

FLYING ACES

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DECEMBER

15¢



Five Answers to the Axis

LOSS OF OIL WON'T GROUND RUSSIA'S HUGE AIR FORCE • I TEST-FLEW THE MANCHESTER
DAYLIGHT BOMBING MAY DEFEAT GERMANY • "POT LUCK" WITH PHINEAS PINKHAM
FLYABOUT GAS JOB • SUNDERLAND SOLID SCALE • "JUNIOR MISS" OUTDOOR COMMERCIAL

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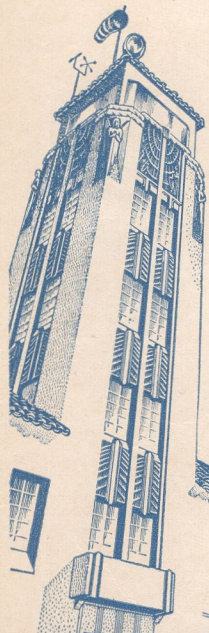
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SLIPSTREAM

• *Grand Smash*—Many striking deeds are getting a news-play these days. But when the historians go to work, you'll find this period primarily hailed as marking the grand start of the great U.S. air smash at Adolf. The AAF quit rehearsing and launched the real show with 31 bang-up sky sorties over Europe in 48 hours!

• *Backed Up*—What's more, the boys are now being supported with a flow of warplanes which carries a haymaker punch. No less an authority than Undersecretary of War Patterson testifies that our "factory fighters" are today turning out more military aircraft than the Nazis, Jappos, and Eyeties combined.

• *Both Wrong*—And as for the current heated arguments in which "Mr. Expert" contends that our U.S. sky-fighting jobs are the worst crates that ever hopped, while the opposing "Mr. Authority" spouts out that our Yank craft are the last-word-in-perfection-plus—well, you can put it in the book that they're both screwy.

• *Here's Why*—"Mr. Expert" is 'way off for the simple reason that by August, U.S. jobs were besting the Nips with a solid 5-to-1 score. Meantime, on the other side of the globe, performances of our Fortresses have had even the hard-to-sell Britishers cheering. And several other American jobs haven't just rolled over on the runways and gasped, either. On the other hand, "Mr. Authority" is barking down the wrong aileron because no country can truthfully boast that all its various types of planes are ideal. In every belligerent's air force, some are good, some bad, and some middling. Since this world is not a Utopia, no plane is perfect. So it's natural that pilots (in all countries) keep hollering for better planes, while designers keep busy trying to provide them. America, as this is written, has got to get a flock of high-altitude fighters into action and must take such "sitting pigeon" jobs as PBY's out of the range of Zeros. But all told, we can be proud of having done a swell job in the short time since the great awakening on December 7.

• *Editorialines*—It'll take another stab across the Channel—one which may come off as this issue is on the press—to really confirm the damage done to the *Luftwaffe's* 3rd Air Fleet at Dieppe. They figure General Field Marshal Sperrle had 1/4 to 1/3 of his sky force written off in that action. The next raid will check that estimate. . . . Who said you never catch the Nazis napping? When the Bolos

(Continued on page 73)

FLYING ACES

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DECEMBER, 1942

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FACT AND FICTION

FLYING INTO FOCUS.....	6
DAYLIGHT BOMBING MAY DEFEAT	
GERMANY..... James L. H. Peck	10
MOCK-UPS	12
SO YOU WANT TO JOIN A BOMBER	
CREW!..... William H. Randall	14
WAR FLYERS IN THE HEADLINES.....	17
WOULD THE LOSS OF CAUCASIAN OIL GROUND	
THE RED AIR FORCE?..... Lucien Zacharoff	18
DOWN MEMORY'S RUNWAY.....	21
I TEST-FLEW THE MANCHESTER... Charles Kennett	22
MODERN PLANES ALBUM.....	24
THE "SKY TRUCKS" ARE COMING	
..... Lawrence Merz Persons	26
POT LUCK..... Joe Archibald	28
KNOW AMERICA'S PLANES.....	30
THE FEMININE TOUCH..... Harold W. Kulick	32
LIGHT PLANE FLYING.....	34
LAST FLIGHT..... Joel Wynfield	36
BRITISH AIRPLANES IN SERVICE.....	37
SIGHT UNSEEN	39
THE FLYING ELEPHANTS..... Seton David, Jr.	40

MODEL BUILDING

WITH THE MODEL BUILDERS.....	45
KOOLHOVEN FK-58..... Leonard Wiczorek	46
FLYABOUT GAS JOB..... Lawrence Reithmaier	47
JAP ZERO THREE-VIEW..... Ralph Tekel	51
OUTDOOR HAND GLIDER..... Milton Kahn	52
SUNDERLAND SOLID SCALE..... Jack Baxter	53
HALBERSTADT FIGHTER W. W. THREE-	
VIEW..... Gerald Maper	57
"JUNIOR MISS" COMMERCIAL..... Ralph Tekel	58
BRITISH TROOP-CARRYING GLIDER.. Martin Powell	60
YOU SAID IT!.....	62
LOGGING THE MOTOR MARKET.....	62

DEPARTMENTS AND FEATURES

IN THE SLIPSTREAM... 4	ALL QUESTIONS
	ANSWERED
AMERICA'S NEWEST	FLYING ACES CLUB
ACES	NEWS
43	44

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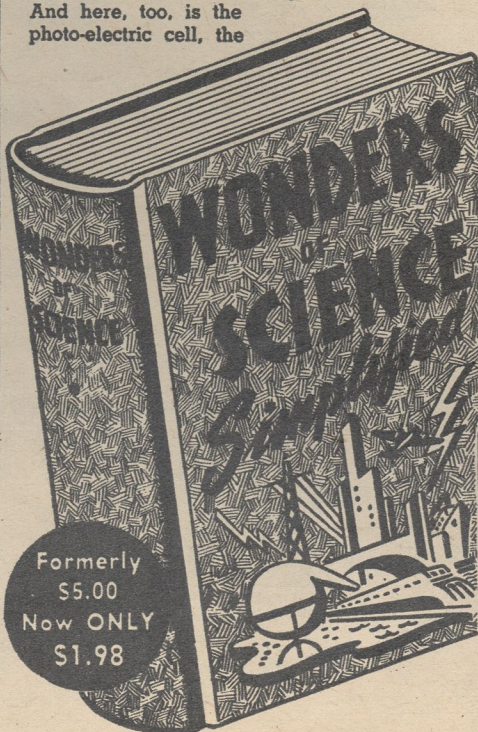
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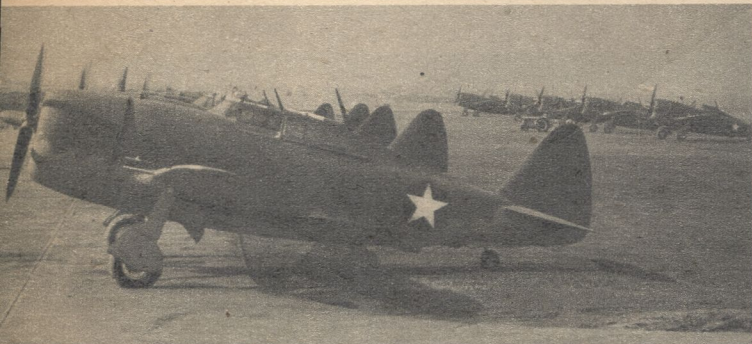
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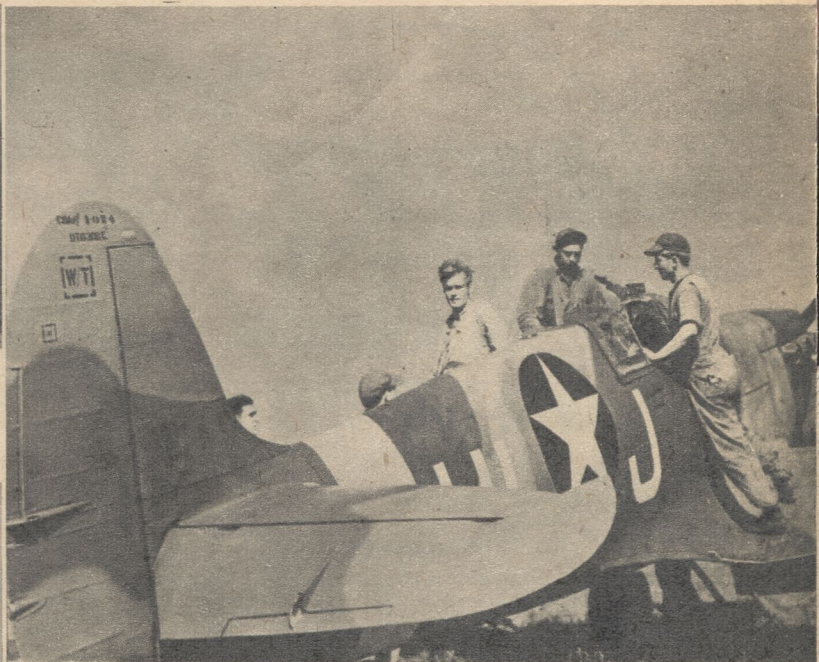
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FLYING INTO FOCUS



Those scrappy Republic P-47 Thunderbolts are rolling from the assembly lines in ever increasing volume. Above, you see them waiting final flight tests. Designed by Alex. Kartveli, they are among world's most powerful fighters.

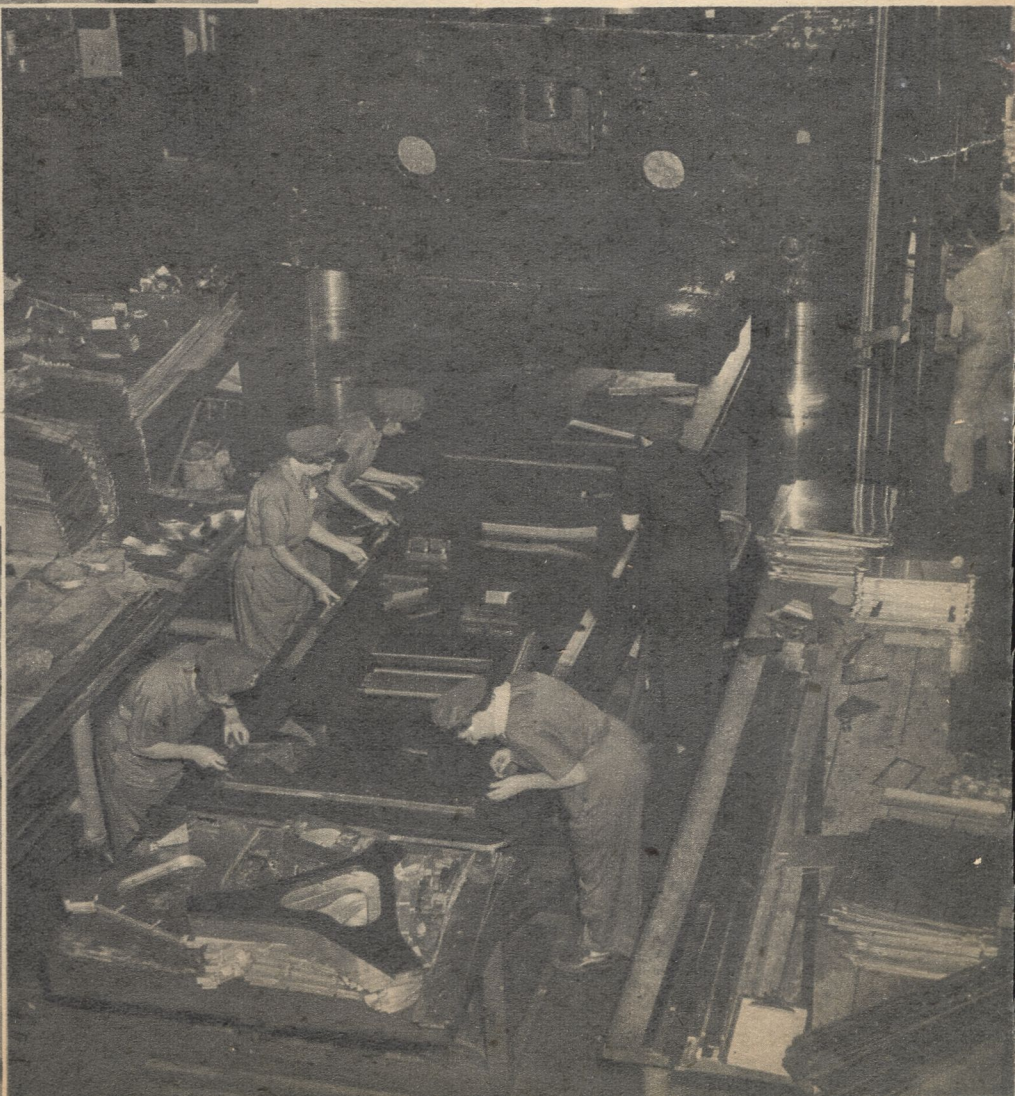


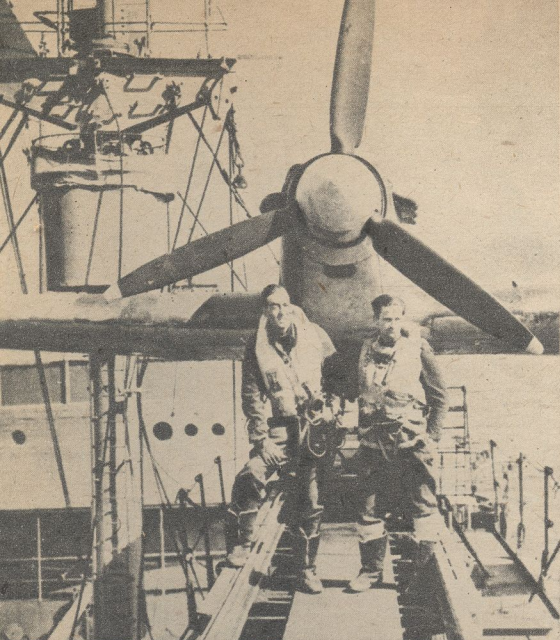
U.S. fighter pilots in England now have their own all-American units with their own ground personnel though many of them are flying Spitfires.



Above, spare motors are loaded into a U.S. Transport Command plane at assembly plant somewhere in the Middle East for delivery to U.S. airmen in Egypt.

Below, Lt. R. B. Buchan, Coral Sea air hero, surrounded by admiring Naval delivery unit pilots, tells how he roared down in his dive-bomber to blast the Jap carrier "Ryukaku" with direct hit. He also accounted for a transport.

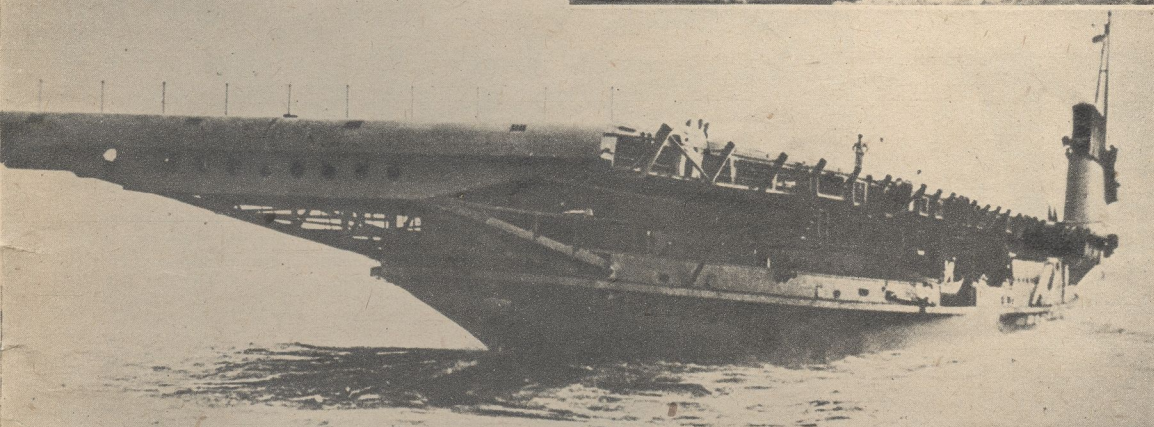




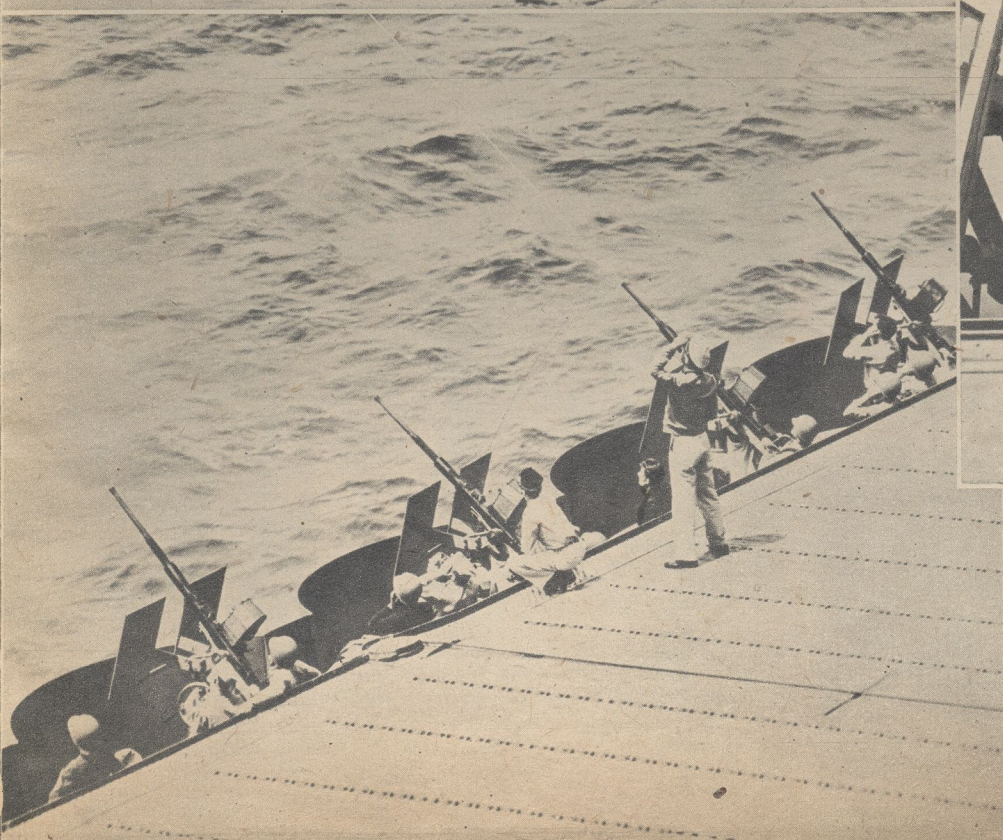
To keep sea lanes open, fighter planes are catapulted from deck of merchant ships when enemy bombers attack. The battle won, the pilot bales out and takes his chance at being picked up.



Above is a most unusual view of Marine parachute troops in training. Nine 'chutes are on the way down—another is coming.

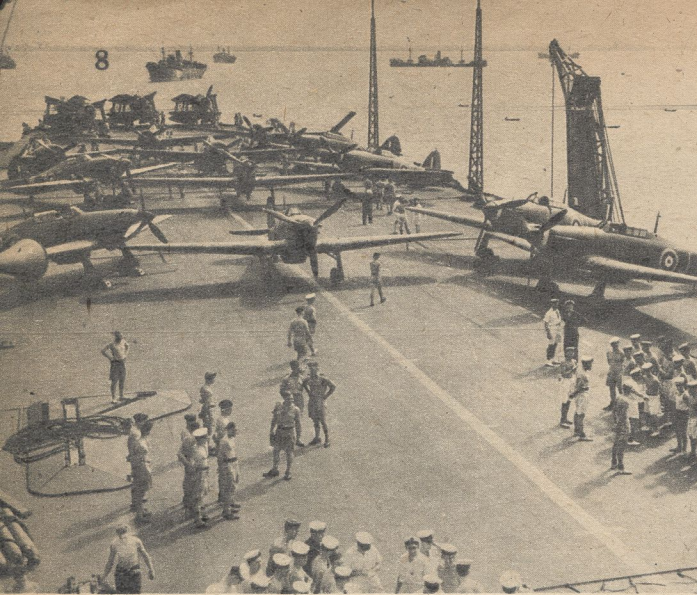


The former Great Lakes' side-wheeler passenger ship "Seeandbee" has been converted into an aircraft carrier trainer—renamed "Wolverine."



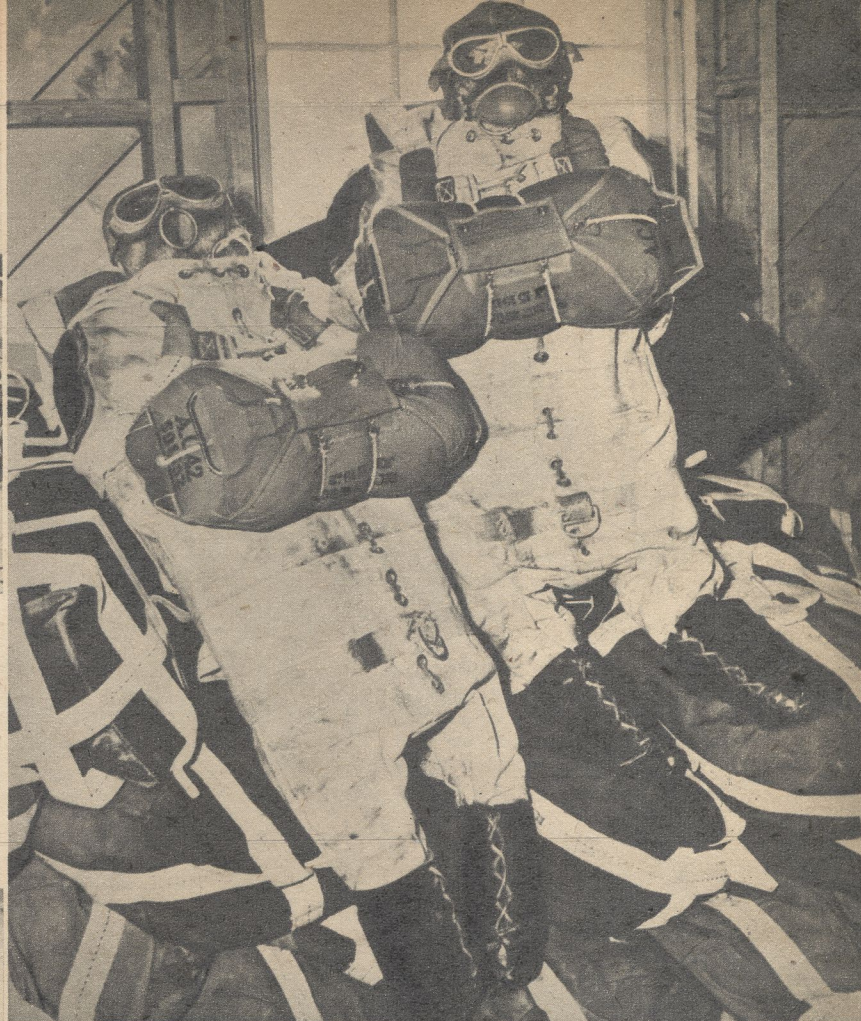
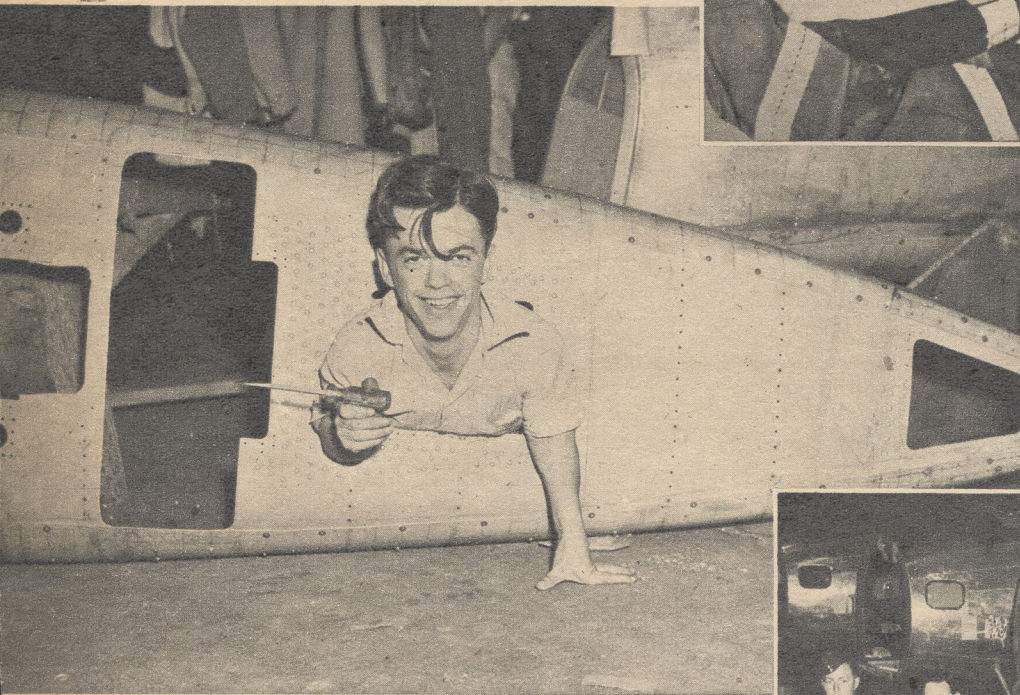
Though Donn Hale Munson (left) and Harry Appel, writers for FLYING ACES, have often had their by-lines side by side in the magazine, they met for the first time at the Army's Pre-Flight School for Pilots at Maxwell Field, Ala. They are training together.

At left, aircraft carrier crew members fire 20mm guns whose incendiary tracer shells spell death for any incautious Jap pilot.



Another Malta convoy gets through. On the deck of a Flat-top, shown above, may be seen a group of fighters and torpedo bombers which protected the convoy.

George Barrett, one of several midgets employed by Goodyear Aircraft Corp., to work in what might ordinarily be considered inaccessible spots. George has his head and shoulders through a 10 1/2 x 8 1/4" aperture.



Meet "Oscar" and "Nellie," two dummies used by our paratroopers training in Calif. The dummies are dropped first. If air is smooth, then men hit the silk.

War heroes touring U. S. inspect Flying Fortresses at Boeing plant. Shown in group below (l. to r.) are Sergt. D. N. Huntley, Sqd. Leader John D. Nettleton, Lt. J. M. Hall, R.A.F. Pilot Officer A. F. Taylor, Harry Howard of Royal Navy, Flight Sergt. Maxwell Alexander Dick Riddell and Lt. George S. Welch.



At left, Evelyn Nell Hummell, Boeing's only girl aerodynamicist, studies data compiled from wind tunnel tests on Flying Fortresses. Her husband reported missing at Bataan.





A standard Navy scout plane a decade ago, the Voight Corsair O2U4 is still being used by the Mexican Air Force as an observation ship.



Col. Eddie Rickenbacker tells a group of Army Air Force technical students in Chicago that, "plane for plane," the aerial fighting force of the U. S. is perhaps better than that of any other nation in the entire world.



A Marine Corps scout plane is seen above making its way to a concealed hangar after landing on a roadway carved from the jungle on a South Sea island, during training of Marines for their attack on the Solomons.



At left, the new giant Avro Lancaster, the first of Britain's mighty bombers to visit the U. S., is shown flying over Montreal before landing at Dorval Airport. The photo plainly reveals the gun turrets in the nose, the mid-upper, mid-under and tail. The ship is armed with 10 machine guns and can carry 8 tons of bombs. It was flown from England by Clyde Pangborn of the R.A.F. Ferry Command.

DAYLIGHT BOMBING MAY DEFEAT GERMANY

Can precision bombing by U.S. and RAF planes—day after day—without interruption—wreck communications, destroy factories and finally break down Nazi morale?

by JAMES L. H. PECK



This reproduction of FA's cover well illustrates how America's top ranking high altitude fighters—the Republic P-47 Thunderbolt, directly below the Fortress, and the Lockheed P-38 Lightning—will be used to protect the B-17s on daylight forays. Below, the Bell Airacobra P-39 and the Mustang P-51 will be used to counter-attack any approaching interceptor enemy fighters.

WE HAVE been hearing a lot about this new "air front." The general implication seems to be that these operations will serve as a next-best—some even claim, a strategic alternative—for an actual second front in the West. This will prove true only if, and not until, the Allies concentrate bomber strength where Hitler can be hurt mortally; and he can be hurt with greater ease in the air over the Reich and the occupied countries where he is weakest. Furthermore, this is probably the only theater of war where a vital decision may be reached within the next few months. There can be little doubt that many of our planes, particularly heavy bombers, are practically immobilized on sleeper fronts; the same can not be said authoritatively concerning the disposition of

the numerous RAF bombers.

The need for greater concentration of American craft such as the Boeing B-17E and Consolidated B-24E immediately raises the question of how they shall be used most effectively. The Flying Fortresses and Liberators have achieved signal results in daylight precision bombing, while the British heavies, such as the Lancaster, Stirling and Halifax, have been used for night raids on a much larger scale. Let's have a look at the record.

During the last week of August, the British Air Ministry announced that the RAF this year had operated against four principal types of objectives—submarine and shipbuilding yards, aircraft factories, transportation lines, and general war equipment factories. Craft and crews of the Bomber Command wiped out a total of about five and one-half square miles of nine of the largest German cities and made at least a million enemy citizens homeless. Some 500 factories were "shut down" for keeps or temporarily disabled. More than 500 planes were destroyed in the air or on the ground, and equipment for half-a-dozen 90,000-man divisions and many submarines and ships and shipbuild-

Brig. Gen. Ira C. Eaker, commanding general U. S. Army Air Force Bomber Command, who led Flying Fortresses' raid at Rouen discusses attack on return to his base.



ing facilities have been written off.

This is impressive. But it is the result of eight months of effort and includes the three 1,000-plane raids made on Cologne, Bremen, and Essen, which makes the record less significant. Indeed, it is estimated that 50,000 of the million homeless Nazis were evacuated from Cologne alone after the Memorial Day raid. By further comparison, one able military observer points out that Germany loses on the average of 500 planes every ten days over Russia, and that equipment for six divisions—including the divisions themselves—is destroyed within two to three weeks. During the night raids which accomplished this damage, the RAF lost heavily up until June. Since then, however, the RAF has dumped more than 14,000 tons of explosive eggs on hostile territory at a cost of less than 5% in plane losses.

At this writing, our Army Air Forces has in operation just three



Above is an official photo showing bombs from a Flying Fortress falling on the aerodrome at Abbeville in occupied France. In right foreground may be seen seven bombs on their way to clearly observable targets below.

squadrons of Flying Fortresses and they have been hard at work. Up to the middle of September, the B-17's have made 102 sorties over German-occupied lands and achieved a 70% batting average, which is certainly big-league hitting. This daylight precision bombing of specific military objectives was achieved with the loss of only two Fortresses. One of the bombardiers who took part in the bombing operations during the Dieppe commando raid is quoted as saying: "We can drop a bomb in Hitler's lap. During the raid we carried out our own scorched-earth policy on Abbeville. We just wiped out the plane dispersal point, ammunition and fuel dumps, and ruined 40 planes on the ground."

THERE has been some heated, but short-lived, controversy over the relative merits of RAF and American heavy bombers. Certain British quarters are said to have expressed preference for the native Lancasters and Stirlings, because they carry twice the bomb load of Fortresses or Liberators. This is true; but both the American ships are faster, can climb higher, and take more punishment than either of the RAF heavies. Most important of all, they're getting more hits: one bomb on the target is worth 10 that miss. When we attempt to estimate the value of the air offensive against Germany we must think continually in terms of the objectives or targets to be destroyed or put out of action. (The

Britain's largest and greatest load-carrying bomber—the Lancaster—has been used on night missions with devastating effect. England is now equipping many such squadrons.

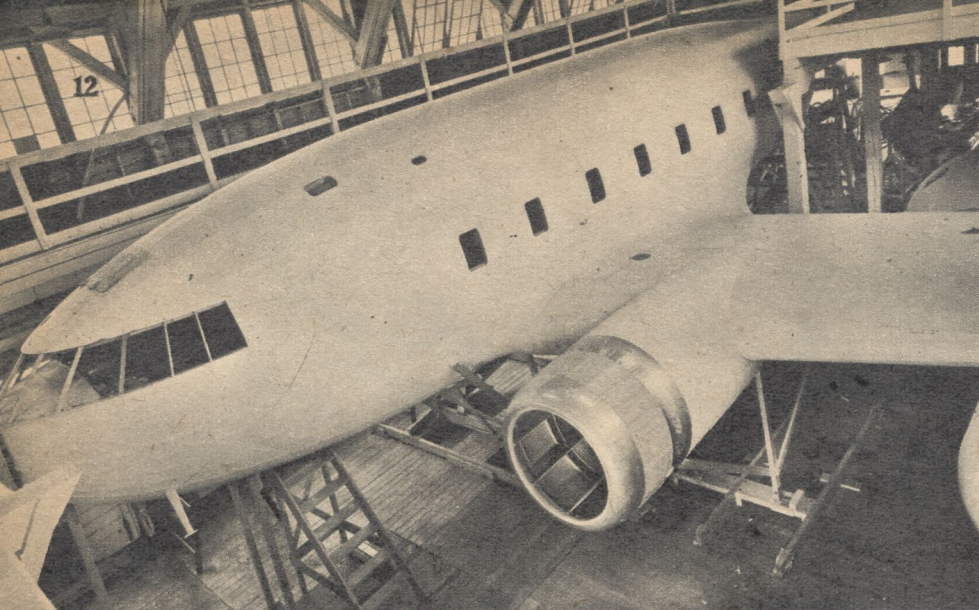
"objectives" might, for example, be a Nazi airdrome while the actual "target" might be the hangers or plane dispersal areas along one or two sides of the field. The target is what the bombardier sets his sight on.)

The British Air Ministry describes the five and one-half square miles of bombed enemy territory as being equivalent to that area of Manhattan from Fourteenth Street down to the Battery. This represents a sizeable piece of New York, but the quantity of bombs necessary to achieve this destruction—and the number of bombers and operating personnel employed for the delivery of these eggs—would have gained a far more damaging effect had they been dropped by precision bombing upon definite objectives, many of which lie on the outskirts of the city. By the same token, London might well have been paralyzed by the Luftwaffe during the epic Battle of Britain, if the bomb tonnage had been aimed at vital arteries instead of helpless civilians.

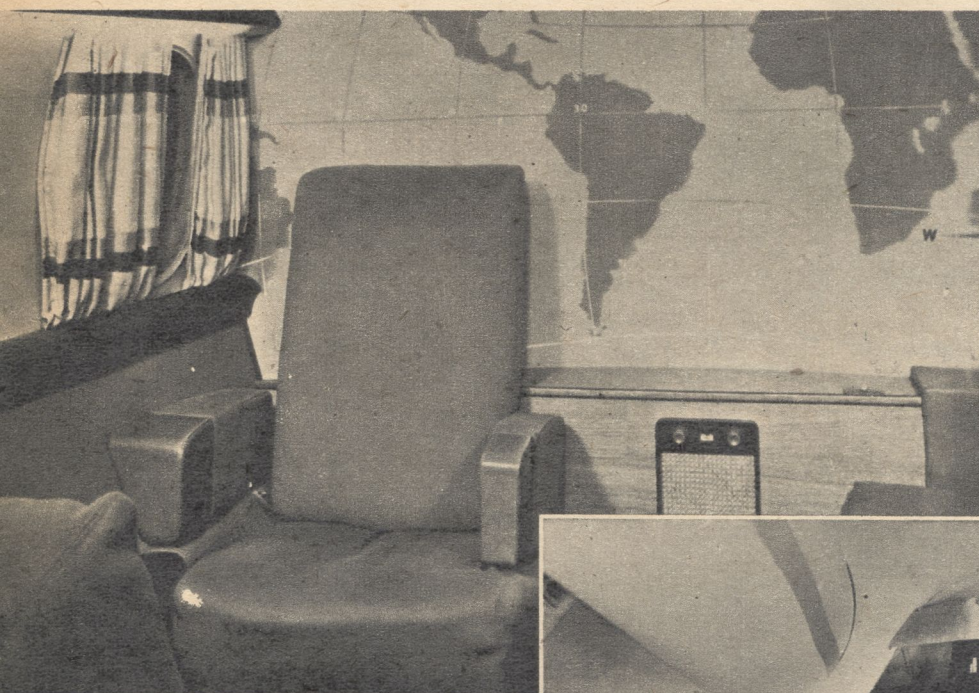
If a commando were attacking a larger adversary, he would not try to tear off the big man's head but would apply only slight pressure to one or two vital points to render the larger man helpless. Scientific bombing seeks to employ judo tactics on the enemy's city. Indiscriminate bombing of buildings or residential areas—however great the casualties, as, witness Barcelona and London—will not necessarily break civilian morale, but hunger, thirst, continual darkness, disease and death will. When one enjoys air superiority, as do the Allies over western Europe, one can "invest" the enemy's city by air.

First, consider the power plants, reservoirs, and pumping stations. A

(Continued on page 71)



When Transcontinental and Western Air were shopping for a high altitude transport, Boeing built this full scale mock-up of the Boeing 307 Stratoliner. Made of wooden formers it was covered partially with fabric and plywood. This huge "model" showed the designers just how the finished ship would look with interior arrangements, too. Note only one wing panel.



Once the mock-up job gets underway, aero engineers as well as stylists and air conditioning experts move right in and work out details.



Mock-Ups

MOCK-UP PROJECTS are an important part of the aircraft industry especially so where the larger transports are concerned. Rather than build a flying prototype after which interior and exterior changes may be required, aero engineers in collaboration with industrial designers, interior stylists and air conditioning experts spend much time working out the manifold details to near perfection before actual plane construction is begun.

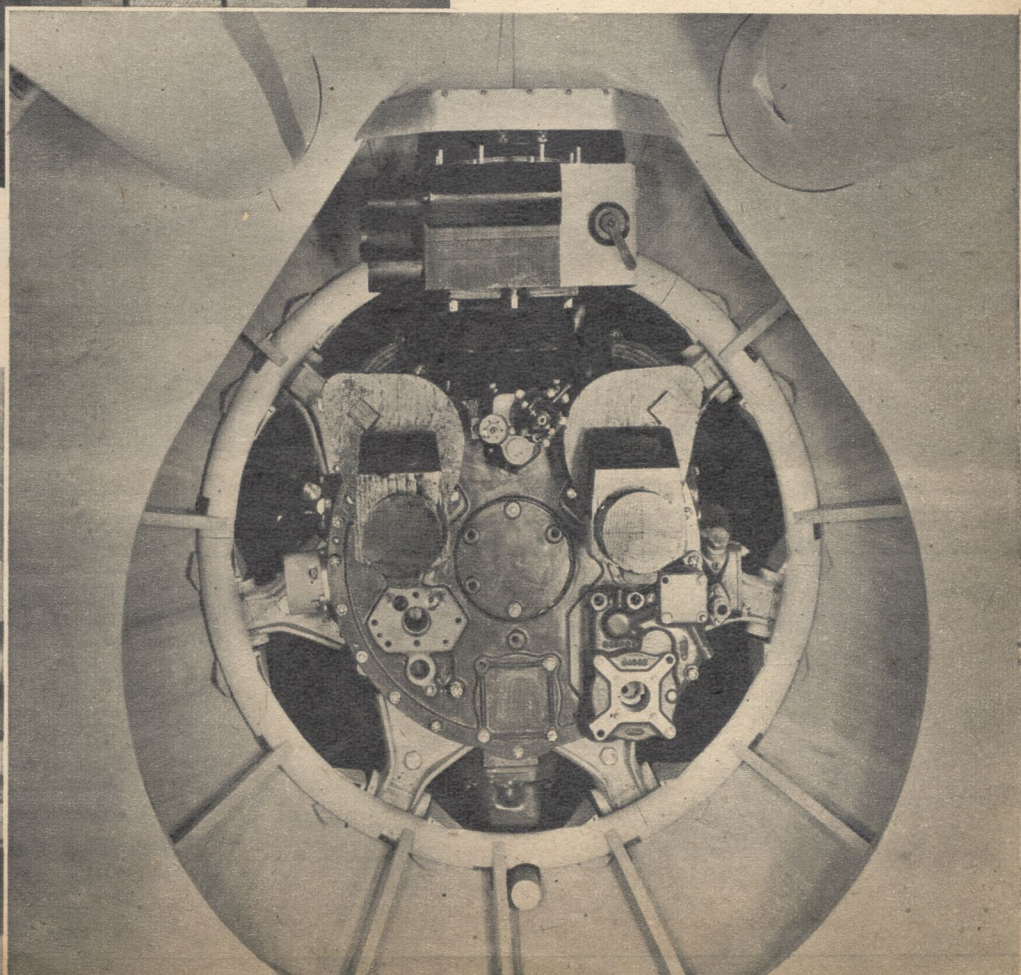
By building a replica of the real ship either in full size dimensions or component parts, engineers are able to make any changes necessary before expensive metal parts and dies are made thus saving much time and money in the final product.

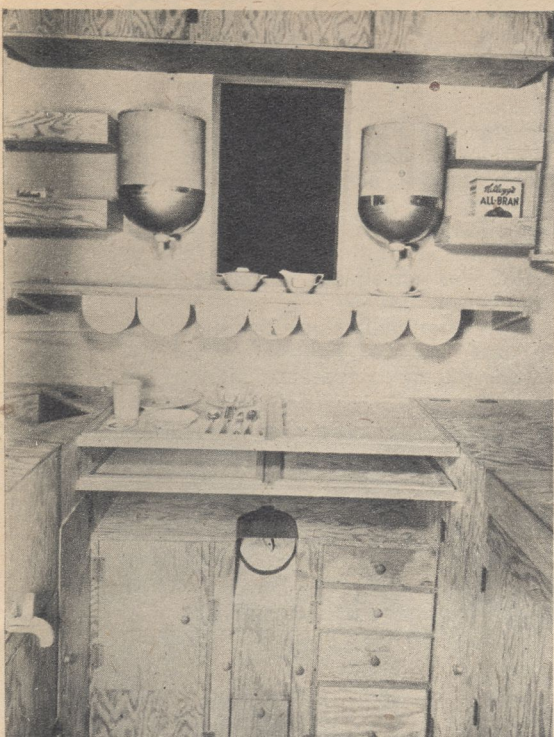
The photographs shown on these pages are not all of the same transport. Some are of the Boeing four-engined Stratoliner (all of which are now in the Air Forces Ferry Command) while the remaining shots are of the Curtiss-Wright twin engined ship largest twin engined transport yet produced.

THE END

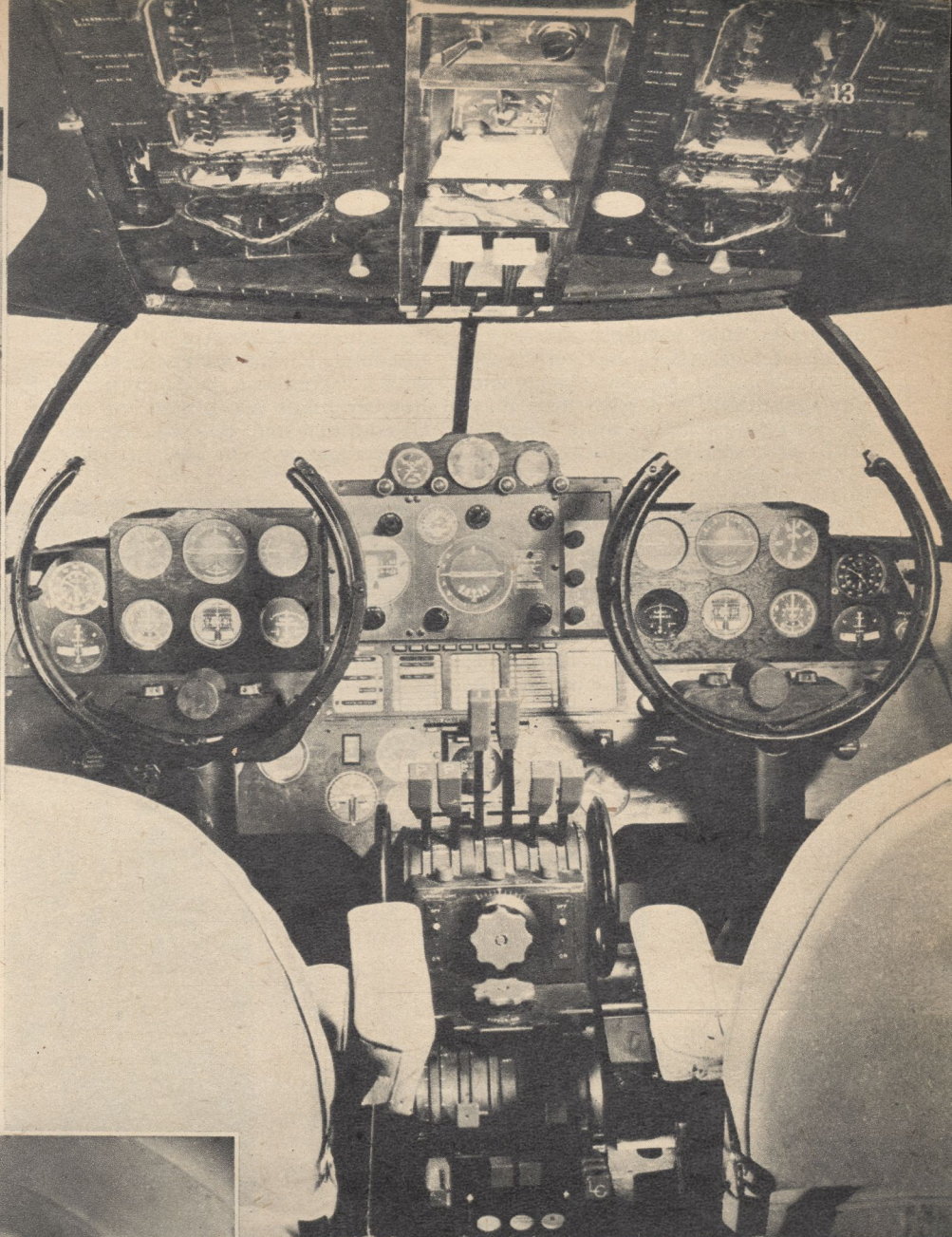
Curtained windows, easy chair, and mural walls give stateroom all comforts of home. Note indirect lighting and air-conditioning nob.

Inside an engine nacelle mock-up. The dummy engine is complete to various valves, exhaust pipes (on top) and other gadgets necessary to engine installation in order to determine how all the connecting parts will function.





Preparation of food on long trips is of utmost consideration. So they built an exact replica of the cooking galley to make sure chef has enough elbow room.

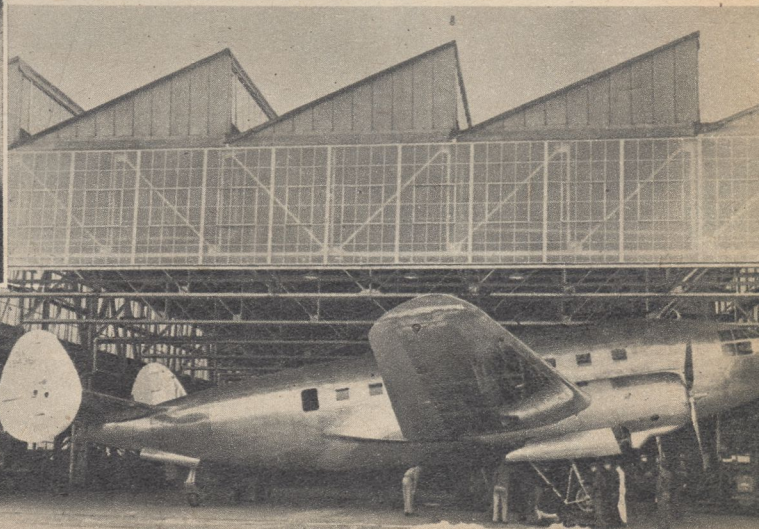


Painstaking detail goes into the mock-up of the pilot's compartment. Paper instrument faces are pasted into position temporarily so that pilots can train their eyes to determine best locations. Everything in this "office" is full size. Airline pilots get in on these pre-views too.

Here's the result of the mock-up job, the cockpit of which is shown directly above. You'll recognize this ship as the Curtiss-Wright C-55 with its original twin rudders. Subsequent flight tests called for single rudder. The Air Forces now use this ship known as Commando.



No cramping of style here. Swinging and reclining chairs enable passengers to relax in comfort while hurtling along at substratosphere altitudes.



SO YOU WANT TO JOIN A BOMBER

NINE MEN in a bomber are not just what the name seems to imply—they are more like nine men on a baseball diamond. They form one of the most closely integrated and savagely aggressive combat teams history has yet known. There must be no petty jealousies amongst them, and each man must be in sympathetic understanding with any character fault of any other team member.

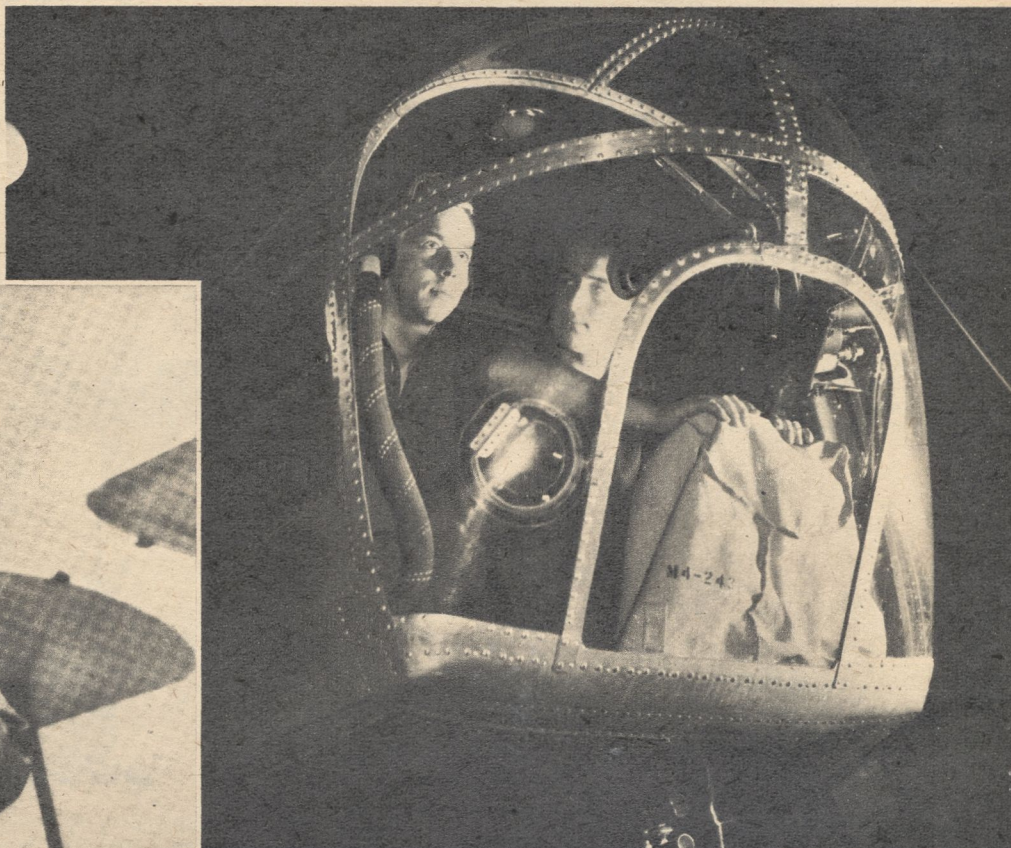
The pilots, navigator and bombardier are the key men of the team, and as such are commissioned officers. The men who man the guns and keep the engines and plane in order are the pick of the enlisted branches. The crew of the plane form a well-drilled team blended to act as a unit—the radiomen are the ears of the plane; the pilots are the

eyes; the gunners the watchdogs; the bombardier the teeth; the navigator the homing sense and the engineers the doctors.

The pilot must fly the plane and is a graduate of the Army's Kelly and Randolph Fields' advanced training, with a rating as a multi-engine pilot. Bomber pilots are picked for executive ability and cool headedness in an emergency. The best bombardier

in the Air Force would be helpless without a steady hand on the controls at the crucial moment when he is operating his bombsight. And the best navigator in the world would be helpless in guiding a plane if the pilot was unreliable in maintaining the course laid out.

The co-pilot is there to relieve the pilot in case of emergency but his main job is to free the pilot of all



The bombardier is in charge of the plane the moment the objective is sighted. In a 10 hour flight he may have nothing to do for 9 hrs. 58 mins.—but THEN

technical worries. He takes care of all operational details, checks instrument readings, operates the retractable landing gear, flaps and propeller pitch controls. The co-pilot carries the same ratings as the first pilot and has had the same training, but is usually less experienced in actual flight.

The navigator is a graduate of the Army's navigational school and is often a cadet who has been "washed out" as a pilot. His job is to start the plane toward its objective and keep it flying toward that point until the bombardier takes over the guiding of the plane.

The bombardier takes over the direction of the plane once the target has been sighted and the entire crew are then working for him. The pilot follows his orders as to course, altitude and speed without question. The bombardier is often a "washed out" pilot also, but not always. His training is gained at the Air Force Bombardier Training Schools.

The pilot is picked for executive ability and cool headedness in any emergency, for he is the key man of the bomber crew.

CREW!

Every man is an expert
at his particular task—
each a unit in a deadly,
well-drilled team!

by
**WILLIAM HERBERT
RANDALL**



The radio operator not only is in charge of the plane's radio equipment but in combat takes over the waist turret opposite the second engineer.



The top turret machine gunner acts as watchdog to protect the bomber from attacking fighters. Those twin machine guns are of heavy calibre.

THE FIRST engineer, usually a technical sergeant, takes care of the plane and keeps it flying mechanically. He must know every part of the giant plane intimately and where to look for trouble in the miles of electrical wiring that go into the plane. All of the enlisted men man machine gun positions if attacked. The first engineer's battle station is in the top turret, just behind the pilot's cockpit.

The second engineer aids the first

engineer in any repair work necessary while in flight and mans the waist turret on one side of the fuselage.

The first radio operator operates the radio equipment and goes to man the waist turret, opposite the second engineer, during an emergency.

The second radioman relieves the first radioman in case of casualty and mans the bottom turret.

The cameraman sits beside the radio operator's equipment and operates his cameras through the floor to photograph the bomb hits for intelligence. His position in battle is the tail turret.

All five enlisted specialists are trained in the Air Force specialty schools in their particular craft, then sent to gunnery schools before being assigned to an operational training center. At the training center the crews are put together and a process of changing, training and coordinating takes place until each crew reaches the "happy family" stage.

During this six weeks of operational training the men work together and get to know one another. The pilots have come from the advanced schools where their training up to this point has been the same as other pilots who have been sent to pursuit, interceptor, observation and other types of duty.

The navigator has been taught to give the pilot a double drift reading to determine the plane's speed as soon after takeoff as possible. While the pilot flies a straight course the

navigator peers down at the ground through the gyroscopic drift indicator, an optical instrument criss-crossed with straight and parallel lines. By sighting on a stationary ground object the navigator adjusts the lenses until the object seems to be moving along the parallel lines, then records his reading. This indicates a single drift. For a double drift reading the pilot changes course 45° for one minute, then swings back on course for another minute. The double reading obtained will tell the pilot his true air speed in relation to his true ground speed.

All pilots seem to want these readings done differently; some start to the left for the first reading and some to the right. Some want to do it enroute to their target, while another may want to make it before setting a course. The operational training period permits these two men to become familiar with each other's methods of operation so that they may cooperate smoothly when on a definite bombing mission. The pilot has no time to check the navigator's work, as does the captain of a surface vessel. He must take the navigator's word, and to do this with satisfaction the pilot must have confidence in his navigator and fully understand that individual's method of working. The navigator is fully responsible for the course of the plane until the objective is sighted, when the bombardier takes over the direction of the plane until the bombs have been released.

AT THIS point the bombardier becomes the commander of the plane and every man is working for him, to the end that he may operate his bombsight in a smooth and unmolested run on the target.

The bombardier's moments are

brief, but in those few moments he must either make a success of the mission, or fail dismally. Because of this brief moment his training must have been such that every movement furthers the execution of his mission. In a ten-hour flight he will have nothing to do for nine hours and fifty-eight minutes. In the remaining two minutes he will hunch over his bombsight, note all the instruments at his side that indicate the plane's speed and altitude, winds and cross-drifts and air temperature. All of these factors must be set into the bombsight through adjustment of tiny knobs.

Once all these settings have been incorporated into this most accurate of all calculating machines he sets his eye to the rubber eyepiece and observes the target as it moves nearer the engraved hairlines on the lenses. He adjusts another knob until the hairlines meet at right angles. The bomb bay doors have been opened and he has aimed the bombs. His hands rest lightly on the bomb release as he directs the pilot how to intersect the target with the hairlines of his sight. Once the target and the hairlines intersect he releases his bombs and reports to the pilot, "Mission Completed."

Teamwork naturally is at its peak when the plane is approaching the target. Very few words are spoken—every man knows what he is to do and is confident that each of his team mates will do his share. Too many words spoken over the intercommunication telephone in moments of high nervous tension, and at high altitudes would probably be unintelligible and confusing. Each crew member's microphone has a button to press before speaking and the pressing of this button causes an audible click in all phones on the circuit.

Orders and acknowledgements are made in a series of pre-arranged and well-memorized clicks mastered at the operational training center.

The bombardier has to be right the first time—he can't go back to pick up his bombs for another run if he misses, and it's a long way home for another load. Because of this

factor his training is probably the most specialized, for the short time he works, of any other job in the army.

Before being assigned to bombardier training the student is tested for special qualifications essential to success in this job—manual dexterity, so that knobs can be adjusted rapidly without fumbling; muscle control, in order to accomplish precise adjustments quickly; serial reaction, in order that a routine may be quickly followed in making those adjustments and a calm temperament that won't rattle him in the tense moments when he must function perfectly.

HAVING PASSED these necessary tests, the student bombardier wades into heavy classwork to learn the theory of bombing. During the early period he won't get more than 12 feet off the ground, and that will be on the platform of the indoor bomber trainer. Week after week he will solve the same problems time after time, adjusting knobs on his

the famed secret bombsights, the Norden and Sperry. An instructor sits beside the student on the platform, while the bomber trainer wheels around the floor that is laid out in a simulated terrain of enemy ground. A traveling box called a "bug" is sometimes used for aiming during training in bombing moving targets.

As the student becomes more precise and skillful, he is given drift problems to solve with the "bug" heading on a tangent across the trainer's course. The "bug" moving at an angle while the trainer moves ahead simulates a condition exactly as though the plane were being drifted in a cross wind. To compensate for this the student must set his trainer course in an arc, in order to correct for the cross-drift of the "bug."

When the newness is worn off the bombsights for the student bombardier and he has become familiar with the use of all the instrument adjustments he starts his flight training. With an instructor beside him in the nose of a Beech AT-11, he undergoes both day and night bombing practice on wooden shacks in the center of circular target areas.

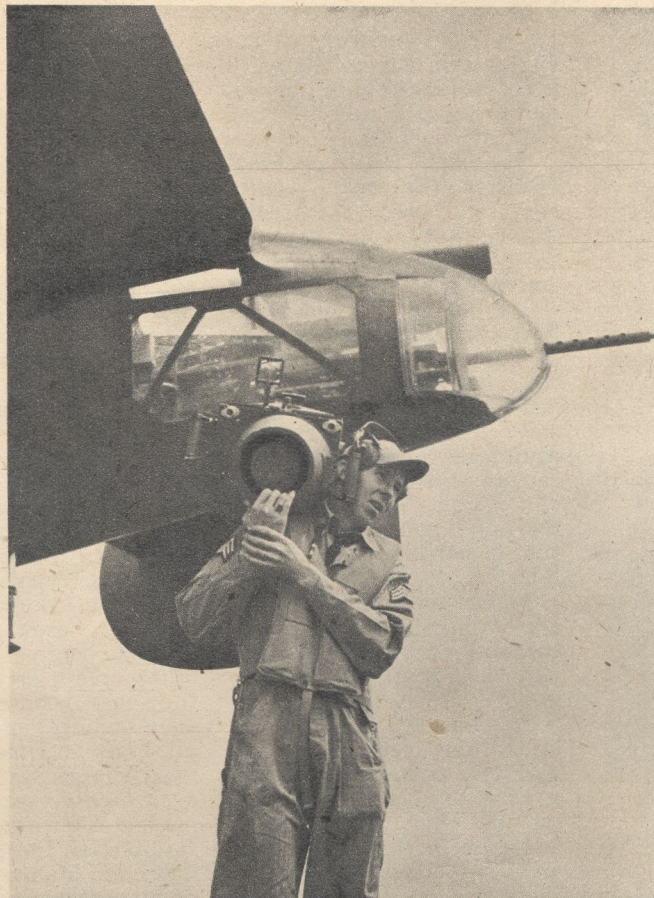
The practice bombs used for bombardier training are not of the high explosive kind. A 5-lb. can of black powder is contained in the tail of the bomb, while the balance of the bomb case is filled with sand to make up the balance in weight equal to a 100-lb. bomb. When the bomb hits, the steel case crumples and the sand sprays out, while the black powder ignites to smoke-mark the hit. The bomb cases are salvaged and used again. Every hit is photographed at the moment of impact when the black powder sends out its puff of black smoke. The closeness of the hit is graduated on the picture and recorded on the student's progress chart.

The ground crew loads ten practice bombs aboard the AT-11 and places them in racks. The student finds them racked neatly on each side of the miniature bomb bay doors. A walkway leads past the pilot's seat to the compartment in the nose where the student bombardier sits with his instructor beyond the instrument panel. A padlocked box in the left hand side of the cabin is provided for storage of the bombsight in the event of a forced landing.

AFTER NINE weeks of training the student makes his record runs for classification as a first, second, or third class bombardier. In formation bombing, a first class bombardier rides in the lead plane to aid other bombardiers in releasing their bombs at the right point.

The last three weeks of training are usually the most interesting. Classroom and ground work have been reduced to practically nothing. Most of the time is spent in aerial combat training. Attack runs are

(Continued on page 70)



At Lowry Field the photographer gets special training for his delicate task of recording all events possible and keeping enemy craft off the ship's tail.

bombsight, generally coordinating his mind and movements until the speed of his reactions has increased to a point where manipulations of the bombsight dials have become almost automatic in serial relation.

On the high platform of the bomber trainer the student bombardier gets his first introduction to

WAR FLYERS IN THE HEADLINES

DAY BY DAY—almost hour by hour—new stories of the courage, daring and expert flying ability of American pilots continue to inspire our fighting forces. Often out-numbered and out-gunned, our boys are proving time and again they can never be out-gamed. Whether it be in the far Pacific area, the icy wastes of Iceland or the Aleutians, over the sun-baked sands of Libya, or in the European skies, the story is the same—American pilots are demonstrating their superiority over the best that can be sent against them.

Sergt. Billy Gribble

From United Nations Headquarters in Australia comes the epic tale of Sergeant Billy C. Gribble of the U.S. Army Air Forces who won a citation for valor by making repairs to the landing gear of a bomber under the worst imaginable sort of conditions. The plane and crew had been on a bombing mission over one of the Jap occupied islands of the Southwest Pacific and was returning to its base when the pilot discovered his landing gear was badly jammed. A crash landing seemed inevitable, bringing with it the danger of possible death or serious injury to all seven men aboard.

Gribble was confident he could make the necessary repairs and was granted permission to try. Seizing him firmly by the legs, two members of the crew lowered Gribble through an open hatch. Hanging head downward, the daring Sergeant proceeded with the job as confidently as though he was standing on the ground. While the plane roared over the ocean, dipping and bucking as it battled a small gale, Gribble stuck to his self-assigned task. The two men holding his legs found it difficult at times to maintain their grip as their comrade below twisted and squirmed to reach parts of the gear almost beyond his reach. Their arms grew numb but they held on.

After almost an hour Gribble called up that the job was finished and was pulled back through the open hatch, to sink exhausted on the floor of the plane. All heaved sighs of relief and shortly afterwards the pilot set down his bomber in a perfect landing at an Australian base. Gribble, whose home is at Alverton, Westmoreland County, Pennsylvania, was toasted by his fel-

lows, though he still modestly insisted that "it was nothing."

Maj. Frank D. Sharp

A Flying Fortress, piloted by Maj. Frank D. Sharp, battled 23 Japanese fighter planes over Burma and though riddled with bullets, top and bottom turrets put out of action, and right rudder control severed, was brought down to a crash landing near a British-controlled village. In the action which lasted for more than a half-hour, one gunner was killed, six crewmen, two of whom were wounded, bailed out and have been listed as missing in action, since it is assumed they are held as prisoners of war by the Japs.

The Fortress took off from an air base near Calcutta to bomb objectives at Rangoon. En route Maj. Sharp, who comes from Salem, Ore., spied a large freighter and swept low to drop a bomb or two. Four Jap fighters suddenly appeared but though under heavy fire from the Jap planes and anti-aircraft fire from below, the Fortress unloaded several eggs, one of which scored a perfect hit on the deck of the freighter.

Turning to head back for India, Jap fighter attacks became heavier as the first four Japs were joined by others. Soon the top turret was re-

Maj. Sharp shook off the attackers by scurrying into a cloud bank and signaled the crew to stand by to bail out. Navigator and the bombardier went overboard with their 'chutes, but as the smoke lessened the pilot decided to keep going. A few minutes later a Jap 97 type fighter appeared on the right and being in an utterly defenseless position Maj. Sharp ordered the others to bail out. He intended to crash-land the plane, aided by Lt. Wunderlich, who volunteered to stay aboard.

Coming out of a cloud they found they had shaken off the Jap and swung their plane down to a crash landing in a rice paddy alongside the Irrawaddy river. With rifle shots they destroyed the bombsight and made their way afoot to a British-controlled village from whence, after a day's rest, they continued their trip to India by boat and railway, arriving in Calcutta several days later. The Silver Star for exceptional gallantry has been awarded to Major Sharp and his crew of eight men.

Lieut. Colonel Bernt Balchen

The name of Bernt Balchen, already familiar to Americans for his services as a pilot while with Rear Admiral Richard E. Byrd on several polar expeditions, gained new fame when he became the hero of two daring rescues on the ice cap of Greenland.

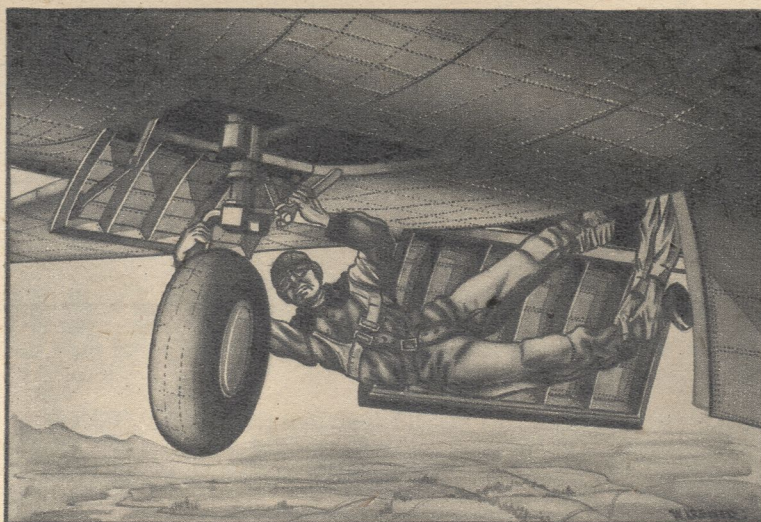
The first involved the rescue of Col. Robert W. C. Wimsatt of Washington, D.C. and an unidentified sergeant from a forced landing in a light plane on the edge of the ice cap near a lake where they were on patrol duty. Col. Wimsatt was injured in landing and the speediness of his rescue probably saved his life.

The second and more involved Balchen's feat took place some two weeks later,

when a faint radio message came through advising that a big Army bomber and a crew of thirteen were down some 100 miles or more inland from the Navy patrol base. Intervening ice, slashed by thousands of deep crevices, made a land rescue virtually impossible. It became apparent the men could only be saved by air.

Supplies were first flown over and dropped to the marooned men by Lieut. A. Y. Parunak of the Navy.

(Continued on page 73)



Repairing a jammed landing gear by hanging head downward through an open hatch of a bomber, earned Sergt. Gribble a Citation for Valor.

ported out of action, the gunner received a head wound and the gunsight was smashed. Then No. 3 engine went out. Shortly afterwards the bottom turret was rendered ineffective when quantities of oil from the bad engine covered the sighting glass. By now some twenty-two or three Jap fighters were in action and enemy machine gun fire killed the side gunner. Another engine was demolished and the right rudder control was severed.

With smoke pouring from its nose



Long trains of precious oil wend their way from Baku northward, augmenting the vast quantities boats transport up the Volga.

Approximately 70 per cent of the oil used to maintain the Russian air force and motorized units comes from the region shown on the map at the left—it represents one of the greatest prizes for which men have waged war since the dawn of civilization.

WOULD THE LOSS OF CAUCASIAN

IS THE Russian Air Force—with its tens of thousands of aircraft—scattered over a 2,000-mile front—each consuming vast quantities of precious gasoline and oil—liable to be grounded if the German advance continues through the Caucasian oil fields to Baku? Is Germany prepared to pay the price for such a victory? May it even be called a victory, if Russia pursues her normal "scorched earth" policy and destroys the oil wells and refineries before letting them fall into Nazi hands? These are but a few of the questions now puzzling the world. For—should Russia's vast air force be put out of action, making it impossible to maintain an Eastern front, then Great Britain and the United States would face a really

herculean task in their operations in the West, and the war might be expected to be prolonged for many, many years.

Imagination totters at the price the Luftwaffe and the Panzers are paying in their all-out effort to reach the oil of the Caucasus. The drive is in its second year. Irrespective of how badly the Nazis are rebuffed, they cannot afford to stop aspiring for the region in question with all their might.

Millions of men in the flying and ground crews of Goering's air force, and armored divisions without count, have been knocked out by outnumbered defenders who have been showing breath-taking skill and spirit in the air and on the ground. Still the Germans come. And the Rumanians,

Italians, Hungarians, Finns—the subject peoples harnessed to the Axis yoke, armed from the stolen industrial plants of Europe.

Is it wanton extravagance, this reckless expenditure of lives and equipment? It may not be as crazy as it first appears. With intense motorization and mechanization of modern armies, and especially with the emergence of air power to its present dominant position, fuel oil is as indispensable to a state's survival as food for its population. Fascist regimes are fighting for their very lives. Their spokesmen admit they are the "have-not" nations.

Can Germany solve this life-and-death problem by seizing the rich oil fields of the Caucasus? Even more important to us is the answer

to this question: What will be the position and prospects of the Soviet Air Force and of the Red Army and Navy, in the event that those generous petroleum wells are no longer accessible to the United Nations side?

Though bleeding profusely, the Wehrmacht has been inching its way to the Apsheron Peninsula, where the great oil industries of Baku are situated. The Apsheron has been called a colossal sponge saturated in petroleum. Baku is the third largest city of the Soviet Union in population.

The Azerbaijan Soviet Republic, in which Baku is located, has been for years one of the world's great sources of "black gold." The name of the city signifies in Persian the "town of winds." It was founded in the fifth century and the old city preserves numerous monuments of antiquity.

Hitler's bombardiers no doubt will be instructed to spare the derricks in the oil fields producing high-octane gasoline hitherto used by the Red aircraft, that is, if the Soviets leave any undamaged equipment. It is safe to assume that they will not, if compelled to evacuate. Then, if precedents set by the Nazis mean anything, they will focus their attention on the nearby steppes and on such spots as the sea bottom and below. For seemingly everywhere the Soviet workers have extracted oil on and about the Apsheron Peninsula.

The Baku area possesses perhaps half of the USSR's oil resources. Before the Revolution of 1917 this precious fluid was obtained by the drag method; that is, it was dragged from deep wells in narrow pails. Now these Caucasian fields are completely mechanized and electrified. The oil is being extracted with electric pumps. Some of it is being raised from the earth's bowels in pipes, under gas pressure.

Raised to the surface, the oil flows in pipelines to refineries where

high grade fuels and lubricants for the Soviet aircraft are produced. By 1936 the oil yield of Baku reached 22.2 million tons annually, comparing with the pre-Revolution output of 7.7 million tons.

PART of the crude oil obtained in the Caucasus is being preserved in special storehouses, afterward to be transported to Astrakhan in sea-going vessels. Then tankers and barges of huge capacity carry it along the Volga and its tributaries to consumer centers and refineries. Eventually every aviation base receives its quota of gasoline.

Also in the Caucasus and second in volume of oil output is Grozny. Its oil is richer in excellent gasoline than that of other regions, except Maikop. As early as 1936 the Grozny wells were overfulfilling their Five-Year Plan quotas. Here a juicy plum, indeed, awaits the Luftwaffe and its hungry fuel tanks. In February, 1937, a powerful stream of oil gushed up on the Gorskaya Mountain of the Tersky Ridge. Here, too, was discovered the third oil-bearing region of the Checheno-Ingush Autonomous Soviet Republic. Within 20 years the little republic's great oil yield, much of it of aviation quality increased threefold.

In addition to oil production, powerful oil refineries have been erected

in Grozny, as well as machine-building plants and chemical factories to serve the needs of the oil industry.

From Grozny pipelines have been laid to Tuapse on the Black Sea, to Makhach-Kala on the Caspian Sea, and to the Donetz Basin, the coal-producing section overrun by the Axis hordes at this writing.

Tuapse is an important port which does not freeze in winter time. It is a well-known oil-exporting center. Makhach-Kala not only receives Grozny oil for its refineries but boasts its own oil deposits at Izberbash on the Caspian shore.

There is a good deal more to be said about the vastness of the oil resources and production in the Caucasus and Transcaucasus, but enough has already been said in the preceding paragraphs to indicate the enormous importance to the Red Air Force of those areas.

What will happen to their air force if it is deprived of the Caucasian gasoline and lubricants will be presently discussed. At this point it may be well to survey briefly the Nazi chances of seizing control of and exploiting those resources.

That Hitler badly needs them is unmistakably shown by the price he has been paying for well over a year in order to gain them. That he will have to pay very much more before he gets to Baku, Grozny and Maikop

Is petroleum—the famed black gold of industry—so rich a stake as to well warrant the reckless expenditure of lives and equipment, by Nazi and Reds alike, in the world's mightiest battle along a 2,000 mile front?

by LUCIEN ZACHAROFF

OIL GROUND THE RED AIR FORCE?

Literally thousands of oil derricks dot the skyline around the ancient Russian city of Baku, on the Caspian shores. Soviet production in this area alone leaped from a pre-Revolution output of 7.7 million tons to 22.2 million in 1936.



certainly is equally obvious.

Then, again, there is a possibility that he will *never* get to Baku. But whether he does or not, it is certain that he is willing to gamble and pay an exorbitant price in the attempt. The Red dive-bombers will see to that. So will the cooperating Red Army and Navy. So will the guerrilla detachments. Glance for a moment at some recent stepping stones to the Caucasian prize. There was Rostov, for instance, first occupied by the Germans late in 1941, at an exorbitant cost. They stayed there but a week before they were thrown out by Marshal Timoshenko's troops. To retake Rostov this year the Nazi High Command sent to certain destruction many other men, planes and tanks. Then there is Stalingrad—the Red Verdun. But why go on, when the world knows the fighting mettle of the Soviet defenders?

Suppose the enemy does reach Baku for we have no right to overlook any possibility in this life-and-death struggle. The would-be world con-

querors from Berlin are already familiar with Stalin's "scorched earth" policy. Blown-up exploitable spots will greet them, columns of fire rising from deep wells and gushers, that may not be extinguished until the end of the war because the Red bombers will come again and again to rekindle the fires. Of course, the local guerillas will contribute their full share to a well-planned program of sabotage of German production, even if Hitler's engineers succeed in bringing in and installing new equipment—no mean achievement in itself, IF . . .

So, the possible, though not probable, subjugation of the Caucasus may be more in the nature of a Russian loss than a German gain. After what will go down in history as perhaps the highest price paid by a generalissimo for a limited military objective, Hitler will be confronted with a barren wasteland, with catastrophically extended lines of communication behind him.

BUT the question still remains as to what will be the status of the Red Air Force in such an eventuality. And the answer, all wishful thinking aside, is most encouraging to the Allied camp in this global struggle. Thanks to intensive exploration by Soviet geologists and prospectors in the past two decades or so, immense deposits of petroleum have been uncovered in virtually every corner of the USSR, which occupies one-sixth of the world's surface. In the Far North and the Far East, in the Urals and the Volga District, not only have new oil fields been located, but they have been equipped for production.

Over extensive areas, the oil industry has established itself in full mastery of deep-well and high-speed drilling techniques. Cracking and polymerization are widespread and are making it possible to obtain high-grade aircraft fuel.

South of the Urals there is fast developing "the second Baku," a rich oil-extracting territory. Stalin and

other Soviet statesmen and military leaders with rare foresight, had not only anticipated the part of air power in modern warfare but have also foreseen the wartime possibility of evacuating their long-established industrial regions.

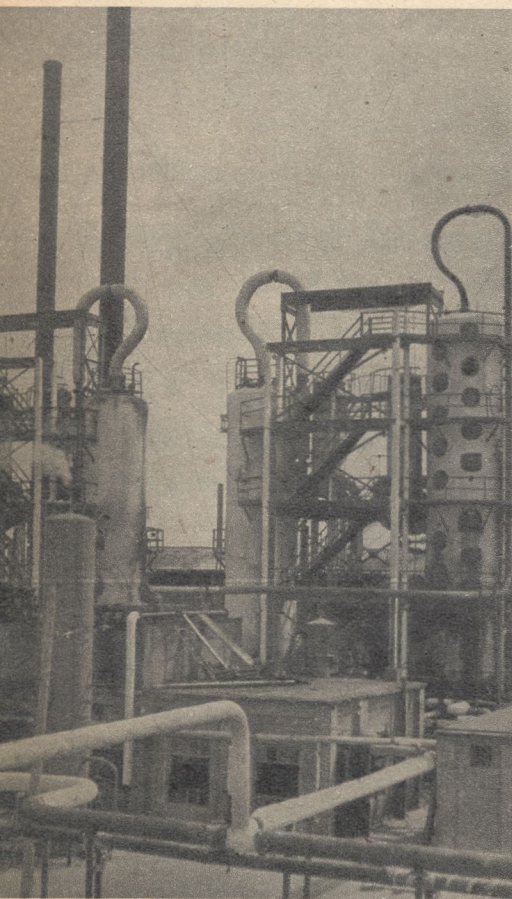
Thus, in the past several years it has been the policy to create for each center of production its "twin." In other words, all of one type of production was not allowed to focus in one spot. Its twin, a similar center, was being erected in some other region of the huge expanse of the Soviet republics.

In this manner the industrial center of the Soviet Union has been shifting to the east, away from the potential zones of Luftwaffe sweeps. Strong efforts were made years before the war to make each region self-supporting on the strength of natural resources available, especially in respect to fuel and food.

Among the many Russian "surprises" of World War II historians will list this provident distribution of industrial resources including the opening up of new oil-producing centers, throughout the nation. What such a program means in the event of an aggressor's invasion is becoming apparent only now.

Recently this writer had an occasion in an article to discuss the Soviet development under the three Five-Year Plans of the Far Eastern oil-bearing regions of Kamchatka, Sakhalin Island and others. They enable the Red Far Eastern air fleets to be self-sufficient, if and when Japan strikes. Oil refineries at Khabarovsk and other Soviet Asiatic centers have been providing their aircraft with reliable fuels and lubricants. All the way between those remote wells and gushers and the ones in the Caucasus there are intermediate petroleum industries. In his extensive report on "The Third Five-Year Plan for the Economic Development of the USSR," in March, 1939, Vyacheslav Molotoff, then Pre-

(Continued on page 68)



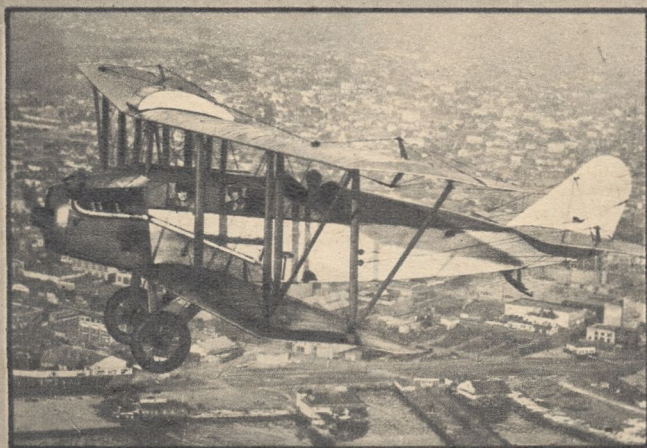
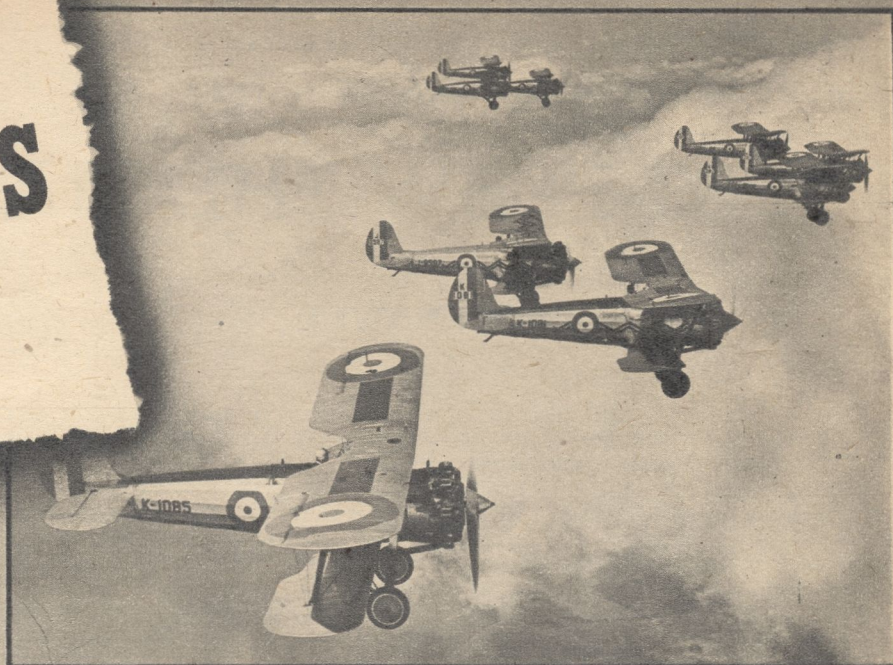
Soviet equipment is modern — cracking distilleries like this one are to be found at numerous centers in Russia.

Pilots of these Red fighters will depend on highly refined Soviet oil to keep their planes aloft during severe sub-zero temperatures.

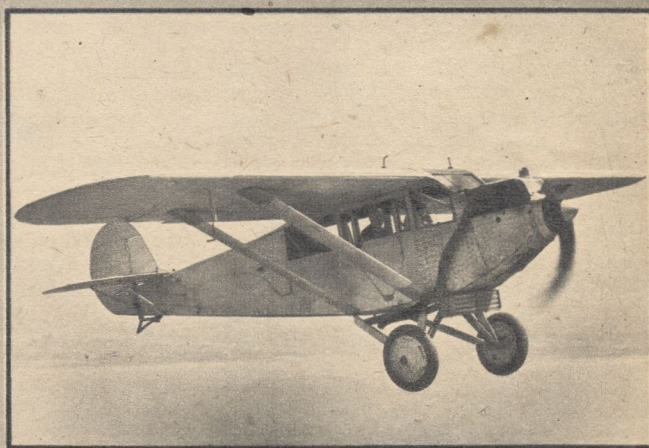


DOWN MEMORY'S RUNWAY

The Bristol Bulldogs were to the Royal Air Force what the Curtiss P-6's were to the U. S. Air Corps back in 1932. Had plenty of speed and maneuverability. Were poor on climb.



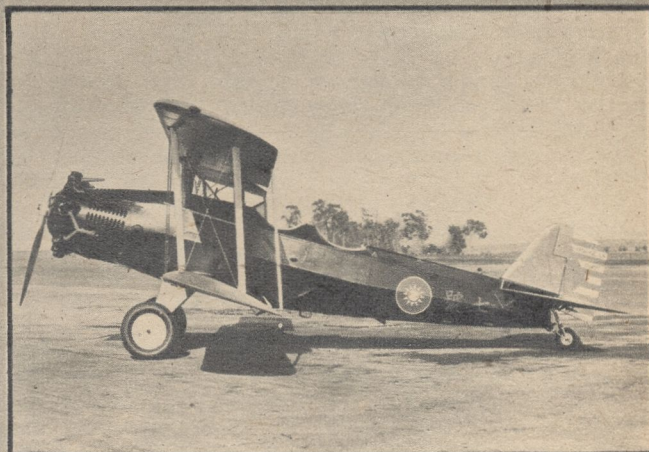
When the Government disposed of World War I flying equipment the Ryan Aircraft Co., purchased this Hisso-powered Standard and converted it into a 5-place cabin job. It was formerly a trainer.



First cabin job to come out of the Ryan plant in San Diego was the Bluebird. Because of the favorable performance given by this machine Lindbergh decided on a craft of similar design for his N.Y.-Paris hop.



The hottest ship of its day was the Conqueror-powered Curtiss Hawk P-6E. It was the last pursuit biplane for Army service and direct predecessor to the Hawk 75 which was submitted for tests in 1935.



When China began to build her air force in 1930 she did so by placing a quantity order with the Douglas Aircraft Company for O-2MC observation ships such as shown above. Wasp 400 h.p. is in the nose.

A personal account by an ex-RAF pilot who put one of Britain's famous bombers through its paces.

I TEST-FLEW THE MANCHESTER

By CHARLES KENNETT

ENGLAND WAS still at peace in the early summer of 1939.

At Newton Heath, Manchester, the Avro Works was working overtime, turning out Avro Ansons, Bristol Blenheims (which it was building under license) and in one section of the huge works, guarded by the factory police, men were swarming over the nearly-completed prototype of the Manchester.

I was busy testing modifications on the Anson at the testing ground at Woodford Aerodrome when I was called to the telephone by Chadwick, the Chief Designer, who asked me to drive to Newton Heath and go over the blueprints of the Manchester with him; also, he wanted me to watch the final assembly of the controls in the cockpit.

For two days I studied the blueprints and then went to have a close look at the machine it was going to be my privilege to test. I had seen her before on various occasions as she was being built, but this was the first time I had seen her standing on her own wheel assembly. As I looked up I realized with a thrill that she was going to be the biggest and fastest ship I had ever tested. The assembly foreman stood beside me and remarked,

"What do you think of her, Sir?"

"She looks pretty good to me. When are you going to have her out?"

"She'll be ready for her final inspection tomorrow—that will take a good week."

"How are we going to get her out to the airport? She'll never go under the bridge!"

"We are going to make a detour to the North on which there will be no obstructions."

It had been previously arranged that on account of her size I was to take her off from the big municipal airport, as Woodford was too small.

Ten days later the huge bomber was towed out, stern first, by a tractor and at a steady three miles an hour, guarded by police, and with myself and other officials following in another car, headed for the airport. We had to make a ten-mile detour to avoid the bridge. We started at one o'clock in the morning and the police had cleared the roads of all traffic. Dawn was breaking before we got to the airport where a large group of engineers and mechanics

were waiting to assemble the wings which had been removed for her road journey.

IT WAS ANOTHER two weeks before the Air Ministry Inspectors gave me the O.K. for my part of the job. At ten o'clock in the morning, I climbed into the cockpit and started the two Rolls-Royce engines in order to give her first taxiing tests. Gradually I warmed up my engines, released the brakes and took her slowly down the field, trying the brakes and rudder controls, to get the feel.

For two days I did nothing but taxi backwards and forwards, swinging her and pivoting; the third day she was propped up on trestles and I tested the hydraulic system of her undercarriage and flaps.

Everything worked smoothly and I asked to have her ready for me at nine o'clock the next morning.

That night I did not get much sleep; I was too excited, for I realized the responsibility that rested on my shoulders. I had discussed every aspect of the ship with the other test pilots and the Chief Designer and knew she was the product of two years of hard work on the drawing board and in the shops.

Next morning I drove out to the airport to watch the inspectors giving her the final check-over. As the time for the test approached, I began to feel tense. Parachute strapped and buckled tight, I was helped up the ladder to the cockpit. The engines had already been warmed up and checked and the log book signed O.K. I wasted no time, but took her down to the

far end and headed her into wind.

For two or three minutes I sat there, memorizing everything I had been told and then, releasing my brakes, I slowly opened my throttles and felt her gather speed under me. I had almost reached sixty miles per hour when she started slewing to the left. Frantically I gave her full right rudder, but we kept on slewing. I not only cut my throttles, but I also switched off the master ignition switch. We almost ground-looped. Thank God we didn't!

Only a couple of minutes elapsed before she was surrounded by engineers and officials who rushed out to me in cars. I climbed out of the cockpit and explained what had occurred. The Chief Engineer immediately went to the port wheel and discovered that the brakes had been

adjusted a wee bit too tight and, as I gathered speed, they had bound. They released the brake control and when she had cooled down she was ignominiously towed back to the hangar by tractor. So ended the first attempt to fly the Manchester!

IT WAS TWO weeks later before the engineers once more gave me the O. K. I was not feeling so happy about the second attempt. In my innermost thoughts I wondered whether she was a hoodoo ship. But the job had to be done, and I went

through the same performance, taxiing her out to the far end.

Gingerly I opened the throttles and released the brakes. It had been estimated she would lift off at a certain speed. My indicator was showing 15 miles per hour more than that estimated and the boundary hedge



Charles Kennett, pioneer aviator.



Following the completion of her tests the huge Manchester bomber was flown down to Martlesham-Heath, where she was handed over to the Air Force Test Pilots for a set of really gruelling Air Ministry acceptance tests.

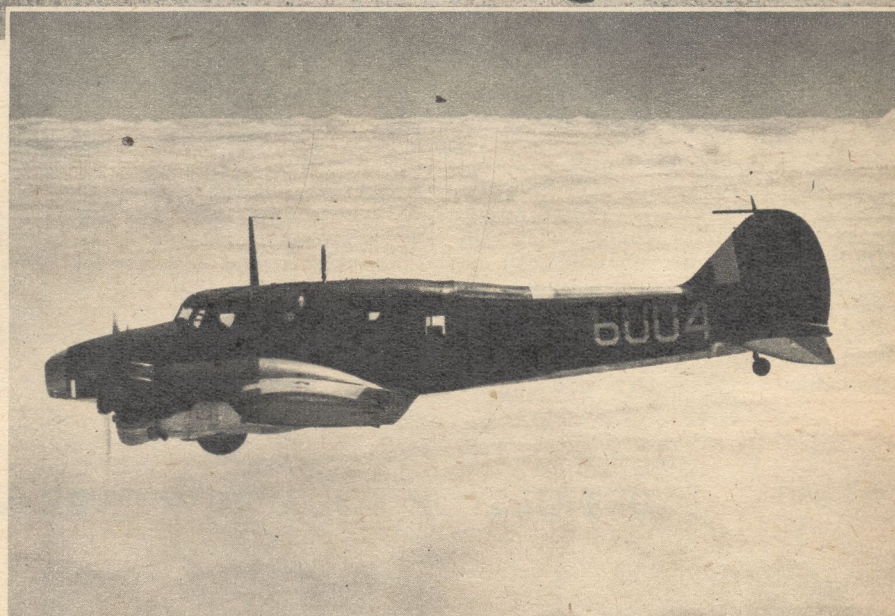
At right, the Avro Anson, another British ship, which gave Test Pilot Kennett some thrilling moments before crashing on a hotel lawn.

was coming mighty near! I was using no flaps on the first flight for the take-off. The hedge was too close for me to attempt to stop her, so I went through the emergency gate on the throttle controls and with the extra burst felt myself air-borne. At 100 feet I operated the hydraulic system of my landing gear and the wheels slowly tucked themselves in to their bays.

The first test flight was to be of only twenty minutes duration. I put her up to 2,000 feet and circled the airport. Testing her controls on medium turns, she responded beautifully; then I took the plane two miles away and prepared to land. I lowered my landing gear, retarding her speed by fifteen miles per hour as I did so. Then I set my boost for an emergency take-off should I overshoot the field. Lowering my flaps sixty-five degrees, at the same time retarding my throttles, I brought her in on a long glide, keeping a constant air speed at the pace advised by the designers.

She was sinking under me like a lift, but I still held full aileron control. I found myself undershooting by a good 500 yards. I gave her a full burst of both engines and then, to my horror, discovered I was overshooting badly. She was going to take some getting used to, and she also needed modifications. I climbed her to 500 feet before I dared tuck my flaps up again. Then I followed the same procedure as before, but only gave her fifty degrees of flap.

This time I came in on a long straight glide; I just cleared the hedge on the east side and found her landing speed was twenty miles over what had been estimated. That was



accounted for by her extremely stubby wings. I was only eighty yards short of the western boundary before I managed to pull her to a dead stop. I had been too busy flying her on that first effort to make notes on the pad strapped to my knee, so the Chief Designer and I went into the Drafting Office and I carefully wrote down exactly what had occurred.

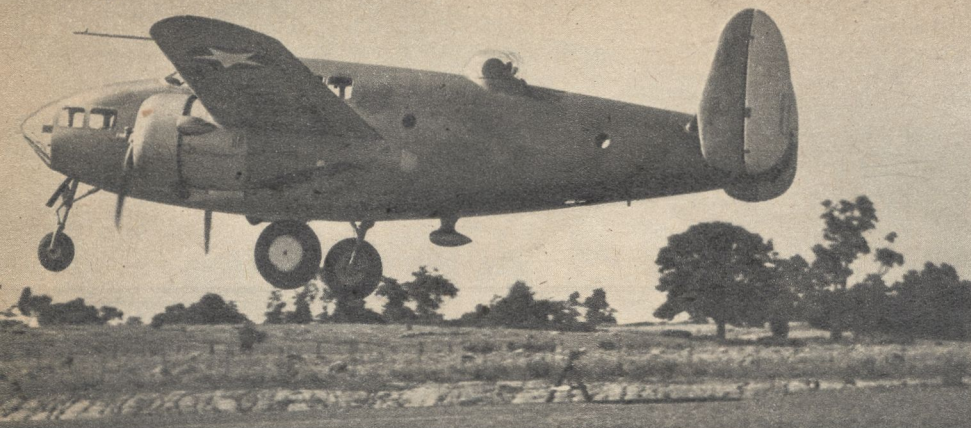
It was decided before any modifications were started that I should give her another going over the next day, so the following morning I took her off again, but this time in order to get a better take-off I used thirty degrees of flap. She responded to it magnificently and I felt much happier. I flew her round for about an hour, trying her in a rate two-turn and flying her first on one engine and then on the other. Bringing her in to land I again encountered the same difficulty as before. Although I altered my flap degree she still either sank too fast under me or came in too fast. I could find no happy medium. Finally, when I brought her in, Chadwick agreed that he would have to make some modifications, and it was another

three months before I was able to give her the O.K. and hand her over to the Air Ministry for the official trials at Martlesham Heath.

WHILE WAITING for the modifications to be completed, I returned to my job at Woodford testing the Ansons. The Air Ministry had called for an alteration on the windshield, for it had been discovered that when flying through rain, on account of the extremely V-shaped windscreen, the rain would pass across it in a sheet, making the visibility practically nil.

The morning I tested the redesigned windshield and canopy, ceiling was unlimited, with only a few wisps of cirrus flecking the sky. I stood talking to the Chief Designer and the engineers while the Cheetah engines were being warmed up. Finally the engineers gave the O.K. and helped me pull my parachute harness tight. I carefully placed the parachute pack in the rack behind my seat and, having made sure that all my instruments were functioning properly, took the twin-engined me-

(Continued on page 69)



MODERN PLANES ALBUM

FAIRCHILD AT-13

EVEN BEFORE the prototype had its first test flights on July 21, 1942, the Army Air Forces ordered the AT-13 crew trainer in quantity from the design on the drawing board. The main characteristic of the plane is its perfectly smooth exterior finish, attained through the use of the Duramold process. It is without rivet heads or exterior fastenings of any sort, with a consequent increase in aerodynamic

efficiency. The after part of the fuselage is of true monocoque construction, all stresses being taken in the skin itself without the use of longerons or lateral stiffeners.

The machine provides places for a bombardier in the transparent plastic nose, pilot and co-pilot in the cabin, navigator-radio operator beneath a special navigation hatch, machine gunner in a power-operated turret, and photographer over vertical and angle camera hatches in the

tail. The ship is equipped with all of the instrumentation to enable an entire training crew to simulate all of the conditions of a long-range bomber attack. As the AT-13 is the first trainer of this type to be equipped with a tricycle undercarriage and is otherwise very similar to tactical types, it enables crews thus trained together to step into actual fighting craft as a well coordinated team.

While the wings are of more conventional interior construction—using two spars and ribs—the skin is also of plywood and thermo-setting resins molded into the necessary compound curves by the Duramold process. The wing itself is of sufficient thickness and consequent rigidity to maintain its true curve under flight stress with much less stiffening than usual and wholly without exterior fastenings, such as rivet heads or lap joints, thus eliminating drag factors which reach high value at the operating speed of the machine.

The only metal or other strategic material used is in the engine mounts and cowlings and in the tubular steel members on which the bomb racks, bombsight, machine guns, and instruments are mounted. The bomb bays are ample for full loads of medium-sized practice bombs.

Other data: Span, 52 feet 6 inches; length, 37 feet 7 $\frac{3}{8}$ inches; height, 13 feet.

DETAILS OF FOUR NEW TYPE WARPLANES

FOCKE-WULF Fw. 190

LATEST KNOWN German single-seat fighter, the Fw. 190 is freely admitted by all responsible observers to be an outstanding machine and a real threat to the RAF and Army Air Forces. It is being constructed in large numbers and has seen action on the Russian front, over Britain, and in Egypt.

The most radical feature about the plane is its air-cooled radial BMW 801 engine, which develops some 1,450 h.p. at take-off, for this is the first time that the Germans have ever used anything except an in-line engine in their fighters. This does not necessarily mean that the Nazis have made an about-face and have turned to the radial engine as more practical, but rather indicates that they realize that there is more than one type of engine. And this changeover should at least give the in-line advocates food for thought.

The Fw. 190 was truly a well-kept secret, for the Germans started tooling-up on the ship as far back as the spring of 1941. But the plane was not sent to front-line squadrons until Nazi pilots had thoroughly mastered its flight characteristics and the machine had been constructed in suffi-

cient numbers to form squadrons and wings, instead of only groups or flights.

Germany has never had a really good defensive fighter, and this new Focke-Wulf should therefore find a big place in the production scheme. The He. 113, until recently, was the only interceptor used by the Luftwaffe, but the machine was not overly effective for those duties because it was actually an offensive craft. With the 190 it is a different story, and a British pilot who test-flew one brought down intact over England

said: "It is a sound job of its type. It is what I would call a good defensive fighter; it was not built for offensive use in the sort of sweeps we are now conducting over North France."

Other data: Span, 34 feet 5 inches; loaded weight, 7,000 pounds; maximum speed, 375 m.p.h. at 19,000 feet; range, 525 miles at 326 m.p.h.; service ceiling 40,000 feet. It is made by Focke-Wulf *Flugzeugbau G.m.b.H.* and other factories, with numerous subcontractors supplying various parts and installations.

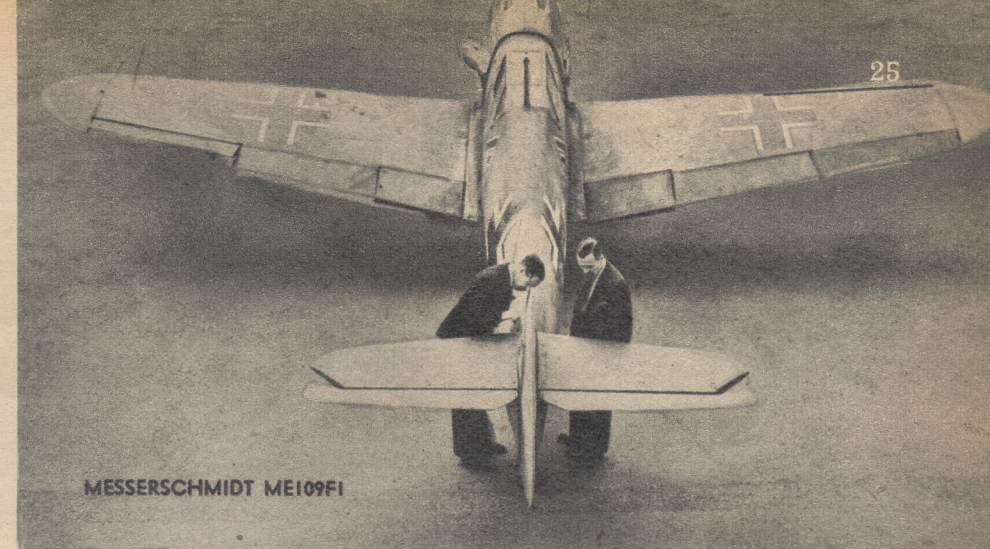


MESSERSCHMIDT ME. 109F1

THE latest known modifications of the original Me. 109 single-seat fighter are the models F1 and F2. They incorporate several new features which are intended to increase performance at altitudes, maneuverability, and fire-power. The most noticeable external modifications are the rounded wing tips, the symmetrical nose with a large spinner, and the cantilever tail plane. Royal Air Force engineers who have inspected the machine say that it is well built and uses the finest of materials.

The fuselage is an oval-section light monocoque structure and is made in halves with longitudinal joints top and bottom. Each half incorporates a number of longitudinal stringers and a series of vertical panels. Every other panel has both its edges flanged to form "Z"-frames, and these frames are holed to let the stringers pass through. The flanged panels have their edges joggled so that the alternate plain panels may be flush-riveted to give a completely smooth outer surface. The longitudinalinals have a single row of rivets to the outer skin only. Each half of the fuselage is butt-jointed top and bottom to a double-width longitudinal.

The all-metal cantilever wing is placed in the low position and uses



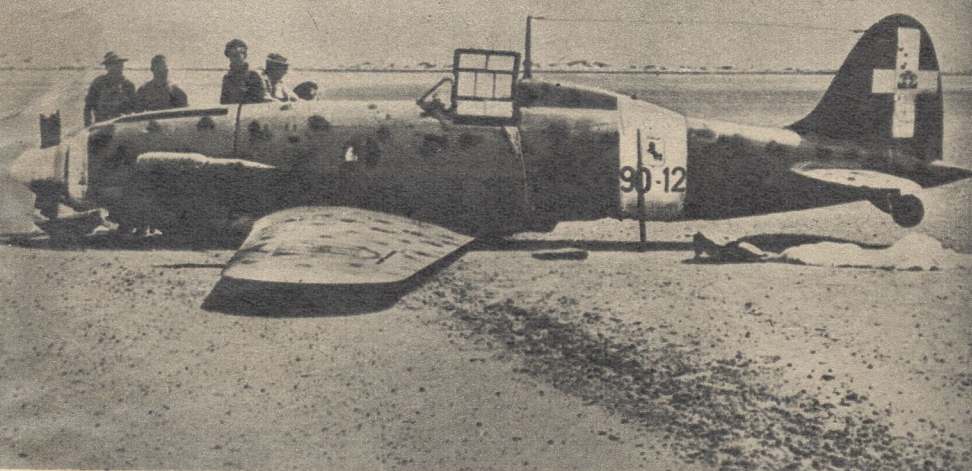
a single spar; covering is flush-riveted stressed skin. The entire trailing edge is hinged, with the outer portions acting as ailerons and the inner as flaps. The undercarriage is completely retractable, folding up and out to the wing undersection by hydraulic pressure; an auxiliary hand-raising gear is also installed.

The original Me. 109 was fitted with two 7.7mm. machine guns mounted on the engine crankcase and synchronized to fire through the airscrew, two wing-mounted 20mm. Oerlikon cannon, and provisions for one 20mm. cannon in the prop boss. The F1 has one 20mm. Mauser can-

non mounted to fire through the prop boss and two synchronized 7.92mm. Rheinmetall-Borsig machine guns. The Mauser is said to have a rate of fire of 900 rounds per minute, but only 200 rounds are accommodated; each machine gun has 500 rounds. The F-2 has a 15mm. cannon instead of the 20mm. type.

Power is supplied by a liquid-cooled in-line Daimler-Benz DB601N engine of 1,150 hp., giving a top speed of 371 m.p.h. at 22,000 feet; cruising speed is 310 m.p.h. at 16,500 feet. The service ceiling is 37,000 feet and the cruising range is 440 miles (1 hour 15 minutes).

MACCHI C.202 SAETTE II



MACCHI C.202 SAETTE II

DESIGNED originally to take the Fiat twin-row air-cooled radial A74R.C. engine, the Macchi C.202, which is a further development of the 315-m.p.h. C.200, is fitted with the liquid-cooled in-line Daimler-Benz DB601N power plant of 1,150 h.p. The German DB601N is used because the Italians have been having difficulty in obtaining metal and their Axis partners have engines coming off the production lines faster than they can make use of them.

The C.202 has proved itself a for-

midable adversary. However, the engine change made the ship nose heavy and shifted the weight to such an extent that the craft is said to be a "heller" to fly. Moreover, this places the cockpit so far back that visibility to the front is cut down appreciably.

The oval-section fuselage is of Super-Avional construction and is monocoque. The pilot's headrest and turtledeck is faired smoothly with the fuselage. The radiator for the engine cooling solution is under the wing trailing edge. This is the only

structure that breaks the streamlining of the ship. Fuselage covering is flush-riveted stressed skin.

The wing has Super-Avional spars and ribs and is covered with flush-riveted stressed skin. The plan view is almost identical to that of the C.200, the wing panels tapering to rounded tips. The ailerons and flaps take up the entire trailing edge, from the tips to the generous fillets. The ailerons are fabric covered and the flaps are faced with smooth metal sheet. The main landing wheels are fully retractable, folding up and into the wing undersection. Flaps come up to house-in the undercarriage and complete the streamlining. The tail wheel appears to be fixed.

Armament details have not been released, but it is assumed that there are at least four wing guns in addition to the two synchronized weapons. If the usual Italian style is followed, these guns are 7.7mm. or 12.7mm. Breda Safats.

Performance details are not available, but judging from the figures boasted by the C.200, which has only an 850 h.p. engine, the top speed should be near 360 m.p.h. and the ceiling should be in the region of 35,000 feet.

The C.202 is being used to replace the Cr. 32, Cr. 42, and G. 50. It has been given only the barest amount of attention by most aeronautical journals, but it should do much to at least bring mention of Italy when airpower nations are discussed.

THE "SKY TRUCKS" ARE COMING

For long-haul transport will they supplant such methods as steamships, trucks and railway express? Some think they will.

By LAWRENCE MERZ PERSONS

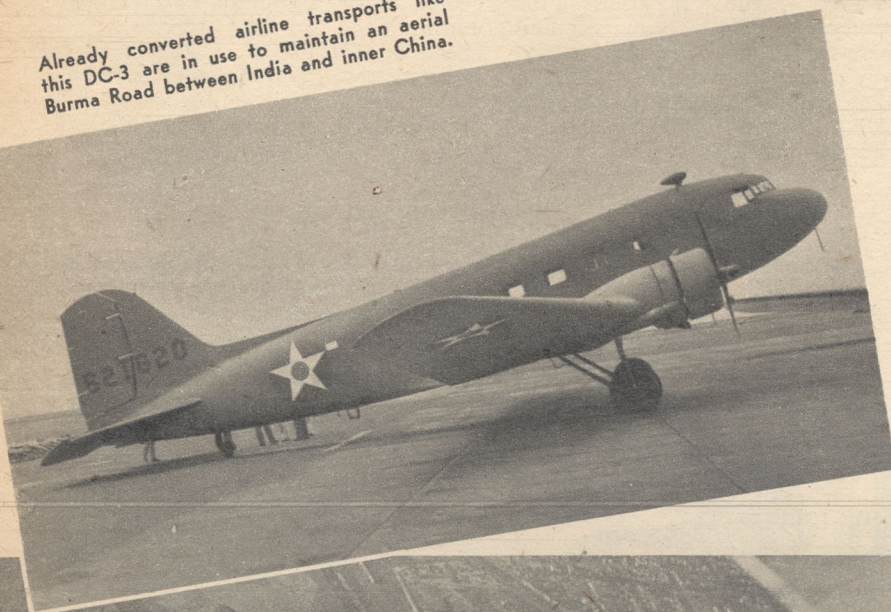
IS THE TRAFFIC volume of American railroads due for a terrific drop? Is our merchant marine threatened with a loss of a substantial part of its potential cargo? Are the cross-country truck lines periled by a switch of present customers to another form of transportation? Will a good part of the present railway-express business be diverted to other channels?

In the opinion of a lot of well in-

formed executives all this, and more, is highly possible, with the close of the war. They believe railroads, merchant marine, truck lines and railway express are facing the fight of their lives for business, immediately the war ends.

Already Pan American-Grace Airways has in operation a regularly scheduled commercial air service between Balboa, Canal Zone and Lima, Peru, the first service of its kind to be started by an international air carrier operating under certification

Already converted airline transports like this DC-3 are in use to maintain an aerial Burma Road between India and inner China.



by the Civil Aeronautics Board. It was initiated with two Douglas transports stripped of their passenger equipment, and pay loads on the initial flights consisted of vital metal concentrates from Peru to the United States.

E. C. Gordon England, chairman of the Engineering Industrial Association of London, England, in an address before the British Institute of Export recently urged the immediate construction of a British aerial merchant marine to consist of 5,000 giant air freighters capable of carrying 1,000,000 men across the Atlantic in 15 hours or moving 150,000 tons of supplies in a week.

In fact, if the present rate of progress continues in the design of gigantic aircraft—capable of carrying not only vast numbers of troops, but also their heavy mechanical equipment such as small tanks, jeeps, trucks, etc.—the near future will see cargo planes in service which can transport goods and merchandise in huge volume over long distances at tremendous speed.

Such at least is the prediction of such sound and experienced aviation executives as William M. Sheehan of Pan American-Grace Airlines, Grover Loening, aviation engineer and aircraft designer; Charles P. Graddick, former 2nd Assistant Postmaster General, now United Airlines' Director of Express, Mail and Freight; and Dean C. Smith, director of transport program for Curtiss-Wright Corporation's Airplane Division.

THE COMMANDING position of such harbors as New York, San Francisco, and other trans-oceanic shipping points—because of their location, docking and other facilities—may be due for a "rude jolt" with the advent of the new air-bourne commerce.

To use the words of Mr. Loening: "As far as trans-oceanic air shipping goes, the harbor of New York City has little, if any, commanding meaning in this new, coming air-age. As a matter of fact, the weather conditions around the Great South Bay would be far better for a sea-plane harbor.

"No place is too isolated for air transports," he continued, "since all places of the world are at the bottom of the same air ocean and anybody can get to you from anywhere, via this boundless road of air, across which there can be no mountain ranges or any impassable jungles that can isolate anything any more."

Germany has already made a remarkable showing in the movement

"Forty thousand B-19 planes, each capable of carrying 20 tons at 250 miles per hour, can replace the whole enormous ton-mile carrying capacity of all the ships in the world available to us," points out Mr. Loening.



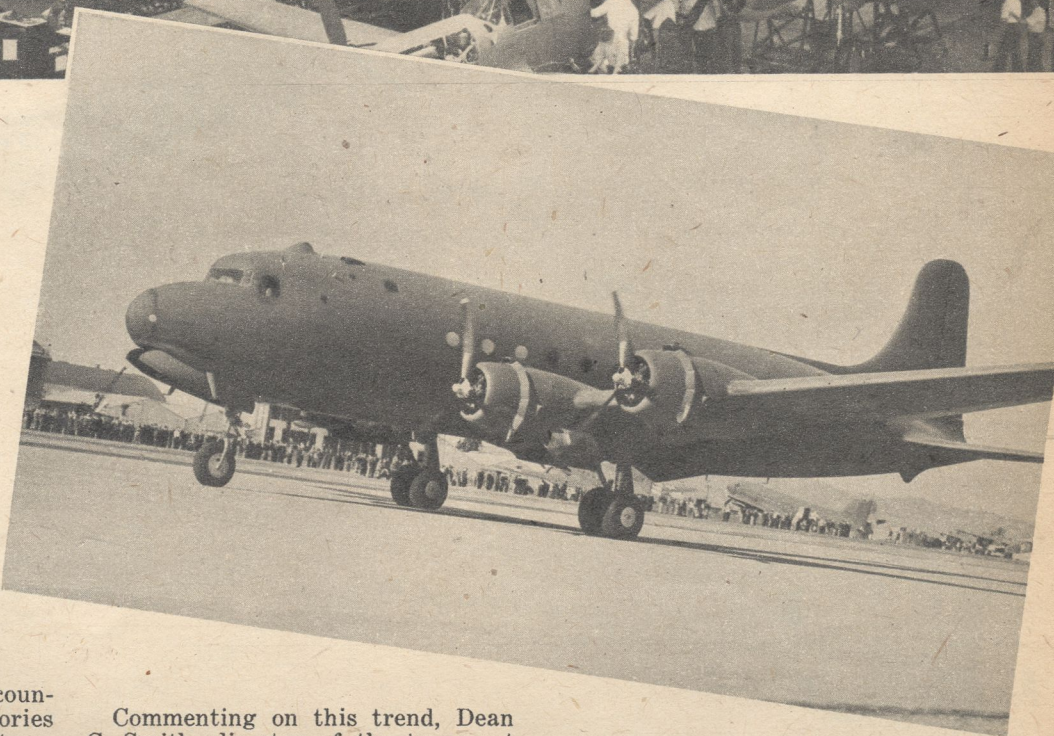
Giant, 25-ton Curtiss Commando cargo carriers are here shown in course of construction. Note their size, when compared with the Curtiss Kittyhawk and Warhawk fighters in foreground.

Merely a glance at the vast bulk of this Douglas C-54 transport will give you an idea of the huge capacity of this plane, when the war's end will permit its becoming a "Sky Truck." The plane was formerly the DC-4.

of air freight. William M. Sheehan, technical advisor to Panagra (Pan American-Grace Airways), present figures disclosing that 30,000 trips were made to the Eastern Front between June 22 and October 31, last year—a total of 12,500,000 miles—carrying 42,000 tons of military goods or a fifth of this country's national total in all categories for 1941. He advocates the construction of a minimum of 16,000 air-freight planes or "Sky Trucks," and an annual replacement of 16,000.

During the latter part of May, dispatches from Washington revealed that a score of American transport planes (not specially built cargo-ships, you will note, but merely converted passenger transports such as were in use by American commercial airlines) making two round trips daily between India and China, were carrying war supplies to the Chinese exceeding in volume the amount previously handled via the Burma Road with the use of vast truck fleets. The same planes made two trips daily, because the distance to be covered required only four or five hours by air. Further, the trips were made with more precision and certainty, since the use of the Burma Road even then was difficult and frequently hazardous, owing to Japanese bombings.

Further examples of the efficiency of air transport may be noted in Alaska, and various isolated regions in Canada and South America, where heavy mining machinery, valuable ores and food supplies in volume, within the past few years have been regularly moved by planes.



Commenting on this trend, Dean C. Smith, director of the transport program of Curtiss-Wright Corporation's Airplane Division, points out that the giant twin-engined 25-ton cargo transport, manufactured at Buffalo by Curtiss and variously known as the C-46 and the "Commando," is designed to carry troops, light field artillery and even reconnaissance cars at speeds approaching those of a twin-engined bomber. Details of its performance are military secrets, but it is known that the first one crossed the Atlantic in 9 hours and 40 minutes.

"This new Curtiss ship is efficient enough to carry freight at rates as low or lower than railway-express rates," said Mr. Smith. "On longer hauls the two operations would be competitive. On shorter runs suitable for air operation, air-freight would be considerably cheaper. Freight could be carried in the C-46 at rates of 10c to 13.5c per ton-mile; such rates would be high enough to allow profitable operation.

"The tremendous acceleration of technical developments now applied entirely to military aircraft will pay dividends on all planes flown in the future, but particularly on cargo-transport types. The aerodynamic

and production experience gained today will make possible tomorrow much more efficient aircraft at lower cost."

MR. SMITH predicts that the American air-transport industry of the future will operate huge planes capable of great speed for long non-stop hauls; planes of average size and speed for stops at the larger cities, and smaller cargo planes with characteristics making possible efficient hauls with many stops, covering the network of smaller cities.

Largely the same ideas are held by Charles P. Graddick, United Airlines' Director of Express, Mail and Freight, who recently told the Institute of Aeronautical Sciences that "Air-cargo schedules will probably follow the pattern of other forms of transportation. There will be large cargo ships operating on transcontinental cargo schedules and between large centers of population. Feeder routes undoubtedly will play an important part in air cargo. The public would receive better service if a single carrier could operate both the

(Continued on page 67)



POT

was rumored about in all the Yank dromes in the sector that there was a sign put up outside the gate leading into G.H.Q. at Chaumont which said:

WANTED—ALLIED ACE TO LIQUIDATE LEUTNANTS VON KRULLER AND PRETZL. LIBERAL REWARD.

A Flight was heading for home but had lost Phineas. Garrity's incorrigible was on his own and at the moment he was not a good risk. Rain clouds skidded across the sky and bits of aqua pura began to spatter the limping Spad's wings.

"Awright, make it worse," Phineas gulped. "Fifty of them drops will cave that top wing in."

The sun kept shining and when sun and rain get together in the sky

THE TWO FLIGHTS of Major Rufus Garrity's Ninth Pursuit Squadron were doing all right against the Kraut circus until a couple of flying freaks from the side show jumped on their backs. Phineas Pinkham, in Howell's flight, spotted Lieutenant von Kruller first, but not soon enough. Before the Boonetown miracle man could wriggle clear, his Spad was almost a write-off. Coming

out of a cloud, von Kruller's apprentice, Rudolph von Pretzl, took another chunk out of the Spad's empenage and Phineas held the crate together by Faith alone.

Together, von Kruller and von Pretzl could hand out the pastry. In three months they had shown the Kaiser's auditors that they had marked off ninety-three Allied planes. Von Kruller's tally was seventy. It

The gold Napoleons at the rainbow's end lead the Boonetown Marvel to discover some rare old ancestors.

by

JOE ARCHIBALD

Illustrated by the Author

"Hey, you fatheads—stop fighting over me—I'm not a Kraut—It is me, Pinkham!"

French farmhouse. It flopped over on its back just after Phineas had been thrown clear.

Something rolled along the ground with the Ninth Pursuit Squadron's practical joker and bumped against the side of a garden wall about the same time as Phineas' left elbow. Lieutenant Pinkham sat up and shook his head to see if it would stay on. He flexed both arms and found he had no compound fractures. When he got his eyes uncrossed he picked up an old brown pot and something that had fallen out of it.

"Why, it looks like argent," Phineas grinned. "It feels like argent. It is argent!" He examined the three

big coins that were in the palm of his hand. They were tarnished with age, but after scraping one of the coins with a sharp stone he caught the glint of gold.

"THE WORLD is mine. Me and Monty Crisco!" Phineas yipped and got up to collect a dozen more of the coins that were strewn about. "Boy, they look like double eagles!" He put all the treasure in his helmet and walked toward a road to wait there for some kind of traction to come along. He smelled smoke and hot oil then heard an olio of voices on the other side of a thin stretch of woods. Phineas cut through the trees and came out to the wreck of a Boche Pfalz. Six Yanks were trying to slap words out of a badly shaken

and thoroughly scared Heinie pilot. "Let him go," Phineas said. "I shot him down and he is my prisoner. What did you steal off him?"

"Nothin'," a lantern-jawed Sergeant tossed out. "We leave that to orfisers. Awright, take the square-head. We got some wires t' string anyways. Come on, guys."

Phineas took over the prisoner and found some papers in his pocket.

"Just my luck," Phineas growled. "It is not either von Kruller or von Pretzl. It is Lieutenant Gottlieb Strudle. Huh, was all Boche aces named after stuff in a bakery? Why, what is this? Well, well? The Boonetown ace read the gist of the scented letter and quickly put it in his pocket.

"Vas ist?" the Heinie asked. "Where am I, hein?"

"You are through mitt der var, Fritzzy. Here ist some marks and a couple of callin' cards I'm giving you back."

"Danke schoen," the Kraut said. "Er—you sure idt ist eferyt'ing? Somewhere's I—ach Gott! It is gut I am der prisoner undt when der var is ofer, promise me, mein freund—don't send me back to Chermanny. I haff der friend in Zinzinnati, ja."

"I will do my best with Pershin," Phineas grinned. "Well, rouse mit, as it is quite a hike to the drome."

Phineas and prisoner managed to get a lift on a Frog farm wagon to within a mile of the drome. They walked into the French farmhouse that was squadron headquarters and the C.O. eyed them askance. "You smell terrible," he said.

"We was not ridin' with a shipment of fleur-de-lisses," Phineas countered. "Frogs are nutty. I ast him what he was goin' to do with the fertilizer and he said he was puttin' it on his strawberries. I use sugar and cream on mine, haw-w-w-w-w-w-w! Well, my report is the same as Howell's must have been if he got back. Those two squareheads should be called prussic acid and aconite as what poison!"

"Yeah," the Major snapped. "They got as many guns on a Spad as on Fokker D 7's. They graduate pilots at Issoudon too fast. What you got in that helmet?"

"Some currants I picked on the way," Phineas said politely. "Me and Bump figure to put up some jelly when we have time. Who shot holes through the window there? It is a good thing I was out fightin' the Krauts or I'd been blamed—"

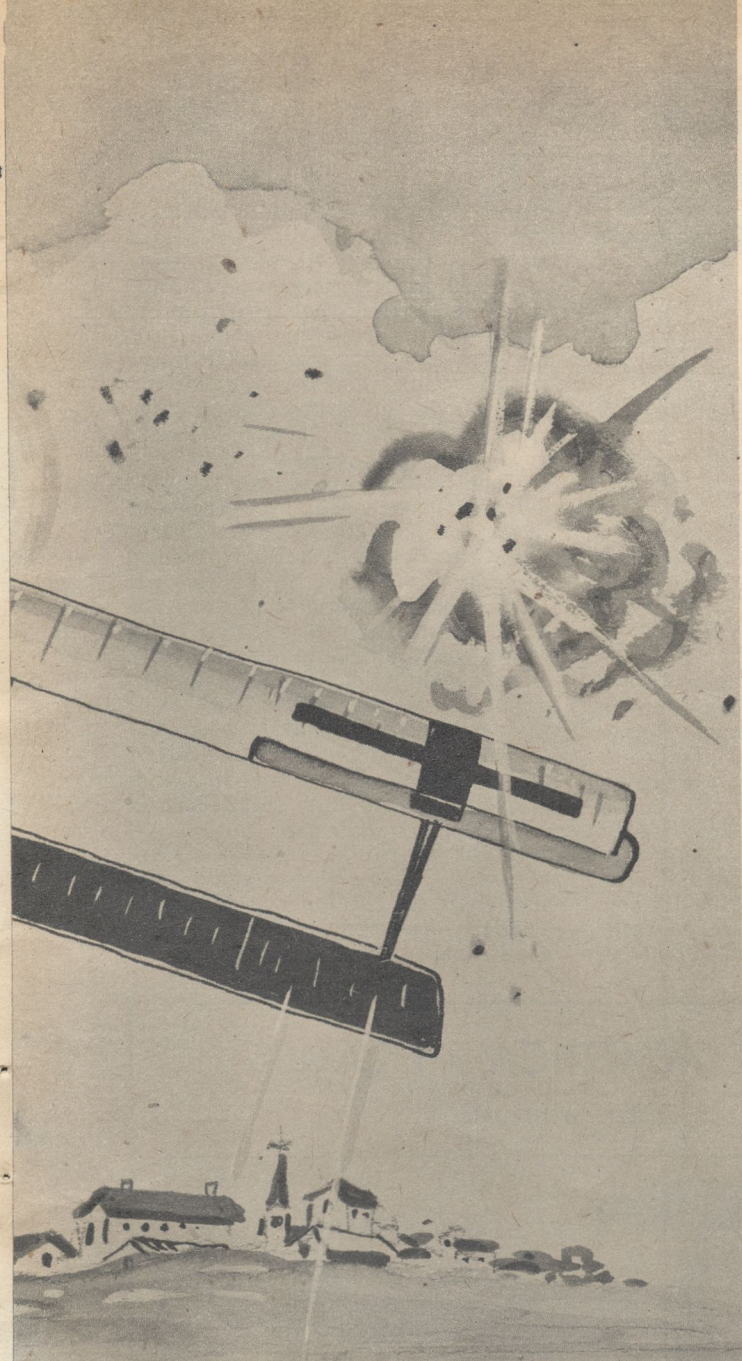
"You are to blame!" Major Garity yelled. "Those two Heinies

LUCK

at one and the same time, a rainbow generally develops. It arched across the sky and one end of it seemed to mark the spot where Phineas was going to fold up.

"Well, maybe I will find a pot of gold," Phineas sniffed as the rain let up and another burst from a Spandau knocked off the hangnail that held a strut and a wing together. "Perhaps I can retire and buy my way out of the air corps."

The Spad had stood all it was going to stand. Phineas tried to keep its nose up without success. It started for terra firma and Phineas had to go with it. Eight miles north of Bar-Le-Duc, the crate skidded across a little meadow, hopped a serpentine rail fence and dug its nose in the ground a few yards from an old





Something rolled along the ground with the Ninth Pursuit Squadron's practical joker and bumped against the garden wall about the same time as Phineas' elbow.

hedge-hopped this drome just before you got in and sprayed h— out of us. If they didn't have a note to drop for you, they would have stayed away!"

The C.O. handed Phineas the insult from the Boche. They wanted to know where he got his reputation as a German ace buster. As far as they were concerned, he was a false alarm, a howling success at a party with a lampshade on his head and a card trick up his sleeve.

In short, von Kruller and von Pretzl considered the Boonetown wonder a loud-mouthed, over-rated fathead, and what did he intend to do about it?

"They can't talk like that to me," Phineas sniffed. "I'll get them squareheads! They are maybe too tough in the sky, but they have to land somewhere, sooner or later."

"No more tricks up your sleeve, huh?" Major Garrity needed. "A big star playing the tank towns, hah!"

Phineas dropped his cigarette when he lighted it. He stooped down and picked it up.

"Trying to claim that Jerry you brought in, too," Garrity said. "An anti-aircraft battery got him, Pinkham. Howell saw them do it. All right, get out of here—and remember nobody leaves this drome tonight. Some brass hats—ow-w-w-w-w-w-w!" The C.O. brought up his right foot and held it in his hands. There was a parched area between the sole and the soft leather covering his pet corn.

A little bit of curled-up carbon dropped to the floor.

"No tricks, huh?" Phineas yelled from the doorway. "That is what you get for bein' off guard like the Krauts. When we Pinkhams strike—that was a hotfoot, Major! Haw-w-w-w-w-w-w! And I will show you I am a match for the two vons before this guerre ends."

PHINEAS WENT to his hut and cached most of his treasure in the bottom of his trunk. He had just closed the lid when Bump Gillis came in. Bump had a bandage on his

head and he could still taste tracers.

"Do you think there is a numisma-tist in Barley Duck, Bump?" Phineas asked. "I got a coin I'd like to have examined an'—what was the price of Rolls Royces when the war started? They will be a little higher after, but I think I'll git one with—"

"I figured the vons had knocked you nutty this A.M. Well, I'll come back when you are more yourself." Bump said. "I just stopped by to get

my tobacco pouch. Why don't you ask for observation, Phineas?"

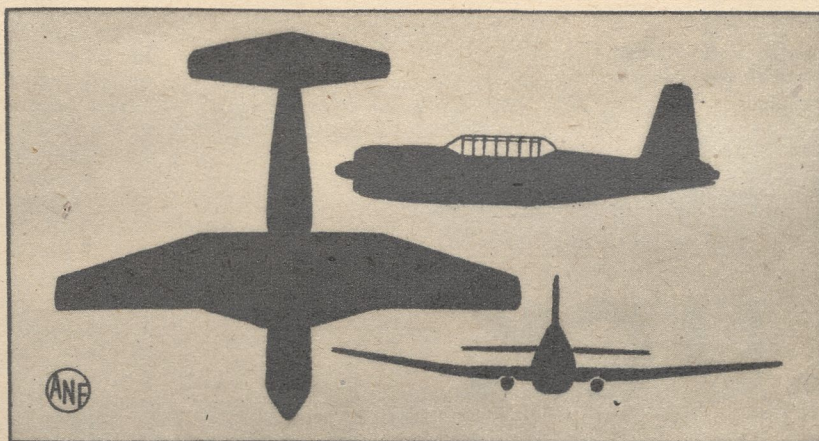
The Boonetown trickster picked up a book and lay down on his cot to read. It had cost him a dollar in Paree and was all about the genealogy of citizens with names beginning with a P. On page nine Phineas read a paragraph that lifted him off the bed. It inferred that he had Frog blood in him. "It is a lie," Phineas yelled. "Huh, the Pinkhams had ancestors who discovered the Mississippi River with LaSalle and who were voyageurs in Canada discovering Hudson's bay! I have been cheated out of a buck!" He threw the book in a corner and stared up at the ceiling. "No tricks left, huh? Wait until Bump finds out what I did with what was in that asafoetida bag my Aunt Yola sent me for a sore throat. It is funny where all the pilots are. They all kept walking past here the last ten minutes. Maybe a crap game—I wonder who buried that pot of gold?"

Behind the ammo shack, eleven of Major Garrity's pilots were in a huddle. Captain Howell, A flight's leader, was acting as chairman.

"I got it straight, guys," the skipper said. "That pigeon come back and it said the Intelligence officer had all the information Chaumont wanted about Kraut railway lines, ammo and

KNOW AMERICA'S PLANES

NUMBER TWENTY-TWO



THIS FORMIDABLE VUL-TEE dive-bomber, ordered in huge quantities by the British, is better known as the "Vengeance." Powered by a radial air-cooled Wright Cyclone engine of undisclosed horsepower, it can carry a large load of bombs. The deep belly of the plane permits the discharge of bombs through hatches that swing down to drop the explosive load and there is also undoubtedly an ejector-type rack for use when dive-bombing. It will be noted in this Vultee drawing that the ship has a high fin, and its wings have a somewhat unusual angular appearance, tapering in trailing edge from the center sec-

tion to squared tips, and tapered on leading edge center section. The front view depicts a low mid-wing with dihedral.

Landing gear is retractable, folding back and flush into the undersection. In retracted position the oleo struts are streamlined by a special housing and the wheels turn 90 degrees to lie flat. Ailerons and control surfaces are fabric covered. Flaps are metal covered. The "Vengeance" carries a crew of two and according to the British is able to out-perform any dive-bomber yet in action. Specifications and performance are military secrets for the duration of the present war.

supply and fuel dumps. The plane is to pick him up at a certain spot, but if he is not there, to go into the town of Bluey and get the map inside the chimney of a bakery. There is a little iron door in the chimney where the soot comes through when they clean it—"

Bump Gillis sucked on his pipe and cocked his good eye at Captain Howell.

"It is a frame-up on my pal," Bump said.

Howell sniffed at the air, made a wry face and glared at Bump. "Yeah, well, who would have the most chance of getting to Bluey and back with the map? It isn't we are afraid to go, but what good is a dead man to the Allies? No matter how much we rib Pinkham, we all admit he's just lucky enough to get away with it an' save maybe three other aviators from death. So you go along with us and do like I say. What is that awful smell? Somewhere close by is a dead cow—"

"I feel sick," Bump said and burped a little. He dumped the dottle of his pipe on to a rock and wondered why the tobacco looked so strange. He got down close and sniffed at it. He gagged and clamped his hands to his face.

"That big lummock!" Bump howled. "Now I know what he did with that bag of herbs—oh, the stinker! What was the plan again? Count me in—I'll do all the dirty work—ulp—I got to go to see a medico first, though. My stummick—"

THE BRASS HATS arrived at the Ninth Pursuit at six-thirty and at six-thirty-eight the plot began to thicken. Major Rufus Garrity had wanted to assign Phineas to the pick-up job in the first place. The brass hats had assured him that he was not to have such a grim responsibility; that it would be their task to pick the pilot this time. "It will not be on your conscience, you see, Garrity?" a Colonel had told him.

Phineas, unaware that the Gods of War had picked him for a football, strolled into the farmhouse for his usual mess. Four officers from the Wing looked over the pilots gathered there with sharp, appraising eyes. Major Rufus Garrity winked at Howell.

"Gentlemen," the leader of a flight announced. "We have with us, as one or two of you may know, an entertainer *par excellence* as the French say. Lieutenant Phineas Pinkham!"

"Bravo! Who's awright? Pinkham!"

"Jolly," a brigadier said. "Have heard of him."

"Phineas," Howell said, "will perform a trick of magic that has astounded many a visitor here. He will make an omelet in a hat. Let me have your hat, sir."

"Certainly," the brigadier said. "But you are sure—?"

"Nothing to worry about," Howell said, and Bump Gillis withdrew to get the props ready. A table with a



Phineas' legs quivered like agitated banjo strings as he gazed at the classic profile of Jules LePinkhomme who "discovered some of America weeth LaSalle."

cloth spread over it. It was placed in front of the door leading into the kitchen where Glad Tidings Goomer, mess attendant, held forth. The trick was simple when you were in on it. There was an officer's hat that was the property of the Ninth Pursuit Squadron, a dead ringer for all officer's visored caps. The ringer was substituted for the hat offered by the brigadier. Glad Tidings Goomer always crawled out to get it, to substitute the real hat for the ringer, when Phineas happened to drop it by accident.

"Well, I will do my best," Phineas said and got the eggs from Goomer. He broke them up and the gooey contents plopped into the hat on the table. The brigadier paled and his jowls began to inflate. "By gad, of this is not a joke, I'll—"

"Watch me close," Phineas said. "I will pass this out to my assistant and in just two seconds he will pass it back again and lo an' behold there will be a swell omelet in it. Without injury to the officer's hat. Awright, professor Goomer—here!"

The hat came out and Phineas looked into it. The familiar rubber omelet he had used so many times was not there. Instead was the gooey mess—he yelled at Goomer.

"Why-er-somebody must of slipped up," the mass attendant said. "That

is the hat with—we used the wrong hat. They got mixed up an'—"

The brigadier stared at Phineas. "Let me look, Lieutenant. If—!" He hopped across the room and ripped the hat out of Phineas' hands, looked at the mess inside of it.

"Garrity, this is an outrage. I demand an apology! I—hah! Never mind, Major!" He stabbed a finger at Lieutenant Pinkham. "That's our man. He goes over tomorrow night and picks up Captain Toomey. Congratulations, Lieutenant, as we wouldn't pick just anybody for—"

"I was framed!" Phineas yelled. "These cowards did it to git out of goin'. Oh, some day I will get hunk."

"The idea!" Bump Gillis sniffed. "To accuse us officers and gentlemen like—by the way, what did you ever do with the stink weeds in that bag your auntie sent you, Phineas?"

"Haw-w-w-w-w! Well, it looks like I asked for it, bums," Phineas said. "I am resigned to my fate and will take it like a man. Oh, you double-crossin' clucks! Have a cigar, Colonel!"

"Don't you do it, sir," Garrity said. "Take one of mine. He'd blow you up!"

"Thanks, Major," the Colonel said. He touched a match to the cigar and drew smoke into his bellows. Phineas

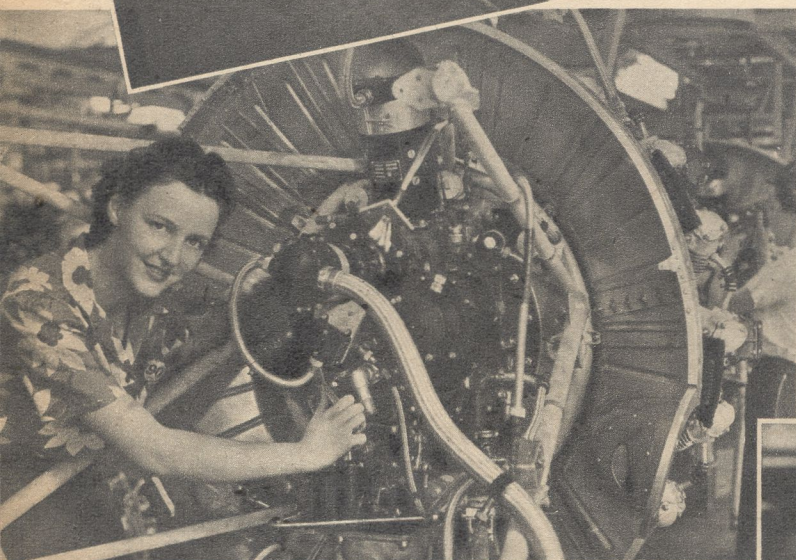
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THE FEMININE TOUCH

Employment of women aircraft workers started on a small and in many cases experimental basis. Now, they have proved they can handle almost any job as well as men—and some jobs better! Their employment is being expanded as manpower wanes.

by HAROLD W. KULICK

These women have proved themselves highly efficient in dextrous installations of attachment fittings, brackets and the like in fuselage structures moving along the assembly lines.



Assembling parts to aircraft engines is just one of about twenty-four different functions in aircraft construction that are performed by women. An attractive Miss adjusts an electric starter.

More adept young ladies make efficient riveting teams as shown by girls at work on Vultee basic trainers. Worker on right uses a light rivet gun on a bulkhead while one on the left bucks them.

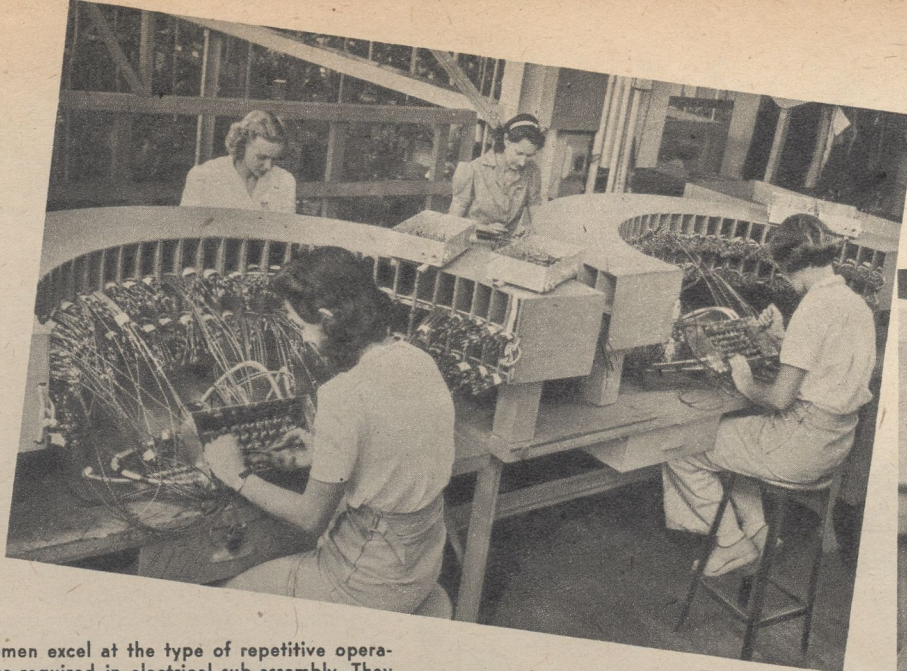
WOMEN ARE PROVING their mettle in this business of building military airplanes. The machine shop, once hallowed territory of man, has been invaded by the so-called weaker sex, where, young or matronly, they operate lathes, drills, etc. They've found jobs in aircraft plants ranging from putting together small sub assemblies, operating light rivet guns, punch presses, to installing fittings and equipment in fuselages on the powered assembly lines. Women have been found to excel in successfully withstanding the routine of repetitive operations—something that men found dull. Because of their known manual dexterity, the girls are put to work attaching multi-colored wires in complicated control panels, and which, as one matronly woman finds, likens her work to needlepoint, following a painted pattern just as she would in embroidery.

With plane plants humming twenty-four hours a day turning out ships for ourselves and our Allies, more and more workers are needed to meet increased production. The call to the colors has taken many of the available young men and so the plane companies are turning to women to ease the threatened shortage of skilled labor. According to a recent survey, it was stated that although more and more women are being employed they are not quite yet as productive as male employees. They are kind of slow and still restricted to light work. Because of this, one popular method has been devised whereby "lazy arms" are put to work which relieves the operator of the machine's weight and makes the job simpler to handle.

Women aircraft workers were first employed by the California plant of Vultee Aircraft, over a year ago. In the months since past other aircraft plants have hired women by the hundreds and they report that they are working shoulder to shoulder with men and have proved their abil-



Highly skilled women workers in aircraft trades were rare to begin with. Most plants can now boast of many. Here's one who has been carrying the torch in various branches of industry since W. W. One.



Women excel at the type of repetitive operations required in electrical sub-assembly. They solder electrical attachments and assemble plug fittings as well as install conduits in basic trainer junction boxes. Note wearing apparel.

ity to handle efficiently a variety of jobs in practically every department.

"Women," according to the president of Vultee, "have a superior tactile sense. That makes them valuable in any delicate operation. They have in addition much greater patience than men . . . they follow instructions literally and skillfully. They have less tendency to go off on their own in the course of carefully planned routine." Their efficiency on the job indicates a greater share of direct production could be handled by women, should the national emergency result in the sharp curtailment of the number of men employees.

Sidney Hillman, associate director of the Office of Production Management, issued a plea in the early days of accelerated aircraft production urging that women living in the vicinity of each aircraft plant be trained and hired in order to reduce the housing shortages created by the influx of men who brought their entire families with them to defense centers.

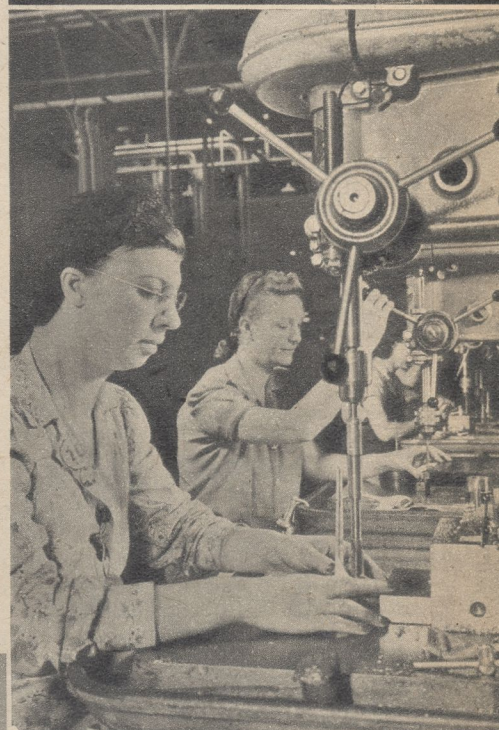
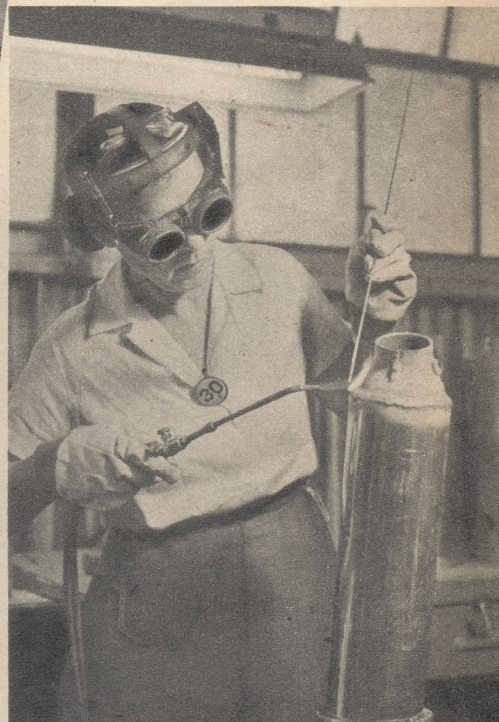
Vultee began with women workers as an experiment hiring 50 of them thus freeing an equal number of men employees for more im-

portant tasks. The girls began with simple jobs such as painting, spraying, sewing fabric on ailerons, rudders and elevators. Today women are used on some 30 different types of direct production jobs some of which reach into the upper brackets, such as aluminum welding, precision and Rockwell inspection and hand turret lathe operation. Men who formerly did these jobs were elevated to more responsible positions.

ON SEPTEMBER 14, the doors of the big Curtiss-Wright Technical school were opened to the fair sex who wish to embark on the eleven months course of aeronautical engineering or the three months course of aeronautical drafting.

"Demands of the aircraft industry for increased numbers of engineers and the growing shortage of manpower have caused us to open the school for women," said Major C. C. Moseley, head of the Curtiss-Wright School. "There's no reason why feminine aero engineers, both during the war-time emergency and in the post-war upswing of commercial aviation, cannot serve as satisfactorily as men. Thus with the radical change of policy, one of the country's greatest air training schools passes women students

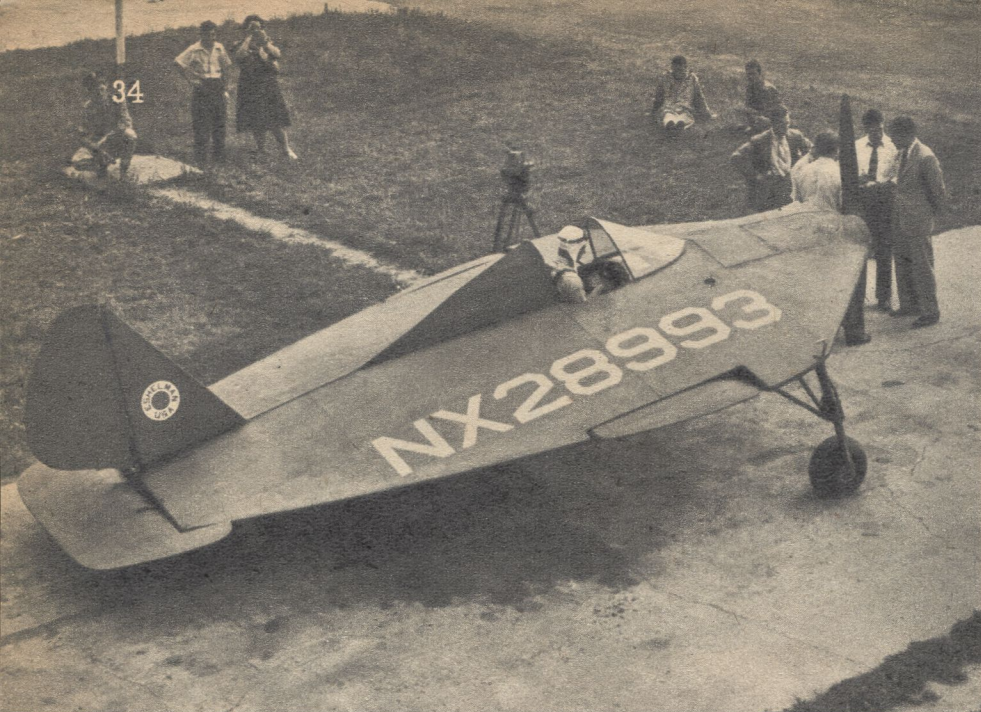
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Some machine shop women at Vultee have qualified for skilled positions such as that of hand turret lathe operators. Ladies above are operating drill presses in drilling, reaming, counter-boring, and chamfering of various small parts.



Masked to protect them from paint fumes, girls do work on canopy structures as well as on other parts of trainer ships.



This pancake-shaped plane, designed by Cheston L. Eshelman who in 1939 landed in the Atlantic on what he termed a "flight to Mars," is claimed to be capable of doing 190 miles per hour. Note the neat engine cowlings.

LIGHT PLANE FLYING

CPTP ACCEPTING VOLUNTEERS

IN COOPERATION with the 12,000 posts of the American Legion, the Civil Aeronautics Administration has begun a nationwide program of recruiting thousands of pilots to be trained in the CPTP this Fall. They will be trained for the Army Air Forces as flight instructors, transport, glider, and liaison pilots—in other words, non-combat airmen.

It was pointed out by CAA officials, according to the *Washington Newsletter*, that the present program of the Navy to furnish enlisted reservists (classes V-1 and V-5) to be given CPT training will proceed as planned originally. After receiving training at CAA schools, the reservists will be assigned to Naval air stations for further flight training in the stage for which they are qualified. Some may be carried through the CAA advanced courses to become instructors or ferry pilots, but the bulk will train for combat work.

Trainees for the expanded war pilot program may be from 18 to 36 years of age. Physical requirements have been relaxed considerably from the standards set for combat pilots. Both novices and men with some flying experience are wanted; the latter will enter CPT training at an appropriately advanced stage. Pilots who already have 150 or more hours can qualify as instructors after a two-month course.

Although the age bracket has been considerably expanded to include those who have not yet reached 37, men in the age group of 18 to 26, inclusive, can be accepted as flying "specialists" only if they have been unable to pass the requirements of the Army for Flying Cadets. The 18

to 20 group comprises the lot from which the Army draws its Flying Cadets for combat pilots.

Accepted applicants in the Army phase of the CPT program will be enlisted in the reserve corps in a new category whereby specific numbers will be called at the completion of certain courses for prescribed duty in the Army. Others will remain on inactive status as civilian instructors and airline co-pilots. There will be seven courses offered applicants: elementary, secondary, liaison, cross-country, Link instrument, flight officer, and instructor.

All courses will be conducted on a full-time basis and all will cover a period of eight weeks, except the liaison pilot course, which will take ten weeks. Subsistence will be provided, together with health and accident insurance during training. Wherever practicable, trainees will be housed in dormitories at colleges giving the ground instruction. Flight training will be given concurrently at a nearby field. Those who may go into Army flying schools will have the opportunity of qualifying for a commission, or for the rank of staff sergeant, with flight pay.

Applications for the Army phase of training may be secured at any CAA office, or at any college or flight school participating in the program. Those who prefer to enter the Navy phase of CAA training are advised to apply at the nearest Navy recruiting station.

WIND SHIFT ON LANDING

ONE OF THE most disconcerting and often dangerous phenomenon that pilots have to deal with is the wind-shift line that crosses the landing area just as a landing is being effected.

A wind shift is said to occur when the wind suddenly changes direction. As an example, the wind may be south and suddenly change to west, or it may be west and suddenly change to north. Usually the wind change occurs along a line which can be followed on a weather map as a front of "wind-shift line," as it is often called.

The cross-wind and added tail-wind effects are the most dangerous and may produce disastrous results if the pilot is caught unaware. The effect of changing of the wind to a tail-wind during landing is to experience a sudden loss of lift, which may force the plane down outside of the airport or decrease the altitude to such an extent that there is a danger of striking obstructions near the edge of the field. If the plane is over the airport, the drop may damage the landing gear.

The cross-wind effect is always dangerous, since the drift to the side will produce undesirable stresses in the landing gear on contact with the ground.

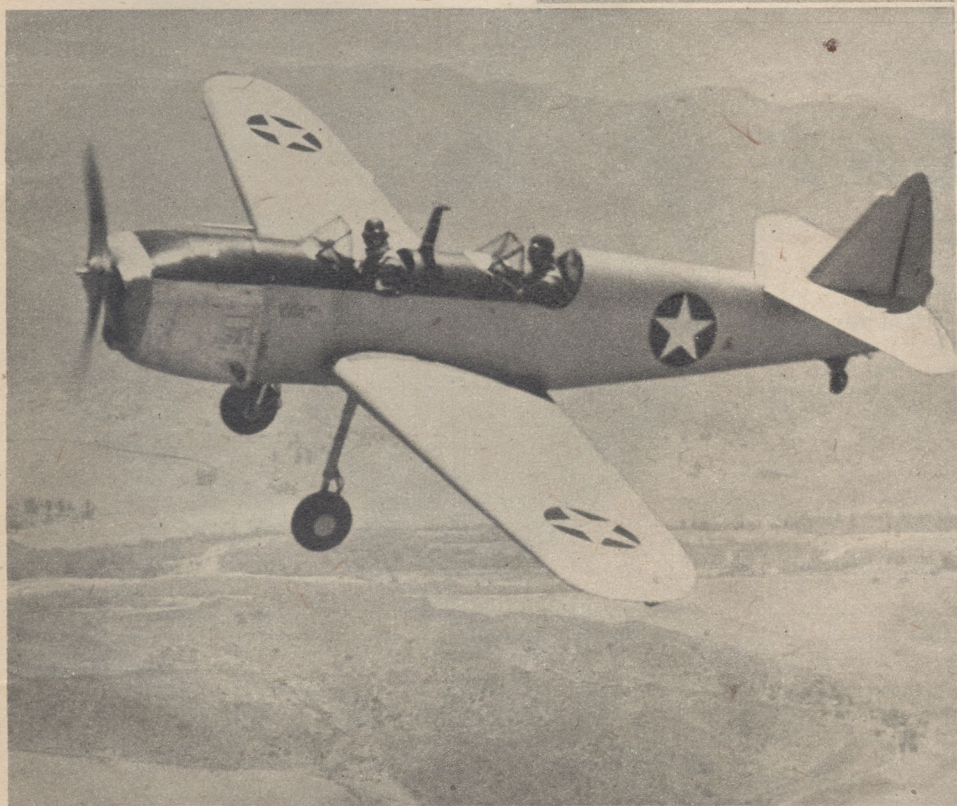
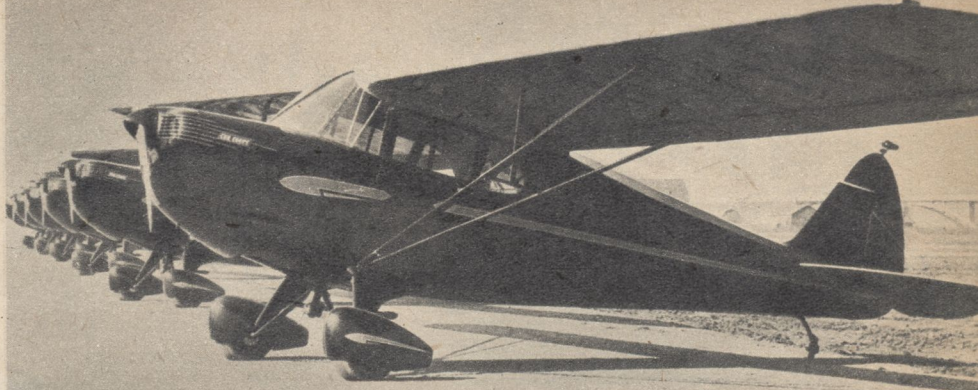
There are three main types of wind-shift lines that may be observed. The wind-shift at a warm front is the least important, since it usually shifts slowly. The warm-shifts that occur with the line-squall and the strong cold front are the most important and dangerous types.

If thunderstorms are isolated, they may not pass a weather station and will arrive at an airport unannounced. These storms, however, usually give a warning of fifteen minutes to one-half hour, and planes may be grounded and put in the hangars or stacked down. As the storm approaches, lightning will be visible. When thunder is heard clearly, the storm is not far distant, usually ten to fifteen minutes in time. When the storm is two to five minutes away, a low black roll cloud will be observed, and the wind-shift will occur as this cloud passes over the airport. The wind behind this cloud is very gusty and will be accompanied by moderate or even heavy rain. Gust peaks have been estimated to be over 75 m.p.h. in a well-developed line-squall connected with a severe thunderstorm. The general movement of these localized thunderstorm squall lines is in the direction, and with the speed, of the winds in the air mass in which they are forming.

The direction of a cold front wind-shift is always from your right, if you are landing into the wind before it has shifted. Cold front wind-shift lines are usually accompanied by a lowering of the clouds, precipitation, or in dry types by dust. Along sea coasts the sea breeze may give a local wind-shift during the late morning

The grounding of all civilian planes around the East and West Coast areas does not mean that light plane manufacturers have called it quits. These new Piper Cubs are to be used in service by the Civilian Air Patrol Corps.

Below: You are looking at the latest Ryan student trainer which is constructed entirely of non-strategic materials. It is powered with a six-cylinder opposed type Lycoming air-cooled engine which develops 180 horsepower. Now in mass production for the U.S. Army Air Forces it carries the designation PT-25.



or early afternoon. The wind will blow on-shore during the day and off-shore at night.

All operators should be thoroughly familiar with the effect of wind-shift lines crossing their airports, since local effects may cause some variation from the general rules. All pilots should be instructed as to the dangers of landing at an airport through a wind-shift. Schedules should be arranged so that cross-country flights are delayed or local flights grounded when the wind-shift of strong or questionable intensity is expected to cross the airport at or near scheduled time of landing.

DON'T GET SHOT DOWN!

IN THESE DAYS of war, failure to read the airport bulletin board daily may prove to be fatal. New danger areas are being established from time to time and these areas are likely to be protected by anti-aircraft batteries and machine guns. The orders to the gun crews are to shoot down any civil aircraft flying over those areas, and these orders are likely to be carried out with dis-

patch. There has already been a case in which a pilot did not read the airport bulletin board notice telling of a danger area. He carried sightseeing passengers over this area, was shot at, and one of his passengers seriously wounded.

NEWSY NOTES

CUBS IN RAF.—Piper Cub Coupes have gone to war to play a role as important "in their own way" as that of the Boeing Flying Fortresses or ordinary pursuit planes, in the opinion of the commanding officer at an advanced training school in England. He described the craft as being good basic airplanes and said that any pilot who learned his job in them should have little difficulty even if compelled to make a forced landing in a confined and rough space. For this reason, their safety speed of 110 m.p.h. maximum, low fuel consumption, and side-by-side seating, the Cub Coupes are being used to an increasing extent by the British for advanced training of pilots.

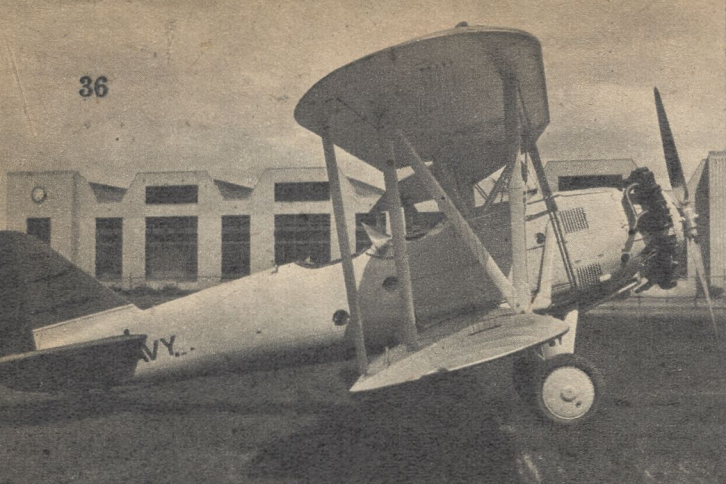
Ryan Trainers Praised.—Officials

of the Ryan Aeronautical Company heard their first direct report of the use of Ryan training planes in the Netherlands East Indies, prior to Japanese occupation, from John H. Russell, American pilot who served as instructor there for a year before Pearl Harbor. Rating them as "the sweetest acrobatic airplanes" he had ever seen, Mr. Russell declared the trainers were used as military ships for every possible job except gunnery and bombing training. Students went directly from these trainers to multi-engined equipment, and when the war actually began many were "graduated" directly from elementary training into combat flying.

CAP Still Grows.—Total enlistment applications received by the CAP have passed the 58,000 mark and still are coming in at the rate of hundreds each week. Although departures of men into the armed services and other wartime assignments has depleted the units in some areas, the newcomers are keeping most Squadrons at operating strength.

Be Careful of Fuel.—Stating that it has received "far too many reports" of aircraft engine failures caused by use of unspecified fuels, the Civil Aeronautics Board labeled such carelessness not only dangerous but unpatriotic. The Board asserted that the use of low-grade fuel other than the quality specified by the engine manufacturer amounts to practically willful damage to aviation equipment that might be useful in the war effort. It was emphasized that under these circumstances "it should be sufficient to point out that an operator using such fuels must accept full responsibility."

Mass Glider Delivery.—An official announcement of the Piper Aircraft Corp. reveals that delivery of "a large number" of planes to Army glider camps in the midwest has been complete. It was disclosed that pilots from Lock Haven alone covered a distance in excess of 75,000 miles, making this the largest single delivery ever undertaken by the company's Factory Delivery system.



Here's the BM-2, first dive-bomber to successfully operate with a 1,000 pound bomb in a terminal velocity dive in 1929. Ebel put the ship through her paces before it was placed in actual production. Right: Test pilot Ebel and crew members aboard the giant Mars before being turned over to the Navy. Shortly after, it flew across the Atlantic.

LAST FLIGHT

by JOEL WYNFIELD

RECENTLY, William Kenneth Ebel took the gigantic Martin flying boat *Mars* up for her first flight. Quite naturally it was a real thrill to the man who, for years has been giving Martin planes their initial flights. Flying this battleship of the air for the first time was a soul-satisfying experience to a man whose first love was flying. It represented the top rung in the ladder for a man who has practically lived with the ship since its inception on the drawing boards. He knew what it would do before he ever took off. But that, according to Ebel, is the foundation of test flying today—a knowledge of what a ship will do under various conditions before it leaves the ground or water. That is why engineering is so important. And that is why Ebel is more valuable as an engineer to the Martin Aircraft Company than as a test pilot. Because of this, the *Mars* represented Ken Ebel's swan song insofar as further test-flying is concerned.

For years Ken Ebel had taken Martin ships on their first flights. He was first to fly the famed China Clipper. He test-flew the world's first practical dive-bomber with which the Navy developed the technique Hitler copied with dreadful effect a decade later. He joined the famed Caterpillar Club when the first ship of the lot flat-spun and crashed into the Potomac River at Dahlgren. So it is not unnatural that Ken Ebel, test pilot, should be far better known than William Kenneth Ebel, outstanding aeronautical engineer. A sweet-toothed public that likes fancy icing is prone to overlook the solid cake beneath.

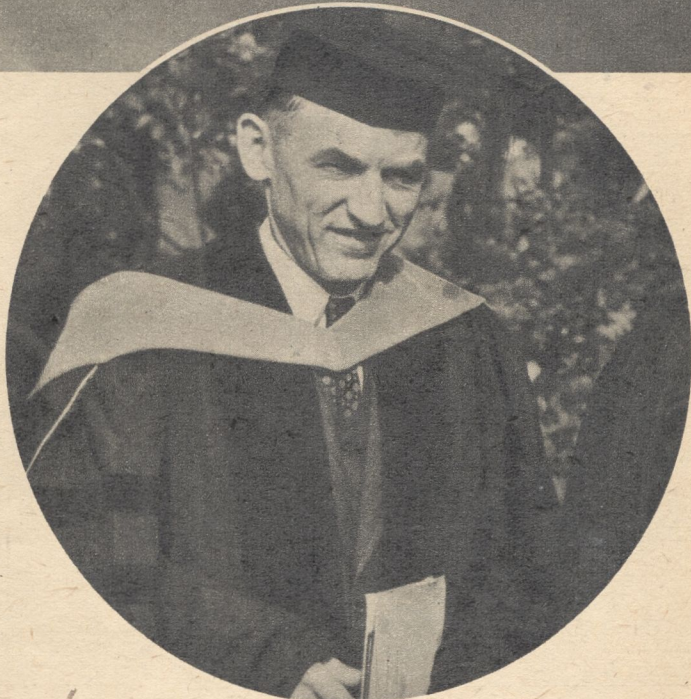
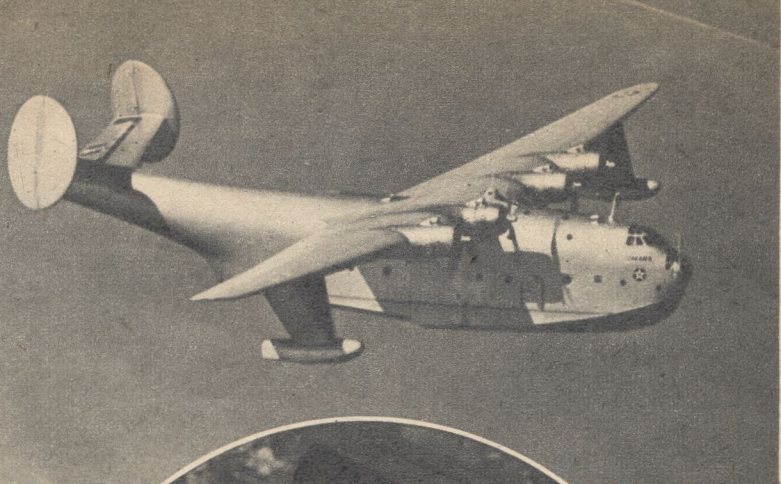
Today, the pilot of the mighty *Mars* quietly guides the efforts of some 1,600 engineers-designers, developers, researchers, mathematicians, and technical specialists, in creating some of the most powerful airplanes that lift themselves in the

air. His more important function as Vice-President in Charge of Engineering however, demands every minute of his time, every ounce of his energy.

Less meteoric has been Ken Ebel's progress to one of the upper rungs of the aeronautical ladder. It has been a hard steady pull that began back in the spring of 1922, when as a junior in the Case School of Applied Science in Cleveland, he shelved his books and hid himself eagerly to the fast growing Glenn L. Martin Aircraft Company, a rifle shot away. He applied for and got a job as draftsman and thus began an association that reached its twentieth anniversary a few months ago.

It was design, not chance, that steered Ken Ebel to aviation. In boyhood he vowed that someday he would become a part of it. He built kites, was fascinated with the study of air action against the frail wood and paper contraption. Then when the press began to pay some attention to such daring airmen as the Wright Bros., Martin, and Curtiss, he turned to model planes, and, later, gliders. *Scientific American* used to carry stories of these airmen and Ken ate them up. It also carried scale drawings of the latest planes and he would build them in model form. His father never sympathized with young Ken because he would use his tools and fly the model from the top of farm windmill tower—rank disobedience in both cases, for which his trousers were warmed more than once.

But the event that clinched avi-



In cap and gown, William Kenneth Ebel receives the Honorary Degree of Engineering from his old Alma Mater.

ation definitely in the mind of this lad was that of the Stephenson County (Ill.) fair in 1910 when he saw a frail Bleriot monoplane sail beautifully over the farmlands where he had been born on January 2, 1899. He did not confide his ambitions then to his parents because they were already casting fishy eyes at the rickety little crates.

"There were two airplanes at the county fair," Ebel recalls, "and one of them—a Curtiss pusher, piloted by an American—wobbled at the take-off and crashed into the crowd. The pilot was unhurt, but there was a lot of broken arms and legs among the spectators. You'd think a kid would remember the name of the pilot, but I didn't. For me there was only one name—Rene Simon, the Frenchman who flew the Bleriot successfully."

Ebel had grounded himself well even before he took his summer job with the Martin people. With a mathematical mind and a flair for design, he had steered for mechanical engineering (there was no such thing as aeronautical engineering then). When his family moved to Tiffin, Ohio, in 1917 Ken entered Heidelberg College and took his A.B. in 1921. So he was able to enter the Case school as a junior.

(Continued on page 66)



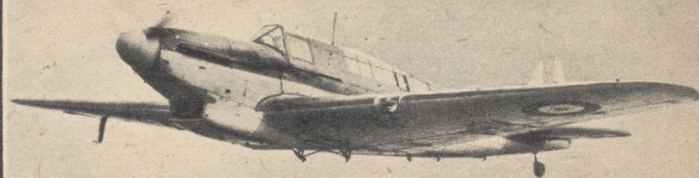
BRITISH AIRPLANES IN SERVICE

PART III

FAIREY FULMAR FLEET-FIGHTER

(One 1,030-h.p. Rolls-Royce Merlin II)

First flew 1936. Crew, two. All-metal construction with stressed-skin covering. Armament, eight machine guns in wings. Single fin and rudder. In service with the Fleet Air Arm, flying from aircraft carriers. No other date available, but top speed is under 300.



1



2

FAIREY GORDON GENERAL PURPOSE

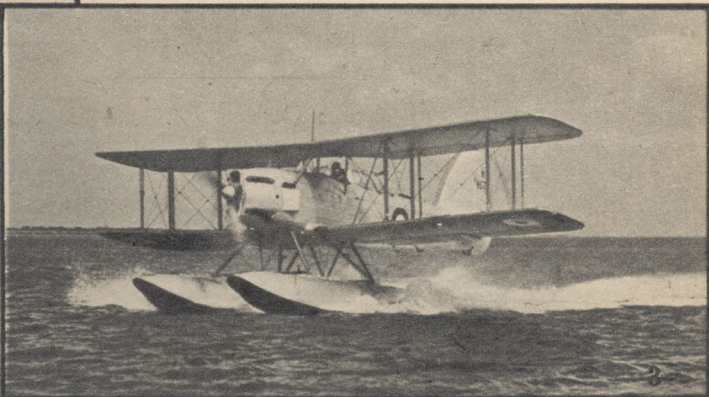
(One 525-h.p. Armstrong-Siddeley Panther)

First flew 1932. Crew, two. In service for target towing. Production completed. Speed, 149 m.p.h. at 500 ft.; span, 40 ft.; length, 33 ft. 5 ins.; wing area, 450 sq. ft.; empty weight, 3,805 lbs.; loaded weight, 5,420 lbs.; range, 600 miles at 120 m.p.h.; rate of climb, 1,000 ft./min.; service ceiling 22,000 ft.

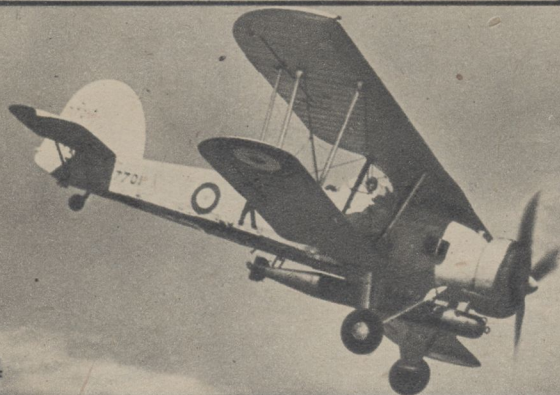
FAIREY SEAFOX RECONNAISSANCE

(One 395-h.p. Napier Rapier VI)

First flew 1936. Crew, two. In service with Fleet Air Arm. Armament, one machine gun. Speed, 124 m.p.h. at 5,800 ft.; span, 40 ft.; length, 33 ft. 5 ins.; wing area, 434 sq. ft.; empty weight, 3,805 lbs.; loaded weight, 5,420 lbs.; range, 440 miles at 110 m.p.h.; rate of climb, 420 ft./min.; service ceiling, 11,000 ft.



3



4

FAIREY SWORDFISH TORPEDO-SPOTTER

(One 775-h.p. Bristol Pegasus III M3)

First flew 1936. Crew, two. Alternate load of bombs or one 18-in. torpedo. Speed, 154 m.p.h. at 7,000 ft.; span, 45 ft. 6 ins.; length, 36 ft. 4 ins.; wing area, 542 sq. ft.; empty weight, 4,195 lbs.; loaded weight, 7,720 lbs.; range, 750 miles at 131 m.p.h.; rate of climb 1,220 ft./min.; service ceiling, 19,250 ft.

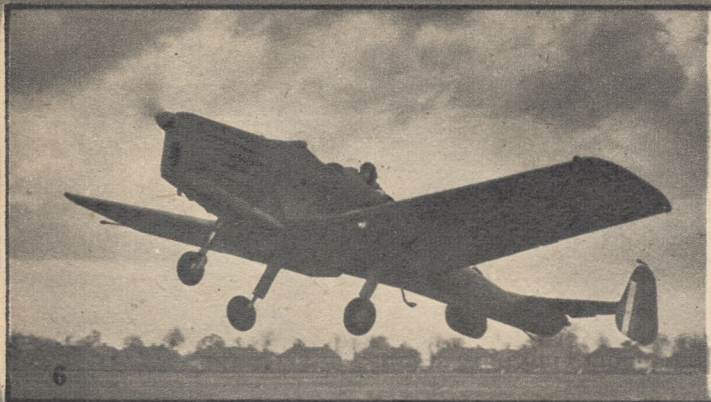
GENERAL AIRCRAFT CYGNET TRAINER

(One 150-h.p. Cirrus Major)

First flew 1937 with normal tail wheel. Two seats, side-by-side. Tricycle undercarriage. Speed, 135 m.p.h. at 1,000 ft.; span, 34 ft. 6 ins.; length, 23 ft. 3 ins.; wing area, 179 sq. ft.; empty weight, 1,475 lbs.; loaded weight, 2,200 lbs.; range, 445 miles at 115 m.p.h.; rate of climb, 800 ft./min.; service ceiling, 14,000 ft.



5



GENERAL AIRCRAFT OWLET TRAINER

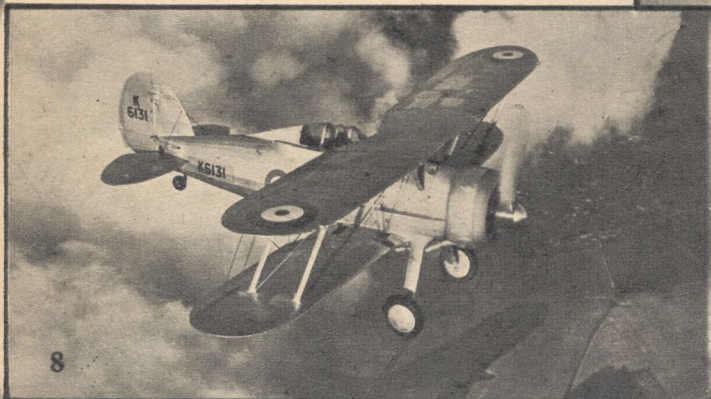
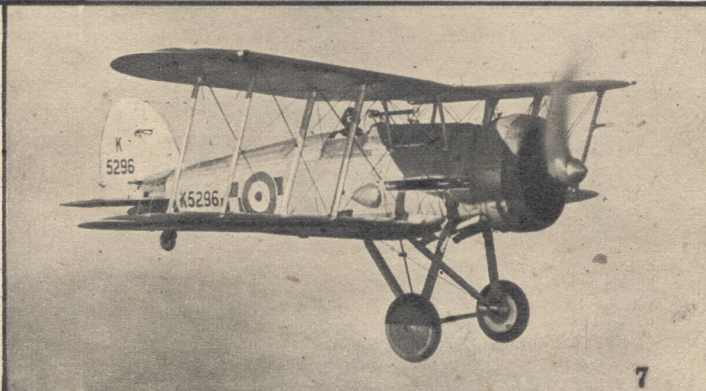
(One 150-h.p. Cirrus Major)

First flew 1940. Crew, two. Tricycle undercarriage. For initial training in night flying. Speed, 125 m.p.h. at 1,000 ft.; span, 32 ft. 5 ins.; length, 24 ft. 7 ins.; wing area, 173 sq. ft.; empty weight, 1,563 lbs.; loaded weight, 2,300 lbs.; range, 450 miles at 110 m.p.h.; rate of climb, 770 ft./min.; service ceiling, 15,000 ft.

GLOSTER GAUNTLET FIGHTER-TRAINER

(One 635-h.p. Bristol Mercury VIS)

First flew 1933. Crew, one. Armament, two Vickers machine guns in fuselage. Speed, 230 m.p.h. at 15,500 ft.; span, 32 ft. 10 ins.; length, 26 ft. 2 ins.; wing area, 315 sq. ft.; empty weight, 2,775 lbs.; loaded weight, 4,050 lbs.; range, 460 miles at 195 m.p.h.; rate of climb, 2,300 ft./min.; service ceiling, 33,500 ft.



GLOSTER GLADIATOR FIGHTER-TRAINER

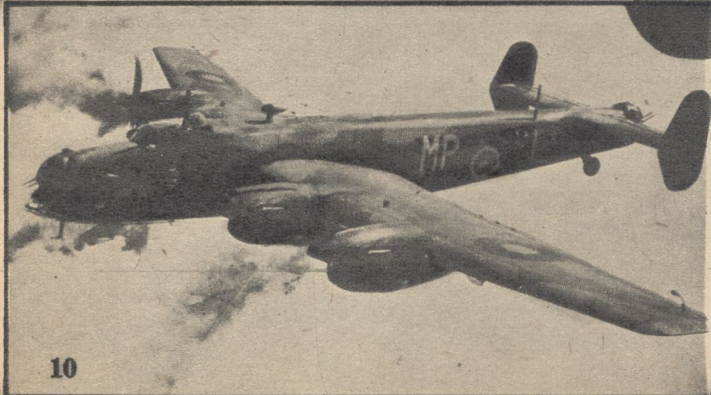
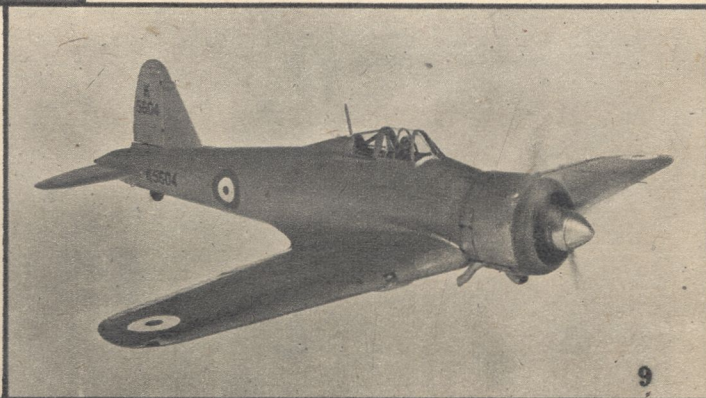
(One 830-h.p. Bristol Mercury IX)

First flew 1935. Crew, one. Armament, six machine guns. Cockpit fully enclosed. Speed, 250 m.p.h. at 15,500 ft.; span, 32 ft. 3 ins.; length, 27 ft. 5 ins.; wing area, 323 sq. ft.; empty weight, 3,285 lbs.; loaded weight, 4,750 lbs.; range, 420 miles at 210 m.p.h.; rate of climb, 2,300 ft./min.; service ceiling, 33,000 ft.

GLOSTER F.5/34 FIGHTER

(One 830-h.p. Bristol Mercury IX)

First flew 1937. Crew, one. Prototype only. Armament, eight machine guns. Speed, 315 m.p.h. at 16,000 ft.; span, 38 ft. 2 ins.; length, 32 ft. 1/2 in.; wing area, 230 sq. ft.; empty weight, 4,243 lbs.; loaded weight, 5,400 lbs.; range, 410 miles at 280 m.p.h.; rate of climb, 2,080 ft./min.; service ceiling, 32,000 ft.



HANDLEY PAGE HALIFAX BOMBER

(Four 1,260-h.p. Rolls-Royce Merlin XX's)

First flew 1941. Crew, eight. All-metal construction with smooth flush-riveted skin. Three power-operated multi-gun machine gun turrets. Speed, more than 300 m.p.h. at best operating altitude; span, 99 ft.; length, 70 ft.; wing area, 1,250 sq. ft.; loaded weight, 54,000 lbs.; range, 3,000 miles at cruising speed.

'SIGHT UNSEEN

There's never a moment when our Secret Bomb-sight is left unguarded. Never before did so little mean so much.



On the table a Bible and the famous Norden Bombsight, shrouded in its bag. Behind the table, Lt. Col. Richard H. Smith, delivering the solemn words of the bombardier oath. The faces of the fledgling bombardiers reflect the seriousness of the moment. When all have taken the oath, the men obtain their first glimpse of the all-important instrument.

The Bombardiers' Oath

In the presence of Almighty God, I do solemnly swear and affirm that I will accept the sacred trust placed in me by my Commander-in-Chief, the President of the United States of America, by whose direction I have been chosen for bombardier training. I pledge myself to live and act according to the code of honor of the bombardiers of the Army Air Forces. I solemnly swear that I will keep inviolate the secrecy of any and all confidential information revealed to me, and, in the full knowledge that I am a guardian of one of my country's most priceless military assets, do further swear to protect the secrecy of the American Bomb Sight, if need be, with my life itself.

Reproduced (left) is the exact text of the celebrated oath each bombardier is required to take before he is entrusted with the priceless bombsight.

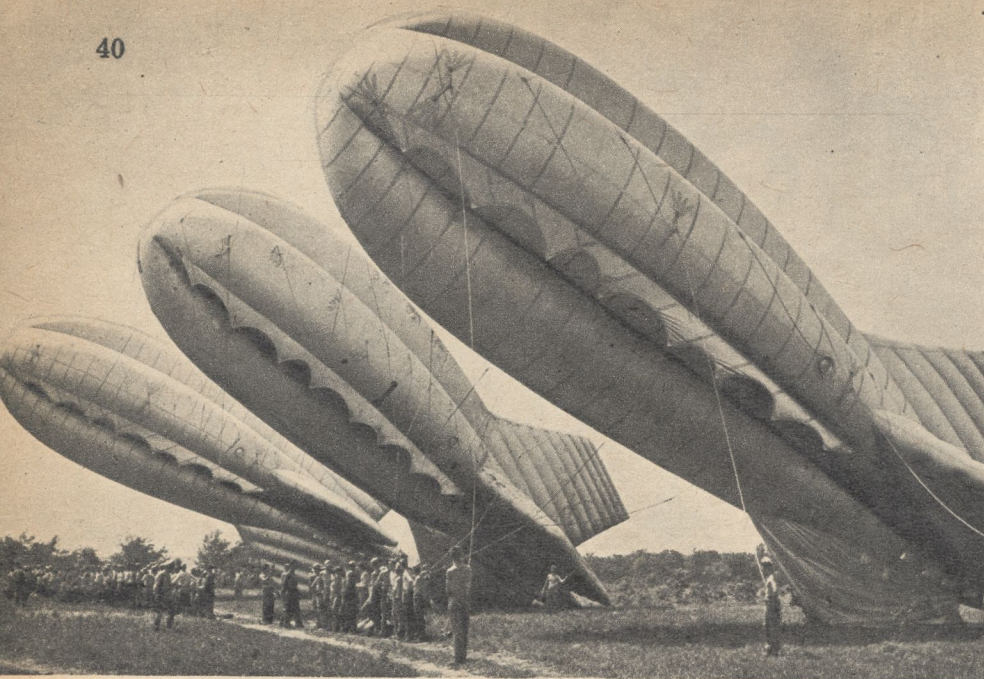
Armed guards stand by as a cadet gets his bombsight, enclosed in the bag, from the truck which brought it to the field.



A cadet passes the bagged bombsight into the nose through the escape hatch to the bombardier. This precision instrument is never left unguarded, is removed the moment a flight is ended.



The "Greenhouse" is the bombardier's workshop. He sits behind his deadly bombsight, hooded here as it always is when not in use. When the target is sighted he is in supreme command of the plane. The bombsight eyepiece leaves a ring—known as "the Badge of the Bombardier"—on cadet's faces.



Noses up, three of the big gas bags eagerly tug at their cables at a Marine Corps base where crews are undergoing special training.

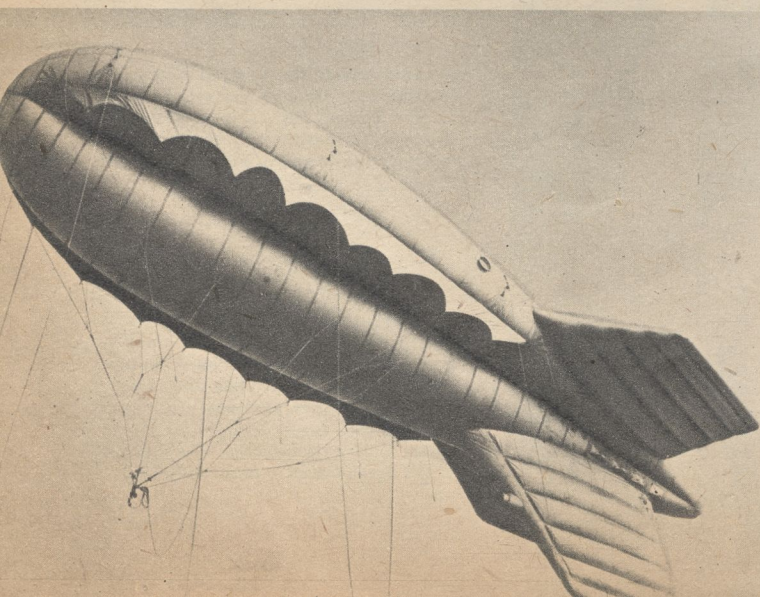
THE FLYING ELEPHANTS

By SETON DAVID, JR.

Though clumsy and homely the Balloon Barrage is a real friend when enemy dive-bombers approach.

At right, the Marine on the winch watches the slowly swaying balloon alert to any sudden gust of wind. The winch operates the cable which raises and lowers the big bag after it leaves the hands of the crew.

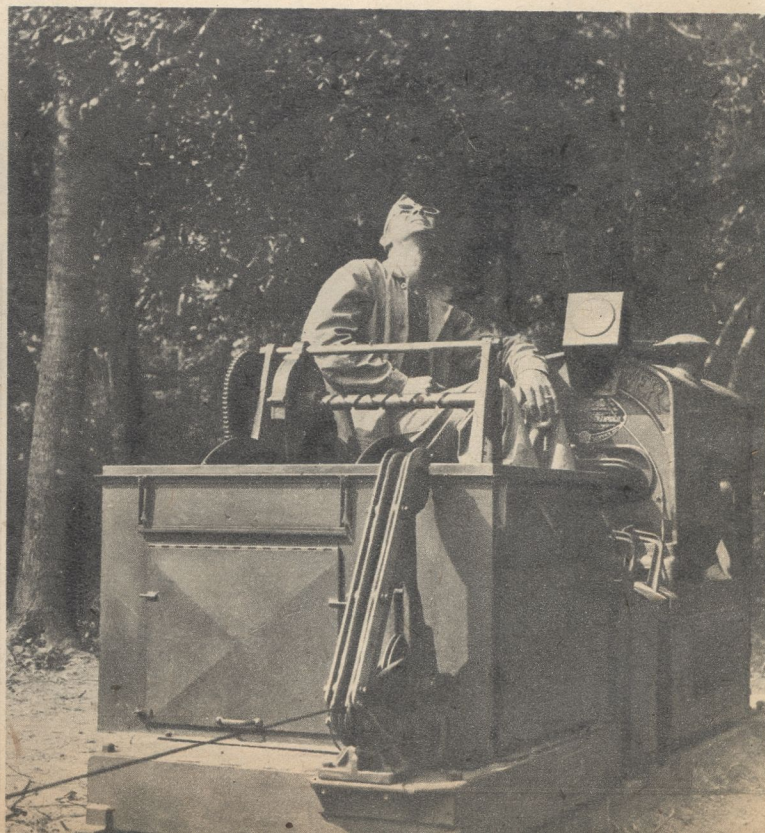
Up she goes! Taking her place as one of the pickets in the aerial fence, her dangling network of trailing wires is really dangerous.



SCORES OF BIG gas bags known as barrage balloons, tugging gently at their cables over the outskirts of most European cities are such familiar sights that they have become commonplace. As yet the United States—and particularly that portion of it along the Atlantic coast—has little acquaintance with this type of defense. But don't get the idea for a moment that we, as a nation, are overlooking a bet or are apt to be caught unprepared should enemy raiders make a sudden appearance. The United States, too, has barrage balloons—lots and lots of them—and men who have mastered the technique of operating them. The Army has a big training school at Camp Tyson, Tenn., and the Marines are trained in the operation of the big bags down at Parris Island, S.C.

Balloons came into use in warfare long before the Civil War. Then, however they were designed for observation and men went aloft with binoculars to obtain wider views of what was happening in battle than might be obtained from the ground. Even as late as World War I, captive balloons were used to spot artillery fire and still bore observers aloft.

Now, however, all that is changed. The gas inflated bags carry no crew aloft but are used to support vast cable nets, designed to hamper low-flying bombers and dive-bomber operations. Their function is solely and simply to protect vital areas inside the 5,000 foot altitude, while the next upper layer of air—between 5,000 and 20,000 feet—is defended by the anti-aircraft batteries and all the area above the 20,000 foot level,



out of reach of ack-ack fire, is guarded by high-flying, hard-shooting fighter planes.

Each gas bag is served by a 22-man crew and has its own winch-equipped carrier truck bearing essential supplies. The bags are of various sizes, most of them about 100 feet in length and the average 3-lobed balloon has 15,000 cubic feet capacity, while the 4-lobed ones contain 30,000 feet and the big 6-lobed ones can take aboard 68,000 feet of gas. During the period of training the bags are inflated with helium for safety, but in combat they will use hydrogen or other gases to make it suicidal for any enemy plane to attempt ramming them.

Taken from their hangars and inflated, the big balloons are sent gradually aloft, their ascent always under control by the anchor cable which is attached to the winch mounted on the carrier truck. The winch is operated by a standard Ford V-8 engine, governed by a foot clutch and brake, like that of an automobile. Even an unskilled man quickly acquires the "know how" of letting out or reeling in the anchor cable. The balloons are moored in concentric circles over vital spots such as manufacturing areas, densely populated cities, etc. and with their curtains of dangling wires have succeeded marvelously well in keeping deadly dive-bombers at a distance, forcing them to higher altitudes where their accuracy is less dangerous.

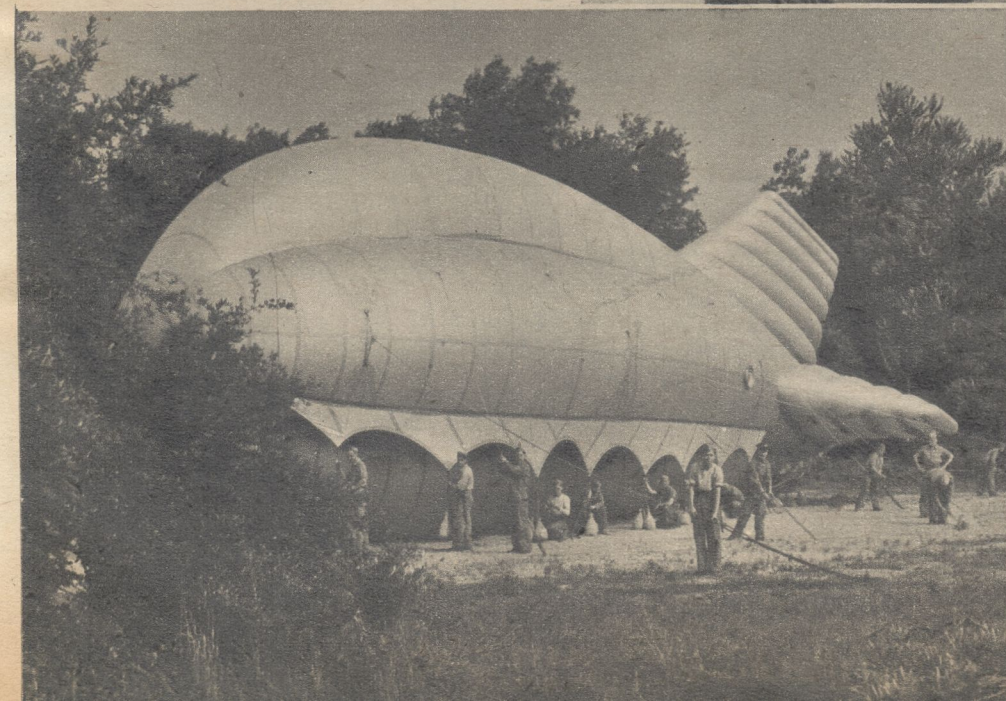
The advantage of keeping dive-bombers above the 5,000 foot level is obvious. Below that height anti-aircraft fire is ineffective, since ack-ack gunners can't easily depress their gun barrels sufficiently. And even if they could, the angle of fire and trajectory would be so flat their missiles would constitute a hazard to ground objects. Jimmy Doolittle found it relatively easy to "skim the treetops" at Tokyo because he had no

A power winch pulls her close to earth and then man-power takes over, as the crew hauls her in. This is a task that is harder than it looks and on really windy days the boys are apt to have a real tussle to get the big bag down.

Guy ropes and sand bags guard her from squalls. Crewman is twisting cork-screw iron stake in ground as extra protection. These prima donnas of the air are apt to be restless so extra care is taken in putting them to bed at day's end.



Bedded down for the night, the big balloon nestles snugly in the shelter of a friendly grove which serves as a natural camouflage.



barrage balloons to dodge and the speed of his low-flying, fast-speeding craft had the Jap gunners baffled even before they went into action.

The English have proven beyond the shadow of a doubt that the Nazis have real respect for the barrage balloons, since every plane that has contacted their dangling nets has been seriously damaged or brought down. Even in broad daylight the cables are hard for a pilot to see, while at night they are doubly dangerous to a low flying bomber.

Some may wonder why, if the barrage balloon is so effective the big bags aren't shot down by enemy raiders flying in advance of the

(Continued on page 74)

All Questions Answered

Harvey Nichols, Salem, Mass.:—Your friend is definitely wrong in saying that the full name of the Allison engine is Bell Allison. The Allison is built by General Motors, and the only connection it has with Bell is that it is used to power aircraft manufactured by that company.

A. D. Williams, Duquesne, Pa.:—I am sure the P-38 is included in the Navy's 500,000 model airplane program. Plans and instructions are available, and they may be obtained from the Bureau of Aeronautics, Navy Department, Washington, D.C.

N. G. Patterson, Ft. Bragg, N. C.:—The National Advisory Committee for Aeronautics, Langley Field, Va., will be able to supply you with any and all information you may desire about airfoils. When writing, tell them what you have in mind and they will probably indicate the most desirable sections.

Tom Sibson, Kerrville, Tex.:—Dive-bombers usually begin their approaches—not dives—from such high altitudes so that they will present smaller targets to ground defenses while nearing their objectives. They usually corkscrew on their ailerons before the actual bombing dive, and pullouts are as a rule made not lower than 1,500 feet.

Alton Reynolds, Charlestown, S. C.:—No, the Vought-Sikorsky F4U-1 does not mount a cannon, but I cannot tell you how many guns it carries. The ship is now in production, and many companies are doing subcontracting work on it so that production will be speeded up. Germany has very few heavy bombers in serv-

ice, and the only ones known at this time are the Dornier Do. 19, Focke-Wulf Fw. 200K, Heinkel He. 177, and the Junkers Ju. 89. Of those, the He. 177 is rated as best, having a top speed of approximately 290 m.p.h. at 19,000 feet.

C. H. Kalstrom, Alberta, Va.:—The Taylor Cub is now known as the Piper Cub. The Cub and the Taylorcraft were both designed by C. G. Taylor, who is now president of Taylorcraft Aviation Corp.

Buddie Bedell, Keansburg, N. J.:—Because of military censorship and restrictions, it is impossible to say which airplane is the fastest. The largest, however, is the Douglas B-19. The Macchi C. 200 is a low-wing cantilever single-seat fighter powered by an air-cooled radial Fiat A. 74R. C. 38 engine of 840 h.p. at 2,400 r.p.m. It has a top speed of 314 m.p.h. at 15,745 feet.

John W. Hach, Jr., Shippenville, Pa.:—The best book about the German army is *The Axis Grand Strategy*, and the only one which discusses the Luftwaffe to any extent is *War Planes of the Axis*. These books may be obtained from, or through, any book store.

In the July issue of *FLYING ACES* we mentioned that flaps may be used on the take-off to make the run shorter, that they are not necessarily always used only while landing. There were many comments regarding this statement, so we feel that the following letter, from Lieut. James R. Blackburn, Perrin Field, Sherman, Tex., will prove our point without further doubt. Lieutenant Blackburn writes:

"I would like to add to your statement a bit by saying that on the Vultee BT-13A airplane, on which I am an instructor, flaps are used on the take-off, while climbing and gliding, and even in level flight while in the traffic pattern. They are also kept down in turns. The flaps on the BT-13A are trailing edge flaps instead of the usual split type, though."

F. J. Hinkley, Detroit, Mich.:—C. B. Colby, who years ago drew the pictures used in our "War Planes Album," may be reached at 79 Seventh Ave., New York, N. Y.

Charley Hill, Tulsa, Okla.:—Sorry, but according to our records there is no plane by the name of Hendel Hawk. The only Hawks I know of, as a matter of fact, are those built by Curtiss. I believe that the author of *A Yankee Flier With the RAF* must have been using a "dream" ship for some reason.

Bill Dils, Reading, Ohio:—Armament details of the Curtiss SB2C-1 have not been made public, but it mounts at least two forward guns and one swivel gun. Like the SB2C-1,

the Consolidated B-24 is also on the secret list; it has at least three gun stations, and possibly three others. The Grumman TBF-1 was reviewed in our September issue.

George Keadle, Williamson, W. Va.:—Your model photos are not quite good enough for reproduction. Our Model Editor is always seeking photographs for his "With the Model Builders" department, and we would be glad to see any pictures you may have or shoot in the future. However, be sure that the photos are very clear and that the model shows up well and has good lighting.

Sam Wimley, Wildwood, N.J.:—World War books reviewed in *FLYING ACES*, to the best of my knowledge, are still available. When writing to Airbooks, please mention that you saw the books reviewed in this magazine. Back issues may be obtained from our Accounting Department for 20c each.

Jack Lucas, Santa Ana, Calif.:—You are right and your friend is wrong, for the Airacobra mounts six machine guns and a cannon instead of eight machine guns and a cannon. Thanks for your comments on the mag, and you may be sure that we're doing our best to make it even better.

Leroy Molseed, San Francisco, Calif.:—Until the advent of the new Focke-Wulf Fw. 190, Germany did not have a real defensive fighter. The Heinkel He. 113 has been used for interception purposes, but it was not designed in the first place for defensive use. The 20mm. cannon has a greater range than the 37mm. cannon because of its higher muzzle velocity.

Donald Phumbey, Olean, N.Y.:—Yes, the Arado Ar. 68 and the Heinkel He. 51 are very similar in general fuselage lines. The main difference seems to be in the vertical fin; the fin on the Ar. 68 is high and is braced by inverted "V"-struts, and the tail on the He. 51 is rounded, blending smoothly with the fuselage, and is braced only by wire. Specifications of the two ships are: Ar. 68—span, 36 feet; length, 31 feet 2 inches; height, 10 feet 10 inches; wing area, 293.7 square feet. He. 51—span, 36 feet; length, 27 feet 6 inches; height, 10 feet 6 inches; wing area, 292.6 square feet.

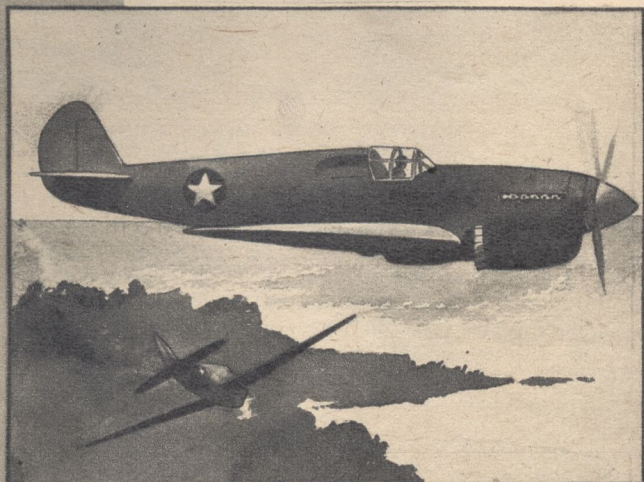
John R. Miller, York Pa.:—Early in 1941 the so-called "experts" said that the RAF was equal to the Luftwaffe, but that was in direct contradiction to official claims from England. Then, during the Battle of Russia, it was again pointed out by some writers that the Reds had the Nazis on the run and had things more or less their own way. And while the latter may have been true during the severe Winter months, when Germany had so much difficulty supply-

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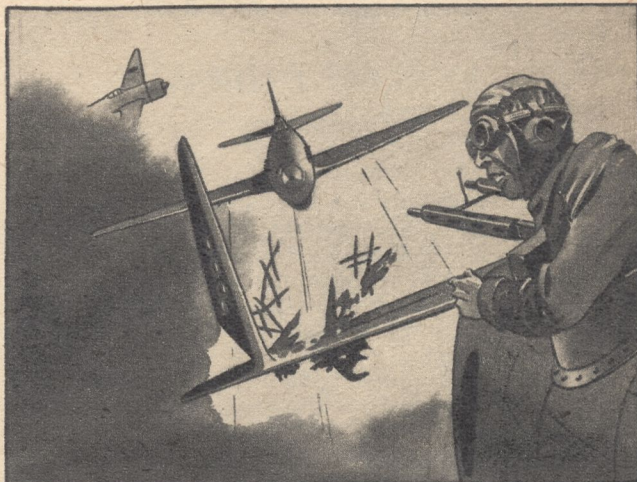


AMERICA'S NEWEST ACES

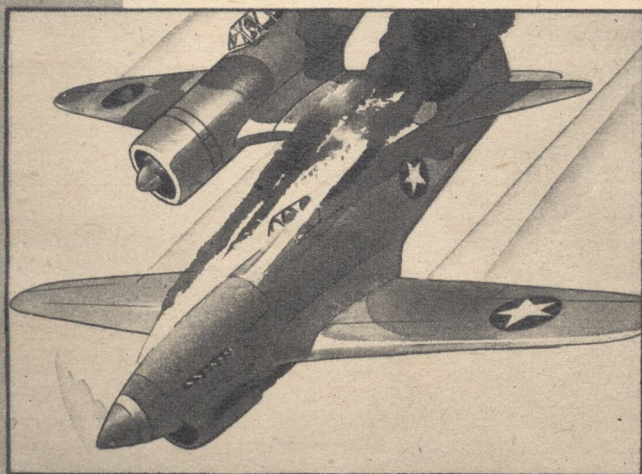
X-MAJ. ROBERT D. VAN AUKEN—SOUTH SEAS HERO



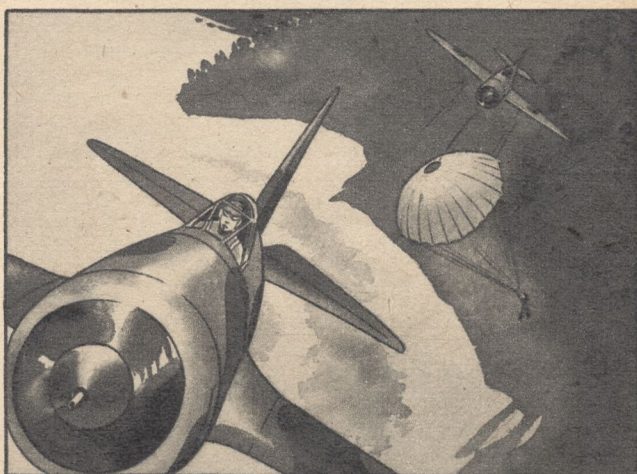
1.—Receiving reports that enemy planes had been sighted, Maj. Van Auker and another pilot took off. As they started climbing the other pilot had trouble so Van Auker continued on alone, believing a flock of P-40s would shortly follow him into action.



2.—Sighting a group of Jap bombers, escorted by some Zeros, he got in a burst at one bomber and saw pieces fall away. Shifting over to the other side of the formation, he was set upon by six Zeros, one of which tore a piece from his right aileron.



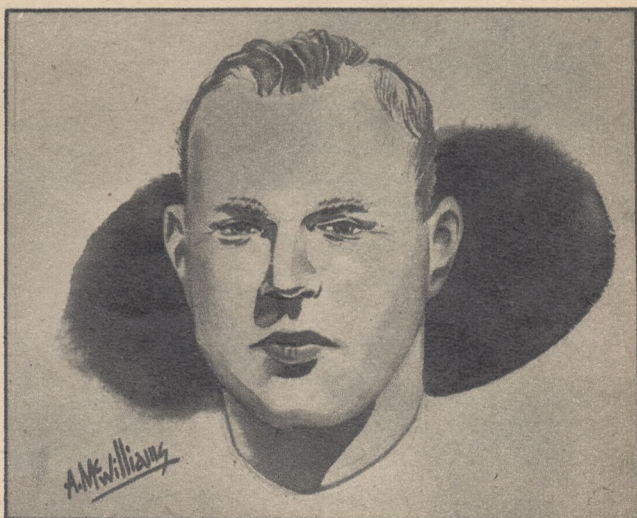
3.—The Major didn't stop to look behind him but headed for a nearby island. More Jap Zeros swept down upon him, put a hole in one wing and peppered his fuselage. Glancing back, he saw they were on his tail again and then his plane caught fire.



4.—He pulled her nose up in an attempt to roll her on her back but they shot his plane to pieces. He was unconscious when the wind pulled him from the cockpit. Coming to, he pulled the rip cord. The Japs fired at his chute as it fluttered earthward.



5.—He landed 150 ft. from land in five feet of water and, as the Jap circled away, staggered ashore. After a five-mile walk he found a friendly native, was fed wallaby meat and next day taken down the coast in a native dugout to a waiting ambulance.



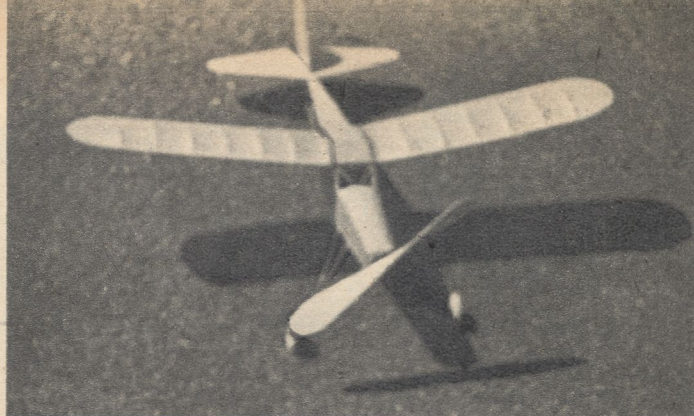
6.—In recognition of his valor, Major Van Auker, whose home is in Bergenfield, N.J., has since been awarded a Silver Star "for gallantry in action." Not every pilot can stand off successfully 27 Jap bombers and 18 Zeros to escape with his life.

FLYING ACES

CLUB NEWS

by CLINT RANDALL

National Adjutant, Flying Aces Club



This month's D.S.M. winning craft was built by Richard Coyle, Lancaster, Pa. Yes, it's a "Moth."

THAT THE FLYING ACES CLUB is popular throughout the United Nations is a well known fact to all of us. Therefore we were not so surprised when the letter which appears below, came to us the other day. It was pleasing to know, however, that Major Fred Lord, well known airman and F.A. writer found enough time from his arduous duties of ferrying the many different types of American and British aircraft all about England to interest brother airmen in becoming members of the FLYING ACES CLUB. As National Adjutant, and on behalf of the many members of the FLYING ACES CLUB, we are adding the six names of the British airmen to the roster of Honorary Club Members. Welcome, airmen on happy landings.

One look at the photo on the upper right is enough to convince you that

it is the winner of this month's Distinguished Service Medal. And you're right! Further, the winning model is none other than that unforgettable old "Moth" which, in all probability is the best-loved model plane ever to take the air. Its builder-photographer and recipient of the coveted medal is Dick Coyle, of 157 Wilson Drive, Lancaster, Pa.

Dick says he heard a lot about this ship and waited until the plans were reprinted in the August, 1941, issue and then went to work on it. The ship turned in consistent flights of 45 seconds each until one day it hit a high of 1 minute, 32 seconds—then wham! the rubber strands blew the insides out.

Dick was heartbroken, and all he had left was a photo or two he managed to snap while he was still proud of his handiwork. But winning the

D.S.M. which, in the opinion of Wing Commander Neil Caward, Model Editor, Jesse Davidson, and your N.A., is well earned, should do much to cheer up Dick. Congratulations, young fellow!

A LETTER from Major Fred K. Porphyrius, C. O. of F. A. Squadron 81, 349 Broadway, Brooklyn, N.Y., asks that we consider Clubster Michael Amico for our Distinguished Service Medal. According to Major Fred's report, Mike was a radio man in Pearl Harbor on December 7th, 1941, and he was busy kicking his key around around when Jap bombs fell. Mike's face was almost blown off and he has lost the control of the nerves in both hands. But Mike keep his spirits.

Fred goes on to say that many members of the club are in service. To be exact, 12 are Army pilots, 4 Naval pilots, 6 Army mechanics, and 2 civilian aero engineers among whom Fred is one himself. The remainder of the squadron members still receive F.A. and Fred is glad to say that F.A. was responsible in getting them started in aviation.

Of himself, Fred tells us that he was a second lieutenant in the National Guard Air Service as a bombardier. And, "I was a good one even without the Norden sight." He was up for promotion to first lieutenant, but during his periodic physical examination the medicos discovered he had a collapsed left lung. So Fred was honorably discharged. This was just about the time the N.G. was federalized and Fred wanted to get into service somehow. Possessing a B.S. in aero engineering, he became a civilian aero engineer and he went to work for Douglas aircraft and later for Republic. Now Fred is a roving test A.E. for Uncle Sam. Fred's letter also included a comprehensive report of the five year activities of Squadron 81.

From Al Babetski, of 149 E. Main St., Glen Lyon, Pa., we hear that he "was tickled pink" when he received his Aces Star. Al says he introduced F.A. magazine to many of the boys in his neighborhood and they took to the new issues immediately. They thought the articles fine, howled at Phineas, and are now building model planes from all its plans.

Elsewhere in this issue readers will find a photo of Harry Appel, well known model designer who is now receiving flying training. Harry writes that among the aviation cadets stationed at Maxwell Field, Alabama, he has come across many members of the FLYING ACES CLUB. So it is no surprise to us that the activities of certain older groups have been abandoned for the duration. And we don't doubt for a moment, that these young men who, through their activities of the FLYING ACES CLUB, learned much of what they know of aviation, will be able to serve their country better since they had foresight to prepare themselves for the game they loved best. And after the war is over, these same young men (and we hope they all return safe and sound) will carry on as counsellors for new squadrons of the F.A.C. Adios!

To be added to the roster of Honorary F.A. Club members are the six named below who were informed of our organization by one of its greatest boosters, Fred Lord.

AIR TRANSPORT AUXILIARY

Cadet J.G. Gibbons
9 Richmond Road,
Coneys Quay,
Flintshire,
North Wales,
ENGLAND.

31st August, 1942.

Dear Sir,

We would like to become members of your "Flying Aces" Club, which was brought to our attention whilst flying with Major Fred Lord who is an Honorary Member of the Club.

We have had 100 flying hours with the A.T.A. where we work as Co-Pilots. We have a large range of scale models which we make in our spare time for Aircraft Identification.

We are six Cadets wishing to join the club and are all air minded both in theory and practice.

Would you please forward the necessary particulars.

Yours faithfully,

J. Birch

..... J. Birch
..... R. L. Williams
..... R. R. Lloyd
..... J. R. Gibbons
..... J. A. Boycott



Herbert Kuckert holds a Super-Soarer which he flew at the recent Linden, (N.J.), meet. It is similar to a full-scale Franklin glider.



Art Gray's sleek-looking Ohlsson powered gas job is modeled after the Manta fighter. Highly streamlined, it was the fastest entry.



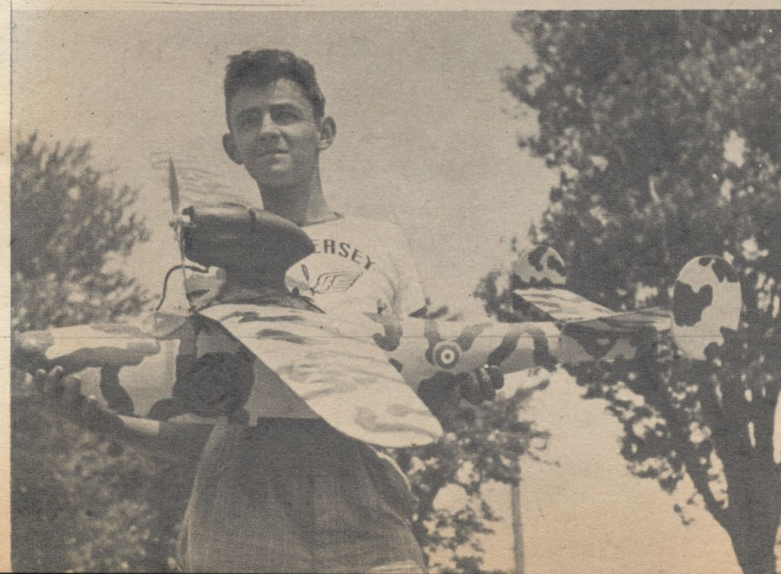
Don Carey, of Miami, Fla., is keenly aware of the shortage of model materials. So hereafter he will concentrate on small craft as shown.

With the MODEL BUILDERS Everywhere



Max Jurist, of The Bronx, N.Y., must have seen a snake swallow an ostrich egg. Note fuselage design. His ship flew O.O.S. in six minutes.

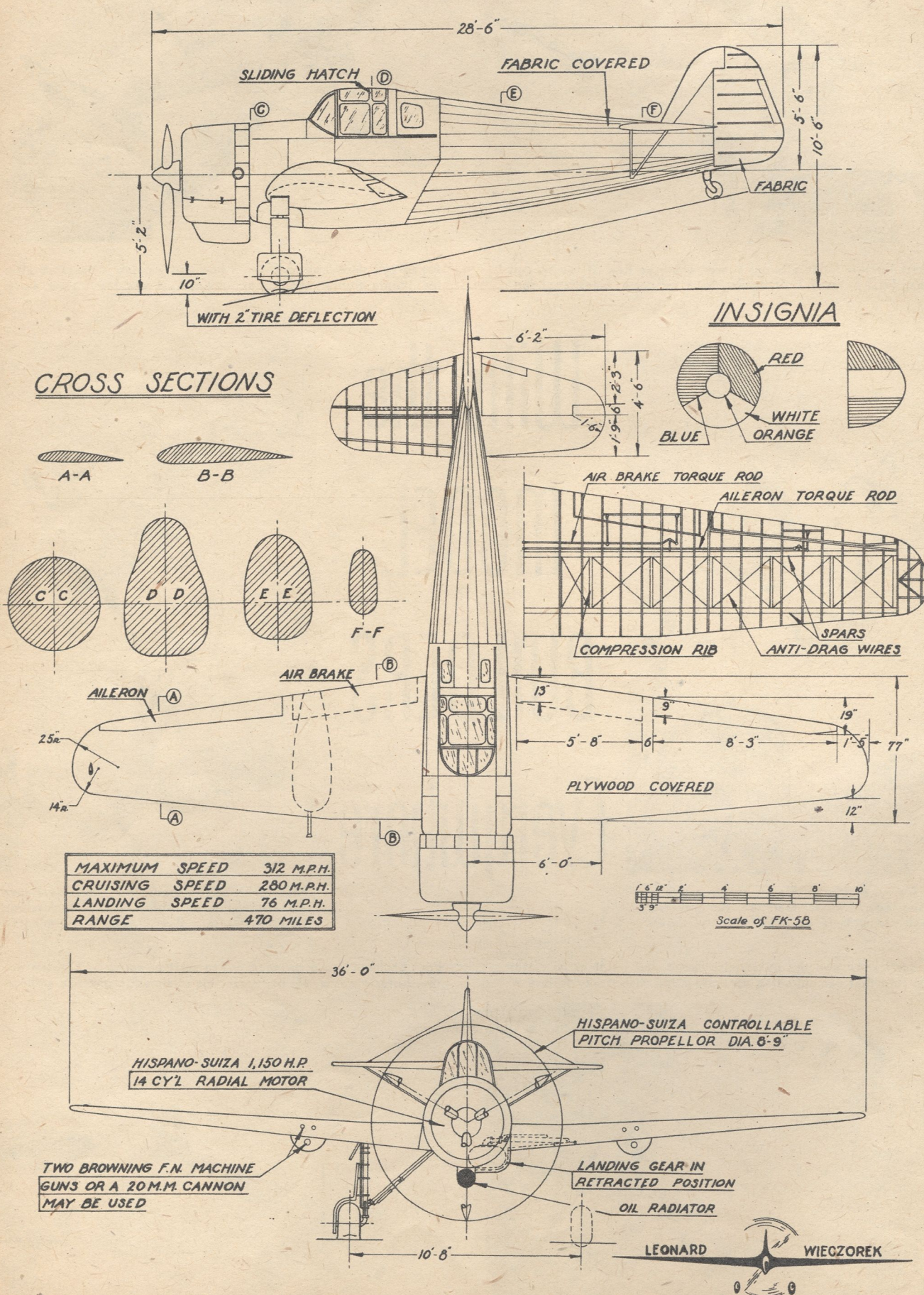
We don't know who this unassuming lad is, but we think he ought to be told that camouflaging his craft is the easiest way to lose it.



Leon Shulman's solid surfaced G-line craft powered by Ohlsson was the fastest model of its type. He claimed eight-mile-an-hour.



KOOLHOVEN FK-58



BUILD THIS

Flyabout

by LAWRENCE REITHMAIER

THE FLYABOUT should appeal to both beginner and expert alike because its simple construction and ease with which it can be adjusted, it is an ideal model. Although not primarily designed for contest work it should hold its own with the best. When carefully adjusted it has a skyrocket climb and a very flat glide. This should meet with the approval of the expert.

Whether this is your first gas job or your tenth you will marvel at its stability, for the Flyabout has that old demon spiral dive completely subdued. Due to its inherent stability, motor torque does not effect its performance to a great extent, thus simplifying the construction somewhat since no wing warp or offset motor is required. Its stability also accounts for the ease with which it may be adjusted; it is not very sensitive to minor changes in wing or tail settings.

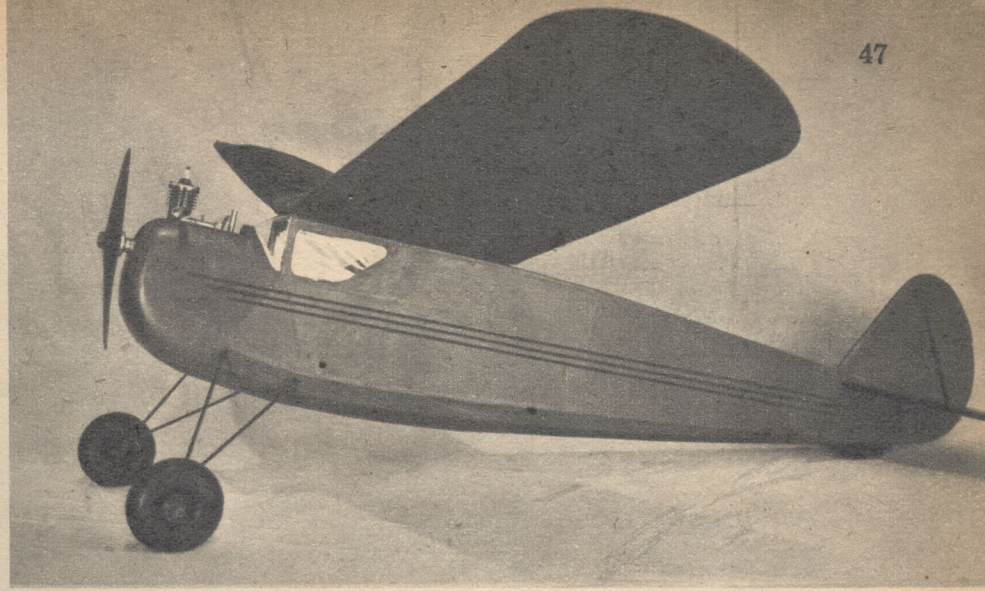
The Flyabout is a consistent and reliable flyer, the original having turned in hundreds of flights with no damage other than a few broken props. It has been flown in high winds, which would "ground" most gas jobs and has proven that it "can take it" by coming through the resulting downwind landings unscathed. You will find the Flyabout to be one of the strongest Class "C" jobs and it comes well under the requirements for this class when powered with any 1/5 or 1/6 horsepower engine. If the plans and the description are carefully followed you should find no difficulty in building and flying the Flyabout.

Fuselage and Tail

PLATE 1 should be enlarged to full-size, preferably on a large board. All material for this model is medium hard balsa unless otherwise specified.

The sides of the fuselage are constructed of 1/4" sq. Be sure that all joints are well fitted and use plenty of cement. The sides are then joined together with 1/4" sq. crosspieces. The formers for the bottom of the fuselage are cut out of 1/8" sheet. It is a good plan to cut the slots for the stringers after the formers are cemented in place, thus making better alignment possible. The stringers are 1/8" by 1/4" strips.

The motor mount is 1/8" plywood cut to the shape shown on the plans. This is firmly cemented and nailed to the top longerons and uprights. Aluminum angles, with holes correctly spaced for your motor, are bolted to the plywood. Incidentally, the nose of the model as shown on the plans was designed for a Brown Jr. motor but



This easy-to-construct Flyabout is a consistently good performer.

may have to be changed to accommodate other types of Class "C" engines.

The nose blocks are lightly cemented in place and cut to their correct shapes. After their outside surface is finished they are removed, hollowed out to a 1/4" thickness, and cemented back in place. Blocks "A" may have to be trimmed to suit your motor.

The landing gear is bent up from 1/8" diameter music wire to the dimensions shown. Bind the two struts together at their lower ends with fine wire and solder. The struts are then bound to the fuselage crosspieces with heavy thread and coated with cement. 3 1/2" airwheels are used.

The celluloid for the windows is now cemented in place. The covering is cut to the window shape. A small piece of heavy paper is used for the cowling by the windshield. Bamboo paper is used for covering, using thinned out cement for adhesive. The nose blocks can be covered with tissue. The rudder and stabilizer sections are flat with a rounded leading edge and pointed trailing edge. Soft copper wire is used for the rudder tab hinge. The stabilizer is made in one piece and cemented to the fuselage after both are covered. A small block shaped to carry out the fuselage lines is cemented on top of the stabilizer and the rudder is cemented on top of this. If you intend to fly your model in rough fields it is advisable to add short 1/8" by 1/4" struts from the rudder to the stabilizer as shown on the photographs of the model. The tailskid is made of hard 1/4" sheet.

Wing Construction and Ignition

THE WING is made in halves and later joined. To assemble the wing, place a rib between the two 1/8" by 1/4" spar cap strips, then insert a 1/16"

by 2-15/16" web, add another rib and web, etc., until there are eight ribs in each wing half. Be sure to allow enough of the 1/8" by 1/4" spars to extend on each end to construct the spar joint and wing tip. The leading and trailing edges and wing tips are now cemented in place on each wing half.

The spar joint pieces are cut out of 1/4" sheet. Each wing half is raised six inches and the spar joint pieces are cemented in place. Be sure that the joints are well fitted and use plenty of cement. The three ribs at the center section are cut in two and cemented on each side of the spar. The leading and trailing edges are joined; the center section is covered with 1/16" sheet. The wing is covered with bamboo paper. Wiring diagrams are as numerous as gas jobs at the Nationals, therefore none was included in the plans. Any standard hook-up can be used. All joints in the wire should be soldered and insulated with tape.

The battery box is made of 1/8" sheet balsa with a spring from an old flashlight on one end. It is held in place on the battery track with rubber. The coil can be taped to one of the crosspieces of the fuselage, since a metal band may interfere with the proper functioning of the coil. The mounting and position of the timer will be determined by its make. A good place to mount it though, is on the crosspieces by the window with its arm protruding through the celluloid.

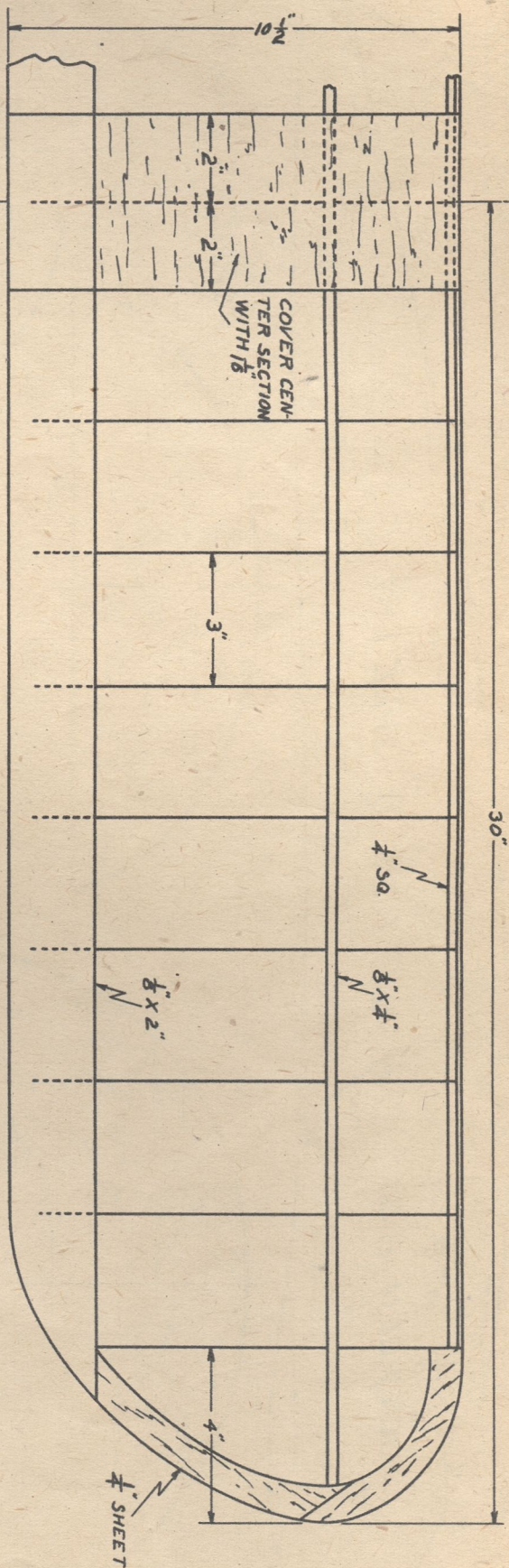
There should be no side or so-called down thrust and the wing should be free from warps. The wing is held in place with about eight feet of 1/8" flat rubber. The model should balance when held one-third back from the leading edge. Proper balance is achieved by shifting the batteries. The rudder tab is left neutral for the first flight. Set the timer for about ten seconds and run the motor at about one-third throttle. Hand launch the model into the wind. It should fly nearly straight. After the first flight the speed of the motor can be increased and necessary adjustments for climb and circling can be made.

THE END

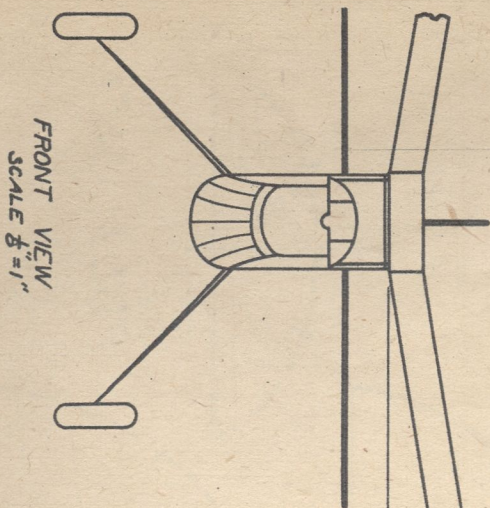
PLANS FOR THE FLYABOUT GAS JOB

On Pages 48, 49, 50

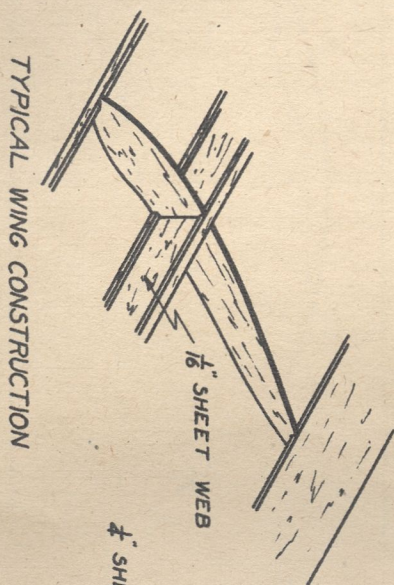




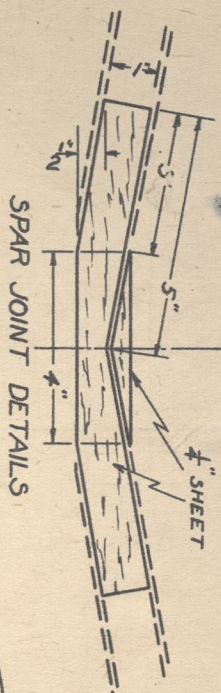
SCALE 1/4"=1"
EXCEPT WHERE NOTED



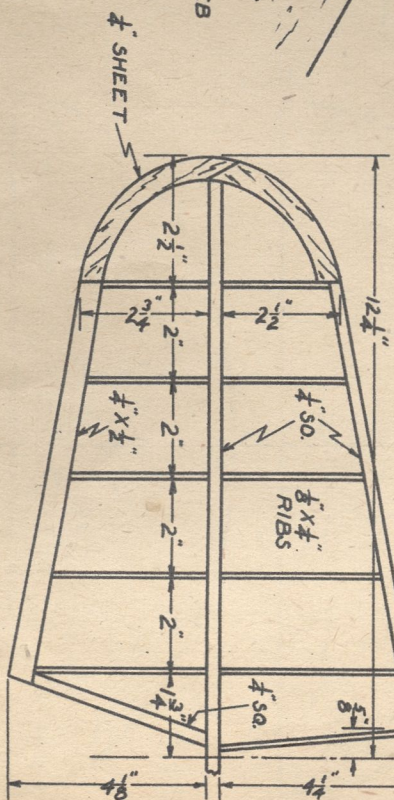
FRONT VIEW
SCALE 1/4"=1"



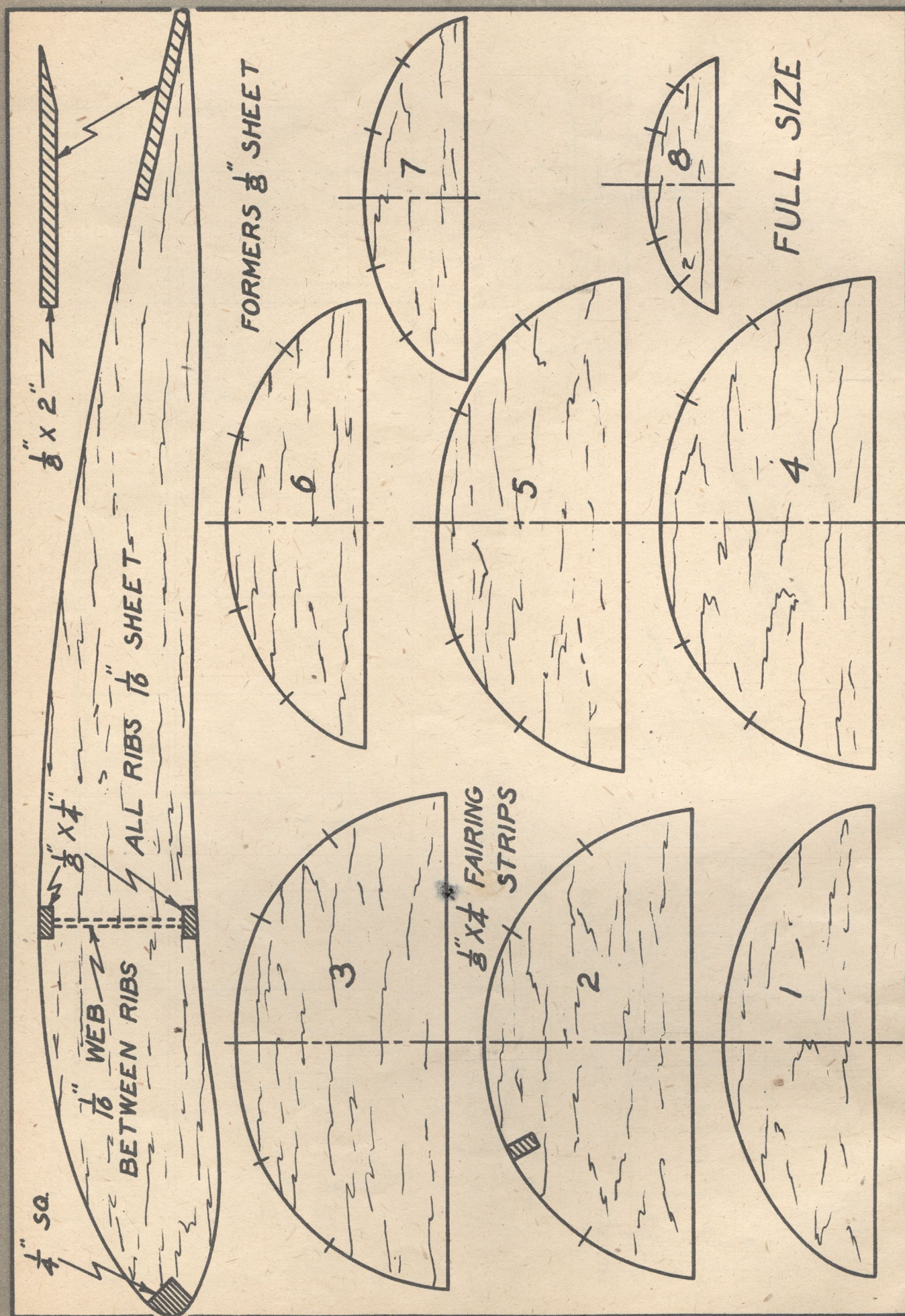
TYPICAL WING CONSTRUCTION



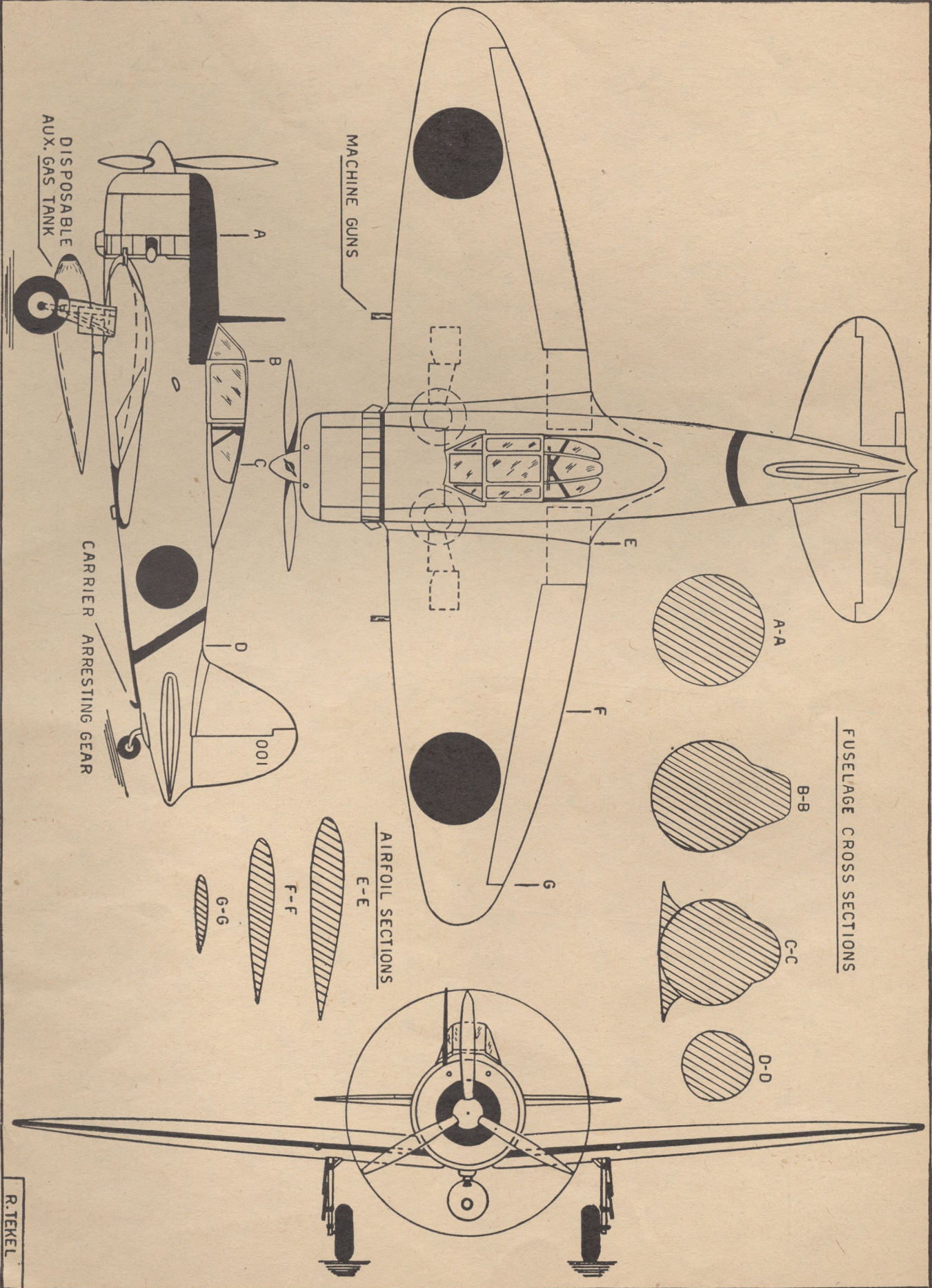
SPAR JOINT DETAILS



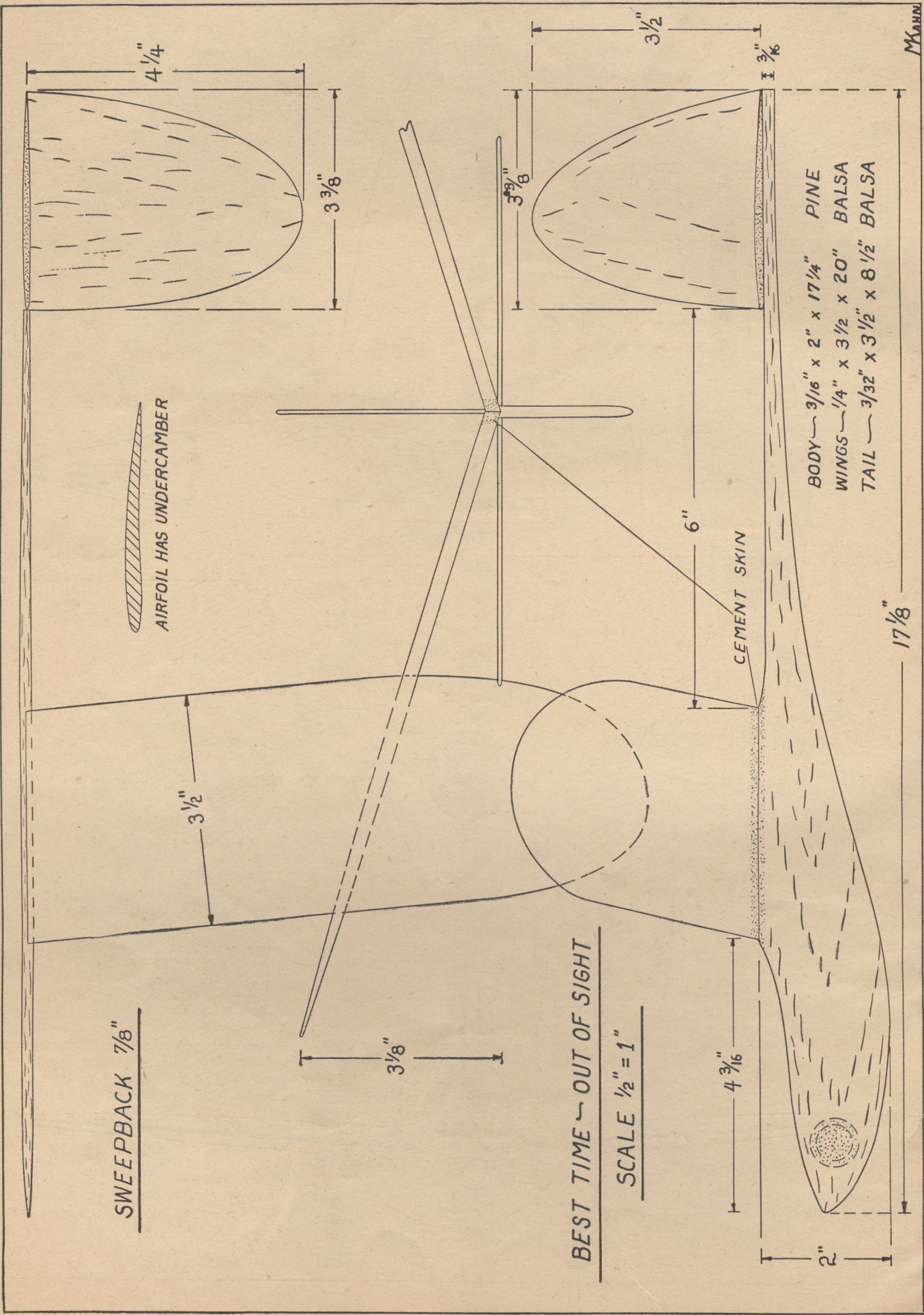
BUILD THIS CLASS "C" GAS JOB-PLATE 3

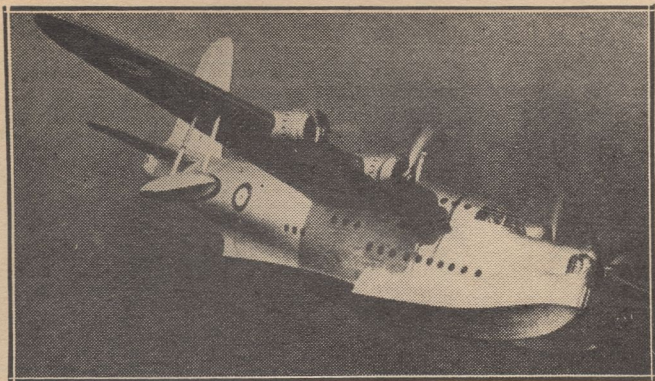


JAPANESE "ZERO" FIGHTER SENTO KI 001

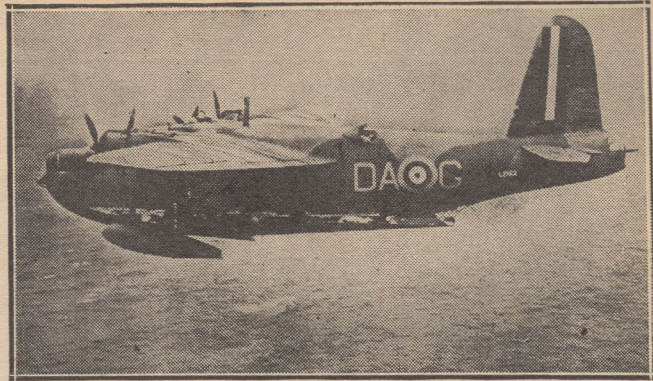


HIGH-TIME OUTDOOR HAND-LAUNCHED GLIDER





A scale model of the huge Sunderland flying boat makes a worthy addition to your solid collection.



Here's the ocean-patrolling craft dressed in war-paint. Note machine gun stations fore, mid and aft.

SUNDERLAND SOLID SCALE

On the following three pages are presented full scale plans for building a solid replica of a famous British Flying boat.

by JACK BAXTER

SUNDERLAND flying boats are a direct development of the Empire flying boats operated by the Imperial Airways before the war although first production models for the R.A.F. Coastal Command were delivered in late 1938. Manufactured by the Short Bros., of Rochester-Kent, England, they are powered with four Bristol Pegasus XXII engines each delivering 840 horsepower at 6,250 feet. They have a take-off rating of 1,000 h.p. each.

Wings are constructed of metal with stainless steel spars, duralumin ribs, and Alclad covering with countersunk rivets. The hull is also all-metal structure with Alclad covering. Dimensions are as follows: Span, 112 feet 9½ inches, length, 85 feet 4 inches, height on beaching gear, 32 feet 1½ inches. In performance, it has a cruising speed of 178 m.p.h. at 5,750 feet and a high speed of 210 at 6,250 feet. Its normal range is 1,780 miles with a 16 hour duration. With an overload, its range is 2,900 miles. Two Nash and Thompson power-driven turrets are located in the bow and stern. Amidships, there are two manually operated machine guns. The hull has provision for a large bomb load.

Beside escorting convoys and bombing enemy transports, Sunderlands have effected rescues in mid-ocean taking on as many as 34 seamen from torpedoed ships. Boats of this type are camouflaged with irregular patches of dark brown and green on the upper surfaces of the wings, tail, and hull. The undersides are painted in silver in accordance with the standard scheme for sea-reconnaissance aircraft. Modelers are urged to use the best paints available as well as good brushes. Surfaces should be sanded smooth.

CARVING THE HULL AND TAIL

INSTRUMENTS which follow apply to shaping the various surfaces either from soft pine or balsa. As done with your previous solids, make stiff paper templates of the side and top view of the hull proper. This excludes the upper portion of the roof of the vertical fin. The nose turret may be made integral with the hull as would be the tail turret or, they may be fashioned by wire or bamboo framework covered with sheet celluloid. Before carving the hull, however make stiff paper templates of the hull cross sections as shown on Plate 3. Note the concave shape of the lower hull surface at section "A-A" and "C-C." The pilot's cabin may be built up or painted in to simulate a built-up effect. Front and rear turret can be made to suit one's self.

Tail surfaces are streamlined as illustrated and are cemented into position only after the hull is completed. Filleting is done with plastic wood or a mixture of balsa sawdust and cement. Hinged surfaces should be marked out with sharp pencil point before surfaces are mounted. The wing floats are miniature hull shapes and can be whittled to shape by referring to the full sizes on Plates 1 and 3. Machine gun stations in the hull (shown on Plate 2) may be carved out clean to the shapes shown. Install single guns on a mount and imbed into the hull tightly. The guns should be able to swing in a half circle.

WINGS, NACELLES AND ASSEMBLY

THE WING may be made in two fashions. One is to make it in halves and cement with bamboo prongs to each side of the hull, or in one piece whereby a portion of the hull roof is removed and the wing ce-

mented flush. The roof portion is then replaced or added to form the smooth contours of the hull section.

With regard to the mounting of the engine nacelles, the modeler's attention is called to the June, 1940 issue of FLYING ACES where in the article titled "Build Model Planes For Defense" is illustrated with drawings on page 60 showing how two types of nacelles may be carved.

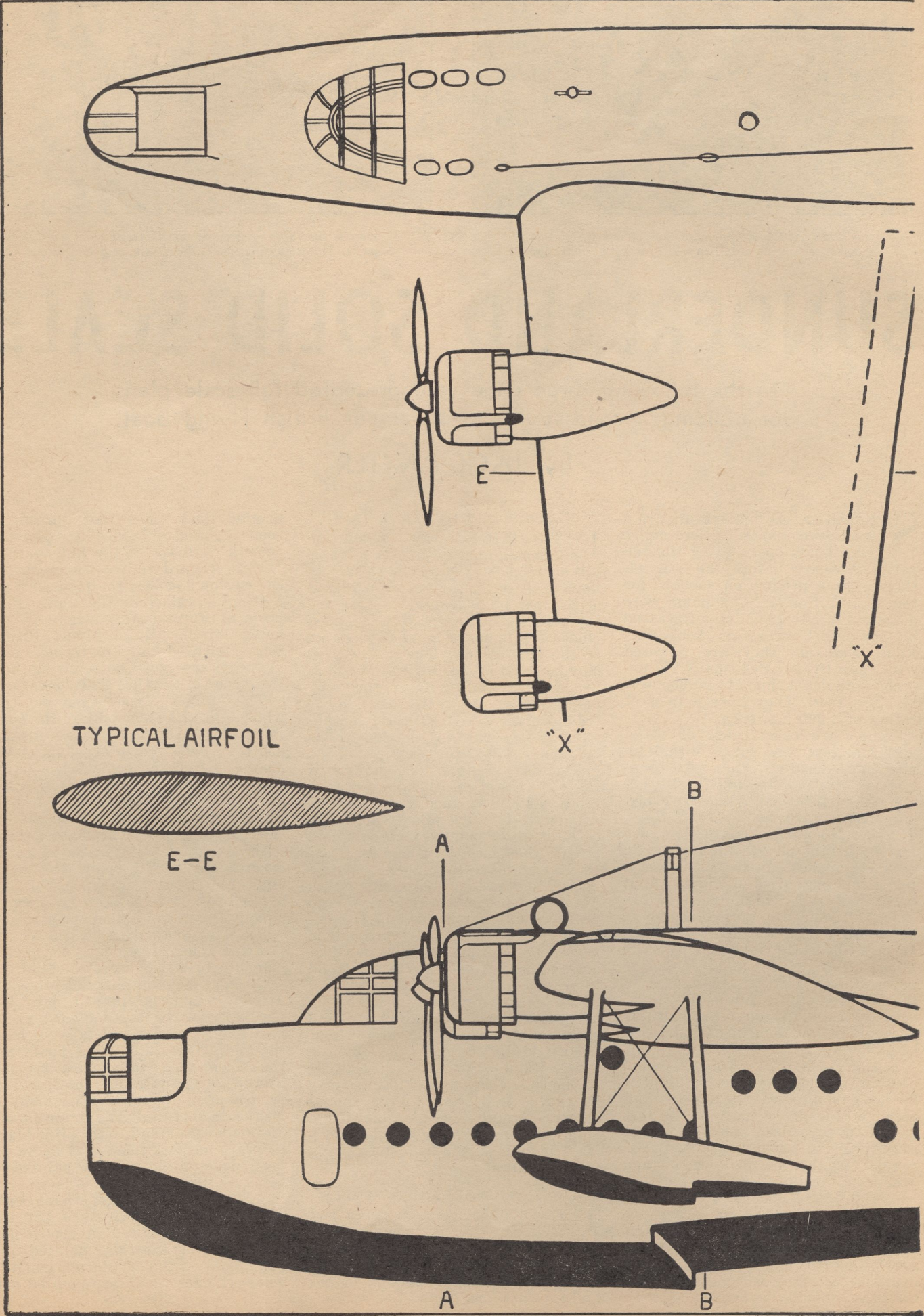
The "carrot" type is carved in a whole unit and inserted into the leading edge of the wing where a cut-out has been prepared to exact measurements. After the cement has hardened filleting material is worked along the edges of the nacelle to flow into the joining wing surfaces. The "clothespin" type nacelle is made with a portion cut out so as to fit exactly above and below the wing and when tightly in place, filleting applied to obtain a likewise integral effect. The model builder may choose which ever method he desires as the completed job shows up good workmanship in either case.

Circular celluloid discs of propeller diameter may be pinned onto the nacelle noses or three bladed props attached as shown. Details such as the radio mast and wing floats are then cemented into position and braced with wire as shown. The frames of the pilot's compartment as well as in fore and aft turrets should be made to stand out with black paint. The port holes and doors on both sides of the hull are painted in black as illustrated.

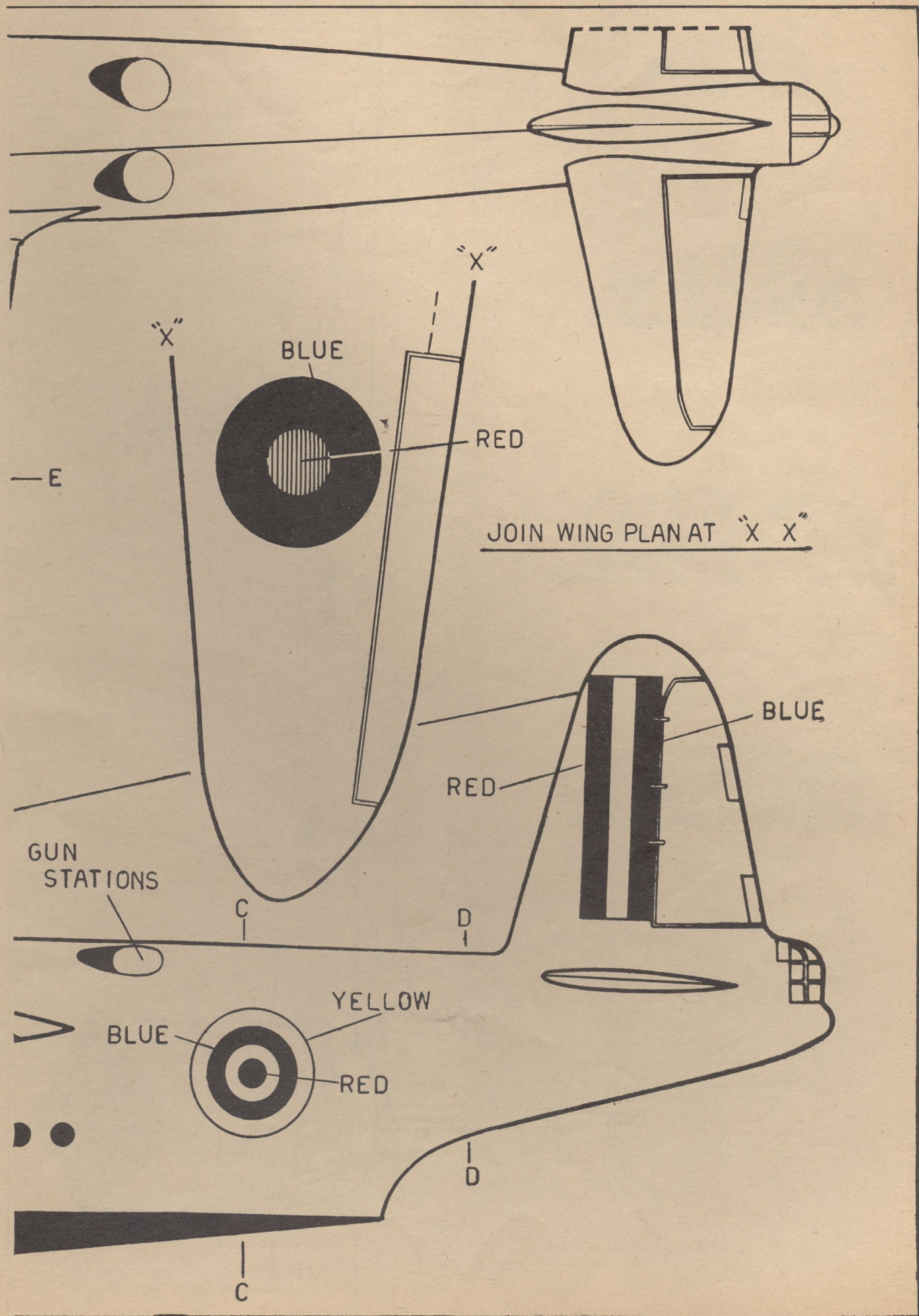
After giving the craft a final check with fine sandpaper, mark out the patches to be colored in brown and green. After they are painted and dried, add on the regulation insignia color schemes which are pointed out.

THE END

CARVE A SOLID R.A.F. FLYING BOAT-Plate 1

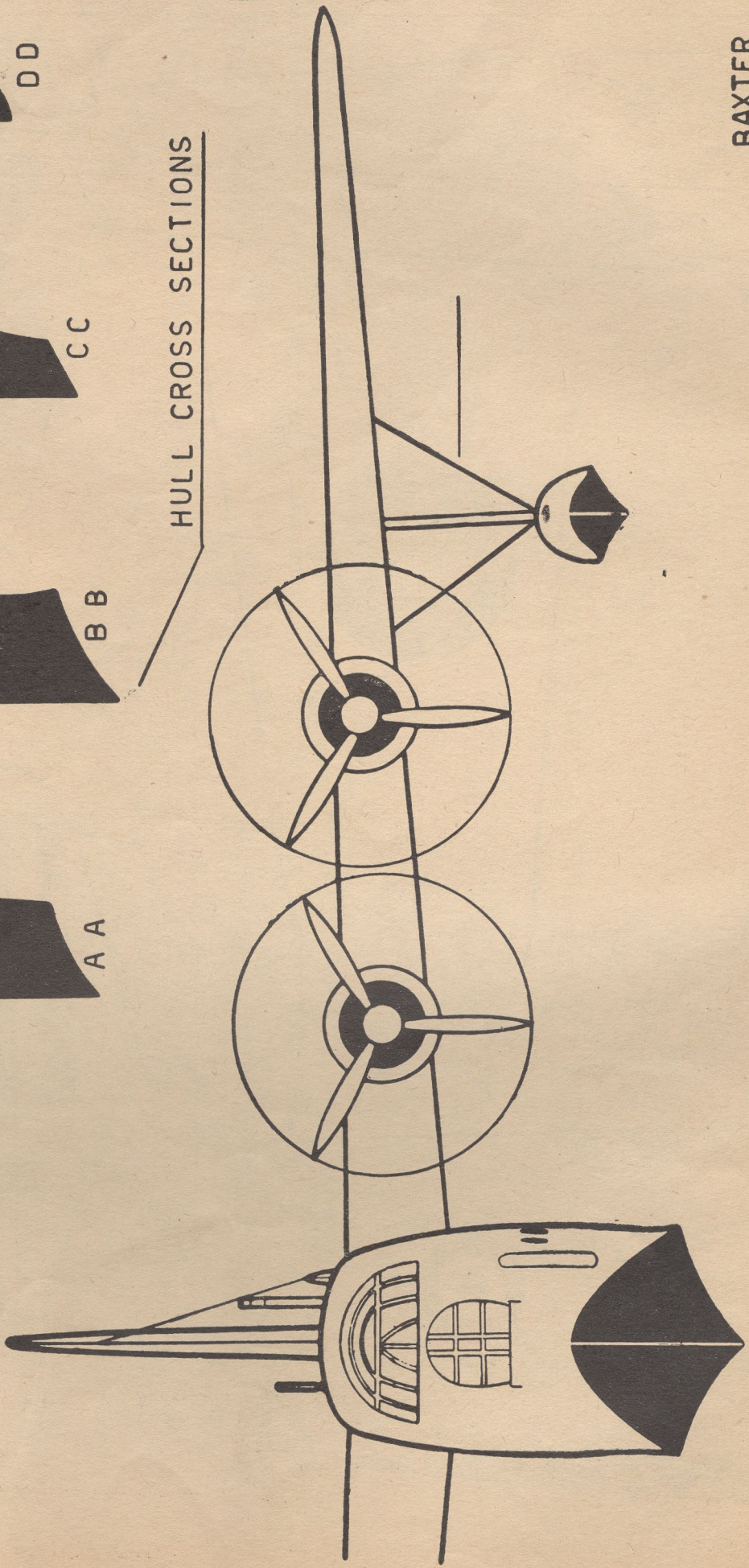


CARVE A SOLID R.A.F. FLYING BOAT—Plate 2



CARVE A SOLID R.A.F. FLYING BOAT-Plate 3

BAXTER



HULL CROSS SECTIONS

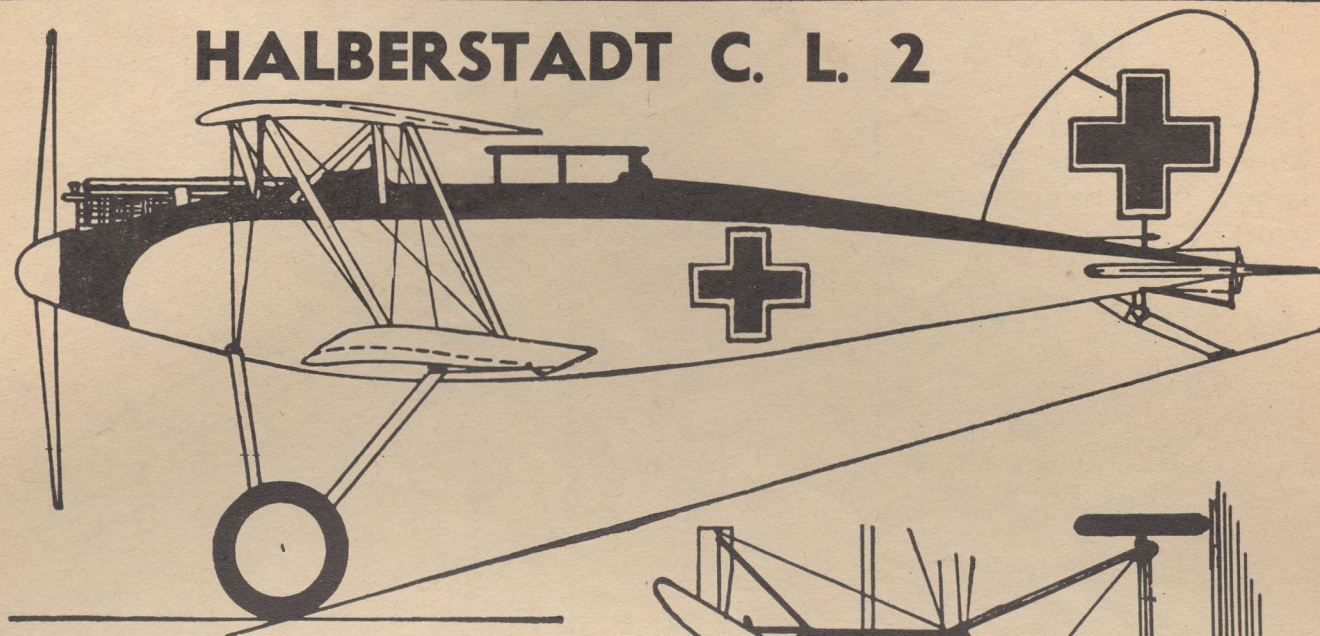
A A

B B

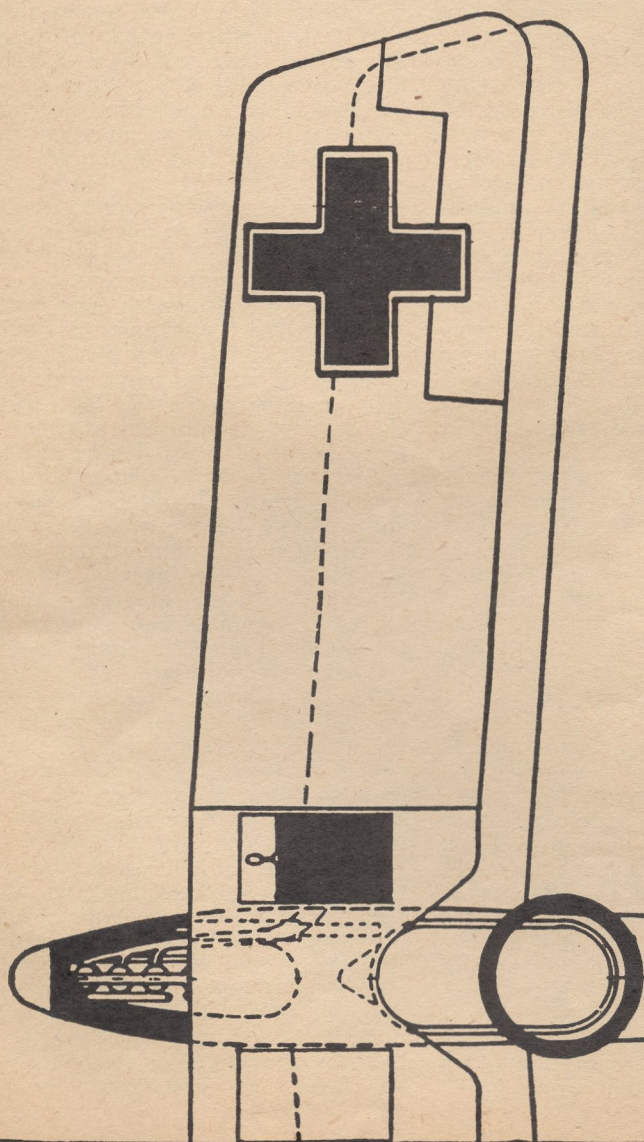
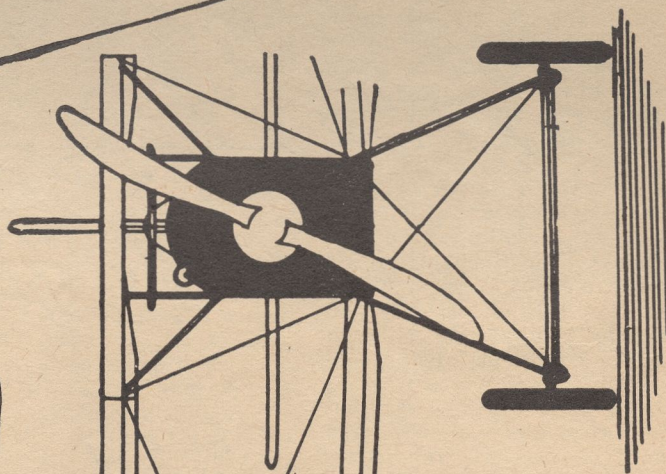
C C

D D

HALBERSTADT C. L. 2



TWO-PLACE FIGHTER



Wing span, upper.....	35 feet 3/4 inches
Wing span, lower.....	34 feet 11 inches
Chord, upper.....	5 feet 3/4 inches
Chord, lower.....	4 feet 3/2 inches
Height.....	9 feet 6 inches
Overall length.....	24 feet
Engine—Mercedes.....	180 horsepower
High speed.....	105 miles per hour
Rate of climb.....	500 feet per minute
Landing speed.....	55 miles per hour

GERALD MAPER

"JUNIOR MISS"

This fine-flying outdoor commercial job is just the thing for your Fall program

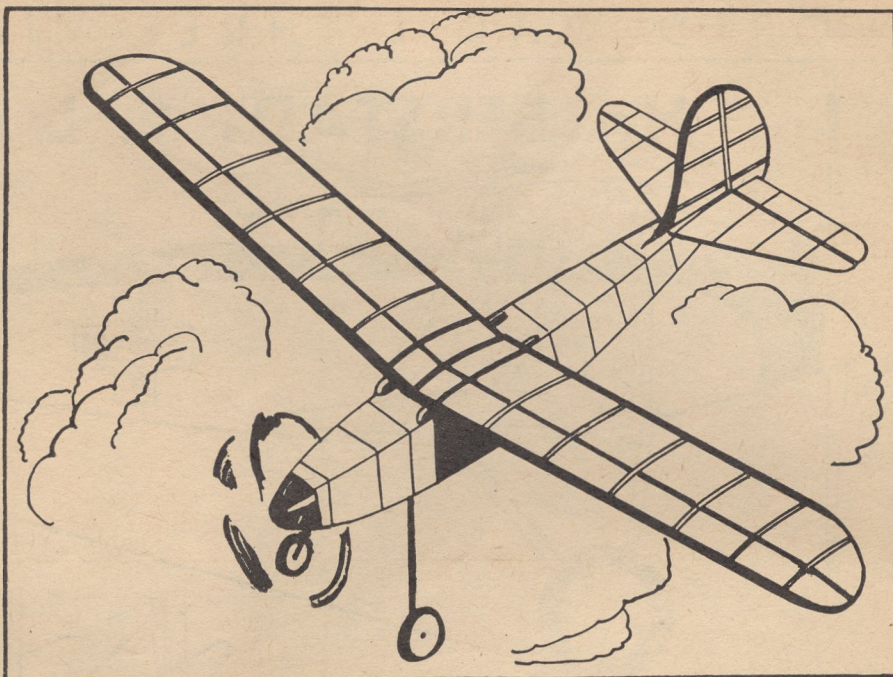
by Ralph Tekel

"JUNIOR MISS" has been designed in response to the many letters from beginner-modelers who were desirous of constructing a simple craft of dependable flying qualities. The plans appearing on the next page have been drawn in half scale. In order to make a full size working plan either one of the two methods to enlarge the plans may be used. The first is to have the plans "blown up" twice size by photostating which can be done at little cost. By spreading a piece of tracing paper over the plan it is a simple matter to proceed with construction. The second method is accomplished by using a scale rule and doubling every portion of the plan and transferring it to a working drawing. A flat table, T-square and a curve or two will also be necessary. The use of a sheet of transparent paper over the work drawings is suggested so that parts of the plan will not stick to the wood.

FUSELAGE AND TAIL SURFACES

SELECTED lengths of medium strength 3/32" sq. balsa is used for the longerons as well as the compression members and cross braces. After laying down one side with the aid of small pins to hold them in curved positions where necessary, a second side may be built simply by placing a sheet of transparent paper on top of the first side and proceeding as before. When both parts are ready assemble the body with the cross-braces, positions of which are shown in the top view layout. Note the positions for the pine anchor in top and side views. The anchor is braced as shown in the side view. The inner gusset is a piece of hard sheet balsa cemented firmly in place.

Small pine braces cut to triangular form are cemented in position as shown after a hole is bored to accommodate 1/8" dia. dowels. These dowels serve to retain the wing in position when attached with rubber bands. An additional brace strengthens the "N" strut—where the landing gear leg rests. The tail end of the fuselage is also braced with a piece of hard balsa to strengthen the converging longerons. Add the sheet balsa skid and wing mounts. The nose plug is carved to shape as shown. To the attaching side is added a frame composed of four pieces of



Here's the author's sketch of the original "Junior Miss" which flew out of sight.

3/32" sq. lengths and arranged so that when the plug is inserted into the mouth of the fuselage it fits snugly. A hole to accommodate the prop shaft is bored. Cement eye-let bearings in each opening.

The landing gear is bent to shape from .038 music wire to the design shown. The upper piece is cemented to the cross brace with a generous application of cement and reinforced with a binding of strong thread after which another application of cement is spread over it. The propeller shaft is shaped from wire of the same size. Using a free-wheeling device or a stationary shaft one is optional. Carve the propeller from a hard balsa block. Pine may be substituted if desired. Note the airfoil section shown in the propeller template. This should be worked out in the carving.

The tail surfaces are of simple construction. Use hard balsa of the dimensions listed and cement all joining parts well. The rudder frame is assembled as shown. Round off the leading edges and taper the trailing edges with sandpaper. Note the manner in which the rudder frame is designed.

WINGS, COVERING, ASSEMBLY

SINGLE SPAR and wide spaced ribs make the wing construction simple. All ribs are cut from 1/16" sheet and notched to accommodate spars whose dimensions are given. By making a tracing of the right wing and turning it over, the other half of the wing may be constructed at the same time. Round off the leading edge and taper the trailing edge to match the curve of the typical ribs shown. The extreme ends of the spar, leading and trailing edges should be tapered to meet the tip which is cut to shape from 1/16" sheet balsa.

The inner ends of the wings have double ribs. By this it is meant that the ribs are twice thickness of the other ribs. Each one is slanted inward before actually cementing it fast so that when both wing panels are raised, they will have dihedral angle measuring 2 1/2". When so, apply cement between both center ribs generously as well as upon the spar joinings themselves, and press both panels together. "Prop" blocks raising the extreme wing tips to the correct height must be placed in position and allowed to remain there until the wing unit hardens.

Fine tissue is used in covering all the surfaces. Use banana oil for the adhesive and do a careful job. Both sides of the tail surfaces are covered. The portion of the fuselage where the rubber strands are attached is left uncovered to facilitate matters.

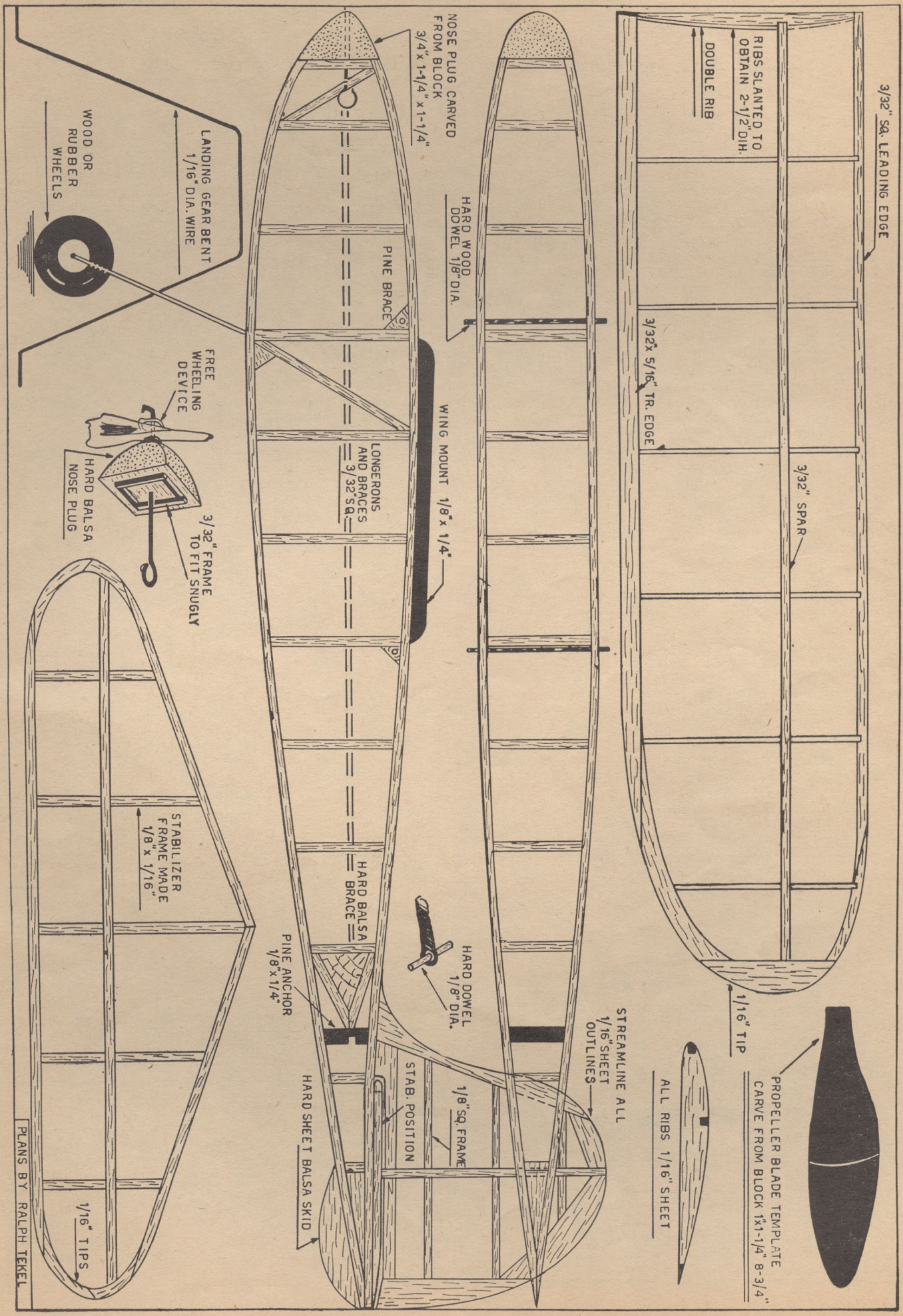
Six strands of 1/8" flat rubber are used. Strands should be measured so that there is a two inch slack when the rubber is wound out. Power strands should be inserted into the fuselage before covering. Water shrink all surfaces and allow to dry thoroughly before brushing at least two coats of dope over all.

The horizontal stabilizer is cemented in the position shown and the rudder directly above it. The space shown between the rudder and the stabilizer is a bit exaggerated on the side view. The rudder should be cemented flush to the surface of the stabilizer at perfect right angles. Using flat rubber attach the wing securely to the wing mounts by looping them around the pine dowels.

The propeller may be hand wound or winder-wound. In the latter case it should be pulled out once again its normal length. Follow the same method of testing and adjusting as has been done with your previous outdoor models.

THE END

HALF-SCALE PLANS FOR "JUNIOR MISS" OUTDOOR JOB



BRITISH TROOP-CARRYING GLIDER

Here are some detailed facts on Britain's glider training program including notes on Hotspur II, troop-carrying job

by MARTIN POWELL

PLANS for an air-borne invasion of the Continent have been under steady preparations by the British Air Force for the past several months. Beside the use of transports carrying air-borne infantry, and paratroopers, troop-carrying gliders will also augment the invading forces.

Like the United States, England was rather late in establishing the use of gliders as an integral part of the Airborne forces but since its inception it has been making rapid progress. One of the gliders used in training both pilots and troopers, and which is being built in large quantities, is the General Aircraft *Hotspur* 11, a three view drawing of which is shown on the opposite page. This training ship is quite similar to the operational craft in which actual invasion will be made. Details of the latter cannot be revealed at this time due to military secrecy but it is reported that the only changes that are apparent is the alteration of the cockpit canopy. Otherwise the ships are basically the same, but on a larger scale.

Too, details on the *Hotspur's* capacity is restricted but it is believed capable of carrying either a fairly large cargo, or several personnel. The *Hotspur* which will soon give Hitler's hordes the hotfoot has a wing span measuring 45 feet 10¾ inches. Its length measures 39 feet, 8¾ inches. There are two entrances, one on the

right side just ahead of the leading edge of the wing which is in a sort of mid-wing position, and another entrance located just aft of the trailing edge on the left side.

The *Hotspur's* landing gear is an interesting feature. It is a combination of twin wheels and a broad fuselage skid. Student pilots learn to put the ship down on its wheels as though the craft had a tricycle landing gear. Since there are no wheel brakes, the nose is pushed full forward bringing the flat skid in contact with the ground which in turn brings it to a stop. On landing in this fashion, the glider appears to be nosing into the dirt but the skid prevents any such damage. The landing gear is arranged so that it may be jettisoned in the event a landing must be made on rough terrain. Split flaps aid in cutting down the landing speed.

THE *Hotspur* is built of non-strategic materials, too. Except for small metal fittings the ship is made entirely of wood. Elliptical shaped bulkheads are used throughout in conjunction with four main longerons and stringers. The wing is made in halves being attached to short stubs protruding from mid fuselage which are set well back. Its square-cut wing tips, high rudder and humped cockpit give this glider distinctive identification features. All surfaces are fabric covered and camouflaged

with straight and irregular patches of dark green and muddy brown.

Method of training glider pilots under the British Airborne troop training program is similar to that of the U.S.'s. Cadets are selected from the ranks, most of them having a corporal's or sergeant's rating. Flight training is given first in domestically manufactured craft as well as light power planes such as Cubs and Taylorcrafts which are numerous in England. The course is almost identical to that given to Royal Air Force pilots with the exception that great emphasis is placed upon dead stick landings.

Those completing the primary course are then transferred to the glider school where they immediately receive training on towed flights. Cast-offs from the tow plane are made at various altitudes so that student develops proficiency in making landings from different approaches. One of these approaches calls for the pilot to dive his glider steeply to gain speed and then hedge hop—sometimes out of sight of the landing field and then back to a landing on the drome after a wide sweep.

Students end their training with formation flying both by tow methods and cast-offs. They are finally sent to operational training units where they get advanced instructions on gliders designed to carry numbers of fully equipped soldiers.

MODELERS naturally may be interested in whittling a solid scale replica of the *Hotspur II* from the plans presented on the opposite page. In this case, one proceeds in the following manner.

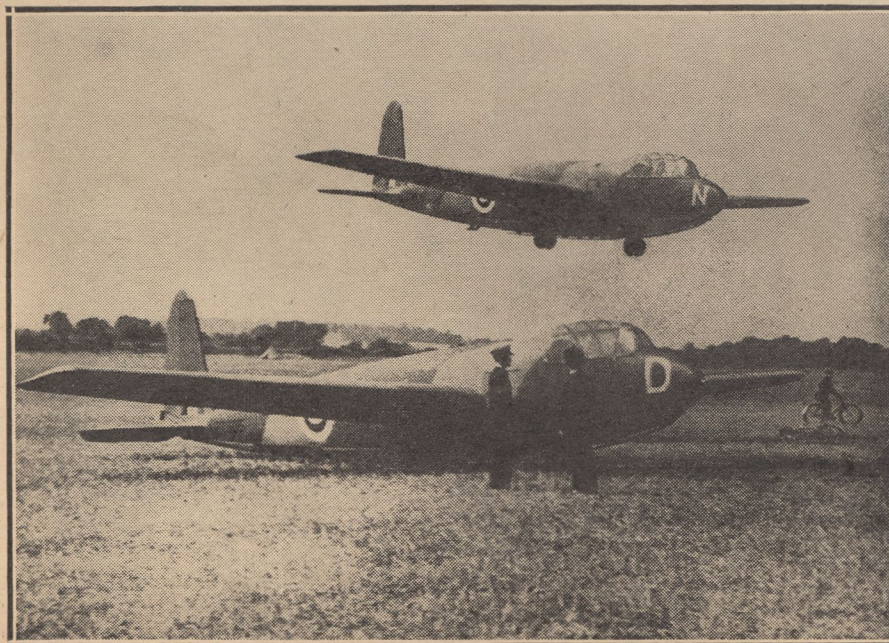
First decide what size the craft shall be. Glider models look more realistic when they are built on a larger scale than one, say, built the size shown opposite.

The cross section of the fuselage follows the form shown in the front view. The cockpit may be built up from metal frames or spliced bamboo and then covered over with thin sheet celluloid. Of course, it would be much better if you would dig the cockpit out about half the depth of the body itself and install a miniature set of controls.

The wing is cambered as shown and tapered both in thickness and plan form. It is attached in a mid-wing position. The tail surfaces are attached as illustrated and as with the wings, have their hinged surfaces outlined. Skids and wheels may be fashioned from wood. Add the camouflage and identification markings as shown.

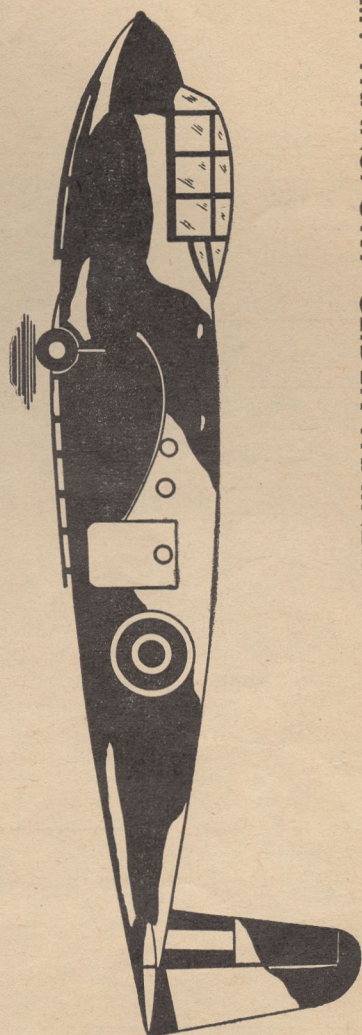
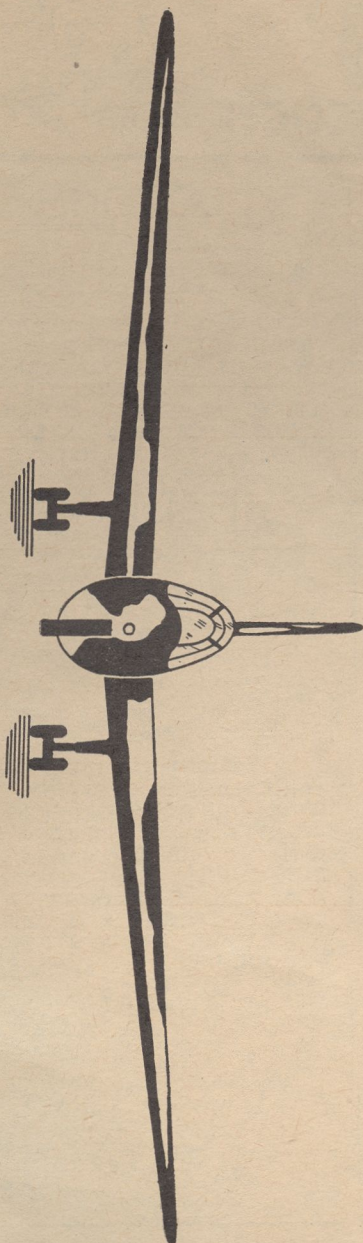
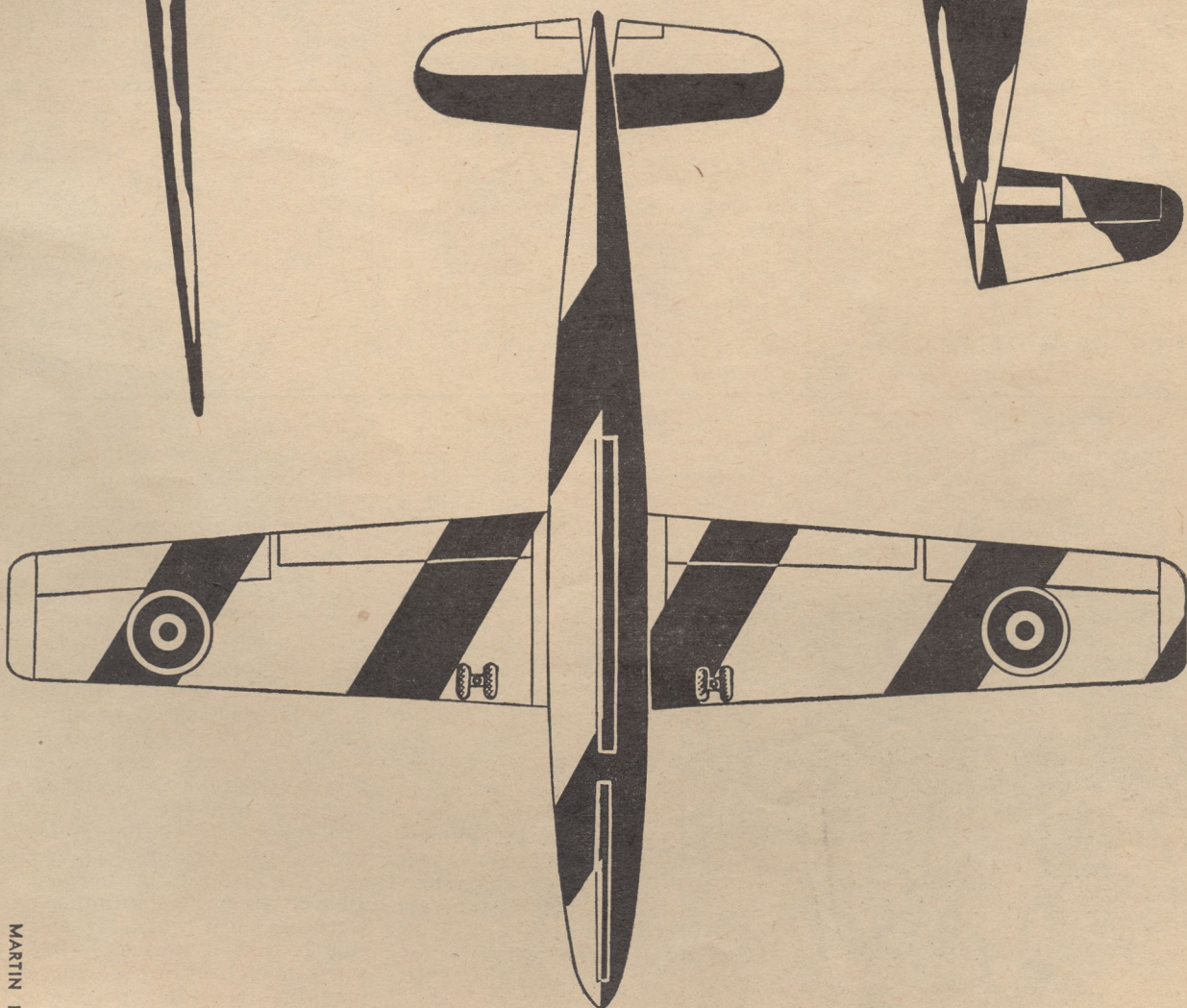
THE END

In *Hotspur* glider transport trainers such as shown below, R.A.F. pilots are being trained for the day when they will fly even larger gliders carrying airborne troops for the aerial assault on the Continent. Note double wheel landing gear and skids.



MODEL THIS SILENT-WINGED TRANSPORT

R.A.F. TRANSPORT GLIDER-TRAINER

GENERAL AIRCRAFT
HOTSPUR II

"YOU SAID IT"

Here's your corner, buzzards, and it's open to all readers.

Cullen Column

Model Editor, FLYING ACES:

Why all this bickering over the respective merits of British and American planes? Who cares which country builds the better plane so long as we win this war? Granted, some American types are better than British and conversely, British planes are better than American jobs. So why quibble?

Why doesn't the FLYING ACES become pro-United Nations instead of only pro-American? Give the good points of other countries' planes as well as their bad ones.

ROBERT A. JOSS,
Montreal, Canada

Model Editor, FLYING ACES:

Who is the guy that won't open his eyes to the fact that the U.S. Lightning and Thunderbolt have twice the horsepower and are eight years younger than the British Hurricane? Why doesn't he compare them with the Whirlwind which still hasn't the same power—approximately two-thirds as much?

The reason we use your planes to train our fledglings is because we can't turn them out fast enough. The new Spitfire V will go up against any Yankee plane in the sky today—and beat it!

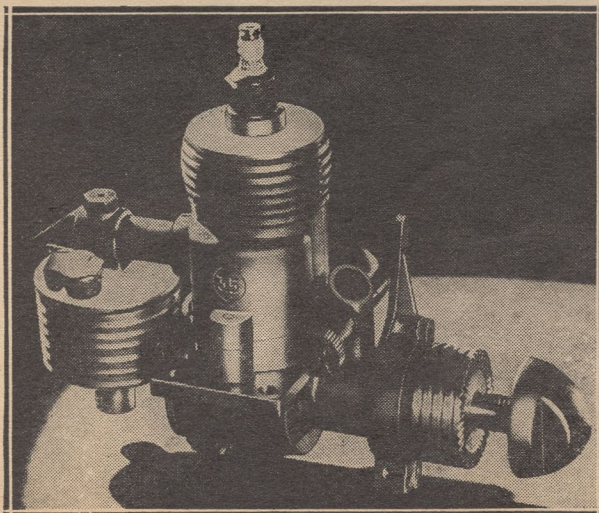
Ross Cullen has the right idea.

DON EMMONS,
Toronto, Canada

Logging the Motor Market

Rogers 35

THE ROGERS Model "35" is a Class "C" engine which, according to its manufacturers is capable of delivering 1/5 horsepower. Its basic structure is the same



Rogers Model "35"
Class "C" Engine.

as the Model "29" which was described in November 1942 issue. This engine uses the new type alloy metal called Molded V. Its outstanding qualities are that it has five to six times the heat conductivity, it is

one-third the weight of cast iron or steel, and requires less oil.

Manufacturers say that the engine is precision-engineered and is match-fitted to ten-thousandths of an inch. The appearance of the Rogers engine is thoroughly modernistic and the cylinder head fins are designed to offer maximum cooling at all operating speeds.

Recommended propeller for the "35"

may be either an 11, 12 or 13" diameter of hard wood with a pitch of 6 or 7 inches—all depending upon the requirements of the plane to be flown. Gas and oil mixture is five parts of S.A.E. 70 to one part of clear gas.

Flying weight with coil and condenser is but 7½ ounces. Bare weight, which does not include the coil, condenser and high tension lead is 4¾ ounces. Bore is .888, stroke is 9/16". It is two cycle type, with a 2 plus integral by-passing ports. Cubic inch displacement is .35.

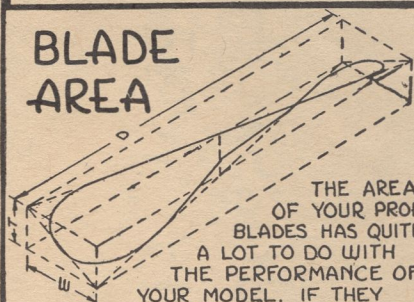
Type of gas feed is arranged through a crank rotary valve which assures steady fuel feed at all flight attitudes. The engine is held fast by a four bolt lug type mounting. Maximum revolution per minute is 10,500 while its minimum is 500. Current price which is subject to change without notice is \$14.50. Engines may be procured direct from manufacturer: Rogers Motor Corp. Hedge & Gillingham Sts., Philadelphia, Pa. Please mention FLYING ACES MAGAZINE.

NOTES FROM THE WORKBENCH



BY RAY WEEKS

BLADE AREA



THE AREA OF YOUR PROP BLADES HAS QUITE A LOT TO DO WITH THE PERFORMANCE OF YOUR MODEL. IF THEY DON'T HAVE ENOUGH AREA THE PROP CHURNS UP THE AIR AND PLANE BARELY MAINTAINS ITS ALTITUDE AND USUALLY COMES DOWN IN A LONG POWER GLIDE.

FOR AN AVERAGE FLYING MODEL THE BLADE AREA SHOULD BE ABOUT 10% TO 15% OF THE WING AREA. BLADE AREA IS DETERMINED AS FOLLOWS:

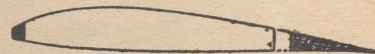
$$\text{BLADE AREA} = \frac{T + \sqrt{T^2 + W^2}}{2} (75 D)$$

WHERE T = THICKNESS OF BLOCK,
W = WIDTH OF BLOCK
D = DIAMETER OR LENGTH

FOR EXAMPLE: YOU HAVE A BLANK 1" x 2" x 12", THEN T=1, W=2 & D=12
SUBSTITUTING YOU HAVE ~
B.A. = $\frac{1 + \sqrt{1 + 4}}{2} (.75 \times 12) = \frac{1 + \sqrt{5}}{2} (9)$
= $\frac{1 + 2.25}{2} \times 9 = 1.66 \times 9 = 14.94$

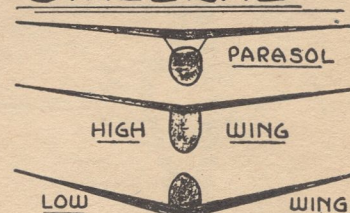
APPROX. 15 SQ. INCHES. RIGHT FOR A 30" WING WITH A 4" CHORD. THE AREA IS MULTIPLIED BY .75 BECAUSE THE EFFECTIVE AREA AFTER THE CORNERS ARE ROUNDED OFF AND THE HUB CUT DOWN IS APPROX. 75% OF THE CALCULATED AREA BEFORE CARVING IS BEGUN

AILERONS



TO AVOID ANY UNWANTED IRREGULARITY WHERE WING RIB MEETS AILERON DON'T CUT THEM OUT SEPARATELY ALWAYS MAKE THE ENTIRE RIB IN ONE PIECE AND LATER CUT OUT THE SECTION NOT NEEDED.

DIHEDRAL



AMOUNT OF DIHEDRAL VARIES WITH POSITION OF WING. A PARASOL NEEDS THE LEAST AMOUNT WHILE A LOW WING NEEDS THE MOST. THIS IS THE RESULT OF KEEPING THE CENTER OF GRAVITY BELOW THE CENTER OF LIFT SO IT WILL ACT AS A STABILIZING PENDULUM.

RUBBER

A GREATER NUMBER OF SMALL STRANDS WILL GIVE MORE TURNS THAN AN EQUAL WEIGHT OF LARGER STRANDS

POT LUCK

(Continued from page 31)

started for the door in a hurry.

Bang! Swi-i-i-ish!

"No tricks, huh?" Phineas said and hopped toward the Nissen. "Here all the time I was offerin' the brass hat one of Garrity's good ones. Haw-w-w-w-w-w, I'm in form now. If I ever meet the vons—"

CONSCIENCES WERE twitching when Lieutenant Phineas Pinkham climbed into the office of a Spad the next night at dusk. Phineas had no mercy on them. He looked right at Bump Gillis and Howell and said, "I bet you are the kind of citizens hangmen call on when they don't want to spring the trap themselves. When the gare is over, go an' git jobs in a slaughter house somewhere."

"We just thought you was the only one could do it," Bump said. "Can I have that wrist watch you have, as maybe you won't be usin'—"

"Ghoul!" Phineas sniffed. "I should knock you both for ghoul. Well, adoo again." He jammed the throttle home, the Spad tore loose and roared across the field.

Phineas managed to cross the lines without mishap. Kraut anti-aircraft took a poke at him near Mont Sec but he ducked the flying scrap nicely and angled toward Bluey. "Fly as the crow flies to Ars, then point a little northwest and you will see the ruins of a little town backed up against the side of a big hill," the brass hats had said. "The only thing the Heinie shells did not miss was a church steeple."

"That looks like where I go West," Phineas gulped and brought the Spad down until its wheels were clipping needles off pine branches. "I hope the Intelligence officer is here. I will apologize for not putting a cot on the wing." He went down to make a landing on a long flat plain and rolled along the edge of the woods. No passenger was in sight. He brought the crate to a stop and got out. After making sure there were no Krauts in the immediate vicinity, he started on a run for the ruins of Bluey.

"So far, too good," Phineas gulped as he reached the ruins of a certain edifice. There was the big wide chimney, the drunken sign that told the community it was a bakery. Phineas clambered over some debris, got into the old house and found the little iron door in the brick chimney. He opened it, thrust a hand in and his fingers came in contact with a thin, square package. He thrust it into his pocket and withdrew.

"What a cinch," Phineas sniffed. "They could have sent Glad Tidings Goomer for such a sissy job. Well, I will hurry back so that Chaumont won't worry. Haw-w-w-w-w!" Emerging from the ruins of Bluey he started downhill to where his Spad was grounded. Still no Boche in sight.

He took his time, even whistled a couple of bars of an old song. Ten paces from the Spad, the pyrotechnics started. A rifle sounded the keynote. A machine gun took over and three potato masher grenades flew through the air. Bong! Bong! Bong!

PHINEAS MADE a running jump for the stirrup and nearly sailed over the other side of the crate. He got the Hiss yowling just as a grenade took a piece off the tail assembly. Bullets hummed like a swarm of bees in a honeysuckle bush as Phineas took off.

"It was too quiet," Phineas admitted as he got buoyancy under the crate. "Well, you didn't git me, you dirty bums, haw-w-w-w-w-w—er—or didn't they?" The Spad would not gain altitude. Steam was swishing back in Phineas' face and oil plopped into the Boonetown wonder's half-open mouth. Just two miles away from the take-off, Phineas was on real estate again and the Spad was sliding down a steep bank and into a frog pond.

"Oh, cripes," Phineas said. "I have the map of the Heinie back area dumps and here I am—it is like a burglar who has got into a store full of diamonds and then steps on the electric alarm system." He started running when he heard shouts somewhere in the night. He cut through a deep woods, forded a shallow stream and climbed the side of a steep, rocky promontory. The mists were thick on the summit and Phineas got on his hands and knees and tried to pierce the soup with his eyes.

He saw a light, a will-o'-the wisp in the fog and started toward it. Slowly something took shape in front of him. A big house of some kind.

"Just like a fairy tale," Phineas choked when he got to a window and looked in. He saw an old coot with a white Van Dyke beard toasting his pedal digits in front of a big fireplace. Phineas went around to the door and knocked.

The big door finally swung open and the strange character peeked out. "What ees you want, oui?"

"Succor," Phineas said. "Which is what I am or I would not be a aviator."

"An Americain, voila! Entrez vous—vite-vite," the old man said. "Have ze chair."

Phineas sat down in a high-backed chair the legs of which suddenly gave way and his empennage hit the boards with a resounding whack.

"Haw-w-w-w-w-w-w-w-w!"

Lieutenant Pinkham knew he had not laughed. Little imps, each armed with a darning needle, marched up and down his spine and kept using the spears.

"Welcome, M'sieu. To ze maison of Henri Pinkhomme, oui. Now you

take ze good chair at ze table an' I breeng ze wine."

"It is a nightmare," Phineas groaned. He got up, went to the table and sat down. The old man brought a glass of wine. "Me, I dreenk ze rum. Wine ees for babies. To your health, mon ami."

Phineas lifted the glass to his lips. Wine sprayed his tunic and trickled into the collar of his coat. He lifted the glass again and made sure his lips were firmly against the rim. The wine began to wash his chin again. Phineas, heart thumping, lifted the glass to the light fanning out from a wall lamp. He saw the two tiny little holes in it.

"A dribble glass," Phineas yipped. "Look, you said your name was-er-M'sewer—?"

"Pinkhomme. Of ze famous French family. Ze glass ees fun, oui? Haw-w-w-w-w! On ze wall in ze nex' room I show you ze peeecture of Jules Le Pinkhomme who discover some of America weeth LaSalle—"

PHINEAS, his legs quivering like agitated banjo strings, trailed the old Alsatian into a big, raftered room. The Boonetown miracle man sniffed at the air, was sure he could smell the unwashed voyageurs of centuries past. A cob-webby painting hung on the wall. It was of a man with a black Van Dyke and he had big ruffles around his neck. His nose was big and his teeth were prominent and there were spots on his cheeks.

"You look seek!" Monsieur Pinkhomme said and gripped Phineas' arm. "Sacre bleu, but ze peeecture an' you—ze name, mon ami—queeck!"

"Phineas P i n k h a m, M'sewer." Phineas gave the old coot a cigar. "A present for ze host, oui. Ze ten center from the U.S."

"Ah, so long seence I have ze cigar," the old man beamed and touched a match to the weed. Bang—Swo-o-o-osh! M'sier Le Pinkhomme slapped fire out of his Van Dyke and ducked out from under a shower of sparks.

"Haw-w-w-w-w-w-w-w!"

Old Henri Le Pinkhomme was aglow with wonderment, incredulity. "We are relations," Phineas said. "Shake, M'sewer."

"Oui. Ze eyes, an' ze nose, an' ze freckles," the aged one marvelled. He grabbed Phineas and kissed him soundly on both cheeks. He pushed him into a chair and asked him what his business was in Alsace.

Phineas told it all in detail. Old Henri cupped his bearded chin in his hands and listened.

"So," Henri said at length. "Ze Boche theenk they insult ze Pinkhommes, oui? Ha, zey theenk I am ze frien' of ze Kaiser, Pheenys. Ze vons Kruller an' Pretzl—bah! Often I see zem in ze village drinking ze wine. Not so far away ees ze drome where ees the Fokkers. Zis Gottlieb von Kruller ees the wors' peeg! You havé ze trick up ze sleeve, non?"

"I must get a crate to escape in, mon ami," Phineas said. "It is sui-

cide to go to the drome an' try an' steal one. Mahoomet has to bring the mountain to him this time, comprenny? Let me think, M'sewer. Gottlieb, huh?"

"Oui, so weel, Pheenyas. Two Pinkhommes mus' be able to trick ze Boche. One of us weel have ze idea, non?"

"Eureka," Phineas said. He dug down into a pocket and brought up two big coins. He handed them to old Pinkhomme.

"Mon Dieu! Gold Napoleons, mon ami! Where ees eet you get ze ol' coins of France? Voila!"

"At the foot of the rainbow an' they was even in a pot," Phineas grinned. "So, if any of the Krauts should see an old galoot like you spending them in a buvette, what would they think, huh?"

"Ah, a cheep off ze old block, oui," Henri Pinkhomme yelped. "Zey would theenk I am ze hermit who finds ze treasure. Ze vons weel make ze excuse to come here an'—"

"An' they would most likely want none of the other Boche pilots to git in on it," Phineas diagnosed. "So while they were out on patrol they would sneak in for a landin' an'—"

"Oui, ze field below ees so flat," Old Henri enthused. "Ze Boche weel theenk there ees gold here. You mus' go down there an' hide in ze old cellar wheech I weel show. An' so ze Boche lands, you weel steal ze Fokker an'—pouf! I go to the village tonight, mon ami? Eet ees always about ten zey are drinking ze schnapps there, Pheenyas," Old Henri said. "In ze leetle estaminet. I get ready to. Vive la Fraw-w-w-w-wnce!"

"FROG blood in me," Phineas sighed when he was left alone. "It could be worst, as I could find out I'm a relation to the C.O., couldn't I? Funny about that time I visited New Orleans—I was sure I was there before sometime, which I wasn't. I bet the Pinkhommes discovered most of the U.S. but was robbed of confirmation by Louie. Now let's see." Phineas took a letter from his pocket. Delectable perfume still lingered between the lines. He read it aloud, translated it as well as three years of German in the high school in Boonetown, Iowa, would permit.

"Dearest, sweetest Gottlieb. I miss you so much an' count the days when you can get to Munich. You know why I had to marry Herr Oberst von Kluck, the old cow, ja, don't you, my precious liebenkucken? While you are flying and facing death, he sits in a chair and looks so smart like the pig. Fly to me again when you have the chance. I love you—love you—love you, my great, big, brave aviator. Lots of kisses until I see you in der garten by der roses. Your loving Gretchen von Kluck—I mean Gretchen Liverwurstig."

"Boy!" Phineas snickered. "Herr Oberst von Kluck. The tough old Kraut who was the best bum with a sword at Heidelberg. With the High Command. M-m-m-m! Well, I will

send the letter to him and say it is from a friend who does not like to see a home broke up. It is an outrage, wreckin' happy homes and I won't stand for it. Haw-w-w-w-w!"

Old Henri Pinkhomme returned at midnight. "Ah," he said. "I pay for ze dreerk weeth ze gol' Napoleon. All ze eyes bug out. Ze Boche flyers, von Kruller an' von Pretzl zey get ze heads together when I go out. Zey weel be here tomorrow, in ze matin, mon ami. Now I show you where to hide down by ze flat field."

"They will put a gun at your head an' kill you if you don't tell them where it is," Phineas said, betraying a little alarm. "If they don't find it, they'll say you are a liar an' knock you off. I shouldn't leave you alone with the butchers as we are blood rel—"

"Bah, I am ze Pinkhomme, non? So I have ze treek up my sleeve, oui," Old Henry bridled. "In ze cellar ees where I mak' ze rum. I am ze ol' voyageur an' dreerk only rum. When I see ze guerre ees come I have to put een ze supply of what mak's ze rum, non? Zere ees t'ree beeg hogsheads of thick molasses in ze cellar, an' only to get in ze cellar ees ze trap-door weeth the ladder down. I tak' out ze ladder an' somebody has to drop in ze cellar. Comprenny?"

"Haw-w-w-w-w-w-w!" Phineas laughed and it was a real belly laugh. "Us Pinkhams, how can the Allies lose? Awright, here is a letter I want you to put a Heinie stamp on, mon gran'pa."

"More tricks, oui?"

"We are full of 'em, huh?" Phineas grinned.

Old Henri got a bottle of wine, some bread and cheese and then led Phineas down the steep, rocky scarp to the level land where an airplane would have to land. He showed Phineas a nice hiding place and then shook hands.

"AFTER ZE GUERRE, look me up, oui," Old Henri said and brushed a tear away. "Adieu, Pheenyas. I weel take care of ze Boche and you weel steal ze Fokker. Vive le Fraw-w-w-w-wnce."

"Adoo," Phineas said. "Blood is thicker than water, huh?"

"But not as thick as ze molasses, non?" Old Henri grinned. "Adieu encore."

Phineas curled up in the old, abandoned stable cellar and got some shut-eye. He did not intend to sleep until morning, but even a Pinkham's fuselage can only stand so much pounding in a day. It was dawn when he opened his eyes. Birds were not singing but the prop of a Mercedes engine was. Phineas peeked out and saw the Fokker D 7 coming in to land.

"One, huh?" Phineas sniffed. "My hunch was right. 'One von stole a march on the other. People are not human when they see gold in front of their peepers. I bet it is von Kruller."

The Heinie got out of his office, made sure his Luger was in easy

reach and strode up the rocky hillside. Phineas counted the minutes before he emerged from his hiding place. He counted forty of them. It wouldn't take long to get the Boche engine turning over. "Good luck, Henri. Boy, would I like to see the von drop into the cellar. I bet there is six inches of thick merlasses in it now. Well, I have the Allies to think of."

He ran to the Fokker D 7, climbed into the pit and switched on. He jumped out, ran up to the nose of the Heinie battle wagon and spun the prop. He raced back to the office and richened the mixture. H-r-r-r-r-room!

Phineas took the D 7 off, got up to a thousand feet when he saw the other Boche crate coming. It was diving and when it got in close, the Spandau guns spewed Krupp phlegm. Bullets cut across Phineas' lap, washed out an instrument on the panel and messed up the little backwash shield.

"Oh, I get it!" Phineas howled. "It is von Pretzl. The other squareheaded pilot crossed him and left to hunt treasure without him. Von Pretzl thinks von Kruller has already knocked the hidin' place for the Napoleons out of the old geezer an' is he goin' to git hunk—!"

Phineas climbed crazily, implored his cranium to put what was in it to work and get him out of the mess. His gray matter obliged. It told him von Kruller was the master mechanic and von Pretzl only the apprentice. If he could stay up until von Pretzl cooled off, he would save his neck.

"Double-crossers should live—but not for long," Phineas gulped, and went into an Immelmann. It was von Kruller's favorite maneuver and once Phineas had nearly been liquidated by it. Von Pretzl would recognize the play. He would get into a circle with the master and then the master would knife out of it and knock him off. Von Pretzl would be expecting such a move, so Phineas Pinkham did exactly the opposite and he went up into a loop and came down on von Pretzl's D 7 before the Boche could get his eyes back into their sockets and the element of surprise out of his system. Phineas sent a burst at von Pretzl and it took most of the D 7's empenage away.

"Even a eagle is at a loss fightin' a dove with most of its tail feathers off," Phineas yelped. It is no use now, you fathead. Boys, he is scared stiff now. I can hear him say, 'Oh Gott, it ist Gottlieb I am fightin' an' I lost my dome. Himmel!'"

Leutnant von Pretzl, the yen for buried treasure melted by a great fear, thought only of getting downstairs and digging himself a hole in the ground. He was in too much of a hurry to land and before the D 7 came to a stop, a lot of pieces from it were flying through the air.

"What a landin'," Phineas howled. "If he walks away from that one, he will not be able to pilot nothing from now on except a go-cart. Boy, what

the lure of filthy lucre does to a citizen. Why my own grandfather, Hector, was killed in a gold rush. Huh! Adoo, von Pretzl. Now it is up to the Kraut mail service and Old Henri to fix the wagon of the other Heinie."

IN THE OLD chateau, Old Henri Pinkhomme looked down a trap-hatch. Round, rugged Teuton oaths came up to widen his toothless grin. Old Henri played the rays of a lamp on the upturned face of Leutnant Gottlieb von Kruller. The Jerry was up to his knees in thick, black molasses. He slipped and fell when he shook his fists at the old Alsatian and then he was on his hands and knees in the gooey stuff, like a fly bogged down in sticky fly-paper.

"Haw-w-w-w! If Pheenys could only see ze Boche," Old Henri snickered. "By ze time you get out, mon ami, I weel be in Paree. Why should I stay when all ze molasses for ze rum ees gone? Listen, Fritzzy. You hear ze plane go? Eet ees mon blood relative, Pheenys Pinkhomme on hees way home. Voila!"

"Donnerwetter!" Leutnant von Kruller screeched. "Pinkham! Ja—Gott! Also you have ze same face, nein? Himmelkreuzdonnervetter! I am going crazy yedt!"

"Gold eez ze curse, oui," Old Henri yipped. "Well, adieu, mon ami. Alsace eees not ze safe place for a Pinkhomme now." Old Henri put the trap cover on and von Kruller's howling was muffled.

Leutnant von Pretzl crawled over the real estate, calling for the police to arrest the motorman of the street car that hit him. "I vas crossing der street, an' he had der time to stop, ja. I will sue der city undt—" His senses flew the coop again and he spread himself out in a bushy area and became as quiet as a mouse. When he sat up, a terrible looking monster was shaking his shoulders. It was on its hands and knees like a man, but it was made up of goo and sand.

"Go away," Leutnant von Pretzl yelped.

"Look, idt ist Gottlieb, kamerad," the gooey man gurgled. "Eferyting ist der dream, ja? How you get here, hein?"

"You shot me down, bummer! I haff der broken leg, and der arm, and maybe der head. You sneak oudt an' go after das treasure—!"

"I was not in der Fokker. It was Leutnant Pinkham, ja. I bet you we was tricked undt—"

Leutnant von Pretzl passed out again.

Lieutenant Phineas Pinkham got over the Meuse at six A.M. and three Spads had at him. Phineas recognized Howell's crate by the silk stocking that flew from a strut. Bump Gillis was right behind the leader of A Flight and Phineas knew they were a tough combination in the scraposphere. Frantically he waved to them, thumbed his nose, and pointed down at the ground. Vickers lead

pelted his D 7 and made it as sluggish as a turtle with hookworm.

"They are sore at the Krauts," Phineas choked. "They think I got shot down last night so are givin' everythin' they got. Well, my only chance is to hedge-hop. Here I git out of two messes, an' when I git home I git into a worst one. He-e-ey, you fatheads! It is me, Phineas. I have the bacon, an' if you burn it to a crisp, how can the Allies—?"

THE D 7 SKIMMED over the trenches. Rifles barked at it. A hand grenade broke up underneath and washed a wheel off. Behind Phineas, Bump and Howell kept working the Vickers. Phineas pancaked close to a communication trench and the D 7, shedding both wings, slid into a big shell crater. There was four feet of muddy water in the hole.

Phineas, a mud pie with legs and arms, lay on the soil of France while soldiers and aviators fought over him.

"Nerts," a non-com yelped. "You guys did not bring him down. Pooley here, he got him with a grenade. The Mills bomb took off a wheel. I got two close pokes at him with a rifle an' I know I pocked him. You frowsy flyers always grab credit for everythin', hah?"

"You look here," Bump Gillis started in just as Phineas began to become aware of the world buzzing around him. "We got this Heinie an' if we have to knock a couple of you doughs dizzy, awright! We'll see how you can fight. You work on the tall one, Captain."

Phineas sat up and scaled mud away from his eyes.

"Oh, shut up, all of you bums!" the Boonetown flyer coughed out with a chunk of mud. "Stop fightin' over me as I am not a Kraut. When you clean me off, you will get down to a U.S. uniform. I am Phineas Pinkham—remember?"

"Wha-a-a-a?" Bump squeaked. "In a D 7? Then we was shootin' at you all the way in, huh? Why didn't you—?"

"I forgot my lodge sign, you lunk-heads!" Phineas growled and got on all fours. "Well, I bet you won't be bothered by the two vons, Kruller an' Pretzel no more. I fixed their wagons, but the way I did it I wouldn't do it the second time if I had to. Who has some rum?"

"I got cognac," a top-kick said. "I'll get it—"

"Bilge-wash," Phineas huffed. "I am a voyageur with tough Frog blood in me. Rum or nothin'. Haw-w-w!"

Lieutenant Phineas Pinkham rode to the drome of the Ninth Pursuit at noon. He limped into the Operations shack and placed a map on the Old Man's table.

"You can eat it, too," Phineas said. "So you thought you'd all get rid of me, huh? You are a big walrus and a mangy one at that. Oh, I wish I could think of all I was plannin' to call you, you big lug! You would steal sheep. You are a—"

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"Awright now, Pinkham," the C.O. said. "Just get it all off your chest so there will be room for medals, huh? Get him some spirits of ammonia, Goomer, as he is not quite himself."

"Rum I want," Phineas tossed out. "Rum goes with buried treasure. Eight men on a dead Kraut's chest, yo-ho and a bottle of rum. Get it, the bottle! Or make some with merlasses as gran-pa Henri does it easy—yo ho and two bottles of rum. Make sure no Boche is stuck in the merlasses—rum-rum! I want—rum!" Phineas sighed deeply and popped off to sleep.

"Yeah, let him sleep here," the Old Man said. "Get him a pillow. Hurry up and snap into it. He's worth more'n the whole bunch of you clucks! Uh—er—look what dropped out of his pocket. A big coin. It's gold! 'Pieces of eight—yo ho an'—' that fathead found treasure some place. Maybe Monte Christo's. Well, when he wakes up, he'll tell us where, or we'll break his skull. Gold!"

"F-Filthy lucre," Phineas said in his sleep, "Glop-glop—pl-r-r-r-r-r-p."

TEN DAYS later, Herr Leutnant von Kruller was accused by Herr Oberst von Kluck of trying to steal his wife. He was shown the incriminating mash note and was challenged to a duel. Von Kruller argued that there was a mistake. It was some other Gottlieb. But an outraged husband can never be convinced.

The duel took place and Leutnant von Kruller lost the top of his left ear and a piece of his nose. When he had been tidied up by Kraut medicos, he got his orders to go to the Eastern front. As far away as Turkey, in fact. The continued absence of the two pestiferous Boche in the sky was proof enough for the Allied airmen. They held a binge and assured Phineas that he was still top man in the war.

"Haw-w-w-w, it takes you long enough to find out, you bums," Phineas said. "Now I must see about that week in Paree as I would like to know if Henri got there. How did the Krauts think they could lick two Pinkhommes, huh?"

"Two?" a brass hat exploded. "Look, Garrity, you let the Lieutenant get out of bed too soon. Where's the other one, Pinkham?"

"Oh, he's awright," Phineas grinned. "I am not worryin' about him. An old voyageur that has the blood of the citizens who discovered Hudson's bay in him, could easy find a place like Paree that is always there. Excuse me, as I want to go and count my Napoleons."

"Yeah," a Colonel said when Phineas left the mess. "You can't take a pitcher to the well too often, Major. That one is cracked for keeps now."

"Some day," Garrity said, brushing his feverish eyes with a big hand, "I will sit down all alone and try and think this thing out. You will excuse me, won't you, gentlemen?"

THE END

LAST FLIGHT

(Continued from page 36)

IT WAS even a more determined lad who plunged into his senior year the following fall. He was going to become an aircraft engineer; any vestige of doubt was now removed. And he was going to be an airplane pilot as well. How firmly he planned his course, how far ahead he was thinking, can be gathered from his senior thesis, which he worked out with a classmate—"The Physical Properties of Aluminum Alloys." A rare thesis that! Airplanes were still being built of wood and wire, steel tubing and fabric. Here was a student exploring materials that, later, were to become basic for the aircraft industry. It won for him the coveted Sigma Xi key when he took his A.B. in M.E. in 1923.

In the spring Ken Ebel returned to the Martin Company, worked hard through the summer, but to his chief he confided his further ambition—he wanted to be a pilot. Engineering data were not as precise and dependable then as they are now. The airplane itself was still the best laboratory.

So in the fall of 1923 the youthful engineer entered the Army Air Corps training center at Brooks and Kelly Fields, in Texas. He breezed through his primary training and was moving steadily in advanced training when he was dealt a cruel blow. He was washed out because of "flying deficiencies." Today, as one of the greatest test pilots in aviation history, he smiles a bit at that memory.

"I heard from a comrade that it was because I was 'too conservative', he recalls. It was comforting to know that, anyway."

When Ebel returned to Martin's he got an unexpected lift when he was put in charge of stress analysis, and even an official letter from the Air Corps three weeks later inviting him to come back to Kelly Field and try again (somebody had obviously looked over his record) failed to entice him.

"I'll get my flight rating some other way," he resolved. He did, with the Air Corps Reserve, and from then on every spare moment was spent gaining experience in the air. He joined the Ohio National Guard Squadron, and in the years that followed he became a crack pilot.

In the meantime, Ebel moved rapidly with the Martin outfit. In 1925 he had been made assistant chief engineer. There had taken form the TM series of torpedo scout-bombers with which the Navy set up standards of excellence in the launching of torpedoes by aircraft—a technique that today is sending great warships to the bottom in modern warfare. There had been other Martin ships, too—Navy

scouts, a mail plane, an experimental submarine-borne scout plane, and others. Up to that time Ebel entertained no ideas of being a test pilot. He was a good flier, having piled up plenty of hours on clumsy D.H.-4's and such.

It was in the late 1920's that Ebel began to cast his eyes covetously at the controls of the ship he was helping to create. It was the BM-1, dive-bomber. "I was itching to test the ship myself," Ken relates, but the chief had other ideas. He wanted Ed Ritchie to handle her. Ed had been a top flight Navy pilot and the Navy requirements were for terminal velocity dives, pull-outs and spin tests with a dummy load. The prototype was not "given the works" but she behaved well enough in first tests.

The first production model of the BM-1 was taken over to the Navy field at Anacostia for tests. Everything went along fine until Ritchie took her up for the big dive. With 1,000 pound dummy placed between its landing gear, Ritchie stood the ship on her nose and down she came. But Death was riding with Ed Ritchie that day. Horrified watchers saw the wings fold up and float away. The pilot could not clear the ship.

RITCHIE did not die in vain. Out of the splintered wreckage rose salvation for many another flyer, for there came a new conception of air gusts and wing loadings for the whole industry.

"No one can estimate the value of his contribution," Ebel remarked. "You see engineers had never before fully considered the effect of gusts. I might explain it this way:

At 10,000 feet the air is moving horizontally, let us say at 20 miles per hour; two thousand feet lower, perhaps, it is moving at 50, and maybe at 30 again in the layer below that. Now send an airplane, as Ritchie did, diving through these strata. Can you see the wrench the ship sustains on its upper surfaces when it hits that higher velocity? The same is true of sudden vertical gusts. In investigating that accident, the board went back over the weather data, and especially the air soundings, and marked the gusts. The result was that wings were "beefed up" to stand sudden strains."

Even so, it took a good measure of intestinal fortitude to watch a comrade die violently and then ask to take up where he left off. That is what Ebel did. He had been spoiling to test Martin ships, and now he set up a clamor in Glenn Martin's office. He won out.

It was quite a while before the BM-2 was ready. In the meanwhile the company had moved into its new factory and was concentrating on the Navy's new PM-1 and PM-2 twin engined patrol flying boats. So January, 1932 rolled around before Ken Ebel took the new dive-bomber down

to Dahlgren Proving Grounds and put it through its dives and spins.

She came through with flying colors and Ebel was enjoying his new rating that had been added to his title of assistant chief engineer. By August of that year the second of the series was finished and the Navy's contract called for the limit in this one, too. It was just as well, for there was an unsuspected "bug" in it. But let Ken Ebel tell about it.

"She seemed to be a good ship—a little heavier than the preceding one, but she went through her dives in good order. Those were its first tests. Ten days later we got around to the last hurdle—spin tests. I took her up to 10,000 feet with her 1,000 pound bomb in place, pulled her into the usual stall and kicked her into a spin. Something was wrong. She flat-spun and that wasn't the call. So I blasted her out with the engine and climbed back upstairs to see what caused it.

"We started down again, and hanged if she didn't get back into that flat spin. I watched awhile to see what the trouble was, but when I tried to use the engine to wrench her out of it, the thing quit cold. There wasn't any use fooling around then, so I got out."

But that's not the side of test flying Ebel likes to talk about. "The days of the break-neck boys have gone. It is the engineer who flight-tests the ship today and he has to know a whole lot more than just handling the controls."

"And put this down in your note book," Ken adds, "for every terminal velocity dive and high acceleration pull-out, there are hundreds of other tests in which the actual handling of the airplane is purely incidental. Take the big ships for instance—the patrol bombers and Clipper jobs. Did you know we water test her for weeks before we even take the air? And what's more, there's a full crew of engineers aboard who check every single part for performance—thousands of readings and observations are made, and the flying qualities, so

far as a pilot is concerned, are reduced to exact figures. The test pilot is not worth his salt who cannot interpret those qualities intelligently."

That coming from such a test pilot as Ken Ebel is something a man knows what he is talking about.

THE END

SKY TRUCKS

(Continued from page 27)

feeder and the trunk line service of its own system, controlling and coordinating schedules accordingly. Cost of ground facilities would be less, as would the cost of operation and maintenance.

"Rates will be the biggest factor in determining the volume of air cargo. In time of emergency the rate may not play so important a part—but in days of recession, business houses and individuals will seek a means of saving money. At present air express rates are from 4 to 7 times rail-express rates; correspondingly higher than rail-freight rates. Ton-mile operating costs of cargo-planes will have to be low enough to attract the movement of large numbers of commodities. Prompt pick-up and delivery service is so important a part of cargo operations that carriers must always be prepared to meet the situation, even to the extent of setting up the service themselves."

Another angle of the picture was presented by Mr. Loening who commented that the development of the troop-carrying glider, towed by an airplane, was probably the most significant development of all the recent items that have led to more and more efficient load-carrying efficiency. Terming gliders the "freight-cars-of-the-air," in which loads can be carried with two or three times the efficiency that they can be carried on the aircraft themselves, Mr. Loening built up a word-picture of such operation.

"Visualize a locomotive plane that can leave LaGuardia Field with a

train of six gliders," suggested this aircraft designer and engineer. "By the use of the glider the cargo capacity of a ship like the DC-3, for example, would be doubled. By having the load divided, there would be the added facility of unhitching the car that must land at Philadelphia as it flies over the city—unhitching the load that has to land at Washington, when reaching there—then Richmond, Charleston, Jacksonville, as each city is reached—and finally the locomotive plane itself lands at Miami."

Mr. Loening asserted that "40,000 B-19 planes, each capable of carrying 20 tons at 250 miles per hour, would be able to replace the whole enormous ton-mile carrying capacity of all the ships of the world available to us. The cargo that is carried by 2,000,000 freight cars in the United States could be carried by 45,000 heavy, long-range bombers being flown day after day."

Continuing, he commented, "It is clear that to keep 300,000 pilots that we are going to have at the end of the war at work, and the still larger number of mechanics, and in order to use some of the thousands of aircraft that we are going to inherit from the war, as well as keep the factories going in some way after the war—aircraft will have to invade the heavy freight field of the railroads and the heavy cargo field of the international shipping companies.

"IT IS NOT impossible to envision the shipbuilding industry of the United States being turned over to the construction of ocean aircraft. To build a fleet of huge flying ships in the shipyards of the United States to completely replace the existing, ancient and completely obsolete idea of moving cargos on boats that float on the water, would require material and men on a scale less than half of the total capacity of the present aircraft industry."

This comment by Mr. Loening was made more than a month before Henry J. Kaiser, West Coast ship-

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builder, proposed to undertake mass production of 70-ton Mars flying boats as cargo carriers in his shipyards. Though Mr. Kaiser has broken many shipbuilding records he admittedly is without experience in aircraft construction and for this reason his prediction that within ten months his yards can be in full production, turning out the new air giants at the rate of 5,000 planes per year, are termed "fantastic" by at least one production expert of the War Production Board.

The Army is enthusiastic over plans for relieving the transportation bottle-neck by the construction of vast numbers of air cargo planes. Lt. Gen. Henry H. Arnold, Commanding General of the Army Air Forces, recently pointed out to a Senate subcommittee investigating the feasibility of air-freighter fleets, that the Army is already using bombers to transport troops, material and supplies to combat sectors. Said he: "No one realizes more than the air forces the necessity for cargo planes. We welcome any facility that can produce more of them."

By way of emphasizing the Army's awareness of the job ahead, Gen. Arnold revealed that it has long since been "balancing" production of combat and cargo planes. During the latter part of this year, he said, 21 per cent of production of all multiple-engine planes will be cargo ships. During the first half of 1943 it is estimated this production may be increased to 30 per cent. Meanwhile, Gen. Arnold disclosed the cargo carrying services of the airlines under contract are expected to increase substantially. Whereas these services began operations with the transportation of only 170,000 pounds of supplies per week, he said they soon will be stepped up to 2,500,000 pounds a week.

Months ago a Naval Transport Service was organized and the Army Air Transport Command as far back

as 1940 was reported to be carrying more cargo than all the commercial airlines of the United States, combined. Both services have ordered large numbers of cargo planes of various types, many of which are already flying and in production. Some of them, however, suffer from the limitations of relatively short range and limited load, and none of them as yet has the characteristics of either the Douglas B-19, which weighs 83,000 pounds empty and has a maximum overloaded weight of 164,000 pounds, or the Martin Mars, of smaller capacity, which many believe should be the pattern for our future "sky trucks."

MR. LOENING, for example, believes that ships of this type could carry twenty tons of cargo 4,000 miles. On such a basis fifteen planes of this type—making many round trips—it is estimated could deliver as much cargo in a year to the Middle East as a plodding 11,000 ton freighter. To do the job of 100 fast cargo merchant ships we would have to undertake to build 2,000 80-ton aircraft. To those who retort that it would take two or three years to develop a plan of this tremendous nature and that by that time the war would be over, Mr. Loening replies that if we take these steps now, we can insure the end of the war in three or four years instead of perhaps six or eight.

In any event it would not appear unreasonable to assume that, with the signing of peace, the big rubber factories at Akron, Ohio, can plan on bringing rubber direct from the forests by plane, eliminating the train-ship-train method of transportation. Then, the huge castings from a Pennsylvania steel plant, needed by an Alaskan mine operator, instead of making a long railroad journey, plus a voyage up our West Coast, requiring weeks to reach its destination, can be shipped by plane and

arrive within a day or two. Then, the citrus fruit of Florida, via the air, can reach its New York consignee within a few hours after it is picked from the trees, instead of facing a grueling cross-country trip by truck. Then, you can ship an exotic bouquet to mother or the "girl-friend" at the other side of the country—or even abroad—sure it will reach her as fresh and beautiful as when you selected it. THE END

CAUCASIAN OIL

(Continued from page 20)

mier and now Foreign Minister, said that the plan called for an output of oil (with natural gas) 177 per cent greater in 1942 than in 1937. In the latter year 30,500,000 tons had been produced, while the 1942 program called for 54,000,000 tons.

Today, almost four years later, it is extremely pertinent to recall certain other highly significant remarks of Mr. Molotoff:

"... Of the biggest industrial construction projects, I shall mention the following: Between the Volga and the Urals we are building a 'Second Baku,' which by the end of the Third Five-Year Plan period is to have an output capacity of 7,000,000 tons of oil. I might remind you that the Baku output of oil in 1913 was 7,700,000..."

WHEN development in the vicinity of the Ural Mountains is mentioned, it is the Bashkirian Autonomous Soviet Socialist Republic that speakers have in mind. Several years ago Stalin himself indicated that Bashkiria was soon destined to become a great oil producer, when he urged his countrymen to "set to work in real earnest to organize an oil base along the western and southern slopes of the Ural mountain range."

The first year in which Bashkiria yielded oil on a commercial basis was 1934. It amounted to some 63,000 tons. In 1935 the output jumped to 406,000 tons, a sixfold increase in 12 months. In 1936 that district produced 968,000 tons. Then there was a two year's snag occasioned by anti-Soviet wreckers and saboteurs working in collaboration with the Axis enemies. At the present time Bashkiria is undoubtedly giving millions of tons of oil, with the Ishimbai and Tuimazy fields being particularly successful. The republic has a powerful cracking plant.

Although quite formidable in itself, the Bashkirian oil fields are only a part of a greater oil-bearing strip of territory. This begins on the eastern shore of the Caspian Sea, at Nebit-Dag in Turkmenia. It stretches incredibly through the Uralo-Emba Region, Bashkiria, Perm Region, to the shores of the Pechora River in the North. The Emba-Bashkiria areas are consider-

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ed the richest, being second only to Baku.

Baku, incidentally, is also a part of a great oil-bearing strip that begins at the Apsheron Peninsula and passes through Dagestan, Grozny, Kuban, Taman.

A 720-kilometer pipeline joins Emba to the oil refining plant at Orsk, Orenburg Region. That's Kazakhstan Republic's oil. In the Fergan Valley of the Uzbekistan Soviet Republic, although known primarily as Central Asia's largest cotton-growing country, good petroleum in quantity has been taken out of the earth since 1935.

In the Tadjik Republic the KIM oil fields have been revived and reconstructed, new areas prospected. And here is something in passing, of particular interest to aviation fans. Before the Soviet Revolution Tadjikistan was an unexplored wilderness, a land that did not have a single city, railroad or highway. It could not be reached on wheels overland; so, Soviet pioneers brought to the Tadjik people their first horse carriage in a tri-motored plane. The aircraft was the first means of mechanical transport to come to that remote and inaccessible part of the world.

So, from the sultry tropics to the frozen tundra the rich petroleum deposits of the USSR lead the world, while that country's actual output of that lifeblood of modern fighting machinery is second only to the United States'. What a gift from mother nature to the United Nations—the fact that the U.S.A. and USSR control this natural wealth.

Speaking of the Far North, on the Pechora and along its tributary, the Ukhta, there are wells with a yield of wonderfully light oil, suited for aviation, insuring this section's ultimate independence of the Caucasian resources too. How the taiga of the northern forests primeval retreated to give place to oil derricks is a story that Soviet children read in their schools.

One day a group of daring prospectors were sailing on a raft down the Ukhta. One of them lighted a cigaret and dropped the match into the water. To his amazement and even horror, the water all about was set on fire.

The geologists were very much interested, investigated the vicinity and within a month found the place which served as the outlet for the oil.

Were it not for the great riches in the Soviet earth's bowels, the great Red bombers and fighter planes would be grounded, the Red Navy battleships would list helplessly in the waves, the tanks and tractors of Russia would grind to a standstill. Instead, millions upon millions of horsepower, harnessed to scores of thousands of internal combustion engines, are roaring fierce defiance of the Axis hordes and heralding the day of our common victory.

THE END

I TEST FLEW—

(Continued from page 23)

dium bomber down the field at Woodford. Heading into the wind and, opening my throttles, I used a good plus two boost, for I needed every ounce of power output, as the field was small and partly surrounded by houses.

At 10,000 feet the outside temperature registered 34 degrees Fahrenheit. The temperature inside the cabin registered 38 degrees. The Chief Designer wanted the machine flown with both port and starboard windows open for ten minutes, in order to check the splay of the windows and to insure there was not too much forced draft at 140 miles per hour cruising.

I had my doubts as to whether she would take it, for the windshield in my opinion had been played out too much—an excellent idea when it was raining, but not so good if you froze up and had to open the windows. I opened the starboard window and the Anson began to vibrate ever so slightly. Slipping my goggles down over my eyes, I cautiously opened the port window. Then things began to happen in a hurry. There was the sound of a crack abaft the cabin.

LOOKING BACK I saw the emergency escape hatch in the fuselage had blown out. Before I could reach forward and slam the window shut the canopy parted company with the fuselage. The bomber got out of control. She started into a dive. Pulling on the control column had no effect. I altered the trim of the longitudinal stabilizers, all to no purpose. Then she became inverted and, with a crack like a lot of cans being banged together, the starboard wing went adrift.

I reached for my parachute pack and clipped it on to my harness. The actual bailing out was not a hard proposition, for we were inverted and only my safety harness kept me from falling out. Drawing my feet up under me on the seat I slipped the safety pin of my harness and shot myself out downwards, head first. I will always take my hat off to the men who deliberately do parachute jumps and delayed drops. In those awful seconds before my chute opened I had never prayed so hard in my life. The thought also went through my mind, "suppose the damned thing doesn't open?" Then suddenly I was jolted as the silk ballooned out above me and I found myself floating downwards. Everything seemed so quiet, as I looked down and around. Then far away to one side I saw a sheet of flame and afterwards there drifted up to me the noise of an explosion. I knew that was the end of the Anson. The big hotel on the north side of the Manchester-Liverpool road, on the

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outskirts of the city, appeared to be the object with which I was going to tangle up. The ground seemed to be coming up fast. Fortunately for me there was hardly any wind blowing and the box tree hedge surrounding the garden of the hotel saved me from being dragged.

I was still fumbling at the release catch of my parachute harness when some of the hotel staff arrived. A few minutes later I was having a much needed whiskey and soda. The works had to be telephoned. In no uncertain terms I told the Chief Designer what I thought of his brilliant idea for splaying the windows. When he inquired where I was, I told him that in the event of forced landings I always made them as near as possible to a hotel.

His adjectives are not usually found in a dictionary.

In Great Britain after bailing out one has to take a physical before resuming flying. When I returned from my Medical Board I had a talk with the chief designer as to the cause of the canopy collapsing and why my starboard wing had parted company when I became inverted.

While the fuselage of the Anson is constructed of alloy tubing, the wings are wood, with cloth covering; even the main spar itself is made of wood. The Anson was never stressed to fly inverted. As the machine had been a complete burn-out they had to rely on my statements, and all I could offer as a solution was that the sudden vortex of air let into the cabin by the canopy parting caused the nose to drop so suddenly that she became unmanageable and directly we became inverted the strain was too great and the main spar had snapped close to the jointing bolts.

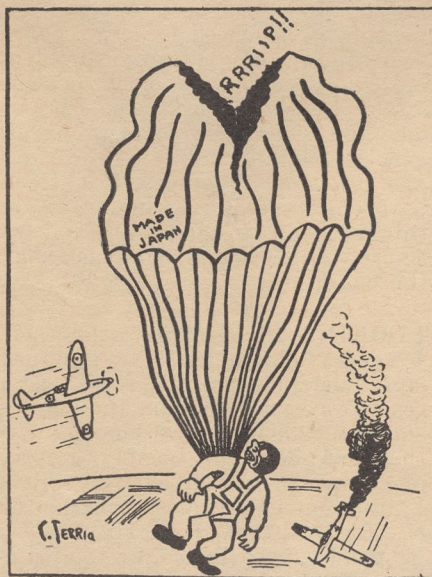
IT WAS SOME three months after my bail out that once more I went to the Newton Heath Works and studied the blueprints of the modifications on the Manchester. Her flaps had been enlarged and her angle of incidence had been slightly altered. They decided that that would give me a better take off and a slightly lower landing speed.

Once more she was towed out from the Works to the airport. This time I only spent half an hour getting the feel of her rudder and controls. I knew her better this time, and had a feeling of confidence that I could get her off and bring her down without difficulty. With her enlarged flaps for the take off I only gave her twenty-five degrees, which I considered sufficient. Pulling a good plus four boost I took off and this time the take off run was 300 yards less than before. That gave me more confidence, so I decided to do a circuit and landing to see what her approach was like. It was certainly better than before but she still came in at over fifteen miles per hour faster than had been estimated by the designer.

After five landings I discovered that sixty-five degree flap and half-

throttle was the best obtainable, but her landing speed was still too fast. After an hour and a half I decided to call it off for the day. All the time I had been in the air I had been making notes on the pad strapped to my knee and I handed this in for typing and examination by the technicians, and told the engineers to have her ready for her altitude test the following day.

THE NEXT morning fortunately the ceiling was unlimited. So was visibility. Not even any heat haze. Having made sure that all the instruments were sealed and that the barometric pressure recording instruments were in the cabin with the Air Ministry seals on, I checked the oxygen tanks carefully and got into high altitude flying kit. I had to ascertain her ceiling, and how the controls responded in the upper air. I expected to be up for four hours.



It is funny how little matters can be overlooked. I made a nice take off and had started my long steady climb when I reached for the pencil on my notation pad and discovered it wasn't there. I searched all round the cockpit but could not see it. It was impossible to get to the pocket of my jacket on account of my heavy flying kit and parachute harness. So there was nothing but to go down again and ask for a pencil.

Once more air borne I climbed steadily, making notes all the while as to temperatures, revolutions, rate of climb, how she responded to the controls and as I was going to be aloft some time I turned on my oxygen at 12,000 feet. Up and up we went. I thought that the designers were being over optimistic with regard to her ceiling on account of her stub wings which, although they undoubtedly gave her speed, greatly reduced her lifting surface.

The time came when the altimeter stayed steady in spite of all my coaxing to get her any higher. The sealed altimeter in the cabin would tell the story after I had landed. I tried her controls out at her ceiling

taking her into rate two and three turns, then having made all the necessary recordings I decided to go in and land. Her fuel consumption was exactly what the Rolls-Royce people had guaranteed.

I descended very slowly, at the rate of 100 feet per minute, for I did not want, from that high altitude, to start bleeding at the nose and ears. Finally I came in to land on a long glide on half throttle and decided to attempt a three point landing to see if that would make any difference. To my surprise as I pulled the control column hard into my tummy to get her tail down and expecting her to balloon slightly, she settled down as softly as a thistle, with a good 200 yards less run than before.

The Avro officials were pleased with my report, but disappointed over the ceiling. I decided to take a rest the next day because she still had to have her velocity tests done. I was held up by bad weather over a week. You can't go fooling about with that sort of test with the ceiling down to 1000 feet.

AT LAST the weather cleared and again I took off and climbed her steadily to 14,000 feet. I had previously made sure that the emergency hatch in the cockpit worked smoothly and easily. Then having got almost directly over the airport where the officials were standing with binoculars, I turned her nose down and with throttles full open started her dive. A set figure had been given me for pulling out and I had just reached this speed when she began to vibrate ever so slightly. Very gently I eased back on the control column as I cut my throttles. I was a good twenty miles away from the airport by the time I got her to a level keel. But she had held the speed required of her by the Air Ministry without breaking up. Everyone was jubilant. Three days later, after she had been thoroughly examined for any structural defect, I flew her down to Martlesham-Heath where I handed her over to the Air Force Test Pilots for the Air Ministry acceptance tests. You know the rest.

THE END

BOMBER CREW

(Continued from page 16)

made at low altitudes, with bumpy ground air simulating anti-aircraft explosions. Short runs and turns are practiced, that give him as little as 20 or 30 seconds to set his data in the bombsight and release his bomb load. He dodges in and out of clouds to lay his eggs, and he learns to let his bombs go in string (one after the other) and in salvo (all at once) as well as to lay one at a time on successive targets. He bombs from high levels, using oxygen, and from levels so low that he can't use his sight, but "kicks off" by eye alone.

Graduated after twelve weeks and

commissioned a second lieutenant, he goes to operational training for crew assignment.

Lowry Field specializes in training crew cameramen for the bombers, as well as armorers and bomb-sight mechanics, while radio operators are trained at Scott Field. Men selected for this training from the enlisted branches of the army must be well grounded in mathematics (elementary) and are tested for mental alertness.

During the evenings he must do "home work" and on week-ends he tours adjacent aircraft and engine plants, or radio and camera laboratories for research. Even after graduation he must spend a long time under apprenticeship to experienced men before he is rated as an expert in his field. He starts as a private in the school and can advance through the enlisted technical grades of private first class, corporal, duty sergeant, staff sergeant and technical sergeant to the highest grade as master sergeant.

The Japs have shown that they don't care much about going up against the sting of the Flying Fortress manned by nine American experts. The Fortress has been called by many "America's best fighter plane!" It is practically impossible to knock one of them out of the air. A Fortress pilot, returning from a bombing mission over Formosa, outmaneuvered a squadron of Jap Zero fighters to drop his bombs, said "When she can't win with her guns, she fights with her knees and elbows."

THE END

DAYLIGHT BOMBING

(Continued from page 11)

hit by a small bomb on a power station or reservoir puts those agencies out of commission, and delicate transformers and pressure pumps cannot be replaced in a week's time—or in a month. The bombing of nearby oil tanks and refineries, highway intersections, rail yards, and the large bridges can disrupt or seriously impair communications. Sustained bombing of such facilities as may be undergoing repair can keep things in a state of chaos. Little or no food and water—and communications interrupted so that none can be brought in—no light or power to operate plants, the city's food centers bombed and contaminated by chemicals, sewage out of commission because of lack of water, and fire incendiaries raging wild because of that same lack of water—this is the picture of a city invested from the air. Can this be applied to Germany's cities during the next few months?

COMMUNICATIONS within the Reich offer a most attractive target, singularly enough, because of one of the very few miscalculations the High Command made during its

years-long preparation for this war. Germany motorized and mechanized her army, which is one of the reasons why their famous system of express highways came into being after Hitler's ascendancy. He had neither the raw materials nor the labor to arm the war machine—with all that that implies, build the highway system, and expand the railroads. The railroads suffered; there was a program instituted after the armament reached a satisfactory stage that was to have begun in 1939. The war interfered with this project. So long as the Nazis fought short-radius campaigns, the rail system proved almost adequate. The highway system, however, is within the Reich and Poland had too few roads to accommodate large blitz forces bound for Russia. The Wehrmacht had to use the railroad and the nine to twelve-year old rolling stock. As the attack on Russia slowed, a greater strain was placed on the roads of steel because a slow campaign requires more materiel. In most of the Nazi-occupied lands, railroads were already taxed by the transportation of food supplies formerly moved by sea.

Of dire necessity, the High Command has had to step-up rail traffic to a precarious point; each interruption—such as bombing or wrecks—disrupts schedules that much more, because more trains are held up. Secondly, central Europe's entire rail system is linked through Greater Germany, and these links themselves bottleneck through certain switching points like Wustermarke (Berlin), Hamm (Essen), and Duisberg (on the Rhine about 30 miles from the Netherlands). Systematic precision bombing of these centers will seriously cripple German rail transportation to the West.

The Rhine bridges can be systematically knocked out, but even a large bridge presents a comparatively small linear target and this, again, is a daylight job and a tough one, because no one knows better the importance of these bridges than the Nazis themselves and protective measures have been taken. Bridges can be repaired, but not if they are continually bombed, and hastily laid pontoon bridges can accommodate only so much traffic. Even at night these bottlenecks of traffic would present an attractive target in themselves.

The bombing of highway intersections is purely a temporary interruption, since they can be repaired. A cavity made by a 1,000-pounder can be repaired by clever engineers in three or four days. The best strategy for interrupting highway traffic, is a systematic destruction of oil and fuel supplies within a given territory. The Nazis have many synthetic fuel plants and these are easily put out of action by even a small bomb. The largest and most important unit of such a plant is the compressor house. A hit on the compressor house, where the low pressure hydrogen lines lead to the compressors,

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will cause an additional explosion that will put the plant out of commission.

These are examples of the vital targets. Hitting them while flying through enemy anti-aircraft and interceptor fire is something else again, which is one of the reasons why our Fortresses and Liberators have made such a splendid showing. High altitude bombing requires reasonably clear air however, and by the time this is in print meteorological conditions over central Europe will have become unsettled. Even through his view finder, the bombardier may have difficulty in seeing his target properly from high altitudes in the hazy October air. But when a Yank bombardier and his Norden Mk III sight get together on a target there is likely to be grief down below. Proponents of mass night bombings may point out that the shorter daylight hours and hazy air would tend to make day bombing impractical this Fall. The whole point of this argument is that the night bombers will be even worse off. The weather will be equally bad—probably worse, because of the advection fogs at dusk and dawn—for them, and even the night bomber is supposed to be able to see his target, which is why they usually pick the bright moonlit nights.

Theoretically, the night bomber enjoys greater safety because of less chance of interception and anti-aircraft hits. To date, it has not worked out this way: U.S. losses have been far lower than those of the RAF's heavies, despite the fact that the Lancaster, Stirling, and Halifax carry more firepower to fight off Luftwaffe defenders. Both the Fortress and Liberator are said to carry more and heavier armor than any of the RAF craft, and there is little doubt of their ability to absorb punishment.

Getting the bomber and its valuable crew back home is one of the primary considerations, even if the bomber has to be sent out in daylight. As indicated by Gen. Carl Spatz, AAF chief in Britain, the English themselves—who maintained most vociferously that day bombing was not the thing—have been sold on the performance of our men and planes.

* * *

Whether or not a second front is opened this year, the pace of bombing operations is going to be stepped-up to a formidable degree within the closing months, Winter weather notwithstanding. Even if AAF bombers from less active theaters are not transferred, our mounting production, in a measure, will permit great concentration of a bombing force. Adolph is in for a great aerial squeeze play. With our Army Air Forces in action and the two RAF's, Royal and Red, carrying on both their day and night attacks, Greater Germany seems headed for a hard winter indeed. America's huge bomber program, remember is just now

getting into high gear, particularly the heavy bomber phase under which the Flying Fortresses are being built by Boeing, Vega, with Douglas and the Liberators being built by Consolidated and Ford.

Fine as these ships are, we have a few new bombers on the way which will make the present B-17's and B-24's obsolete. Among these which have been mentioned in print, are the Boeing XB-29, Lockheed XB-44, Douglas XB-33, and Consolidated XB-32. These four ships are pressurized for high-altitude operations—an improvement no other existing bomber type in service is known to boast—and powered by new engines which are very much on the secret list. They should fly farther, faster, and carry more war load than any bombing planes known to be in use or projected anywhere in the world, and they will carry new armament, which also cannot be described. In fact, the trend seems to be toward arming long-range bombers in such a manner that they will not require fighter escort. Until these new dreadnaughts are delivered to AAF squadrons, however, the Fortresses and Liberators can and will carry on in typical American fighting tradition. Adolph is aware by now that we know the job before us and how to handle it.

THE END

FEMININE TOUCH

(Continued from page 33)

through its portals for the first time since its establishment in 1929.

Martin Aircraft in Baltimore is today the largest employer of women aircraft workers in the world. The original dozen hired a scant nine months ago has miraculously grown to an army of more than 7,500 with over 5,000 of those busy on actual production and assembly of planes. They still come—at the rate of 500 a week—of all ages, walking up to machines, drafting boards, test tubes, all meeting the demands of a tremendous production schedule by which Martin bombers are delivered to the Army, Navy and the R.A.F.

Wishful thinking and girl's patriotism cannot produce airplanes. Many of the willing workers must be trained and so the Government set up nine local Defense Vocational Schools to provide the sound basic training needed. Sharing the burden of free training centers in that city, similar courses are given at the Johns Hopkins University, University of Maryland, and the University of Baltimore. Most of these schools are equipped to handle more than their present enrollment. The bulk of their students are recruited by the U.S. Employment Service.

The plane producing business has taken on the status of a feminine career. Whether a girl rivets wing sections, designs tools, assembles electrical parts, the woman worker knows how dependent the nation is

upon the role she plays. She may or may not know, in addition, that nearly all production and engineering processes have been broken down into simpler steps so that her inexperience will be of no hindrance. Several women these days do the various parts of what used to be one complicated operation, thus making effective use of experienced men workers to become their supervisors and instructors and at the same time fill gaps in the vital production front left by men headed for battlefields.

THE GAPS they fill are as varied as the backgrounds of the women themselves. Housewives who never thought of working before, college grads, gray haired matrons and young glamour girls, experienced factory workers, and women bored from playing bridge all day while the nation bustled, all these have found that their efforts are welcomed in the jobs at hand.

Not all women aircraft workers are new to construction work. In fact many of them are unusually well qualified. They include girls who have built and operated their own amateur radio stations for the past several years, raced automobiles and made a hobby of auto mechanics. Some have gathered machine shop experience in other than aircraft plants. Despite the varied background of experience, the average woman worker is about 27 years old. About three out of four are married and many of them have children. Despite their differences, they all enjoy one thing in common—they work as equals with men, get the same rate of pay, spend the same numbers of hours on the same jobs and are expected to produce the same results.

Women have less tendency than men to change their employment from one plant to another and the number of women who take advantage of free extension training courses available to company employees is slightly greater in proportion to employment than the number of men enrolled in such courses. Yes, the feminine touch is making itself felt!

THE END



"Sh-h-h! There are ladies present—I think."

WAR FLYERS

(Continued from page 17)

Many survey flights were then made in an attempt to find a safe place to land a big Navy flying boat. Then a miracle happened. About twelve miles from the stranded men a big "dimple" formed on the ice and filled with water from the icy slopes around it. The "lake" thus suddenly created was deemed deep enough to support a plane and permit a take-off. The Navy craft was stripped of all unnecessary equipment, took aboard snowshoes for the stranded crew and a minimum of gasoline.

Balchen and Parunak took off and soon Balchen had the marooned flyers on snowshoes slogging their way slowly over to the miniature lake on which Parunak and the rescue ship awaited them. Luckily Balchen had insisted the men be tied together, as one of them on the journey back broke through the ice crust and dangled helplessly over a deep crevice until pulled out by his comrades. It took twelve hours to work their way to the rescue ship and then it was found ice had formed against one shore of the lake and so limited the takeoff space that only eight of the men could be flown away and a return trip to save the others would be necessary. The second trip was less difficult, as changing weather once more increased the size of the "lake" so takeoff proved relatively easy.

As a result of their two rescue efforts Balchen and Parunak are reported to be seriously considering incorporating themselves as the "Greenland Co-operative Salvage Company." THE END

SLIPSTREAM

(Continued from page 4)

raided Warsaw in late August, the Jerries were so surprised that bombs landed long before they got the city blacked out. . . . We'd say they're wrong in calling the new Iowa "the mightiest warship ever launched"—for any 1916 battle-wagon was mightier in its day by virtue of the fact that it commanded the seas unopposed by the superior power of aircraft. . . . But, alas, our Navy Department still can't "see it." A seven-man board has been named to advise the Secretary on the "number, type, and design of vessels and aircraft"—yet not one of those seven is an airman!

• *Vanished!*—Wars bring numerous mysteries, and many which go into the records remain to baffle all who attempt their solution. Now comes the strange case of Lieutenant Cody and Ensign Adams. On August 16, they took off in a submarine-patrol blimp from Moffet Field, Calif. Then, later that day, their ship bumped to

a landing in Daly City, engine switches still on, 'chutes in place, life raft intact—but with no one aboard. Not a single message had come from the craft's radio. Those are the facts, readers. What do you think happened to Cody and Adams?

• *Front Notes*—Those P-38 Lightnings have finally seen action! They're credited with knocking off two Jap K-97 (probably Hiro 97) four-engined flying boats. . . . The new 23rd Fighter Command, AVG successor, "did for" more than 75 Nips in its very first month. . . . It's estimated that at least 500 Nazi war factories have been smashed either permanently or for several months. Included in the list are Focke-Wulf at Bremen, Heinkel at Rostock, and Arado at Warnemuende. . . . When Britain's newest A-A shell bursts, it sends a great flaming barrage in every direction. The Heinies call it the *Fliegerschreck*—Airmen's Terror. . . . The RAF Coastal Command is said to save an average of 40 merchant ships a month.

• *Home Notes*—Brewster is now "back in" after that plant trouble it suffered. The company is making Bermuda dive-bombers for the British, Buccaneer d-b's for our Navy, and it is about to begin work on a Navy fighter known as the Battler. . . . For the record: Two new carriers have now been launched, the *Essex* and the *Independence*. . . . Our CAP is reported to have saved at least 25 merchant vessels and 250 survivors of sinkings. . . . Thirty-four Negro pilots have qualified for the AAF, and 73 more are on the way. . . . The Marine Corps has opened its glider ranks to enlisted men, and civil flyers may now seek MC Reserve flight commissions.

• *Lighter Lines*—According to a recent news story, Turret Gunner M. Pat Norton conked a Zero by pouring 100 rounds of ammo "into its left-wing cockpit." Despite the way these reporters move the 'pits around, our Yanks are still pluggin' 'em. . . . Strangely enough, the bombs that were dropped on Tokyo were made by a Chicago wallpaper firm! . . . Right after Bombardier Dick Olson laid a big "stick" among the Nippos down below, he got a terrific blow in the back and figured A-A had done for him. A moment later he breathed a sigh of relief. It was just a wallop of congratulation from one of his pals in the plane.

• *Aces Department*—Sgt. Hans Beerenbrock, leader of a Moelders Pursuit Squadron unit, is credited by the Nazis with downing a total of 102 Russians. How come, then, he's still only a sergeant? Clive "Killer" Caldwell, Aussie Ace who fitted bomb racks to make the Kittyhawk into the Kittybomber, now has a score of 21. . . . Max Aitken, son of Lord Beaverbrook, got two of the foe

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the other day, bringing his record to 12. . . . Now those bombastic Japs contend that Takeo Kato, killed by a Blenheim near Akyab, Burma, had shot down or damaged more than 250 enemy planes. Maybe it was actually 25 and Takeo scored his own Zero on the end to make it look better.

• *New Stuff*—Capt. Don Herb, of Mitchel Field, has come up with a 10c low-level bombsight. That's only half the price of the one used over Tokyo. . . . Volume production has begun on a new Sperry-designed powered bomber turret which is of ball design and rotates to cover all firing arcs. . . . Plans for another of those combination plane-dirigibles have just hit the newspapers. This one is enthusiastically publicized as a job which would be supported by helium, would carry 12 warplanes, and would be propelled "by suction." . . . They say the British will shortly be dropping 7,000-pound bombs! Meanwhile, the Nazis have a new oil-bomb said to burn more than an hour.

• *Peculiar*—Strangely enough, the people who are plugging Seversky's book, *Victory Through Air Power*, keep illustrating their ads with a shot of a warplane which *didn't* pass muster—the Airacuda! . . . Startling is this one: Roy Porter, author of *Uncensored France*, says that according to Nazi officials in Vichy, Hess was captured on his third flight to England. . . . Another amazer is the word that Rene Fonck, great World War I Tri-colored Ace, is on the Fighting French's blacklist as a Hitler collaborator. Certainly hard to believe.

THE END

FLYING ELEPHANTS

(Continued from page 41)

bombers. It is known that some of the twin-engined Heinkels were equipped with V-shaped bumpers projecting some 10 feet ahead of the plane's nose, designed to cut the balloon cables, but they seemingly proved highly disappointing. At least the records disclose that the English have lost few of their balloons and the majority of those lost were victims of high winds or lightning.

CONTRARY to general belief that the absence to date of barrage balloons from the skies above American cities is due to the shortage of rubber, there is very little rubber used in their construction although they are manufactured in the big rubber plants. The reason is simple. Rubber, it is found, is not impervious to helium gas, with which all the balloons are inflated when not in actual combat. As even such a prodigal nation as ours could scarcely afford to let the highly prized he-

lium escape, science went to work on the problem and engineers from the petroleum industry came up with the suggestion to coat ordinary cotton-rayon fabric with a certain crude oil derivative. It proved to be the right answer.

When the balloons complete their tour of duty, power is applied to the anchor cable winch and the big bags begin to come down one by one. They are reeled in slowly and steadily, care being taken to guard them from sudden jerks, and as the big tail fin spills its air and settles down for a mooring the ground crew rush forward to grasp the control cables by hand and straining on the leading ropes bed down the big bag for the night, using sand bags to anchor it, usually in the shelter of a grove of trees which both protect it from any sudden gust of wind and at the same time act as a partial camouflage.

THE END

ALL QUESTIONS

(Continued from page 42)

ing and servicing her machines, it certainly does not hold at this writing. For the Nazis would never have been able to go on the offensive in the Caucasus unless their land forces were far superior, unless they had first achieved—and held—air superiority. However, the coming Winter may see the Nazi armies stalled once more as well as a curtailment of air action. For full information on the German Luftwaffe I suggest that you purchase a copy of *The Axis Grand Strategy*. The Kurier has a top speed of 279 m.p.h. at 18,100 feet. Specifications are: Span, 108 feet 6 inches; length, 78 feet 3 inches; height, 23 feet 4 inches.

Morris Dyer, Orlando, Fla.:—The Lockheed P-38's you saw with a white cross on the tail booms indicated that they partook in war games. This is not a flight or squadron insignia, but just a marking to show that they were connected with the White Army. Red balls have been eliminated from stars on American aircraft to prevent them from being falsely identified as Japanese planes.

THE END

December Membership Application

I, the undersigned, hereby make application for membership in the Flying Aces Club. I agree to live up to its rules and regulations; to foster the growth and development of aviation; and cooperate with all other members in the work of spreading aviation information, building up confidence in flying for national defense and transportation. I will aim to build up the Club and its membership, and do my best to win the honors that the Flying Aces Club offers.

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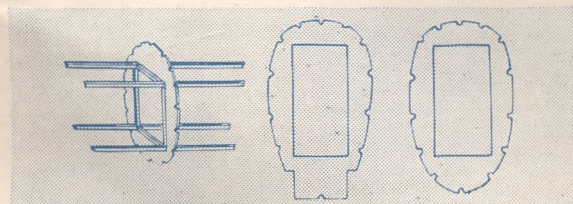
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"When we were taught flight theory, I found that I knew about 90% of what was being taught, from my past experience building models."
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"Due to 5 years of model building I am a good deal farther ahead in learning the standards set up by the government in 'Keeping 'Em Flying.'
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"I have been making models since I was 12—and that experience has helped me a lot in my Air Corps Technical School work."
F.K., Jr., Mississippi

★
"I have found my model building experience exceedingly helpful in my work as a mechanic in the Air Corps advanced flying school."
E.S.A., California

★
"I had no trouble identifying various aircraft in the 'aircraft recognition course', because I had made models of many of them. In the course 'theory of flight', I already knew most of the principles involved before we started it. As for the actual flying, I knew the various controls, etc., before even getting into the plane. I soloed in 6 hrs., 5 min.—almost 2 hours before anyone else soloed. I believe my model experience helped me in all my work many hundred per cent."
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writes Aviation Cadet E.H.S. from an airfield in California

He says: "I was a corporal at Camp Grant THAT Sunday, and several of us had been flying models in the fields of a nearby farmer, when we heard THE news. We put our models away for the rest of the day, and sat with our ears glued to the radio. All of us had been modelers for a number of years. The next morning my application was in for the Aviation Cadet Corps . . . In a week I wind up my Primary Training here, and go on to Basic—night flying, instruments, precision—the works!

It's been tough—plenty! But it's been mighty helpful having a background of aerodynamics, engine and construction, all gained from the experience of modelbuilding. It was a breeze through preliminary ground training—no "groping" or trying to discover what an instructor was talking about. We were able to concentrate on the fine points, because the fundamentals were ours. Six years of preparation for the show of a lifetime, and every minute worth it!"



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