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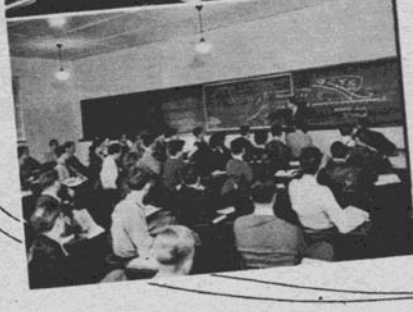

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AIR TRAILS Pictorial

JUNE, 1943 — VOLUME XX NO. 3

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COVER PHOTO IN FULL COLOR BY HAROLD KULICK

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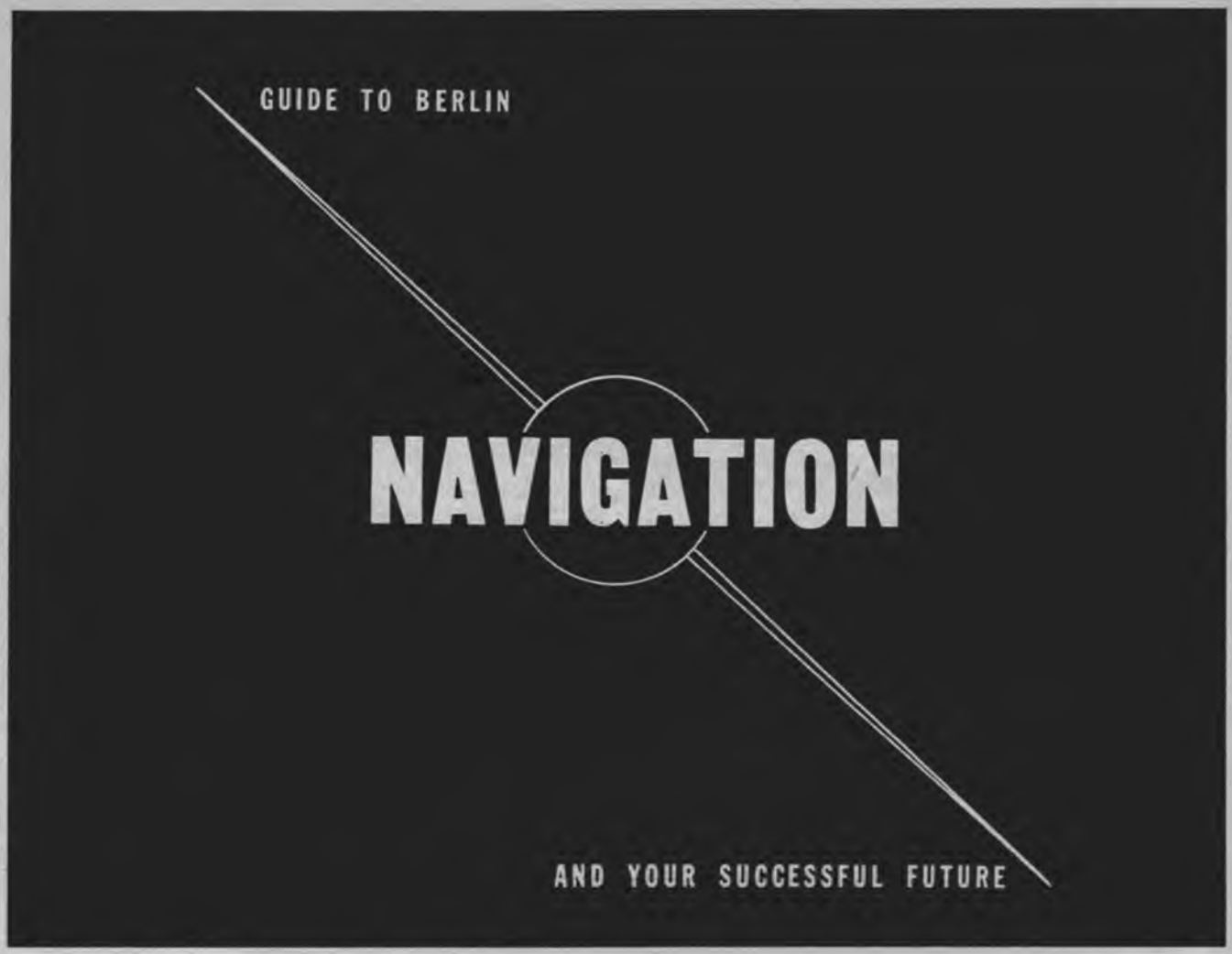
A. T. JUNE 1943



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CEILING AND VISIBILITY UNLIMITED

A RECENT ARTICLE in *The Reader's Digest*, "Queens Die Gracefully," made mention of Russell Church, the army pilot who flew with Buzz Wagner. They had gone out one morning in the Philippines to strafe a new Japanese landing ground. Church's P-40 caught fire from anti-aircraft, but he refused to bail out and, after blasting a row of Jap fighters, crashed. Church is considered one of the greatest of our flying heroes, and as we receive pictures whose legends testify to his fame, we think back to the Russ Church we used to know. A retiring chap, there was nothing about Russ that attracted undue attention. He was slight, quiet and had curly black hair, was practically the only fellow we know who went into aviation without first having been a model builder. Planes just didn't seem to interest him, *then*. (His father, however, was an expert machinist and, as a hobby, made two- and four-cycle gas engines that were honeys. We once carved a mahogany prop which he used as a pattern to make an aluminum one.) None of us could have pictured the quiet Russ Church as a brilliant airman—a great American hero and a menace to the Japs. For years we heard nothing of Russ Church—and then suddenly, when he and his buddy, Wagner, waged a two-man war on the Japs, all America heard of him and his gallant sacrifice. Wagner, too, is dead now, having, ironically, crashed while on a cross-country hop back home. We hear that a plaque is on display in Church's old school, the Dumont High in New Jersey. The deeds of Wagner and Church will hold a high place in the colorful history being made by our boys.

CORRESPONDENTS who find themselves in a jam for lack of news pending the outcome of a battle, fall back on the old reliable, "the situation is fluid." In talking of the glider as a means of air cargo transportation, we find ourselves tempted to steal the correspondents' phraseology. More than one financier wishes he knew for certain what part the freight glider will play in the future. Glider proponents have one rather general argument which is interesting. They say that the transport airplane is only a locomotive and like a locomotive, doesn't make sense unless it's pulling a string of cars—ops gliders. For practical reasons the size of a locomotive is limited; you can't run block-wide tracks across the country. On the other hand a steamship may be 1,000 feet long. It chooses its own route and can be as big as its builder's think it should be and still make money. Of the two, the steamship may be a more apt example when talking of the future of air freight. When the *Queen Mary* comes up the Hudson River towing twelve tramp steamers we'll concede that cargo gliders are a necessity. But when it comes to our knowledge of cargo gliders our knowledge, too, is "fluid."

IT IS ENCOURAGING to learn that P-38s are being used as fighter trainers by crowding the student in behind the pilot. This may be a strange sight around American airfields, but the idea is no stranger to the Russians who long ago took the bull by the horns and put two cockpits in their I-16, which was known as the Mosca or the Rata during the Spanish Civil War. This stunt would be the equivalent of making a two-place Boeing P-26—assuming that little low wing is still well remembered. With little respect for red tape or the conventional, the Russians simply chopped another opening for a second cockpit and slapped in the necessary controls. Fighter pilot training is a tough problem. From an advanced trainer—in this country it's the North American AT-9—he steps right into a ship like the Curtiss P-40 and is off on his own.

THE FORTRESS arouses an interesting bit of speculation. Though it is built to fight, to bull its way into an objective and back again, its amazing ability to knock down Focke-Wulf Fw-190s and Zeros alike must surprise even its builders. The Japs call it a four-engined fighter which, in a sense, it really is. Multi-engined fighters are nothing new. Numerous attempts have been made for long-range fighters—the Bell Airacuda, the Messerschmitt Me-110 and so on. All lack maneuverability and are somewhat vulnerable to the single-engined interceptor. One wonders if the approach wasn't wrong, for the ungainly convoy or long-range fighter operated roughly according to time-honored fighter tactics. The Fortress is an entirely new thought, though probably an accidental one, in offensive nastiness. Maneuverable for a bomber, it barges along, armed at all points with its devastating .50-caliber guns.

SYNCHRONIZED CANNON are assumed generally not to have existed before the Focke-Wulf 190 which has two 15-mm. Mauser shell guns in the wing roots in addition, of course, to the two 20-mm. Oerlikon cannon in the outer panels and the two fuselage-mounted machine guns. But from the early days of the war the Germans themselves have been using synchronized cannon in the wing roots of the Arado Ar-196 floatplane fighter which jousts with the sub-patrolling Whitleys.

WHAT DO YOU MEAN

medium bomber!

There's nothing "medium" about our American medium bombers but their size. For example, the Vega Ventura can bomb accurately from high-level flight—swoop down on its target for low fast attack—strafe troop concentrations—blast tanks—tow gliders loaded with men and supplies, and tow high speed targets for our fighters to practice on—a combination of tasks no other medium bomber can do.

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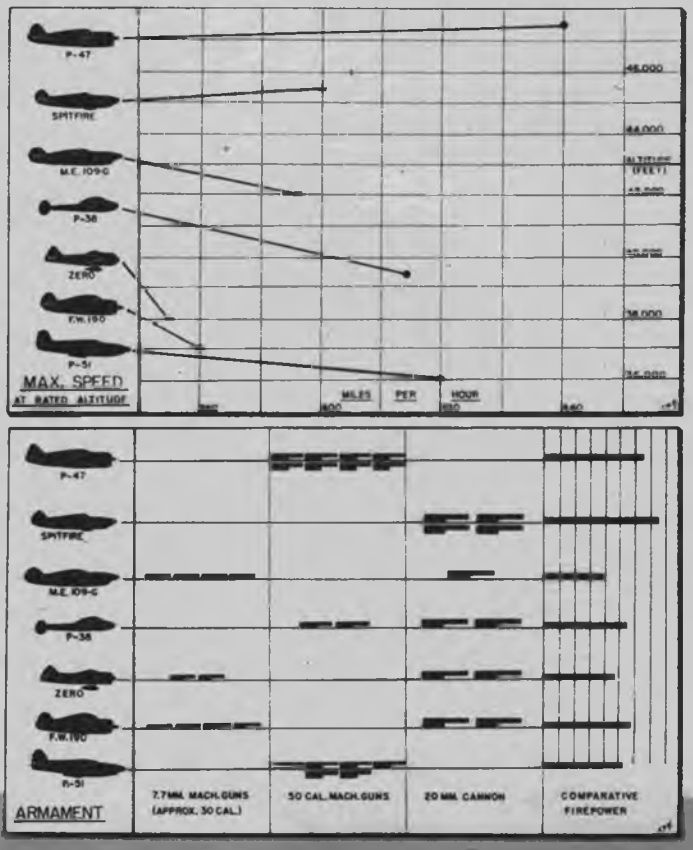
Lockheed Hudson
Medium Bomber

Lockheed P-38
Lightning Fighter

YOU CAN'T COMPARE FIGHTERS

By Ed Yulke

ANY FIGHTER IS A COMPROMISE BETWEEN VARIOUS DESIRABLE CHARACTERISTICS, EACH OF WHICH CAN BE IMPROVED UPON ONLY AT SOME COST TO ANOTHER.



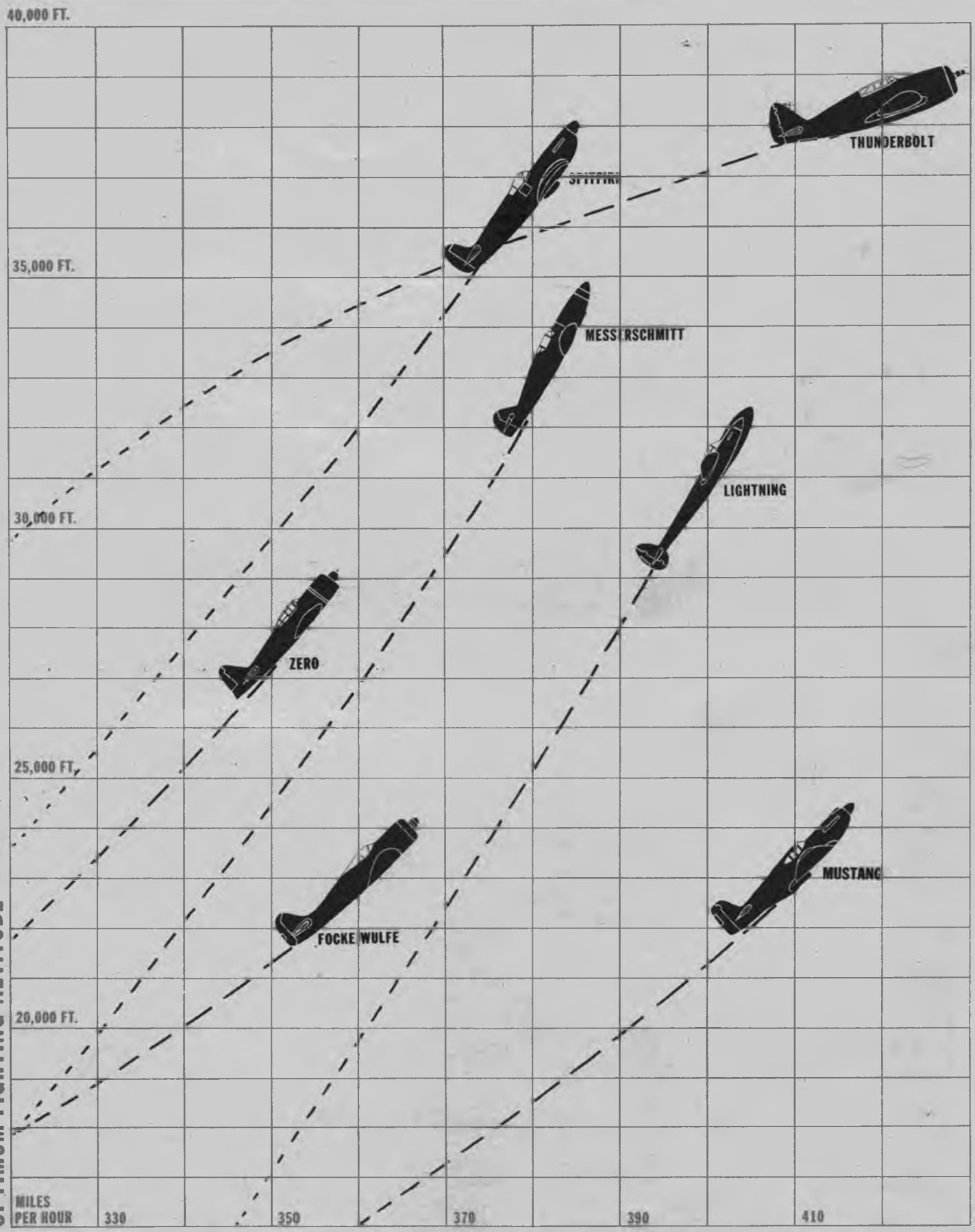
INVARIABLY "Hangar Flying" discussions will swing to the subject of the relative merits of the Thunderbolt, Spitfire, Messerschmitts and others. These discussions usually wind up in a verbal brawl when somebody mentions the Focke-Wulf 190 and the Jap Zero. Top speeds, armament, rate-of-climb and service ceilings are quoted freely and the battle is on as to which plane is best.

Fighters of all nations cannot be directly compared since the design specifications that governed the original basic design were entirely different. Just as the specification for the design for the Spitfire called for the use of a liquid-cooled engine, the specification for the P-47 design called for the use of the then new 2,000 h. p. radial air-cooled "coffee-grinder." In many other ways design specifications laid down by the air forces, that would later be the purchasers, varied. Armament requirements, strength requirements, equipment to be carried at all times (called fixed equipment) and the performance figures that were to be met depended on what that particular air force thought it needed for the operations the planes were to be used for in actual service.

How much the different design requirements affected the different designs can best be described by taking various design criteria point by point. Some time ago, everyone was alarmed by the reports that came back from the South Pacific area. It seemed the Japs had a fighter that was far superior to any of ours. Perhaps the Japs did have an airplane that was capable of reaching a higher altitude faster than our planes. The Zero outclimbed and outmaneuvered the current models of the P-40s we had there at the time. Suddenly reports came back that when the Zeros were hit by a fistful of .50-caliber machine gun bullets, they fell apart. Then, of course, the secret of the "superior airplane" was out. The Japs had sacrificed something to obtain this remarkable performance: strength, and thereby had saved sufficient weight to increase the rate of climb, service ceiling (highest altitude at which the plane will maneuver efficiently) and the maneuverability.

Taking fighters all over the world as a whole, the airplanes that are generally considered to be the most ruggedly constructed are those designed in the United States. On the other end of the list is Japan who seemed to care little what happened to her pilots, judging from the Zero at the outbreak of the Pacific war. Since then, she has come out with a modification of the Zero that is not only stronger, but also is reported to carry armor plate around the pilot and self-sealing gas tanks. The Focke-Wulf 190 was at first reported to be a plane very much in the same class as the P-47, but later, tests on a captured plane indicated that it must have been designed for a much lighter gross weight and it was on the basis of this lighter weight that the original performance became known. As the weight increased, the aerodynamical set-up of the plane was not changed and as a consequence, it is of little value over 25,000 feet altitude.

Since in the design of any airplane, a compromise must be reached between the ultimate in design strength and the lightness of the design, the specification usually calls for a minimum safety factor or number that the level flight loads must be multiplied by to obtain the loads for which the part is designed. In this country, the highest figure possible is used in the sense that the Air Forces have determined the highest load that the pilot can stand in pulling out of a dive and have used that as a "design factor"—and then have added a "safety factor" to insure having a plane that will "hang together" if the pilot inadvertently pulls out more quickly than he realizes. If the pilot temporarily "blacks-out" he can be reasonably sure the wings will not have parted company from the rest of the airplane by the time he recovers consciousness. That must be a rather uncomfortable feeling—waking up from a temporary black-out to discover that the airplane has converted itself into a motorized bomb! Other airplanes, notably the Zero, do not have this amount of structural strength built into *(Turn to page 48)*


40,000 FT.
35,000 FT.
30,000 FT.
25,000 FT.
20,000 FT.
OPTIMUM FIGHTING ALTITUDE
THUNDERBOLT
MESSERSCHMITT
LIGHTNING
ZERO
FOCKE WULFE
MUSTANG
MILES PER HOUR
330
350
370
390
410
430

LIGHTNING SQUADRON

At a base in northern England, R. A. F. officers kibitz as army air forces mechanics tune up one of the many Lightnings at the station. Props revolve in opposite directions.

Bomber crews know the Lightning as a long-range escort fighter. This pilot takes on seat-pack—note rip-cord ring.

Lightning rider. Thick bullet-proof glass inside windscreen; radio behind cockpit; oxygen bottle, right foreground; inflatable life belt around pilot's neck.

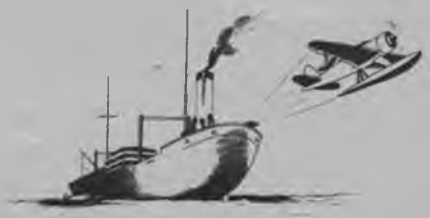
Since synchronization is not required guns shoot at maximum rate of fire. All in nose, they are: two .50 caliber; two .30 caliber, one 20 mm.

FOR a while, in Tunisia, the brunt of the fighter work fell on the Lightnings. Their long range, not common to the smaller single-engined jobs, enabled them to protect bombers against the Luftwaffe which was operating at conveniently short ranges. In addition, the swift Lightnings strafed everything in sight. Originally designed as high-altitude interceptors, the P-38s are becoming hit-and-run-and-hit-again destroyers. Lacking the maneuverability of the one-engined fighter, they specialize in slashing tactics. A blast from the nose battery of a darting P-38 spells curtains for any enemy fighter that hesitates too long in the reflector sight. The two Allison liquid-cooled engines are turbo-supercharged, the turbos being placed flat on top of each boom back of the fuselage. Fowler-type wing flaps that can also run out behind the wing to increase the effective area help land the fast three-wheeled ship at a practical speed. A Lightning squadron can scramble aloft at a breath-taking rate of climb. Here the Lockheed Lightning shows up the admittedly fast-climbing Zero. Although American Lightnings have props that revolve in opposite directions to kill torque, the British version does not. Neither do the British have the turbo-supercharger. Speed of the British Lightning is 360 m. p. h., according to their own figures.

Armorer feeds belt of .50-caliber bullets into ammo box. Below—Interception, strafing, escort; it's all the same to the Lightning Squadron.

Seaplane Zero has unsurpassed cleanness for a floatplane, though it looks flimsy. Among tricks are fuel tank in the pontoon and oil-cooling radiator in main strut.

AT THE OUTBREAK OF WAR, JAPAN HAD AT LEAST ELEVEN OF THESE STRANGE VESSELS, NOT COMMON IN OTHER NAVIES.



JAP SEAPLANE CARRIERS

By Leonard Engel

THE Japs, as a result of their heavy losses of fleet aircraft carriers, may soon be compelled to bring into action a desperately makeshift type of ship in order to provide themselves with at least a minimum of air cover at sea. This is the seaplane carrier, a vessel not found in many navies. While generally the enemy has not made much active use of his unusual vessels, they *were* used, apparently, to bring enemy seaplanes to the Aleutians.

The seaplane carrier is to small floatplanes what the flat top is to wheeled sea-going craft. Naturally it cannot begin to compare in effectiveness with the regular carrier, for floatplanes fall far short of wheeled planes in performance and, furthermore, much fewer are carried. A navy compelled to operate throughout a vast war zone with but few flat tops may, however, find the seaplane carrier of definite value in secondary zones. The seaplane carrier is not, of course, to be confused with the seaplane tender. The seaplane tender—developed by the U. S. Navy—is a fuel and repair depot for great long-range flying boats. The flying boats go aboard the tender only for overhaul and repairs; otherwise they remain in the water and proceed from area to area under their own power. The seaplane carrier is an actual carrier.

At the start of the war, Japan had at least eleven of these vessels, eight converted merchantmen and three specially built. Two or three appear to have been sunk, but this is not certain: navy communiques are not always clear and these vessels may be confused with auxiliary aircraft carriers for wheeled planes, also converted from merchantmen.

In general, the Japanese seaplane carrier has inside stowage for twelve to twenty seaplanes, but more can be carried in wartime by stowing some on deck. The planes are usually launched by catapult or, in calm weather, lowered over the side for take-off under their own power. The carrier is quite heavily armed.

The three specially built seaplane carriers are the *Titose*, *Tiyoda*, and *Midusho*, 9,000-ton (displacement) sister ships built in 1937, 1938 and 1939. They have internal storage space for twenty planes and four catapults. Their main armament consists of six 5-inch guns mounted in pairs. The *Titose* and *Tiyoda* have a top speed of 20 knots, the *Midusho* of 17. All three are 577½ feet long with a beam of 62 feet.

The largest of the seaplane carriers is the *Kamoi*, built in 1922 as a tanker and converted to its present duties in 1932. The *Kamoi*, the first Jap naval vessel with electric drive, displaces 17,000 tons, but because it is short and squat (the least efficient shape for carrying planes) it can carry only sixteen aircraft internally. The *Kamoi* has a top speed of 15 knots and is armed with two 5.5-inch and two 3-inch double-purpose guns. Photographs show what look like two catapults, but this is not certain.

The *Notoro*, twenty-two years old, 14,050-ton displacement, likewise stows sixteen planes internally and likewise was originally a tanker. Its armament consists of two 4.7-inch and two 3-inch guns; top speed, however, is only 12 knots. Both the *Kamoi* and *Notoro* are less than 500 feet long. The remaining Jap seaplane carriers have, roughly, about 7,000 tons displacement and have a peacetime capacity of a dozen planes each. The normal complement of the eleven craft was 164 planes.

The Japanese seaplane carriers all date from the middle thirties. They appear to have been developed to give greater range to Japanese overwater operations—at that time we were developing our big flying boats, a field in which Japan lagged notoriously. The Japs evidently attempted to overcome their handicap in this respect and at the same time make use of their existing seaplanes by the device of mobile seadromes. The seaplane carriers thus are a typical example of Japanese adaptability and economy. *(Turn to page 58)*

TOADSTOOLS ARE THEIR DISH!

By Lieut. Fred Tupper

OVERNIGHT the power turret, or "toadstool," became lethal armament in Allied long-range plans. Ordinarily it takes years to bring a combat plane from drawing board to assembly line, but designers now hastily squeezed turrets into plans for American planes. The navy installed them in its patrol planes, the PB2Y's and PBM's, and in its deadly torpedo plane, the TBF Avenger, with signal success in their use. For example, the mission of a torpedo plane is to bore in there at low levels and smash its "tin fish" home against enemy carriers, battlewagons and cruisers. That done, its sole intent is to get home. Out in the Solomons, Torpedo Squadron 8 went out on a score of missions and scored hit after hit. In over a month's time they lost only three planes. Such outstanding success is due to the gunner who, in the upper-deck turret, protects their retreat homeward by blasting pursuing Zeros from the skies. Gunners in the upper deck and spherical bow turrets on the navy's patrol planes are scoring similarly in the Aleutians.

To instruct men in their use, the navy has established the largest turret school of its type in the world, at the Chicago Vocational School. Here, in a two-month course, AMMs (mechanics) from the fleet and top-ranking graduates of "A" technical training schools learn everything there is to know about the maintenance and overhauling of the various types now being used in naval aviation.

Starting from scratch they learn about turret structures. The turret generally is a completely self-contained unit and may be removed from or installed in the airplane as such. The main member of the turret is a large aluminum alloy casting to which is fastened the brackets and mounts for carrying the gun carriages, gun sight bracket, seat, armor plate, ammunition boxes, power drives and inclosure. *(Turn to page 56)*

HE'S A NEW KIND OF MECHANIC, THE CHAP WHO OVERHAULS THE POWER TURRETS. IN THE NAVY, HE IS TRAINED AT THE WORLD'S BIGGEST TURRET SCHOOL, IN CHICAGO, ILLINOIS.

The two-month course is given to AMMs (mechanics) from the fleet, and high-standing tech school grads. Navy favors twin .50-caliber.

When the Avenger skims the waves to launch its torpedo it would be duck soup to the Zeros without its "bubble" turret and hydraulically operated guns.

LOAD

18,000 pounds of bombs can be carried in the 33-foot-long bomb bay beneath the Lancaster's floor. Provision is made for two- and four-ton "block busters." Though rather vulnerable to fighters they have made day raids.

LANCASTER

DESIGNED TO FERRY GREAT BOMB LOADS TO THE AXIS, THE LANCASTER IS BRITAIN'S BEST BOMBER AND IS TRULY AN EXCELLENT AIRPLANE.

Clyde Pangborn demonstrates operation of remote-control belly turret on the big Avro. Turret is aimed by sighting *mirror* inside hood. Note ammunition rails along wall to rear turret. Ten .303-caliber guns have weight of fire per minute of 275 pounds.

DEFENSE

Maximum speed of both machines is restricted, though approximately 300 m. p. h. The British say that with maximum bomb load at best operational altitude the Lancaster is slightly faster: that cruising speeds are identical. Lancaster's critical altitude with four liquid-cooled Merlin 20s is about 21,000 feet. 1,500 horse-power air-cooled engines also will be used.

PERFORMANCE

RANGE

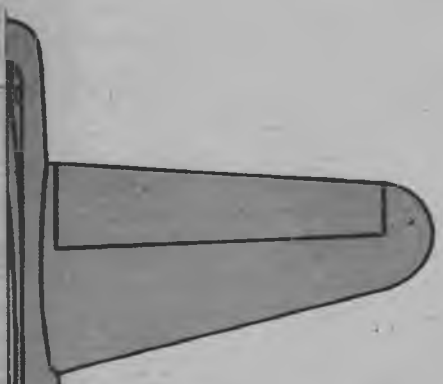
Maximum range of the Lancaster with an undetermined bomb load is supposed to be around 3,000 miles. Fuel capacity is 2,600 gallons against 1,762 on Fortress, though the latter can carry tanks in bomb bay for a total 2,500. Lancaster spans 102 ft.; wing area, 1,297 sq. ft.

VS. FORTRESS

THE GREATEST FIGHTER DESTROYER EVER BUILT, THE FORTRESS IS MEANT TO OPERATE AT HIGH ALTITUDES AND TO EXECUTE PRECISION BOMBING.

LOAD

Originally intended for long ocean patrols, the B-17 series has a deep bomb bay with eleven-foot-long doors. Since range and tankage were emphasized, bomb capacity is small. However, Boeing could lift as much as Avro.



Twin .50-caliber remote-control tail guns of Fortress are only two of a dozen fifties. One .30-caliber also. Fire-power is terrific with a weight of fire of 1,185 pounds per minute. Range compares with 20 mm. Sperry "ball" turret is notable feature.

With maximum load the Fortress operates fully 10,000 feet higher than the Lancaster because of its turbo-superchargers. And the Lancaster itself is well supercharged. Fortress cruises 25,000-30,000 feet. Over Continent in winter poor visibility often interferes with high-altitude bombing.

PERFORMANCE

DEFENSE

The Fortress is world's first day bomber that can penetrate enemy territory sans fighter protection and cloud cover when there is strong fighter opposition. Though some losses result, the rate of attrition for the Axis is very high. Span 103 ft. 9¾ in.; wing area, 1,486 sq. ft.

RANGE

Right: By reducing air pressure in test chamber steadily increasing altitude is simulated. Camera follows subject's ascent without his face mask, records his every reaction.

12,000 FT. Subject feels ill, headache, very slow reflexes.

16,000 FT. Person's heart thumps, lips blue. Reaction: hilarious.

HOW HIGH?

In the old days pilot "sucked" on tube for oxygen; today's mask incorporates reservoir, effects 75% saving, warms, humidifies oxygen.

By means of this duplicate panel on outside of chamber, watch is kept on rise and fall of pressure, as well as on the rate of ascent and descent.

Doctor's watchful eye is alert to distress. Balloon expands during ascent. Above 15,000 oxygen should be used; above 10,000 on long flights.

THE first known deaths from a high-altitude flight occurred in 1875 when Tissandier, a Frenchman, and two companions ascended in their balloon to 26,000 feet. Oxygen starvation killed both Tissandier's passengers!

Oxygen lack is an insidious and mortal foe of high-flying airmen. It can kill or permanently injure without the victim's being fully aware of his danger. If he goes aloft without a supply of oxygen, the average flier suddenly passes out when he reaches somewhere between 18,000 and 26,000 feet—prolonged exposure between 18,000 and 30,000 means death. Peculiarly enough, he is not too aware of the slowing down of his mental and physical reactions, his state being exactly similar to acute alcoholism.

At the Jacksonville Naval Air Station the navy determines pre-

20,000 FT. Reaction: vision blurs, breathing is labored.

25,000 FT. Subject collapses, is revived again with oxygen.

40,000 FT. With mask, can reach 40,000. Works problems.

BENDS Forming of nitrogen bubbles causes the "bends."

AT THE JACKSONVILLE NAVAL AIR STATION THE NAVY FINDS OUT HOW HIGH EACH PROSPECTIVE PILOT CAN FLY, ASSIGNS HIM ACCORDINGLY.

Problems test reaction and co-ordination at various levels. Gadget on man's ear, in the foreground, makes recording of subject's brainwaves.

For emergency use the air lock opens one end at a time to prevent a change in pressure. At 33,000 feet man requires 100% oxygen.

Each cadet has earphone and throat "mike" so that he can converse with doctor on outside. Switchboard, shown, connects with each cadet.

cisely the ability of each individual to withstand oxygen lack. This is important in the classification of pilots. For example, a fighter pilot must operate at higher altitudes than the chap cast as a torpedo plane pilot. In the last war it was discovered that 14% of the pilots examined could not go over 8,000 feet while 25% dared not go beyond 15,000 feet.

Three main factors govern altitude sickness: altitude, rate of ascent, and period of exposure. The best rate of ascent is said to be 500 to 1,000 feet per minute, and while a fifteen-minute exposure at 17,000 feet may be reacted to normally, sustained exposure at the same height can cause loss of consciousness. In contrast with the situation in the last war, aviation medicine today has the background, due to its research, to see that our boys fly high safely.

One of the most devastating medium bombers of the war, the Vega-built Ventura is bigger, faster, and carries more bombs than the Hudson which it resembles.

This unique two-level system gives workers access to both top and bottom of ship. Ventura is a Lockheed design.

DOUBLE-DECK ASSEMBLY

VEGA'S NOVEL TWO-LEVEL ASSEMBLY METHOD FOR MAKING THE VENTURA WAS BIG FACTOR IN THEIR WINNING COVETED ARMY-NAVY E.

Here a Ventura fuselage is being guided into place in the mating jig where the wing center section will be attached. The Ventura is the army's B-34.

Overhead monorail crane moves bomber out of fuselage assembly. In final assembly, it will receive outer wing panels and tail surfaces, turrets, etc.

Impatient to be off for the bombing of Europe, the big Venturas flow through final assembly. Vega makes Fortresses with Boeing and Douglas.

BRUCE UTHUS,

WHEN FLIGHT TRAINING COMES . . .

STUDENTS OF PREFLIGHT AERONAUTICS WILL HAVE QUALIFIED FOR FLIGHT TRAINING BY PASSING C. A. A. GROUND SCHOOL QUIZ.

By BRUCE UTHUS

DIRECTOR OF PREFLIGHT AERONAUTICS PROGRAM, CIVIL AERONAUTICS ADMINISTRATION

THROUGH the eager mind of Bill Smith, a freshman in the Thomas Jefferson High School, had been buzzing a pressing question. For days and weeks, as he read aviation magazines and newspapers and listened to radio accounts of American fliers operating over New Guinea, China and Tunisia, he kept asking himself this question: "How can I become a pilot?"

Bill debated the question with his gang while going to and from school. He put it up to his father, who suggested he forget about flying for three or four years. At last one night Bill decided that somebody in Washington ought to be able to answer his question, and, accordingly, he wrote a letter to his government. When he finished, he wondered how to address his little incendiary so that it would land on the right desk and induce some effective heat. Bill remembered that he had once heard of the C. A. A. but had only a hazy recollection of just what those three letters meant. However, he decided just to take a long shot and write "C. A. A." on his envelope.

That letter revealed that Bill was already an embryonic bombardier, for his letter didn't land merely in "the target area" or result in a "near miss"—it was a perfect bull's-eye, landing squarely on a desk in the C. A. A. offices which house the Preflight Aeronautics Program.

The man who picked up Bill's letter read the following assortment of vital statistics and genealogical facts, followed by the burning question: "What must I study to be a good pilot?"

I am going to be sixteen in August, 1943, and I am 5 feet eleven and weigh 153 pounds and am in my second year in high school.

I want to join the navy aviation as soon as I graduate from high school. My dad is a chief boatswain in the navy. My sister Mary is in the Bureau of Mines and my sister Virginia will soon be with the F. B. I., and my Mom will join the WAACs. We are patriotic and I wish to God I was old enough to be an aviator.

What must I study to be a good pilot?

Please send me all details. (signed) BILL SMITH.

Upon reading Bill's urgent letter the man checked the list of schools which had installed preflight programs. No, the Thomas Jefferson had not yet gotten around to begin satisfying that curiosity about aviation which is rapidly becoming as integral a part of young America's outlook on life as is the call of the sea to young Britons.

As Bill's school does not yet have a preflight program, it belongs to a rapidly declining minority of American high schools. Because, since the teaching of aeronautics under the stimulus of the C. A. A. Preflight Aeronautics Program began rolling across the country in the fall of 1942, approximately half the secondary schools have organized classes for juniors and seniors. So it is likely that within another year Bill can start right in at the Thomas Jefferson High School to build up that co-ordinate set of knowledges, habits and skills which an effective pilot must possess.

Preflight aeronautics courses are not planned as a picnic for the fellows and girls who take them. These courses involve the study of what makes a plane fly, elementary science of weather, navigation to get from here to there, some of the mechanics of operating and maintaining aircraft, air traffic and control rules, and aircraft communications, as well as some understanding of the social significance of the airplane. The course is designed to help fellows like Bill with a yen for piloting; but it is also for boys like Jim and Sam who may be potential designing engineers, traffic managers, maintenance men, or air-line copywriters; or for girls like Anne and Jane who may also be potential pilots or who may have talents as plane hostesses, airport information specialists, or skilled assemblers and checkers of flight instruments in aviation factories.

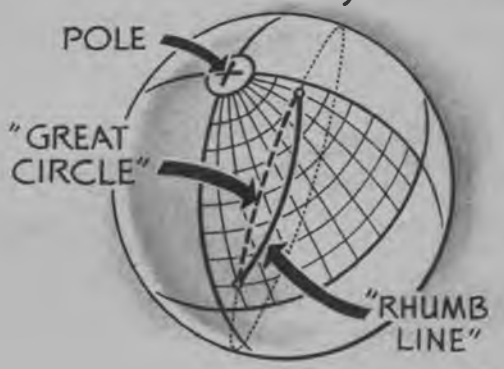
Of course, in a long war Bill Smith and many of his friends may eventually pilot fighter or bomber planes or become equally important members of bomber crews operating in one or more of the many theaters of this global war. But when the world finally swings back to stability, Bill and his flying chums *(Turn to page 54)*

AIR MANUAL LESSON NO. 9
MAP PROJECTIONS

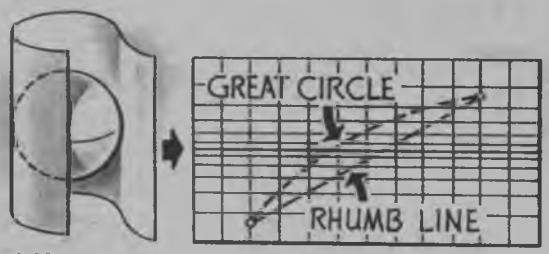
By H. A. Thomas

MANY methods are employed to project the spherical, bulged surface of the earth on a plane, for use as a map. Since the earth's surface is not developable, it is projected as though it were the surface of a cylinder, a cone, or a plane. The four principal methods are: 1. MERCATOR, devised mainly for nautical work since rhumb line routes can be drawn as straight lines. 2. LAMBERT CONFORMAL CONIC, a highly accurate method, used in military and aeronautical charts. 3. GNOMONIC (polar), also known as great circle charts, since great circles can be drawn as straight lines. 4. POLYCONIC, shows areas in nearly true size, but is unsatisfactory for air navigation. A "great circle" route is the shortest distance between two points on the earth's surface. Due to convergence of meridians toward the poles, following a great circle course requires a constant slight change of heading. Distortion in all projections, with the exception of the Gnomonic system, makes a great circle route appear curved and longer than a rhumb line, though actually the reverse is true.

"GREAT CIRCLE" ROUTE
lies in a plane which passes thru earth's center... Equator and meridians are great circles

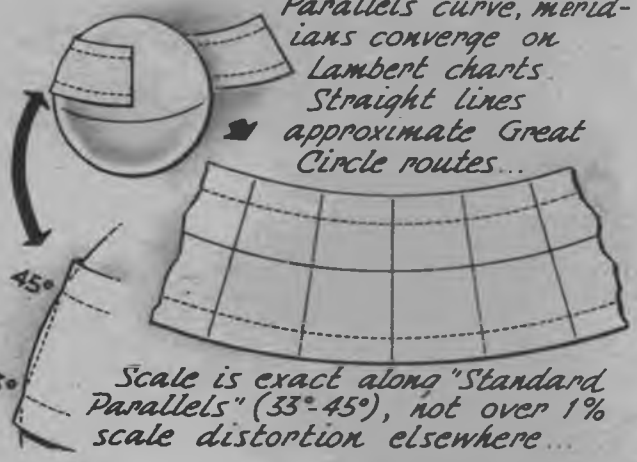


"RHUMB LINE"
a longer route, crossing all meridians at the same angle...



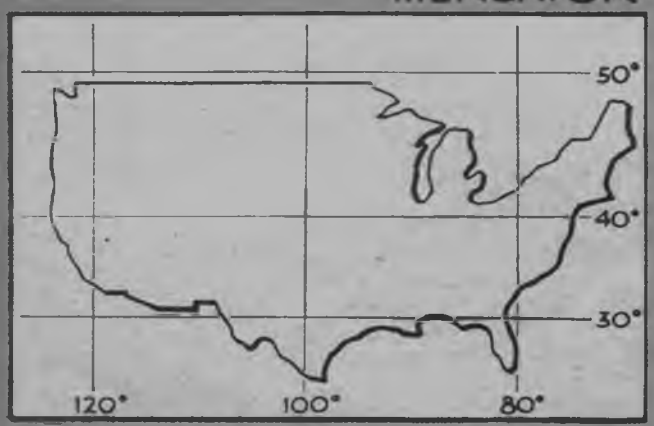
Meridians and parallels on Mercator chart are straight and at right angles. Distortion increases toward north & south.

Parallels curve, meridians converge on Lambert charts. Straight lines approximate Great Circle routes...

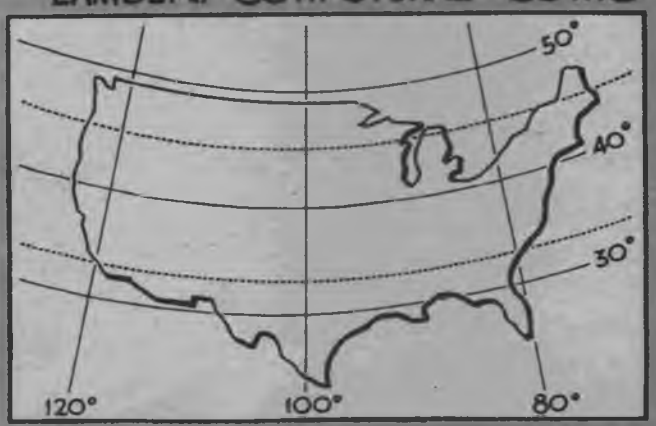


Scale is exact along "Standard Parallels" (33°-45°), not over 1% scale distortion elsewhere...

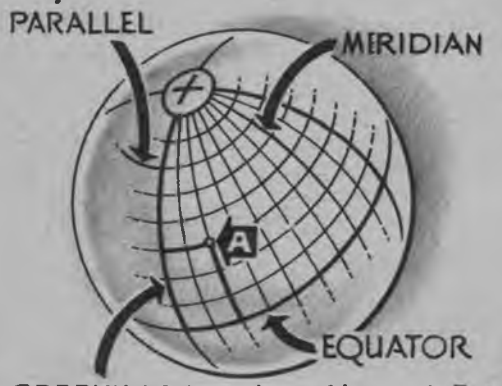
MERCATOR



LAMBERT CONFORMAL CONIC



"LATITUDE" is measured by parallels in degrees north or south of the Equator. Parallels, except Equator are "Small Circles"

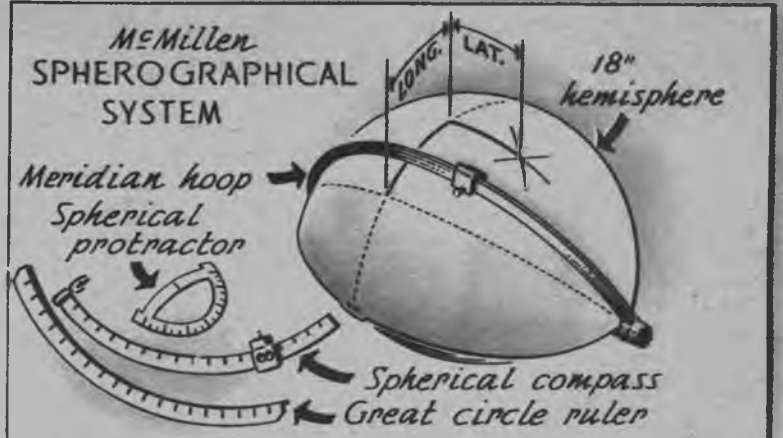


GREENWICH MERIDIAN

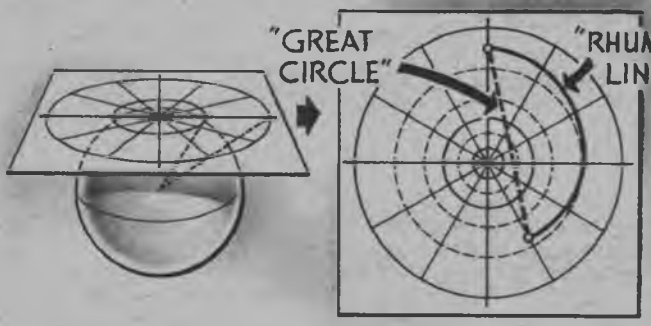
Location of A: Long. 20°E., Lat. 30°N.

"LONGITUDE" is measured by meridians in degrees east or west of Greenwich (England) meridian, called "Prime" meridian...

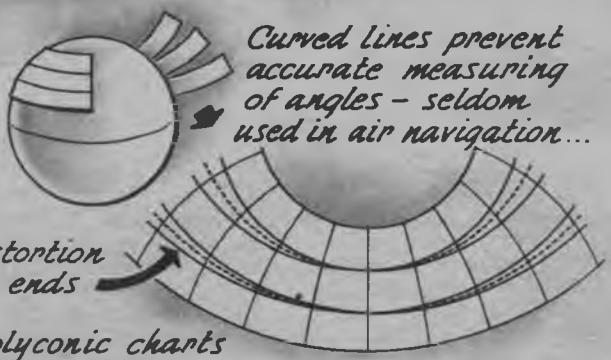
McMillen SPHEROGRAPHICAL SYSTEM



THE McMillen Spherographical System is an entirely new approach to air navigation and orientation, and theoretically is more accurate than other methods. Though not yet in general use, it permits accurate orientation in ten minutes' time by a graphic procedure, eliminating the magnetic compass and all the lengthy calculations of other systems. The navigator carries the small hemisphere on his lap, drawing prime meridian and equator for reference. Using the sextant and air almanac for reference, he observes and plots "position circles" of two stars. Their intersection is the plane's position which is measured to find latitude and longitude. However, slight mechanical difficulties prevent popular adoption of this method.



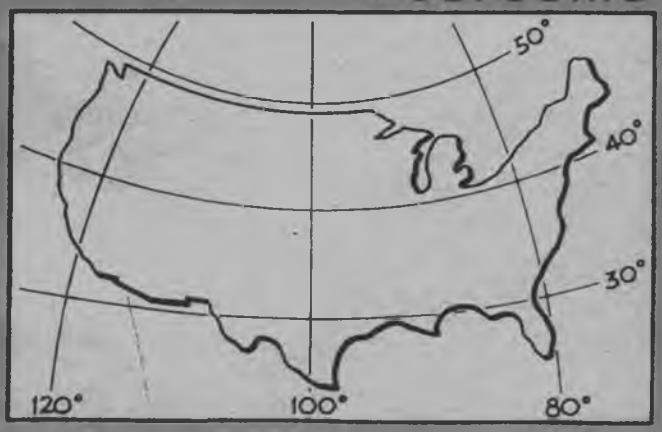
Gnomonic charts show parallels as circles; meridians radiate from point of tangency (on polar gnomonic charts) Great circles shown as straight lines.

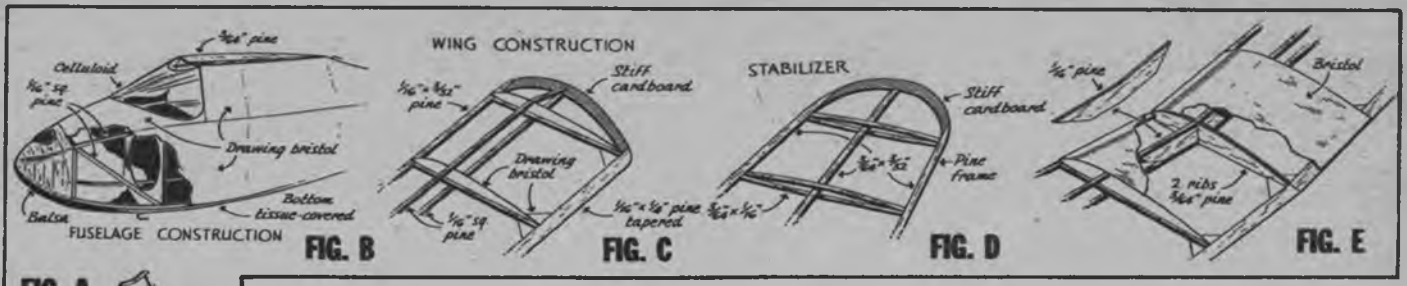


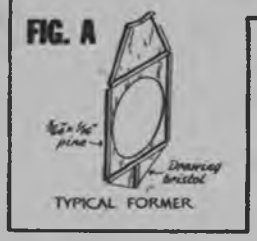
Polyconic charts show all meridians and parallels curved except central meridian... Least error in central portion

GNOMONIC

POLYCONIC







AIR YOUTH GLIDER NO. 3

By W. F. Tyler

REALISM COMBINED WITH SIMPLE CONSTRUCTION—PLUS PERFORMANCE. MAKES THIS TOW-LINE GLIDER AN INTERESTING SUBJECT.

THE third and final design in this series of classroom projects bears a close resemblance both in appearance and construction to actual, full-size utility gliders. Two-ply bristol board, stiff cardboard, assorted pine strips, a nose block of scrap pine or balsa, light model tissue, cement, dope and a paper clip for the simple wire fittings complete the list of required materials.

Make a duplicate of the graphic scale as shown on the plans and use it to measure parts in order to redraw them full size. You'll find the graph paper background useful in duplicating wing tips, fuselage shape, et cetera. Begin by laying out the two fuselage sides on two-ply bristol board. Draw in the position of the formers and longerons. Cut these two sides out with scissors or razor blade and then cement in place the $^1/_{16}$" square stringers and cross members. Now cut out the formers from bristol board as shown by Fig. A. Cement the two fuselage sides together at the rear, and when dry, add the formers. See Fig. B for details of nose and wing mount construction.

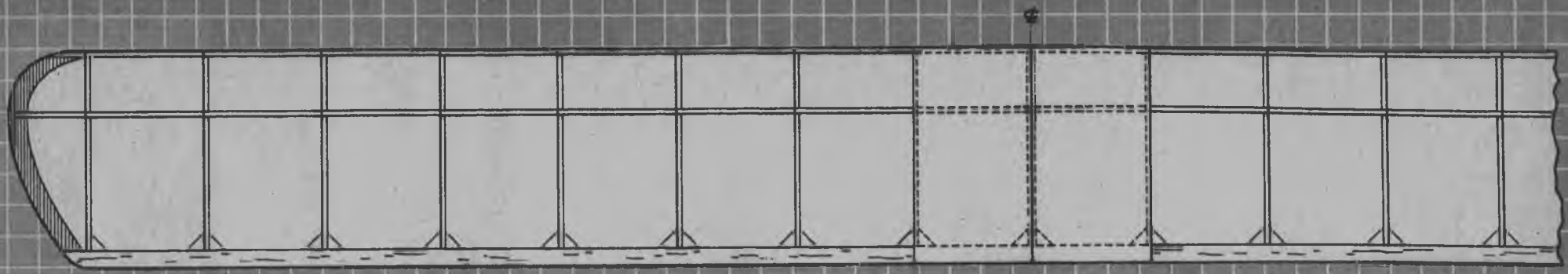
Next, add the wing mount which is angled to correspond with the dihedral of the wing. If you have enlarged the Y and C formers accurately, the construction will automatically come out correct. Cement in the top and bottom stringers and add Former X. Shape the nose block from scrap balsa (if available) or pine, and add to Former A. Note the hole in the top of the block. Cut the cockpit cover from sheet celluloid, or cellophane and glue in position. Cover the area from Former A to D on top of the fuselage with a fairly heavy grade of bond paper; fashion the simple wire fitting from a paper clip; cement in place, and the fuselage is finished except for covering—which shouldn't be done until the entire model is completed.

The wing and tail group are conventional, except that stiff cardboard has been substituted for the usual wood tips and the wing ribs are of bristol board. This bristol board is used for all but the two end wing ribs and is reinforced by a strip of $^1/_{16}$" square pine glued along the side; see Fig. C. Build the wings in two separate panels, then join together as shown by Sketch E. Use plenty of cement and block up one tip while drying to maintain the proper dihedral. Notice how the stabilizer ribs (see Fig. D) are cemented in pairs, one passing over and one under the center spar. The rudder is built flat. Although $^3/_{64}$" x $^3/_{32}$" pine strips are called for on the outlines, $^1/_{16}$" x $^1/_8$" strips may be substituted without affecting the performance of the finished model.

Cover all parts with ordinary Silkspan tissue and spray lightly with water. When dry, apply a coat of thinned dope. Cement the tail group in place—first the stabilizer, then the rudder—checking carefully for alignment. The wing is held in place by a rubber band, as shown in the photographs.

Before flying, try several test glides to see if the model is properly balanced. Very likely, you'll have to add *(Turn to page 69)*

YOUTH IN AVIATION



Make a cardboard copy of this scale to measure parts direct.

EACH SQUARE EQUALS ½ INCH

1 ½ 0 1 2 3 4 5 6 7 8 9 10 11 12 inches

Flat rudder

FULL SIZE PLANS ARE NOT AVAILABLE

Incidence

X

Y

1½" dihedral

A B C D E F G

Make 16 drawing bristol or cardboard ribs, 2 of pine

1/16" pine dihedral reinf.

A B C D E F G

Pine or balsa

X Y

Clay

Thomas.

CLOSED COURSE CLOSE-UPS

This ship, built by Wayne Leasure, took first place in team exhibition. Wayne is an expert at mimic combats; three ships fighting at once.

Howard Broughton took third place in the Class B event with this streamlined bullet. Note special prop for high speed rather than for climb.

WEST COAST "NATIONAL TETHERLINE CHAMPIONSHIPS" RESULTS SHOWED UNOFFICIAL SPEEDS OF OVER 100 M. P. H. BY "SOUPED-UP" FLYING ENGINES.

Keith Goodwin's record holder did 92.07 m. p. h. after a bad crash. Before the meet it turned in an unofficial clocking of 115 m. p. h.

A 60 m. p. h. job, by Frank Greene, features retractable gear. An extra line pulls a catch pin, releasing take-off dolly. Timer later releases wheels.

Despite the weird design, this "flying ray" clocked 72.3 m. p. h. for owner Tony Naccarado. Latter won first in Class A event. Stable flier.

Granger Williams designed his model around the famous Davis airfoil with outstanding success. Model features inverted motor; tricycle landing gear.

THE amazing growth of control-line flying has the country literally going around in circles. Initially introduced on the West coast by Jim Walker, and in Texas by Vic Stanzel, this new phase of our hobby has mushroomed to its present size, where it threatens to displace free-flight gas models in popularity. Recent coast contests have already introduced many new technical developments such as specially designed propellers, retractable landing gears, and "souped up" engines. Speed flying, however, is not the only feature of this sport. Stunt flying attracts many contestants, and mimic dogfights have been reported with three ships zooming around in the air at once, the boys raising the lines above each other's heads as each ship passes overhead. Converted free-flight gassies called "goats" are used by beginners as a simple way to learn the knack of handling the ropes.

The need for suitable rules standardizing events is becoming increasingly apparent, and all model builders should write to the Academy of Model Aeronautics to have their opinions brought to the attention of a committee now working on this problem.

(Drawings from photos by Robert Lloyd Brown)

This snappy Class A job, by Danny Greene, is not only exceptionally fast, but shows that control-line models can have realism with high speeds.

This ship not only had a beautiful appearance, but its performance was equally impressive. Note rudder is placed ahead of stab for stability.

Second place, Class C winner with 86 m. p. h. Landing gear has extra-wide tread to prevent ground loops. Also has new high-speed propeller.

A converted "Cavalier," "goat" to you, works swell, despite its size. Owner, E. D. Hopkins, an engine expert, co-engineered many winners.

Really, it actually flies, but test hops showed that this type of flying wing needed a more stable airfoil to improve its longitudinal stability.

Here's one for the books! This "Flying Milk Bottle," the old Gee Bee, not only took second in Beauty Event, but had speed of over 60 m. p. h.

WARPLANES 95¢

Kit X8—Grumman "Skyrocket"

Kit X9—Westland "Lysander"

Kit X10—Focke-Wulf

CORSAIR, WILDCAT, SKYROCKET, LIGHTNING, SPITFIRE . . . these are names that are writing history in the skies . . . and all, plus many more, are among the 95c Megow Flying Models that every model builder wants today!

With 30-inch wingspan, they are *impressive* in size, fascinating in design . . . and boy! the way they fly! Easy to build, too . . . with Megow plans that picture every detail.

Build a few of these Megow Warplanes now — develop your skill with tools and learn more about aviation, while you familiarize yourself with the air fighters of the great warring nations. See them at your dealer's, or write direct to us.

Kit X12—Fairchild Trainer

Kit X2—Republic "Guardsman"

Kit X5—Vought "Corsair"

Kit X4—Douglas SA5

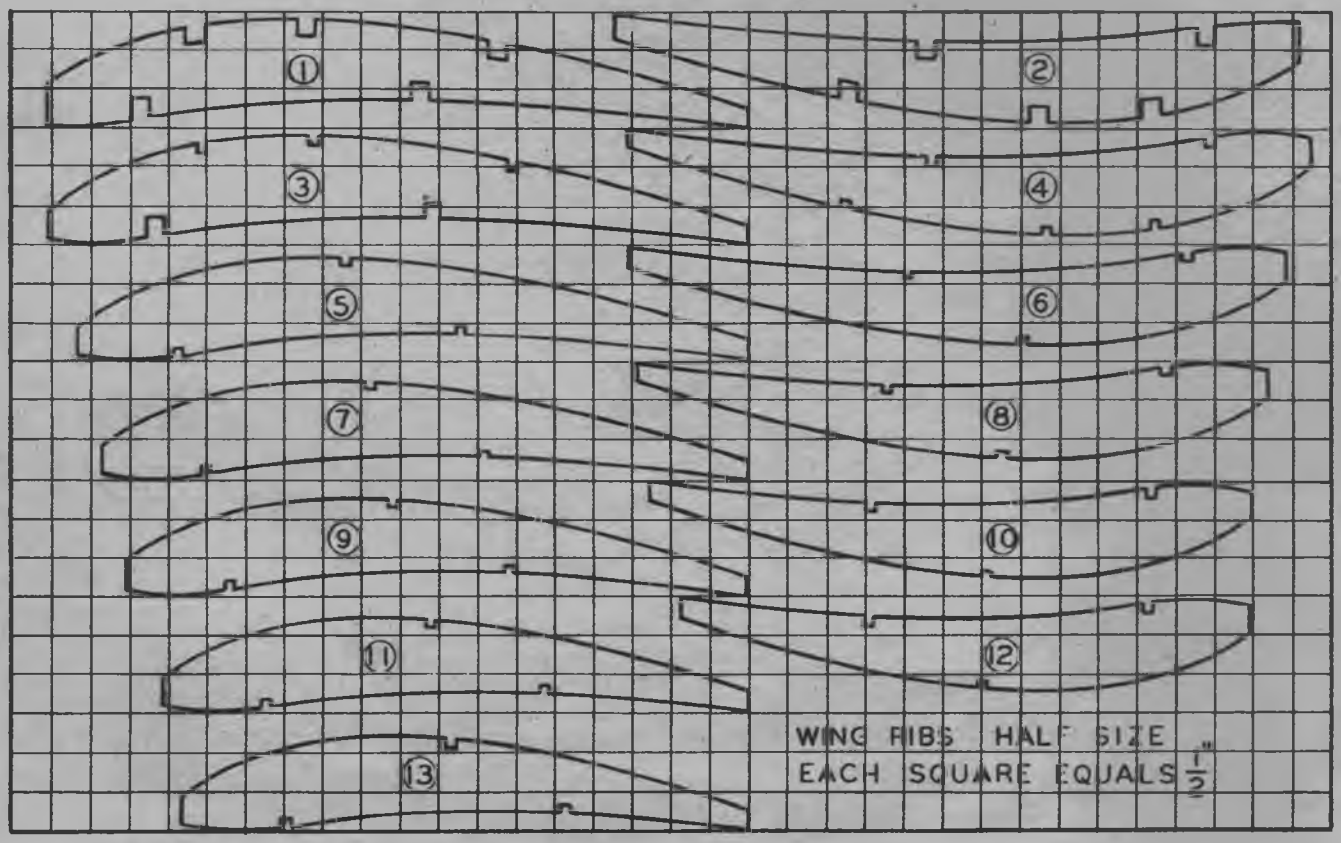
DESIGNED FOR PINE

By Dick Everett

BUILD THIS ALL-PINE CONTEST WINNER DEVELOPED BY NACA EXPERT. FEATURES NEW TYPE OF DETHERMALIZER.

"WHAT! Build a gas job with white pine?" Now wait a minute, pine isn't heavy. As a matter of fact, it's a soft wood, while balsa, as probably few of you know, is classed as a hard wood (all trees that shed their leaves in the fall are hard woods).

After some experimentation and the building of one gas job with pine, it was decided that pine was satisfactory; in fact many people prefer it to balsa. Construction time was about the same as with balsa, although it was a little more difficult to work with until we learned the different tricks. For instance, on the first attempt we used Weldwood in preference to model airplane cement, thinking the latter would not do. However, when it dried it was so tough it could not be cut with a razor blade. We then had recourse to casein glue, which while satisfactory in other ways, took too long to dry. As a last-ditch resort, model airplane cement was tried but it did not work very well until a fillet of cement *(Turn to page 58)*



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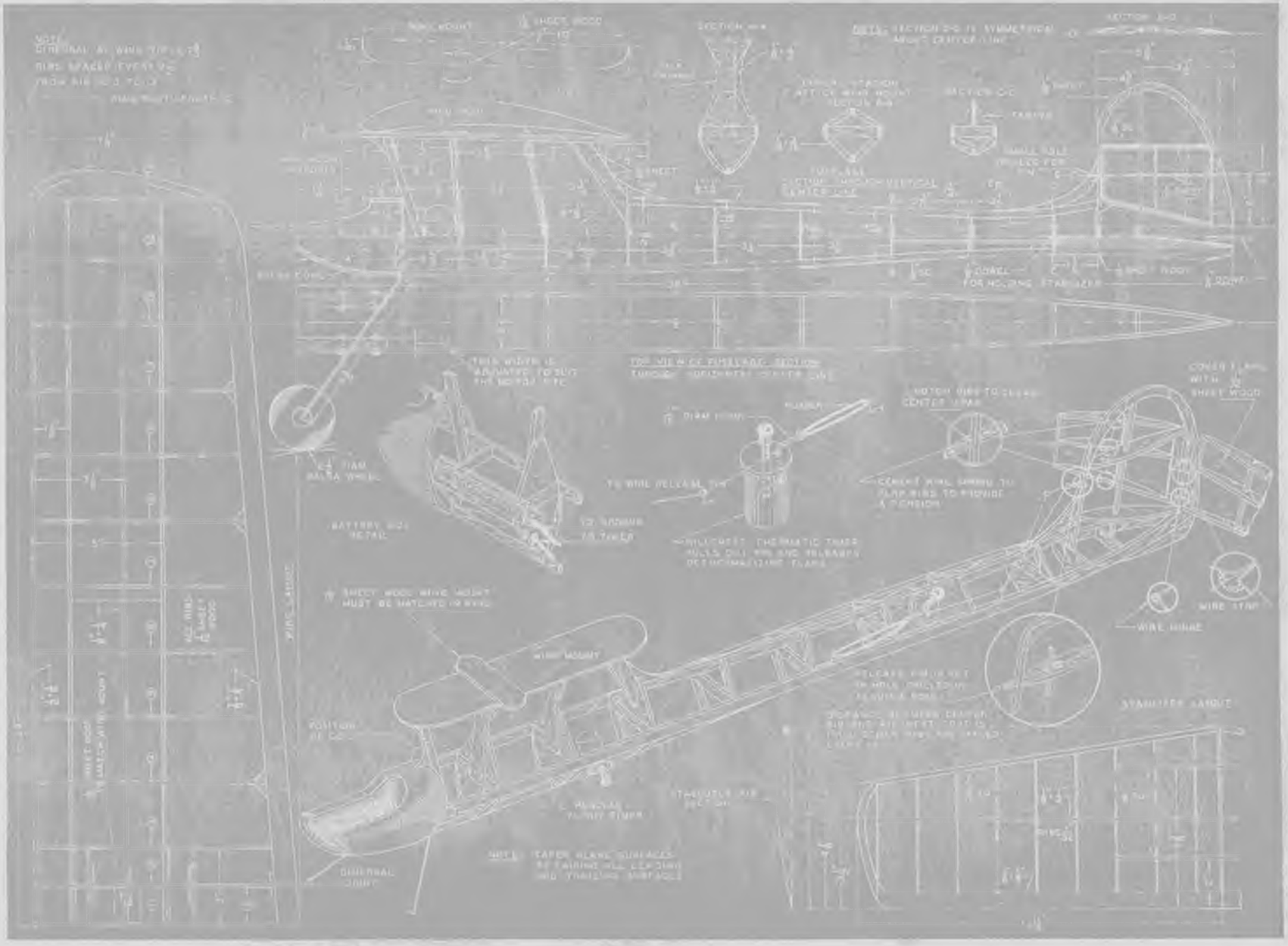
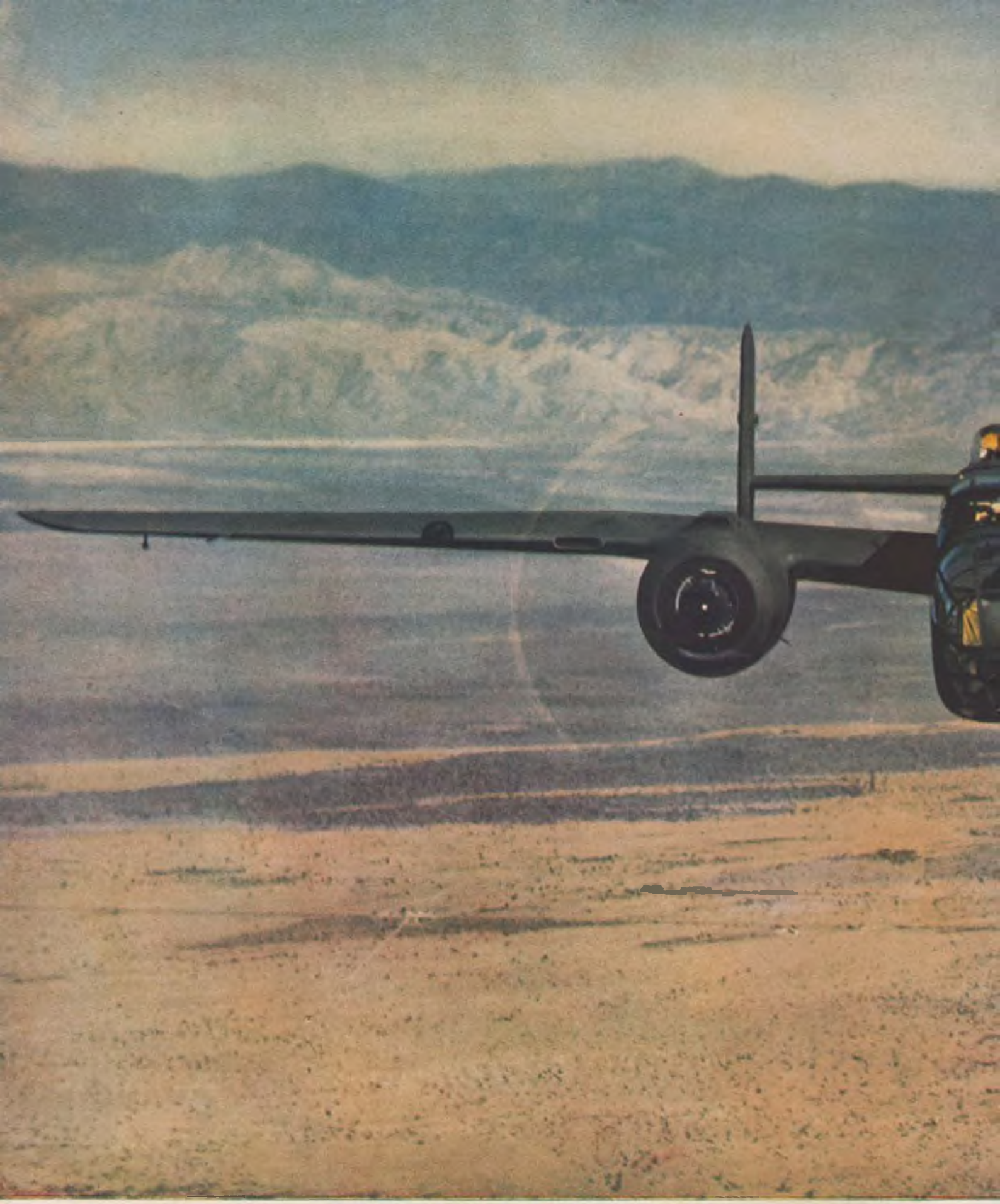


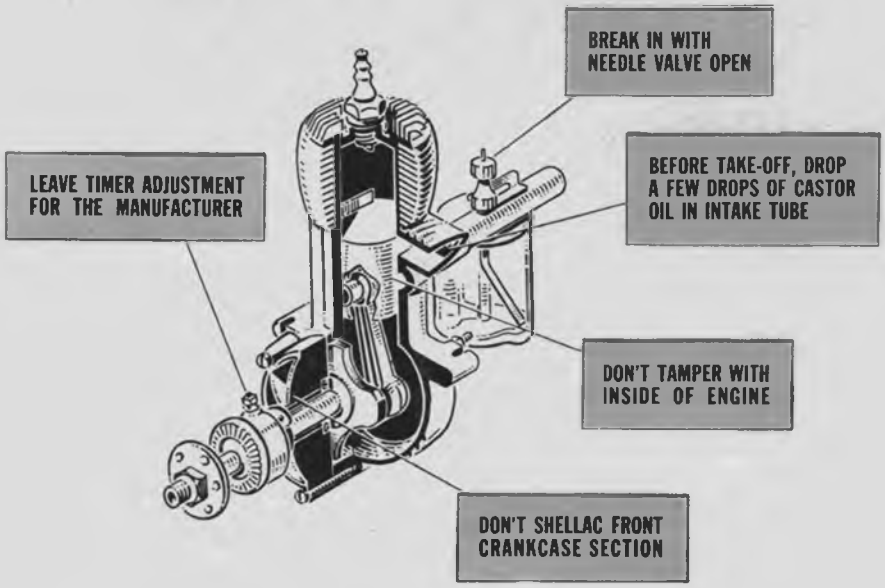


NORTH AMERICAN B-25 MITCHELL

MADE FAMOUS BY JIMMY DOOLITTLE'S RAID ON TOKYO, T

Kodachrome for Air Trails Pictorial by Sherwood Mark of North American Aviation

IS FAST MEDIUM BOMBER IS ACTIVE IN AFRICA AND THE SOUTHWESTERN PACIFIC. IT'S ALSO A NOTED SUB HUNTER.



HANDLE WITH CARE

By Irwin G. Ohlsson

Editorial Note:

Mr. Ohlsson has been kind enough to bring to our attention the many dangerous fallacies that result in a shortening of life or permanent damage to miniature gas engines. Since these engines today are worth their weight in gold, the editors have asked Mr. Ohlsson to pass along this information to our readers. His statements are offered on behalf of the engine industry as a whole and do not relate to any particular product.

IF it is correctly broken in, an engine that is properly fitted up will give hours of service, but the folly of running an engine wide open will result in several things which are disheartening to the model builder. At this time it might be well to explain just what the manufacturer regards as a properly fitted piston and cylinder (an assembly which insures long life to the motor). When these two parts are properly matched, there is no allowance made for expansion of the piston beyond the expansion of the cylinder. If the piston was set up with such clearance that an engine could be run wide open from the very start, the life of that motor would be extremely short and it would soon become inefficient. Since the cylinder has cooling flanges radiating the heat much faster than the internal circulation of the gases can cool the piston, there will be a difference of temperature between the piston and the cylinder. This will result in a greatly expanded piston, which will reduce the clearance between that part and the cylinder, thereby not allowing oil-film clearance. As a consequence, the motor would be running without oil by this time, causing the vital parts to gaul and score.

During the break-in period, the needle valve should be opened so that the engine runs on the rich side and may even four-cycle occasionally so that an abundance of lubrication is always present in the interior of the motor.

Test-block running is even more severe on the motor than actual flying, since it does not allow the engine to dissipate its heat as rapidly as if it were in flight. Familiarity with the motor before the actual flight is a recommended feature, but it must not be run wide open on a test block. It is our recommendation that it be broken in not in excess of three-fourths rated RPM.

Injecting a few drops of castor oil into the intake tube, previous to taking off, is a highly favorable procedure. Castor oil provides one hundred percent lubrication because of the fact that it does not mix with the fuel and deposits an insoluble oil film on the working surface of piston and wall, thus decreasing wear.

Any substantial changes in the interior of the engine, such as changing the crankcase volume by placing cork in the interior of the piston, leads to replacement of many costly parts. The substances used to make materials adhere to the interior of the engine melt, due to the heat of the motor, and flow between the cylinder and the piston. This causes instant stopping of the reciprocating parts, due to either a bent crankpin, a bent connecting rod, or even, occasionally, a piston broken because it had to be forced in order to remove it from the cylinder wall. For the same reason, shellacking the front case section should also be discouraged.

While we hold that the correct fuel mixture is three parts of clear, white unleaded gasoline to one part of seventy SAE oil, we do not feel that any damage would result by using ethyl in the correct proportions. The only disadvantage is the deposit of tetra-ethyl lead that accumulates on the insulation of the plug, causing the spark to occur between the insulation and the body of the plug rather than at the electrodes. At present, many auto fuels are loaded with tetra-ethyl lead in order to raise the octane to a usable point. For this reason we suggest that a modeler use aviation gasoline whenever possible because of higher volatility with a high octane rating. This high volatility makes it possible to lubricate the engine better, because, as the oil enters the crankcase under reduced atmospheric conditions, the gasoline vaporizes, leaving a coating of undiluted oil as a lubricant. Heavier fuels such as auto gasoline do not gasify as readily, but remain mixed with the oil, thereby depositing oil which becomes carbon in the combustion chamber.

If work on the timer becomes necessary, great care should be exercised not to distort, bend or change the position of any of the parts. Any major adjustment should by all means be referred to the manufacturer because of the intricate nature of the timer.

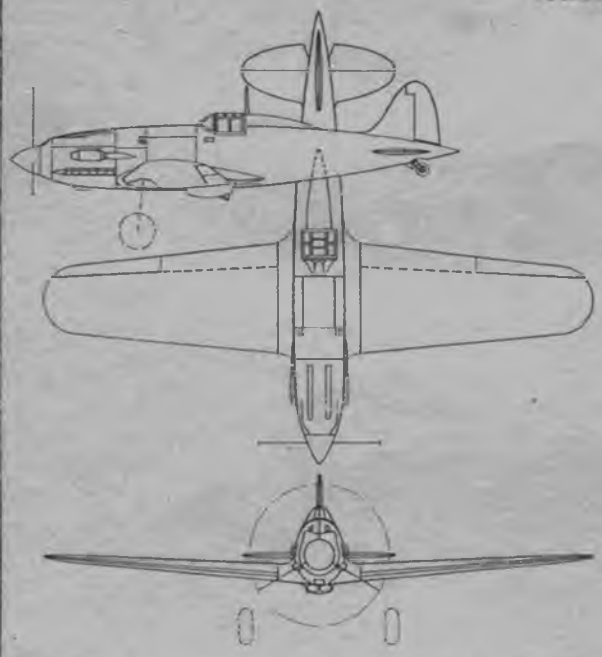
When the engine has been thoroughly broken in, the modeler can expect it to have a long life, providing he uses a propeller of the correct size. The propeller chosen should allow the motor to "rev" up to the speed recommended by the manufacturer.

One of our first model "23" motors was subjected to an endurance run in order to prove the engine to ourselves. The running time was four hundred and twenty-six hours, without replacement or failure of any parts. We think that this should prove to anyone that an engine, if properly handled, will give more service than will ever be expected of it.

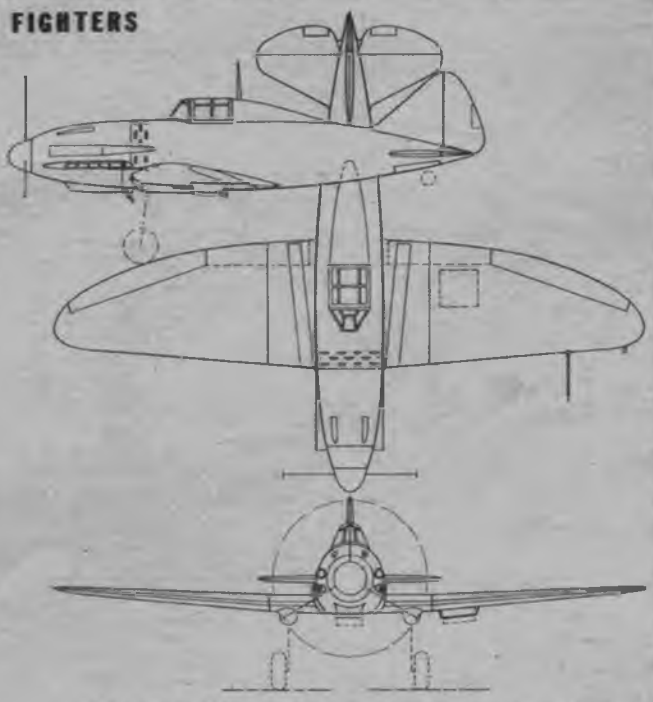
AIR TRAILS PLANBOOK NO.4

DRAWINGS BY THOMAS A. NAYLER

ITALIAN FIGHTERS



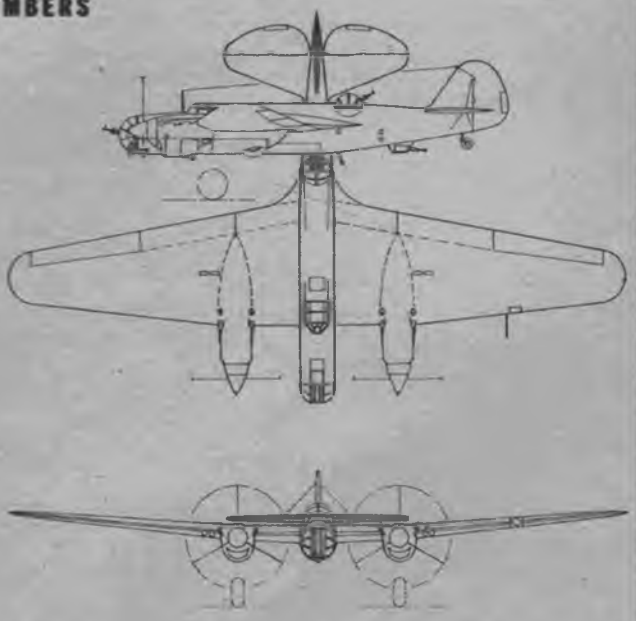
MACCHI C.202. Pilots say it is equal of the Messerschmitt Me-109 in the desert. Powered by 1,200 h. p. German Daimler-Benz, it is capable of 330 m. p. h. Service ceiling 34,500 feet.



REGGIANE Re.2001. A development of the Seversky P-35, this ship has been given a Daimler-Benz power plant and fully retractable landing gear. Performance approximately the same as Macchi.

RUSSIAN BOMBERS

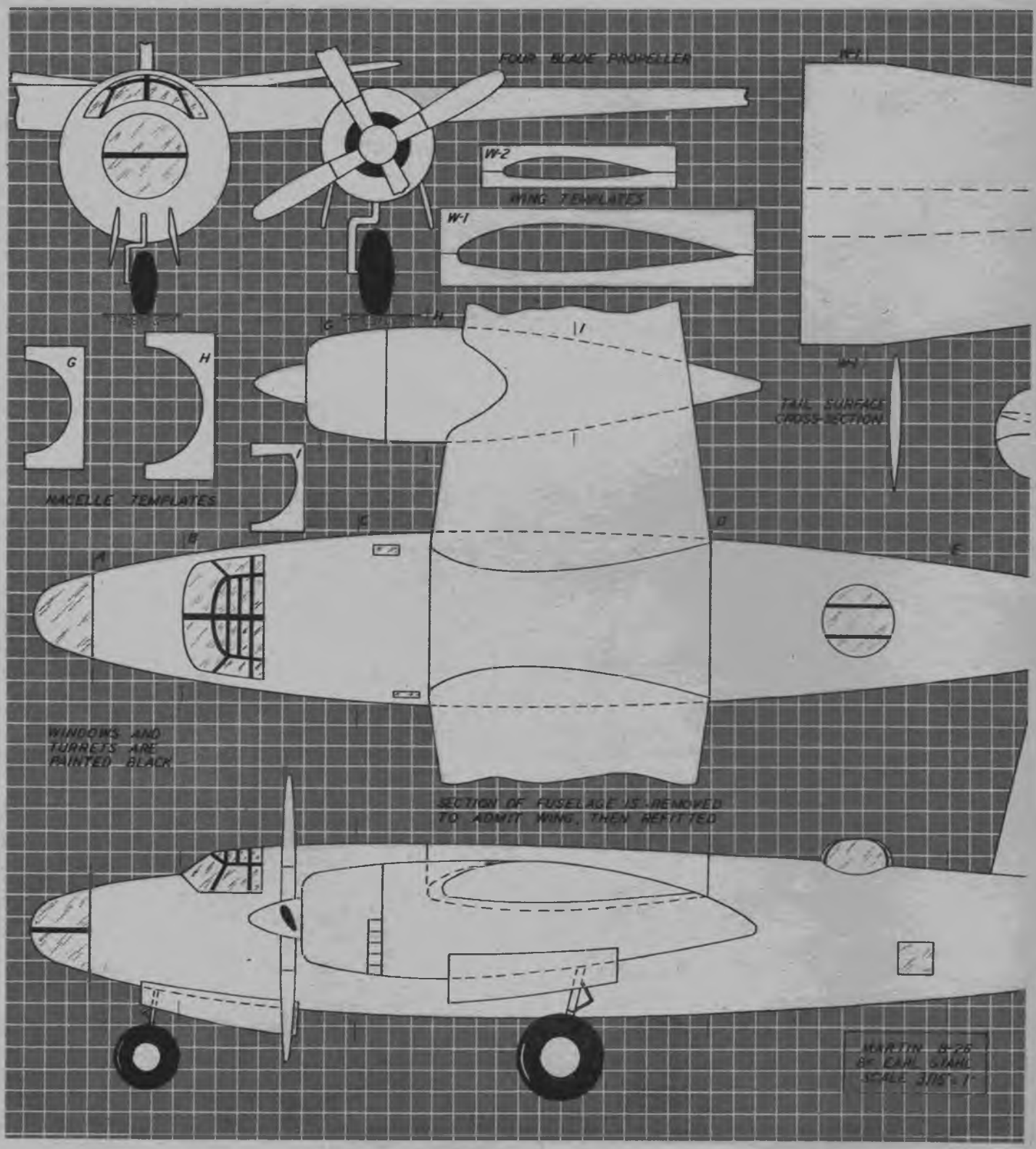
DB-3F. A fairly fast, clean-looking job, this ship is about the size of our Douglas DC-3 airliner. Its 1,000 h. p. M-88 engines are neatly streamlined in small-diameter cowlings. Lifts big load.



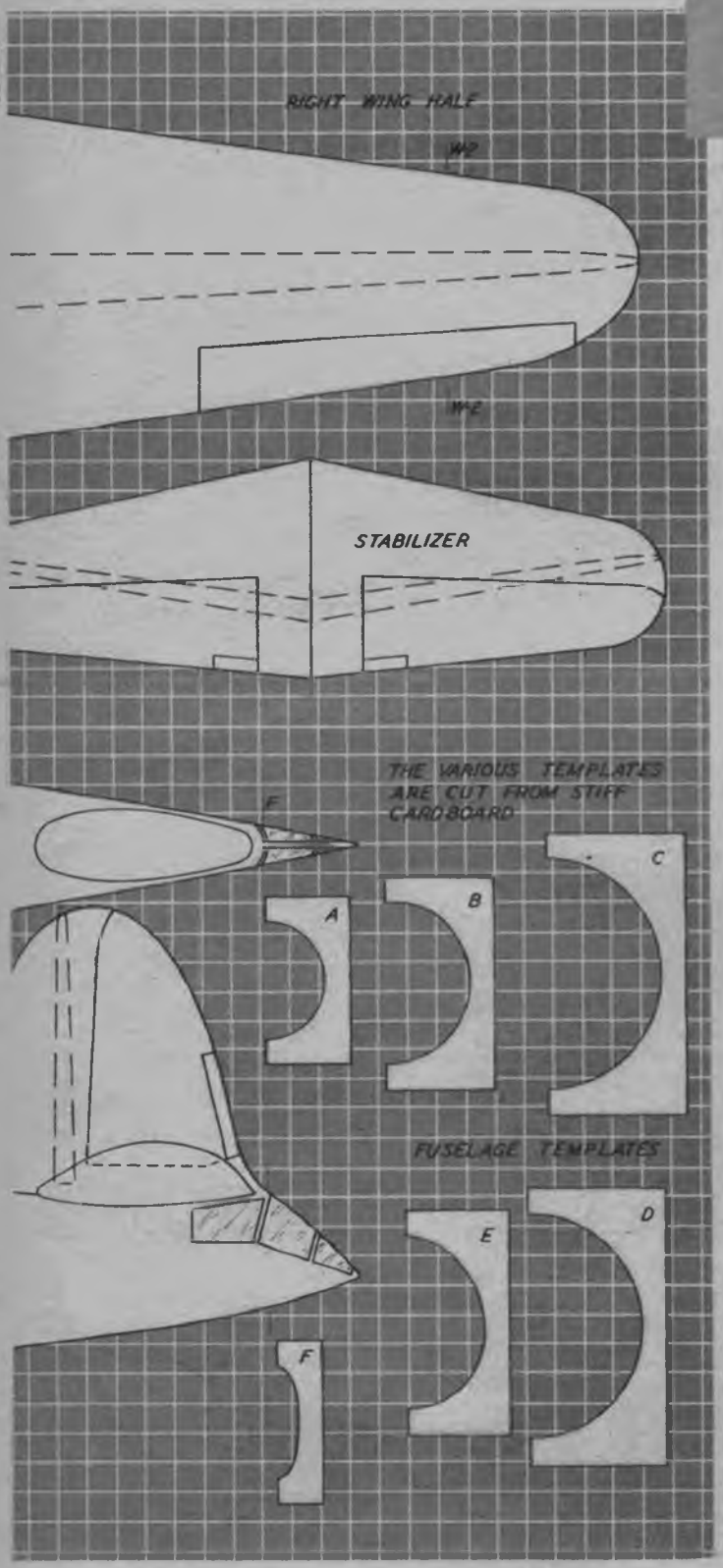
SB-3. This basic design was proved in the Spanish Civil War One of the first two-engined dive bombers, it may have inspired Germans. Span 66 feet, does 230 m. p. h. on its 830 h. p. M-34s

THE MARTIN MARAUDER

By Earl Stahl



SLEEK, DEADLY AND EFFICIENT, THE B-26 IS AMONG THE FASTEST BOMBERS YET PRODUCED IN THIS WAR.



INCORPORATING in its design lessons gleaned from the first years of war, the B-26 is fast—almost equal to the best standard fighters of any nation. The accompanying full-scale plans are for building a model to the scale of $^{3}/_{16}$" to 1'.

Make templates of top and side outlines; these are traced on the fuselage block. When cutting the side view it is best to cut out the indicated section into which the wing is later fitted. This is recemented to the fuselage block and is not removed until the whole unit is finished. When the blank is sawed to shape, center lines are drawn as a guide in using the templates. Trace the fuselage templates on stiff cardboard and cut them out accurately; use frequently as the body is shaped. Use a sharp penknife to remove most of the excess and then with a small rasp smooth off the bumps and reduce the fuselage to exact cross section. Finish with finer grades of sandpaper.

There is no dihedral, so make the wing in one piece with a level top surface. On the board's edge, mark the amount of taper; then shave away excess with a drawknife or block plane. With a template mark the wing's plan view, using a saw to cut to shape. The wing is cut to airfoil shape with a plane or small drawknife—check with templates for accuracy. After the wing is roughly shaped finish with rough, then finer grades of sandpaper.

Motor nacelles are of the clothespin type, i. e., notched at the top to fit neatly over the wing. To make the nacelles fit the wing exactly, cover leading edge with sandpaper and work back and forth over the rough surface until it fits exactly.

Construction of tail surfaces is identical to that of the wing, except for cross-section. Cut the stabilizer in the center, bevel the edges carefully and recement with ½" dihedral at each tip.

A landing gear is optional. If desired, bend from heavy music wire. Drill tiny holes in nacelles and fuselage and force struts into the recess. Cut wheels from small blocks and shape with razor blade and sandpaper.

The finish and amount of detail are most important items for any exhibition model. Before using any color, apply several coats of clear dope with light sanding between each. The color of many B-26s is solid olive drab with light blue-gray undersurfaces. Many coats of thin paint make a better job than one or two heavy coats.

Windows are painted on with black dope, but before applying the dope, mask the various window frames and outlines with scotch tape; tape should be pulled off just before dope has hardened. The gun turret just forward of the fin is made separately and fitted neatly to the body; it should be painted before being cemented fast. If the landing gear is in the extended position, as on the original model, use thin sheet to make the covers that close the wells. Control surface outlines can be represented by thin strips of black tissue or ruled with India ink.

The four-bladed propellers are, in the opinion of the author, unattractive and for that reason were eliminated. Note that spinners without blades are mounted on the original. Revolving propellers may be simulated by two disks cut from sheet celluloid. Spinners are made from small blocks and blades can be made from scraps. Propeller blades are painted black.

Fred Tuxworth sends this shot of recognition model shop, Pensacola. Note the line-up.

Model Matters

A "P-38" control-line model by G. Pearson, Montgomery, Ala., from two Fireball kits.

We wonder if Hank Cole's liking for hydros influenced his joining the navy air corps.

Frank Ehling (remember him?) finds time between flying B-17s to continue building.

THE DOPE CAN

Model builders are well into their spring campaigning. Oil-thirsty winders and one-cycle growlers are disturbing the otherwise peaceful spring days. One sound missing is the death-snap of rubber motors. Fewer boys are putting in that fatal last turn. Missing, too, are the out-of-State license plates on the cars lining the field. In fact, there are practically no cars. Youngsters who hang around contests collecting wreckage are finding crack-up victims reluctant to part with the debris. Material is too scarce. Contestants can be cataloged readily: either they're youngsters who haven't shaved yet or real old-timers. But it's still good relaxation; war worries take a back seat when King Model takes the throne for a session of flying.

Mr. Piggott is a few thousand miles from home-field in England. This transplanted member of the Blackheath Flying Club is thriving in his new surroundings at Moncton, Canada, getting his RAF pilot training. He's anxious to convert some of his spare time into gas-model flying. It's his first chance in more than three years: gas boys in England have been officially land-bound since the beginning of the war. Tell Cadet Piggott where he can get a motor and you'll make a friend for life. His full address is L. A. C. Piggott, 1602556, 31 P. D., Moncton, N. B., Canada.

The theme we like to hear these days goes something like this: "Our club has lost practically all the experienced builders, but, somehow, we'll keep going." We suspect many of the less hardy have used shrinking membership as an excuse to fold. Lyle Crist reports an all-time low, but the Purdue (University) Aeromodellers are still doing business. Last winter they held a free-for-all indoor meet in the Fieldhouse. Carl Goldberg did 14:10 for first; not bad for the flying space. Dick Obarski used to be an Aeromodeller—now he's an engineer with Goodyear. He spends much of his time in the airdock at Akron and feels depressed whenever he thinks of all that gorgeous flying space going to waste.

Chicago Aeronuts sort of sagged for a while, but have picked up lately. Matulis and Goldberg are the only veterans left. Aeronuts in the air force are Lenny Elgenson (USA), Roland Schmitt (Africa) and Leon Klesman (India). He says the thermals there are so hot the models will stay up all day. Frank Nekimken is at the Army Glider Academy in Arizona. Ed Lidgard is a gunner on a B-24. Wally (Downdraft) Fromm is a lieutenant in the Q. M. corps. Wally Simmers is a civilian mechanic at Pearl Harbor. Milt Huguelet is in the field artillery. Joe (Rug Chest) Vermoch starved himself a trifle under 5 x 5 and managed to get into the AC. Sid Axelrod and Jack Jenkins are in Oklahoma working for Douglas.

When Charlie McCarthy joined the Junior Air Reserve, he told NAA President Gill Robb Wilson that his family is distantly related to the County Cork Balsas. He can be glad he's not balsa from the neck up; he'd probably feel lightheaded if he were. More dangerous would be the temptation to decapitate him in favor of a propeller block. You'll probably be surprised, too, when you read that he's been an honorary member of the AMA for several years. Of course, if we were feeling nasty, we could say that blockheads in the AMA are nothing new.

But we're really for the Academy and hope newly elected President Irwin Ohlsson will be able to smooth out some of the fussing. With one of their own boys in a key position, maybe the West coasters will stay aboard and help work out their problems peaceably.

Tulsa-Kansas City feud has fizzled into silence. Pvt. George Dossett assures us that it will be renewed when the boys get back home. He went home on a furlough last spring and found his alma mater—K. C Winger Motors Club—practically disbanded. Dossett is propeller instructor at Hill Field, Ogden, Utah. Barring interruptions, his Super-Cyclone P-47 should be kicking up a fuss. In addition to being a model of a mighty fine fighter, there's a family interest in the P-47. George's brother, Kenny, is a crew chief on one of them.

Speaking generally, one might say people fly models better than anybody. Speaking specifically, women fly just as well as men. The boys in southern California believe this—now that the results of the January contest of the San Diego Aeroneers have had a chance to soak in. Mrs. Leta McAllister took the boys in Class C and, tied for the club's trophy, awarded every six months on a high-point basis. In 1940 Mrs. McAllister spent all of her first contest in the pit trying to coax a growl out of her Tiger-powered Zipper. Shortly after, though, she came out slugging with a Playboy Sr. and has taken two firsts and never lower than fifth. A model builder for life, at least, Mrs. McAllister thinks it's the finest sport ever. The Aeroneers are just the outfit for an enthusiastic young lady to tie up with. They don't seem at all peeved about losing their trophies to a woman. Maybe they're too dazed to complain.

Linden (N. J.) Model Aircraft Club dedicated the February issue of their *Gazette* to the club members in the service. Eighteen of them on the honor roll. Editor Mary Messinger did a nice job of telling the boys the news and reminding them *(Turn to page 61)*

THIS DEPARTMENT IS DEDICATED TO THE SUPPORT OF CLUBS, CONTESTS, AND MODEL ENTHUSIASTS IN

AMA PLANS NEW RULES!

For some time, AMA headquarters has been noting aeromodelers' comments about the Academy and 1942 rules.

Our interest in these comments is deep-rooted, for we feel that with opinions from leaders in different sections of the country, we are able to obtain the true cross-section of opinions from their groups. In every case criticism of the rules has taken one of two definite forms: that expressed by the chronic griper, or that expressed in the form of constructive criticism from individuals who understand the situation and, more important, suggest well-thought-out solutions.

It is not the purpose of this statement to apologize for the Academy with respect to these matters. In fairness to all concerned, it should be said that the various well-meaning critics cannot be expected to be familiar with all of the details and facts contributing to such situations.

It is the job of the Academy to rectify every existing condition which is unhealthy to aeromodeling. This will be done.

New Academy officers have been elected and vacancies filled on the Contest Board. On this board, no one section of the country has greater representation than any other. Headquarters has assembled many constructive suggestions for amendments to the 1942 rules from every section. These are being turned over to the new Contest Board for consideration in drawing up the necessary amendments to the present rules. These amendments will be based on the desires expressed by the majority.

In view of the present travel conditions and in consideration of the fact that so many of our AMA members are devoting long hard hours to the war effort, it would be impractical and unpatriotic to call a meeting of this board. Instead, the various board members will be asked to obtain from their districts an expression of the wishes of the majority of AMA members, and to represent this majority, in voting for the acceptance or rejection of any proposed amendments. In this way, it is felt that the committee will be able to adopt a set of official rules and regulations which will materially assist the further advancement of model aviation.

It would be folly to hope for a set of rules which would completely please everyone, but we can and will make every effort to satisfy the majority. To offset possible charges that any rule was railroaded into existence by a minority, AMA headquarters will publish the results of the final voting on the *(Turn to page 46)*

CLUB CHATTER

WE CAN HAVE A "NATIONALS" THIS YEAR—If proposed plans are worked out to avoid transportation and hotel difficulties, "Little Nationals" could be conducted in each of the twelve AMA districts and the twelve winners sent to a central point, such as Chicago, for the "finals." Local clubs could run contests to determine the person they would want to send to the district contests. Where more than one club exists in a locality (such as in the Philadelphia area) and a council exists, also, let the council run a contest for several clubs at once. If no council exists, the heads or leader members of a group of clubs could combine their efforts. If small group contests such as this were limited to clubs covering an area of say ten to twenty miles, and nonmembers of clubs invited to compete with the group, a champion of this locality could be determined much in the same way that the national champion is chosen—by the point system. This part of the contest would not require much in the way of transportation and should present few problems.

The next stage of the plan consists of sending the winning man from each of the above contests to a district meet to be conducted under the direction of the AMA district vice president. This contest or "Intermediate Nationals" could be held in a city centrally located within the district. In the case of District II (New York and New Jersey) the district contest could be held around New York City so that the boys from south Jersey would have no farther to travel than the fellows from Buffalo. Fellows winning local meets could be sent to the district meets with all expenses paid by some local organization, such as the Business Men's Club, Rotary Club or any other organization interested in the Model Builders. Clubs in the immediate vicinity of the district meet could band together and arrange to have the contestants put up at the members' houses. The district vice president should be the one to arrange details just as in the past the Nationals Committee has at Chicago and Detroit. Transportation, being less than 400 miles on the average, would not present too much of a problem. The AMA National Headquarters would do well to acquaint the Defense Transportation Board with this plan if it is to be followed and arrange for its approval. With all the Youth in Aviation movements gaining momentum throughout the country this should not be difficult, particularly since this plan is designed to have the fewest number of people travel the shortest possible distances. In their order of desirability, the following means of transportation or arrangements would be: Cars (with the necessary A coupons), trailer bus (requires strong packing boxes for the models) or last but certainly not least—proxy flying. Models could be shipped to clubs in the vicinity of the district meet that had agreed to furnish members for the flying of these models (this requires not only good packing cases, but detailed instructions of the models' quirks).

Once the district champion has been determined, there remains the comparatively simple matter of getting the twelve fellows to a central point, such as Chicago or Detroit. Since both the NAA and the Model Industry Association have asked in the past what they could do to help aeromodeling, why not ask them to assist in conducting the local, district and final meets, particularly in the finals from the financial standpoint. The MIA might arrange to pay the expenses of the district winners to the finals.

Prizes for all these contests is the subject that has probably popped into everyone's mind by this time. Several contest directors were agreeably surprised last year when they approached manufacturers and dealers of articles other than model supplies. Aeronautical books were supplied as prizes free of charge or at low cost—a trip to the local hardware store would supply ideas as would a trip to the local large department store. Subscriptions to magazines can still be obtained. Of course, the outstanding prize could be the all-expenses-paid trip to the next stage of this plan, winding up with a trip to the Nationals.

For the sake of simplicity, the events might be reduced in number by just running Classes A and B as one event, Class C in gas, Class D in towline glider and Class D in rubber-powered models. A decision on a matter like this had best come from the vice president of each district, inasmuch as they should best know the wishes of the modelers in their particular area.

The preceding Chatter outlines a workable plan for holding contests locally with a view toward that all-important event—the Nationals. It is a plan that can be worked out, but not without the sincere and wholehearted co-operation of everyone concerned. To place the plan in operation for this year is *(Turn to page 63)*

THIS AND THAT

The "Believe-it-or-not" idea of the month comes from "L. B." of Hamilton, Ont., Canada. He writes that he was inspired by a sketch appearing in the "Wanted—Ideas" article published in January. That sketch showed a modeler carrying his batteries beneath a plane and praying that they would sustain the flight. Well, our friend tried that. He attached batteries to the control wires of a Grumman Wildcat control-line plane powered by an Atom and weighing 14 ounces. One wire was the positive and the other the negative. The plane showed increased power and ultimately did 35 miles per hour. He attached a piece of pipe about 1½" in diameter at the end of the control *(Turn to page 60)*

At least it's original! A canard-type tractor by O. Stewart Brown, uses Forster "29."

Now scale gas jobs can be flown via control lines. Detailed P-40 by Frank Townsend.

Jack Shinn, of the famed Seattle Guidelinars, posed his Ohlsson-powered Stinson, Reliant.

Five-foot-span Grumman F3F-2 weighs 4½ lbs. Made by Sherman Shultz, St. Paul, Minnesota.

A control-line Manta, from Air Trails plans, uses Bunch Tiger. By Robert Field, Chicago, Ill.

THESE DIFFICULT DAYS OF WINNING THE WAR. HELP YOURSELF AND OTHERS BY WRITING REGULARLY.

IDEA TESTER

TEST YOUR IDEAS ON SMALL R.O.G.'S BEFORE WASTING MATERIAL ON LARGER MODELS.

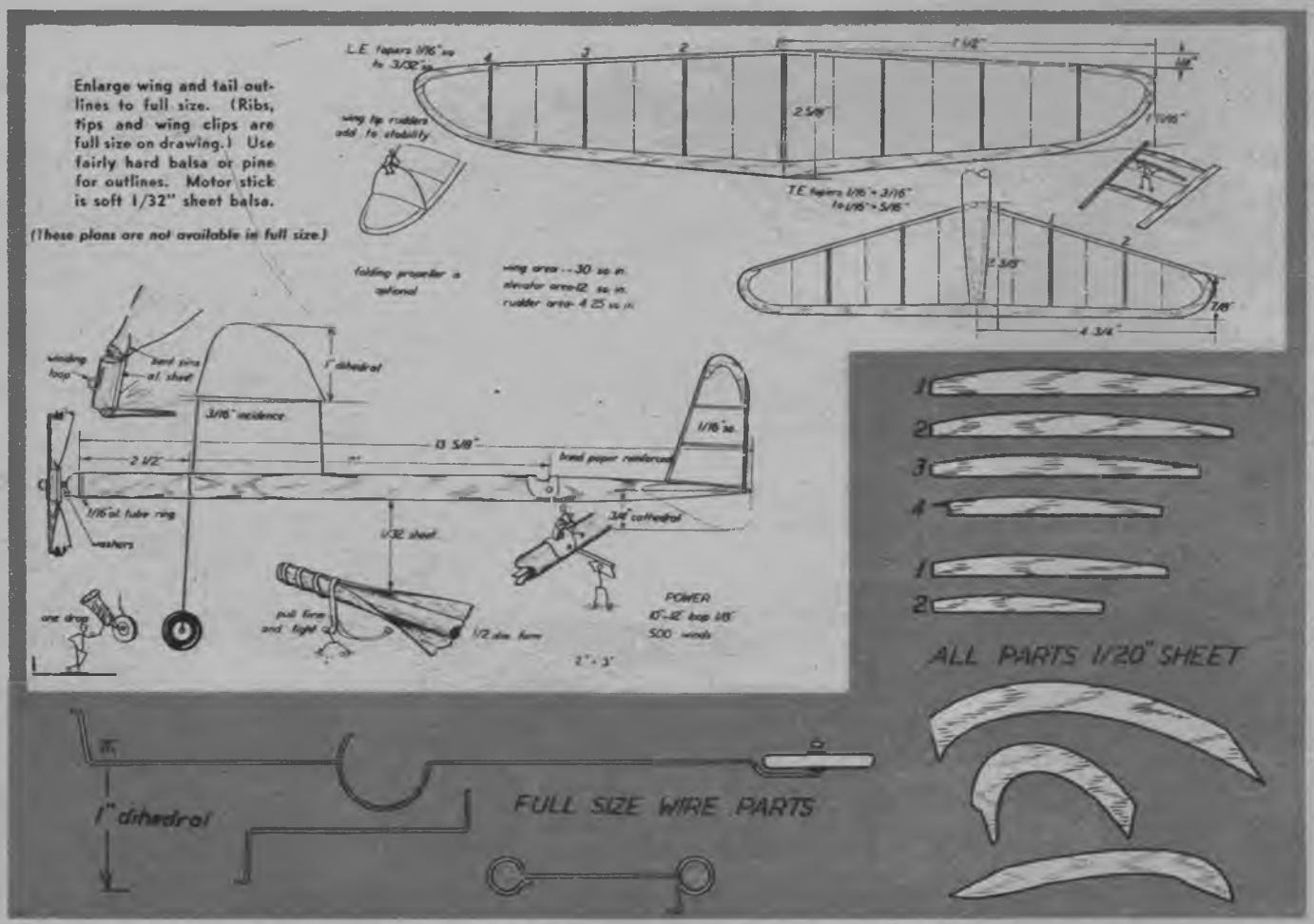
By Ed Lidgard

WITH supplies becoming more and more scarce, necessity should make us modify our modeling activities. Those outdoor models we used to throw together with such abandon will have to be limited so that supplies can be conserved for contest ships.

This R. O. G. was built with this idea in mind. It was to be simple, quickly built and still out of the usual stereotypes. We wanted to incorporate as many innovations as possible, but we wanted a rugged model. If necessary, we were going to power it with common rubber bands.

When it was completed, we found our time had been very well spent. It flew with all the zip and power of a Moffett job—naturally with flights of shorter duration. It formed the base for some interesting experiments. We tried variously sized rudders and verified some theories concerning the effect of varying the area. Too much rudder causes sharp turn to the left and, in extreme cases, a left spin. We went to the other extreme by minimizing the area until a right spin resulted. A warped wing or turn in the rudder will naturally affect the results. The rudder shown is exactly the right area. By using just a slight right turn a good climbing right turn can be obtained.

Having solved the rudder problem, we turned *(Turn to page 57)*



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PIPER *Cub*

POINTS THE WAY TO WINGS FOR ALL AMERICANS

AMA Plans New Rules!

(Continued from page 43)

rules and will hold the files open for inspection by any AMA member.

The right to express a personal opinion is one of the elements which goes to make up that kind of freedom for which this country is now fighting. AMA headquarters feels, and always has felt, that democratic debate among the model builders is a healthy condition, but let's criticize constructively and make an effort to improve aeromodeling rather than tear it down.

Regardless of how many sections of the country do or do not follow the 1942 rules; regardless of how some individuals feel that these rules came into being, Academy headquarters takes this opportunity to solemnly reavow the spirit and principles laid down in our constitution. Every effort will be made to adopt and maintain these official rules which will represent the wishes of the majority and which will constructively guide model aviation activity in this country of ours.

In return, we ask every member for this support. The going in our model-aviation world has been tough since the beginning of the war, and from a purely practical viewpoint we can only expect that it will be tougher still before the war is over. This is no time for Academy members to falter and quit; rather, now is the time for each and every one of them to throw in his full support in a united effort to accomplish the most for all.

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You Can't Compare Fighters

(Continued from page 14)

them and are consequently so frail that if a slug tears out a stringer or nicks a spar flange in the wing, the part will fail the next time the pilot puts undue stress on that part in fighting.

How much the weight of the airplane has to do with its performance can easily be seen when it is realized that the greater the weight, the greater the load the engine must pull per horsepower. Everyone who drives a car will recall that a light car with a fairly powerful engine will accelerate much more quickly than a heavy car with the same engine. A manufacturer came out some years ago with two cars that had the same chassis and body, but while one had a four-cylinder engine the other had a new eight-cylinder engine. The cars looked the same when they were stopped for a traffic light, but when the light changed to green, the eight was down to the next corner before the four could get into high gear. This was simply because the eight had each of its horsepower pulling a lighter load.

In an airplane, additional weight has an even more serious effect on the performance of the machine, since the plane has two other performance criteria that are affected, namely, rate of climb (number of feet the airplane will ascend per minute) and the maximum altitude the plane will attain. It works in this manner: the designer starts with an engine of given horsepower, and then designs an airplane around the engine and equipment that is required. If additional weight must be carried, additional wing area is needed to carry this weight and keep this wing loading (pounds per square foot of wing area) down to a figure that will allow a reasonable take-off and landing speed.

If a given engine of say 2,000 horsepower is taken for example, the airplane that has a wing loading of 30 pounds per square foot and a power loading of 4 pounds per horsepower will have a higher rate of climb, be more maneuverable and be able to go higher than the plane with the same engine but with a wing loading of 40 pounds per square foot and a power loading of 5 pounds per horsepower. Thus it can be seen that it is a constant battle in fighter-plane design to keep the weight of the plane down to a minimum. This is particularly true when it is considered that as the weight goes up and the wing area increases, the drag of the airplane increases and thus the maximum speed diminishes.

Careful research has shown that the wing area is not the only item affected in designing a high-altitude airplane. In designing a ship for altitudes of over 35,000 feet, the ailerons, elevators and rudder areas must be increased over what would be necessary at low altitudes in order to allow sufficient control of the plane in the rarefied atmosphere. Better control per square foot of control surface area may also be obtained by increas-

(Turn to page 52)

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(Continued next page)

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"I want you to know how building your models has helped me in my training as a pilot in the RAF. I have been building Cleveland Models for about eleven years, and had it not been for the very valuable lessons learned from these models, I should not have reached the very high grades I did in Aircraft Recognition, Theory of Flight, Aircraft Structures, etc.

N. J. C.,
No. 1, C. N. S.,
Rivers, Manitoba, Can.

★ ★ ★

"I had formerly been attached to the 88th Bomb Squadron at Key Field, Meridian, Mississippi. For the first few months there we were working on the A-20C's, which at that time were our squadron's ships. One day I sent for your C-D Douglas "Dauntless" kit, knowing nothing of this ship at that time. Upon the arrival of my kit I was amazed at the beauty and detail of the plans. It took 3 weeks of spare time to build that swell ship and as a reward I received word that our squadron was to be supplied with Douglas A-24's (Army Designation). Upon arrival of these ships, I was told to study this ship very carefully and familiarize myself with it. Imagine my crew chief's surprise when I began to pour out information about the A-24. He immediately asked how I knew so much about this ship when I had never been near one until this day. I explained about my previous experience with C-D model building, telling of the World War I models I had built years ago and also showing him my newly completed A-24 model. He was so impressed that I was recommended for P.f.c. rating."

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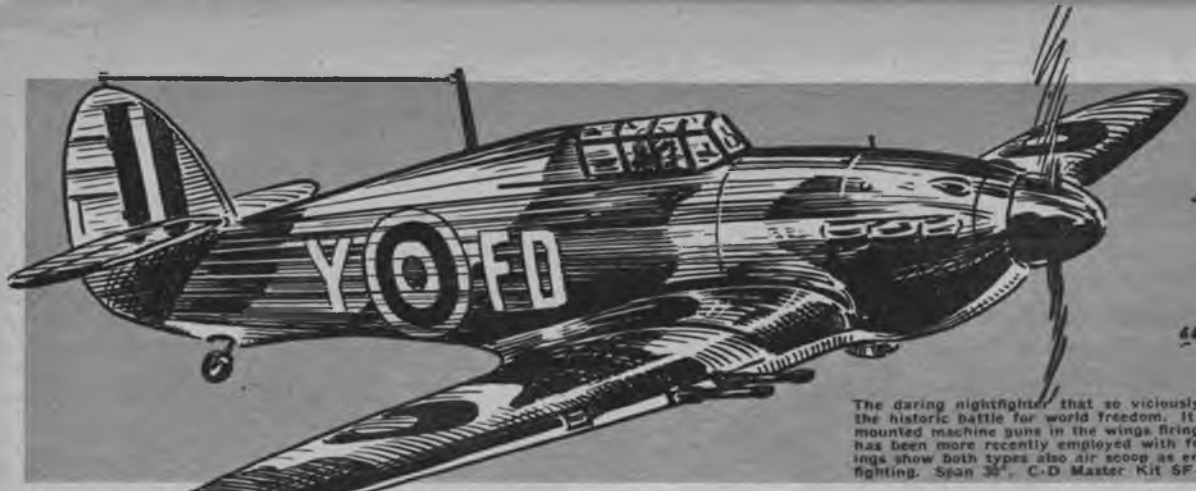

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U. R. L., A. R. M. 3/c
A. F. G. S., Jacksonville, Fla.

★ ★ ★

"I am a service man in the Air Corps as ground crew in the Navy; and working on model planes and original ones go together like ham and eggs."

A. W. E., AMM 2c
USNR Air Base, Grosse Pt., Mich.

★ ★ ★

"Being a model builder, aircraft identification was easy for me . . . lowest grade of 5 tests was 96, rest were 100's. I soloed in Primary in 6 hrs. 28 min.—was third in our class. At present I'm flying AT-11's, and have had a little time as co-pilot in a B-18. My job is to fly bombardier students, and it's interesting. My training all the way from Primary to Advanced was really rugged. I agree with one of the model building pilots who wrote you 'we were able to concentrate on the fine points, 'cause the fundamentals were ours.' Anyone who builds models has the advantage over the others."

Sgt. R. S. P. Jr.
AAF, Midland, Tex.

★ ★ ★

"I am now a pilot in the R.C.A.F., having been in this service for almost a year and a half. During this time I've come to realize the value of my eight years of model building. They have helped me exceedingly in my training as a pilot—taught me the principles of flight, construction, recognition—in fact, I owe something like 20% of my passing marks to model building.

F/O J. O'C., RCAF,
Montreal, Can.

★ ★ ★

"After being in the Army Air Corps for only 30 days I was called in for an interview in the Link Trainer Department. If I had not been building and studying model airplanes for the past eight years, I would have not received the appointment for the school. I could talk intelligently to the officer in charge only because of my study and building of model airplanes.

Pvt. A. C. F., AAF,
Strather Field, Kansas.

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(Continued from page 48)

ing the moment arm to the center of pressure of the control surface (i. e., a longer span wing will increase the effectiveness of the ailerons).

An outstanding example of the difference in fighter designs can be found by comparing two fighters of late design here in the United States. The P-47 was primarily designed for an efficient operational altitude range of from 30 to 40 thousand feet, while the P-51, "Apache," was designed to fly efficiently from ground level up to 25,000 feet. Comparing the two ships, we find that the P-47 carries a turbo-supercharger while the P-51 does not. This supercharger is designed to supply air to the carburetors of the engine at sea-level pressure, up to near operational or service altitude, thus maintaining the horsepower available from the engine up to this height despite the drop in air density. This drop in air density would rob the engine of the P-51 of so much horsepower that it is doubtful if the plane could maneuver properly and maintain its speed at anywhere near the service altitude of the P-47 Thunderbolt. So the weight of the supercharger must be dealt with in the original weight estimate of the high-altitude airplane. Since air increases in temperature when compressed, it must be cooled again to normal heat before it reaches the carburetors or else it will induce "knocking" or pre-ignition of the fuel. To cool this air entails the use of air-radiators, called intercoolers. Where liquid would normally flow in an automobile radiator, air from the supercharger flows through the intercooler, is cooled and then delivered through ducts to the engine. Here again weight must be taken into account.

Going into more detail in regard to the two designs, we find that the pilot of the P-47 needs more oxygen than the pilot of the lower altitude fighter, so the higher fighting ship must carry three or four times the amount the lower altitude plane does and the increase in tankage provision increases weight on this item.

All these items add up to the conclusion that any airplane that is really going to get "upstairs" must be a larger and heavier airplane than ships designed for a limited altitude. The equipment to provide the power adds weight, the additional equipment for the pilot adds weight, and so the engine must be a higher horsepower job (which also adds weight). This added weight automatically necessitates a design for a larger airplane. The space in the larger airplane is needed also to carry a larger fuel and oil load which is necessary: 1. to enable the high-flying crate to stay in the air longer in order to get it up to the desired altitude; 2. to provide a reasonable cruising range and supply of gas for fighting; 3. in order to have a sufficient amount of fuel to get home again. This will answer the question many people have been asking ever since the gross weight of the P-47 was compared to the old Ford Tri-Motor—about 13,000 pounds.

Armament always has been and always will be a critical problem in fighter design. Aside from the weight standpoint, sufficient space must be found to house the guns. When engines became larger and larger and the higher speeds of the fighters made every bit of extra drag a matter of utmost importance, other installations besides the usual cowl guns were investigated. Wing-mounted guns were found to be advantageous for more than one reason. Engine compartments never quite provided all the room for ammunition while the majority of fighter wings will hold more ammunition than the design specifications call for. Add to this the advantage that the guns are not slowed down to fire between propeller blades by a "synchronizing gear" and you can readily see why all the latest fighters carry their machine guns in the wings. In the case of cannon, the wing installation is particularly advantageous, since the rate of fire is not further slowed down and the long barrel and breach mechanism can be housed in the wing contour from the leading edge to the rear spar. Of course, some of the cannon require the barrel to protrude farther into the airstream than others, due to the length of the barrel, while in other installations the barrels of the cannon protrude simply because the original design of the spars did not take into account cutouts in the webs for the back end of the gun to protrude through. This idea of modifying a plane to take cannon is also a compromise with performance. The additional weight and sometimes drag are usually decided to be less of a disadvantage than the additional hitting power of the cannon is an advantage. Armament has been a subject for quite a bit of controversy for some time now. The question of whether to rely on the explosive power of the shells of the relatively slow-firing cannon or better to take advantage of the faster-firing .50-caliber machine guns that spit solid slugs, has not been definitely decided even after a few years of actual combat. Some pilots maintain that a single cannon shell can bring a plane down by literally blasting it apart. On the other hand, some planes have flown back to their base with rudders blasted off, most of the trailing edge of the wing missing, et cetera. Then there are pilots who claim that with a wide spray of .50-caliber slugs, they stand a better chance of hitting a vital place in the plane. As far as solid slugs are concerned, many a plane has come back looking like a strainer, while the great ace, Paddy Finucane was brought down by what is believed to be one solid slug in the cooling system of his fighter while returning from a sortie over France.

Altogether, planes can be shown on charts and graphs, discussed till the moon turns blue, but one fact will always wind up any discussion—the planes are not enough alike to be directly compared. The different tactical forces that are instrumental in laying down the type specifications for airplanes have different problems, the design engineers in charge of creating the airplane have different ideas, and the different problems and ideas will find different solutions in different equipment and consequently in weights and aerodynamic arrangements.

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When Flight Training Comes

(Continued from page 25)

will be prepared to turn to the enormously widened civilian field for cargo and passenger air fleets.

Even if Bill decides to come back to his home town after the war is won and settle down and help Pop run the Monarch Department Store, he is almost certain to fly his own plane, perhaps rising perpendicularly from the back yard in the evening to let the family cool off in the upper atmosphere. And as a "veteran" of the late war, Bill will follow with critical interest such issues as taxes on air cargo, granting of franchises to international air lines, building of a local airport on the roof of the municipal auditorium, or the action of the school board in approving a course in meteorology in Bill's old school, the Thomas Jefferson.

But a good many months before Bill Smith became conscious of his deficiencies in aviation knowledge, a group of C. A. A. officials in Washington and educators in the nation's schools were also asking questions. C. A. A. obtained the co-operation of the U. S. Office of Education and the blessing of the army and navy for its program of encouraging and assisting in the introduction of preflight aeronautics courses in the high-school curriculum. With these indispensable assets, the C. A. A. went to work with the school people of the country, who, like Bill Smith, were more than ready to begin studying the lessons which were daily being written in the skies.

A series of educational conferences, held in various sections of the country, soon had school people appreciating the need for and value of aviation courses. By the Summer of 1942, after only eight months of organization, what had been little more than a hope in the minds of a few enthusiasts was emerging as a tangible reality—aeronautics courses in American secondary schools. For school officials, accepting the challenge to prepare Bill and Anne and their generation to meet and understand the numerous and novel problems of the air age, acted with alacrity.

But, just as bricks can't be made without straw, educational courses can't be taught without books. Next to the moderate miracle of converting a considerable fraction of American educators to the need of aviation courses, was the winning of the Battle of the Textbooks. This critical engagement was fought during the Spring and Summer of 1942, and on two widely separated fronts: in the industrial East at Columbia University and in the grass-roots West, at the University of Nebraska. The literary soldiers, drawn from teaching staffs of schools and colleges, were encouraged and provisioned by the Civil Aeronautics Administration.

When the battle quieted down and the clouds of ideas settled to earth and took organized patterns, a total of twenty books had resulted. Two of these were concerned with the unit which Bill and his friends needed for a basic grasp of elementary aviation science. The other books dealt with important relations of aviation to such subjects as geography, biology, physical science, mathematics, and literature. Publishers did their part by performing the herculean task of editing and printing these twenty volumes at break-record speed.

The teachers, too, were doing some hard thinking—asking themselves, "How can I best prepare to teach my students the elementary science of preflight aeronautics? How do science and mathematics apply to aerodynamics and navigation?" For, like Bill, Miss Jones and Mr. White of the Thomas Jefferson High School were becoming conscious of the impact of the air age. They were beginning to realize that our thinking and activities as an earth-bound people were in need of prompt modification if we were to appreciate and develop our destiny in a world which had broken its fetters and suddenly was conscious of being air free. And well might these teachers give serious thought to their roles, for it was high time that a great potential national asset—youth's avid interest in aviation—should be recognized and nurtured.

But the C. A. A. officials had anticipated that teachers would soon become aware of their new responsibilities. To provide them with temporary compasses by which to chart their courses, a couple of practical teachers' manuals were developed for their use in teaching aeronautics.

During the Summer of 1942 the C. A. A. encouraged colleges and universities to establish teacher-training institutes. The C. A. A. assisted in this activity by opening its civilian-pilot ground schools to prospective teachers of secondary-school preflight aeronautics courses, and without tuition charge. Again this spring, because of the unprecedented demand for teachers in this subject field, the C. A. A. is assisting colleges and universities in this activity by sponsoring teacher-training courses in preflight aeronautics without charge to the teachers.

To provide immediate personal advice for school staffs, the C. A. A. appointed a group of educational consultants—trained and experienced men who performed yeoman service during the Spring and Summer of 1942. They advised school administrators in fitting the preflight courses into existing, and often crowded, curricula; they helped banish the fears of prospective teachers of the courses.

These plans for providing Bill with an interested and informed teacher have not obscured the need of maintaining high standards for Bill himself. The C. A. A. gives him the privilege of taking its Private Pilot Ground School Written Examination. He, himself, must decide that he wants to pit his mastery of aeronautics against the C. A. A. quiz. If he makes a "hit" on one or more units of the examination, he is rewarded with a C. A. A. Certificate of Aeronautical Knowledge. If he is able to pass the four units of the examination, he has satisfied the ground re-

quirements for the C. A. A. Private Pilot Certificate.

Thus, the preflight course will provide Bill, perhaps by the end of his junior year, with part of the answer to his question as to how to become a pilot. And if his interest in aviation survives this indispensable ground course, Bill may, even before he leaves high school, have a chance to sprout real wings. For, guessing that Bill's next letter to Washington might deal with exactly that question, the C. A. A. is already searching for the answer.

Last summer, as an experiment, flight training was conducted by the C. A. A. in twenty-one high schools. Fellows of Bill's age and limited experience had to remain earth-bound. But the boys who did satisfy the desire to pilot planes convinced the C. A. A. officials that with proper training high-school youths could become competent fliers. However, flight training for Bill and his friends is not as yet a reality since it involves funds, equipment, and trained personnel. But the problems involved in providing Bill's generation with flight experience are receiving the earnest consideration and planning of the C. A. A. and are due for early and satisfactory solution.

So, the lure of the sky, expressed in Bill's simple letter, and unexpressed, though felt, by thousands of his contemporaries, no longer consists of the stuff of dreams. The Preflight Program is helping to give form and substance to Bill's vague ambition. And real flight experience, when added, will round out and complete youth's preparation to understand and participate in the air age.

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Toadstools Are Their Dish!

(Continued from page 19)

The turret is designed for the mounting of two .50-calibet modified guns, which the navy has found the best all-around armament in the Pacific battle areas. The turret drive, actuated by electrical units, mechanically elevates, trains and fires the guns.

The gunner is as well protected as modern ingenuity can make him. A thick armor-steel plate, bolted to the side of the turret, extends below the gunner's knees and a small plate is provided above the main ring for face protection. The armor always moves with the turret to protect the front of the gunner. Transparent domes made of plexiglas, cover the gunner's head.

Tom Merritt, CARM, and holder of the Distinguished Flying Cross, is one of a number of outstanding gunners who have written a saga of Japanese air defeats across the vast Pacific from Coral Sea to Midway, from the Aleutians to Australia. He crawls through the "belly" of an Avenger, into the turret, straps himself into his seat and then closes a number of switches. Hands on his firing grips, he is ready for any emergency.

Merritt operates his turret with a minimum of difficulty. His firing grips are the key to the operation. By depressing his controls, he elevates his guns; by elevating them, he lowers the guns. By turning them about a vertical axis, he rotates the turret to fire on Japanese planes approaching from any angle. The speed at which the guns or turret move depends upon the displacement of the grips. For emergencies, a special "two-speed" button doubles the speed of the turret movement and an "interrupter" switch prevents the guns from firing into tail surfaces. Should the power fail, turrets may be operated by hand.

A turret is a gunner's home for the duration of his mission and he is provided with comfort-giving accessories. He sits on a detachable seat cushion which can be adjusted for height and his feet are on a sliding foot rest. Near his hand are ammunition boxes holding enough rounds to take care of enemy planes on any ordinary mission; ammunition boosters feed shells into his guns. An extension light and suit-heating equipment are available for any high-altitude flying missions. An interphone apparatus connects him with his two companions, the pilot and the radioman-gunner.

Gunners must know the operation of all this equipment. So, too, must the "mechs," who must know in addition how to install, inspect, maintain, lubricate and adjust it. Behind blackened windows in the basement of the Chicago Vocational School these men work eight hours a day, six days a week.

A typical "job sheet" in the power turret course might deal with making round patches for the plexiglas fabrication unit. With such hand tools as a jig, power drill, files, clamps, plates and an alcohol torch, AMMs

lay out holes to specified dimensions; trim, dress and fit the patches to the holes; heat until soft and press into holes; apply cement with clamps and then dress down the patches with sandpaper, polish and buffer. Such job sheets cover every detail of the power turret and its accessories.

There is reason for such thoroughness. During the dark days at Guadalcanal last fall, a thin Marine squadron went up day after day, completely outnumbered, and fought off everything the Japs could put in the air. At night the mechanics went to work, patching bullet-holes, repairing wings, and sometimes converting two wrecks into one serviceable plane.

Turret experts are familiar with such duty. Between operations they may have to remove a complete turret, with the hundreds of separate steps involved, and install it in another plane. They may have to inspect the drive motors, generators and inclosures; lubricate casting rollers, potentiometer control units and motor generators; adjust mechanical stops, "trouble-shoot" motor failure, and repair torn armor plates.

A fighter plane is helpless unless its fixed guns work; a divebomber useless unless its bombs drop true. And if torpedo and patrol bombing planes are going to run and fight another day, their turret guns must be greased and geared for action. That's the job of the turret mechanics—and the navy is guaranteeing their readiness.

Idea Tester

(Continued from page 44)

to the center of lateral area. Its fore-and-aft position was already determined; all that remained was the vertical position. The wing mount places the wing in a parasol position and the model is quite stable. It will, however, bank on fast power turns. To begin with, the area between wing struts was covered with tissue to simulate common pylon mounting found on most gas models. A marked improvement was noted in climbing characteristics, and the model also became less "touchy" on adjustments. It must be remembered that there is a difference between design and adjustment characteristics.

The area between struts was divided into two and replaced on top of the wing near the tips (see photograph), with care taken to align them properly. This follows the theory developed by Carl Goldberg and Louis Garami and worked out on Garami's Atom-powered model recently published in Air Trails. It's really one swell idea! It worked to perfection. The model rode almost perfectly level in fast climbing spirals and thus obtained more altitude. All-around stability was improved and adjustments were not so touchy.

You may want to try other experiments which might be risky on a more complicated outdoor model. But whether you're an old hand or still a bit inexperienced, you'll enjoy a model like this—so let 'er go!

Jap Seaplane Carriers

(Continued from page 18)

traits which we have sneered at them for possessing, but which seem to be standing them in good stead.

The only other navies in which seaplane carriers have been employed are the French and Italian, each of which has one. The Italians have the *Giuseppe Miraglia*, and the French, the *Commandant Teste*. The *Giuseppe Miraglia*, a one-time freighter, carries four large floatplanes and sixteen smaller ones, although it is less than 400 feet long and displaces only 4,880 tons. It has two catapults and is armed with four 4-inch antiaircraft guns. The *Commandant Teste* was built as a mobile reserve hangar both for the scouting seaplanes carried by French cruisers and for the landplanes of France's one regular flat top, the *Béarn*, which is now at Martinique. The *Commandant Teste* was badly damaged in the shelling of the French fleet by the British at Mers-el-Kebir two and a half years ago, and its present fate is, therefore, not known.

It is interesting to note that the seaplane carrier was developed in those countries having a great number of bases in the sea areas which interested them. Both France and Italy have, for obvious reasons, been more interested in the Mediterranean than the Atlantic and have ample harbors there. The same applies to Japan, with her great strings of islands in the western Pacific—the Marshalls, Carolines, Marianas and the islands nearer Japan itself. These countries consequently were able to get along with fairly small floatplanes long after a nation like the U. S. had begun developing the large flying boat of great range. In time, these other nations, especially the Japanese, found themselves too far behind to catch up in one leap. For them the seaplane carrier serves a definitely useful function.

Designed For Pine

(Continued from page 34)

was added (much the same procedure every model builder uses for square fuselages). This did the trick; the cement held so well that the *wood* broke before the cement.

Wood in sizes up to 1/16" can easily be cut with a single-edged razor blade. The ribs were cut around a tin can template in this manner. Curved parts were eliminated wherever possible because pine splits very easily. But wherever they *were* used, they were glued together in straight sections and then cut to shape. Two tools that proved priceless in making this model were a Synco Jr. saw and a variety of sandpaper blocks bearing rough, medium and smooth sandpaper. Remember, the only difference between the beginner and the expert is that the expert uses sandpaper.

As for the weight, pine when properly used will cause the ship to weigh no more than the old type of balsa ship, while possessing the advantage of great strength. The sizes were slightly smaller than those usually used. They could not be cut in half even though pine weighs almost twice as much as the hardest balsa—16 pounds to 30 pounds per cubic foot. Despite the fact that pine was used, with bamboo paper for covering, the ship, complete with dethermalizer, is only half an ounce over the weight specified in the latest A. M. A. contest rules. The cross section was kept to a minimum and no balsa was used except for the cowling. Wire was used for the landing gear (which was made from ordinary clothesline) and hook up only.

The rudder brake type really works wonderfully, slowing up the glide to a mush. It also acts as a wind vane, keeping the model headed into the wind at all times, thereby bringing the model toward the starting point. At first there was much debate as to the advisability of using this type of dethermalizer, but after witnessing the first flight, all the fellows decided to install them on their own ships. Try it and see whether you don't like it better than the one you are now using.

Such were my experiences in building my first white pine gas model. Sincere thanks must be given to Frank Zaic who very generously gave his time and many valuable suggestions.

FUSELAGE: The crutch is constructed first, and the entire top part of the fuselage, including the wing mount and rudder, is built before removing from the work board. When the cement is dry, the crutch is removed and the bottom half built. The landing gear is then bent and cemented in place. The inside of the cowling is carved and cemented on and when dry, the outside is shaped. Sand thoroughly with rough and smooth sandpaper. The dowels for the wing and stabilizer are then added and the completed fuselage laid aside.

STABILIZER: To save yourself a lot of work when constructing the horizontal tail, use pre-tapered trailing edge stock. All the ribs are made alike and then cut to the required length. The taper for the ribs is cut from the rear, using the leading edge for a basic point. The ribs are then glued in position and the spars, tips and gussets added.

WING: The wing design was selected because of its simplicity and efficiency. The straight taper is very easy to build and eliminates the necessity of long curves on the tip for a nice-looking wing. The ribs are all cut to the same length and then cut to the proper length for their respec-

(Turn to page 60)

U. S. Army's

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JOE OTT MANUFACTURING CO. Dept. 16 *415 West Superior Street,* **CHICAGO**

(Continued from page 58)

tive positions. The following method is used to taper the ribs by means of the tin template. The ribs are tapered by placing the bottom of the template on the lower surface of the airfoil in a line with the leading edge and the trailing edge thickness. The wood projecting below this should be sliced away with a razor blade. Do not expect to cut this wood with one sweep of the blade. After the second or third try, depending on the pressure used, the wood will part and presto!—a perfectly tapered rib. The ribs and spars are then added and cemented securely in place. The tips and gussets are now cemented in place and allowed to dry. The leading edge is first shaped with a razor blade and then, along with the rest of the wing, sanded to a smooth shape, both in outline and contour.

MISCELLANEOUS AND COVERING: Add the wiring and shellack well the inside of the cowling. Mount any

Class B motor, being sure to drill the mounting holes slightly oversize so that the thrust of the motor can be adjusted to any direction. The entire model is then sanded to a very smooth finish to avoid ridges under the covering. The original was covered entirely (with the exception of the wing mount) with a light grade of white bamboo paper. White Silkspan or silk may be used, for the wing mount—just be sure to wet the material first so that it may be pulled into a well-faired shape. The model should be given three thin coats of clear dope and then trimmed with two thin coats of red. The striping tape is then removed and one more coat of clear added. This provides a high gloss as well as making it a tight moisture-proof job.

RIGGING AND FLYING: The effect of the wing's being out of line with the tail or vice versa, is really amazing. The findings were that the model could be made to circle entirely independent of the rudder and thrust by merely inclining the stabilizer out of line. This is important as it will fly against thrust, torque and rudder if the stabilizer is merely tilted out of line. This makes the rigging job very important. The motor is set to the right exactly ¼", using a 12" prop. A stick is fastened to the rudder—mark this with the prop blade horizontal. Swing your prop blade 180 degrees and move the stick to the other side. Loosen the motor and twist until this setting is achieved. This is essential for it will allow the builder to get the utmost from his ship by allowing it to fly in a nice right circle under power and then roll out on top like a hand-launched glider into a left glide, actually gaining altitude on the pull-out instead of losing it as most ships do. The actual testing is a ritual which should be done in a slow and easy manner.

The ship is tested for the glide by running with it until you feel it start to lift from your hand, whereupon you should give it a slight shove—not up—but at a point about sixty feet from you on the ground. The ship should glide well in a nice left circle about 200 feet in diameter; adjust the tab until you get this circle. If necessary, vary the incidence to obtain a nice long flat glide. When this glide is obtained, the model is ready for her maiden flight.

Start up the motor and when it turns up at about ¼, throttle her with the same procedure used in gliding. The ship should climb slightly and to the right. This circle should be about 125 to 150 feet in diameter. If your ship shows a tendency to do this, she is really right, so slowly add power until the maximum is reached, adjusting the rudder tab until the old crate is really ticking.

A Forster 29 and a Comet 35 have both been used for motive power and the ship seems quite capable of handling more power. So far, the highest flights that have been turned in were over three minutes on 14-second motor run. Piney has just won fourth place in the West Virginia State Meet with only two official flights.

This And That

(Continued from page 43)

line and inclosed the batteries therein. He tried the same stunt on a 90-m.p.h. Ohlsson 60 Thunderbolt and did 93 m.p.h. Says "L. B.," he'll hit 100 m.p.h. yet if we disclose some more of those ideas. In conclusion he states, "You Yankees haven't thought of quite everything yet." At last report our poor cartoonist, who drew the darn sketch as a joke, was frothing at the mouth and pawing at his own 40-m.p.h. control job.

We received the most interesting letter of the week from our old pal Bill Effinger, who is proprietor, chief layouter and general boss, et cetera, of Berkeley Models, Inc. Bill informs us that he expects shortly to be appointed aviation specialist officer in the U. S. navy and in view of his excellent background (including aeronautical engineering college training) we sure think it's the job for him.

At any rate, Bill has a couple of kinks worthy of our consideration. The problem of "glue on the fingers" has always haunted the modeling clan. He suggests the application of some of the wife's or sister's cold cream to the hands before diving into that model. Rub it into the hands aplenty, until it disappears; then go to the favorite job. Rub hands with

cream again after you have signed off from the modeling job and then wash your hands. The cement (or dope) will disappear.' He also states that a Rogers Timer will fit on the Brown, Jr. motors. Remount the Rogers Timer arm to fit on the Brown shaft being careful the contact plate does not touch the crankcase. Broach the rear hub washer with a small file so that it will slide on the square part of the crank shaft. Fit the part connect it, and the old Brown will "perk" like new. Thanks for the ideas, Bill.

The Dope Can

(Continued from page 42)

they're missed back home. Mary had plenty of enthusiasm for such a job since her husband, Roy Messinger, is somewhere in England.

Dr. H. B. Newlin of Paris, Ill., has an electric persuader for balky engines. Hand grinding is taboo when the doc runs into a stubborn one. A piece of rubber hose about ½" diameter (inside) by 2" long is slipped over the end of a flexible shaft (found in many home-workshop outfits for grinding and drilling) and fastened with a hose clamp. The hose serves as a friction clutch which can be pushed against the prop hub. It takes considerable push to engage the propeller, so mount the engine firmly to absorb the push.

Aeroplane Photo Supply, P. O. Box 195, Toronto, Canada, specializes in photos of military airplanes. Their catalog lists shots of more than a dozen nations' warplanes. Photo collectors and aircraft recognition lecturers will do well to get the forty-page catalog, listing all the available photos. Price is ten cents.

A couple of issues ago we mentioned hearing from Frank Antosh, stationed in Panama with the air force. This stirred an old buddy of Frank's into life. Ed Onze wrote us from Brooks Field, Texas. He used to fly models with Frank in the Anthracite Gas Model Club (Scranton, Pa.).

Kenneth R. Lotz of Rockton, Ill., wants some advice on how to start a model club. Starting one isn't so bad. Keeping it going is the problem —as scores of clubs throughout the country will testify. But if you're still in school at least the recruiting sergeant will give you a fighting chance before he grabs off the active members. The best approach is obviously through the Academy of Model Aeronautics (1025 Connecticut Ave., Washington, D. C.) with one of your air-minded teachers helping to push the idea.

A new club which seems to be coming along nicely despite present-day difficulties is the Annandale (Virginia) Model Airplane Club. Regular Saturday night meetings are held at the home of Secretary-Treasurer Bryton Barron, 36 Leewood, Springfield, Virginia. They fly every Sunday near Leewood School, south of Annandale. Their first contest this spring was held at Bailey's Crossroads Airport, Virginia.—*By Gordon Light.*

Your Question?

A. J. J., Bridgewater, Mass.—Sorry, we have no information regarding the Russian L-760. We believe that it is powered by six engines developing 1,000 h. p. each. We cannot give out any information regarding armament of military aircraft. The Zero fighter is supposed to be more maneuverable than the P-40, but it is more vulnerable than the American planes.

J. F., Bronx, N. Y.—Information on marine paratroops appeared in our August issue of Air Trails.

C. J., Providence, R. I.—The English Spitfire is equipped with either eight machine guns of rifle caliber or two 20-mm. shell cannons and four machine guns. The ship which you saw in the Eagle Squadron movie was a Spitfire with two cannons. The World War I Fokker D-7 had an auxiliary airfoil on the spreader bar of its undercarriage. In some cases this airfoil carried a small gas tank which allowed the ship to fly in an inverted position and extended its operational range. The U. S. army uses not only Piper Cubs, but Aeroncas and Taylorcrafts as well.

F. M., Livingston, N. J.—The Brewster Buffalo is a single-seat fighter monoplane. Its cockpit canopy is extended to the fin to give it better streamlining. Laminar flow-wing allows an airplane to travel at higher speed, carry more weight and makes it more efficient than the ordinary type of airfoil. It is supposed to overcome the bugaboo of high-speed flying known as "compressibility effect." At speeds approaching sound velocity, the air at the leading edge and around the wing compresses to an extent that it becomes almost like tar, considerably slowing up the airplane.

G. L. P., Syosset, N. Y.—Sorry, we have no separate color plates of the Grumman TBF-1 available.

P. S., Chariton, Ia.—A person sixty percent color blind is not eligible for flight training with the army air forces. Sorry, we do not know which of the two ships—the Jap Zero or the FW-190—have the best combat qualities. The Curtiss P-37 was powered with an Allison liquid-cooled engine. It was not put into service because the P-40, which came out shortly after, was a better airplane. The Russian ship illustrated in the clipping you sent us is a TB-7. The Consolidated PB-2A was powered by a Curtiss Conqueror liquid-cooled engine of 675 h. p.

G. S., Jr., Statesville, N. C.—The Lockheed Aircraft Corp. has not stopped producing the P-38. The Douglas A20-A has a single-place pilot compartment and does not carry

a copilot. We doubt that the P-36 and P-35 fighters are in active service, although a number of them are used here in the U. S. The British have some P-36s, called the Mohawk by them, which originally were scheduled for the French Air Force but were delivered to England after the fall of France.

W. R., Billings Bridge, Ontario—Thank you for your correction. Our Question-and-Answer Editor must have been in a fog when he stated that the North American P-51 was powered by a radial air-cooled engine. The P-51, better known as the Mustang, mounts an Allison liquid-cooled motor of 1,150 h. p. However, the North American P-64, a number of which were built for the Thailand Air Force, and subsequently turned over to our army air forces after Thai was invaded by Japan, is powered by radial air-cooled engines. According to rumors from abroad, the Heinkel 177 has a top speed close to 300 m. p. h.

J. T., San Francisco, Calif.—As far as we know, the Vultee Vanguard fighter is not in the service of our air forces. Yes, the F4U-1 is in production. The reason that the 20-mm. air cannon has a greater firing range than the 37-mm. shell gun is that a reduced powder charge to lessen the force of the recoil is used in the larger gun. The Allison liquid-cooled engine develops 1,150 h. p.

Miss W. S., San Gabriel, Calif.—There are no government-sponsored training schools in which only women are trained. The Civil Pilot Training Program, which is sponsored by the

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Club Chatter

(Continued from page 43)

going to require fast work on the part of everyone from the national leaders down to the club members—no one is unimportant nor is their effort.

For this year's schedule, the local meets might have a deadline of August 1st, if a definite program could be decided upon by June 15th. This is entirely possible unless the rules are radically revised. With the winners of the local meets determined by August 1st, the district contests could be held during the month of August and the finals could be scheduled for the Labor Day week end. Rather close work, but the author is of the opinion that most modelers will go back to the old midnight oil work if a possibility of having a Nationals is presented and backed up by the AMA in a clear and concise manner.

We would appreciate hearing from anyone interested in this idea—letters of constructive comment will be forwarded immediately to AMA headquarters in Washington, since the ideas of a large group are bound to produce a more workable plan. Do your share and let us know how you and the other model fliers in your locality feel.—*by Ed Yulke.*

All models are designed, tested by Barney. Mrs. S., "The Boss," acts as checker.

MEET BARNEY SNYDER

BY HERB PREEG

AFTER waiting half an hour for Barney Snyder to show up for our meeting, I decided to prowl about the factory and see what was detaining him. In the back of the shop I noticed a group of model builders gathered around a tall, slim chap who was working with a wire stapler and a small cardboard carton. As I watched the skilled fingers deftly manipulate the materials I received the impression that he was a "fixer": the type of fellow who can take your watch apart with a hairpin and put it together again, dismantle and set up the distributor on your car or fix your wife's vacuum cleaner.

"There, I thought that would do it," he exclaimed with satisfaction. "That will not only save one operation at the factory, but a whole piece of aluminum, which is one thing we don't get much of these days."

As he looked up, our glances met and he came forward with an apologetic smile. "Sorry I kept you waiting, but—well, you know how you get involved." Before I left, I was to know that reluctance to talk about himself had made him shy of being interviewed and was the principal reason for his having become "involved."

An unassuming fellow with blue eyes and hair brushed straight back, Barney is the West's No. 1 model builder and owner of one of the largest model factories in the country. The Modelcraft catalog includes seventy-six model kits, ranging from a ten-stick model to the Douglas B-19.

A dynamic, original thinker, he builds models the Snyder way and gets people to like them. He would rather build a good-looking model, giving full value as far as cost to the actual builder is concerned, than have a one-year's flash champion.

Nevertheless, he has had his share of "firsts" with Pacific Ace, Miss Tiny, Spooks and the new slot-equipped Westwind. But what Snyder prides himself on is that all his models look and behave like real airplanes. "Working on them taught me a lot," he said. "If any modeler will study the principles involved in the design of these planes, he will be providing himself with a good background for actual flying as well as modeling."

Out in Modelcraft's Vermont Avenue salesrooms in Los Angeles, Mrs. (Peg) Snyder, whom Barney calls The Boss, runs the business end of things, while he spends most of his time at the Western Avenue factory, superintending designing and manufacturing.

They started from scratch over eight years ago, retailing model planes. Snyder's exceptional aptitude with his fingers started him fussing with different parts here and there that he thought could be improved; one thing led to another until he found he was in manufacturing.

Today they have many employees of both sexes, every one of whom is a model builder, getting the best possible training for the career that many people will be following in the years ahead: aviation.

Barney has some very definite views on contest rules. "In the first place," he related with emphasis, "present rules do not make allowance for the progress that has been made in both models and engines. The ratio between the weight of the models specified for the various classes and the horsepower of present-day engines does not bear close-enough relation to the ratio between the weight and horsepower of full-sized aircraft.

"In the second place, if we model builders are going to stick to our present loading per square foot, the engine run allowance is too great. Models are flying away from the field too much. A fifteen-second en-

gine run would be a lot better under today's rules, but even so the loading should be heavier.

"Combining road work with model airplane flying doesn't make sense," he continued. "A lot of modelers spend half their time chasing all over the country.

"The sport has progressed, the models and modelers themselves have improved, but the rules are out of date. Models should come nearer to duplicating the scale of actual planes.

"Here at Modelcraft we have never been interested in any of the freaks that pass for model airplanes. We think a model should be a model and not some mere plaything or trick job that could never be adapted to full-scale aviation use.

"Last summer, for instance," he dryly continued, "I took an ordinary box, put something resembling wings on it and installed an Ohlsson 23 engine. It flew all right, but it didn't teach us anything about airplane design."

He is of the opinion that manufacturers, as such, should stay out of contests. All future fliers, he believes, should spend some time building models. This experience would save them two or three months in instruction time. "If all flight students had model experience," he remarked, "some of them would not pull the dumb stunts we occasionally hear about."

To substantiate this point in part he related that Peg Snyder attends a women's ground school and had observed that only those girls who had had model experience really knew anything about the internal structure of an airplane and the functioning of the various parts. Center of gravity, center of pressure, dihedral incidence and other such terms which are elementary to the model builder were just vague ideas in these trainees' minds. Some of them still thought a "slot" was where you dropped a letter. One girl who had had thirty hours of actual flying knew that when she kicked the pedals or moved the stick it would do something, but she didn't know what she was moving.

Modelcraft's distribution is worldwide, but has naturally suffered a little as a result of the war. Looking over a file of recent orders we noted that they still came from Alaska, Canada, Australia, South and Central America, although, Barney said, not in the same volume as before.

Of course, all parts of the United States were well represented. Stacked high on a table were about fifty packages destined, via parcel post, to Hawaii. "We used to crate these and ship them as freight," Barney said, "but they have to go as mail now." Many orders come from boys in the armed forces.

As to the future of model manufacturing, Barney says, "Modeling is bound to attain a high pitch of perfection. Air transport is uppermost in everyone's mind today and the model comes before the plane. The two will grow together, but it is essential that rules makers do not hold up the progress of models by stultifying them through insisting that they adhere to outdated rules."

Balsa Butch

G. R., 83 W. Pitman St., Penns Grove, N. J.—Install a spark-control mechanism in this manner. Make the spark lever move very freely. Then, with the aid of a rubber band or spring, arrange it so that it pulls wide open all the time. A control line then attached to the spark lever will pull it (retarding) as the operator wishes. We've seen it done—took three control lines to do it, although the regular two might be used. Yes, retractable gear has been used on control-line models, but it isn't perfected as yet.

E. V., 1016 14th St., Sheldon, Ia.—Sorry, fella, we haven't a scrap of plan left on that ship you mention. Wish we could help you. You might write to Aircraft Plan Co., 307 Fifth Ave., New York, and inquire for the other plans you wish.

C. De F., 1415 E. Third St., Brooklyn, N. Y.—We believe that Cleveland Model & Supply Co., 4508 Lorain Ave., Cleveland, O., used to put out the ship you ask for—in a detail kit. Don't know the Stinson Co. address; they have so many factories now. The Academy of Model Aeronautics, 1025 Connecticut Ave., Washington, D. C., might be able to help you on your history report. We can't.

G. S., Palisades Park, N. J.—Well, Jerry, you sure were in a questioning mood the day you penned your letter. Here are some of the answers. A free-wheeling prop is fully described in the *Air Trails Model Annual* now on the newsstands. Basically the idea is this: When the rubber power of the plane has been exhausted (unwound), the tension on the prop relaxes enough to allow a tiny spring to release a catch. This permits the propeller to rotate freely as the ship moves through the air, cutting down drag greatly and improving the glide. As for the reason why an airplane can fly inverted, let us explain that every wing, no matter the airfoil, has a certain amount of effectiveness when inverted. The bottom surface, which becomes the top in inverted flight, is not so efficient, but in most cases is enough to sustain flight. In rubber models, the high-pitch, low-speed props produce greater efficiency than the low-pitch, high-speed variety. No matter what prop is used, a rubber motor has only as many turns in it as are wound in. With a slow-speed prop, one gets a longer motor run and about the same thrust. Of course, the climb is a bit slower, but the flights are longer. A moment arm is roughly an arm which

balances another arm at the center of gravity. In other words the tail moment arm, which extends from a point one third back of the leading edge to the tail, balances at that point with the nose moment arm which extends from the point on the wing to the prop.

H. A., Great Neck, N. J.—We have yet to see an article describing the construction of "retractable wheels and flaps" on a control-line model. We suggest you design such features yourself if you really want to use them on your Fireball.

F. L., Detroit, Mich.—If you follow building instructions on any ship, you will note that all items such as coil, batteries and so forth, are placed in such positions that the ship will almost balance itself. If not, shift the battery case backward or forward until balance is achieved. Some ships do not balance at one third back of the leading edge of the wing which we usually consider as the C. G. The Zipper flies best when balance is almost on the trailing edge of the wing. The best way to check balance is by hand gliding the completed ship. If it stalls, it is tail heavy. If weights cannot be shifted, put a small piece ($1/16$") of balsa under the trailing edge of the wing. If it dives, put the incidence under the leading edge.

P. L., Fort William, Ont.—High tension leads go from the spark terminal of your coil to the spark plug. Booster leads are usually so that you may start your ship on outside batteries, saving those in the ship for actual flight. Booster leads are usually connected by having one wire going to the engine base or ground and the other to one side of the battery box—of course, this depends on your hook-up. Properly connected, the booster batteries run the motor when the flight timer is off; pulling out the timer connects the inner batteries. If you have seen a diagram where leads to outside battery leads are called high-tension leads, somebody was off the beam. Essential parts of the ignition system, aside from the motor parts, are coil, condenser, battery and flight timer. Read any article on gas-model building and you'll find a good hook-up diagram.

R. D. W., Augusta, Me.—We've seen several pictures of models equipped with skis, but, truthfully, the only ones we have seen were hardly worth the effort. We ran several winter contests a few years ago, and the "big-shot" modelers continued with wheels—and, of course, cleaned up. The planes with skis were harder to adjust and were treated as merely stunts by the other contestants. Guess you'll have to design and make your own, and you might tell us how you made out with them.

B. R. T., Knoxville, Tenn.—For years modelers have been looking for a recipe guaranteed to make a plane stallproof and spinproof. To our knowledge they have never succeeded. Best thing to do is to make the ship carefully, follow plans closely, adjust it well, add a prayer and let it go.

Your Question?

(Continued from page 63)

government, has taught a great number of women to fly and according to your letter, you should be eligible for it. We suggest you get in touch with your local Civil Aeronautics Administration office for further information, or write to them at Washington, D. C.

D. M., Tenafly, N. J.—You can buy pictures of U. S. military airplanes from Rudy Arnold, 545 5th Ave., N. Y. C.

V. C. S., Cleveland Heights, O.—Sorry, we have no information regarding the Hawker Typhoon and Tornado. All figures on performance of the P-40F are restricted.

H. D., Trenton, N. J.—We have not seen the issue of *Popular Mechanics* mentioned in your letter and, therefore, do not know why the mechanics and armorers shown in it are wearing gas masks. Possibly it is because they are undergoing gas-attack training.

J. K., Narbeth, Pa.—The Blohm & Voss BV-141 is known as an asymmetrical aircraft and looks just as shown in our September issue. Do not ask us why, because we wonder about it ourselves.

J. Z., South Euclid, O.—You can get information regarding enlistment in the Marines at your nearest navy recruiting service.

G. M., Auburn, Me.—Most glider manufacturers are busy at the present time building ships for the army and navy. There are no biplane gliders made here. You may try writing to Bowlus Sailplanes, Inc., San Fernando, Cal.

S. J., Brooklyn, N. Y.—The correct spelling and pronunciation of multiple dihedral is polyhedral. Castor oil was used as a lubricant in early types of aircraft engines because regular motor oils could not stand up under the high temperatures and rigors of flight operation. The Messerschmitt 109E has a wing span of 32 ft. 3 in.; length, 26 ft. 8 in.; weighs, empty, 4,180 lbs.; top speed is 354 m. p. h.; cruising speed 298 m. p. h., and is powered by a DB-601 motor of 1,150 h. p.

P. G., Bethesda, Md.—The under side of British planes is painted a light-blue color, the top side is green and sand, or brown. The belly gun turret of the B17-E is more efficient than the one on the earlier models. Sorry, but all information on bomb loads and armament of military aircraft is restricted.

D. C., Malone, N. Y.—Sorry, we have no official figures regarding the maximum speed of planes mentioned in your letter. The P-40F, P-39 and the P-38 are supposed to have speeds close to 400 m. p. h. and the new Hurricane around 380 m. p. h. The

Air Trails Pictorial Advertisers, June 1943

SCHOOLS

MODEL AIRPLANE KITS, MOTORS AND SUPPLIES

GENERAL

While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.

Morane-Saulnier 40F had a 23-mm. cannon firing through the propeller hub and two machine guns in the wings. It is reported that Guynemer had a Spad powered with a Buggatti engine which had a cannon installed between its cylinder banks.

J. G., Chicago, Ill.—The Waterman Arrowbile is not being manufactured and we have no information concerning it. It was powered by a 100 h. p. Studebaker engine.

A. R., New York, N. Y.—For information regarding requirements for an aeronautical traffic controller, write to the Civil Aeronautics Administration, Washington, D. C.

S. T., Cheyenne, Wyo.—For information regarding mechanic's position with the Ferry Command, either write to them directly at the U. S. Army Air Forces Bldg., Washington, D. C., or to the Civil Aeronautics Administration, Washington, D. C.

H. D., Tulsa, Okla.—Sorry, we have no reproductions available of color plates mentioned in your letter, and we do not know where they can be obtained.

H. O., Storm Lake, Ia.—For information regarding pilot certification, write to the Civil Aeronautics Administration, Washington, D. C. Regarding enlistment in the marines, consult your nearest naval recruiting office.

N. R. B., Swampscott, Mass.—The projection on the trailing edge of the Lockheed Hudson bomber serves as tracks on which the Fowler flaps slide in and out. Sorry, we do not know if the Republic Thunderbolt has a pressurized cockpit. We doubt it, however.

Air Youth Glider No. 3

(Continued from page 28)

weight to the nose until the center of gravity is approximately 1/3 the distance back from the front of the wing. Don't attempt tow-line flights until successful smooth hand-launched glides have been made. By slightly warping the rudder, the model can be made to circle, but don't overdo this adjustment, or tow launching the model will become difficult.

For ordinary tow launching, use about seventy-five feet of strong thread, looped, of course, at one end; or attach a small 1/4"-diameter ring which can be fashioned from an ordinary common pin. The launching technique is very simple, but you will need a helper. Have him hold the model while you walk out with the line. When the end of the line has been reached, he releases the model and you run slowly backward, towing the model into the air in a manner very similar to the launching of a kite. Of course, the model should be launched into the wind. When it is overhead, slack off on the line which automatically drops off—and the ship is on its own.

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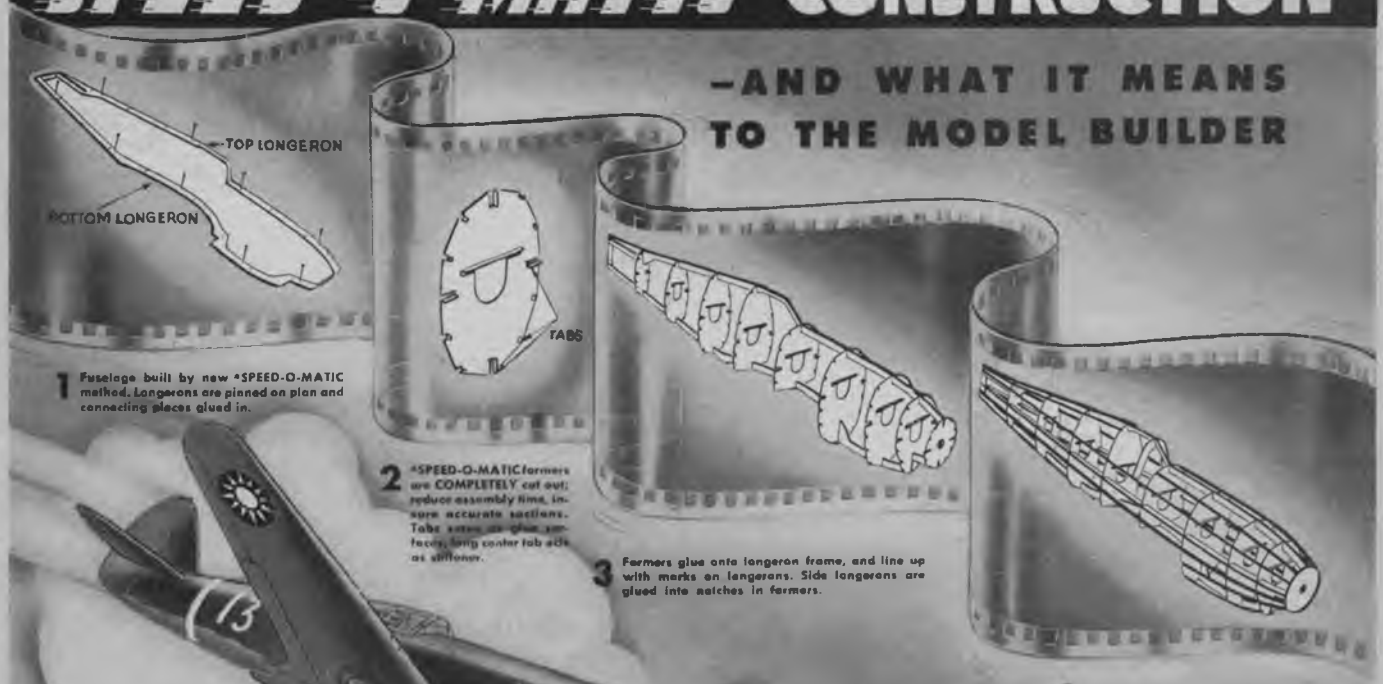
—AND WHAT IT MEANS TO THE MODEL BUILDER



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3 Formers glue onto longeron frame, and line up with marks on longerons. Side longerons are glued into notches in formers.

4 Next, stringers are glued in notches, then cockpit former is glued in. Fuselage is now ready for paper covering.

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