross-wind, float-plane students get more practice per hour—and learn faster than their land-plane contemporaries. Moreover, the take-off and landing procedures, though different from land-plane methods, are somewhat simpler. First of all, the long floats and water rudder give superb directional stability during take-off while the lower center of gravity, produced by the float weight, improves stability in flight. The only real problems of float-plane take-off are quickly mastered. By easing the stick *back*, rather than *forward*, the plane gets onto the step and accelerates to flying speed rapidly. Similarly, slight back pressure on the stick eliminates "porpoising" while the ship is on the step.

In landing, float-plane technic duplicates operations with tricycle-geared landplanes, making full stall unnecessary for a safe set-down. Worrying less about accuracy in landing, float-plane pilots use a faster glide approach and concentrate on leveling off—which makes for smoother landings in the final analysis. There are, of course, some aspects of marine operation which can confuse the landlubber. For instance, the plane normally will continue to move as long as the engine is turning over. In taxiing cross-wind, the float-plane will tend to weathercock but the water rudder will correct deviation under normal conditions while practice in tacking and crabbing will conquer the strongest winds or water currents. Docking, beaching, and maintenance are operational details which anyone can master with experience.

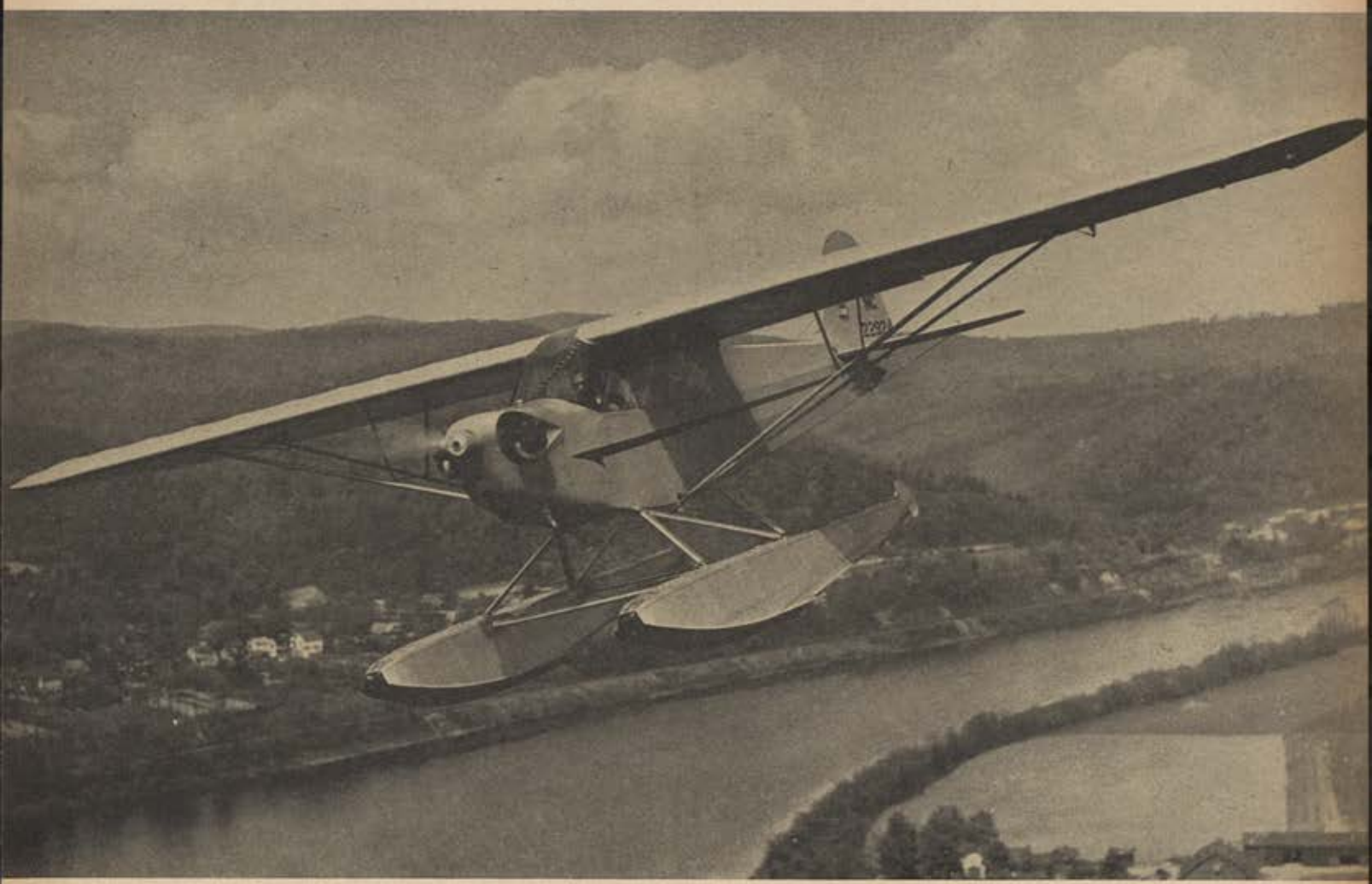
With a nation-wide trend toward water-plane flying already under way, hundreds of veterans have turned to seaplane bases for "business opportunities." And cross-country cruising does offer excellent profit possibilities. However, one caution can save a great deal of money and disappointment. In selecting a site for a float-plane business, be sure to allow plenty of operational room. By its nature, the seaplane is both a boat and an airplane and it must get well under way on the water before it even starts the "take-off run." Beyond that single admonition, success as a seaplane operator depends entirely on ingenuity and initiative. As one Army pilot to a lot of others, I can guarantee that cross-country cruising more than justifies the unhappy nickname of "seagoing soldier."

Newcomer to the water-plane field, Commonwealth Trimmer opens vast hunting, fishing, vacation areas to plane-owners. It is the lowest-priced twin-engine airplane announced to date, has accommodations for pilot and two passengers in plasticized hull.



A favorite with Californians, this Aeronca (above) fitted with Edo floats and auxiliary rudders, is used for aerial photography.

Woods, mountains discourage airport construction near Piper plant but Susquehanna offers limitless Piper float-plane welcome.



Immortality, wealth or disaster, may await this year's National Air Race entrants, as richer prizes and technical progress drive speeds closer to the velocity of sound.

G-Suits and GLORY

BY STEPHAN WILLIAMS

To most Americans, the twentieth running of the National Air Races, scheduled for the Labor Day week end, represents nothing more or less than the postwar comeback of big-time air racing. As such, it is certain to attract tremendous crowds. It may even produce some spectacular speed records. With jet aircraft racing competitively for the first time, with former service pilots at the controls of stripped-down surplus fighters, headlines are certain to be made around the historic pylons at Cleveland. This flight for gold and glory should mark the beginning of a great new era in aviation. But it could sound the death knell for all future air shows.

Recognizing a score of new air race hazards, former winners and selected experts who comprise the Race Committee have tightened up racing rules generally. Demanding 1,000 hours of flying experience, two-way radio, parachute, crash helmets, instrument ratings, and G-suits, they have made every effort to temper the dangers of closed-course flying. But past experience can barely anticipate the hazards which will face former military pilots flying surplus pursuit aircraft.

As this is written, only two pilots with previous closed-course experience have entered in the events. Other old-time racing pilots will join Earl Ortman and Tony LeVier before entries close, but war-trained air men are certain to be in the majority.

Unlike some previous race meets, the 1946 program will not be dragged out to roast and fatigue the audience. There will be only one closed-course event on the field each day, except Friday, August 30, when the Bendix Race terminates in view of the grandstand. That day's closed-course event will be a free-for-all Women's Race, with top money of $2,500 awaiting the winner at the end of five laps over a 15-mile triangle. Closed-course racing for women has not always been popular with the race management. After some operational accidents and some collision with feminine ire, the Henderson Brothers, who managed the air show for almost a decade up to 1939, decided to limit closed-course events to men. The resulting complaints from fair flyers brought resumption of their race this year.

Because only a dozen airplanes can compete in the Thompson Trophy Race, a men's free-for-all event was created for the twelve entrants not qualifying for the big event. This trial, to be run Saturday, will duplicate the Bendix course of 15 laps on the 15-mile triangle. Awards will total $15,000 with $8,000 as top money for this event.

Unique in the history of racing will be the Weatherhead Speed Dashes for jet planes. Flying against time, Army and Navy jet pilots will attempt to break the existing world's speed record for jet aircraft, held by Britain's Gloster Meteor. Although prizes will total $25,000, the pilots in these events will get only trophies and glory. Army and Navy Relief will get the money.

Meanwhile, jet planes will compete separately from reciprocating engined craft in the richest Thompson Trophy Race in history. Awards in this classic event will total $40,000, with $16,000 for the winner. The Allegheny-Ludlum Award will give $2,000 as added money for the prize winner if his speed tops the existing record of 283.419 mph.

The promoters of air racing have always tried to apply an air of science and progress to the events. This was true when the Army sponsored the first national air meet at Mitchel Field in 1920. Gen. Billy Mitchell said the purpose of that meet was "to compare the aircraft that had taken part in World War I with the aircraft developed since the Armistice."

German aircraft and everything else that could pass as a fighter flew in that meet in quest of the *New York World's* silver Pulitzer Trophy. In those days pilots raced against time, not against other pilots. The Army's best that year was the Packard-Verville, a sleek, well-streamlined biplane powered by a 600-hp V-12 engine. Turning up only 500 hp in actual flight, the Verville entry clocked 174 mph with Lt. C. C. Moseley at the controls. Harold Hartney, famed World War pilot, finished second in the 500-hp Thomas Morse Scout.

In 1921, the national meet moved to Omaha and Gen. Mitchell opened the entry list to Navy and civilian pilots. That year, flying the Navy's Curtiss Wildcat, a mono-

Doug Davis, flying the Travelair Mystery Ship outdistanced all military competition at Cleveland in 1929. This ended the ten-year service-aircraft monopoly on the free-for-all closed-course event. Davis is shown here with his 1934 Wedell-Williams Bendix entry.

cocque triplane powered by a 400-hp CD-12 engine, Bert Acosta won the race by covering a 132-mile distance at 176.6 mph. Lt. J. A. Macready, the Army's altitude ace, took second with a Thomas Morse Scout, powered by a 300-hp Wright-Hispano. During the same event, nonmilitary aviation moved back into the racing limelight when C. S. "Casey" Jones flew the commercial Curtiss Oriole to victory in a 90-mile free-for-all event.

Detroit's Aero Club had for, and landed, the race in 1922 and made it a major civic attraction. On a strip which incorporated both land and water facilities, the land-sea military and commercial aircraft performed before one of the largest crowds ever to witness an outdoor sporting event.

One new event, an "On to Detroit" race which was to set the pattern for subsequent Bendix races, was created as a "gimmick" for getting large numbers of civil aircraft to the field for competition. Scored on points according to a complex formula which considered speed, power, passengers, and reliability, this race was won by Walter Beech with his OX5 Laird-Swallow. Casey Jones finished second with his C-6 Oriole, and Eddie Stinson took third with his all-metal Junkers monoplane.

In the main event Russell Maughan, who was later to reach immortality for his dawn-to-dusk flight across the continent, won the Pulitzer Trophy by circling the course at 205 mph in his D-12-engined Curtiss Racer. L. J. Maitland, who later flew the first flight from the United States to Hawaii, finished second in a similar plane. Down in fourth place was another ex-ballplayer named Al Williams, who flew a CR-1 racer. The Detroit meet saw such craft as the Verville-Sperry and a new Verville-Packard racer, a sleek high-wing monoplane by Grover Loening, and an all-metal job by Thomas Morse. The races were paying their way in progress. Moreover, the public was interested: one day brought 22,500 cars to the parking lot, while 82,000 people paid cash to see the events.

St Louis sponsored the next national air race with Casey Jones flying an OX5 Oriole to victory in the 128-plane "On to St. Louis" event. Old Walter Lees, who taught Gen. Mitchell to fly, won the OX5 closed-course event in his Johnson-Hartzell. It was, however, a little cabin monoplane built by an obscure designer named Giuseppe Bellanca which stole the show. Powered by a 95-hp Anzani engine, the startling newcomer carried four passengers at nearly 100 mph, a record which few modern lightplanes can equal. The Pulitzer Trophy went to Lt. (jg) Al Williams and a Curtiss racer powered by a 500-hp D-12 engine and fitted with smooth, in-the-wing radiators.

That year J. F. "Dinty" Moore climaxed his victory in the *Detroit News* Air Mail Trophy Race by stopping his DH-4 in 75 feet to demonstrate the Westinghouse reversible propeller. Among race contestants that year were such greats as Walt Adams, Walter Beech, Larry Bell, Ed Heath, Matty Laird, Lawrence Speery, Speed Holman, Charles A. Lindbergh, and Bill Westlake.

The fifth running of the races in 1924, at Dayton, Ohio, foreshadowed the end of military domination of the national meet. Casey Jones clipped the wings on his Oriole and took the "On to Dayton" cross-country race before annexing a new civil trophy put up by the Central Labor Union of the Dayton area. Jim Ray of Pitcairn took second place in this event with an OX5 Orowing, and Cy Caldwell won third place in the Martin 70.

One of the notable events in this race was a trial of light craft with 80-cubic-inch engines. Most of these power plants were conversions of four-in-line motorcycle engines. Although eight started, Ed Doiney in his home-built "Flying Bathtub" and J. M. Johnson in the Driggs-Johnson Special were the only entries to finish.

With operational and mechanical misadventures, the Pulitzer race was won by H. H. Mills and his Verville-Sperry in the slow time of 215 mph.

In 1925 the race went back to Mitchel Field. Ken Montee, in a specially built OX5 racer, took the "On to New York" race, and the persistent Casey Jones used the veteran Oriole to finish first in the multi-place division. Flying a Curtiss racer at 248.39 mph, Cy Bettis took the last Pulitzer Trophy.

Smoke aerobatics by Mike Murphy and team featured the last running of the National Air Races in 1939. Left, Jimmie Doolittle's stubby GeeBee rounding the last pylon in the Thompson race of 1932. His 252.68 mph for the 100-mile course stood until 1936.

Roscoe Turner in his Turner-Laird, getting the Thompson Trophy for the third time. He retired from racing after the 1939 Nationals.

Designated as a feature of the Sesquicentennial Exposition, the race moved to Philadelphia in 1926 and the Independence Hall Trophy Race replaced the Pulitzer as the main event. Again Casey Jones and Jim Ray finished in one-two order. In place of the Pulitzer Trophy, the Kansas City Rotary Club put up a prize, but there were no special military racing craft to compete for it. Lt. C. T. Cuddihy took the race in a Packard-engined Boeing fighter—a plain, unprepared pursuit airplane.

By 1927 civil dominance in the National Air Races completed the total eclipse of military activity. The "On to Spokane" race drew a larger number of top civil pilots than any other cross-country event on record, and "Speed" Holman topped the field by flying a J-4 Laird biplane from New York to Spokane in 19 hours, 42 minutes. However, the lack of military support tempered the success of all events, with awards necessarily coming from such organizations as chambers of commerce or aeronautical publications like *Aero Digest* and *Western Flying*. Competitors included people like Jack Frye and Paul Richter.

The gloom of 1927 continued the following year when the races originated at Mines Field outside Los Angeles. Although $80,000 had been subscribed as prizes, opponents of airpower kept the Army away from the air meet by curtailing gasoline supplies. The 1928 race nonstop transcontinental derby attracted six starters but bad weather prevented any of them from finishing.

Some experts on air meets state that the 1929 running was the first modern air meet. There were fairly strict regulations, and entries from unqualified pilots and aircraft were turned down. Here the deterioration of our military air strength was demonstrated when Doug Davis, in a 300-hp Travelaire S, flew rings around his nearest military competitor, R. G. Breene, in a Curtiss A3-A at a speed of 194.9 mph.

Chicago was selected for the 1930 race, but a brave turnout could hardly match poor weather and a poor nation. Speed Holman took the Thompson Trophy on its first official running, averaging 201.9 mph in his Wasp-engined Laird Solution—the only biplane ever to win the Thompson race. This was one of the most thrilling pilot battles in history, with Holman taking advantage of his maneuverable little craft to win time on the turns while Jimmie Haizlip and his faster Travelaire Mystery Ship were picking up time on the straightaway. Third place went to "Mike," a home-built job designed, constructed, and flown by a United Air Lines pilot named Ben Howard. Powered by a 95-hp Gypsy engine, it finished ahead of the Army's best entry, flown by Lt. Paul Adams of Nogales.

The Bendix race was inaugurated in 1931 as a real cross-country event with no special classes or handicaps. Flying a Wasp Solution, Jimmie Doolittle crossed the country in 11 hours, 16 minutes with a stop at Cleveland. That year the stubby Gee Bee made its appearance. Measuring 23 feet from tip to tip, 15 feet in length, the little ship "couldn't fly"—according to several experts. But it lapped every entrant except Jimmie Wedell in averaging 236.23 mph. In the 1932 Thompson race Jimmie Doolittle flew the Gee Bee to victory with the 252.68 mph speed of his 800-hp plane exceeding for the first time the 1925 record set by Cy Bettis. Jimmie Haizlip took the Bendix Trophy in the Wedell-Williams.

From the outset the 1933 contest figured to be a race-out settlement of the standing argument between the Granvilles' theory of squat racers and Jimmie Wedell's race-horse types. But fate changed the plan when both Gee Bee entrants crashed before the starting date. Roscoe Turner took the Bendix race in his Wedell-Williams, and was leading in the Thompson when he cut a pylon. Wedell was less than a minute behind.

Tragedy stalked the 1934 meet. Doug Davis was leading the Thompson race after capping the Bendix in his Hornet-engined Wedell-Williams. Despite heavy smoke trailing from his engine, Turner gained a little on every turn. On the eighth lap, Davis crashed near the second pylon. Turner's time was 248.12 mph.

Bert Acosta with Curtiss Wildcat, in which he won Pulitzer Trophy at Omaha, 1921. The little triplane did 132 miles at 176.6 mph.

Just as the Gee Bee had upset the dope in 1931, Benny Howard's "Mister Mulligan," a four-place cabin airplane, won both major trophies in 1935. Howard flew his high-winged ship to the Bendix in 8 hours, 33 minutes. In the Thompson, "Mr. Mulligan," flown this time by Harold Neumann, made it a "daily double" when Turner's pace-setting engine quit cold and forced the old maestro to make a dead-stick landing in front of the grandstand.

Then the real upset came—in 1936. In the Bendix, Roscoe Turner cracked up in his Wedell-Williams, the prop flew apart on Benny Howard's "Mr. Mulligan," and Joe Jacobson had to bail out of his Northrop. The race went to a couple of prominent women flyers, Louise Thaden and Blanche Noyes, who made the flight from New York in their Whirlwind Beechcraft in 14 hours, 45 minutes. In the closed-course races, other upsets were in store. France sent Michel Detroyat and his Renault Caudron, a sleek sharp-nosed job that qualified chiefly as a Greve Trophy lightplane racer. The field was thinned out a little by the Bendix mishaps, but the 340-hp blue streak averaged 264.26 mph to top Jimmie Doolittle's 1932 average.

In 1937, sportsmen pilots showed well for the first time in the Bendix race when Frank Fuller, Los Angeles paint executive, used a Seversky modified export fighter to reach Cleveland—and victory—in 7 hours, 54 minutes. The Thompson race was a less open-and-shut affair. With five minutes to go, it was a touch-and-go race between Roscoe Turner in his Laird-Turner and Steve Wittman in his home-built Oshkosh Warrior. The souped-up Conqueror engine let Wittman down, and Turner cut a pylon. Refusing to menace the safety of closely bunched runners-up, Turner called it a day and it looked like a sure victory for Earl Ortman in his Marcoux-Bromberg when Rudy Kling, winner of the Greve Trophy, power dived "out of nowhere" on the last leg stretch to take the race by a bare 20 feet.

Jacqueline Cochran became the second woman to win the Bendix Trophy in 1938, flying her Seversky from Burbank to Cleveland in a little over 8 hours, 10 minutes. Roscoe Turner became the first man in history to win the Thompson Trophy twice, setting a new record at 283.41 mph. Earl Ortman also bested the previous mark with 269.71 mph. At the last running in 1939, Turner and the same craft repeated the performance at a somewhat slower speed—282.53. Fuller took the Bendix again in his Seversky at a little under 7 hours, 15 minutes.

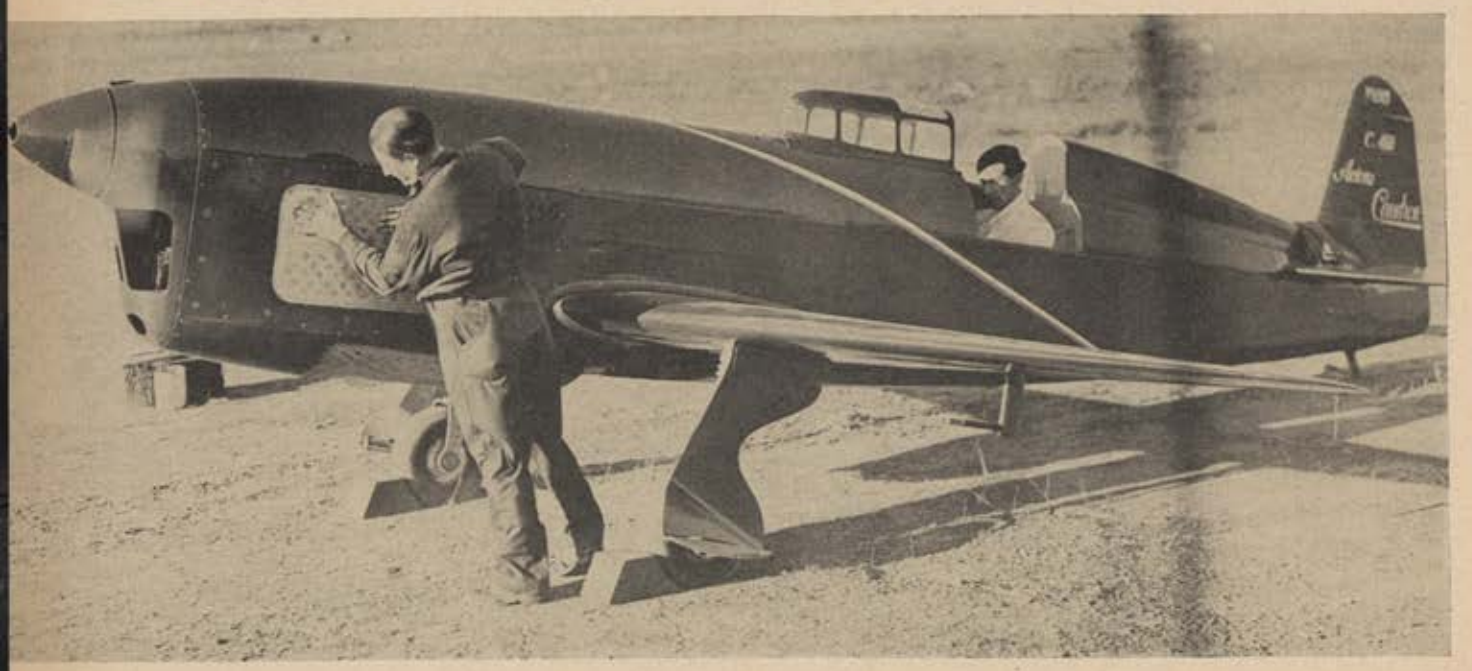
There were good reasons for calling off the 1940 races. Somehow, in a world filled with war and rumors, the airplane was no longer a plaything. The services, whose appearance had been the backbone of the show, had other engagements to keep. Many of the crack professional racers contracted as ferry and test pilots. Aviation was girding its loins.

There are fond hopes for the twentieth running of the National Air Races. To succeed, however, it must have more than public support, backing of the military services, and level-headed management. There must be no repetition of the service jet-pilot who did low-altitude clowning over the crowd at a recent meet in Birmingham. One of the nation's most famous racing pilots pointed out that the competitors this year are likely to be a lot younger and less experienced than the prewar racers. A large percentage of the old crop learned to fly during World War I or in the period directly after. They had the background of barnstorming and county-fair and state air racing. They had developed a professional attitude toward racing, and a point of view which put safety of the audience and fellow pilots above victory, and frequently above their own lives. Many of these pilots built

(Continued on page 64)

Tuning up Michel Detroyat's Renault-Caudron, the French entry that took Thompson and Greve awards at Los Angeles in 1936.

Speed Holman (above), who won the New York-Seattle derby in 1927, took the Thompson Trophy in 1930 in his Laird Solution.



PRO SCHOOL

THE POSTWAR conception of air power by the Army Air Forces is not a conception composed entirely of planes, men, equipment, tactics, and techniques. Air power is now considered as a state of mind of the American public. So the Army Air Forces, whose business is the security of this nation, has determined to train its "informers" with the same precision that it trains the pilots and technicians.

Early this year thirty-two officers of the Army Air Forces arrived in Orlando, Florida. Wearing the shoulder patches of sixteen different air forces, they were the first students to arrive for the newly organized Public Relations Course at the Army Air Forces Special Staff School.

Among these thirty-two men the wings of flying personnel were predominant, and across the chests of most of them were decorations for valor in the skies around the world. A year or so ago most of these same officers were blowing up enemy supply dumps and shooting down FW-190s and Mitsubishi bombers. No paragraph-troopers at heart, they were ready for an Army course unusual in theory, in teaching methods, and in objectives. Shortly after the defeat of Germany a group of men met in Paris to plan for the new military operation—public relations. Among these men was Colonel William P. Nuckols, the present course director at Orlando.

In September of last year the first group of men who were to form the school arrived in Orlando. Some were men with extensive experience in both Army and civilian public relations, others were Regular Army men who had volunteered for this assignment, all of them were determined to establish a school which would train AAF officers as public information specialists.

One instructor had held an English professorship at Northwestern University. Another was an experienced newspaper photographer. And there were others—a journalist from *Newsweek* magazine with ten years' experience as a writer for Scripps-Howard newspapers, a radio instructor with a mechanical engineering background and extensive experience as a radio producer, announcer, and writer. Another had been advertising director for twenty years with a large beverage company, and another had several years' experience as a member of the writing-producing staff of the Mutual Broadcasting System. They were good—they knew their jobs—and they wanted to teach their professions to those who came.

Now in its third class, the Public Relations Officers course can look back on its short history with pride. In less than five months more than a hundred students have graduated. Impressed by Colonel Nuckols' promise that 80 per cent of the public relations job must be done

AAF Public Relations personnel must always be alert for quick coverage and photos of such events as record-shattering P-80 flights.

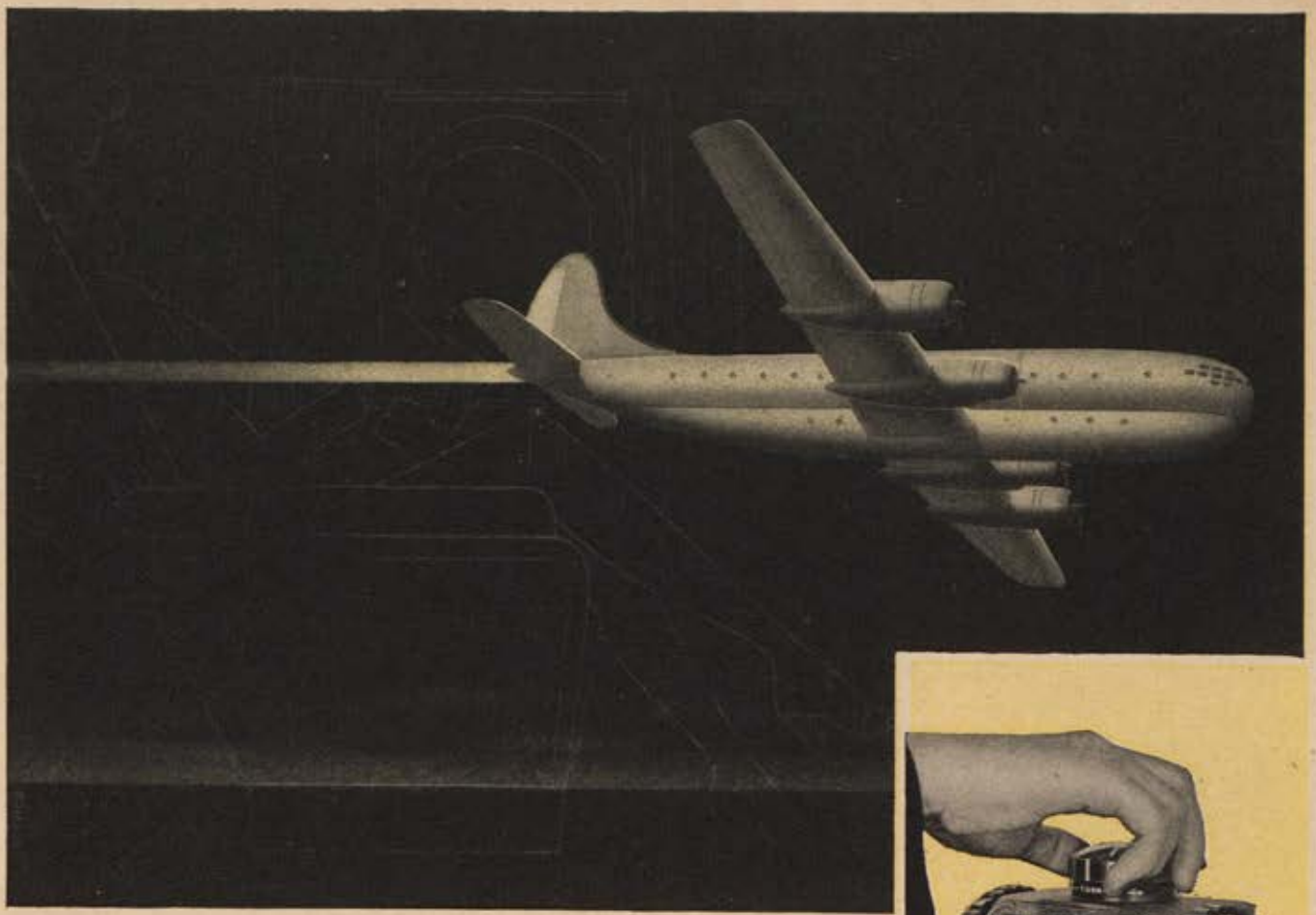
within the Army, only 20 per cent outside the military structure, these pioneer graduates have already given the entire AAF a feeling of pride and confidence never previously approached in peacetime.

The course lasts for ten weeks—eight in Orlando and two on a field trip to Washington and New York. During the eight weeks in Orlando the class schedule reads like a university catalog with courses in Public Opinion, Russian Foreign Policy, Public Relations in Industry, Psychology, British Foreign Policy, Public Speaking, Press Radio, Air Force Organization, and Photography. In addition, instructors from nearly every phase of the Special Staff School at one time or another address the class on their appropriate specialty. The subject matter varies all the way from the problems of an aviation engineer in building a landing strip to a discussion of the Combined and Joint Chiefs of Staff. Topics include: Principles of Air War, Aerial Photography, Logistics, Occupations of Enemy Nations, Radar, and many others. Also included are lectures on future air weapons which are still top secret but which are presented to alert the public relations student to news which will soon be released.

Use of the public relations media remains the stock-in-trade of this course. Every student seems to have some sort of background that fits into the general over-all picture. The students are here to learn other things and to

(Continued on page 60)

Mechanics of pre-flight trainer (above) and radio news broadcasting techniques (below) are but two of the many basic subjects in PRO training course to familiarize officers with all AAF operations.



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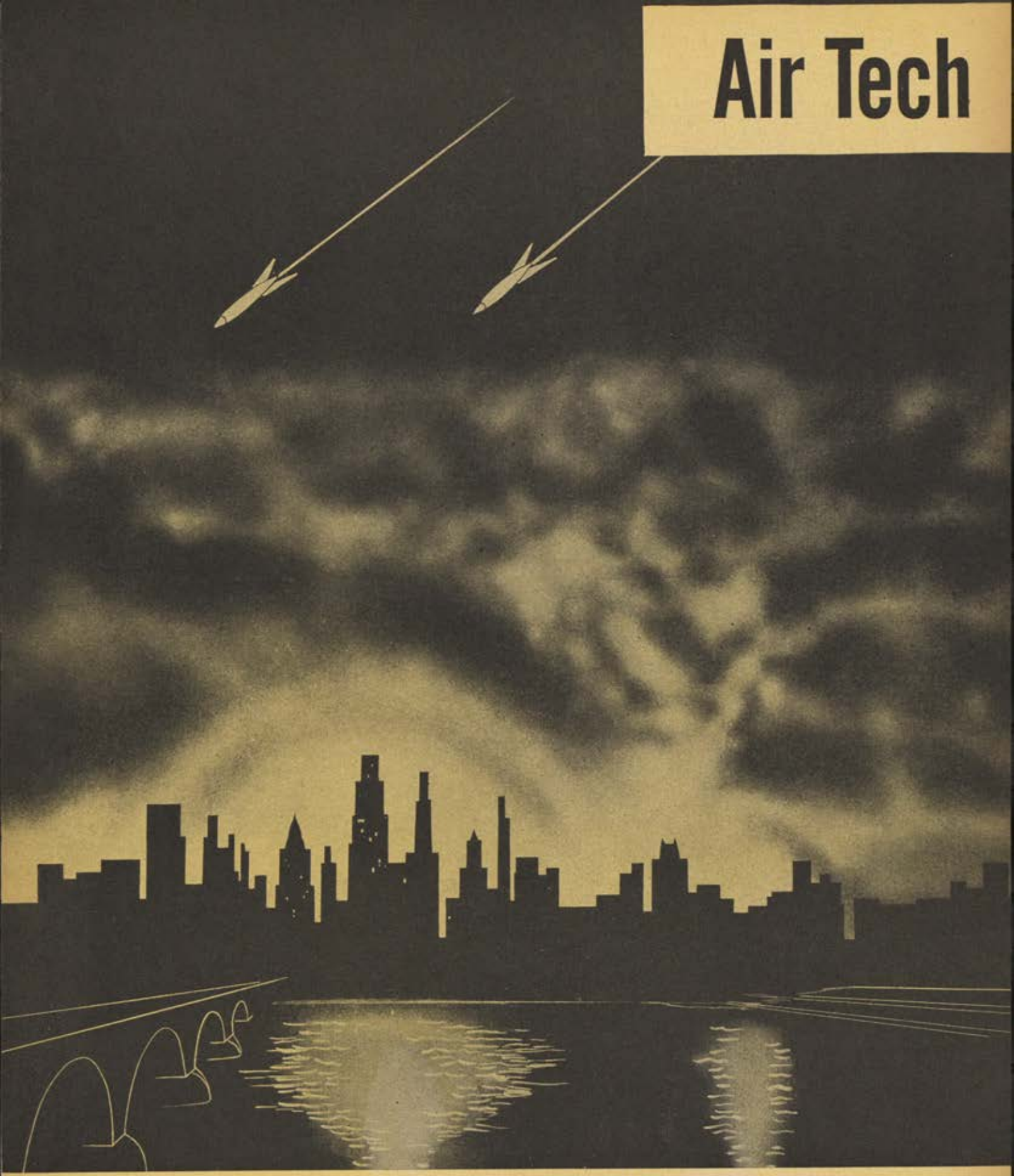
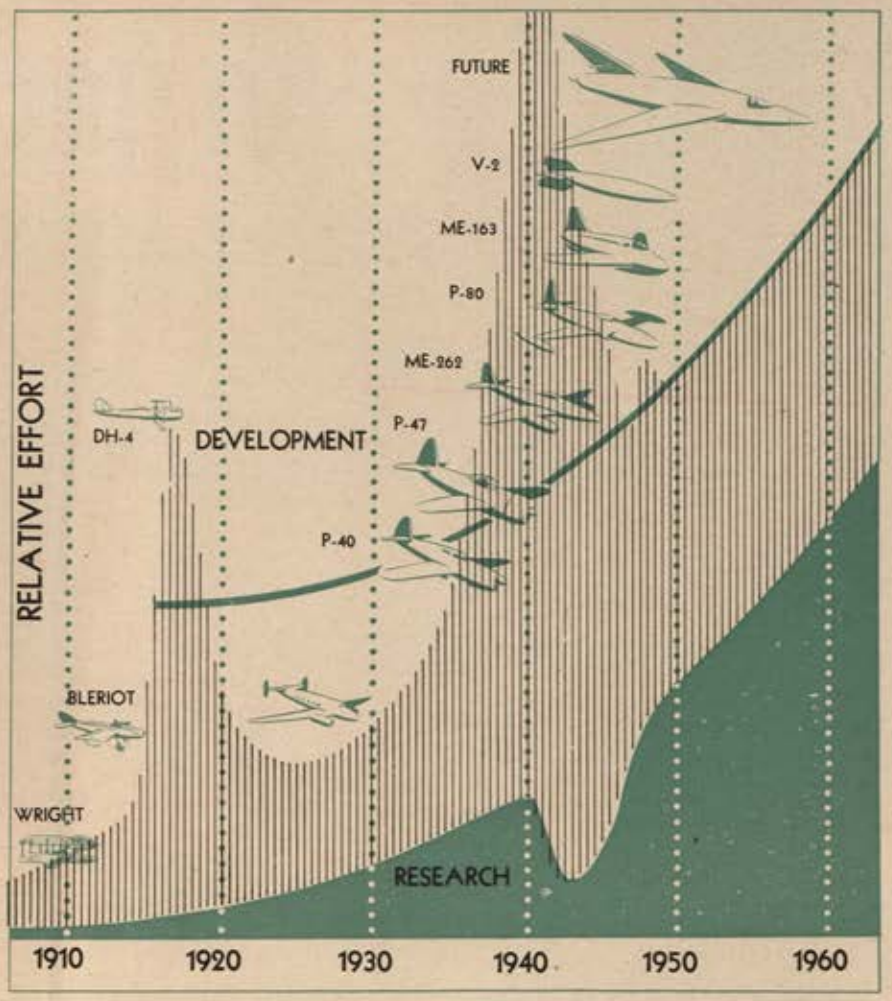


WHAT PRICE AIR POWER?

BY WILLIAM FRIEDMAN



Relation of research to development on a half-century basis shown on this graph, indicates that, while a war may stimulate aircraft development, it may slow down and even retard research effort. Progress can only be maintained if basic research is continued in peacetime.

A PROJECTILE twice the size of a Superfort fuselage streaks across the North Pole at triple the speed of sound. It buries its needle-like nose in the concrete of Detroit's Woodward Avenue. Within a matter of seconds only a conical hole in the earth's crust remains of what was the heart of industrial America.

That is how World War III may start. It will be a war without the problems of supply lines and ground occupation. One belligerent simply destroys the enemy's means for production and transportation, allowing him to rot in his own wreckage.

The end of World War II finds every nation at the edge of a planetary frontier. Relatively inexpensive, conventional aircraft can to some degree defend this zone, but real security will demand man-made meteors that carry neither pilot nor price tag.

Ideally, we would simply eliminate the forces which motivate war. Being practical, however, we must stretch our science into zones twenty miles or more above the earth and prepare to defend this outer edge by physical means.

An estimate of the cost of this type of safety was announced early this summer at Wright Field. Headquarters personnel of the Air Matériel Command demonstrated the materials currently under development, outlined the future needs of America's celestial frontiers, and candidly asked the American people for $600,000,000—the minimum price of research which can provide future national security.

Price of Peace

In a nation flooded by wealth since 1941, it would be well to retrench, to make current weapons do for a while. But experience of the last decade recommends preparation for defense as the least costly insurance against national death.

The nature of weapons *currently on hand* dictates attack without warning. In the last two major wars, the deciding factor has been American ability to produce weapons in vast, hurried quantities. Anything short of a direct-punch attack, without warning, against U. S. industry would, from a military point of view, be most unwise.

Depending so much on science and industry for our defense, we must expect to pay the high price of continuous research and that is what the U. S. apparently is doing.

Visitors to Wright Field can see many things—jet and turbo-jet power plants straining on the test block; JATO rocket units; Lockheed Shooting Stars and Republic Thunderjets. In the electronics lab, systems for radar control of pilotless missiles are demonstrated.

Among the aircraft shown to military guests on a confidential basis is the FS-1, a rocket-propelled single seater which appears to be an advanced re-design of the Messerschmitt "Komet." This is the first in a series of "tool" aircraft, to be used in experiments in transsonic and supersonic speeds.

One fact stands out. Insofar as the science of warfare is concerned, World War II settled nothing in technique. It merely moved the combat zone into an area where nature is more hostile than the enemy, where a new set of military tools is mandatory.

There is little doubt that existing facilities at Wright Field are adequate for subsonic aircraft. But that is the practical limitation of the layout. Aside from the fact that jet power plants must be tested in units originally designed for reciprocating engines and that the wind tunnels were designed when engineers thought the velocity of sound was the top limit of speed, there are more practical reasons for building new test areas.

New Wind Tunnels

The installation at Wright Field is in the center of a highly industrialized and heavily populated area. There is a certain amount of risk involved in erratic flight of pilotless missiles and aircraft. This is no business to conduct close to any town. Moreover wind tunnels at Wright Field are only run late at night when current can be spared from the task of lighting the city of Dayton and running factories. Tomor-

row's research center demands a great deal of open space, large amounts of cold, chemically pure water, and unlimited and inexpensive electric power. The answer is the proposed Air Engineering Development Center.

As military experts see it, AEDC calls for an area of about 100 square miles, removed from large centers of population and industry. There must be sufficient land available for expansion.

Facilities are needed for the study of piloted and pilotless supersonic aircraft, winged missiles of submeteoric speeds, applications of nuclear energy, and for atomic bombs in a variety of forms.

Because high-speed and high-altitude flight impose as yet undetermined loads on the human body, flight physiology research must be accelerated as never before.

Radar and radio, which came into their own during World War II, must be pushed to new goals in detection and control of aircraft through electronics, light, heat, and magnetic applications.

Probably the most important facility of the proposed center will be the fluid dynamic group. Here will be found the aerodynamic data needed for the development of military aircraft. Current facilities are for the most part, totally inadequate. The most powerful wind tunnels at the Army's disposal, the twenty- and ten-foot units at Wright Field each use 40,000 hp. Their best performance is 450 mph at sea level. Under altitude conditions, the 10-foot tunnel simulates only nine-tenths the speed of sound. The few existing supersonic tunnels in the U. S. are too small and limited in speed to be serious tools for supersonic wind tunnel research. Furthermore, there are no facilities anywhere where turbo and ram jets and rocket motors can be tested under high altitude and high Mach Number conditions. (Mach numbers are the ratio between airflow and the speed of sound, expressed in decimals. If the speed of a projectile is 400 mph in a zone where sound travels at 400 mph, the Mach Number is 1. If it traveled 800 mph in the 400 mph area, the Mach Number would be 2.) To fill these gaps in our scientific armor the proposed Center would include the following types of wind tunnels:

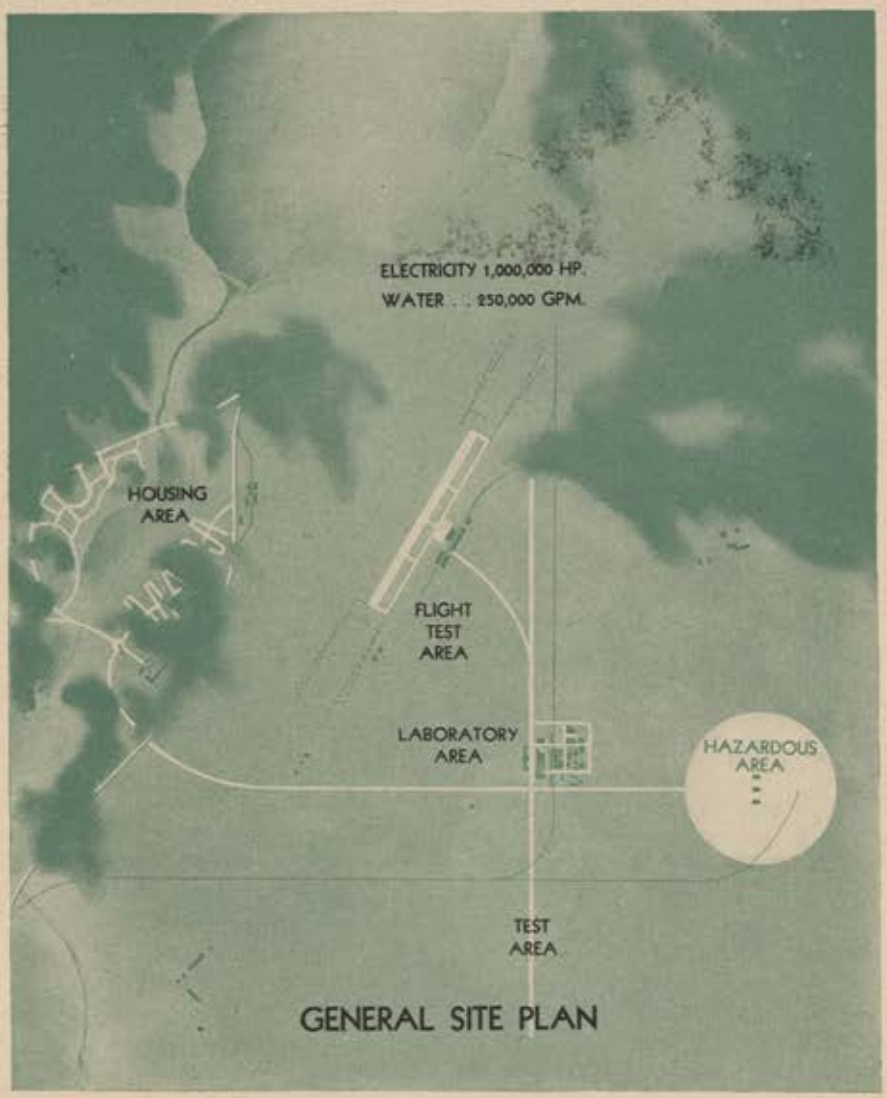
A simple air-exchanger type wind tunnel, not unlike the Otztal type in Austria. Incorporating a test section 20 to 30 feet wide, this tunnel would require 100,000 hp to achieve nine-tenths the speed of sound, adequate for unrefined tests at high speeds to determine such primary considerations as lift, drag moments, and pressure distribution.

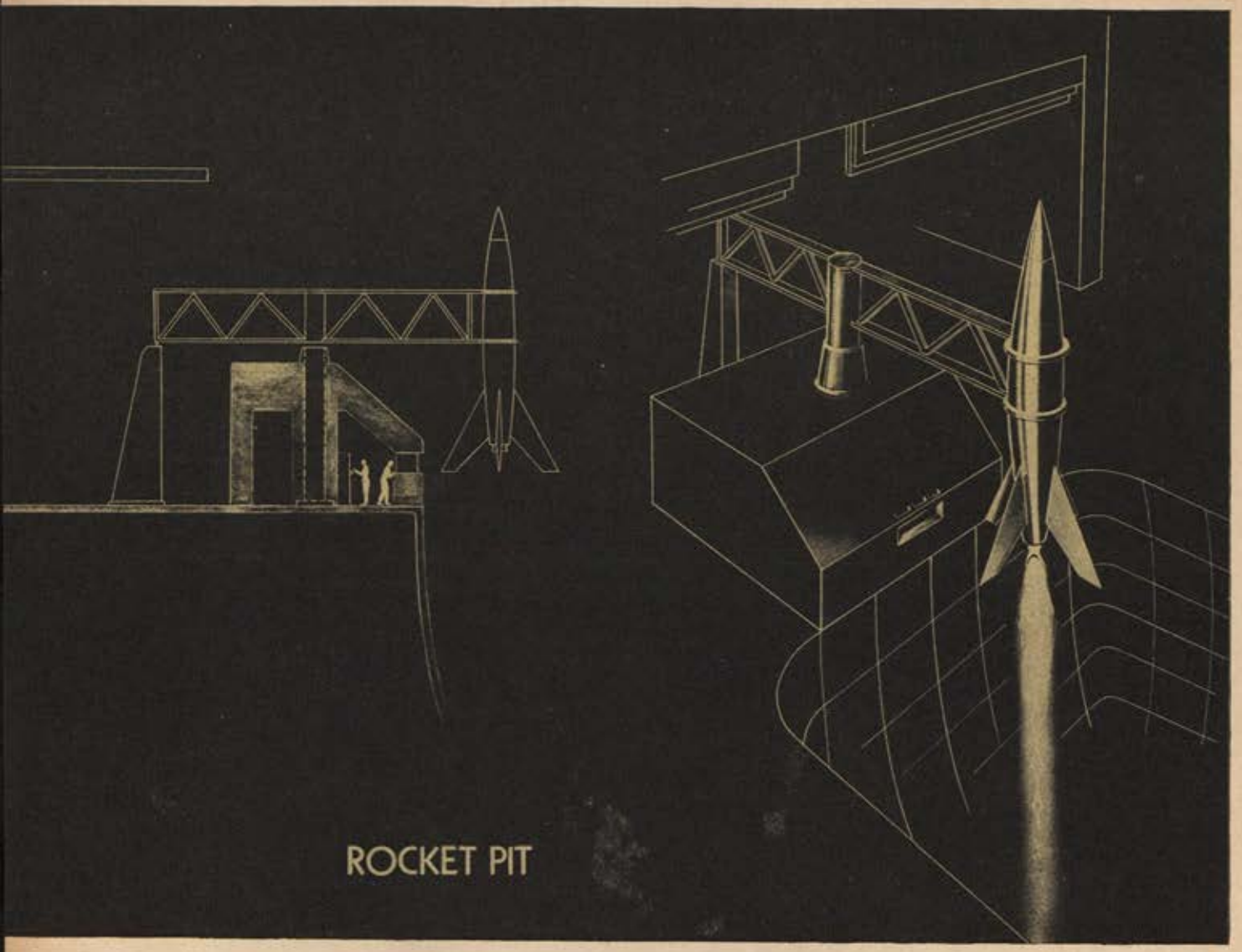
The second tunnel would be dedicated to full-scale tests on nacelles, thermal jet engines, propeller combinations and similar problems at Mach Numbers up to 9/10 at varying temperatures and at simulated altitudes up to 80,000 feet. This would be a bilateral tunnel, consisting of a center tube containing the fan and heat transfer equipment. At each end of this tube a rotary valve would direct the airflow into the separate tunnels, thus allowing a single power source to serve two work sections. One test section on this unit would be 20 feet across, the other 30. There would be enough air cooling, drying, and compressing equipment to service both tunnels at once. This unit would require 120,000 shaft hp.

The third tunnel would serve the transsonic researchers, able to handle Mach Numbers from 7/10 to 1 8/10. With 150,000 hp output, scavenging, evacuating, and refrigerating equipment similar to Tunnel II, this unit's 20-foot working section could accommodate full-scale gas turbines, jet engines, and winged missiles.

Tunnel four, as projected, would be a rectangular layout with 8 x 12-foot section designed to operate in the supersonic range between Mach Numbers one to three. Accommodating scale airplane models, full-scale components of ram and turbo jets, rocket-propelled missiles, and similar projects, this tunnel would permit tests under pressures greater

General plan for the proposed center, showing how the 100-square mile area would be utilized. The power, water and positional requirements of such a center would be greater than any in current use. Hazardous nature of this kind of study requires virtual isolation.





V-class would be tested nose up, at rocket pits, where the forces acting on the rocket could be measured by special instruments. Observing personnel would be sheltered in concrete reinforced revetments. Flames from rockets would be discharged into fire-resistant wells.

than sea level, as well as high altitude conditions.

In the proposed fifth tunnel, a 40-inch square test section would operate continuously at speeds corresponding to Mach Numbers 1-10, the hypersonic range. Although limited to scale models, thermodynamic as well as aerodynamic research could be conducted in this equipment. While tunnels with larger capacities might have certain advantages, the amount of power and equipment required would be out of proportion to results. Moreover, the proposed structure could utilize some parts from a similar tunnel which was under construction at Kochel in Southern Germany.

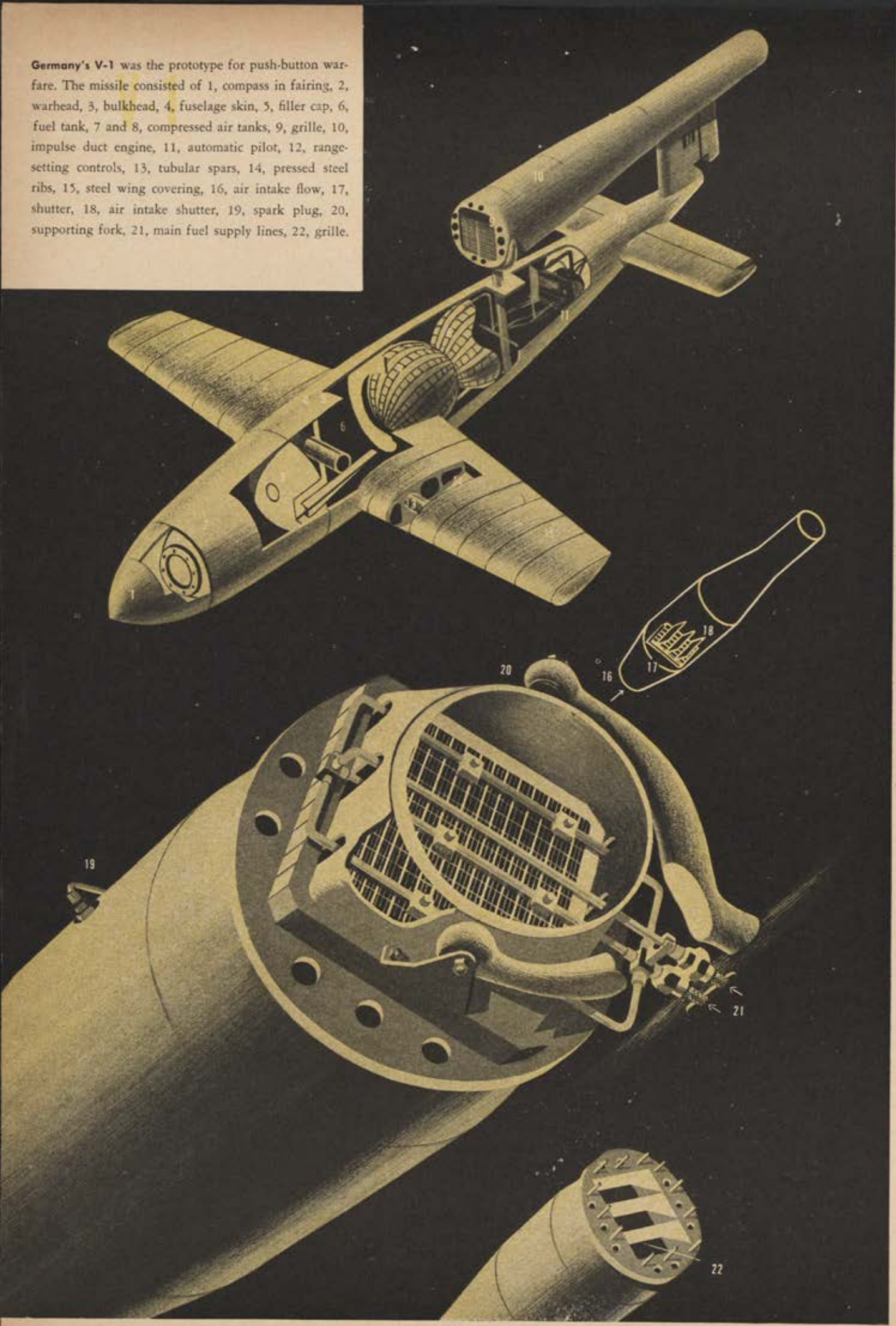
Rocket Research

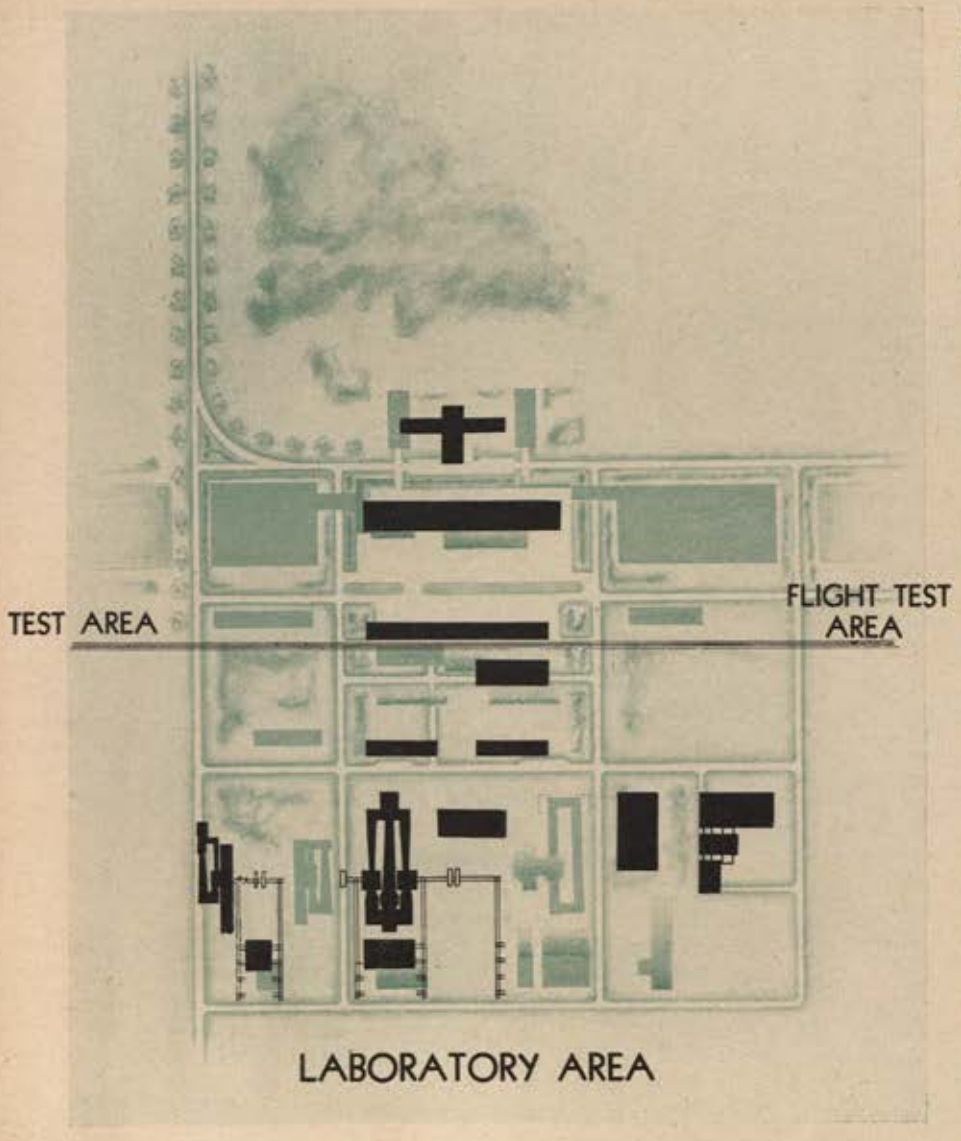
Thus far, the business of creating jet engines has been a trial and error proposition. During the war, our great rush to surpass Germany compelled us to sacrifice some performance in our reaction engines. We must now retrace our steps and collect adequate data so that truly efficient jets can be developed. Aside from power plants, the whole business of heat transfer and insulation problems resulting from skin friction at high speeds requires close study. Add to this the entire field of nuclear fission as applied to propulsive power and it adds up to a lot of equipment which, in many cases, exists only in the minds of the most advanced physicists. Such facilities must include launching stands for rockets and captive stanchions where rockets can be mounted for static fire study under continuous conditions. Because many thermodynamic tests cannot be made in small scale, these stands must have capacity for large projectiles.

It has been pointed out that jet propulsion existed in theory three decades ago. Like the aircraft turbo supercharger, its application was limited by the strength of materials. The whole field of supersonic flight presents new problems in materials and structures. Extremes of heat and cold, the strain of high-speed flight present new questions and novel facets to old ones which require answers. Reactive engines require metals which will retain their strength at yellow- and red-heat conditions.

This part of the Center would require, first, a processing area which would house such plants as electric furnaces, forges, a rolling mill, welding equipment, and handling equip-

Germany's V-1 was the prototype for push-button warfare. The missile consisted of 1, compass in fairing, 2, warhead, 3, bulkhead, 4, fuselage skin, 5, filler cap, 6, fuel tank, 7 and 8, compressed air tanks, 9, grille, 10, impulse duct engine, 11, automatic pilot, 12, range-setting controls, 13, tubular spars, 14, pressed steel ribs, 15, steel wing covering, 16, air intake flow, 17, shutter, 18, air intake shutter, 19, spark plug, 20, supporting fork, 21, main fuel supply lines, 22, grille.





View of test, flight and laboratory areas, showing arrangement of buildings and wind tunnels.

ment. Facilities for plastics and other nonmetallic products would also be provided.

The physical test area would necessarily contain the usual equipment for testing physical characteristics of materials. Some would be housed in cells for trials under conditions of extreme and varied temperature and pressure conditions. There would be laboratories for chemical study and areas for testing complete airframes and components, with special test cells for operation under extreme temperature variables.

The acceleration involved in attaining supersonic and hypersonic speeds imposes loads on the human body not now encountered. With high altitudes of most supersonic flights emphasizing these new physiological factors, human survival becomes the keynote for all aeronautical research.

Various kinds of pressure suits have been developed to protect aircrews from the effects of acceleration. However, past results may soon be forgotten in the light of experiments which show that gas mixtures outclass pressurized air or oxygen in protecting airmen from altitude and acceleration effects.

Meanwhile, ejection seats and ribbon-type supersonic parachutes are moving into the limelight, pointing to such equipment as catapults and whirling arms to determine the effects of linear acceleration.

Test chambers for the study of effects of heat and cold, facilities for observation of the effects of vibration, noise, odors, temperature, pressure, and other associated flight conditions must be established.

Fuels for the Future

Plus 100 octane gas entered the war as the most potent source of flight energy. It seems almost paradoxical that the fuel for jets should be filtered kerosene. Rocket power now uses such infernal cocktails as analyne and fuming nitric acid, liquid oxygen and gasoline, and some types of solid fuels with built-in oxygen supply. The Germans tested over 6,000 different rocket fuels, and failed to produce an ideal solution.

The problems of improving current fuels, developing additional energy sources, determining standards and ratings for fuels not in common use, and planning manufacturing processes, service, storage, and handling of new fuels and propellants demand extensive and expensive research.

Equipment for the investigation of nuclear fission is, as yet, indeterminate. However, facilities, appropriations, and personnel must come first.

Traditionally, instruments are a half generation behind airframes. Right now the jet fighter flies with instruments originally developed for conventional aircraft, simply "stepped up" to answer new requirements.

We are still faced with a staggering number of missing links in the conveyor belt of information. For instance, we lack a satisfactory instrument for measuring thickness of hollow steel propeller blades or for measuring bucket-wheel temperatures in a gas turbine.

Instrument development may well hold the key to all other research, for tests without proper measuring instruments have little value. So the new research center must concern itself with optical, mechanical, and hydraulic instruments, as well as the electronic field.

The physical equipment for such research is no mean setup. The Optics group would need an adequate area in which the air is not only conditioned but dust free. Light-tight optical tunnels, chambers for study of various light sources, altitude and temperature test cells, vibrational equipment are only part of what is needed. The Mechanics area would require pretty much what has been provided in the past—mechanical and force measuring equipment; balance systems, manometers, pressure transmitters, etc. These, however, would have to be calibrated and conditioned for conditions imposed by supersonic flight.

The Electronics area would have

(Continued on page 64)

From the laboratories of the Army and Navy flows a steady stream of Wellsian weapons. In his concluding article Mr. Peck reports on the new creations of our atomic arsenals

Man-Made Meteors

BY J. L. H. PECK

PILOTLESS AIRCRAFT types are versatile enough to be employed in all the tactical functions of missile warfare. Robot planes are as efficient in air-to-air combat, for example, as they are for suface-to-air- operations. They range in size from the 16-foot Navy "Gorgon" to projected flying wing designs of bomber proportions. The AAF calls these craft OQ's or BQ's—O for pilotless, Q for remote controlled, B for explosive-carrying aircraft. Navy models carry the same designations regularly used to identify planes of their flying fleet.

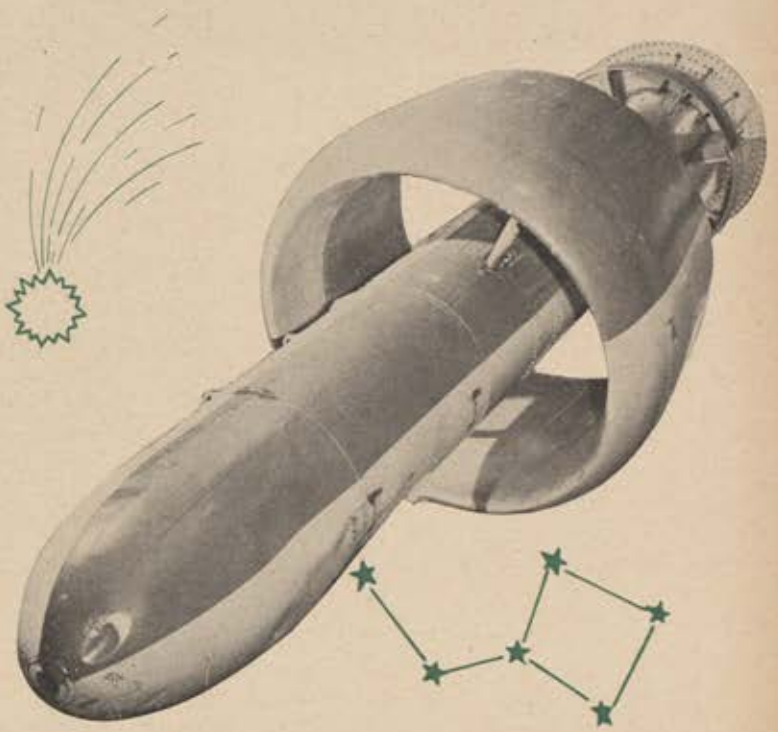
Many missiles are referred to as pilotless aircraft which are not strictly aircraft: this is done to distinguish all BuAer missiles from those designed by BuOrd. The "Gorgon" is KA2N—K for pilotless aircraft, A for air (the kind of target it is to be employed against), 2N the second model from the Naval Aircraft Factory.

Remote-controlled bombers proved themselves dramatically in the war. War-weary Flying Forts and Liberators were loaded with 11 tons of TNT and a more powerful secret explosive called "Torpex," fueled with only enough gas for a one-way trip, stripped of guns and other weighty equipment, and flown by a two-man crew. After the take-off, the pilot and co-pilot bailed out and the ghost bombers were flown by radio control to the target area. Here, the operator, who rode in one of the other bombers of the formation, sent the explosive-laden planes diving into the target with far greater accuracy than could be obtained by precision bombing, and with far greater explosive power. The 40-foot thick submarine pens on Heligoland first suffered hits by these "drones" in September, 1944. Other high-priority targets were knocked out by the war-wearies in the ETO, and many island fortifications in the Pacific were "neutralized" effectively by radio-controlled bombers. These demolitions owe their success to the efforts of a number of technicians who worked at home and in the field on the top-secret joint Army-Navy "Anvil Project." The flights themselves were referred to as "Operation Castor."

The robot that guided these planes so effectively was essentially the same A-4 Remote Flight Control Unit that piloted the Culver PQ-14 and TD2C-1 (Navy version) target planes on which so many gunnery trainees set their sights in antiaircraft and aerial combat practice during the war. This is a combination 10-channel FM receiver and hydraulic automatic pilot mounted together in a box less than two feet square. It incorporates three air-driven gyros, several electric "trim motors" that regulate control movement and activate switches for the throttle, landing gear, and other essentials, and servo pistons that move the plane's control surfaces.

Every phase of flight from the starting of the engine to the application of the wheel brakes following the landing can be executed by a "pilot" in another plane or on the ground. He sends radio commands to the robot plane with a 10-inch "stick box" fitted with a miniature control stick, two selector switches, and a row of amber indicating lights. This is connected by a cable to the FM transmitter in the control plane or ground station.

High speeds are no detriment to radio control. A YP-59B Airacomet known as the "Reluctant Robot," and its mother plane the "Mystic Mistress," a two seater jet job, have been flying around Wright Field for months. The Navy's XF6F-3X "Ghost Hellcat" has also been operating under full radio control at the Johnsville station since April, 1945, and more than 100 of these older Hellcats are being fitted with radio controls for use in combat training.



The WAC Corporal, high-altitude sounding rocket, developed by the Jet Propulsion Laboratory, GALCIT for Army Ordnance. It can reach 230,000 feet in vertical flight. The circular "shroud wing" features the radio-controlled "Roc" bomb. The trick paint job helps sight the falling projectile, whose direction can be changed by moving the shroud. Rear plate acts as antenna as well as a drogue.

An unusual feature of the Army's controlled fighters is a scheme for "television telemetering" of the instrument readings. A compact camera televises airspeed, altitude, and other data to observers or operators in a control plane by reproducing on their television screen, or "scope," an actual picture of the radioplane's special, lighted instrument panel. This system will enable operators of distant pilotless aircraft to check the performance as well as if they were in the cockpit looking at the regular panel.

Smoke trail left by a rocket launched during project conducted by the Jet Propulsion Laboratory, GALCIT, at White Sands, N. M.

Radioplanes are important to Operation Crossroads experiment. Drone Flying Fortresses and Hellcats will carry certain instruments into the irradiated A-Bomb cloud to obtain data impossible to gain by any other means. The radioplanes' televisor units will transmit to screens in the observers' ships a fearful close-up of the "Big Bang."

Remarkable though these pilotless aircraft and smaller guided missiles are, most are in a state of development comparable to the 1918 bomber. The World War I bomber was efficient for its time; it had proved its usefulness, and of it they said: "If there's ever another war, the bombing plane will annihilate us all." The same quote can be applied to guided missiles with much greater conviction, if we do not win quickly this shaky peace.

When—or if—it happens again, guided missile warfare will be the ideal brand of war for those smaller nations which happen to be long on scientific talent but short on airpower and manpower and war potential. In its actual execution, missile warfare is the least expensive method for inducing international bloodshed. Research and development costs are high, but some little nations can well afford this output. People in the know, for example, maintain that America's closest atom bomb rivals are neither Russia nor Britain but Argentina and Holland!

Missile warfare is less costly—after the research—because the automatic nature and accuracy of the weapons economize on material and manpower. One doesn't need several groups of Superforts and escort fighters—plus the couple of divisions of highly trained air and ground personnel necessary to man them—to knock out an enemy target if one has available "seekers" or television- or radar-guided missiles. Offensive control centers are easier to build and equip than great bomber bases, defensive control centers simpler to operate than fighter airdromes.

One reason why design and development is costly is because we are just finding out the answers to a lot of problems—and striving to solve still others. The teardrop was for a long time considered the most suitable aerodynamic form; but this does not hold for supersonic missiles. More ideal is the shell-shaped "ogival" head, perfectly cylindrical body, and the tapering, chopped-off "boat" tail. With or without wings, this holds true. The wings may be used for sustenance or just for control purposes. Two weird examples of the latter are the "shroud wing" and "cruciform wing."

The VB-10 "Roc" bomb features a "shroud" that is bent around the bomb's body in cylindrical form instead of projecting sidewise as does a regular wing. Control is afforded by tilting the shroud in the desired direction. It has only slightly less lift than a straightened-out wing of equal area, resembles a long-chord NACA cowling.

The "X Roc," on the other hand, has a "cruciform" consisting of two short narrow-chord wings that form an X, with the body of the bomb in the center. The trailing half of each wing is hinged, and to these super ailerons that are gyro-stabilized are attached full-span trailing edge trim tabs.

"Little Joe," a new Navy creation for surface-to-air goings on, is of similar but more advanced design. "Joe" features canard cruciform wings and a cruciform "tail" up front. Both wings and tail are fitted with narrow, hinged control surfaces. This rocket-powered missile is radio-controlled and equipped with a VT proximity fuse. It was in production at the war's end for use against new Jap craft such as Baka 22, Oka 22, and the Me-163—resembling "Shusui" rocket plane.

Huge telescopic wings are being designed for V-2-type missiles that can be extended after the flying rocket reaches the top of the trajectory—or at some later point in its flight—by radio control. Long-distance glides will enable the rocket to travel with power off, and the big wing can be retracted or jettisoned as the weapon starts the final plunge to the target.

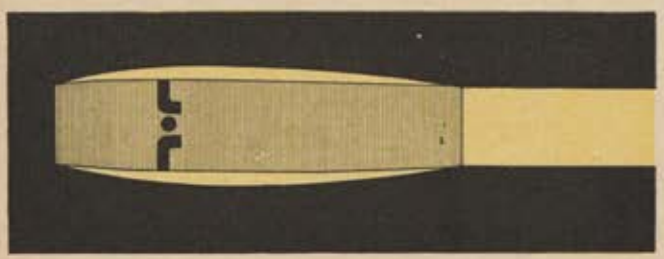
Radical structural features, as well as shapes, are evidenced in missile science. One is a knife-edged, solid forged wing. Another is the "plate wing," that is, a thin casting welded along the trailing edge (after being shaped) in the same fashion

View of rocket, leaving the launcher for a strato-sounding flight.

that our widely used hollow steel propeller blades are formed.

Bat-winged jobs such as the JB-1A, tail-first canards like the Navy's KA2N and KGN "Gorgons," and bombs with V-shaped "butterfly" tails like the "Gargoyle" are other unusual design features currently in vogue.

Future fashions, however, may accomplish good as well as evil. Rocket missiles have been used recently by Army and Navy scientists to explore the great void above the earth's atmosphere, the ionosphere. Actually, it is not void: there are many strange aspects of this outer world of stellar space, and our knowledge is limited because no one has ever been up there. The Germans shot their V-2s above 60 miles in routine operations. Rebuilt US



The ramjet is simply a hollow tube. Nevertheless, all of the events of the conventional engine take place. The craft's forward motion forces air into the jet (intake). The venturi throat compresses the air (compression) in the same stage, the fuel is injected (carburetion) then burned (combustion) and ejected through the jet (exhaust). Engine, sans moving parts, requires no lubrication system.

V-2s attained 75-mile altitudes at White Sands Proving Grounds, New Mexico, while another secret American rocket is reported to have ascended more than 100 miles into the ionosphere. This is at the level of the aurora borealis and meteors.

Increased power, perhaps involving the use of step rockets that fired in succession instead of in one sustained burst as does the single rocket engine, may soon enable us to get beyond the force of gravity. A competent authority estimates this climb would require sufficient thrust for a speed of around 12,000 mph—roughly four times that of the V-2. Once we achieve this speed, the missile could reach the point above the earth where the power could be shut off and it would course around the earth like a man-made satellite. At this critical point gravity and centrifugal force cancel out each other to keep the missile from flying off into space or back to earth.

Aside from the problems of propulsion, however, a number of phenomena of the upper world are under consideration in our labs. Heat problems will result from the friction of such fast travel, plus the fact that the ionosphere is not cold like the stratosphere but very hot. Present studies indicate a temperature of 100 degrees centigrade 125 miles up. This is the point at which water boils on earth. Meteoric dust will cause abrasion problems, and "ionization" of the missile's skin may bring unforeseen difficulties. Solar radiations such as cosmic rays and corpuscular radiations act on the atoms of gases in the upper atmosphere. These bombard the atoms and occasionally knock out a "free electron" that darts around through space on the loose. The atom from which this free electron was separated, of course, becomes electrically unstable. Also on the loose, it seeks to capture one of the drifting electrons. The atom often picks up not only the suitable one but an extra electron; this extra electron is thrown off, but the constant flux of electrons produces what we know as electricity. A rocket missile might pick up enough of these free electrons to charge its surface to a very high potential.

The results of our "Wac Project" and "Hermes Project" have already provided scientists with considerable ionosphere data. Further research is expected to provide invaluable information about weather control and forecasting. These ionosphere rockets are being equipped with specially designed recorders and telemetering devices which will reveal the composition and ionizing characteristics of the various electrified layers.

It is the layers of these charged particles that reflect back to earth the radio waves we transmit long distances. These Kennelly-Heaviside layers are also unstable and shift up and down according to the sun's rays and sunspot activity. This brings about new problems in the design of the radio equipment and other electronic apparatus we will use to control such high-flying missiles. War research in VHF radio added about 20,000 feet to the radio ceilings of our communications equipment.

Indeed, improved radar and SHF radio are expected to play an important part in defense against atomic rockets that may be launched against the US. Interceptor missiles which could be launched to collide in the ionosphere or stratosphere with approaching enemy atom carriers are believed to be the key to such defenses. The interceptor missile need be no larger than the Wac Corporal rocket, or it might also be an explosive-carrying model of the Navy's 1,400-mile per hour athodyd Bumblebee missile. This will have to be strictly an automatic affair:

(Continued on page 60)

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

A preview of Britain's all-purpose cargo and passenger plane which will fly Empire routes in a bid for an important share of lucrative postwar traffic.

BRISTOL'S Flying Freighter

BY RALPH MICHAELIS, AIR FORCE *Foreign Correspondent*

AN AIRCRAFT that can be adapted as a flying freighter, fuel tanker, cattle transport, commercial showroom, among other uses, is Britain's newest bid for a share of the lucrative peacetime air commerce.

This is the Bristol Type 170, England's first postwar aircraft to be built entirely to a civil specification. It is designed to fulfill the need for a simple and reliable twin-engined airplane capable of operating from small landing grounds with a payload of five tons or carrying up to 40 passengers.

Two distinct versions of the "170" are being produced—the *Freighter* and the *Wayfarer*. The *Freighter* is designed for cargo service at low operating costs. The *Wayfarer* offers passenger travel at prices directly comparable with surface transport rates—approximately 2½ cents per passenger mile.

Both the *Wayfarer* and the *Freighter* are twin-engined high wing monoplanes of all-metal construction with fixed undercarriage, powered by Bristol "Hercules" sleeve valve engines. The cargo hold of the *Freighter* has been specially designed to facilitate rapid loading and unloading through the nose which is fitted with large doors opening sideways. These doors allow unobstructed access to the full width of the hold, and with the door-sill only 4 ft. 6 ins. from the ground, a truck may be run under the nose and unload directly to the cargo floor. A three-ton truck may be driven up a ramp into the hold. The payload is sufficient to allow the truck to be driven aboard and transported to its destination fully loaded.

The volume of the main hold is 2,020 cubic feet, and a further 340 cu. ft. of stowage space is provided by a secondary compartment at the rear. This compartment is entered by a door 60 inches wide by 50 inches high and is connected with the main hold by another door.

Payload of the *Freighter* is limited only by the maximum permissible all-up weight and not by the cargo hold capacity as is usually the case with cargo airplanes.

Freight doors and trailing edge flaps are operated by hydraulic jacks energized by an electrically driven pump. The pump works only while a door or flap movement is taking place, and the heavy wear and failure often associated with permanently coupled engine driven pumps is thus avoided.

The Hercules engine, which is the transport version of the one used in the Beaufighter and other military aircraft is mounted in a power egg assembly which can be removed completely by withdrawing four pins from the attachments to the nacelle structure.

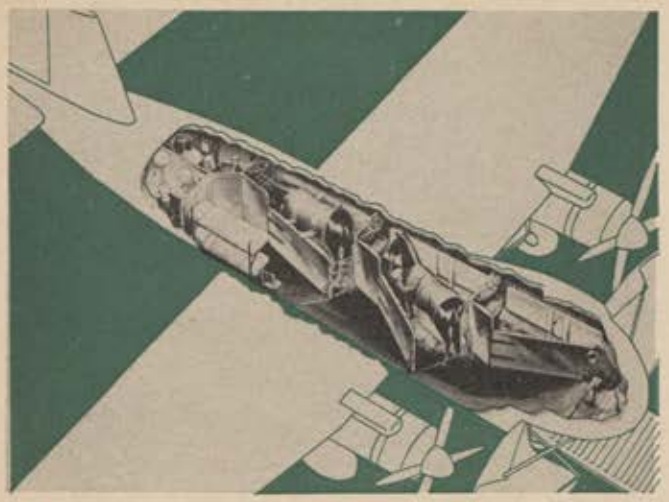
For reliability, lightness, and ease of maintenance, a fixed undercarriage is fitted. For the same reason the tail-wheel type of undercarriage was given preference over the tricycle type, with the added reason that the tail wheel is better adapted to unprepared landing grounds.

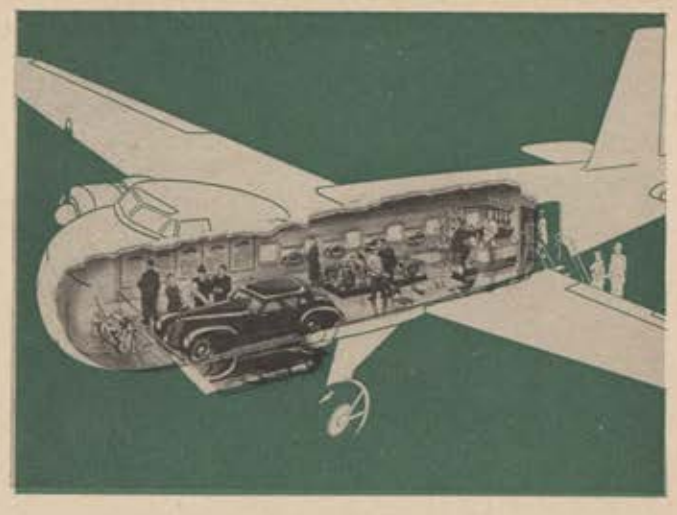
The *Wayfarer* version of the "170" is of the same basic construction as the *Freighter* but the large doors in the nose of the aircraft are replaced by a fixed nose. Seating for up to 40 passengers can be arranged, but the standard design caters for 32 persons in 16 double seats facing forward. These seats are placed eight on either side of a central gangway, and adjacent to each pair of seats is a large window which allows, in conjunction with the high wing, an unrestricted range of vision.

The cost per hour of operating the *Freighter* is estimated at 93 dollars, and it is calculated that additional costs associated with passengers' services (pay of stewardesses, airport services, etc.) approximate 13.00 dollars per hour. Cost per revenue mile is 75 cents. This is equivalent to cost per passenger mile of 2½ cents on a load factor of 62½ per cent, a cost per passenger mile of 4 cents. This includes an allowance of 40 lbs. of luggage per passenger, but does not include any revenue arising from mail or freight.

These operating costs are based on British rates under which the pilot receives 5,000 dollars a year for 1,000 hours flying, and the co-pilot 3,000 dollars, with other expenses in proportion.

The Eristol Freighter can be fitted as a flying ambulance for outlying areas (left) or as a winged horse van (top, left). As a flying auto showroom (top, right) it could carry sales to far places. The bulbous nose of the Freighter (center) permits removal of bulky cargo. Ample interior space enables the craft to be used as fashion salon, taking the latest in mode to places that would ordinarily miss this service. Hospital version, equipped with surgery and waiting rooms can outfly disaster.



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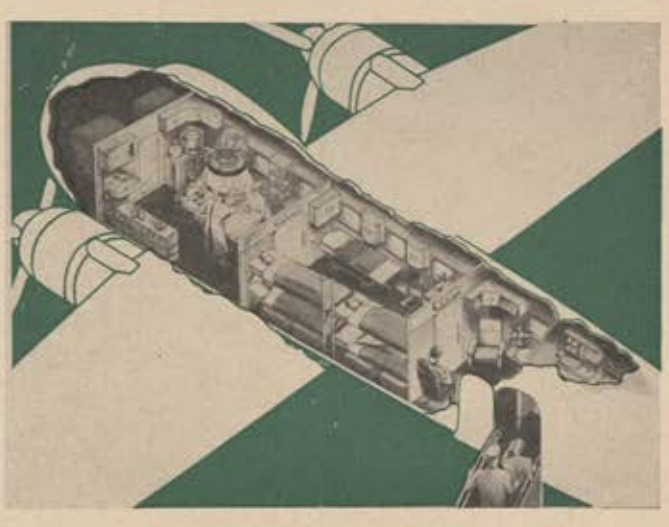

the four-most side-by-side personal plane

HIGHER—*World's Altitude Record for Light Planes*

24,311 feet. Set by Grace Huntington at Los Angeles, Cal. International record for airplanes of second category.

FURTHER — *1700 Miles in 16½ Hours*

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LONGER — *14 Days Aloft in a Taylorcraft*

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FASTER—*Speed Record for Light Planes*

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plane that easily lands in any field or pasture!
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"Best Buy in the Sky" by men who've
found their place in the sky!

TAYLORCRAFT AVIATION · ALLIANCE, OHIO

Targets For Today

Aerial photography offers attractive business opportunities to war veterans with initiative.

BY GEORGE ARNOLD

POSTWAR INDUSTRIAL reconversion and the anticipated boom in civil aviation should offer splendid opportunities to those engaged in aerial photography.

Veterans seeking to establish their own business might well consider the money-making possibilities of taking photographs from the air. Aerial photography doesn't require much initial capital and if you know beforehand the angles that can make or break you there is a reasonably good chance of building a profitable enterprise in this field.

Of course, as in every other type of business, you must have a certain amount of imagination and business acumen. A sound working knowledge of your camera equipment is also essential although this doesn't mean that you must be a crack professional photographer. Nor is it imperative that you buy expensive equipment. Military cameras used by the army and navy during the war are being adapted for civilian use and probably will be reasonably priced as soon as volume production gets under way.

In the war-waiting days of 1939-40, I started my own aerial photography business and though I started to lose money when the war came on, I gained such good, sound experience that I still think a free-lance photographer can make a sizable living in this field.

I probably picked the worst time in history to launch a new enterprise. As war was approaching, people were scared, and things everywhere were tightening up. But I was a little cocky, even though I'm usually the cautious type, because I had had over a decade's experience with aerial photographic companies, and had seen firsthand what makes them tick. I had worked in every phase of their operations: piloting-photography, mapping-mosaics, dark rooms, and the rest. I had a record of 2,000 photographic hours, most of them at over 15,000 feet in the air. My aerial shots had been widely reprinted. All these things were in my favor for prospering; the times were out of joint, that's all.

But up to 1940, aerial photography was definitely a paying proposition in this country, with nice money for those sufficiently alert to its possibilities. Now that the war is over, prospects for civilian aerial photography should again perk up considerably. No important commercial work was done in the United States during the long war years. After such a lapse, it can be considered a virgin field. At least, it can start in fresh where things left off.

Right now three or four large aerial survey companies are firmly entrenched in the field. These outfits do large, complex mapping-surveying projects, usually for government agencies and big business; they have little time or patience for the small, miscellaneous jobs that constitute the independent operator's business. There is no need to fear that these big boys, with money in the bank and expensive operating equipment, will take away all the business. So income prospects for fixed-base operations are varied.

Aerial photography came into its own as a vivid, accurate reporter during the war. The public became accustomed to judging the full scope of news events from aerial photographs. Newspapers and periodicals are bound to make extensive postwar use of air photos—this time showing Americans in action on home grounds.

Besides, in the tremendous postwar reconversion and building programs that will take place, there will be photographic jobs to do for business swinging back into peacetime channels: steamship companies, engineering and real estate concerns, advertising agencies, factories and businesses of all kinds. Long before the war, groundwork was laid in educating both business and government to want and use aerial photographs. With military aerial photography recognized as indispensable, peacetime demands are certain to grow.

It is obvious, though, that anyone going into this field as an independent should ponder seriously several basic considerations for potential success.

This single pre-construction aerial photograph gave housing developer a pictorial record of topography, transportation and site limits.

While planning a vehicular express highway New York engineers obtained aerial shots showing buildings and riverbank contour.

First, the city in which you operate should have a population of 20,000 or more, to provide large enough business firms and newspapers to give you orders. A city like New York, where I did my work, has room for at least six full-time operators, each with his own firm. Other locations can be judged proportionately. It would be smart, for instance, to build up your business in a center populous in itself, but with other good-sized cities or towns near by. Offhand, I can think of Chicago, Detroit, Los Angeles, Houston, Kansas City, Milwaukee.

There are plenty of light planes available at the various local airports now in operation. Charter rentals basis are cheap enough, usually under $10 an hour, and will even become cheaper as competition among operators increases at these fields. If you intend owning your own plane, there are many ways to augment your income whenever your ship isn't being used for photo jobs.

Thanks to the war, thousands of fellows are accredited pilots; thousands more have learned a great deal about aerial photography. At least 50 per cent of them want to stay in the flying photographic field. A two-man team is adequate in the air and both men should also serve as accounts salesmen. Pilots are notoriously good salesmen while professional photographers have always done their own selling.

Finally—but probably most important, camera equipment, mainstay of the business, should be selected carefully. Professional results are obtainable only with cameras designed explicitly for aerial use. Fairchild is probably the best-known name in this field. Negatives should be of 4″ x 5″ type to give sharp detail and clean enlargements to salon exhibition size, 14″ x 17″. The camera must be foolproof, so that a complete cycle of winding and film movement is rapidly accomplished on each picture when the operating handle is twisted forward and backward. This is important in avoiding blank exposures, so expensive in aerial photography.

For small operations, the camera should preferably have roll film, giving at least fifty exposures per roll, to avoid loss of valuable time in changing film. It should have a wide range of shutter speeds and a good lens of at least 6 to 7 inches focal length for photography from altitudes of 250 to 1,500 feet. It should be easy to handle and rugged, so that slipstream exposure will not batter it to pieces. A small aerial camera that most closely approximates these desired essentials is the Fairchild K-20, which did some pretty wonderful war photography for the Army and Navy.

With these items settled and tucked away, you can get started. From here on, I think my own prewar business venture can serve as a fairly accurate criterion of what every novice operator will be up against and what technique he must apply to be able to rake in profits. A good photographer, I had taken care of the essentials in starting my business. My partner, George Kellogg, had a plane and a smooth sales technique. I had sufficient capital to pay the first month's rent on a small downtown office, a good camera, and a supply of roll film and developing equipment. There was nothing very grand about our outfit then or later—we stuck to a very modest scale. Once installed in our office, we culled the classified telephone directory for prospects. These names included newspapers, advertising agencies, construction and real estate companies which had projects under way (we learned this by watching the newspapers), municipal de-

K-17

the original all-purpose aerial camera used for vertical mapping, reconnaissance, intelligence, bomb damage assessment, and oblique photography. Interchangeable vacuum back roll-film magazine accommodates up to 200 negatives, size 9 x 9 inches. Available with lenses of 6, 12, or 24 inches.

K-20

a lightweight, compact, hand-held camera designed especially for rapid-action observation spotting. Highly efficient, it obtains sequence photos in rapid succession from low altitudes. Roll-film magazine for 4 x 5 negatives. 6⅜-inch focal length lens.

K-18

created especially for high-altitude aerial photos, this camera is essential where large area coverage or large image size are demanded by a photo client. This camera may be used on low-altitude obliques with 24-inch lens and 9 x 18-inch negatives.

K-22

used almost exclusively on intelligence and reconnaissance photos in wartime, this camera has limitless peacetime uses because of focal plane shutter offering speeds up to 1/800th of a second with 200 square roll-film negatives.

K-19B

a perfected camera built for aerial photography at night, this type has limited peacetime applications. Fitted with automatic flash-bomb lighting unit, 12-inch lens, magnetic shutter, it uses 9 x 9-inch roll-film or 8 x 10-inch cut-film negatives.

F-56

created to meet special Navy requirements, this is an all-purpose unit for small and large scale mapping, rapid-speed oblique spotting, and high altitude intelligence photos. Available with 5¼, 8¼, 20, or 40-inch lenses to cover wide range with either cut film or roll-film.

partments, and steamship operators. There were others, but these were sufficient for small beginnings. George, a breezy talker who wears his hat on the back of his head, took the newspaper offices to contact. More conservative, I contacted the staid business firms.

Each of us carried a portfolio of local aerial views showing ships entering the harbor, a housing development, an oblique view of the skyline, a vertical shot of a big parade going up the avenue, and the like. You'll find aerial photographs can sell themselves, they're good. We took a lot of trouble with our samples. We made sure they were contrasting in subject matter; that they had sharp detail; and that, frankly, they'd knock the customers' eyes out.

My first call was at the de luxe office of a construction company, one of whose housing developments was shown among my samples. I knew I wouldn't get far by seeing the firm's purchasing agent (this type invariably thinks in terms of money only), but that I should see the president himself—if I could. I learned the name of the president's secretary, Miss Boyer, from the receptionist, and was asked to go in to see her.

She said her boss couldn't see anybody for days; then showed me in when I flashed the picture of their housing project.

Her boss looked at the photograph which showed the construction progress made up to the preceding month. It gave a new slant as to what remained to be done—and we were commissioned to record progress every month. When the job was finally finished, they bought a salon shot of the whole project for their office wall, and used our photos in advertisements and company publicity. This first job was a "flight contract" which paid us $75 for each successive series of pictures.

My next call was on an advertising agency. These people had to be handled a little differently. Instead of the president, I asked to see various art directors. One art director told me of a special project they were handling for an aviation firm, one of their special accounts. They needed an artistic shot of its new factory just completed, complete with air field and hangars. If we could give them exactly the picture they wanted, and he listed various esthetic considerations that had to be a part of it, they would buy it from us.

This was a purely "speculative" job.

That was the extent of my luck the first day, although I made other calls. As I look back on it, this was a good beginning for an unknown partnership. George, my partner, came back to the office a little deflated. The newspapers had been interested all right, but they wouldn't give us any orders beforehand. If we ever took any news pictures we thought they could use, come in to see them. All this showed our inexperience; newspapers can be sold only on speculative shots.

When I could get a word in, I announced proudly the bona fide flight contract and the nibble from the advertising people. George was pretty excited and talked about taking our initial photo flight the next day. We decided we would do it—if it was clear and bright enough—because we didn't want to keep our first client waiting. As a matter of fact, we never kept any clients waiting during our whole career if we could help it. It's bad business; keep them well supplied.

The following day was nice. The air was crisp, with good bright light, and with no haze or smoke apparent. Ideal photographic weather. If it hadn't been like this, it would have been better to wait, rather than risk getting fuzzy, dark pictures.

First we flew out over the suburbs, shooting the housing project, weaving back and forth several times to take pictures from several angles and from varying altitudes. Since the advertising agency's client, the aviation firm, was near by, we were able to take pictures of that while encircling the general territory of the housing project. By this we learned our first important lesson in planning our mileage in the air. Kill as many birds with that one stone as possible. Plan your itinerary beforehand.

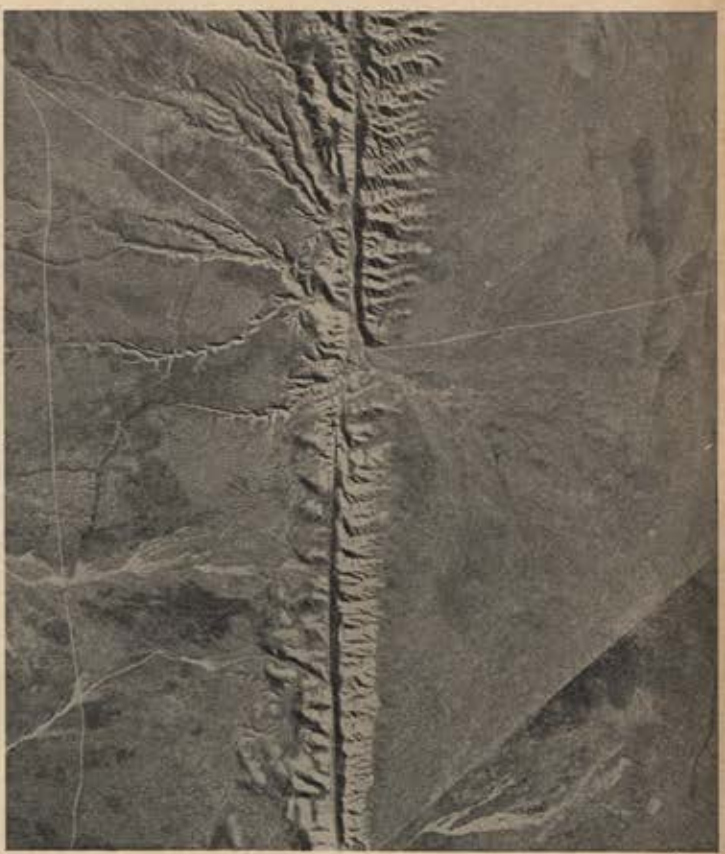
We had some more good luck on that perfect day. We got a picture of a newly built luxury liner coming into New York harbor. This wasn't accidental, though, because we went out of our way for it. We had read about the ship's forthcoming arrival the previous day in the papers.

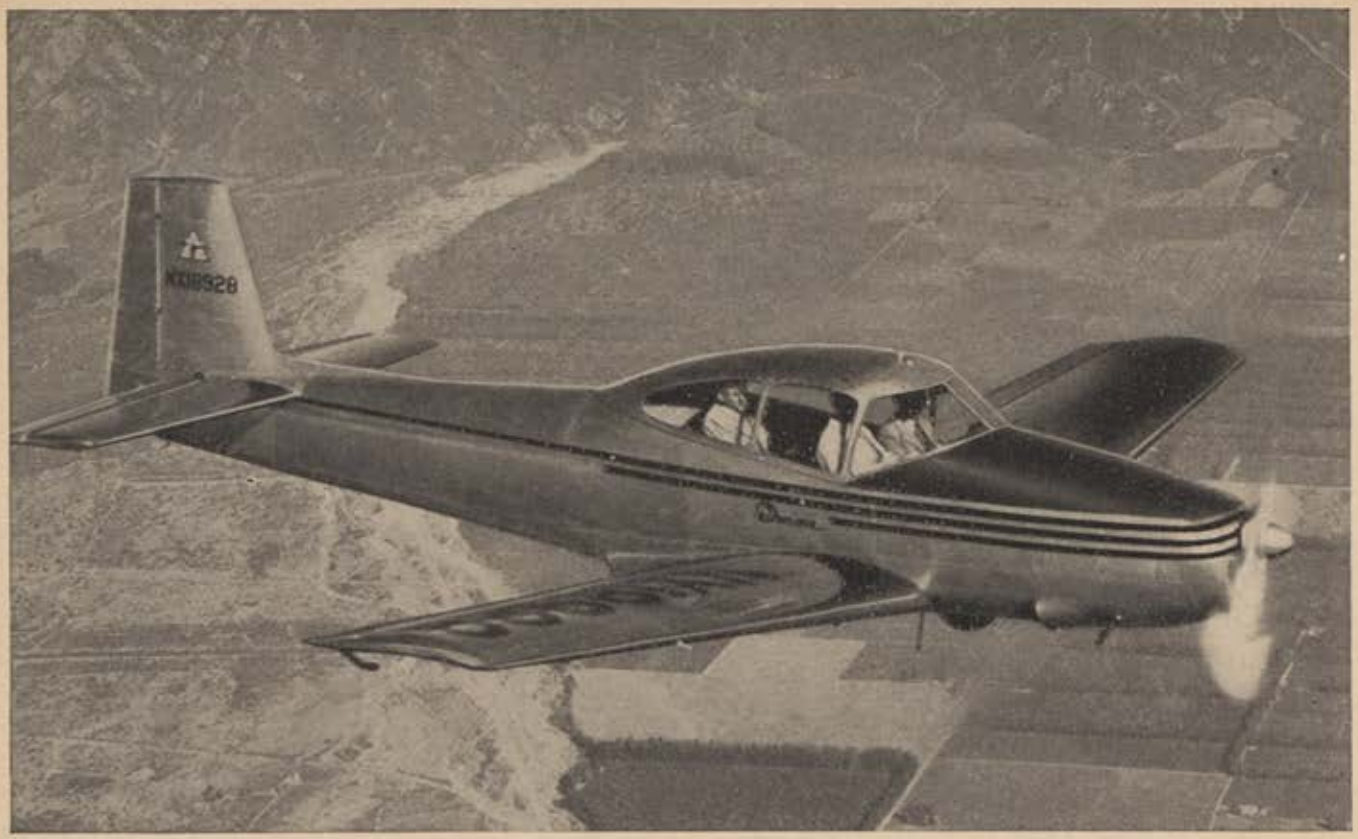
When we got back and developed our pictures, we found a very good take. The next day, the construction company came forth with a $75 check and a handshake of congratulations. The advertising agency said the picture was exactly what they needed, and paid us $100. Advertising people pay well if you give them what they want. One caution, here—never get in the $2-$3 class, always ask respectable prices. Three of the metropolitan papers paid us $10 for the speculative steamship picture; it appeared in afternoon editions with an Arnold and Kellogg credit line.

That was our start, and a good one considering our inexperience. We then had tangible results to show other prospective customers. A Sunday or so afterwards, *The New York Times* used our housing development picture

(Continued on page 62)

Tedious test and ground search have been replaced by aerial photos in locating of valuable sources. Mineral veins cause ridges shown.





The new Navion... test-flown on Chevron Aviation Gasoline

To make sure of top power output during test-flights each new Navion, North American's new personal plane, flies first on Chevron Aviation Gasoline. Engineered by years of research, the high anti-knock qualities of Chevron Aviation Gasoline permit fast acceleration for take-offs in limited space.

No wonder the leading plane builders of the West put Chevron Aviation Gasoline in the tanks of their planes to power their first take-off.

Take a tip from the test-pilots. Lift your own wings with the gasoline that's made for aircraft engines . . . the gasoline that's clean-burning . . . makes engines last longer when you're rolling up those cross-country miles.

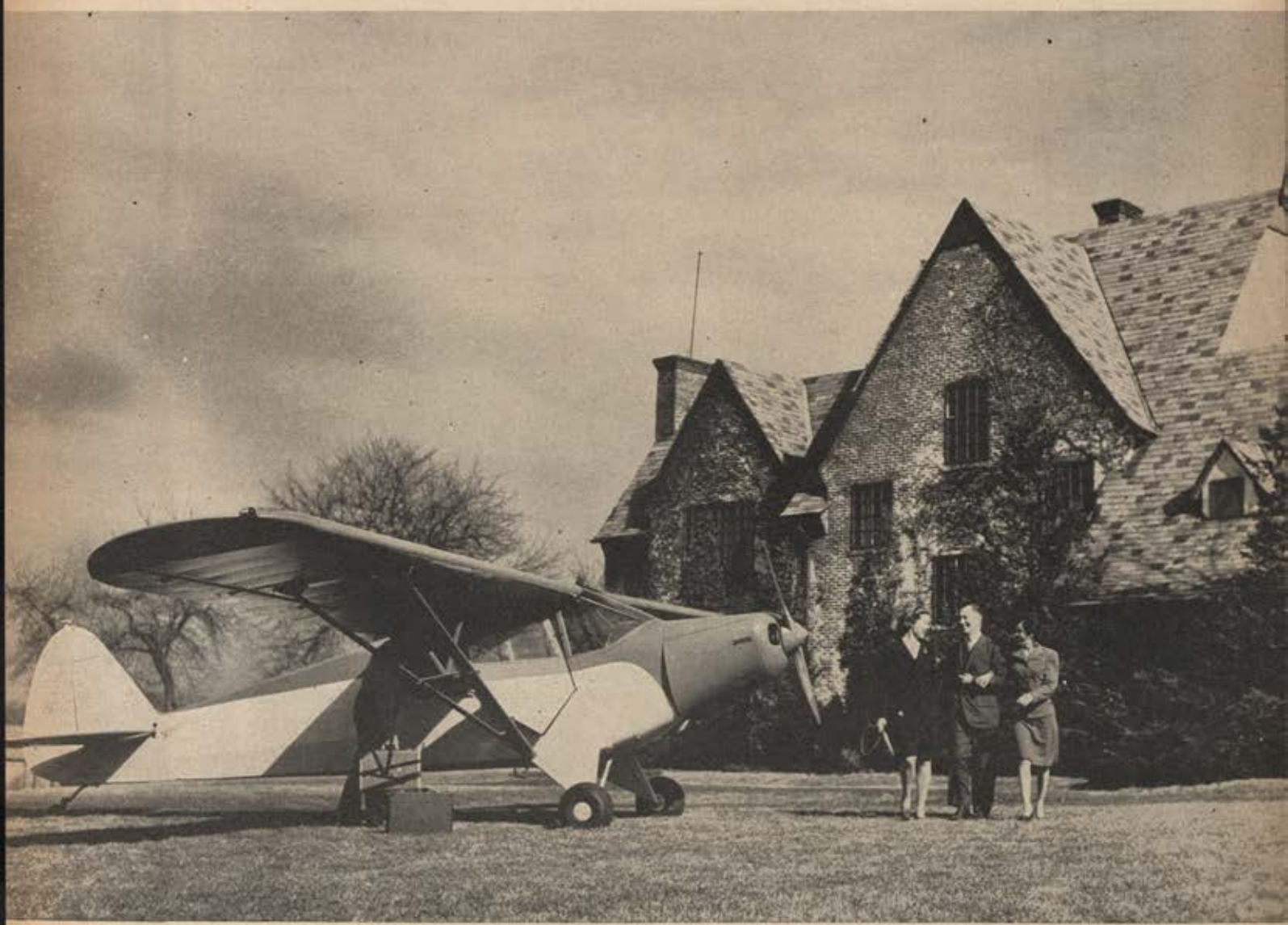
CHEVRON NATIONAL CREDIT CARDS are good at airports throughout the United States and Canada. Ask your Standard Airport Dealer in the West... or write to Standard of California, 225 Bush St., Room 1618, San Francisco 20, Calif. **STANDARD OF CALIFORNIA**

STRICTLY *Personal*

MORE NEW PLANES FOR PRIVATE PILOTS

SOMEDAY, somewhere, someone will produce an airplane that sells for $2,000, cruises comfortably at 200 mph, and carries the average family across the continent on a tankful of super-fuel that weighs practically nothing. Conceivably, this dream-plane will skip blithely from one rooftop to another in good weather, then roll along the highway in the manner of a Buick when the skies foul up. But one thing is certain. When this long-promised magic carpet comes along, the editors of AIR FORCE will use an entire issue to describe its virtues. In the meantime, it seems desirable to present a brief roundup of seven planes which are representative of design trends apparent in several dozen aircraft plants which are actually producing planes for today, not tomorrow.

Because plane production in the foreseeable future apparently will be divided almost equally between newcomers to the personal plane field and old-timers whose products have been synonymous with private flying for a decade or more the six planes presented on succeeding pages are drawn equally from old and new companies.



The seventh plane described is a neutral product—a new design from a company which had barely gotten under way when the pressures of war forced curtailment of all small plane research and manufacture.

Funk Bee

That plane is the Funk Bee, the postwar descendant of the prewar Akron Funk. Launched nearly a decade ago with a converted automotive power plant, the Funk is conventional in everything but performance. A high-wing monoplane with side-by-side seating, fabric-covered steel structure, and an 85-hp Continental engine, it follows the light-plane pattern which has endured since the days of C. G. Taylor. It does, however, boast a half-dozen refinements which may prove challenging to some of the larger light-plane producers. As comfortable as most side-by-side types, more comfortable than some, the Funk has a cabin baggage compartment which is accessible in flight and holds enough baggage for a two-weeks cross-country. Standard accessories include a starter and a generator, illuminated instrument panel, cabin heater, door locks, taxi and parking brakes, steerable tail-wheel, and built-in radio masts and fin attachment. The standard model mounts compass, altimeter, air-speed indicator, gas and oil gauges while the de luxe version is fitted with turn-and-bank, rate-of-climb, sensitive altimeter, gyro compass, and a Motorola Airboy receiver which can be removed from the plane for outside use.

Structurally, the Funk interior has both good and bad features. In the first instance, careful soundproofing has produced one of the lowest noise and vibration levels in the light-plane field. Similarly, the cabin heater, wool upholstery, adjustable windows, and floor rugs challenge the appointments of a fine automobile. In contrast, the painted metal dashboard and exposed welding in the dual control yoke ruin the whole effect of luxury. These disturbing features can be eliminated with ease, but installation of an adjustable seat may require considerable redesign of the cabin which is bisected by tubing directly behind the seats. In common with all small aircraft, the Funk could stand some re-engineering of the doors as well. No moderately large man or modest woman could enter the ship without criticizing the manufacturer. In the air, however, one can only forgive the Funk all minor faults. Rate-of-climb is excellent, and use of the NACA 4412 airfoil section permits rudderless turns and makes stalling, with or without power, virtually impossible.

Piper Super-Cruiser (bottom) and Bartlett Blue Zephyr (top of facing page) are representative of two design trends in the personal plane field. High-wing Piper cruises at 105 mph, is priced at $2905. Mid-wing Bartlett is fitted with a window in cabin floor.

Snub-nosed Funk Bee, with 85 hp Continental, is newest Kansas candidate for personal plane honor roll. Ship cruises at 100, lands at 37 mph, is said to be spin-resistant. (Below) North American's highly regarded NAvion seats four, tops 150 mph, sells for $6100.

Altogether, the Funk is a lot of airplane despite its modest wing span of 35 feet and its 20-foot over-all length. Priced in the $3,600 class, it ranges 350 miles on approximately 17 gallons of fuel, cruises at an honest 100 mph, tops 112 mph, and lands at 37 mph. About 500 "Bees" will be produced this year at Coffeyville, Kansas.

Globe Swift

Like the Funk, the Globe Swift was known to everyone in aviation although flown by only a handful of pilots before the war. Now it is giving hundreds of returned pilots the combat performance that high-wing designs have never been able to deliver. Built in two models—one with 85 hp and the other with 125 hp engine—the Swift offers top speed of 150 mph in the new high-powered version, cruises at 140 mph, lands easily at 48 mph. Designed specifically for cross-country travel, the 125 hp Swift ranges 512 miles on 28 gallons of fuel, climbs at 1,000 feet per minute, and boasts a service ceiling of 16,000 feet. Accommodating two people along with 100 pounds of baggage, the Swift though fairly expensive ($4,395) is a definite standout in its class.

Aeronca Chief

Long-time favorite as a trainer and general sport plane, the Aeronca Chief emerges from the war as an ideal plane for pilots who want some cross-country features at a moderate price. Powered by a 65 hp Continental, the Chief cruises comfortably at 90 mph, has a range of 420 miles, carries two people and a fair amount of baggage in a well-appointed side-by-side cabin. More important, its $2,485 price includes most of the accessories which too often are listed as "extras." These de luxe fittings include starter, impulse magneto, brakes, parking brake, steerable tail-wheel, spinner, provision for radio installation, dual fuel

STRICTLY *Personal*

tanks, ash trays, wiring for navigation lights, adjustable seats, and one-piece full-view windshield. This latter feature, combined with wide side windows, gives the Chief several visibility features which few expensive cabin planes can challenge.

Piper Super Cruiser

Where the Aeronca Chief is distinguished by visibility, the best-known of all small planes, the Piper, is outstanding because of the low noise level in the new Super Cruiser. Externally, the Super Cruiser bears close kinship to the prewar model. But there the resemblance ends. With 100 hp in the streamlined nose, the new Super Cruiser cruises at better than 100 mph, has a range of 6 hours or 600 miles. In the standard model, Super Cruiser exteriors are finished in red-and-cream while interior walls are in gray enamel to complement the blue upholstery of seats and top. A three-place design, the Super Cruiser has a 38-inch seat for two passengers behind the pilot's fully adjustable seat. The retail price is $2,905.

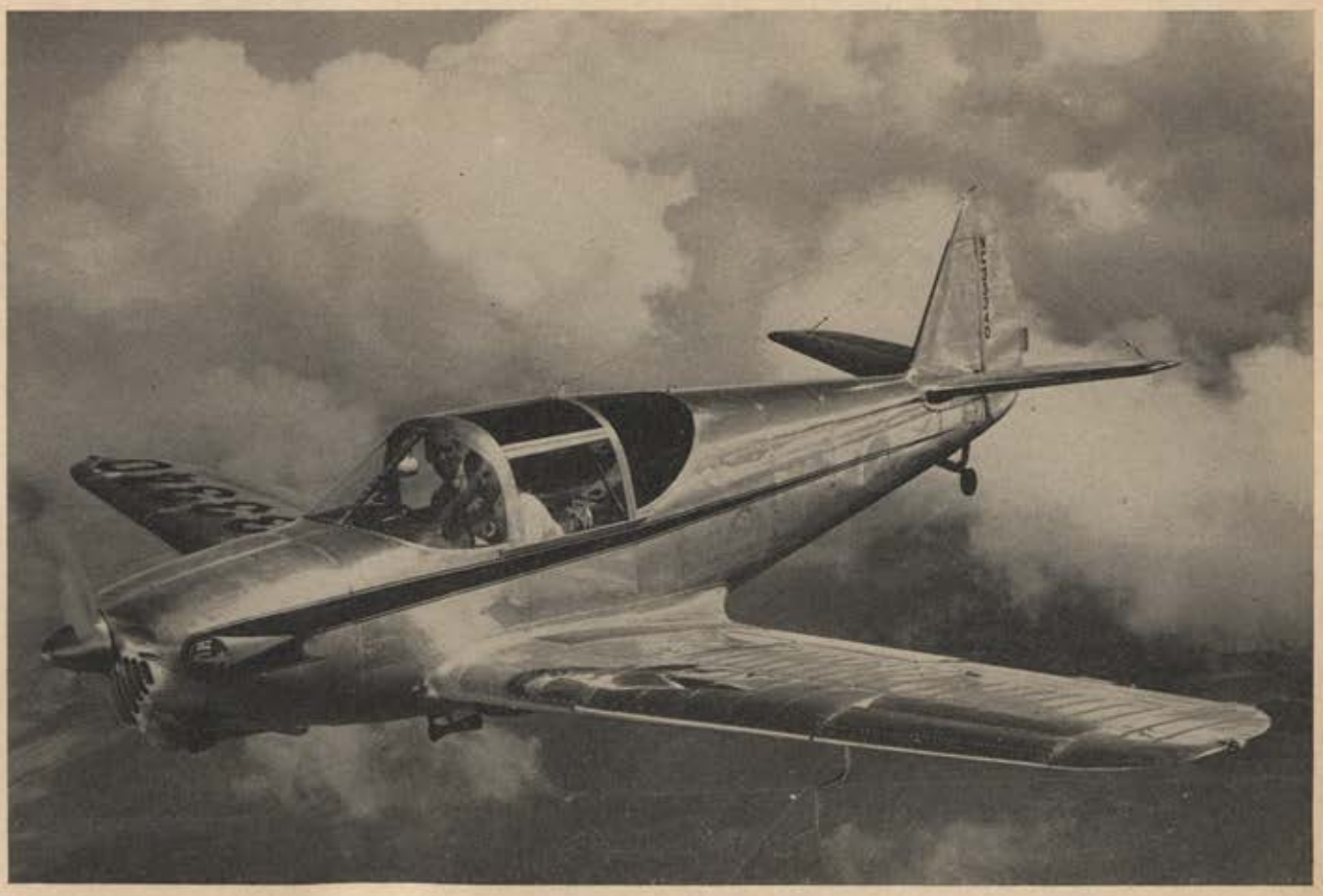
NAvion

Among the newcomers to personal flying, few designs seem to offer real challenge to North American's all-metal NAvion. Described by some who have flown it as a "Baby Mustang," the NAvion is the first real four-place landplane for average-income families. Powered by the superb 185-hp Continental, cruising at 152 miles, the tri-cycle-geared ship has a range of 580 miles. At $6,100, it is the lowest-priced plane in the 2,500-pound class ever offered.

Aeronca's side-by-side Chief cruises at 90 mph, plus Globe Swift (below) tops 150 mph. Prices are $2485 and $4395 respectively.

Coupe and Zephyr

Newest of the three-place types, the Dansaire Coupe produced at Dansville, N. Y. accommodates all occupants on a single wide seat which is only 5 inches narrower than a standard sofa. Specifications for the Dansaire will be announced within the next few months; price will be "around $4,000." Meanwhile, the 130-hp Bartlett Blue Zephyr in the same general price class will be making a bid for military-pilot favor.



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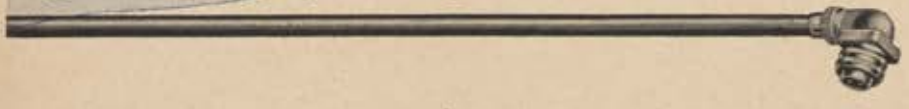
AMPHENOL

● Airborne communications require the utmost efficiency in component parts in order to insure uninterrupted contact between the plane and ground stations. Playing an important part in maintaining this vital communication link are the inter-equipment cables, connectors and plugs.

An especially valuable asset of Amphenol connectors is the positive contact, quick disconnect feature. This enables maintenance men to substitute an operable communications or radar unit for a faulty one in a matter of a very few minutes. Repairs in the equipment can then be made on the ground while the plane continues on its scheduled flight.

Amphenol components are mechanically efficient and electrically correct. Electronic engineers, and radio and radar operators alike have, through long experience, come to place every confidence in the dependability and superior qualities of electronic components bearing the Amphenol name.



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PRO School

(Continued from page 37)

enlarge upon their own individual specialties. Most of the time they study newspaper writing, writing and production of radio programs, and photography. They prepare and deliver public speeches, produce and record their own radio programs in the small yet complete radio studio. Magazine articles are discussed thoroughly and prepared for actual publication. The latest aircraft and some still on the drawing boards are described to the officers. Training and documentary films used throughout the war are used to demonstrate dramatic techniques. In a large classroom each student is assigned a typewriter and it is from this desk and typewriter that most of his work originates. He is encouraged to use the school recording equipment, to develop and print his own pictures.

Future courses may be more specific or broader in concept. But one thing is certain. The American public will be well informed of future Air Forces activities, thanks to a handful of pioneer PRO trainees from Orlando.

Man-Made Meteors

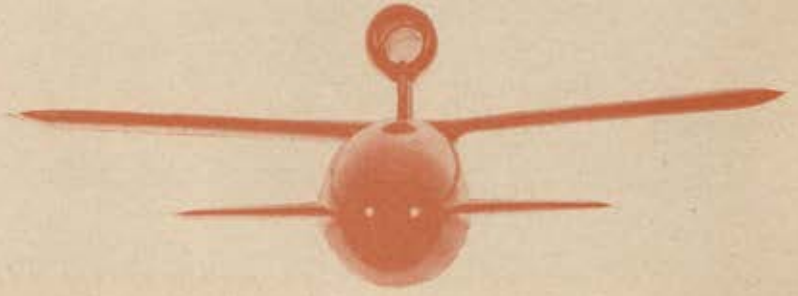
(Continued from page 47)

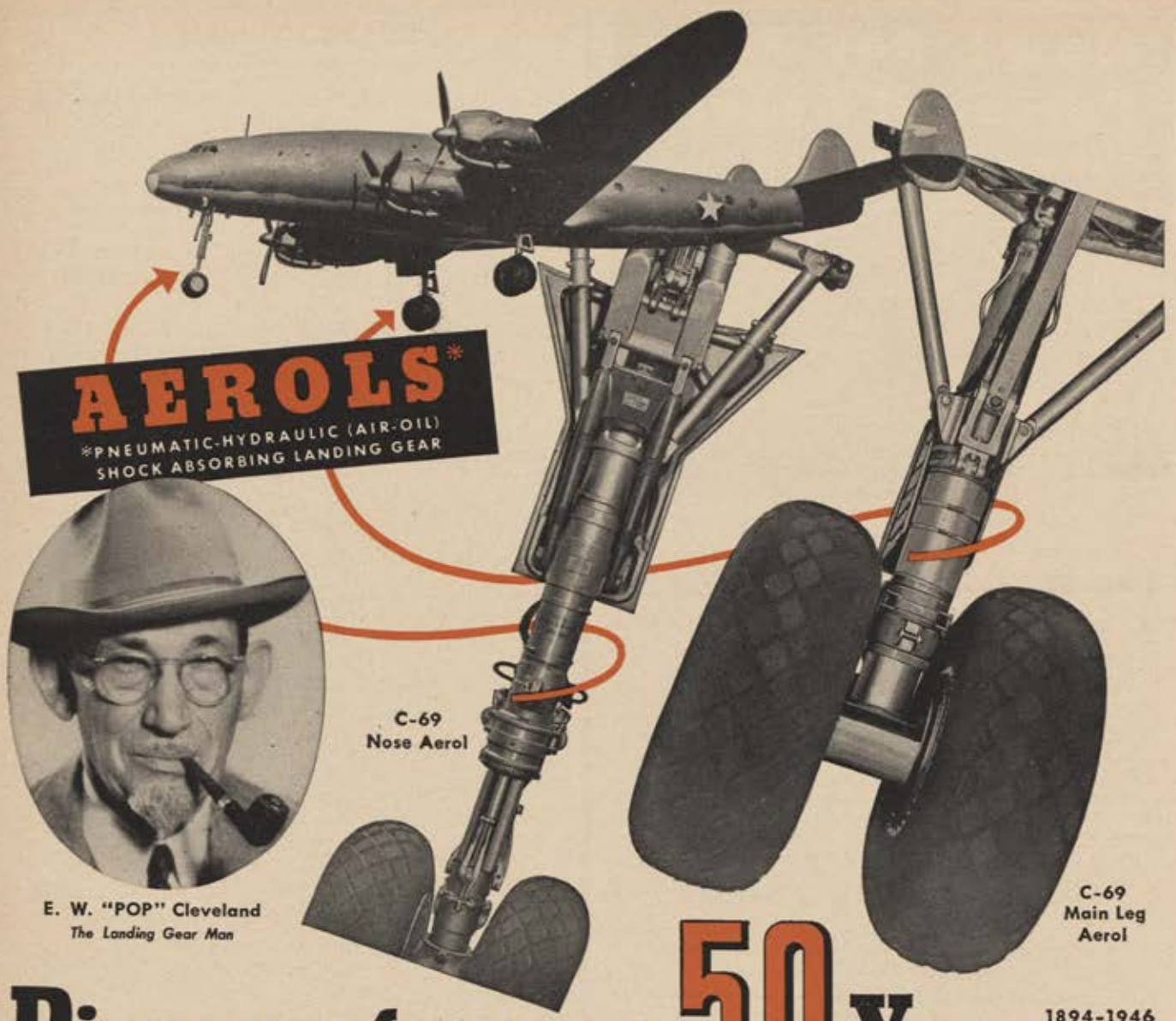
guided missile countermeasures will have to be taken too quickly to depend upon human reactions. A clue to how this might be accomplished is contained in a recent Navy release that stated, "Out of research and development programs will come airborne radars which can *initiate* defense, and automatic circuitry which can release the airborne countermissile."

This adds up to a radar-carrying missile like the SRB, only a surface-to-air or air-to-air type. It would be launched from a defensive control center or carriers at sea automatically by a triggering circuit similar to that on IFF radar or racon beacons. Like a night fighter, its radar would guide the countermissile so as to intercept the enemy missile. Another wrinkle might involve a pilotless search plane equipped with radar that would automatically launch an air-to-air missile of RHB type that would follow the radar beam that picked up the enemy missile. Defensive missiles guided by "seeking" techniques may be even more effective than radar-aimed interceptors. Rockets attracted by heat, light, magnetism, or infrared radiations might be used to intercept, at safe distances, any enemy missiles. Countermeasures such as these, together with the schemes for countering the countermeasures, are what make guided missile warfare—or the spectre of it—an "out of the world" affair.

Our development is following three courses: the creation and procurement of the hottest missiles we can conjure out of American imagination and laboratories; defenses against conceivable enemy missiles and counter-countermeasures to thwart enemy attempts to thwart our missile activity. We cannot—nor can any other nation—afford another Pearl Harbor with either today's weapons or those of tomorrow. In the words of General Spaatz, "It must be apparent to a potential aggressor that an attack on the United States would be immediately followed by an immensely devastating air-atomic attack on him."

(This is the second of two articles by Mr. Peck.)





AEROLS*

*PNEUMATIC-HYDRAULIC (AIR-OIL) SHOCK ABSORBING LANDING GEAR

C-69 Nose Aerol

C-69 Main Leg Aerol

E. W. "POP" Cleveland
The Landing Gear Man

Pioneers for over 50 Years 1894-1946

For half a century, The Cleveland Pneumatic Tool Company has devoted itself to serving many major industries.* Skilled technicians and experienced engineers within our organization have pioneered and perfected many products for each of these fields. Thus initiative and resourcefulness have enabled us to keep abreast of this country's remarkable industrial progress . . . We are proud to have grown with our nation for 50 years, and look forward to serving in the great future that lies ahead.

**CLECO Pneumatic Tools speed production in metal-working plants. AEROLS (the shock absorbing landing gear used so universally on aircraft) insure safe, smooth landings and take-offs. CLEVELAND Rock Drills are widely used in the mining and contracting fields.*

THE CLEVELAND PNEUMATIC TOOL CO., Cleveland 5, Ohio

DISTRIBUTORS IN PRINCIPAL CITIES AND FOREIGN COUNTRIES

CLEVELAND ROCK DRILLS

AEROL RETRACTABLE LANDING GEAR

CLECO AIR TOOLS

CLEVELAND PNEUMATIC

Targets for Today

(Continued from page 54)

and the telephone rang several times on Monday with inquiries as to our capacity and price for similar jobs. One of our best customers, a towing company, came through such an introduction. Credit lines bring business. Always insist on them.

To outsiders, aerial photography may seem romantic. But it also has headaches—meaning that plenty of resourcefulness is required. For instance, Manhattan's Hotel Commodore wanted a picture of its building with a background showing the World's Fair, several miles away across the East River and out in Flushing. We tried to fill the bill by getting Manhattan and Queens County all in one picture, emphasizing both the Commodore and Mr. Whalen's playground, but the detail in the resulting picture was to small for proper effect. A composite seemed to be the only solution. We therefore took a single picture of the Commodore, using the near-by Chrysler building to center the picture, and with the camera pointed down, from an altitude of 1,000 feet. Then, for a second picture, we took another run over the same location, but with the camera pointed farther up and beyond, taking in the World's Fair, but this time from a much higher altitude. We spliced both pictures together. The Commodore man approved the resulting picture.

Other customers were on the extremely fussy side, insisting on minute details. A shipbuilder wanted a picture showing a certain ship coming into a certain pier. The wind would have to be just right that day, because he also insisted on having all the flags on the ship unfurled and twirling merrily in the breeze. With these specifications in mind, we flew over and took our pictures, only to find, upon developing them, that somebody in the steamship company had forgotten the flags. Unfortunately we had to take a loss on this because this meant taking a special air trip, but the next time we personally checked the flags and prayed to the weatherman for the right type of breeze. But even though we'd take a loss on a customer like that, we usually made a profit, about 200% to 300% on every job. Such profit rates are necessary in the East where there are only four good photographic flying days a month. In the West, you can count on 10 days a month.

When things got settled, and our name became better known, we found that we could expect consistent reorders for prints covering previous jobs: newspapers, periodicals, a family who had made the maiden voyage on the luxury liner, people who like aerial shots for home decorating purposes, World Fair visitors stopping at the Commodore, and many more. All this made a permanent file necessary. Before we were through, we had several four-drawer file cabinets filled with prints.

We conducted our medium-sized business like any other business. We started a ledger, keeping permanent records of income from each single picture. We also maintained accurate records of our flying time costs, as well as costs of gas, oil, overhaul, office and hangar rent, everything. Naturally we kept close track of our joint salaries. Each of us started out with a very minimum salary, just enough for living expenses; the rest of the money we put in our partnership's bank account. As our business got better, we gave ourselves a raise, but we always made sure we had a nice floating capital for the business.

All of this may sound so good that perhaps you're won-

dering why we had to go out of business after all. Yes, we did make money—for a while. But we would have lost it all if we hadn't seen the handwriting on the wall. When luxury liners were reconverted into troop ships, we lost customers right there. When all new construction projects were for the expansion of our country's defense, all shrouded in the utmost secrecy, we lost another class of clients. When newspapers were restricted in using pictures that might give the enemy juicy pointers as to the nature of our country's defense preparations, as well as our terrain and coast lines, another group was gone. We made a hasty, but regretful, exit.

But today there are great opportunities for enterprising individuals who combine the commercial values of aviation and photography. There is a good indication that the postwar reconstruction period in the United States will be a healthy one. If free-lance aerial photography as a business is well-planned and thought-out, it can be profitable.

What's Ahead for the Helicopter?

(Continued from page 27)

the pages of automobile and standard aircraft manufacturers, the makers of helicopters will supply their craft with comfortable seats, each, however, equipped with a center-locking belt to protect pilot and passengers from being thrown forward or upward in quick decelerations or in bumpy air. The passenger compartment may or may not be fitted with dual controls—the stick, throttle, rudder pedals, and pitch-changing lever. Helicopters will be roadable in the sense that they can be shunted under their own power from garage to street and to take-off plot.

Growing automobile ownership instigated the demand for good roads. Growing ownership of flying machines automatically will stir a demand for places to take off and land. Aids to cross-country flying will multiply. Not even the helicopter pilot will want to stop periodically and check his course at a crossroads. That would kill time. Aviation aids may take the form of a big radio-highway system auxiliary to that used by air lines. The pilot would have only to listen to the signals in radiophone receivers or, better yet, watch a visual indicator on his instrument panel, to keep on course. For the flier who likes to gawk at the countryside, visual air highways, marked by signs on the ground, will lead from one city to another. One midwestern aircraft company proposes that a mammoth grid identification system, easily torn down in the event of war, be built to cover the entire country. Numbers, readable from considerable heights, would be affixed at the corners of each ten-mile-square area. A pilot lost in space would need only to look at a number and a map to determine his whereabouts.

Igor Sikorsky, social scientist as well as aircraft engineer, says of the helicopter:

"Conditions of living will develop parallel with the availability of this new way of transportation. Just as countless numbers of individuals and a vast amount of enterprises depend on the use of the automobile, so with the helicopter new forms of residences and of business structures, of recreation and of professional occupations will become possible when this new vehicle is given in volume to the public. This may take a decade after the war's end, but undoubtedly it is coming."

G-Suits and Glory

(Continued from page 35)

their own planes, or purchased them with hard-earned money. This promoted a greater respect for their planes than would be sponsored by surplus planes bought for a few cents on the dollar.

Because the races are a link between aviation's past, present, and future, old-timers in the business want to see it go on. Despite the hazards, the races added luster to some of the greatest names in the profession. They pass it into the hands of these G-suited seekers for gold and glory, hoping that they will treat their heritage cautiously and well.

What Price Air Power?

(Continued from page 44)

to be shielded from outside interference. Aside from the natural demand on electric current in sufficient quantity, the myriad of specialized devices such as strain gauges, electrical position transmitters, the run of radar experimental equipment, and such specialized provisions as a lead-outlined chamber to house instruments using X, gamma, and higher energy radiations.

The Computation area would contain proper calculating and computing equipment. Some of the electronic machines would have to be totally shielded from radio interference, while electrolite tanks and rooms would have to be built to offset the earth's magnetic field for problems where the solution is arrived at by analogous computations between aerodynamics and electricity.

The last facility is the Special Test section, a sort of scientific handy man charged with the jobs not covered by other units. They make preliminary surveys to determine the feasibility of pursuing development projects; they provide equipment and personnel for flight testing, and test items not adaptable to trial by other laboratories. The equipment under Special Test includes shops, hangars, runways, launching sites for missiles, firing ranges.

Providing these special facilities is no easy matter. It has to be close enough to personnel centers so that the workers will not have to waste an excessive amount of time getting to and from operational sites. However, setups like rocket, ram jet, and the like must be far enough from buildings and residences for safety. At least one stretch of ocean beach must be available for safe launching of long-range test missiles.

About 5,000 people, mostly civilians and partly unskilled, are needed to man the proposed Center. Their training will consume a considerable portion of the public's money. The bill to the American people for the building and maintenance of the proposed Air Engineering Development Center for three years is substantial. The need for such a center, in a world where only preparedness seems to guarantee peace, is obvious.

There is no doubt that our future safety depends to a large degree on the maintenance of technical supremacy. This comes expensive—about six hundred million dollars' worth, but security is an expensive commodity.

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