

AIR PROGRESS



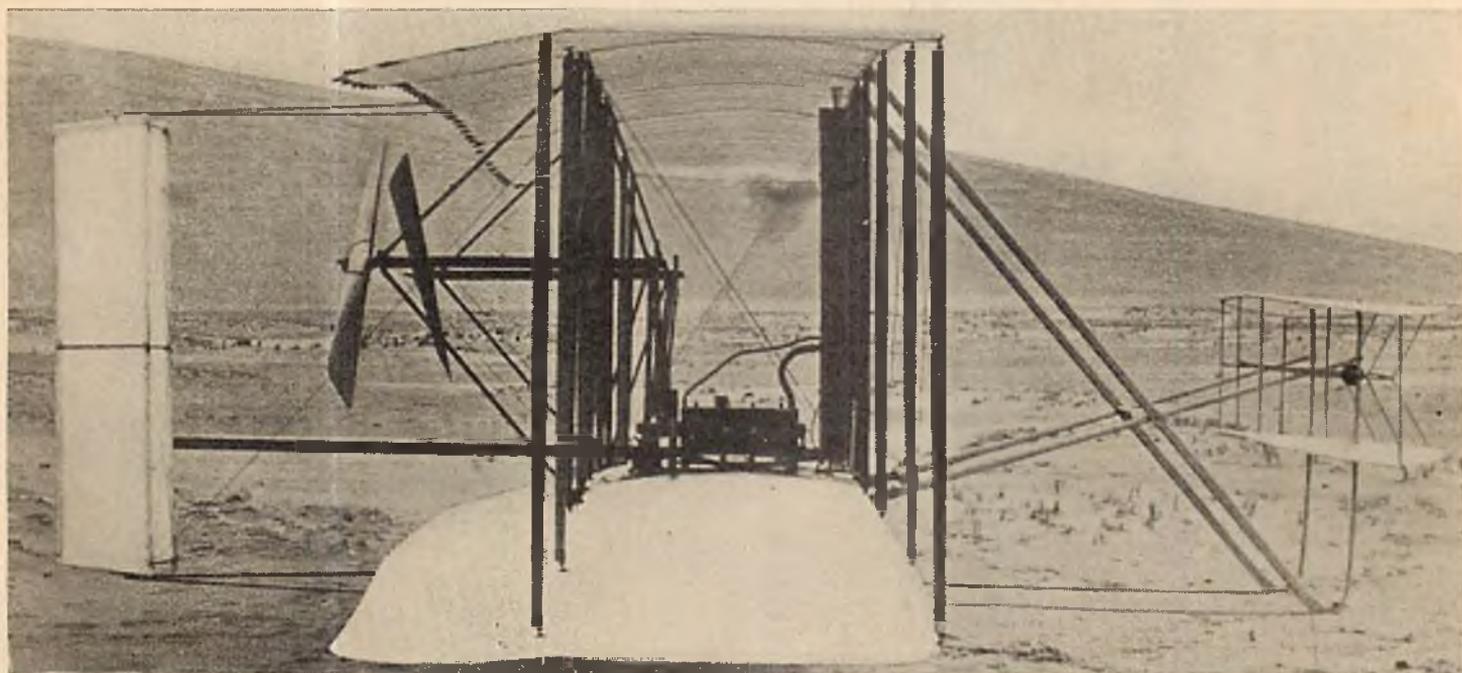
THIS ISSUE
30 CENTS
IN CANADA

AIR TRAILS' ANNUAL 1939
AND
1940
25 CENTS A COPY

Introduction

● Writing an introduction to an issue of Air Progress is a problem. To begin with, one cannot write of today's aviation with any feeling of up-to-dateness for the simple fact that during the time one's thoughts are being transferred to the printed page the subject matter becomes history. New planes, new heroes, new records and new developments parade across the pages of aeronautical history in rapid winged flight too fast almost for one to record before a new chapter is begun. Front-page aviation news of today are but "do you remember" items tomorrow.

In printing this picture of the original Wright plane, the spark that kindled the racing flame of aviation, we offer you the opportunity of comparison with the modern equipment on parade throughout the coming pages, developed within a short span of thirty-six years. The amazing progress here depicted will unquestionably be surpassed in an equivalent period to come, testimony to man's rapid progress in a still new science.



To you, our readers and fellow followers of man's conquest of flight, we offer these pages with the hope that they will but enable you to more fully enjoy and grasp the many phases of aviation and remind you of the breathless opportunities to youth in this, the world's newest and brightest industry.

L. B. Beolby

Editor, Air Trails.



AIR PROGRESS

AIR TRAILS' ANNUAL FOR 1940

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FULL-COLOR COVER PHOTOGRAPH OF GRUMMAN JF-2 BY RUDY ARNOLD

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Introduction

to our

parade of

Air

Progress

told in

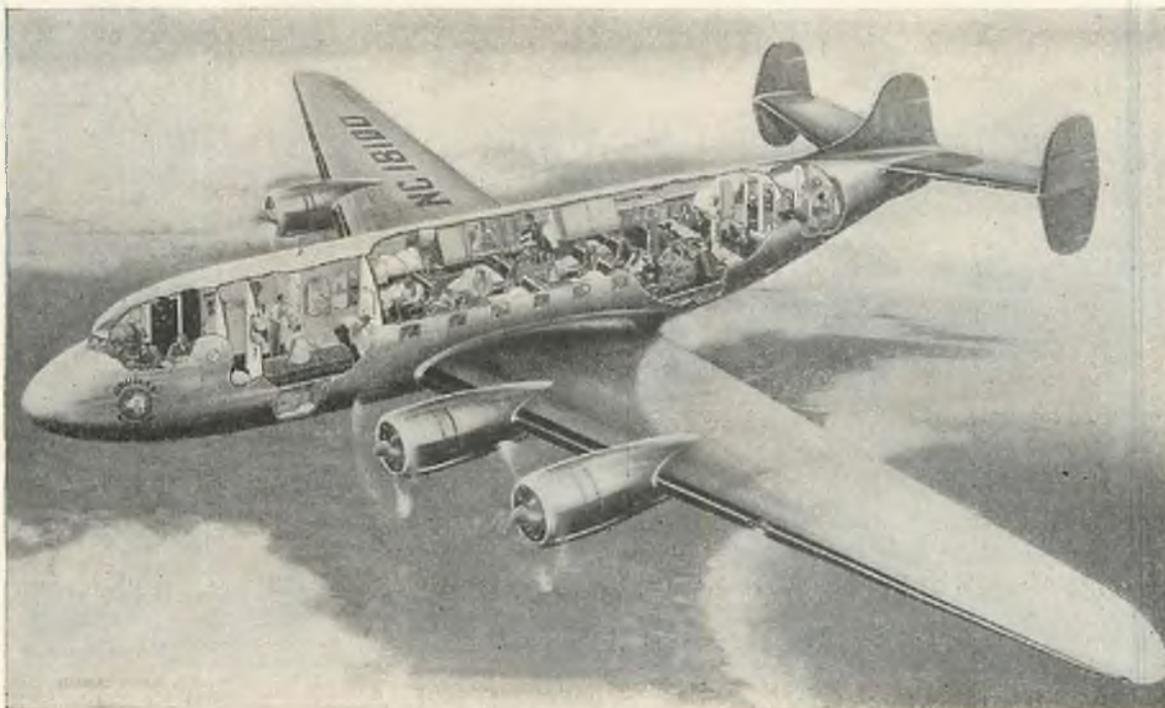
pictures

● The next 12 pages offer you a pictorial study in contrasts. At the top of each page you will find planes and aeronautical equipment of but a few years ago. At the bottom of the same pages, in direct comparison, you will find corresponding modern versions. Some of the early photographs are not of the first of that particular subject, but of the most strikingly contrasting comparison. It is strange yet true that some of the very first phases of aviation are now being reverted to and brought up to date. Witness the "new" tricycle landing gear. Some of the first and crudest planes featured this very thing and found it practical and safe. Now it is being applied to such ships as the giant DC-4, our biggest and most modern air transport. Other ideas of aviation's first years are from time to time modernized and hailed as new and revolutionary. One thought will stand out as you turn these next pages: the simplification and "cleanness" of design of the modern equipment as compared to the stick-and-wire wonders of yesteryear. Man's genius has taken a brave attempt and reduced it to its simplest and most efficient form: the modern airplane.



OLD TRANSPORT

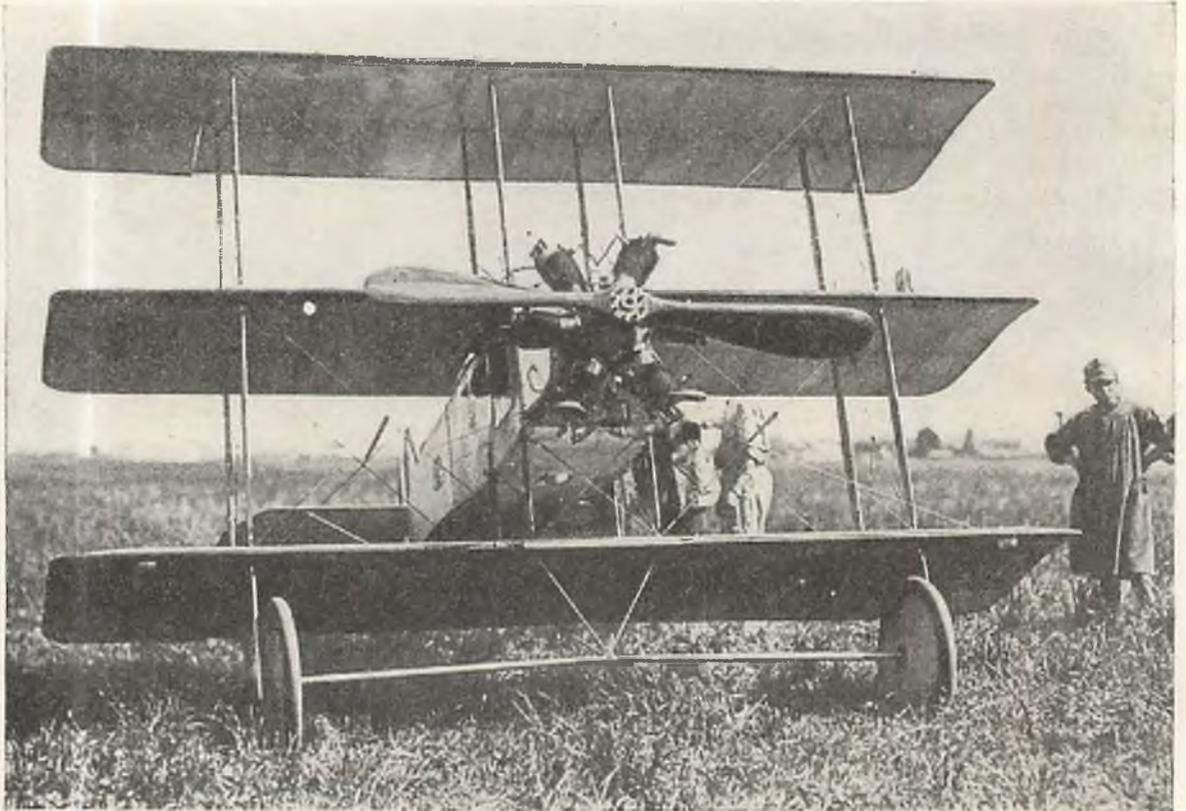
Sensational in its day was this German transport plane of the early '20s. This monster biplane with its four engines and assorted wings and tails was capable of carrying 22 passengers. You will note that this Aviatik transport also had a two-wheel landing gear just under the nose in case of unorthodox landings, which were numerous. The engineers rode in the top of the motor nacelles while the passengers were carried within the cabin or fuselage. The windows must have all been on the other side, if anywhere, for none are visible from this angle.



NEW TRANSPORT

The modern transport, in this case represented by this splendid cutaway drawing of the giant DC-4 built by the Douglas company, shows the almost unbelievable strides made in passenger comfort and luxury since the advent of the early transport above. This forty-two-passenger ship has everything for comfort; automatic steam heat, dictaphones, electric toasters, curling irons, razors, percolators, a ship's library, check room, bridal suite and many other features. The DC-4 weighs over thirty-two tons fully loaded, has a wing span of more than 138 feet.

OLD LIGHT PLANE

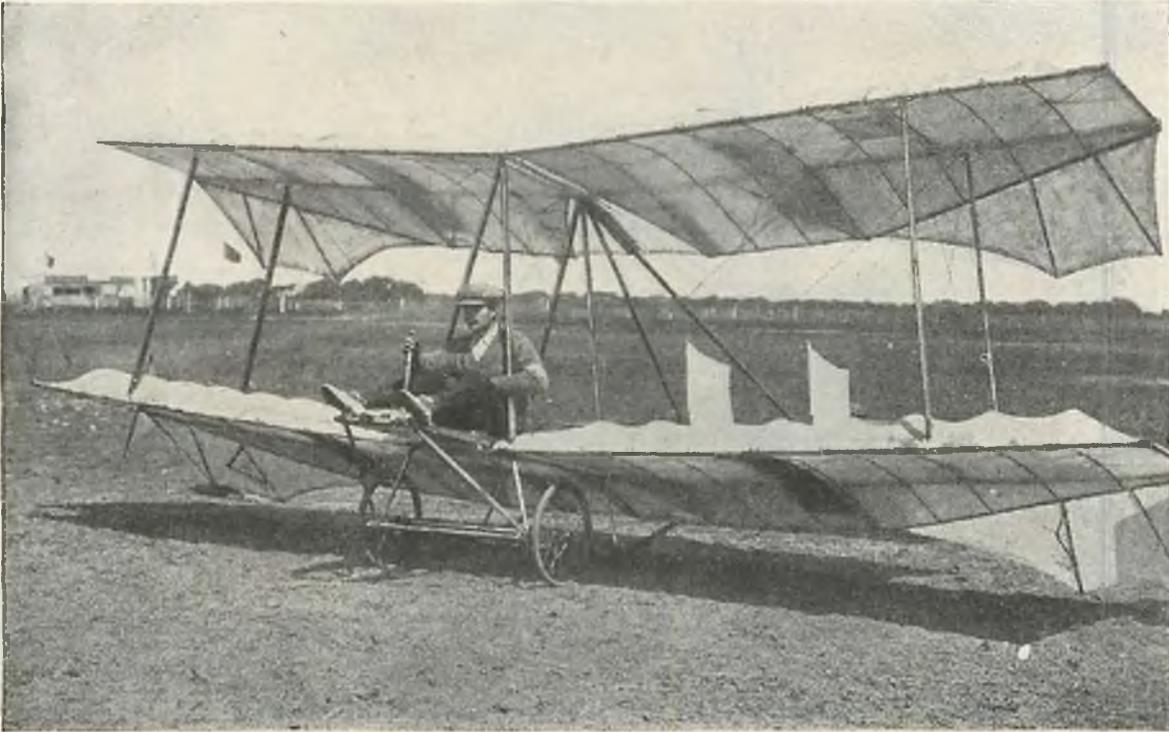


When light planes were really light. This early Italian light plane was built in competition for a government prize and won it with a speed of 106 m.p.h. This little triplane had a wing span of thirteen feet and was fifteen feet and six inches long, which is an interesting fact in view of the aspect ratio now in general use. The exceptional spread or track of the landing gear is another interesting feature, as also is the lower wing dropped below the fuselage. The small six-cylinder radial air-cooled engine, of course, had no N.A.C.A. cowling, as used today.

NEW LIGHT PLANE

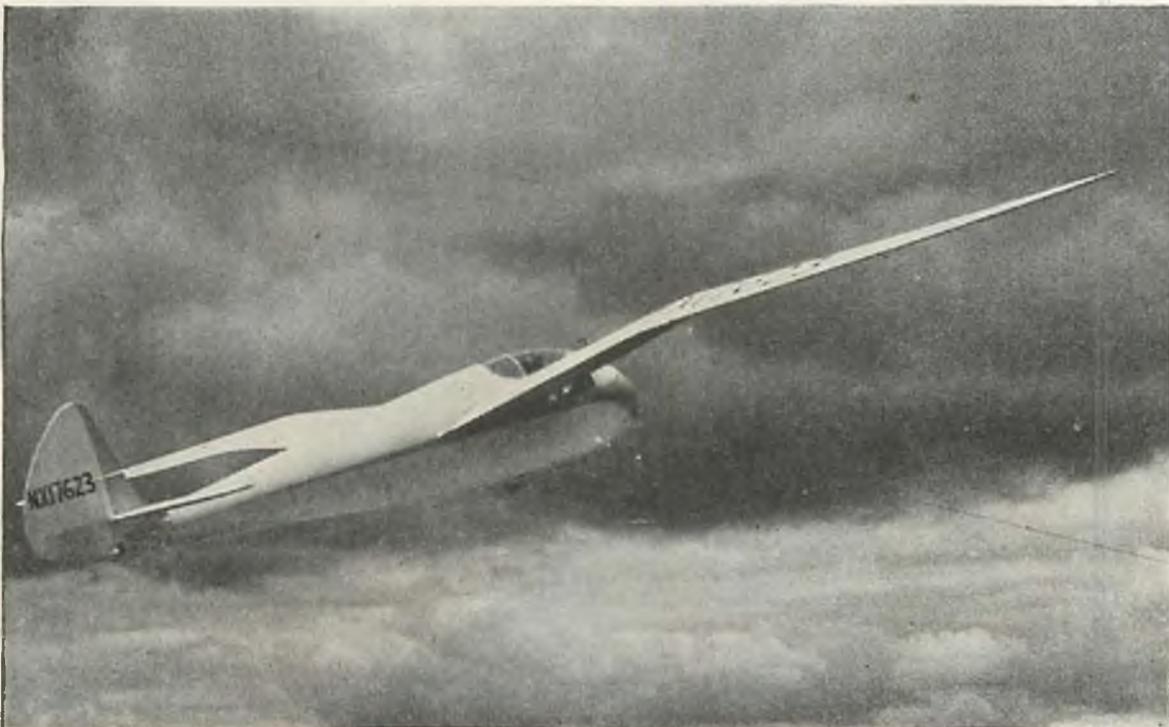


Typical of a trend in modern light-plane construction is the all-metal fuselage and tail of this Luscombe powered with a fifty h.p. engine, also air-cooled through the streamlined cowling. This little two-place ship has a top speed of 107 m.p.h., with a ceiling of 13,500 feet, yet has a landing speed of 37 m.p.h. This type of light plane—as also the Piper Cub, the Taylorcraft, the small Porterfield, and the Aeronca—is doing more than anything to bring aviation to the average man. Safe to handle, economical to operate and easy to learn to fly, are reasons.



OLD GLIDER

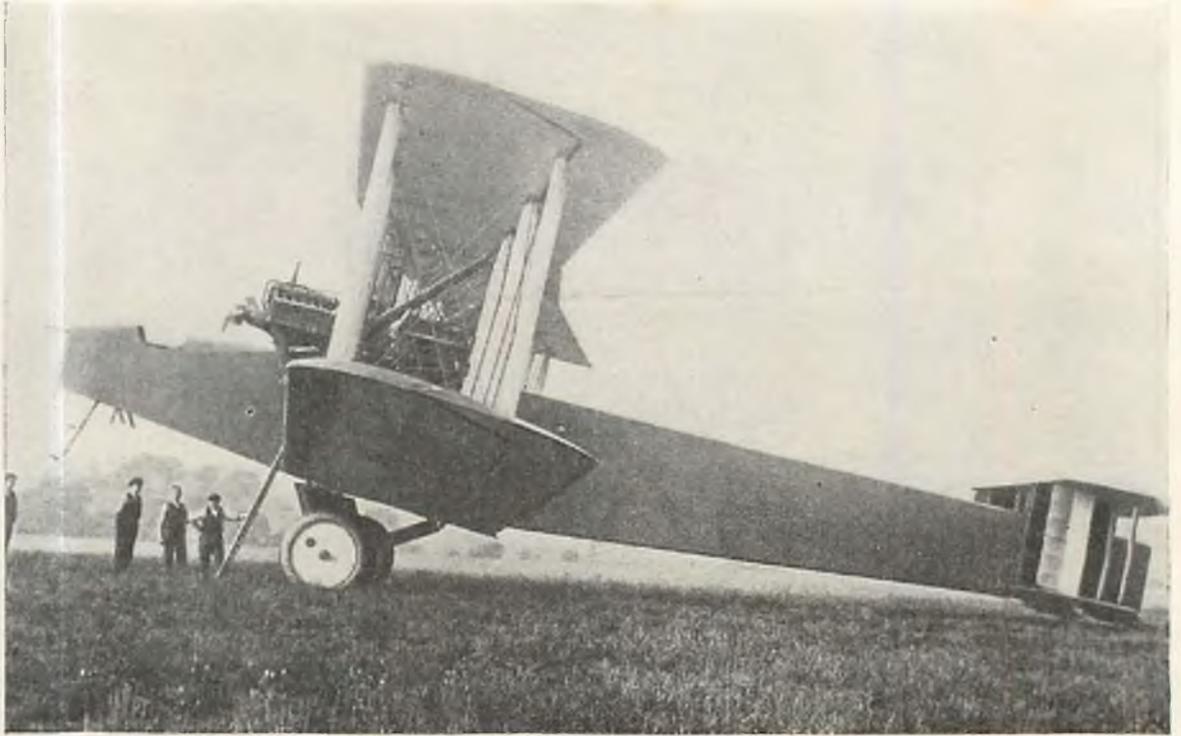
For ages man has tried to fly, and foremost in this age-old yearning has been the employment of the glider. The Wrights, Hargrave, Lilienthal, Chanute, Langley, and many others turned to motorless craft for experience and experiments. After the first World War, Germany, limited to the building of motorless craft, forged far ahead in their construction and flight. Many of the modern sailplanes and power planes contain developments discovered by these post-War pilots with their crude motorless craft. The European pilot Mesler is shown in his early biplane.



LATEST SAIL- PLANE

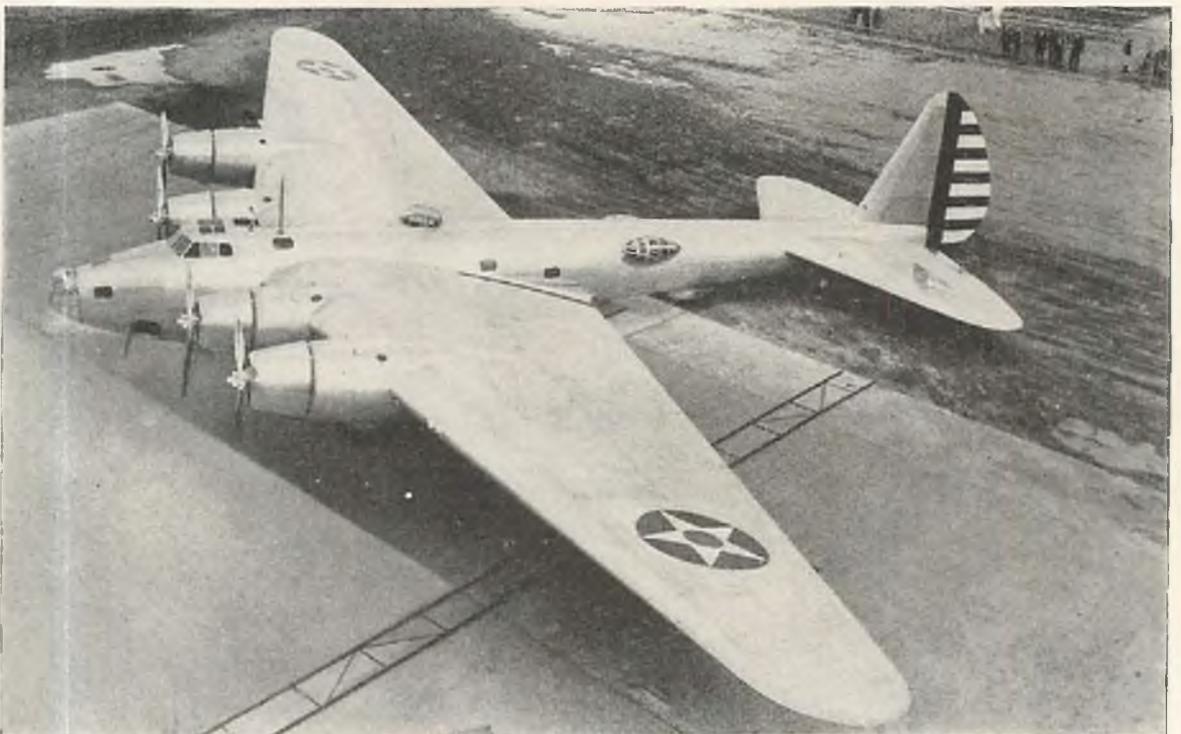
The perfection attained by modern sailplane engineers is shown in the graceful Ross Ibis high-performance sailplane. This beautiful ship with its gull-wing construction and inclosed cockpit is one of the most efficient and graceful of modern ships of this type. Other modern ships, such as the Stanley and Schweizer, feature all-metal construction and more than one place, as in the latter type. Records have jumped from the short erratic hops of the early gliders to distances of over 450 miles, altitudes of over 33,000 feet, and duration flights of over 51 hours.

OLD BOMBER



The bomber of World War days was typified by many wires, struts, uncovered engines, multiple-wheel landing gears and biplane tails. This Handley-Page "super aerial dreadnought," to quote the title, was erected in the United States and was designed to be flight-delivered to the Allies over the Atlantic. This ship had a top speed of around 103 m.p.h. and a landing speed of 50 m.p.h. The square fuselage was also typical of huge early bombers that sometimes reached gigantic proportions for their time, as shown by the comparison with the men standing below.

LATEST BOMBER

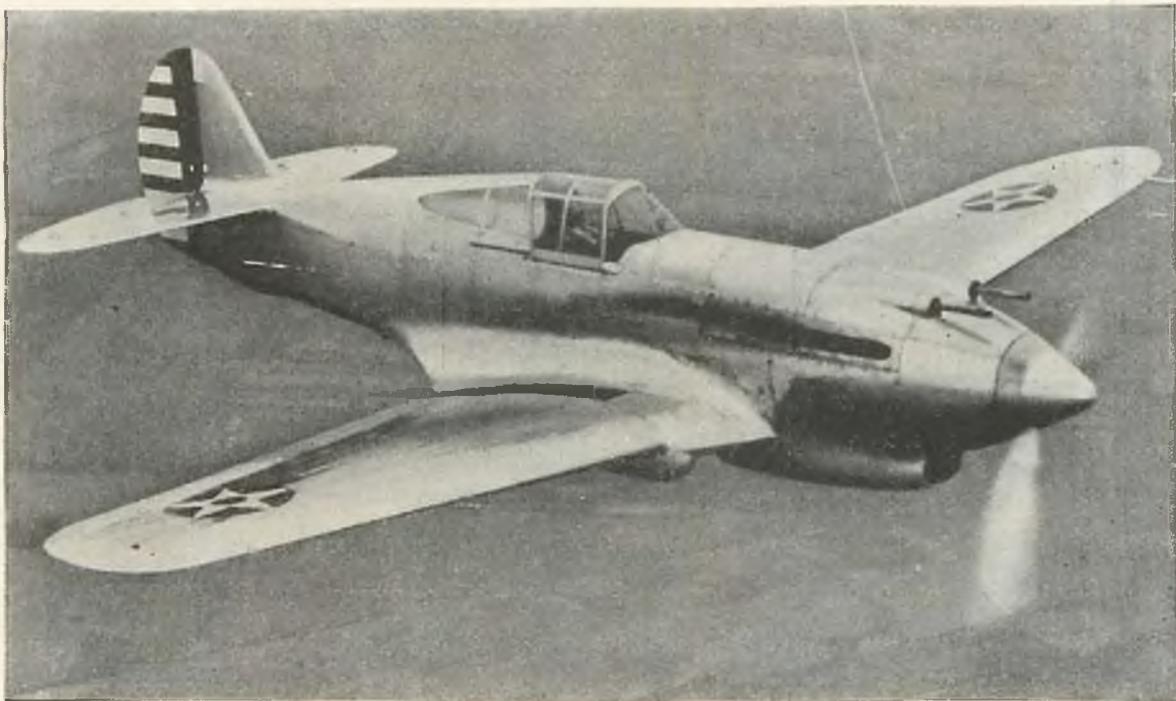


Compare the sleek, clean lines of this modern YB-15 super flying fortress with its four 1,000 h.p. engines, with the lines of the bomber above of yesteryear. This proud possession of the army air corps fairly bristles with machine-gun "blisters" that cover its attackers from any angle. Tons of bombs can be easily carried within its streamlined body. Of entirely metal construction, this super fortress of the sky can outdistance pursuit ships of a few years ago and has amazing performance unparalleled by any other bomber in the world regardless of size.



OLD PURSUIT SHIP

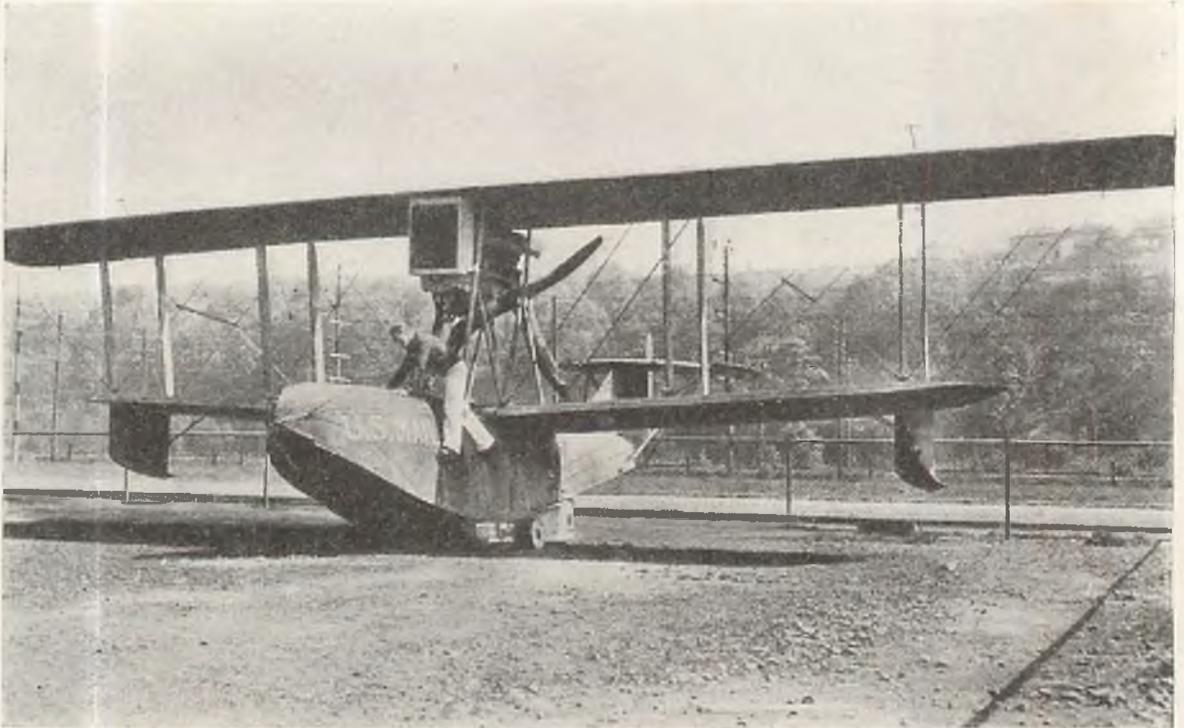
Somewhat remindful of the little Italian light plane is this Fokker triplane captured by the Allies during the war. This was the type of ship flown with such success by the Germans under the leadership of Baron Von Richthofen. The baron himself favored the Fokker triplane and used it to great advantage. The speed of this sturdy ship was around 90 m.p.h. with its rotary air-cooled engine. Parasitic resistance due to the three wings and engine frontal area, however, prevented a higher speed. This ship was tricky to land on any but the very smoothest fields.



LATEST PURSUIT SHIP

Ordered in large quantities by the U. S. government, these Curtiss P-40 pursuit ships stand for the best in modern pursuit construction and design. These all-metal fighters, extremely fast, maneuverable, and rugged, have passed the most difficult of tests with flying colors. The landing gear and tail wheel are fully retractable. The planes are equipped with two large-caliber machine guns firing through the propeller, oxygen equipment for stratosphere combat flying, and a Curtiss electric propeller, which make them the outstanding pursuit ships of the world.

OLD FLYING BOAT



While Glenn Curtiss built the first successful seaplane in 1914 for a proposed transatlantic flight, other now-famous companies were beginning to consider the possibilities of this type of craft at that time. Many of them developed during the early twenties were modeled closely after his original designs. The Boeing company, now famous for its huge Yankee Clipper flying boats, built the first flying boat to be used in international air-mail service. This historic plane, the famous Boeing B-1, ancestor of the modern 42-ton clippers, now rests in a museum.

LATEST YANKEE CLIPPER



The Boeing B-1 may well look with pride upon its progeny as typified by the Boeing 314, the modern version of a luxury flying boat. These giant ships used by Pan American for its European flights are the last word in comfort and luxury for flying-boat passengers. Forty passengers, freight and baggage can be carried with ease, while on short hops, where baggage and extra supplies need not be carried, up to seventy-two passengers and crew can be accommodated with ease. This super air yacht has a speed of around 200 m.p.h. and can cruise 4,000 miles.



OLD AUTOGIRO

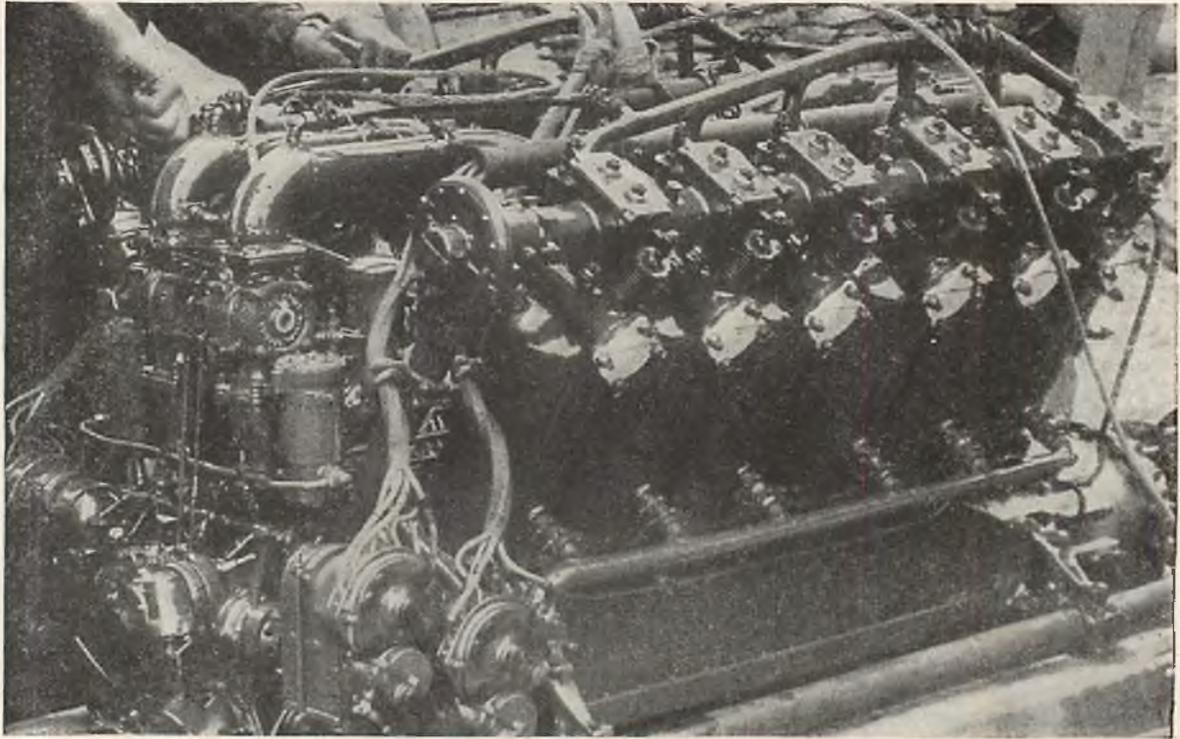
One of the earliest autogiros was built in England after the designs of the inventor, de la Cierva of Spain. This machine was obviously built about the fuselage and landing gear of the old Avro training plane, and still retains the training wheel and skid undercarriage many old war pilots will recognize. The lateral stability was retained by the pole-and-fin arrangement on either side of the fuselage. In those days, man power was needed to start the vanes rotating before the take-off. Pulling on a rope wound about the vertical shaft started the rotors.



LATEST AUTOGIRO

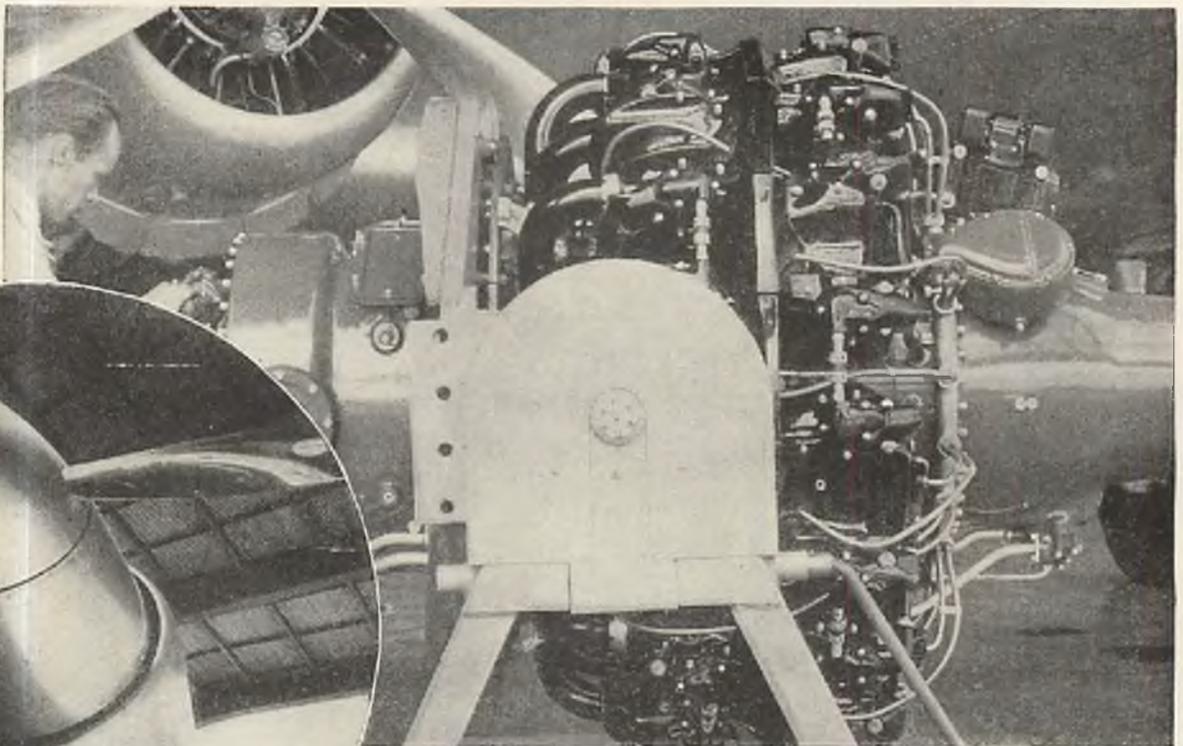
The modern army version of the autogiro ready for flight. These YG-1B planes built by the Kellett Autogiro Corp. of Philadelphia, while basically like the old-timer shown above, show marked improvements and refinements in design. These have but three rotor vanes, while the early one had four. There are no lateral stabilizer wings at all, as this control is achieved through a controllable rotor shaft. The rotors are engine-started and driven by the same engine that drives the propeller. Note the difference in tail design also. The speed: about 125 m.p.h.

OLD ENGINE

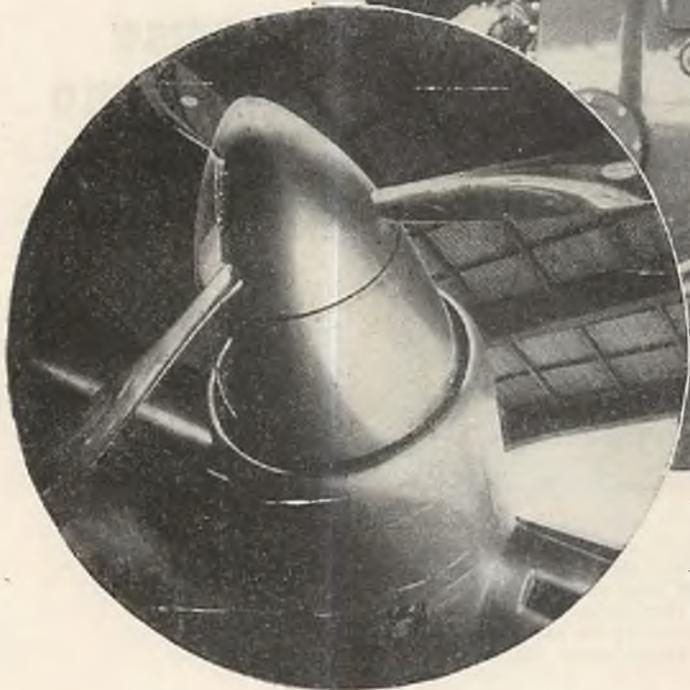


Outstanding in its day was such an engine as this, the Rolls-Royce Eagle of 360 h.p. This typical liquid-cooled engine was used in the famous Handley-Page bomber that Capt. John Alcock, D.S.C., and Lieut. Arthur Brown flew across the Atlantic back in 1919. Engines of this type and period were comparatively low-powered for their weight and difficult to streamline, although in those days small attention was paid to streamlining as compared to the perfection that this science has reached in aviation today. Note the complex collection of magnetos, pumps, and electrical units on the rear end of this engine. The propeller hub is to right, at bottom of engine.

NEW ENGINE



The engine pictured is the new Pratt & Whitney air-cooled power plant designed for the U. S. navy. This engine develops 1,600 h.p. at 20,000 feet, an unheard-of power rating until the appearance of this sensational engine. Above on exhibition mounting, and left, on wing with the new cowling design that permits almost perfect streamlining, a hitherto difficult problem with Radial air-cooled engine installations.





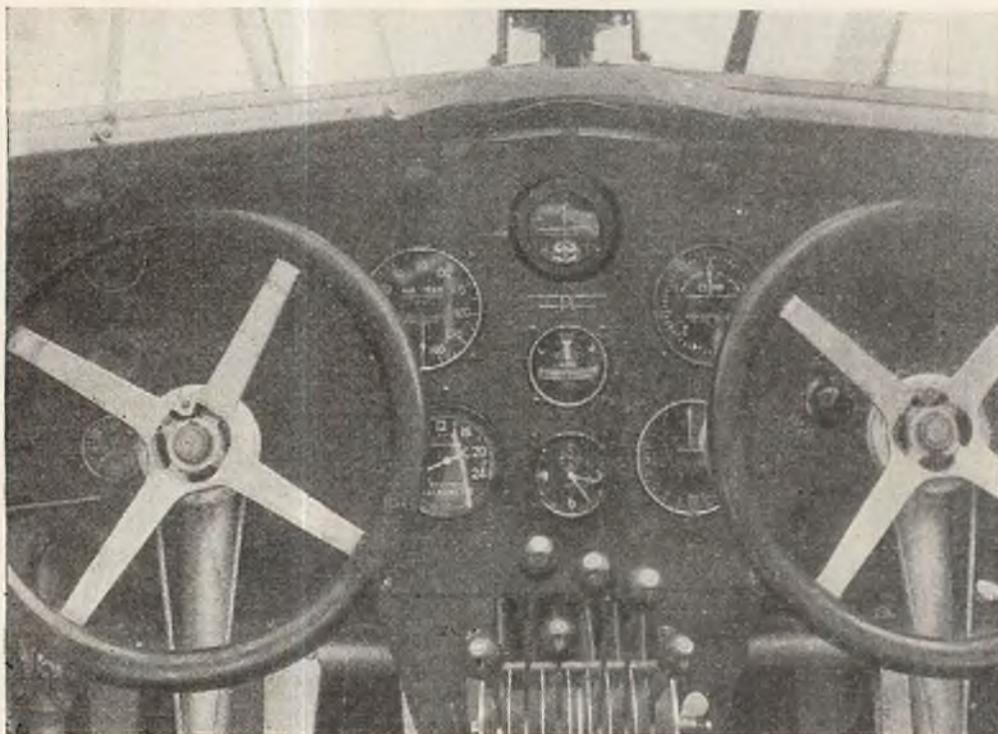
OLD INTERIOR OF TRANSPORT

Those were the days! Pictures on the walls and everything. This interior of an early Vickers-Vimy commercial transport sported wicker seats and a speaking tube to somewhere, along with a clock and altimeter. We had another early interior photo of a shape impossible to use that featured lace curtains and, believe it or not, candelabra complete with candles. These were even an improvement over the jail-like interiors of the Ford trimotored "tin goose" still in use in many South American countries. Note pilot's "office" through windows at cabin front.



LATEST LUXURY INTERIOR

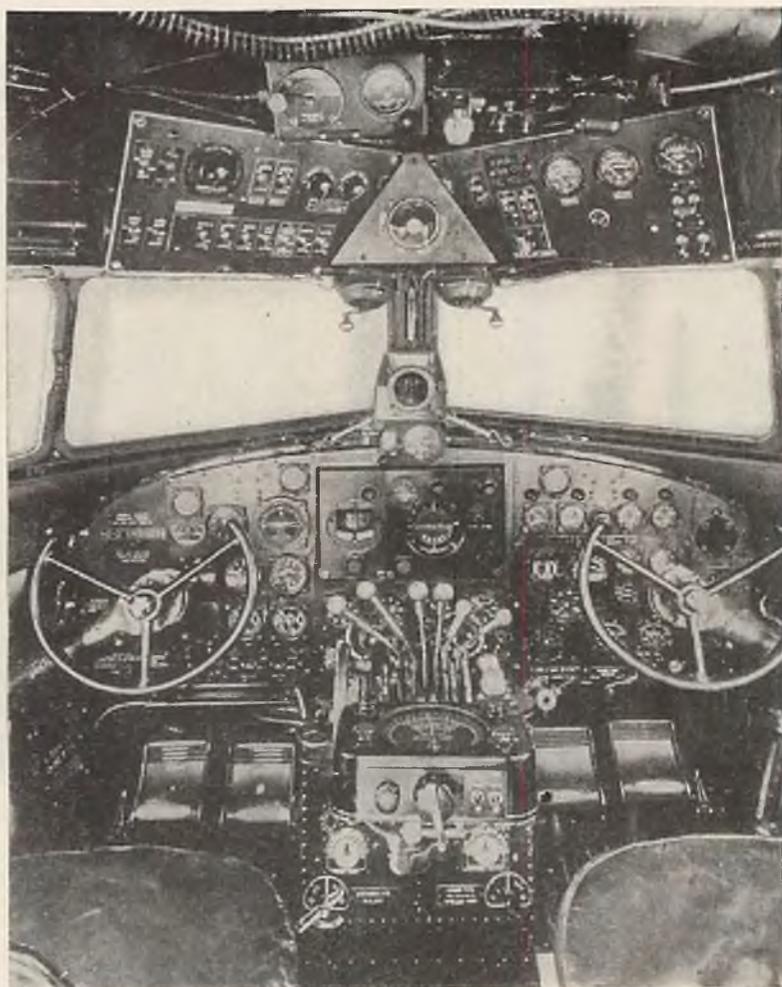
Not a night club but it might well be called a flight club, for this is the dining salon aboard the Pan American Transatlantic Clipper ship. This is an interior view of the Boeing 314 shown on page eight at the bottom. Luxury such as this is common to modern air travelers, for similar splendid appointments are to be found on almost all modern transports even though they are not equipped with a dining salon. Air conditioning, steam heat, soundproofing, and quiet motors add to the comfort. Special color schemes and fabrics too add to the modern interiors.



OLD INSTRUMENT BOARD

This barren instrument board, dual control wheels, and, according to the somewhat bewildered caption, "shifting gears," belonged to the Fokker monoplane "America," flown to France by Commander Byrd, Bert Acosta, and Bernt Balchen a little over twelve years ago. The caption goes on to say that "every possible instrument" was carried, but we see visible only ten dials, the compass above, and the throttles and mixture controls referred to as shifting gears. Note the cable wound about the hubs of the pilot wheels. This was directly connected to the ailerons.

NEW INSTRUMENT BOARD



No wonder the modern transport pilot has to have a physical check-up every few months to see if he's still normal. Keeping check on these instruments during daily flights calls for plenty of what he must have. This view of a modern DC-3 includes flight, navigation, radio, blind-flying, automatic pilot, automatic direction-finding, engine-control and checking instruments, some of which are in duplicate for safety. An auto driver's nightmare!



**OLD
AMPHIBIAN**

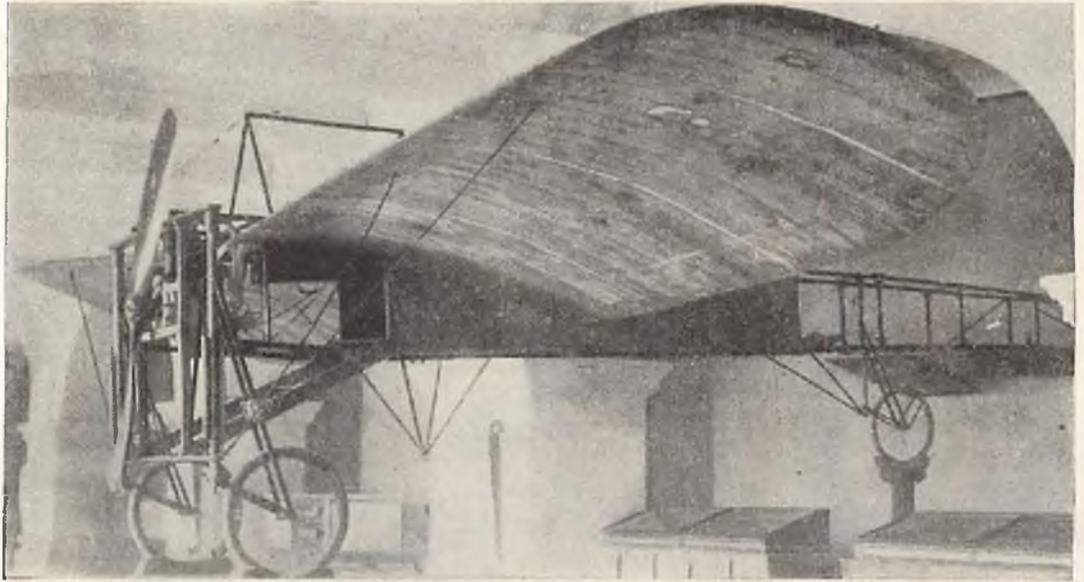
The early nineteen twenties saw much experimentation with amphibians. This English flying boat was equipped with a swiveled landing gear that could be raised up out of the water to a horizontal position by the aid of a ratchet and crank arrangement. This ship, the Viking-11, won a government first prize awarded in competition for designs for this type of ship. This four-place amphibian was of the biplane flying-boat type with pontoons attached to the outer ends of the lower wing. The biplane tail was typical of many British ships of this period.



**NEW
AMPHIBIAN**

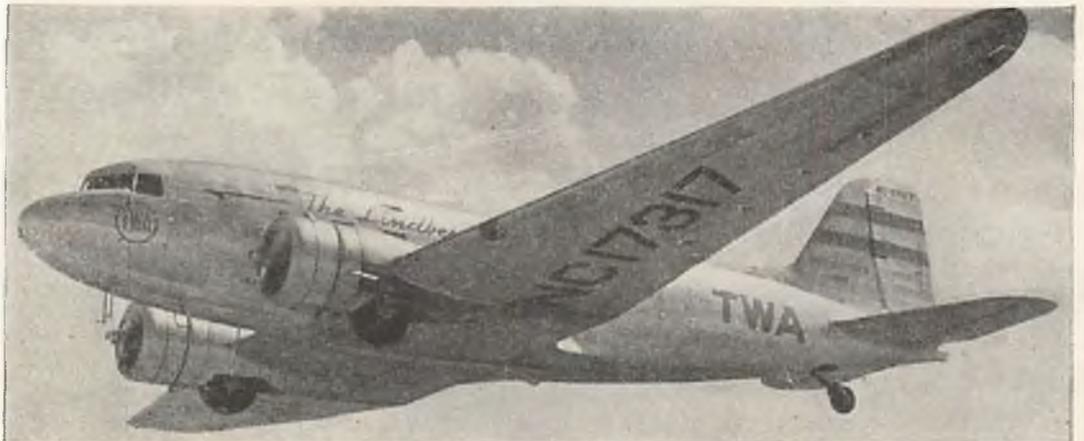
As a contrast we present the modern small flying-boat amphibian as built by Grumman. This G-21-A is powered with two Pratt & Whitney 450 h.p. engines and has a speed of over 200 m.p.h. at 5,000 feet, and a service ceiling of 22,000 feet. Four passengers and a crew of two make this a six-passenger air yacht fitted with many luxuries for passenger comfort. Plenty of baggage space is allowed for long trips. Its cruising range is 800 miles or over. Soundproofing and controlled heating and ventilation are included in the construction of this bimotor amphibian.

OLD CONTROLS



This shows a close-up of the wing of the famous Blériot monoplane with which he made his historic Channel crossing in 1909. Control in those days was acquired by warping or twisting the wings themselves. This was done by the wires and cables seen in the photo running from the wing to the strut under the fuselage. Movement of this strut back and forth and to one side twisted the trailing edge of the wing, alternately; that is, when the trailing edge of the right wing went down, the trailing edge of the left wing was twisted up and the ship tilted to left.

NEW CONTROLS



The control areas of modern air transports are especially efficient due to modern methods of design and experience. In the flight shot at top you will note the single rudder and fin of the DC-3 as well as the long aileron. At the extreme rear edge of the rudder you will note a small separate area set into the rudder itself. This trimming tab gives the pilot even better control and smoother action in flight. In the lower photo of the DC-4 you will note that the landing flaps are down. These immense flaps are used as a brake in landing and shortening ground run.

COLORFUL HIGHLIGHTS IN AIR PROGRESS

- With the popularity of the color pages of Air Trails' first Air Progress Annual in mind, we once more have selected and prepared eight pages of color illustrations. These planes selected are of many types and for many purposes, each of some particular merit that have warranted their appearance on the cover of Air Trails Magazine during the past months. We offer these color pages for your pleasure especially mounted for framing or reference.



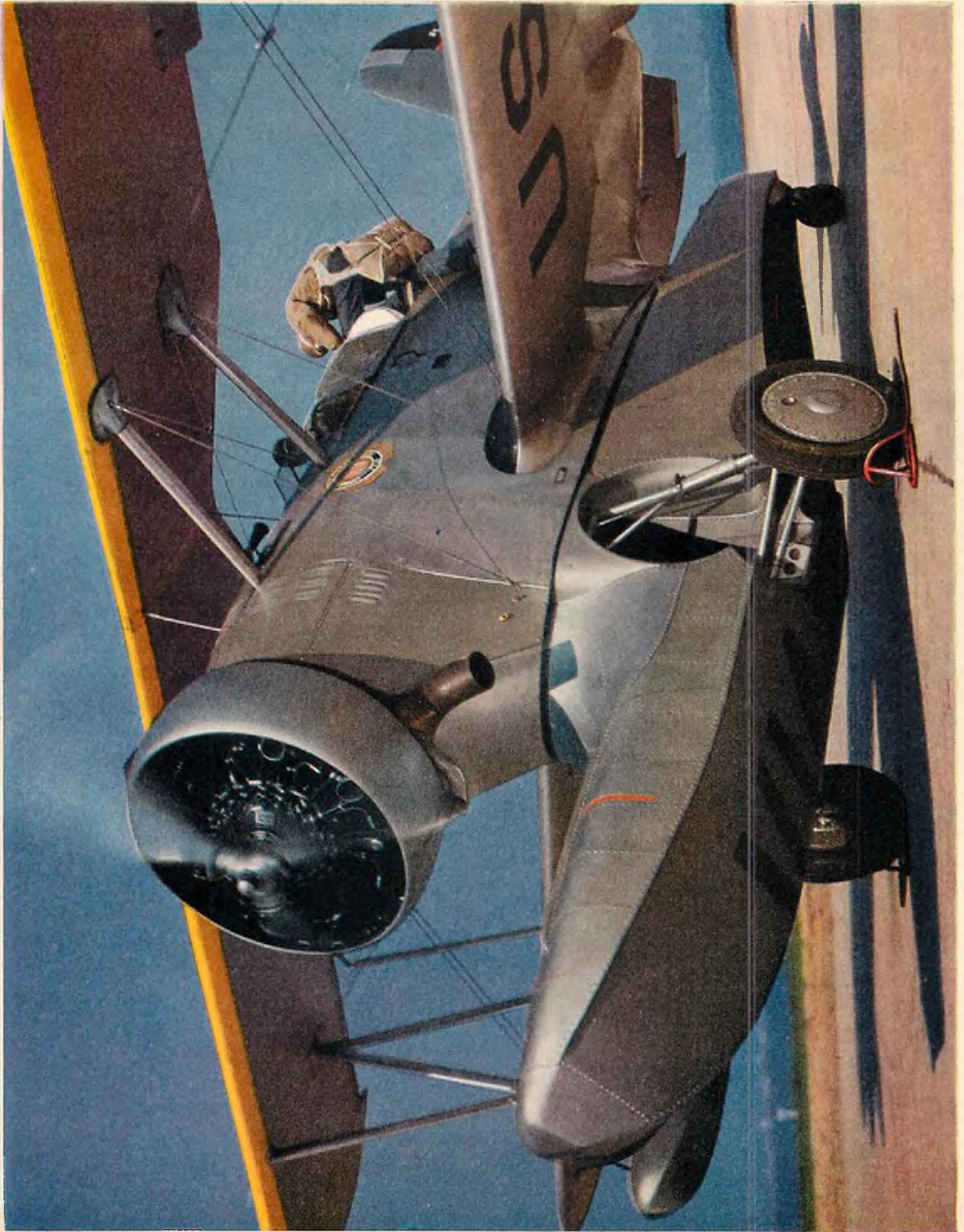
This is the Seversky convoy fighter, powered with a 1,000 h.p. Wright Cyclone engine, designed for export. This famous fighting plane carries two in the crew and is armed with two fifty-caliber guns firing forward and a thirty-caliber gun fired from the rear cockpit. Speed around 250.



The finest bomber in the world, the Boeing YB-15. This American ship has a span of 150 feet and a length of 90 feet. It is powered with four 1,000 h.p. Pratt & Whitney Twin-Wasp Senior engines. The wings have companionways through them to the four engines.



The British Fairey Battle Junior medium bomber. This smaller addition of the Fairey Battle is a two-place monoplane powered with a Rolls-Royce Merlin I supercharged engine of 990 h.p. at 12,000 ft. It has a speed of 283 m.p.h., two machine guns, bombs, full radio equipment.

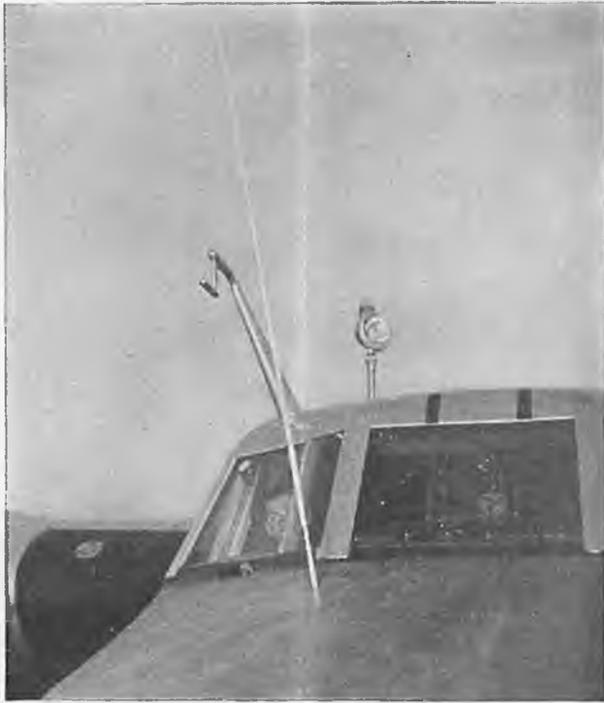


The Grumman JF-2 of the U. S. coast guard. This amphibian is especially useful for patrol work as carried on by the members of this organization. This amphibian is powered with 775 h.p. Wright Cyclone engine and has a speed of over 250 m.p.h. It is equipped with two-way radio.

AIR PROGRESS IN PICTURES

● During the past months many outstanding and interesting pictorial features have appeared within the pages of Air Trails. We have selected the following ones as particularly interesting to our readers because of their variety and their broadness of subject. Both military and civil aviation subjects are presented, for while civil aviation is the most commonly seen, understood and patronized, military aviation has been responsible for developing and perfecting many of our civil aviation successes.

Photos by Rudy Arnold



For safety on the water, this five-hundred-foot searchlight, that disappears into cabin roof. Note static-free radio mast.



Just inside one of the roof emergency exits is stowed one of many self-inflating life rafts, each capable of holding 10 men.

SEAGOING SAFETY



In each passenger compartment is an emergency door around one of the windows. Pulling of handle shown opens panel.



As a safety measure, these gauges indicate the exact amount of fuel in tanks. Engine fire extinguisher levers, center right.



The bow compartment showing: top, another life raft; right, fire extinguisher; left, safety anchor; bottom, mooring-line ax.

Photos by Rudy Arnold



In order that the pilot may be relieved of much strain, the flight engineers in this compartment handle all such duties.



The navigator shooting the sun through the turret on top of huge cabin. This turret may also be used as emergency exit.

Pan American spares no pains in making her great Clippers the safest means of aerial transportation. Here are a few of the safety items.



Every seat includes one of these life jackets where it is instantly available. These will support a large man indefinitely.



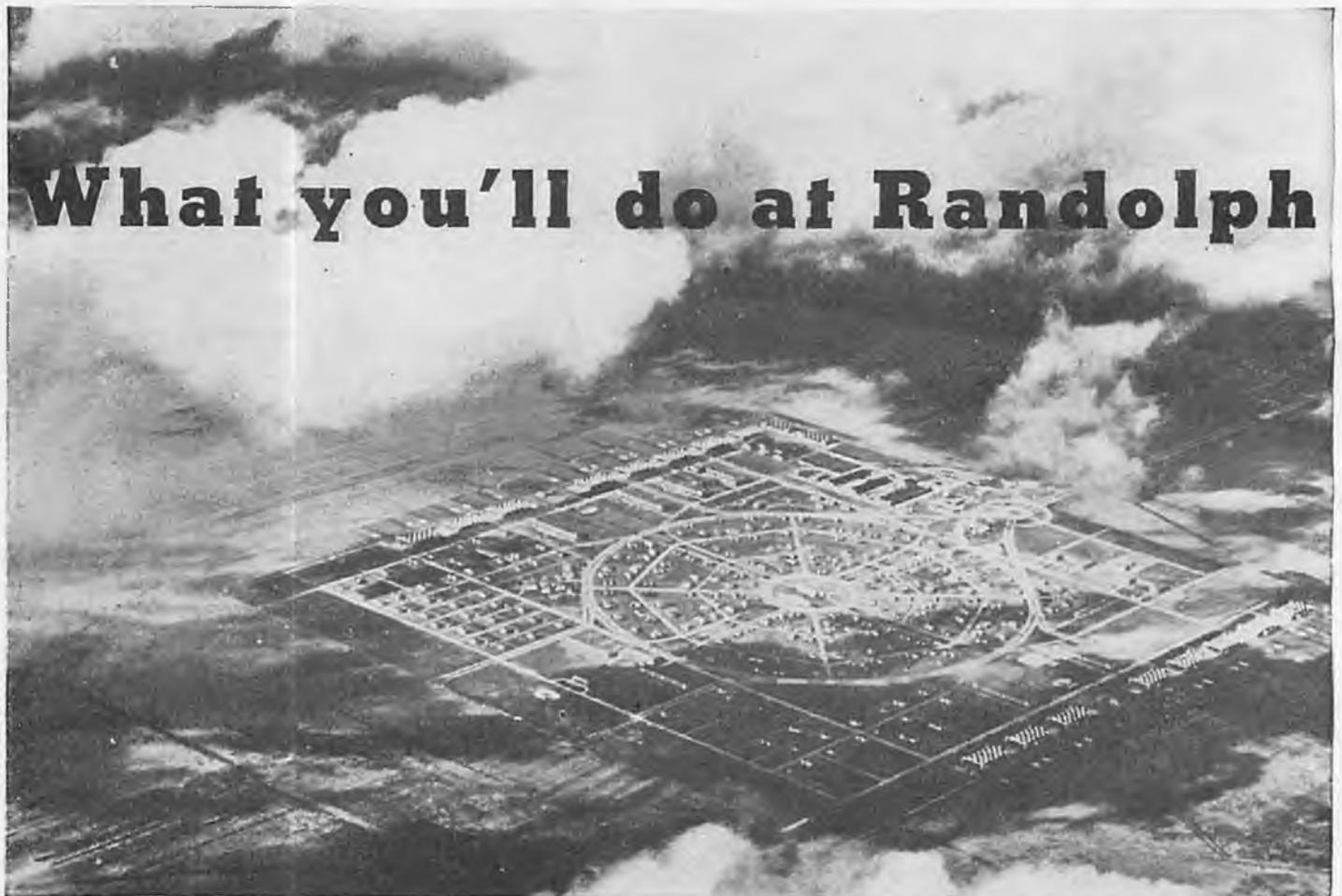
The often spoken of but seldom seen Verrill pistol for signaling with red, green and white flares in case of a landing at sea.



The copilot is shown with his hand upon the fuel dump valves, a pull of which will lighten the ship by releasing extra fuel.



The instructor in the rear cockpit always has the last word, in fact all of them, at Randolph Field. The one-way telephone system enables the instructor to advise the students as to errors.



International Photos, compiled by Capt. J. G. Hopkins

Two North American training planes warming up for a night flight for student training in the important subject of night navigation and instrument flying so important to military missions.



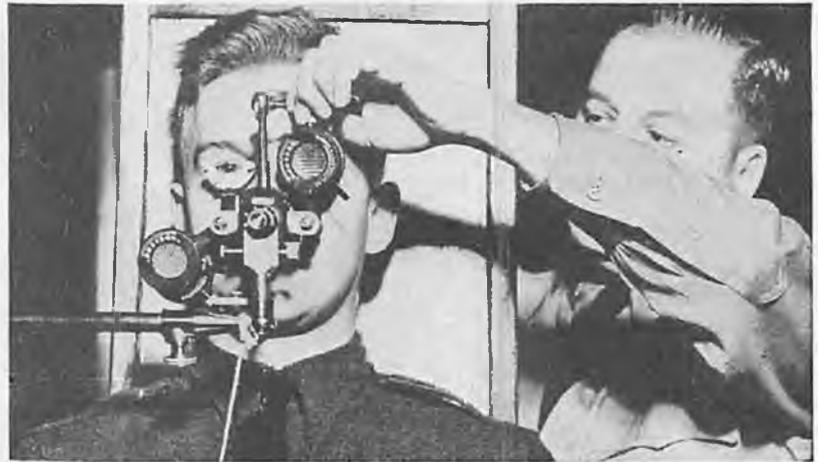


Good or bad? The student learns the art of reading weather maps as part of training.



Randolph Field, the goal of every flying cadet who sets his heart on army flying.

The eyes have it or else—! This all important human organ must check up to rigid requirements and kept at efficiency peak throughout the training.



Radio communication, that ever-vital phase of military flying and mission work, is taught with the aid of buzzer and head sets in groups such as this one.



"WRAP IT UP"

How they get them back together after a jump!



1 First arrange the pack, harness, and harness lift webs along the packing table. Note weight on the lift webs.



2 At other end of table straighten out the folds of the 'chute with the pilot 'chute at extreme end of table top.



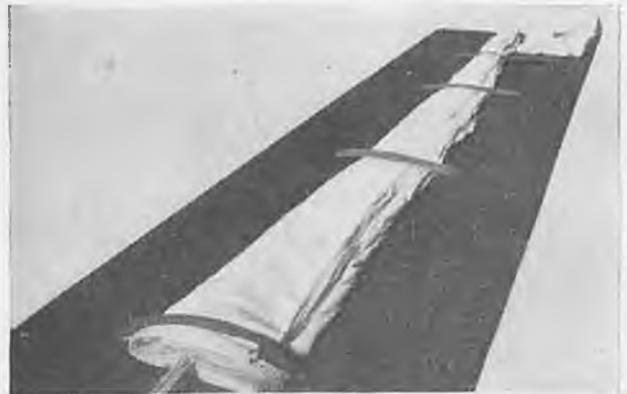
3 Arrange the panels of the 'chute evenly, smoothing out wrinkles and folds. Keep the shroud lines straightened.



4 Half of the 'chute is now arranged smoothly and evenly. Note shroud lines in center and bag weights on panels.



5 After other side of 'chute has been smoothed as first, both are folded in toward the middle, reducing pack.



6 With both sides of canopy folded toward center, weights are used to hold down. Note the pilot 'chute at peak.



7 Now the entire group of shroud lines is hooked into loops in the bottom of the pack to prevent fouling.



8 As the shroud lines are hooked into loops the 'chute is moved nearer. Now it is folded on top of hooked lines.



12 The collapsed pilot 'chute is inserted between the main pack and the temporarily fastened sides of the 'chute.



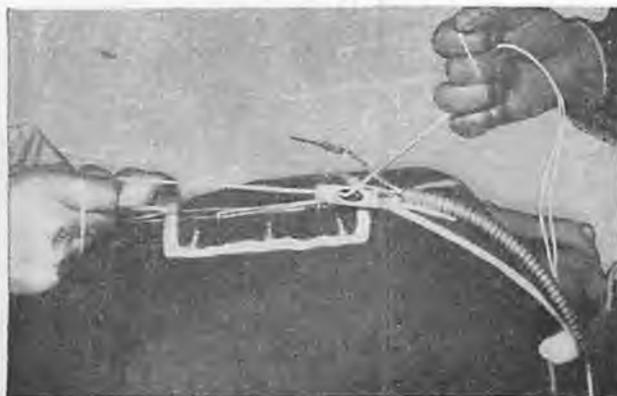
9 The main 'chute is now folded down upon top of shroud lines in the bottom of pack. Note pilot 'chute to left.



13 With main 'chute, pilot 'chute, and sides of the pack in place, we are now ready to close the ends of the case.



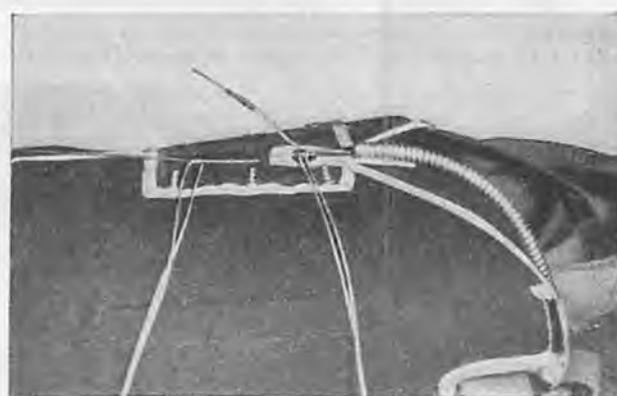
10 The two sides of the pack are now brought up over the folded 'chute and held by temporary pins through pegs.



14 The end of the pack bearing the ripcord carrying tube is brought up and ringed flap placed over nearest peg.



11 The pilot 'chute is now collapsed by folding spring ribs together and pulling pilot 'chute shroud lines with hand.



15 Point of ripcord is inserted in peg. The other end is held by second ripcord tip. Snap protecting flap. Done!

Something besides good looks and a gracious manner make an air hostess. Behind that efficient and attractive exterior is the training of a nurse and the knowledge of many things.



Learning the philosophy of Hostess Service: Girls shall be clean-cut, clear-thinking, not too forward or too retiring, and very adept in dealing with all kinds of people.



Hostesses must learn air-housekeeping and methods of serving and packing various foods for air travel. The efficiency and capacity of the tray service will amaze you.



What's overcast, cumulus cloud, ceiling, all vitally interested in what the weather



At the American Airlines reservation office in Chicago the class learns what to do about and with all types of tickets and reservations.



and all the rest? The class learns all the answers to pass on to passengers, is going to be en route. And don't think the big words bother them, either.



1,177 items go along with each hostess on every flight to add to the passengers' comfort and pleasure aloft.

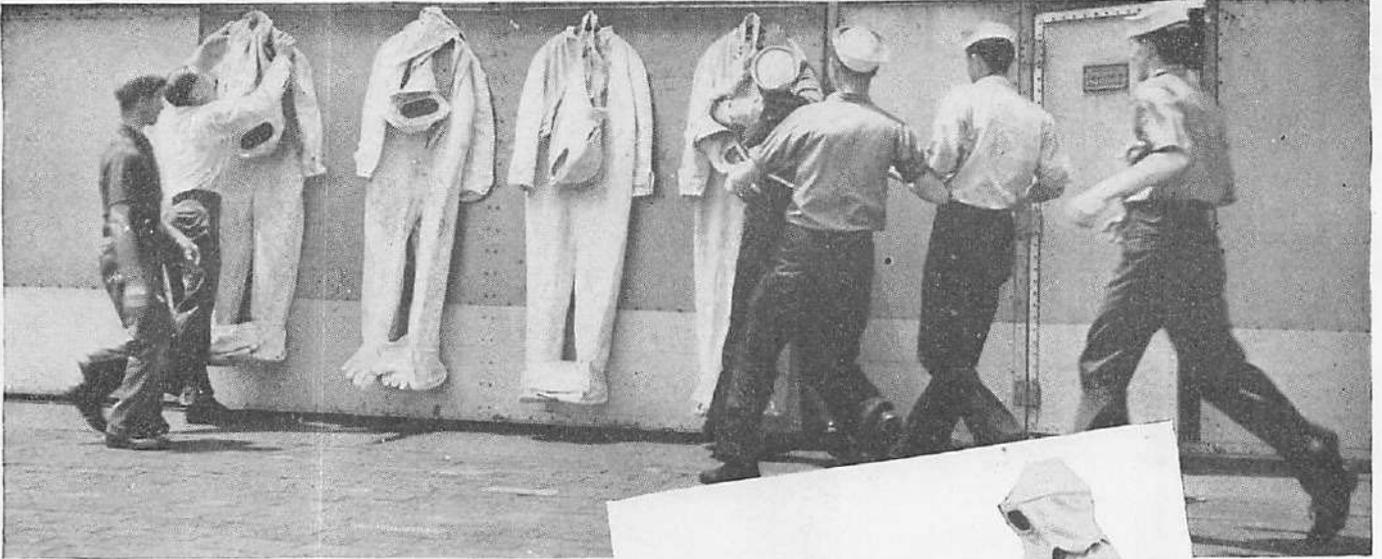


Blind flying, too, holds no mystery to the American air hostess, for she has had first-hand training in its use.



Learning the answer to another passenger "why." Traffic rules of the air are explained and demonstrated in the traffic tower.

Rudy Arnold Photos



1—With the wail of the fire siren men race to the suits.



3—CO₂ is poured onto the fire as an ambulance stands by.

"the seven dwarfs"

One of the deadliest dangers of aviation is fire after a crash. Many a fatal crash would be otherwise had not fire followed, or had there been means of getting to the occupants of the burning wreck. The authorities of Floyd Bennett Field, intent upon minimizing such hazards as far as possible, have trained men and equipment for this very thing ready day and night. Popularly known as the "Seven Dwarfs," these asbestos-garbed men carry out a "rescue" such as the one staged here in ten minutes from first picture to last. In this case a light plane was propped up and smothered with sky-writing smoke while the pilot, like Snow White, awaited rescue by the Seven Dwarfs.



5—While the pilot is placed on the stretcher, an overcome dwarf is pulled to safety by cable attached to back of suit.



2—While all traffic has been stopped on the field by a signal from the control tower, the first "dwarfs" arrive.



4—Protected by their asbestos suits, the "dwarfs" plunge into the fire and unstrap and carry out the ship's pilot.



6—Ten minutes have passed since the siren and the injured pilot is on the way to hospital. Note prop holding up "wreck."



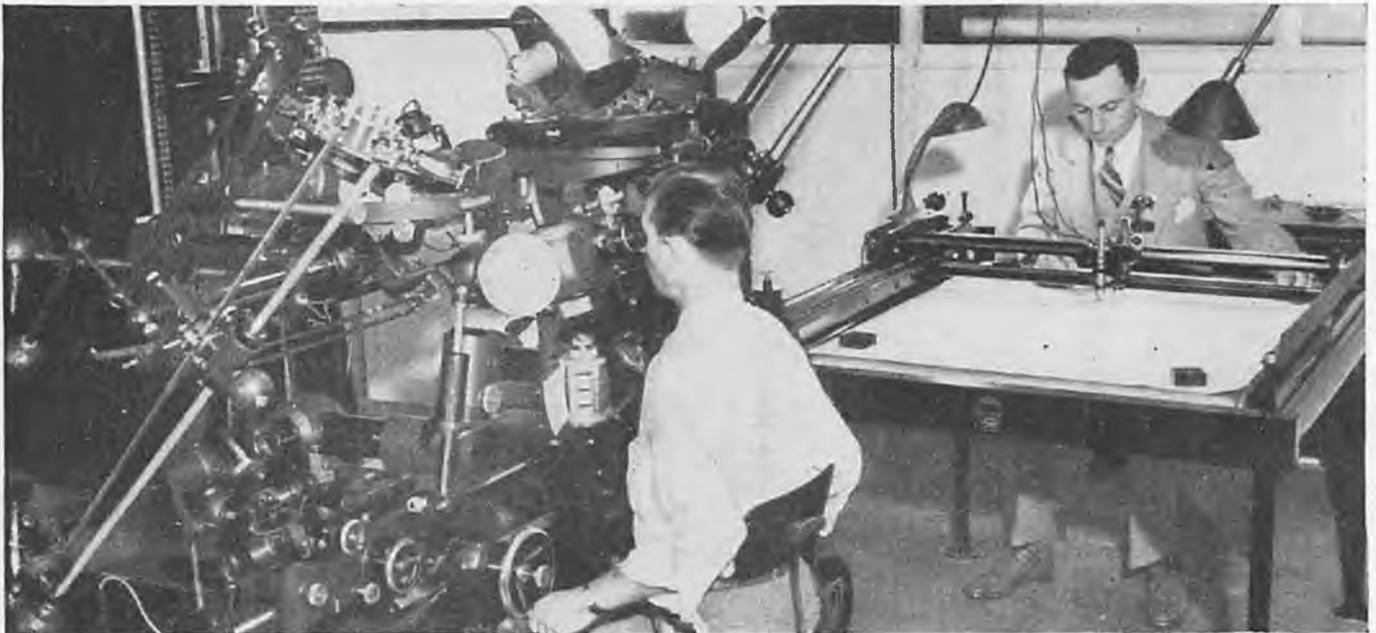
One—The first step in this exacting profession is the taking of four simultaneous photos from different angles of the area. The special camera shown takes these exacting photos. Note the oxygen being used and the heavy clothing for high-altitude work.

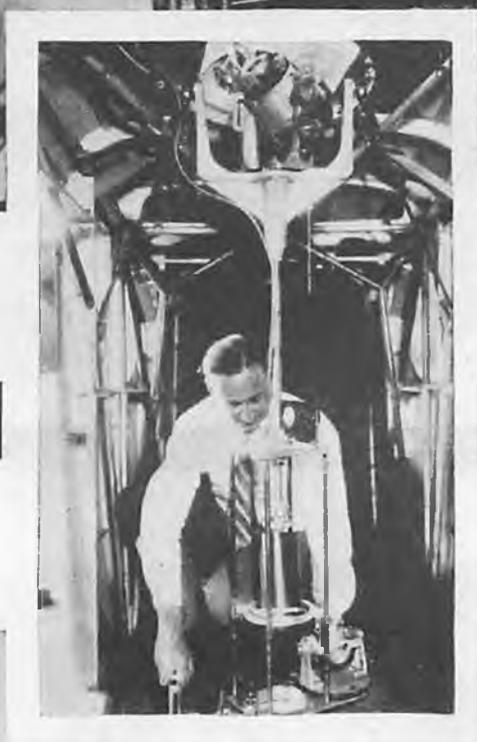
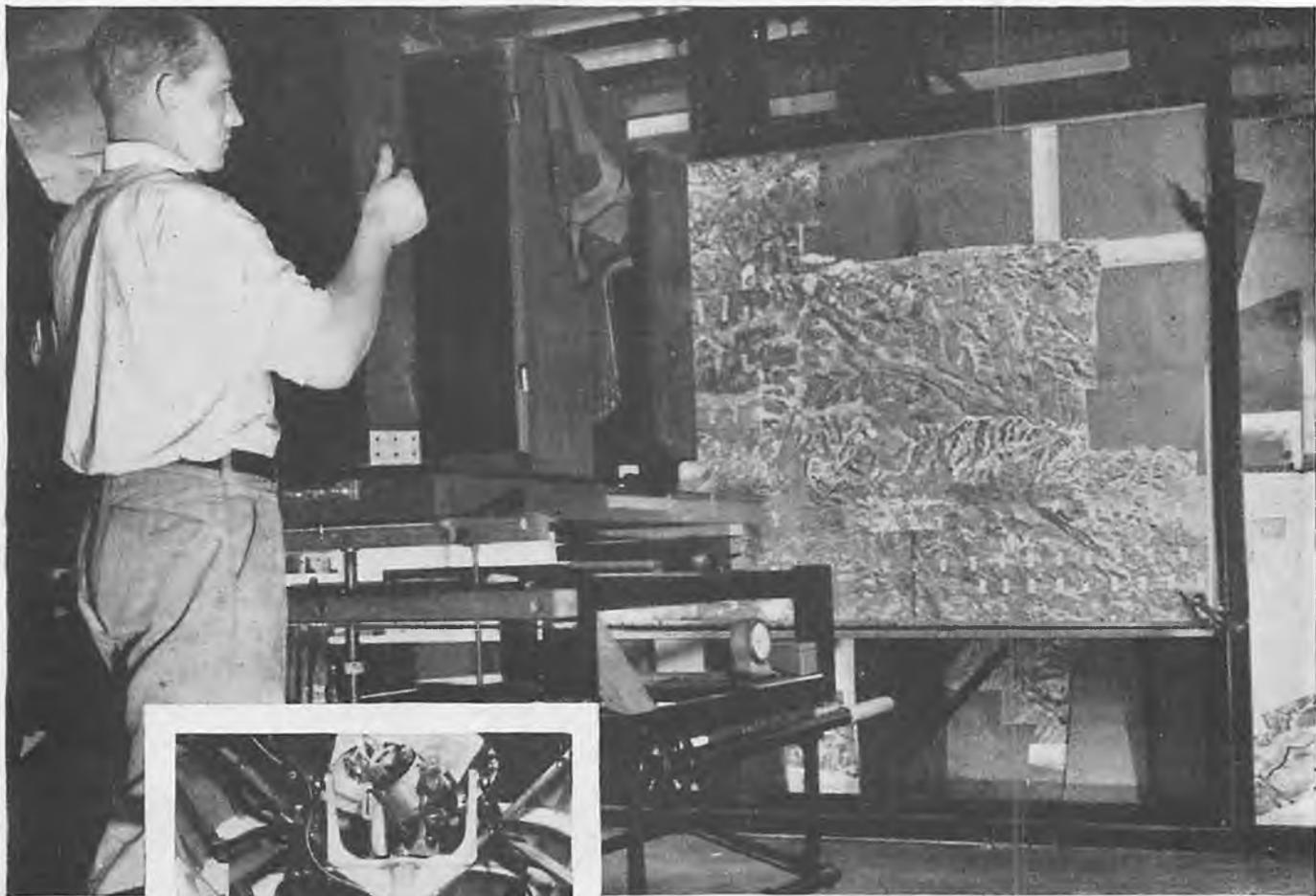


Two—These photos are carefully numbered and placed with millimeter precision upon a huge drafting board scaled with latitude and longitude lines. Skilled cartographers cut and fit the photos until the whole area is fitted like a jigsaw-puzzle.

AERIAL MAP MAKING

Four—The huge assembled photograph is placed in the complicated stereoplanigraph machine on the left being operated by C. M. Cottrell. This machine is designed to transfer the topography as shown in the huge photograph into pencil lines and curves through the medium of the machine on the right, where Frank Terpening keeps watch. From this pencil outline are composed and finished the accurate topographical maps. This method of map-making, although expensive and painstaking, has proven to be the most satisfactory.





Three—The giant assembled photograph is now rephotographed so that the joints do not show after use of the stereoplanigraph. Left—The special "polar navigator" the pilot operates to prevent zigzagging. This assures the aerial photographs being taken exactly in line.

Below—The specially equipped Fairchild 71 of Fairchild, Polley & Eliel, Inc., Photogrammetric Engineers, of Los Angeles, California, who have perfected this unique and exacting science of transferring aerial photos into the most accurate maps known.





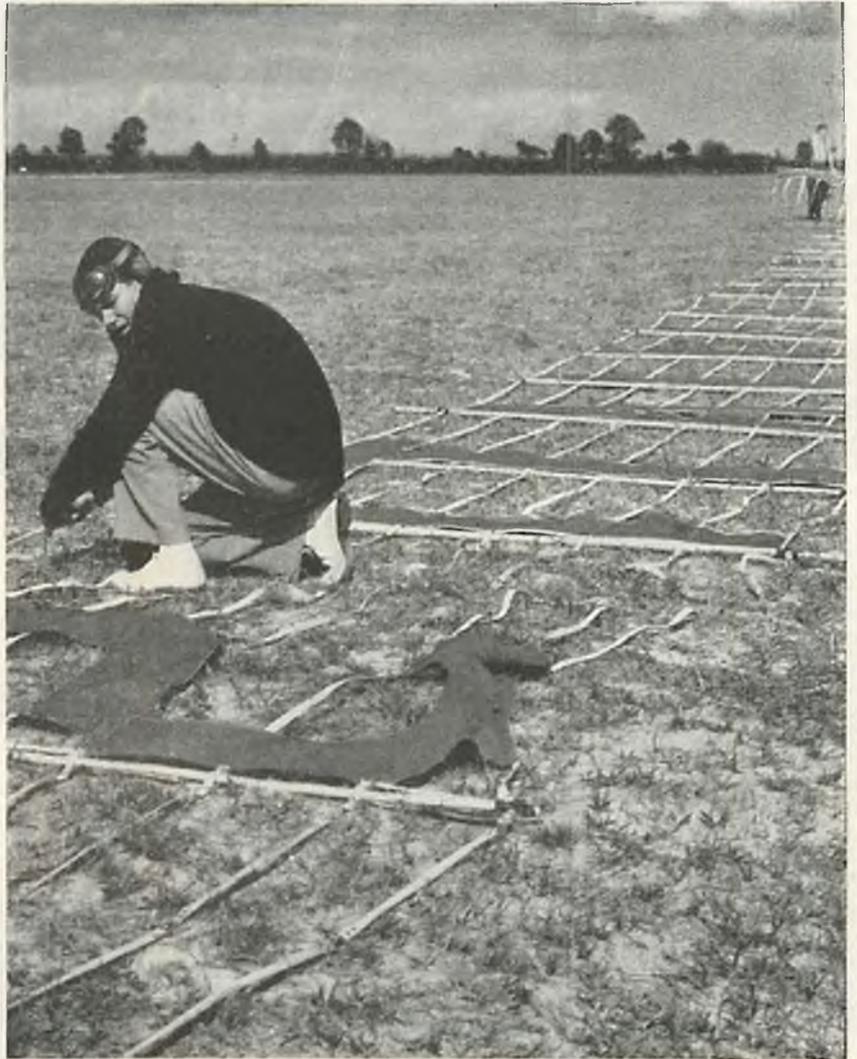
1

sign of the times

2



So that's how they do it! Perhaps you have wondered how those giant towed signs are made and how they are taken into the air and brought down again. Here's the answer. Figure 1 on the opposite page shows the two trailing cones that keep the sign out in line and steady. These are attached to the last letter of the sentence. In figure 2 the size of the letters is evident. These are of strong cloth attached to cords and light bamboo poles to keep them extended. The letters are approximately five and a half feet high and some of the signs are over a hundred feet in length. Figure 3 shows how the signs are laid out in a line upon the field. The pilot flies toward the sign, hops into the air, and flies over the sign peeling it off the ground behind him as shown in number 4. Expert piloting is essential in getting the 150-foot tow rope which is attached to the front of the sign into the air without fouling. The bamboo stick on the front end of the sign is weighted at lower end so the sign will fly vertically, as shown in figure 5. Getting the sign down again is the easiest part of the flight. The pilot simply flies across the home field and releases the tow rope, Figure 6. The sign drops to earth where the crew reassembles the letters into another advertisement while the pilot takes up another, already prepared and laid out.

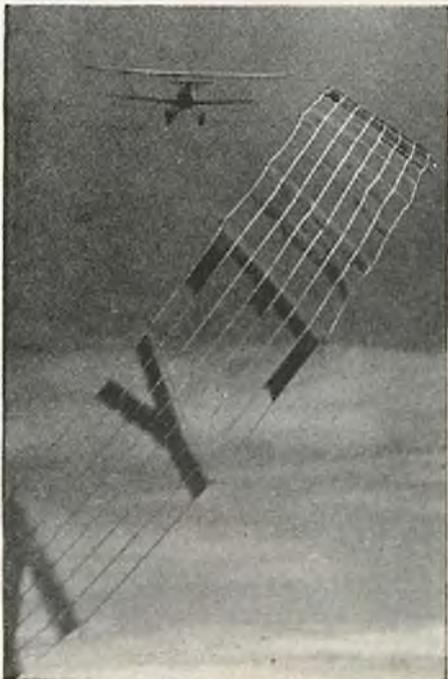


3

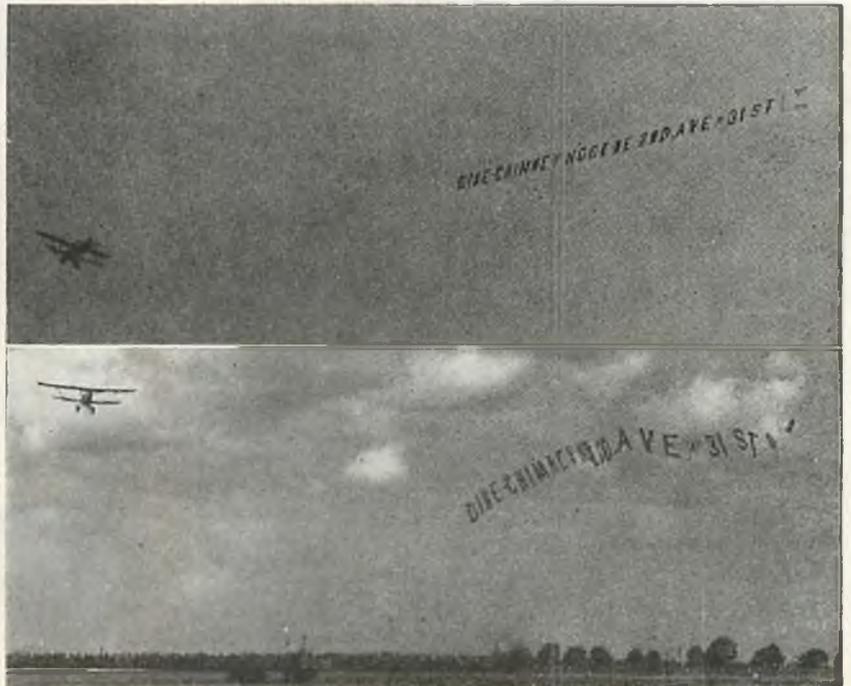


5

Guide feature



4



6

PROPELLER PARADE

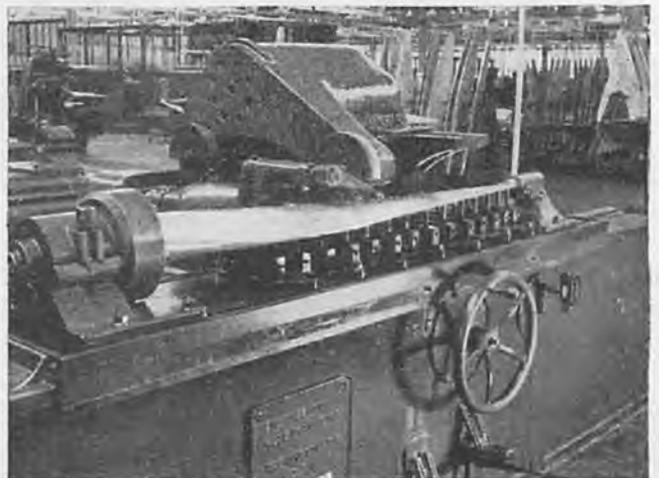


Day and night the new Hamilton Standard Propellers plant is a scene of activity.

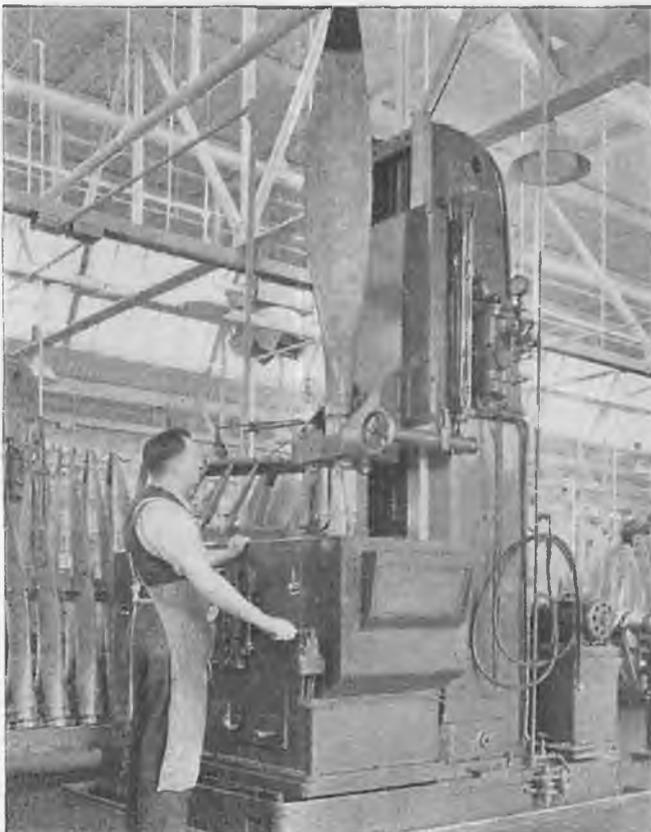


1. Blade forgings before machining.

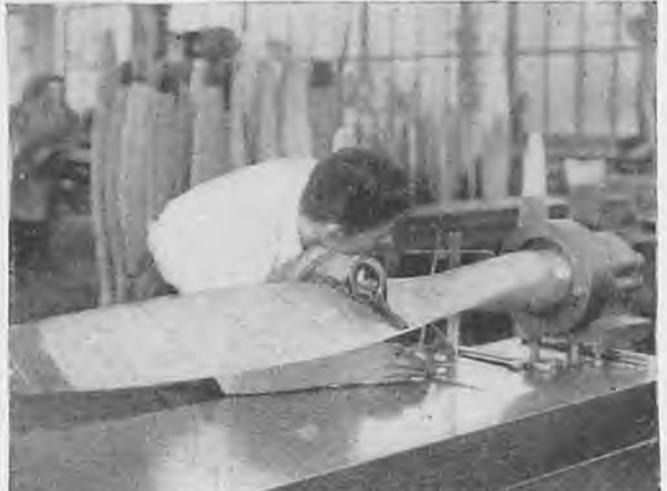
The modern propeller may be a three-bladed affair as large as 13 feet in diameter, and weighing 350 pounds or more. It consists of approximately 200 parts, some of which must withstand forces as high as 150,000 pounds, yet it is built with amazing precision.



3. This machine profiles blades to the proper contour.



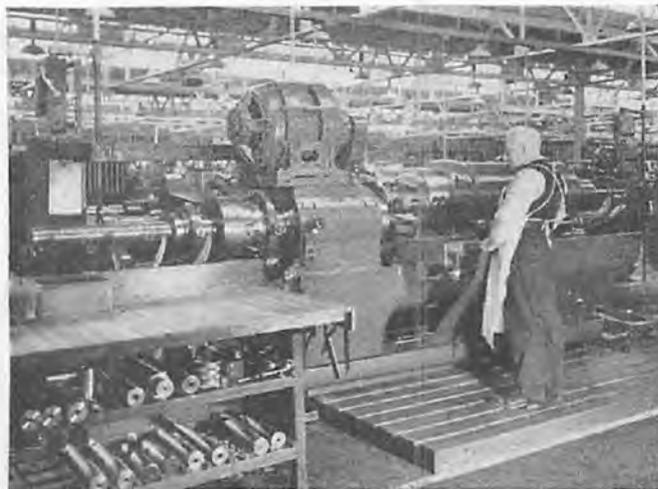
2. Boring the taper hole in the blade shank. The hole diameter is accurate to within ten-thousandths of an inch.



4. The blade forging angles and alignment are carefully checked at all blade stations.



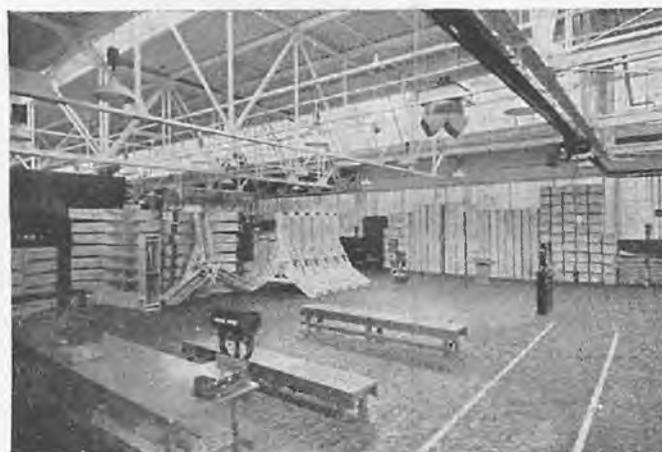
5. Grinding the blade to exact contour.



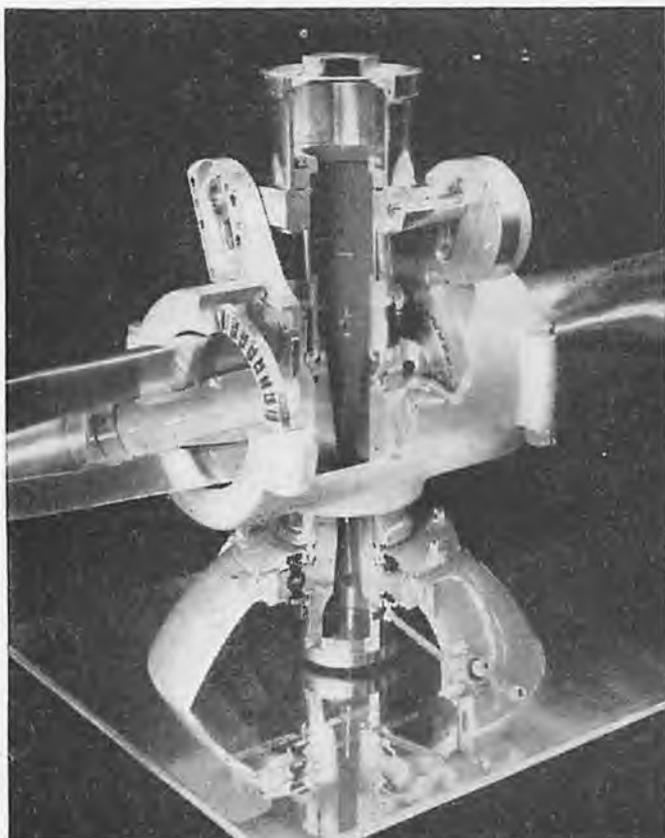
8. This machine transforms bar stock into small parts.



6. Template checking the grinding operation.



9. Propellers packed in their novel shipping crates.



7. Cutaway view of two-bladed, controllable-pitch propeller. The blade angles are adjustable in flight.



10. A typical installation: A constant-speed propeller on the Twin Wasp-powered "Mainliner."

Cruising ZERO

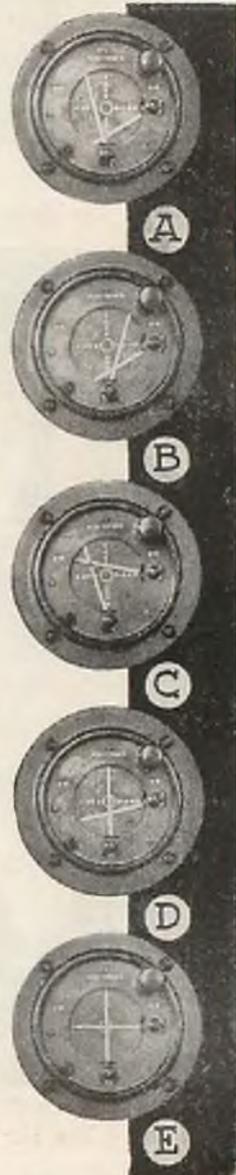
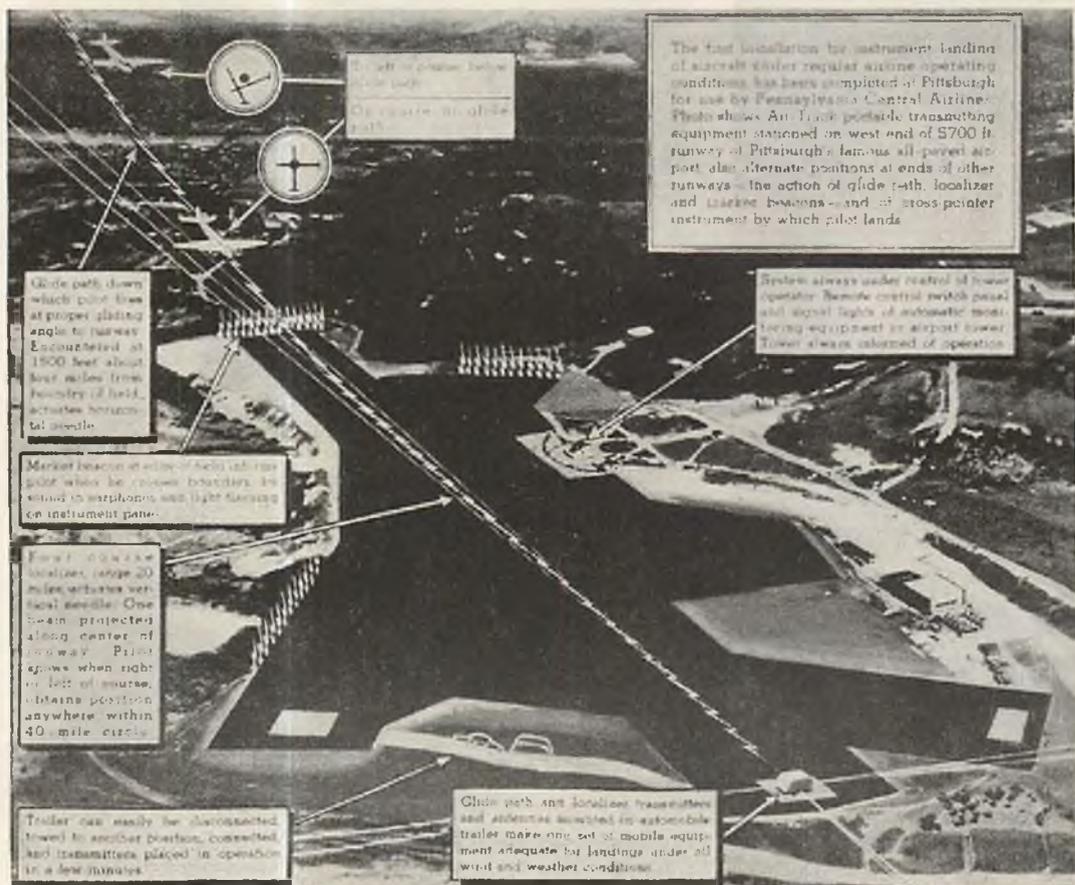
Photos by Rudy Arnold



Transport aviation has overcome the hazards of nature one by one, until air travel has become one of the safest methods of transportation. Even blind landings are now possible. The "Air Track" system illustrated is one of the better methods of bringing a blind-flying ship in to a safe landing.

Left—An American Airlines Douglas DC-3 prepares to take off at Floyd Bennett Field, taking on passengers, mail and express for what is expected to be just another run.

Right—The visual indication "Air Track" dial on the plane's instrument panel gives the pilot both direction and altitude. The photo illustrates the procedure of a plane approaching on the center-line of the localizer. The localizer has a twenty-mile range. When the plane comes under its influence at a 15,000-foot altitude, four miles from the airport, the horizontal needle begins to rise. Any movement of the plane from the proper path is indicated by the needles and, as long as they cross at right angles in the center, the course is correct. A—To left of course, below glide path. B—Right of course, below glide path. C—Left of course, above glide path. D—On course, below flight path. E—On course, on glide path. Below—This superimposed drawing and aerial photo shows "Air Track" directional and glide path utilized by a transport coming in for a blind landing.





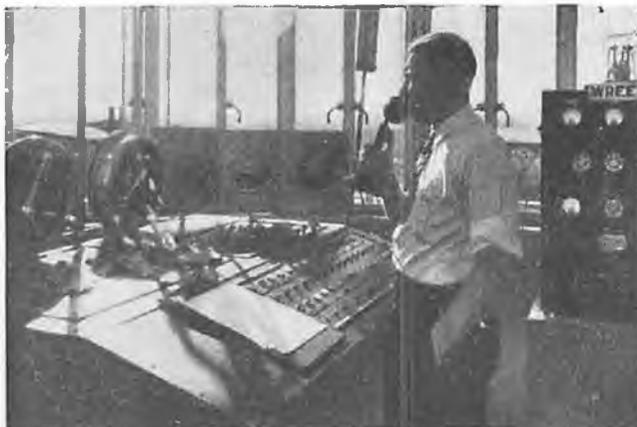
Pilot and co-pilot confer. With weather conditions growing unexpectedly worse, they must fly solely by instrument and radio.



In addition to flying by instruments the co-pilot tunes in the direction-finder-homing unit, getting on the radio directional beam.



Co-pilot uses two-way voice microphone to contact airport at destination, inquiring weather at that locality. Below—The "Air Track" mobile car, containing glide path and localizing transmitters. The trailer is plugged in to power and control cables; is put in operation by man in airport control tower.



The airport answers co-pilot's call; gives résumé of local conditions, advising plane that weather bureau must be contacted for more accurate broadcast.



Weather man checks maps and latest reports. Fog coming in, visibility and ceiling decreasing. Information is relayed to the plane by radio.

When an airliner nears the field flying blind, the airport control tower directs the mobile directional indication finder trailer to its position on the field to guide incoming plane.



Below—A clear-weather demonstration of an "Air Track"-equipped airliner. A DC-3 comes in to a perfect landing, using the direction and glide path radio beams.



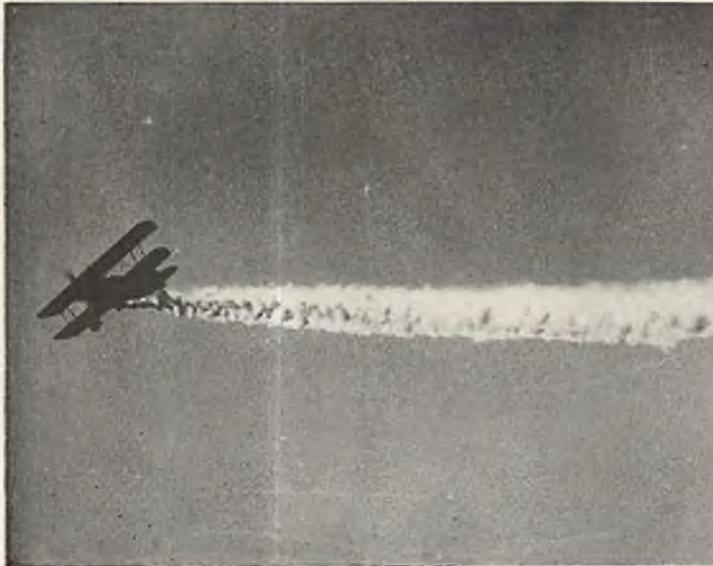
WINGED WORDS



Picture No. 1.



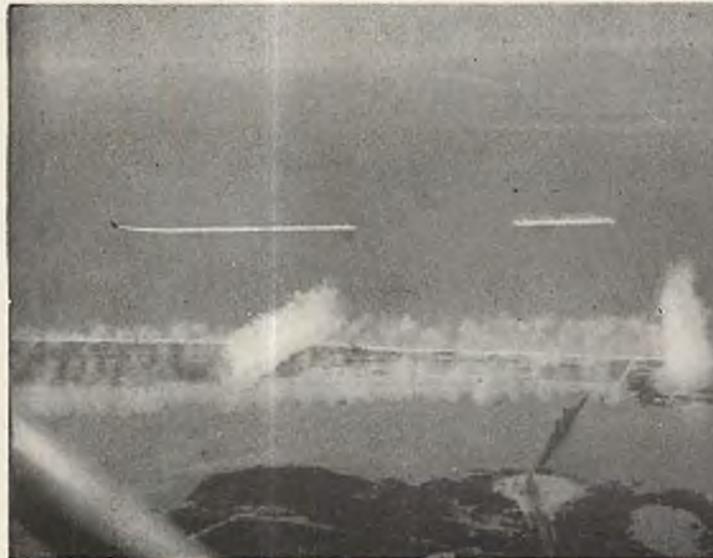
Picture No. 2.



Picture No. 3.



Picture No. 4.



Picture No. 5.



Picture No. 6.

SKYWRITING: Andy Stinis followed by the camera as he weaves mile-high letters and ten-mile words. Complete description on page 95.



Picture No. 7.



Picture No. 8.



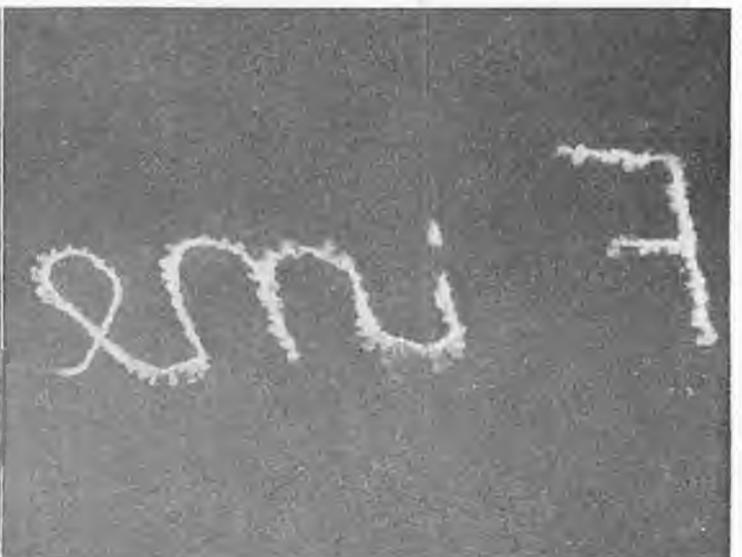
Picture No. 9.



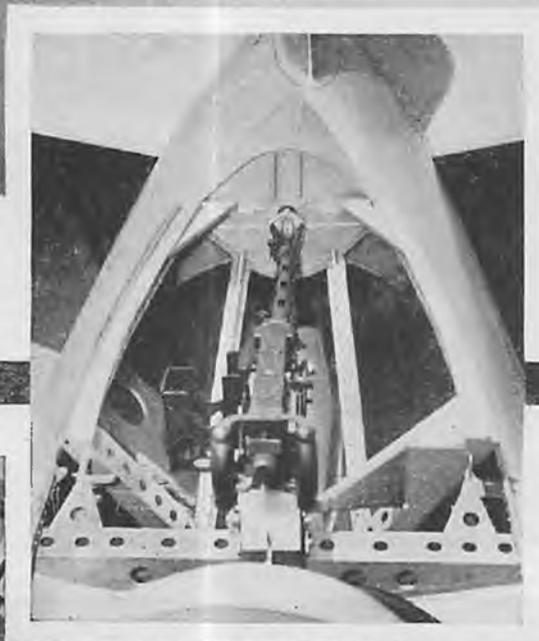
Picture No. 10.



Picture No. 11.



Picture No. 12.



Top to bottom photos show how the revolving turtleback opens to permit gunner to protect the tail of the Seversky Convoy Fighter. Sliding seat enables gunner to also cover all angles of fire above.

guns to the rear!



How bombing practice is taught in miniature, in France. Below, the model bombs held by magnets until released by the student.



Below, the student in the dummy plane preparing to press bomb release, dropping the model bomb onto the moving map below.



This Winged World

View of practice tower. Above is the bomb-releasing unit while below is the instructor checking hits on moving roller-target.

STRATOSPHERE DIVER

This is no man from Mars, but Denois, the French parachutist who jumped from six miles up!

Denois suspended from the ceiling of a test chamber where airtight suit and helmet in which he made his dive were tested for safety.



Wide World Photos



Climbing into ship which carried him to 30,000 ft., Denois has to use a stepladder.



This close-up shows the light but strong airtight helmet with its shatterproof windows.



Back from six miles in one jump. Denois' big 'chute is collapsed by field attendants.

AVIATION'S HISTORY MAKERS

- Occasionally, Air Trails has presented one-page features and one-page photographs of outstanding aviation equipment. These have been of especially popular or interesting planes or developments in modern air travel and aerial warfare. From many candidates the following have been selected as particularly timely and worthy.



The new Boeing Stratoliner comes in for a landing at Boeing Field after a test flight.



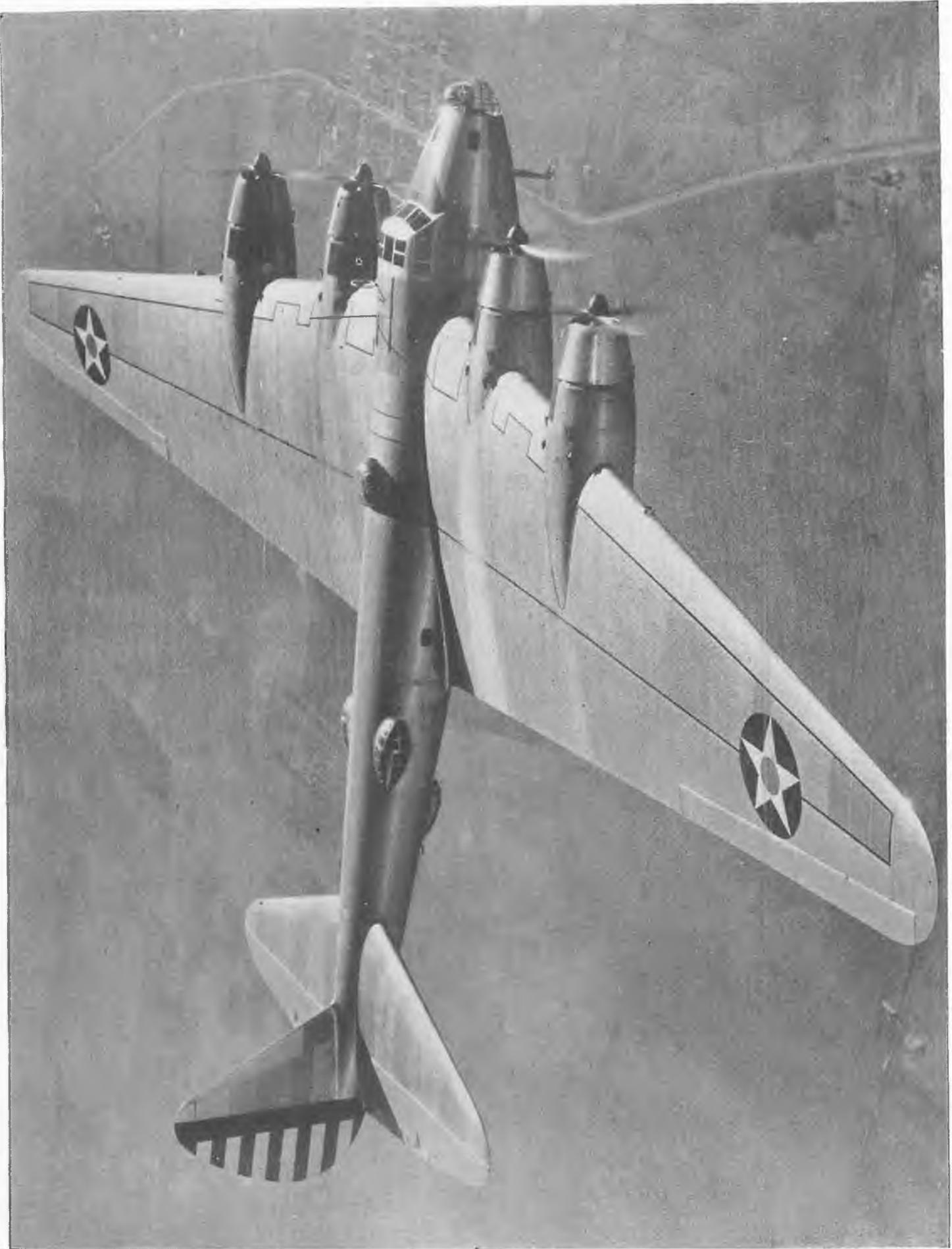
The Stratoliner test crew: L. to R.—
E. Ferguson, E. Allen, and J. Barr.

STRATOLINER

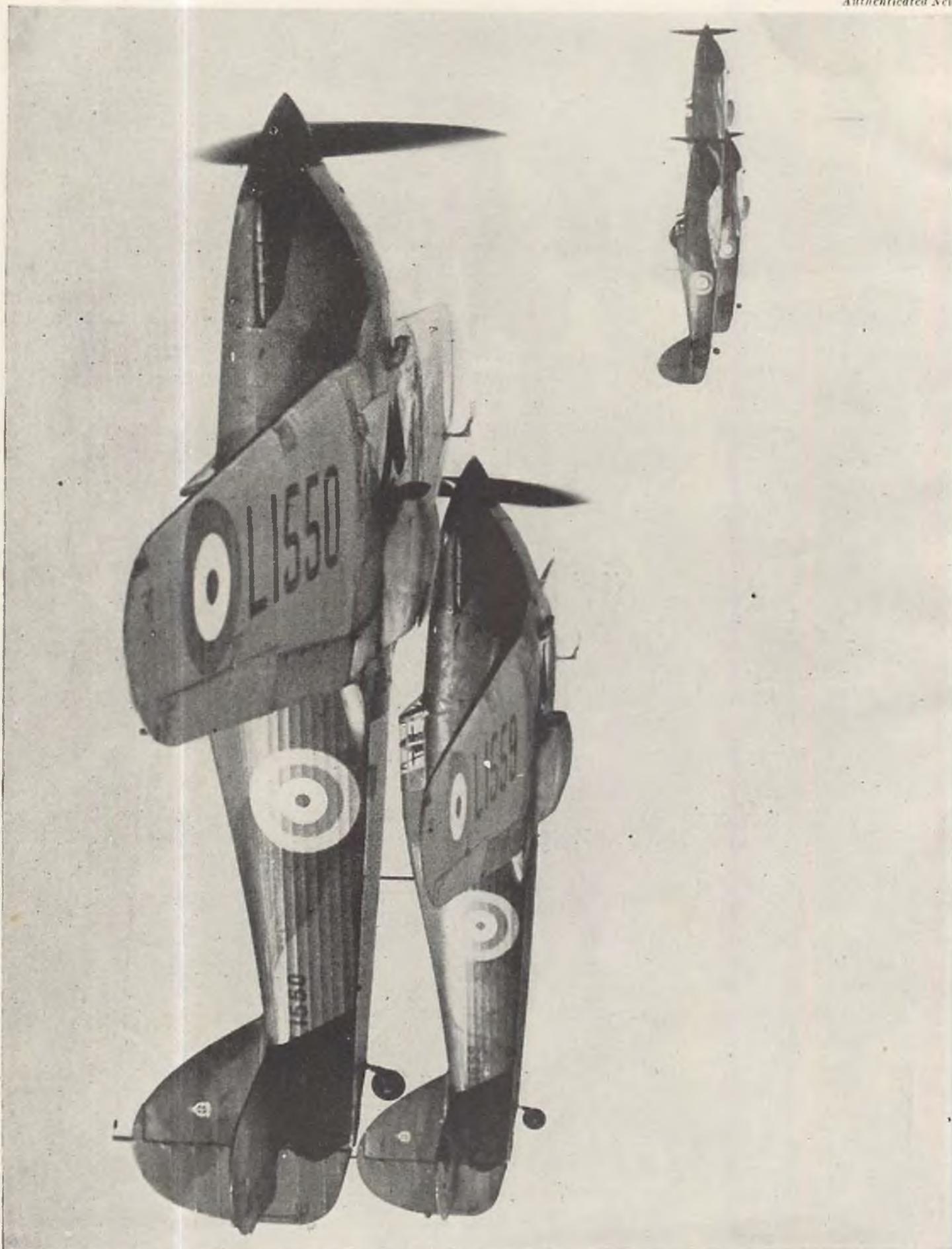
The stratosphere offers additional speed, comfort, and safety for the future air traveler. The Boeing Stratoliner is the first four-engine transport designed for "upper level" flying. The sealed cabin contains, in addition to accommodations for 33 day passengers or 25 at night, automatic temperature and pressure regulating devices for maintaining natural low-level atmospheric conditions at higher altitudes. Four 1,100 h.p. Cyclones power the 107-foot all-metal ship, affording a cruising speed of 240 m.p.h. at 20,000 feet—one-third the speed of the flight of sound!

How the Stratoliner looked as she taxied onto the runway for the first test flight.

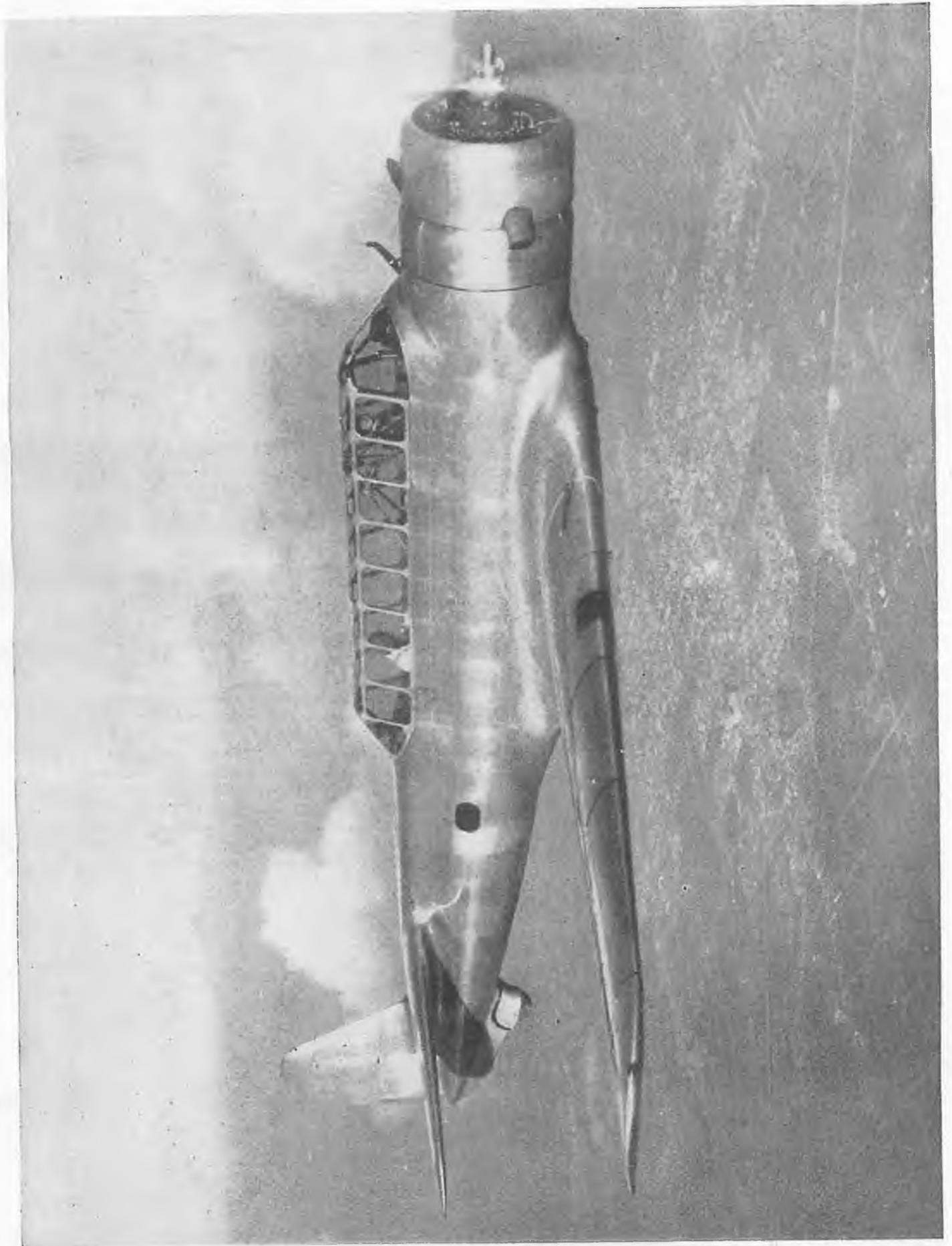




Pictorial
BOEING YB-15, 30-ton Army giant, traveled faster on a cross-country hop than the customary time of a fighting plane. The YB-15 is half again as large as the Flying Fortresses.



HURRICANES bore through the air over England. Rolls-Royce Merlins of approximately 1,000 h.p. drive these swift interceptors nearly 400 m.p.h. Designed for interception only, these ships, judged from their fabrication and climb, are probably more lightly built and loaded than American fighters. See top of opposite page.

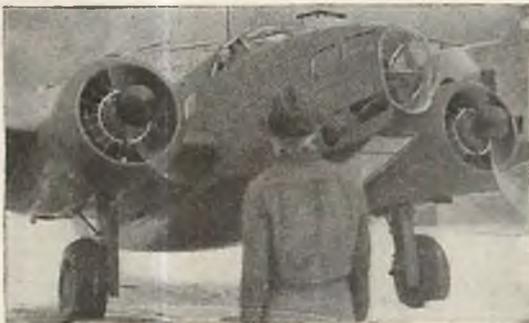


YULTEE attack bombers have attained such success in export competition that enlargement of the plant was compulsory. With a Cyclone these ships hit 227 m.p.h. at 13,500 feet. Range is 1,000 miles. Fitted as a bomber the range jumps to 2,600 miles at a slight sacrifice in speed. Gun hatch opens beneath fuselage to rear of cockpits.



William Larkins

THE LOCKHEED BOMBER



Rudy Arnold

England finds the Lockheed bomber to her liking. Above—The newly developed Lockheed tries her wings in flight. Left—A closeup of the plexiglass nose, showing its interesting detail. Below—Squadron Leader James Addams, of the British Air Ministry, congratulates C. L. Jones, Lockheed engineer, on the craft. This bomber is all-metal, armed with a variety of rapid-firing guns, equipped with mammoth bomb compartments and, manned with a four-man crew and bomb load, is said to be one of the world's fastest bombers.



International



FLYING DREADNAUGHT

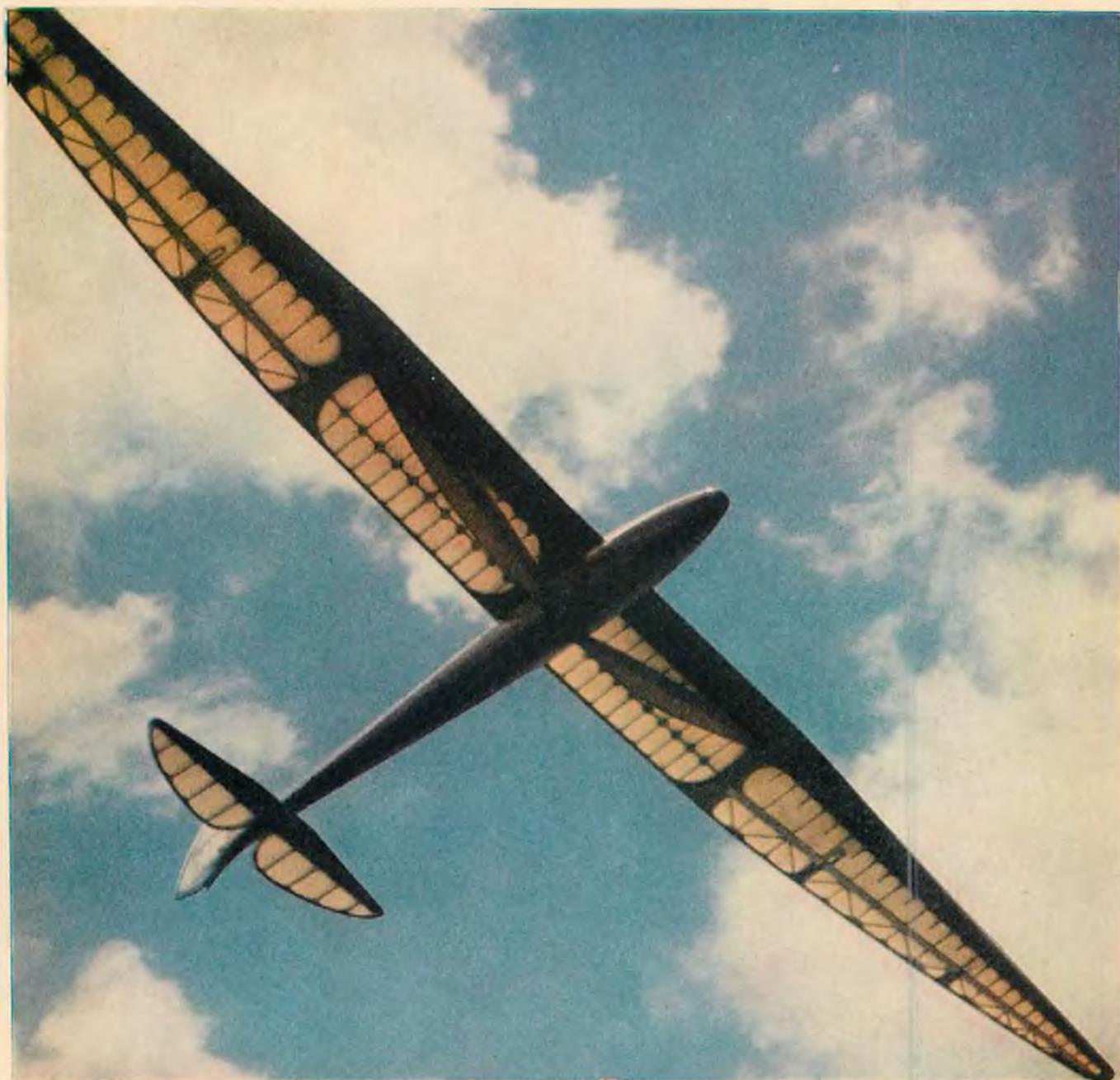
The Navy's newest patrol bomber, the Consolidated XPB2Y-1, recently proved her mettle by making a round-trip, nonstop, transcontinental flight. The formidable XPB2Y-1 is fully soundproofed and has a heating and ventilating system. Engines are Pratt & Whitney Twin Wasps of 1,050 h.p. each. Following Consolidated practice, wing tip floats retract to form wing tips.

Globe Photos





AIR TRAILS GALLERY—The GLOSTER GLADIATOR.



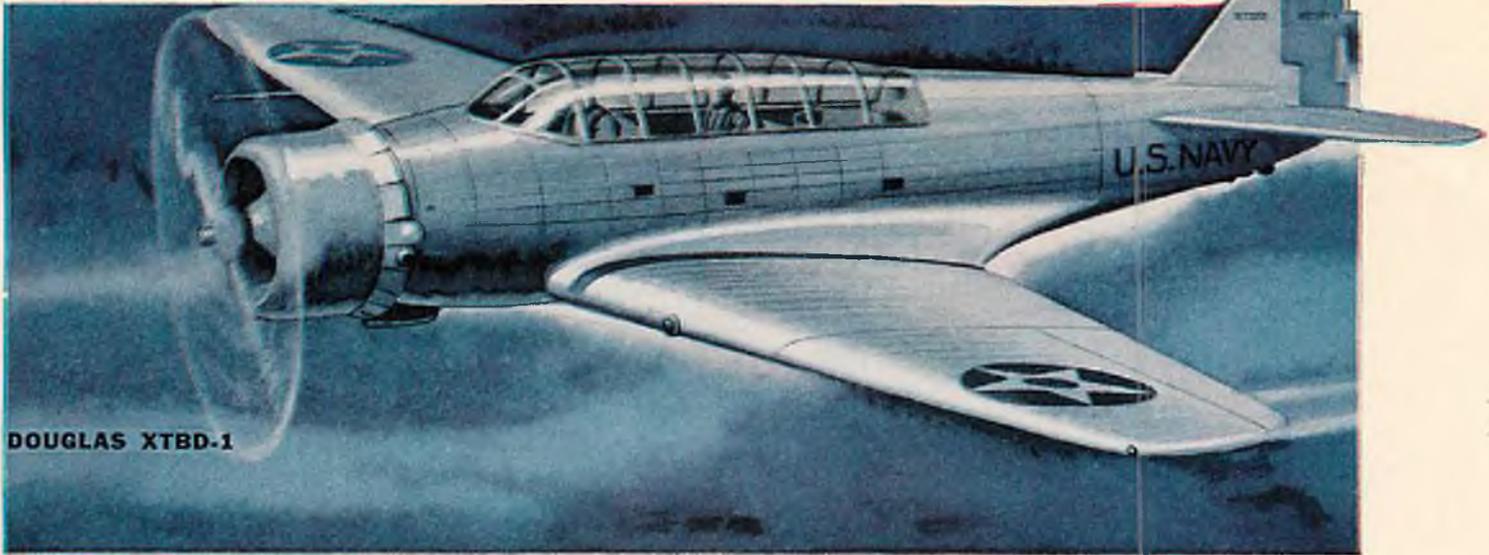
The Bowlus-duPont high-performance sailplane. This all-wood-and-fabric ship was flown from Elmira, New York, to Roosevelt Field, Long Island, New York, by the owner, Warren Merboth, a distance of 202. This was first American high-performance ship.



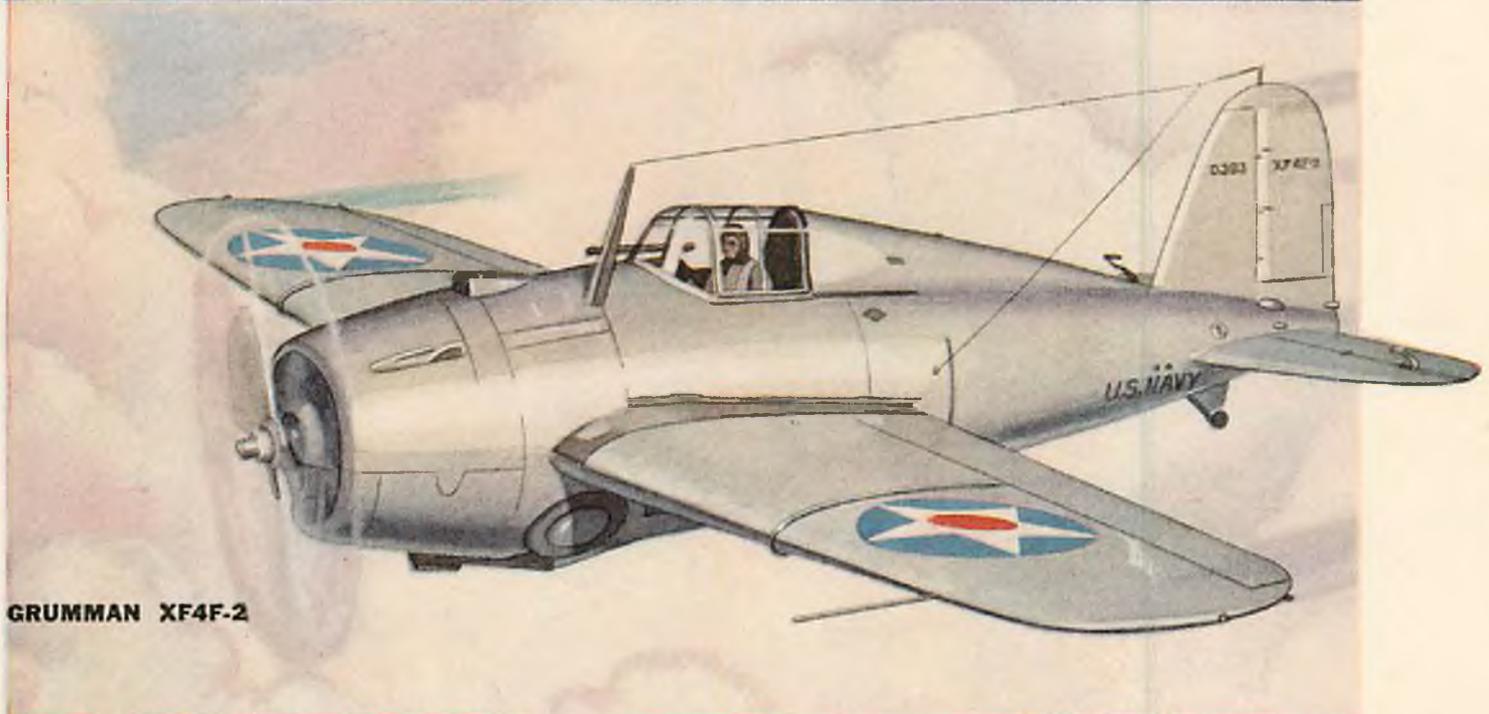
The famous flying machine-gun nest, the Supermarine Spitfire of Great Britain. This single-seat interceptor, with a top speed of over 360 m.p.h., has eight machine guns. The wings and fuselage are all flush-riveted for speed. This radio-equipped fighter has a Rolls-Royce Merlin engine.



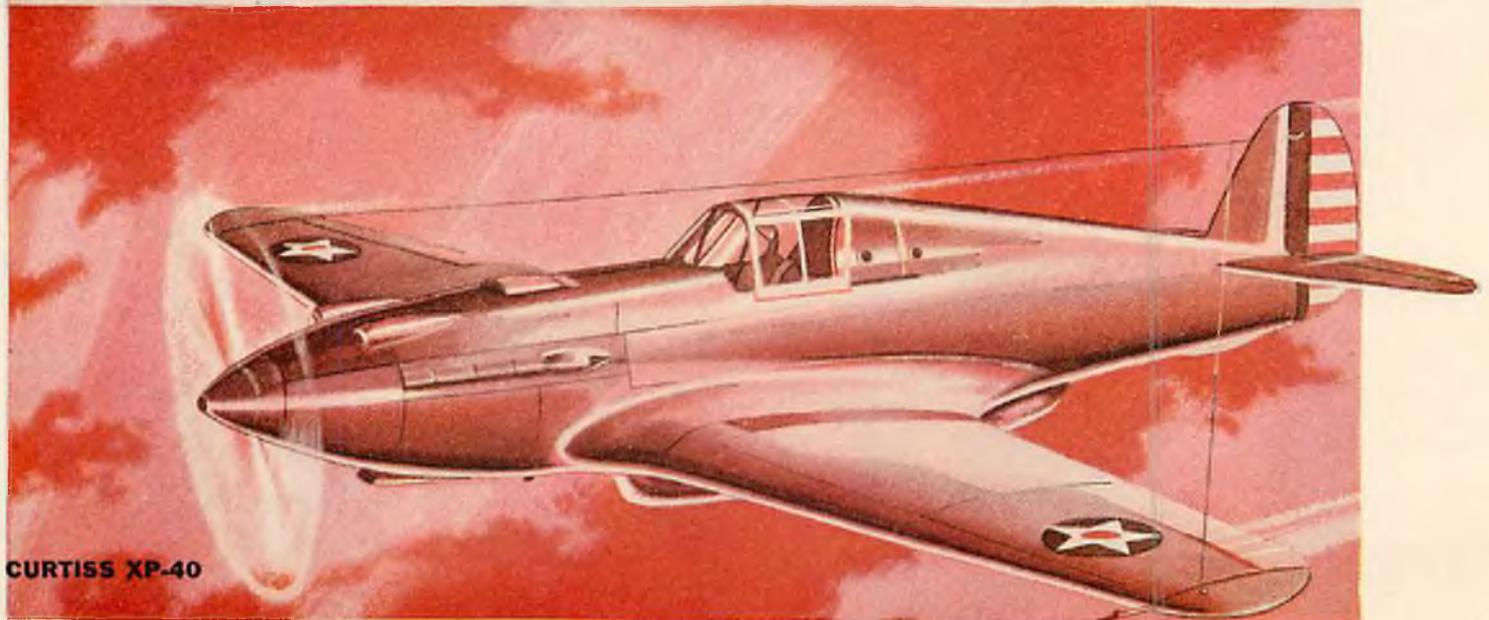
The rugged and reliable Stinson Reliant as a seaplane. This five-passenger private ship is also used as a landplane with wheels. A 245 h.p. Lycoming engine gives this a speed of about 150 m.p.h. and a cruising range of around 650 miles. This ship has dual controls, two-way radio.



DOUGLAS XTBD-1



GRUMMAN XF4F-2



CURTISS XP-40

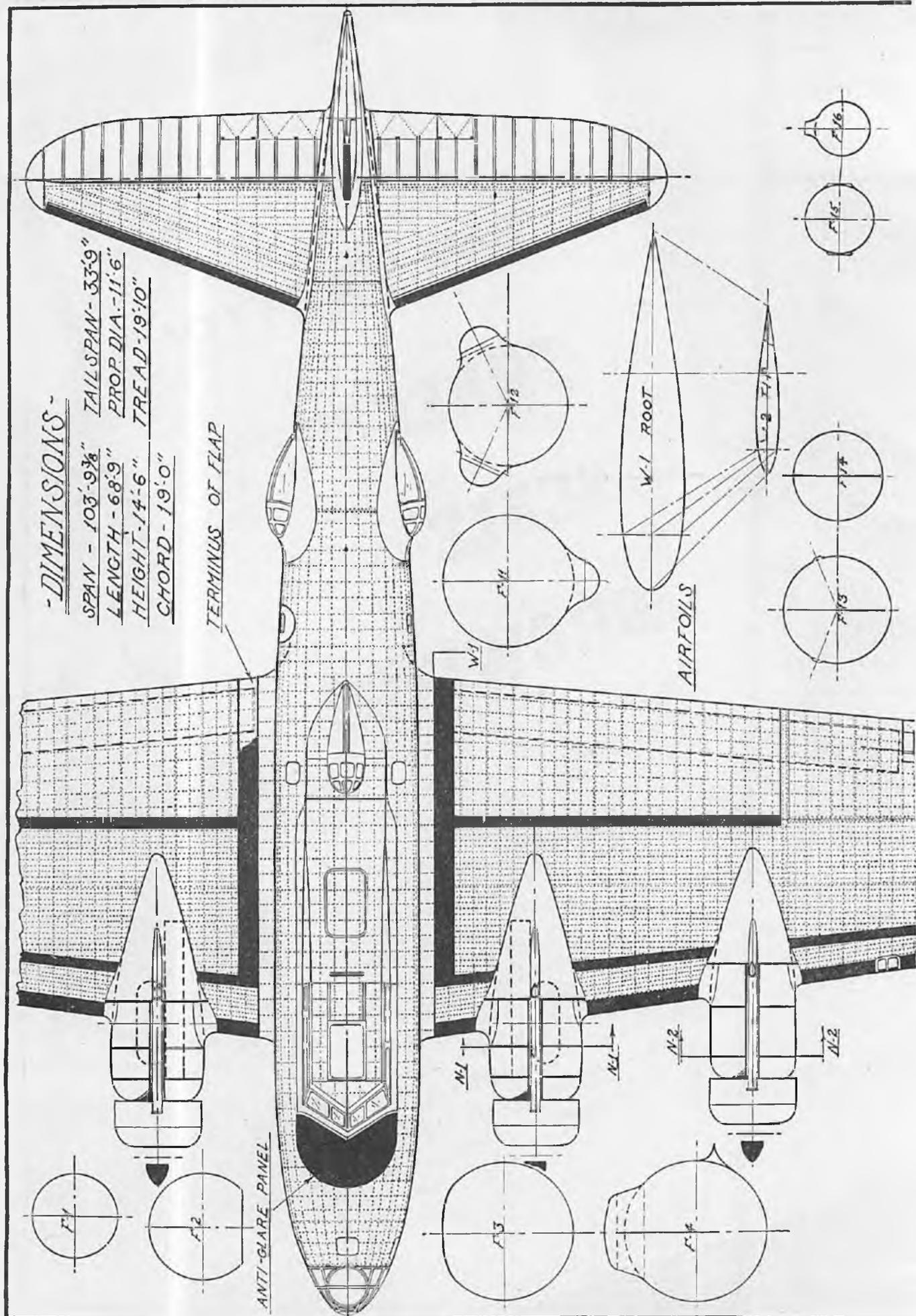
The Douglas XTBD-1 torpedo-bomber was designed for the U. S. navy for aircraft carrier use. The Grumman XF4F-2 is a sensational and much-guarded fighter also for use by the U. S. navy. The Curtiss XP-40, powered with the liquid-cooled Allison, is in use by the U. S. air corps.

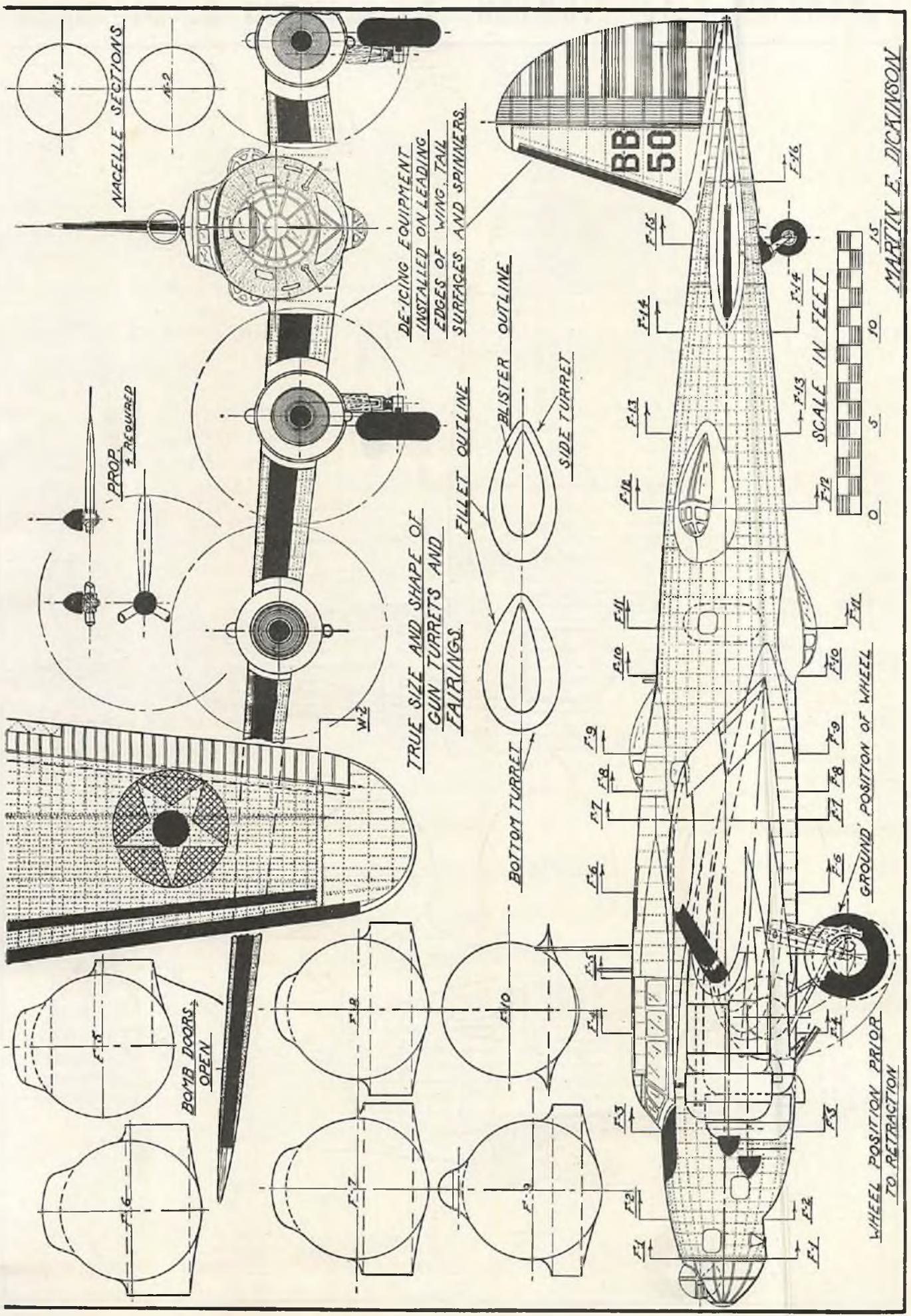


**AIR TRAILS'
THREE-VIEW
SCALE
DRAWINGS**

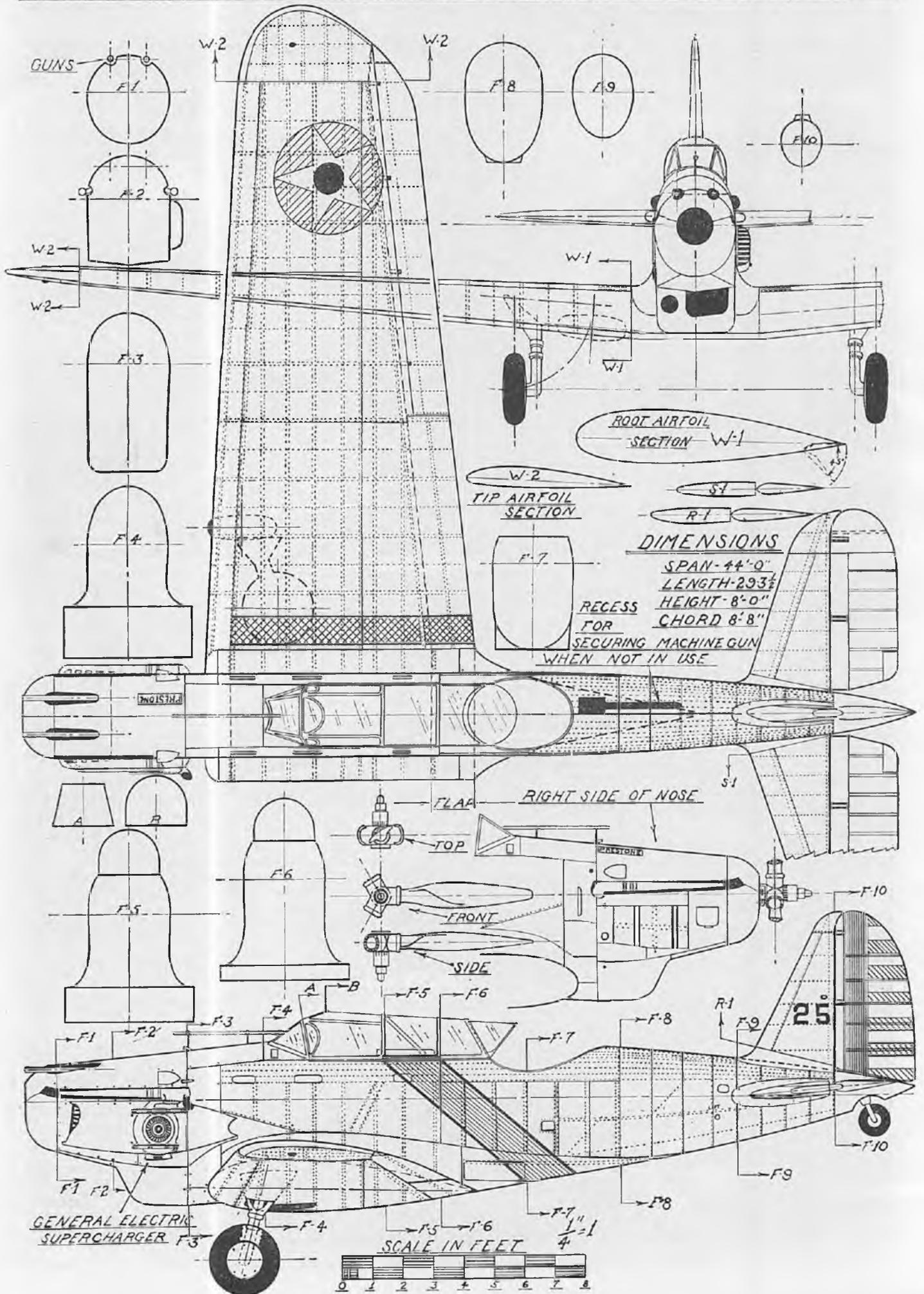
●
Believing that the universal interest in the construction details of our aerial giants holds true for all ages, we are presenting these detailed three-view drawings of outstanding modern ships of the sky. These, while of interest in themselves, make splendid working plans for scale models or construction reference.

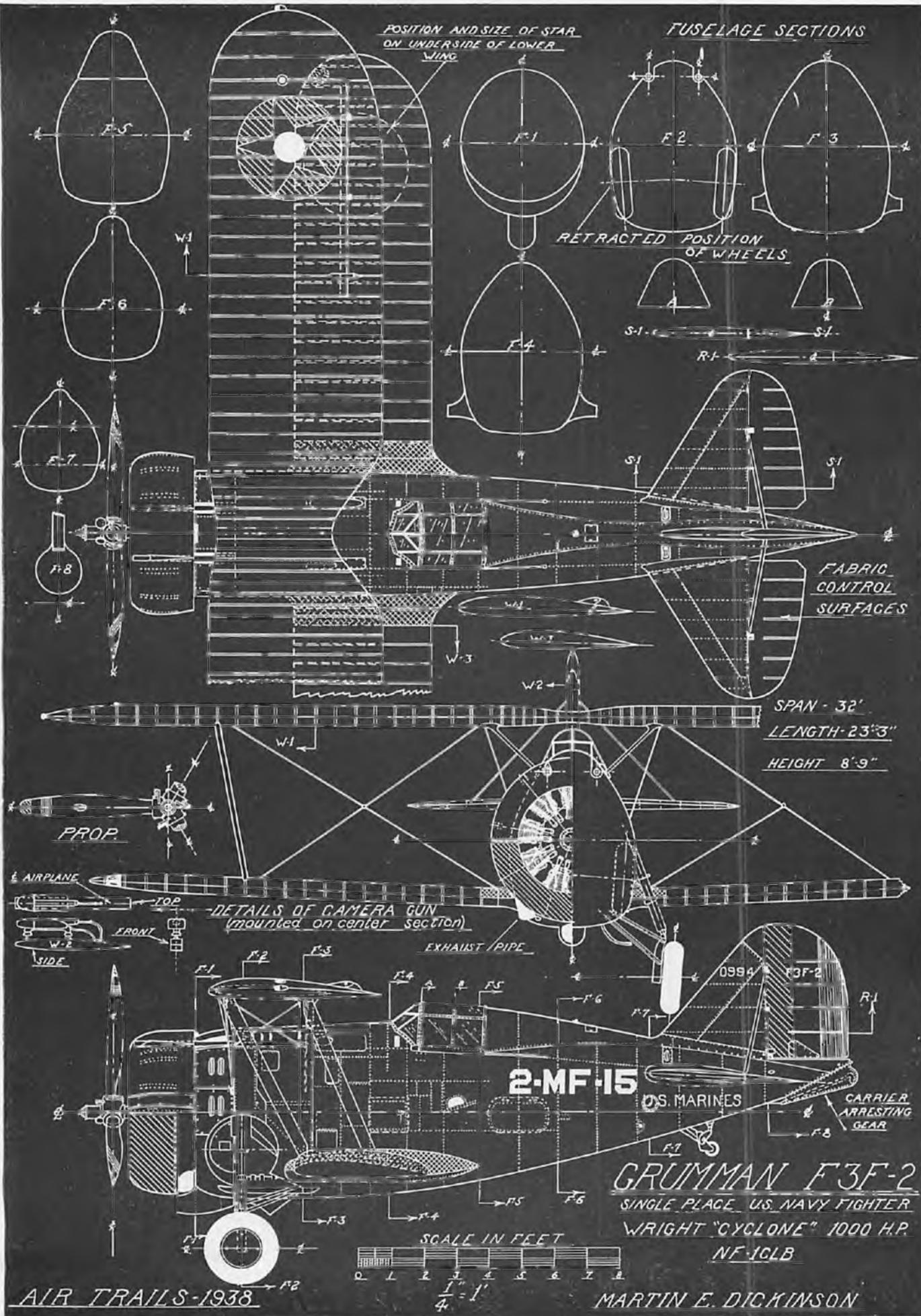
SCALE MODEL OF FLYING FORTRESS



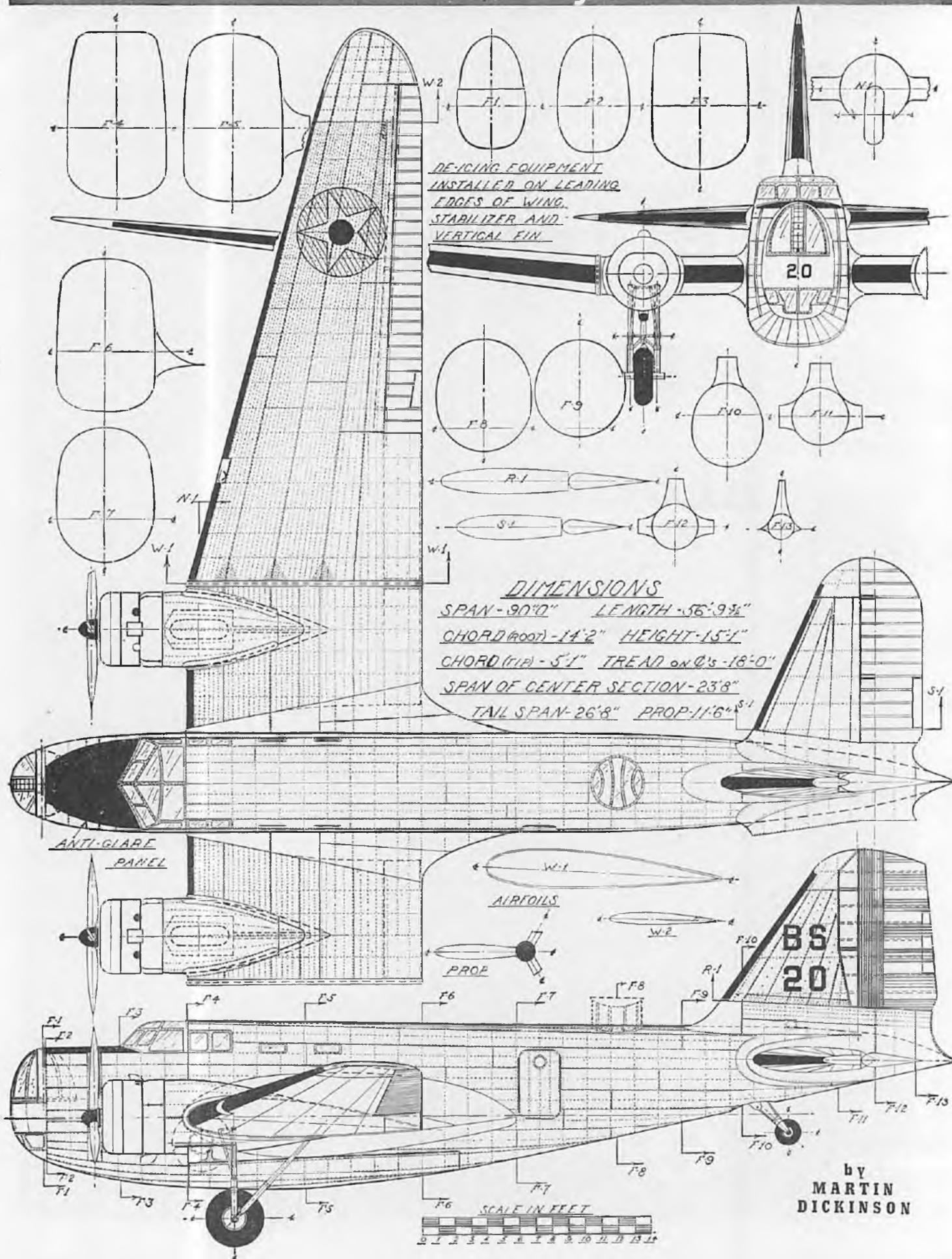


CONSOLIDATED PB 2A · · u. s. army biplace pursuit





DOUGLAS B-18—U. S. Army Medium Bomber



by
MARTIN
DICKINSON

AIR TRAILS'

AERO

ALBUM

● An ever-popular feature of Air Trails has been the Aero Album monthly, featuring the latest in flying equipment of not only the military arms but the civil and private phases of aviation. Within the next few pages we review popular and timely models of man's latest aerial transportation items.

AERO ALBUM

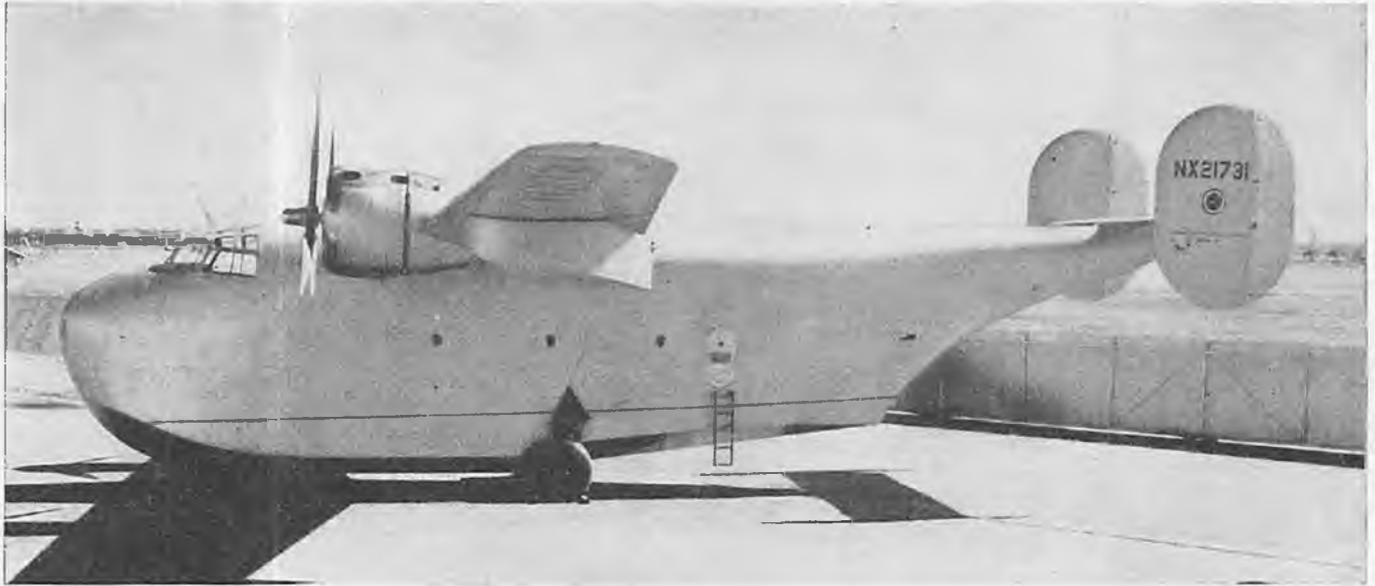


International

Top—A contender for 1939 Thompson is this latest Folkerts racer. Tiny wings span but 16 ft. Speed is 360 m.p.h., 400 h.p. Menasco.



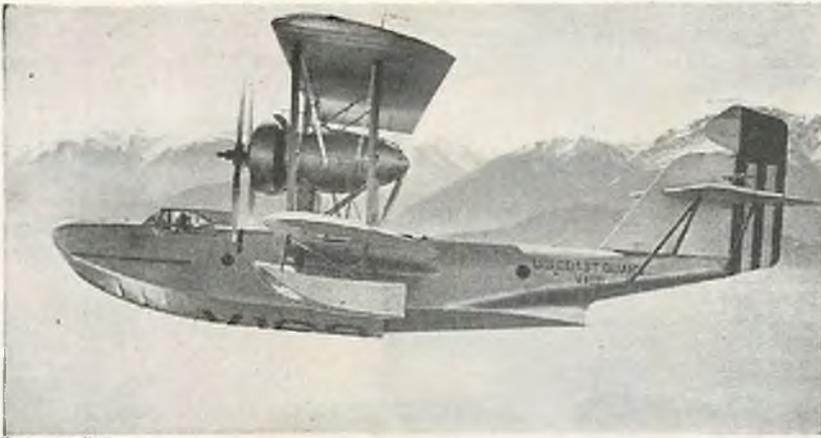
The Blackburn Skua, Britain's shipboard dive-bomber, has watertight fuselage compartments. Engine is the 900 h.p. Bristol Perseus.



Consolidated's sensational 25-ton flying boat is powered by two 2-row, 18-cylinder, 2,000 h.p. Wrights! Span, 110 ft.; ship, 57-place.

DeHavilland Flamingo, a British bid for world markets, is expected to rival the new DC-5. Speed over 200 with 12-17 passengers.





Gordon Dear Williams

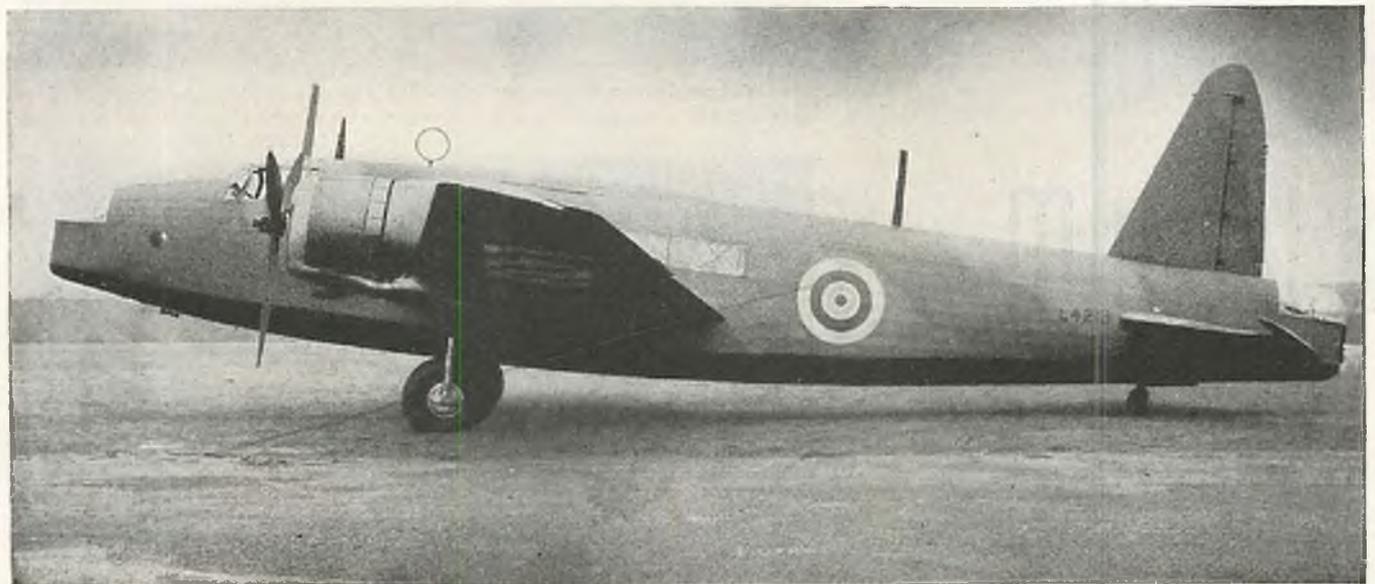
Authenticated News

Presenting the world's most interesting and unusual airplanes—each unique for its purpose.



Top—Coast Guard Hall-Aluminum PH-2 from Port Angeles base flying over the Olympic Mountains. Max. cruising range 2,242 miles.

Fastest trainer in the world! A 715 h.p. Rolls-Royce Kestrel drives this Miles Master faster than some fighters—about 270 m.p.h.



Vickers Wellington, long-range heavy bomber, famed for geodetic or "basket weave" construction. Tail turret is typically British.



Canada's high-speed fighter, the all-metal Grogor, has two 50-caliber guns. Speed over 300 m.p.h., engine 750 h.p. Twin Wasp.

U. S. Army Air Corps photo



A new bid for light-bombing crown as presented by Stearman in the X-100, powered with twin-row Wasps. Performance unknown.

International



Martin's contribution to navy's might. The 18-ton patrol-bomber, with twin rudders and gull wing, carries a crew of seven, plus plenty of bombs and armament.



U. S. Army Air Corps photo

The army air corps' Curtiss YP-37 has many interesting characteristics. Note the position of the cockpit, faired into the fin, and air scoop on engine side.

AERO ALBUM

North American unveils a tricycle bomber with unusual visibility. This ND-40B has wing-mounted guns, nose turret, rear guns.



U. S. Army Air Corps photo



U. S. Navy photo



One of the most deadly of the navy's aerial weapons is the Grumman midwing fighter, XF4F-4, of exceptionally clean design. Note the machine-gun sight.



International

According to the British, this is the world's fastest fighter. The Defiant two-seater with controllable-pitch prop claims 400 m.p.h., but its armament is a strict secret.

An interesting spring fashion in death dealers from Paris, the Morane-Saulnier 405 C.I., with nose cannon, machine guns and bombs.

The latest toys of Mars from all over the world paraded for our readers interested in war planes.

Another bid for light-bombing supremacy in the U. S. is the twin-engined Martin 167 below. Note deep belly and plexiglass nose.



U. S. Army Air Corps photo

Authenticated



One of the cleanest ships aloft is the famous British Albatross passenger transport.

AERO ALBUM

One of England's answers to war, the sensational Westland Lysander all-purpose fighter.

Nonmilitary but interesting is the French Caudron three-place low-wing sports plane.



Bully Arnold



Authenticated

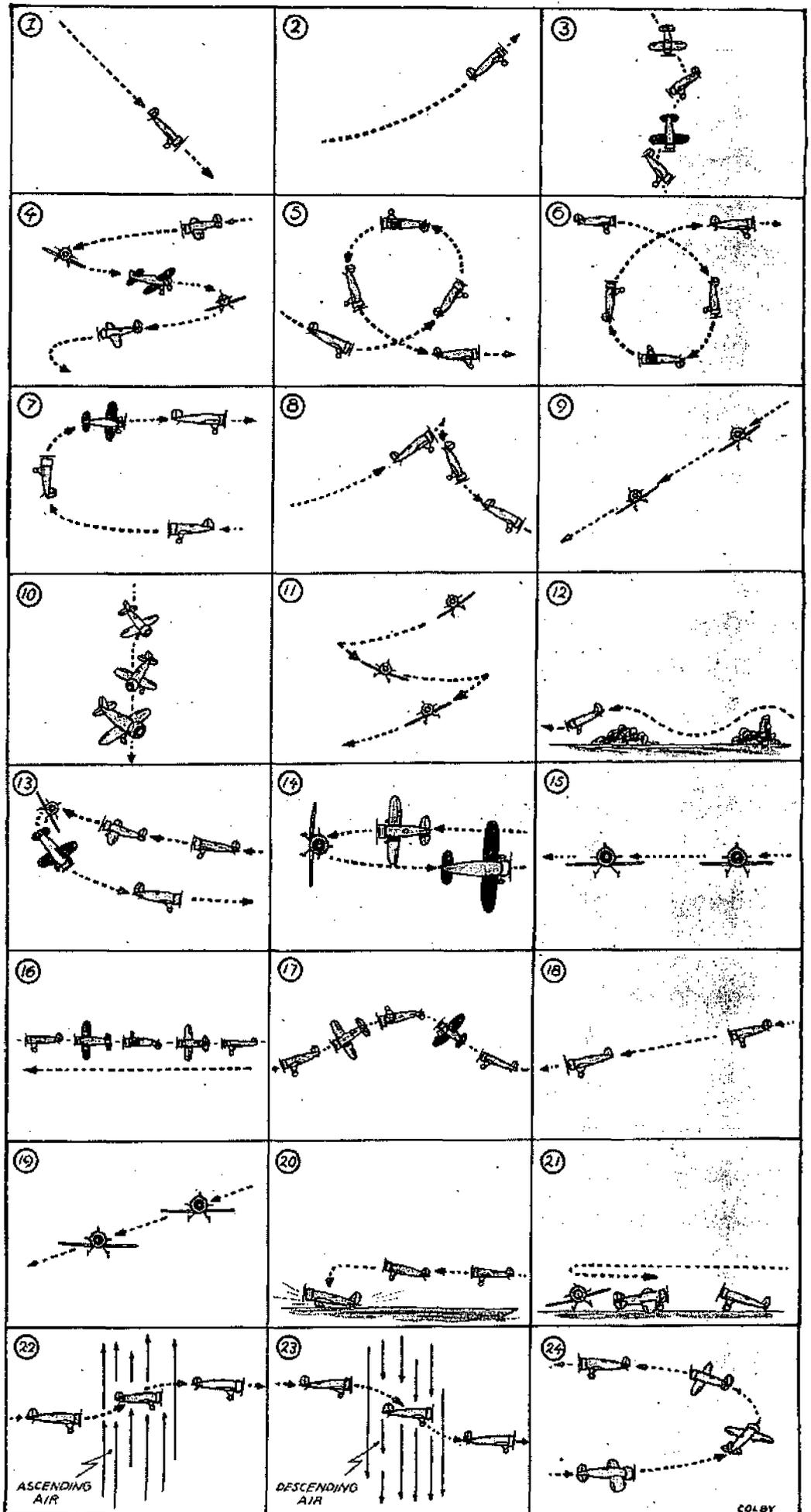
THE LANGUAGE OF FLIGHT



With more and more of the world's youth turning to this new industry for a career and with aviation becoming a daily topic of news and conversation, it seems only appropriate that we present in Air Progress a glossary of aeronautical terms to augment your present understanding and familiarity with the new language of flight. We present this that you may more fully understand and appreciate modern aviation writing and reporting, which is rapidly becoming of prime importance and need in the everyday life of us flying moderns.

MANEUVERS

- 1 DIVE
- 2 ZOOM
- 3 SPIN
- 4 SPIRAL
- 5 INSIDE LOOP
- 6 OUTSIDE LOOP
- 7 IMMELMANN TURN
- 8 STALL
- 9 SLIP
- 10 FISH-TAILING
- 11 FALLING LEAF
- 12 HEDGE-HOPPING
- 13 WING-OVER
- 14 VERTICAL BANK TURN
- 15 SKID
- 16 BARREL ROLL
- 17 SNAP ROLL
- 18 GLIDE
- 19 CRAB
- 20 PANCAKE LANDING
- 21 GROUND LOOP
- 22 BUMP
- 23 AIR POCKET
- 24 CLIMBING TURN



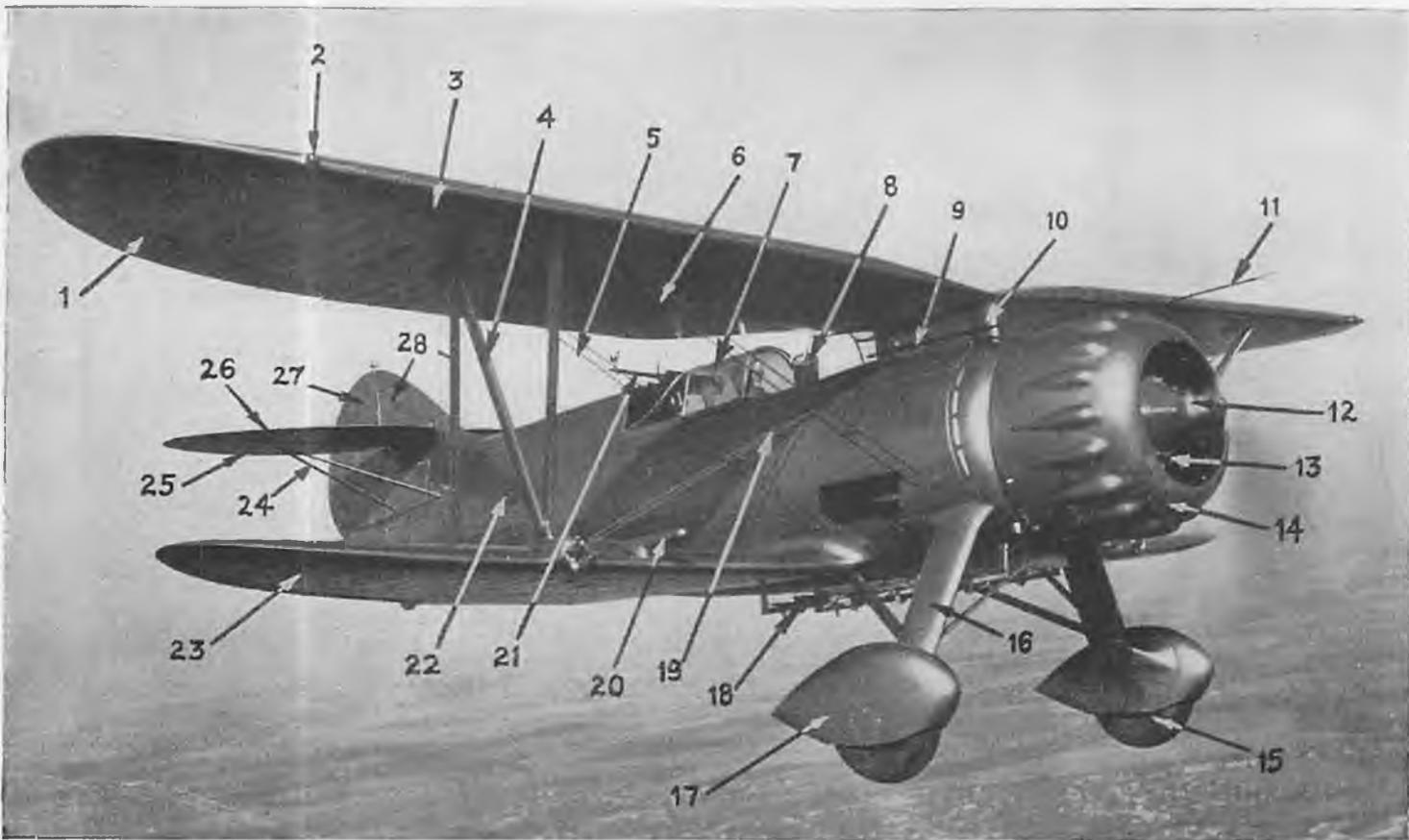


TYPES OF AIRCRAFT

- 1 BIPLANE
- 2 LOW WING MONOPLANE
- 3 MIDWING MONOPLANE
- 4 HIGHWING MONOPLANE (seaplane)
- 5 FLYING BOAT
- 6 TAILLESS
- 7 SAILPLANE
- 8 BLIMP
- 9 BARRAGE BALLOON
- 10 ZEPPELIN
- 11 AMPHIBIAN SEAPLANE
- 12 AMPHIBIAN FLYING BOAT
- 13 AUTOGIRO
- 14 HELICOPTER

PARTS OF A PLANE

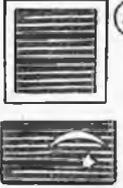
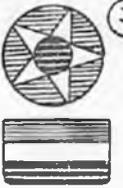
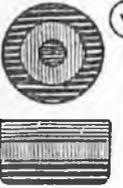
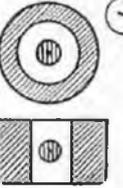
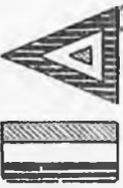
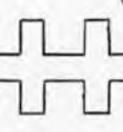
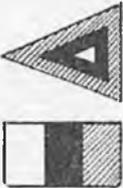
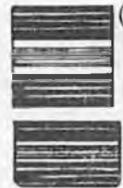
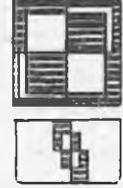
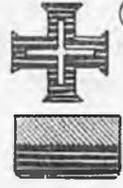
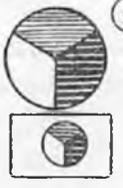
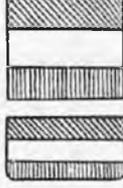
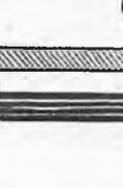
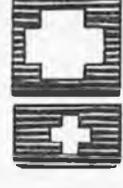
Using a Waco WHD two-place military ship



- | | |
|-------------------------|-----------------------|
| 1 AILERON | 15 WHEELS |
| 2 NAVIGATION LIGHTS | 16 LANDING GEAR STRUT |
| 3 TOP WING | 17 WHEEL PANTS |
| 4 "N" STRUT | 18 BOMB RACKS |
| 5 FLYING WIRES | 19 LANDING WIRES |
| 6 DRAG WIRES | 20 FORWARD FIXED GUN |
| 7 COCKPIT INCLOSURE | 21 FLEXIBLE REAR GUN |
| 8 COCKPIT | 22 FUSELAGE |
| 9 GUN SIGHT | 23 BOTTOM WING |
| 10 CENTER SECTION STRUT | 24 STABILIZER STRUT |
| 11 PITOT TUBE | 25 ELEVATOR |
| 12 PROPELLER HUB | 26 STABILIZER |
| 13 ENGINE | 27 RUDDER |
| 14 N. A. C. A. COWLING | 28 FIN |

INSIGNIA OF THE
WORLD'S AIR
SERVICES

- 1 ARGENTINA
- 2 BELGIUM
- 3 BOLIVIA
- 4 BRAZIL
- 5 FRANCE
- 6 ENGLAND
- 7 GREECE
- 8 PERSIA
- 9 RUMANIA
- 10 SOUTH AFRICA
- 11 SPAIN
- 12 DENMARK
- 13 EGYPT
- 14 CHILE
- 15 HOLLAND
- 16 SIAM
- 17 U. S. NAVY
- 18 U. S. ARMY
- 19 SWEDEN
- 20 CHINA
- 21 YUGOSLAVIA
- 22 CZECHO-SLOVAKIA
- 23 PARAGUAY
- 24 LATVIA
- 25 JAPAN
- 26 URUGUAY
- 27 LITHUANIA
- 28 NORWAY
- 29 POLAND
- 30 PORTUGAL
- 31 SOVIET RUSSIA
- 32 SWITZERLAND
- 33 TURKEY
- 34 MEXICO
- 35 IRAQ
- 36 ESTONIA
- 37 GERMANY
- 38 FINLAND
- 39 IRISH FREE STATE
- 40 ITALY

COLBY	 <p>33</p>	 <p>25</p>	 <p>17</p>	 <p>9</p>	 <p>1</p>			
	 <p>34</p>	 <p>26</p>	 <p>18</p>	 <p>10</p>	 <p>2</p>			
	 <p>35</p>	 <p>27</p>	 <p>19</p>	 <p>11</p>	 <p>3</p>			
	 <p>36</p>	 <p>28</p>	 <p>20</p>	 <p>12</p>	 <p>4</p>			
	 <p>37</p>	 <p>29</p>	 <p>21</p>	 <p>13</p>	 <p>5</p>			
	 <p>38</p>	 <p>30</p>	 <p>22</p>	 <p>14</p>	 <p>6</p>			
	 <p>39</p>	 <p>31</p>	 <p>23</p>	 <p>15</p>	 <p>7</p>			
	 <p>40</p>	 <p>32</p>	 <p>24</p>	 <p>16</p>	 <p>8</p>			
								

LEADERS OF AVIATION

● Were it not for men such as those whose pictures appear on the following pages the preceding pages would not be. These personalities, selected from many phases and branches of the industry, represent but a small part of those worthy of mention and presentation were space possible. The absence of any who to you seem particularly worthy means that we but felt that their particular phase of the industry was well represented, and that their very absence was proof of their established leadership and prominence. The careers of these personalities, typified by courage, perseverance and sincerity, stand as beacons for the guidance of future followers all.



Chet Decker, famous soaring pilot and National Champion of 1939. Mr. Decker also is an instructor.



C. G. Taylor, president of the Taylorcraft Aviation Corp., and builder of the famous Taylorcraft light plane.



Art Chester, famous racing-plane designer and pilot and winner of the thrilling Greve Trophy race for 1939.



Benny Howard, famed race pilot, aeronautical engineer, test pilot and designer. Tested DC-4.



Richard C. duPont, well-known sailplane pilot and president of the new air mail company, All-American Aviation, Inc.



C. S. (Casey) Jones, famous World War instructor and barnstormer, now head of his own aviation school.



Guy W. Vaughn, president of the Curtiss-Wright Corporation, builders of planes and radial engines.



Donald L. Brown, famous industrial leader and president of the United Aircraft Corporation of Hartford, Conn.



Jack Frye, well-known pilot and president of Transcontinental and Western Air.



Roscoe Turner, three times winner of the famous Thompson Trophy speed race, and many other speed classics.



Jacqueline Cochran, outstanding woman pilot of both commercial planes and racing planes. 1938 Bendix Race winner.

LEADERS OF AVIATION



Philip G. Johnson, president of the Boeing Aircraft Company, builders of famous planes.



R. H. Fleet, president of Consolidated Aircraft Corporation, builders of the famous PBY boats.



Vincent Bendix, president of Bendix Products Corp. and donor of the famous Bendix Trophy.

8E

LEADERS OF AVIATION



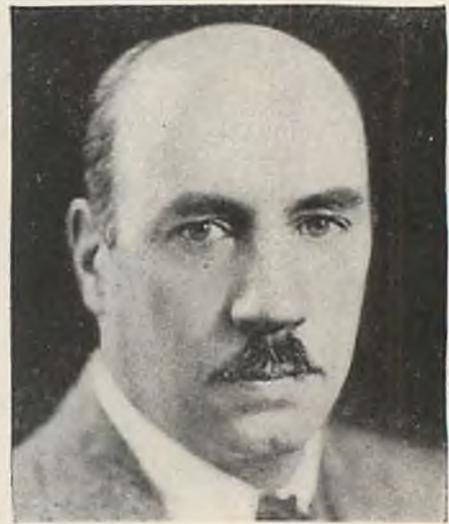
Edmund T. (Eddie) Allen, regarded as America's foremost freelance test pilot.



C. Bedell Monro, well-known president of the expanding Pennsylvania-Central Airlines.

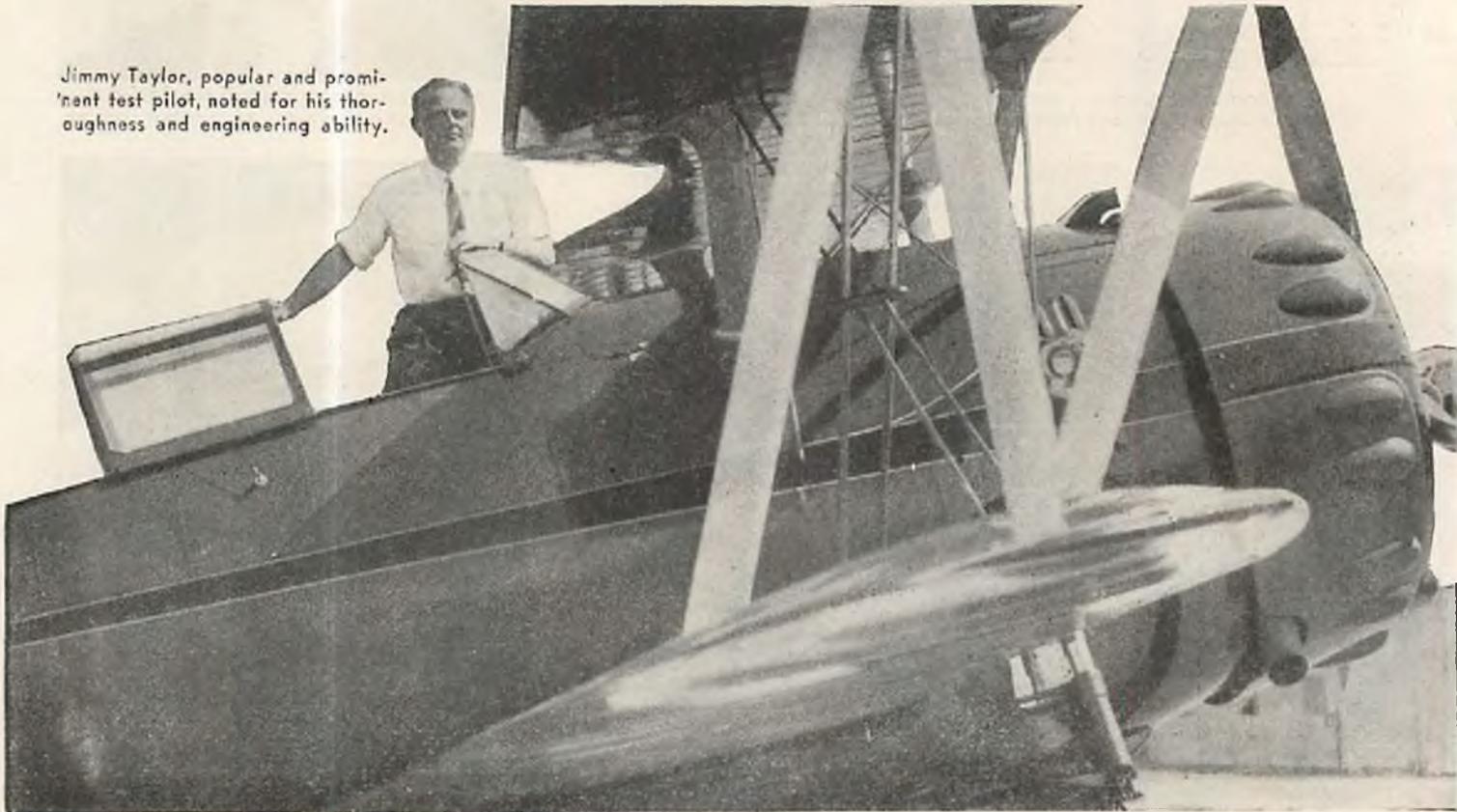


Jack Knight, famous United Air Lines pilot and executive. Holds record of air hours.



Igor Sikorsky, famous pilot, engineer, and designer of the planes bearing his name.

Jimmy Taylor, popular and prominent test pilot, noted for his thoroughness and engineering ability.





Frank W. Fuller, Jr., famous sportsman racing pilot and winner of the 1939 Bendix transcontinental race.



Douglas "Wrong Way" Corrigan, internationally known for his famous solo flight to Europe.



Donald W. Douglas, president of the famous Douglas Aircraft Company, Inc., of California.



C. R. Smith, president of the American Airlines, one of the most successful of transport lines.

LEADERS OF AVIATION



W. A. Patterson, president of United Air Lines, one of the oldest and most famous transport lines.

Lloyd Childs, famous Curtiss test pilot, and ship he dove at 575 miles an hour.





Arthur E. Raymond, director of engineering for Douglas Aircraft, aboard the DC-4 with Mr. Patterson.



Robert Stanley, famous soaring pilot, and U. S. navy blind-flying instructor.



Lewin Barringer, internationally known soaring pilot and soaring lecturer.



W. T. Piper, president of Piper Aircraft Corp., builders of famous Cub planes.



Major Al Williams, famous navy pilot, popular writer and aviation authority.



Capt. M. A. Mitscher, acting chief of the bureau of aeronautics, U. S. navy.



Capt. Eddio V. Rickenbacker, war ace and president of Eastern Air Lines.



Glenn L. Martin, president of the company bearing his world-famous name.



Emil Lehecka, famous motorless stunt pilot, and 1938 soaring champion.

LEADERS OF AVIATION



General H. H. Arnold, chief of the United States army air corps.



Tex Rankin, world-famous movie and precision flier, noted for aerobatics.



Carl I. Friedlander, genial president of the Aeronautical Corp. of America.



E. E. Porterfield, Jr., president of the Porterfield light plane company.



Robert E. Gross, well-known president of the Lockheed Aircraft Corp.

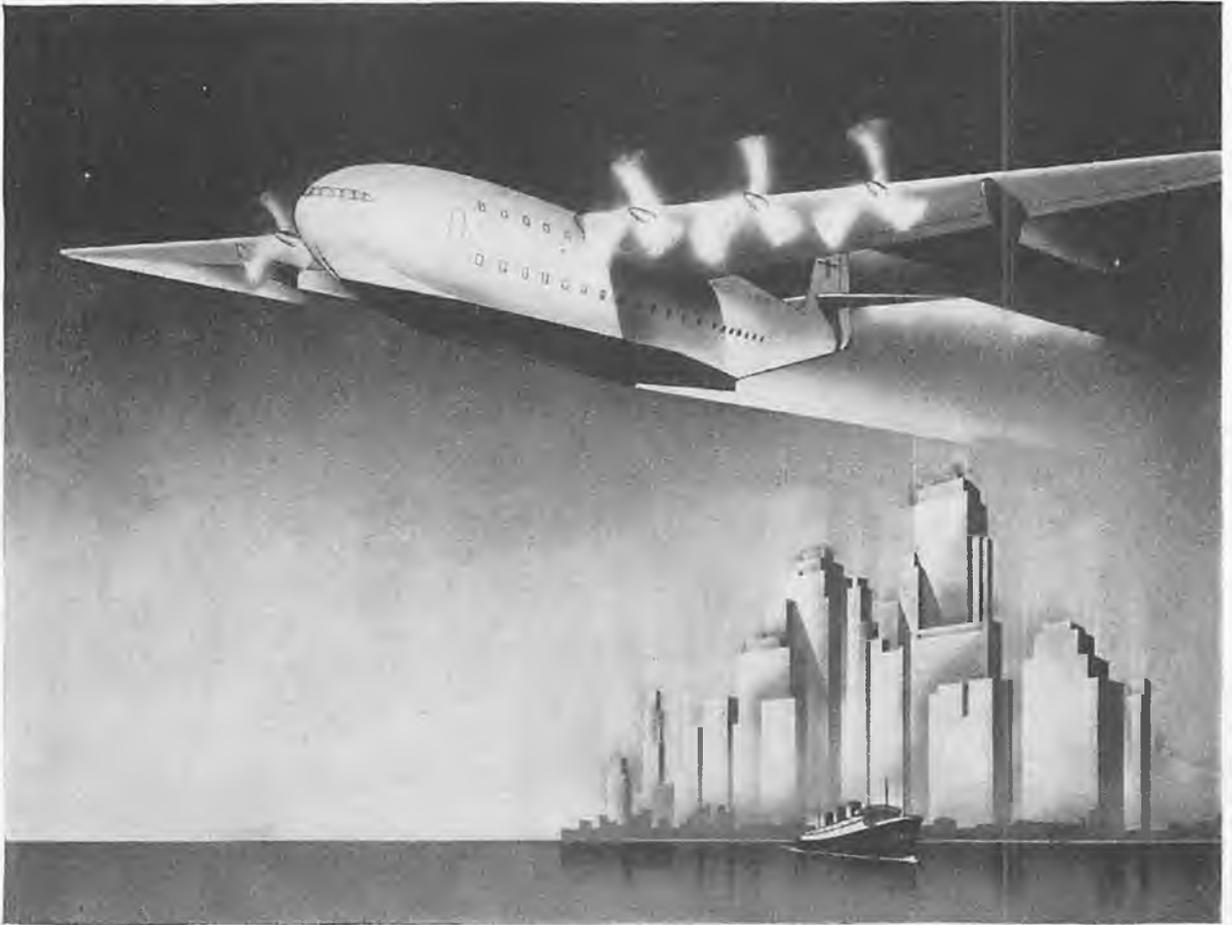


Capt. Jack A. Boettner, flight commander of Goodyear's blimp fleet.

Walter Beech, president and test pilot of popular Beechcraft planes.

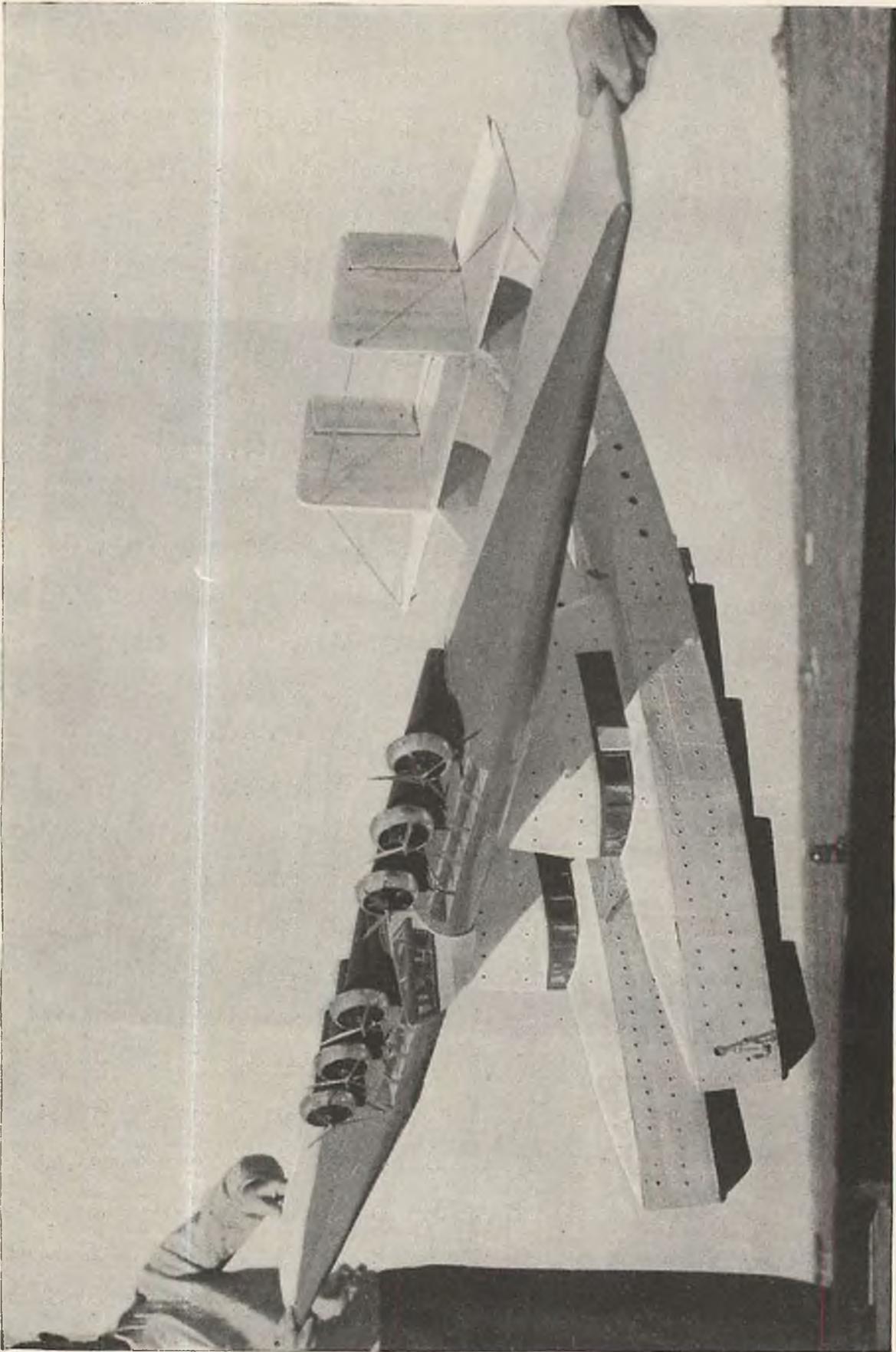


PLANES OF TOMORROW



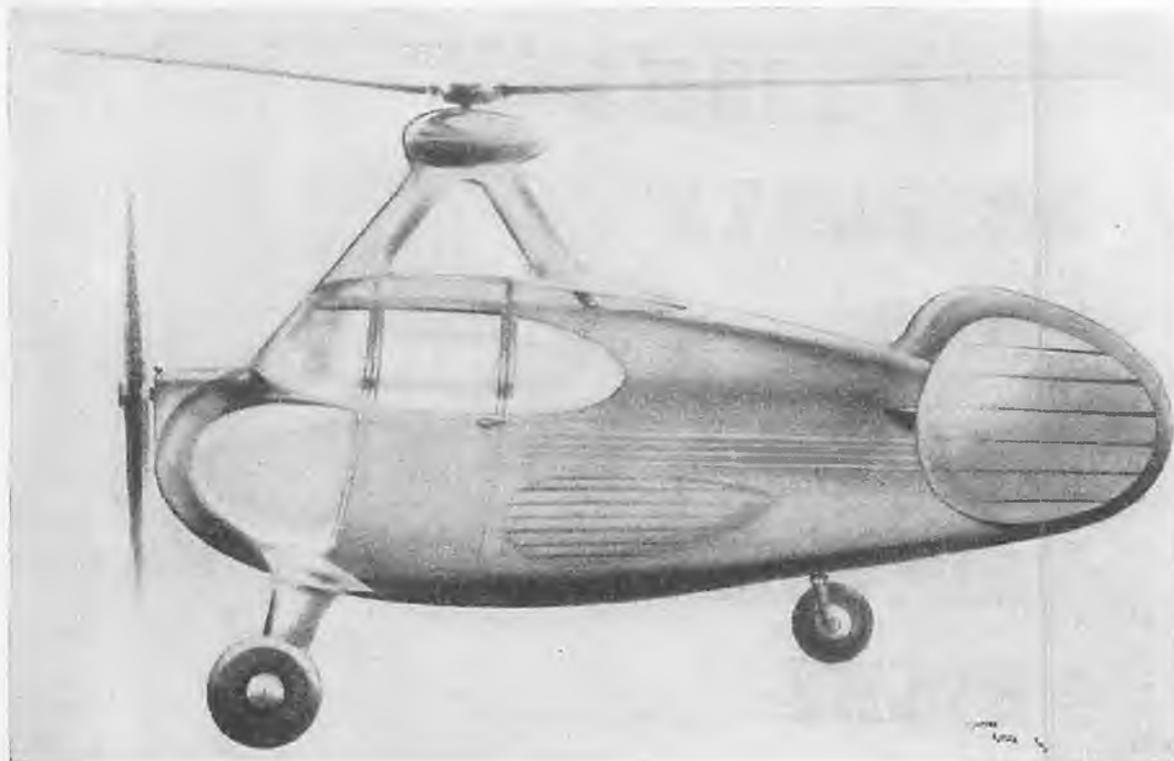
Just what the aerial transports of tomorrow will be like is a question that only future history can answer. A few years ago the planes of today would have been of as fantastic appearance as those projected planes of tomorrow are to us, schooled in believing the obviously impossible as we are. On the drafting boards of today's aeronautical engineers lie plans and completed drawings of ships as fantastic in concept and design as those of a Jules Verne, yet as basically sound and possible as the DC-4s, but awaiting the demands and markets necessary for their being. It would be interesting to know just how many short years hence these very ships of tomorrow, projected today, will be at the top of the first few pages of a future AIR PROGRESS.

Above we present the latest visualization of the airplane of tomorrow to come from the design rooms of the Boeing company. This 100-passenger flying boat would have six engines of tremendous power and would include staterooms for all passengers, in addition to a dining salon, cocktail lounge and observation room. This ship would be roughly twice as large as any now in existence.



Another projected ship of tomorrow's skies. This detailed model was built by John Molinet, of Rosedale, Long Island, New York. As fantastic as it may seem to us now, this ship, designed to carry 500 passengers, is similar in design to those projected by many outstanding aeronautical engineers of prominence today. This particular model features a twin-hull, upper-control or flight cabin with six radial air-cooled engines mounted above the cantilever monoplane wing similar to the famed DO-X that crossed the ocean a few years ago, but proved impractical.

PLANES OF TOMORROW



The private plane for the man of tomorrow is typified by this projected "readable autogiro" being constructed by the Autogiro Company of America at the present time. This giro may be driven along the highways by folding the rotors and applying power to the wheels. The folding of the rotors will enable the owner to park the machine in a small garage or lot ready for the next take-off. An experimental model of this ship has been built and flown for many hours, entirely proving the feasibility and future success of this type of roadable plane of tomorrow.



WINGED WORDS

CONTINUED FROM
PAGES 44 AND 45

1. Andy Stinis supervises the pumping in of the special smoke-making liquid. This fluid, an oil base with a secret chemical to hold the smoke together, flows by gravity into a motor-driven pump. The fluid is pumped into the manifold, where it is turned into smoke by the heat. One capital letter requires approximately a gallon of liquid.

2. At 12,000 feet Stinis feels for smooth air, as an up or down draft will break up the smoke. Finding the best altitude, he then depresses a lever—permitting the fluid to reach the manifold. The sign must be written backward in order that people on the ground may read it correctly. The lines are horizontal, not vertical.

3. Having made sure that clouds or the sun will not interfere with the reader's vision, he starts the first letter by heading directly at an object on the horizon. Other lines are to be made parallel. The straight line of a capital may be a mile long.

4. A finished F as the pilot sees it. Accurate judgment is necessary in turning the smoke on and off.

5. Completing the letter I, Stinis' plane is viewed

here from across the F previously finished. The smoke expands to approximately 50 feet in diameter after leaving the exhaust.

6. Starting the N. This letter here looks like a question mark due to the fact that it has been, as all skywriting is done, written backward.

7. Having finished a letter, Stinis shuts off the smoke and dives down to view his handiwork.

8. A sharp climbing turn makes the top of the letter E.

9. In making an E the plane must do a wing-over, then swoop around to finish the letter.

10. The ship is now in a vertical climbing bank on top of the letter E. Skillful handling of the ship is necessary, because at high altitudes it may easily fall into a spin.

11. A close-up of the skywriting plane. Going between 125 and 140 m.p.h. The exhaust is asbestos wrapped to hold the heat, for near-zero temperatures are encountered.

12. Here we have the completed word as seen over the ocean from 3,000 feet above. This typical four-letter word is nearly four miles long.

AIR TRAILS REPORTS AND MAKES AIR PROGRESS EVERY MONTH

And so we come to the last and final page of the Air Trails Annual for 1940. We have presented aviation as it is in the thirty-sixth year of the existence of aerial transportation. What the next year holds for members and followers of the aviation industry only time and our next appearance can tell. Until then, follow its monthly trend and advancement through the pages of Air Progress' source and mentor, AIR TRAILS Magazine—"aviation for everybody."

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