MODEL AIRPLANE NEWS

12th Year of Publication

JULY, 1940
20c

Short "Sunderland"
Patrol Flying Boat

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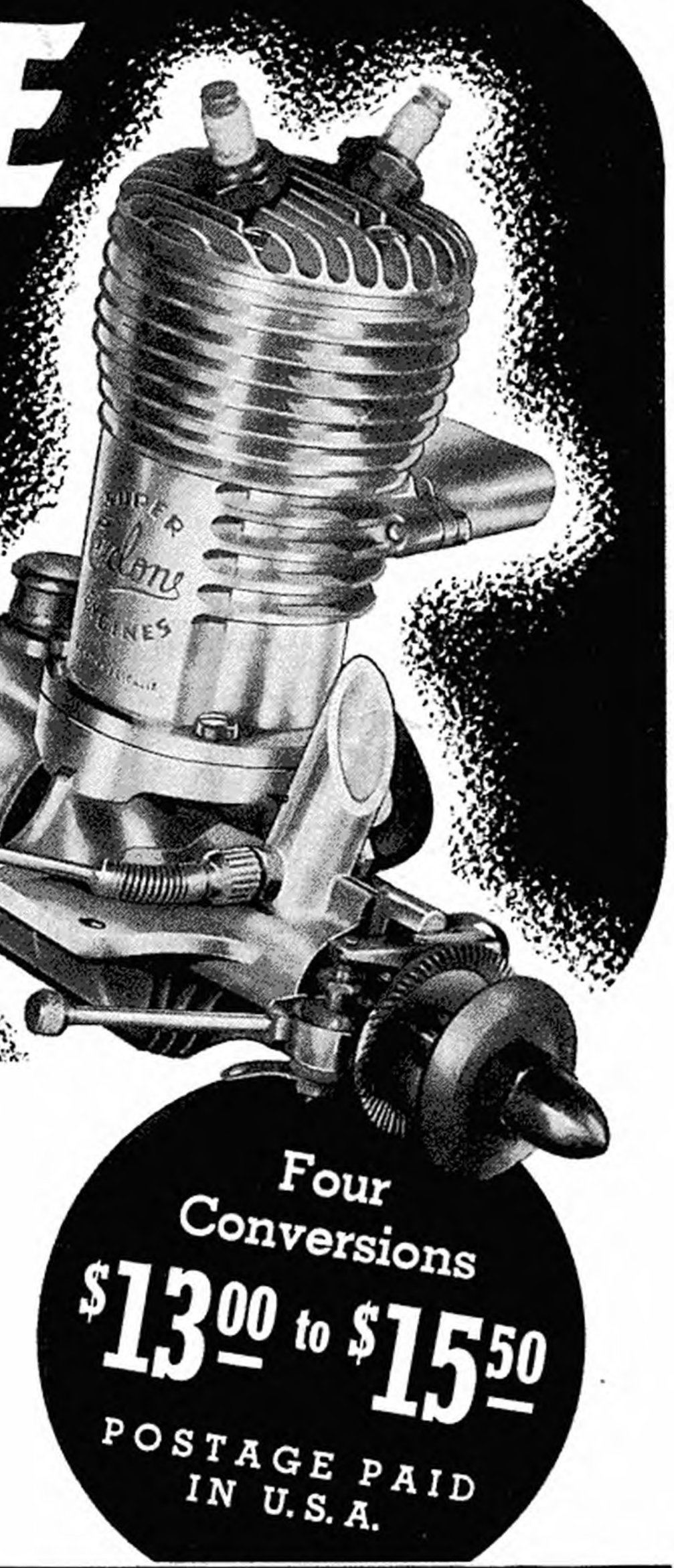

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12th YEAR OF PUBLICATION

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Edited by Charles Hampson Grant

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JULY, 1940

NOTICE

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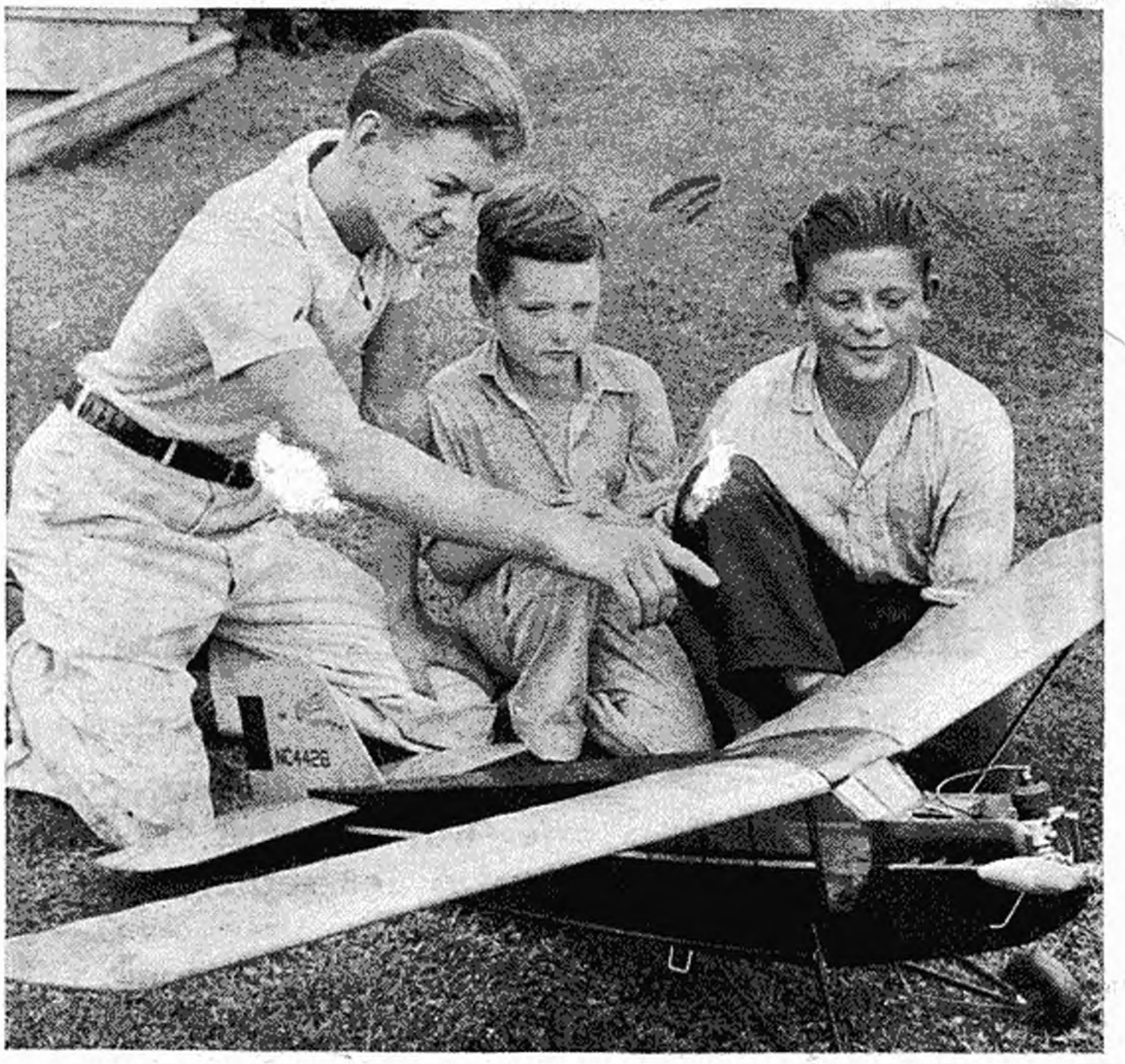

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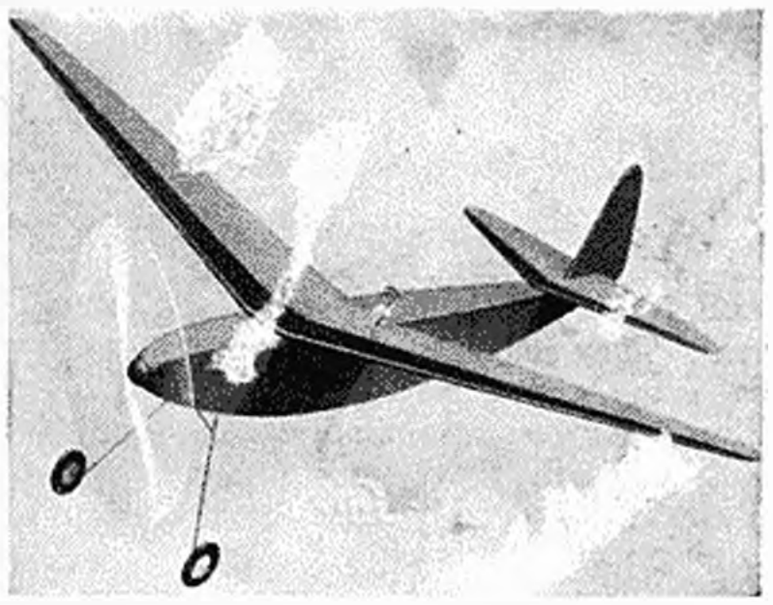

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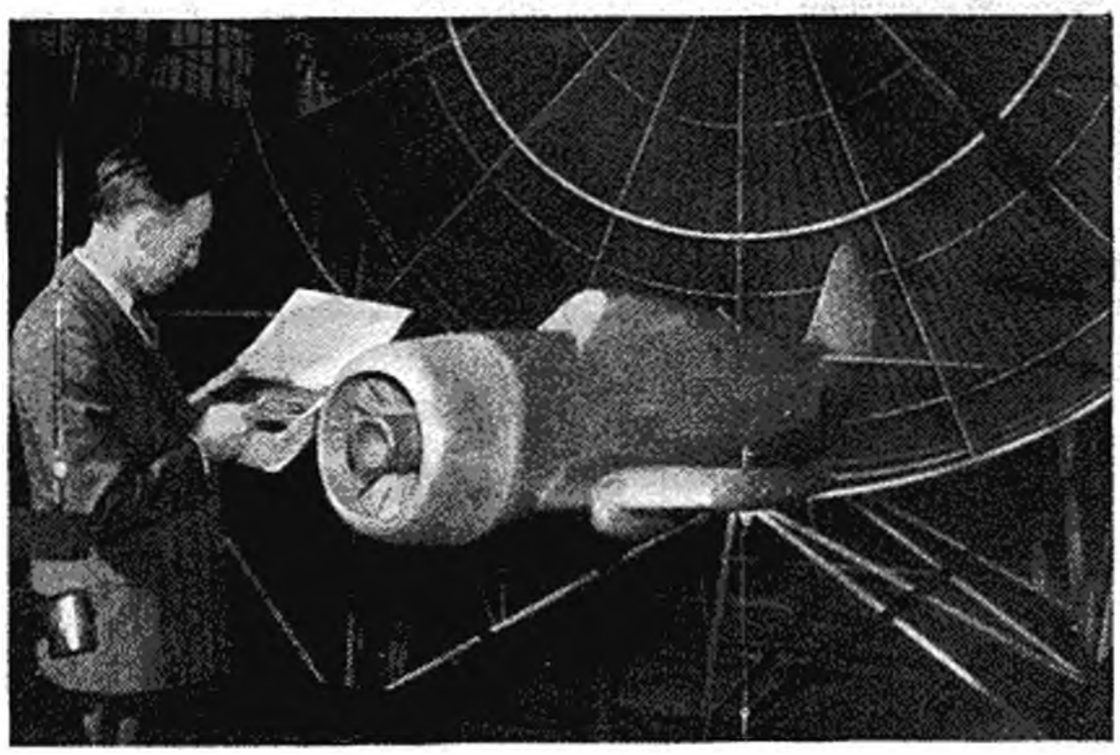
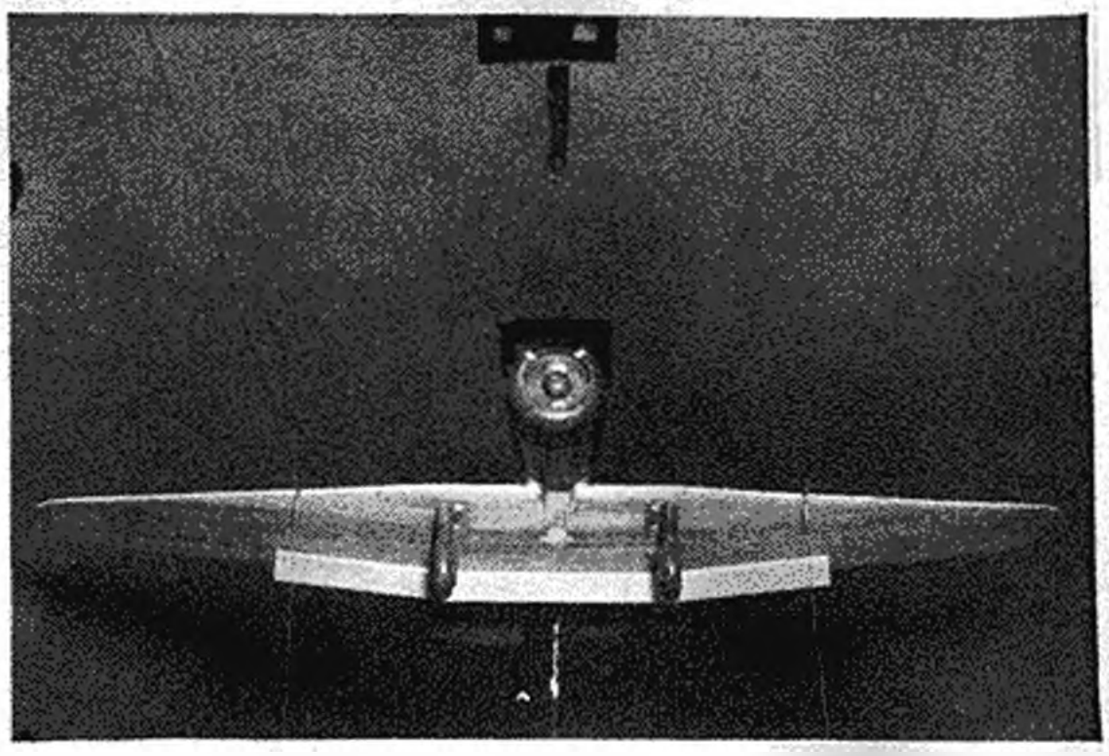


A balsa model to ascertain pressure distribution



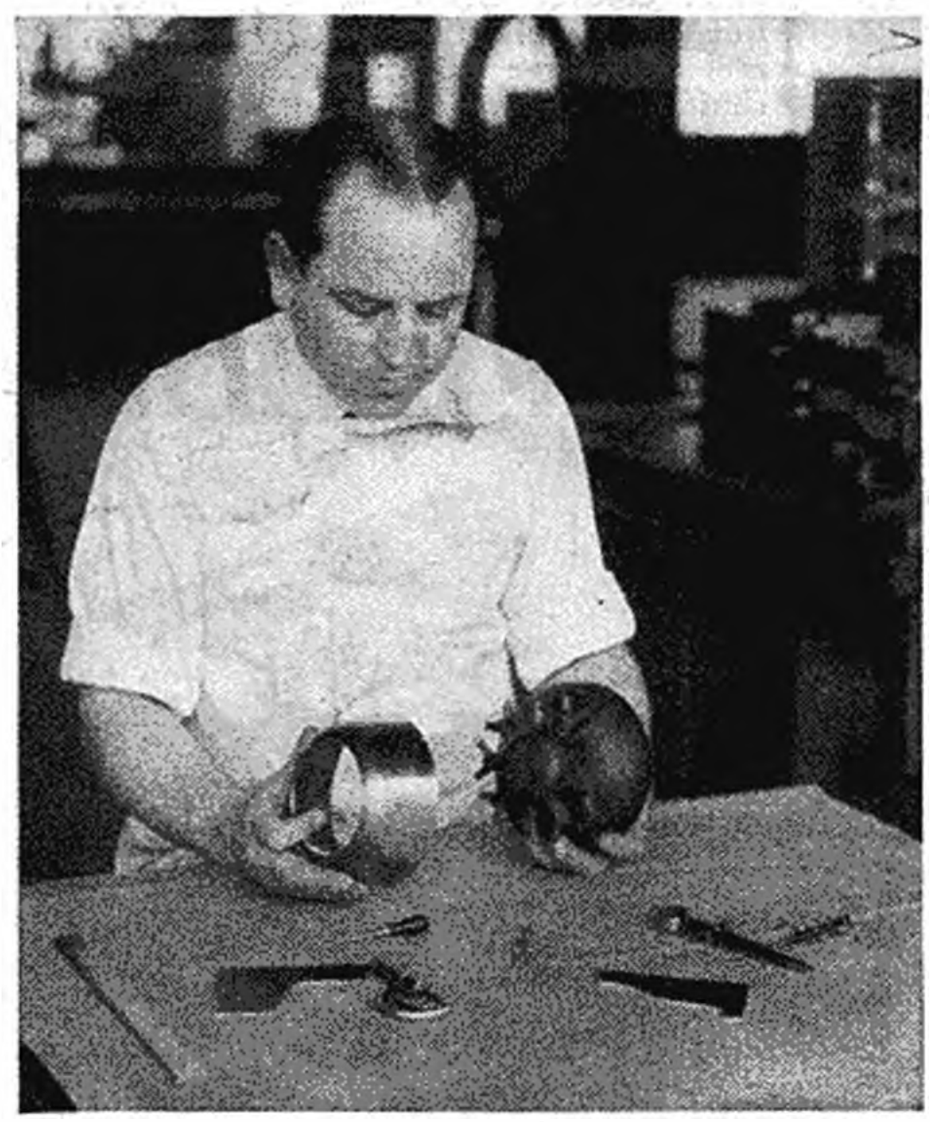
A tunnel model with flaps down, ready for testing

PLANES THAT

Full Scale Aircraft Fly Efficiently Only Because Someone Builds Models—How They Are Used to Obtain

MEN had to die before others would listen. They soared aloft in faulty planes and many times because of structural failure, poor designs and other weaknesses in their craft, they crashed and were killed. It happened because they believed building models was child's play.

The story goes that a millionaire sportsman wanted a new plane with special features so that he might enter it in one of the nation's aerial speed classics. He was a good pilot, one of the old school that flew "by the seat of their pants." This may explain why he couldn't agree with modern ideas.



Fitting a cowl on a dummy motor

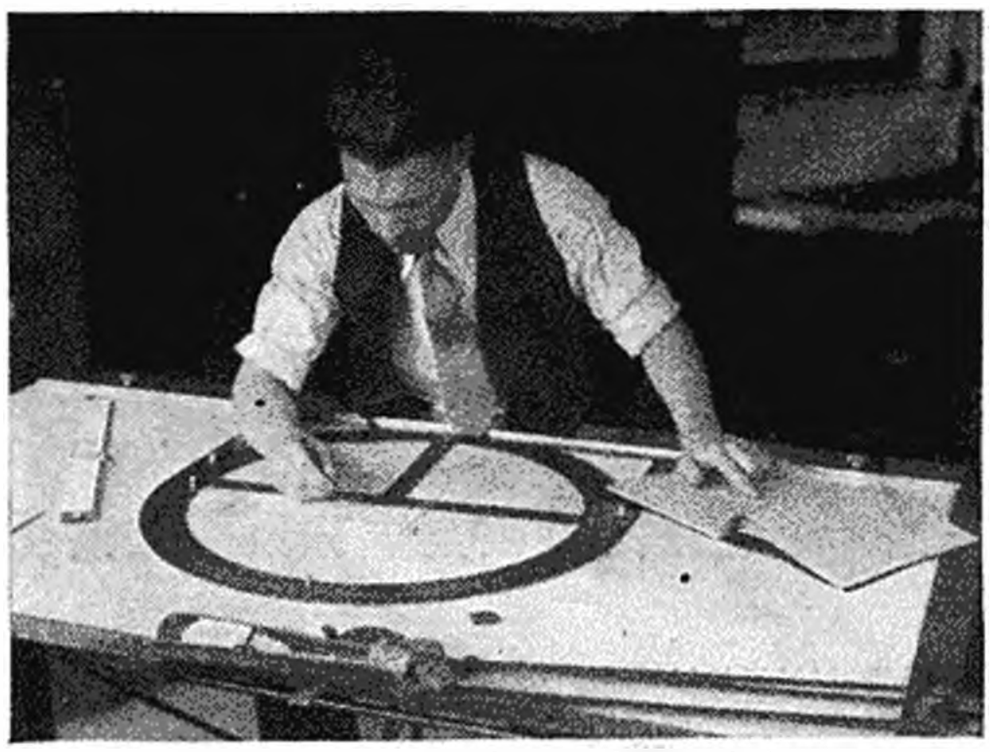
He hired expert engineers and designers to draw up plans for the new airplane. And when the pencil pushers were through with the job the new design had everything—speed, stability, range and performance. Figures proved she would do anything that could be desired of any plane, and figures seldom lie. But that was on paper—mere lines and specifications, fundamentally and aerodynamically sound, to be sure, but still only figures. And these figures were wrong.

The engineers were certain of their work, but they wanted to build a model, test it in wind tunnel experiments and compare blueprints with the statistical data obtained. But time for the race was near and the builder wanted things rushed.

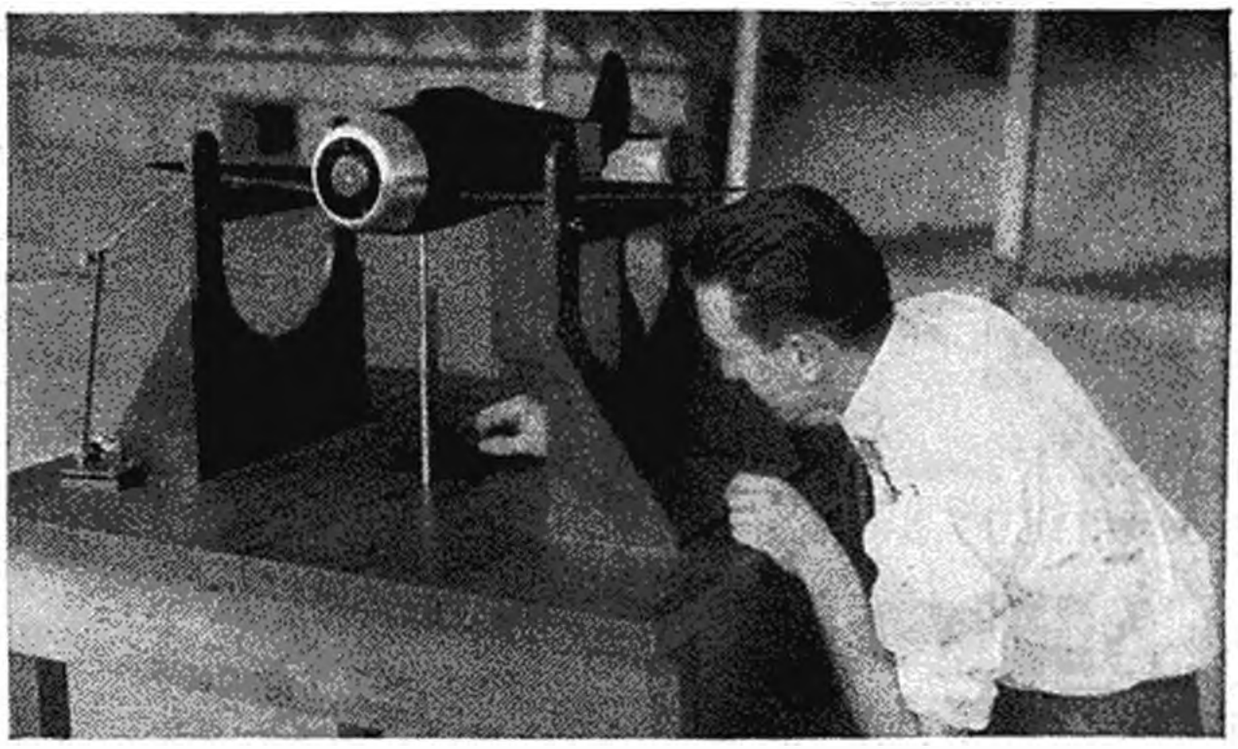
So they built the plane without any model. It proved to be everything the plans had said that it would—except that it was a bad "spinner." When a test pilot put her into a tail spin the ship never came out. A parachute saved the pilot's life, but the $100,000 investment proved to be a bad one. All because one man wouldn't listen. Experts could have determined the ship's spin reactions in the wind tunnel tests, if only they had built that model.

Others weren't so fortunate. Back in the beginning when the knowledge of aerodynamics was little enough indeed, and rested with only a select few, they had to find out the hard way. It took human lives. Planes didn't come out of spins. Wings crumpled. Motors shook themselves free. It was a long time before planes hung together in the air and flew safely.

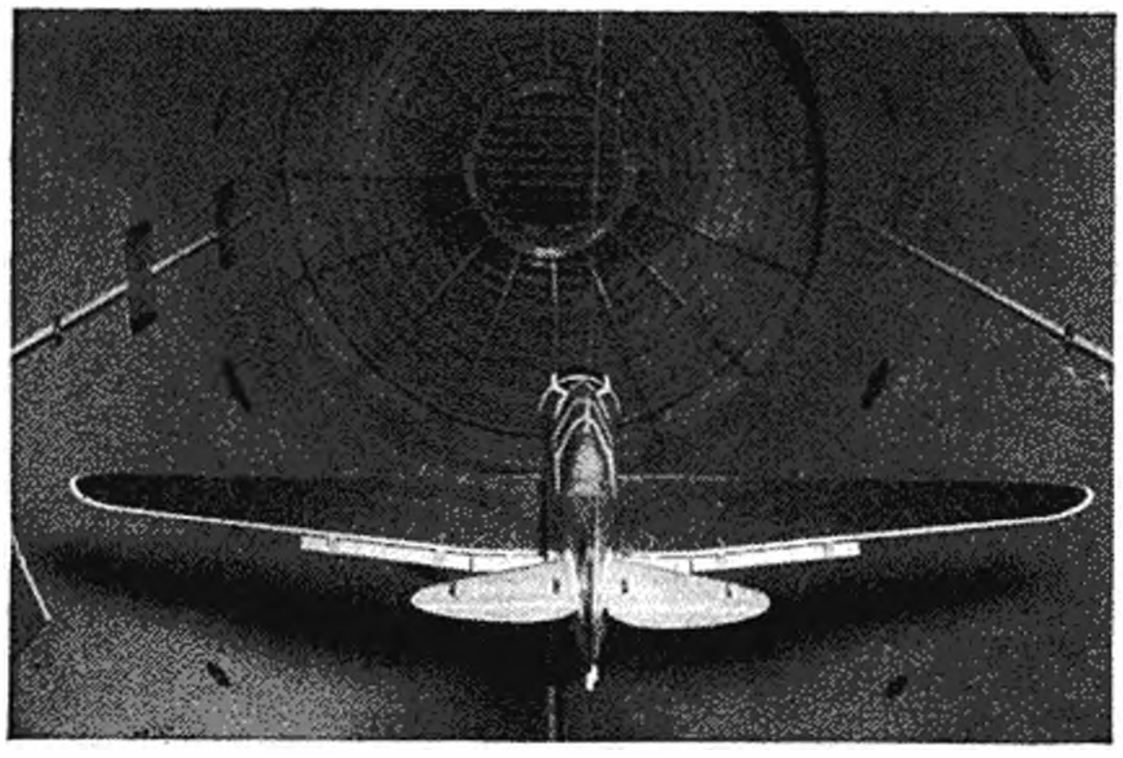
But we've come far since the "early



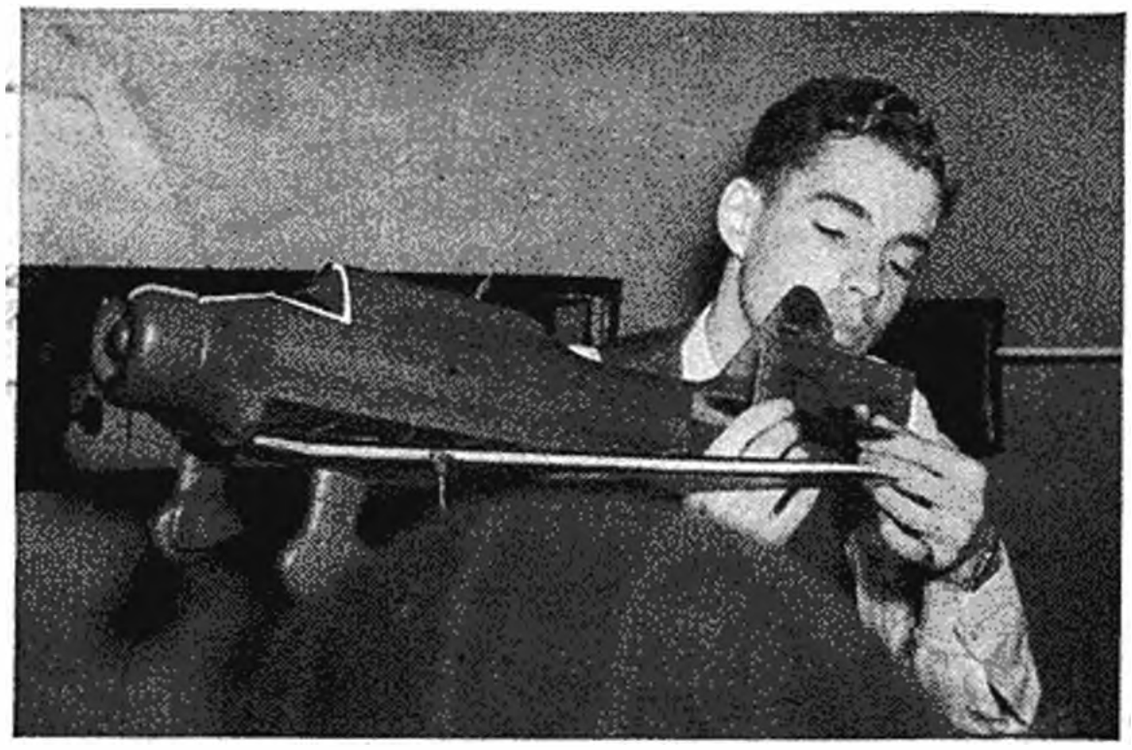
Scaling device checks wind tunnel data



Checking the accuracy of a tunnel model with precision instruments



The model suspended in the tunnel—rear view



Angles of control surfaces are checked before tests

NEVER FLY

Elusive Information Vital to the Design and Production of Modern Planes

By DOUGLAS J. INGELLS

birds" and today the aircraft industry is a process of evolution. Airplanes are born, not made—born on paper, the creations of engineers and designers. And they grow, from blueprint to model, model to mock-up, until finally they emerge as the airliner or pursuit.

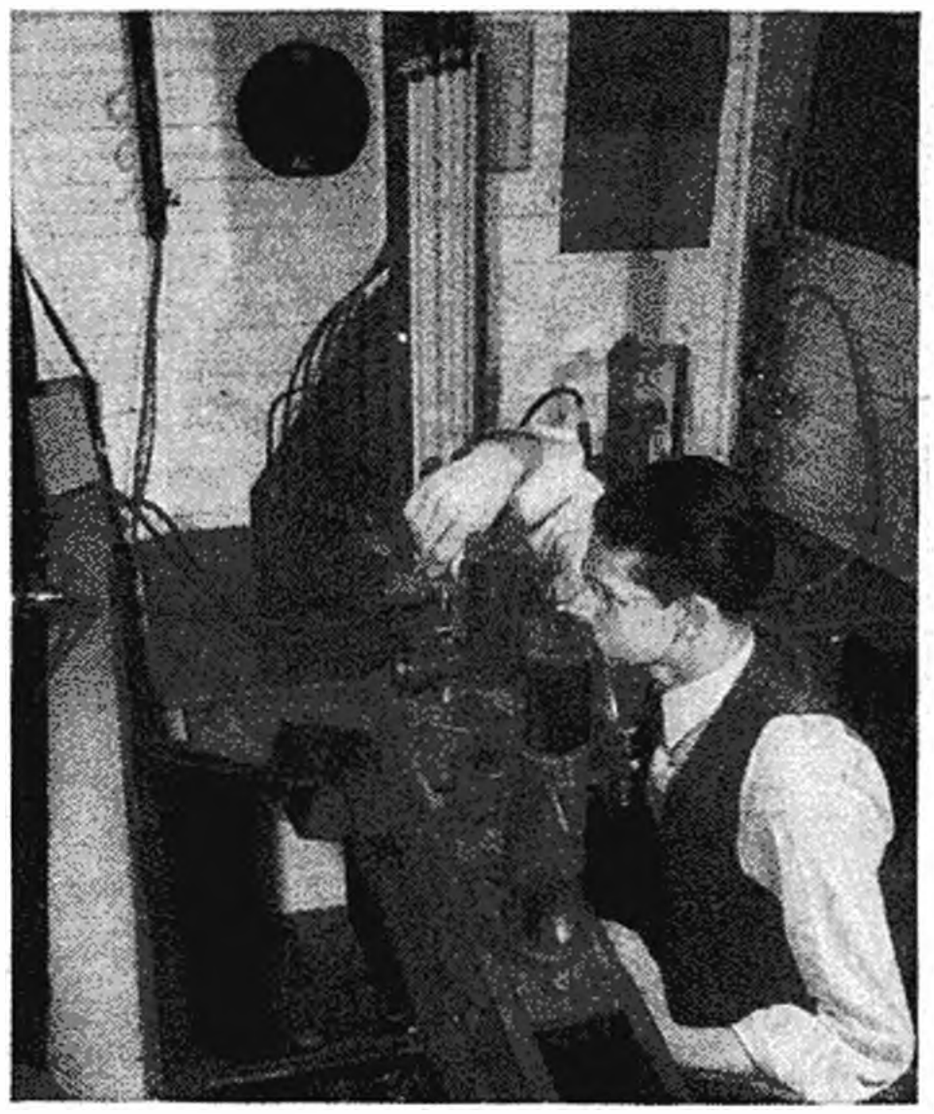
With this there has grown-up a new generation, one which has schooled itself with the knowledge of flight. A generation raised in a world of wings. On Sundays when the family goes for a ride you'll see them—the youngsters in the fields with their small gasoline-powered airplanes. They are the designers, builders and executives of tomorrow's aviation industry.

This model business is a serious thing. The adults are in it, too. Uncle Sam spends thousands of dollars every year at various experimental fields building models, studying them in wind tunnel tests, and developing from them pursuits, fighters and bombers that are second to none in the world in design and performance. Actually the "Flying Fortresses" you hear so much about had their beginning this way—with a small wooden model. There were no gasoline motors; no rubber powered propellers; but there were fuselages and wings carved from wood and sanded down to form the contours of the army's super hombers that were to come.

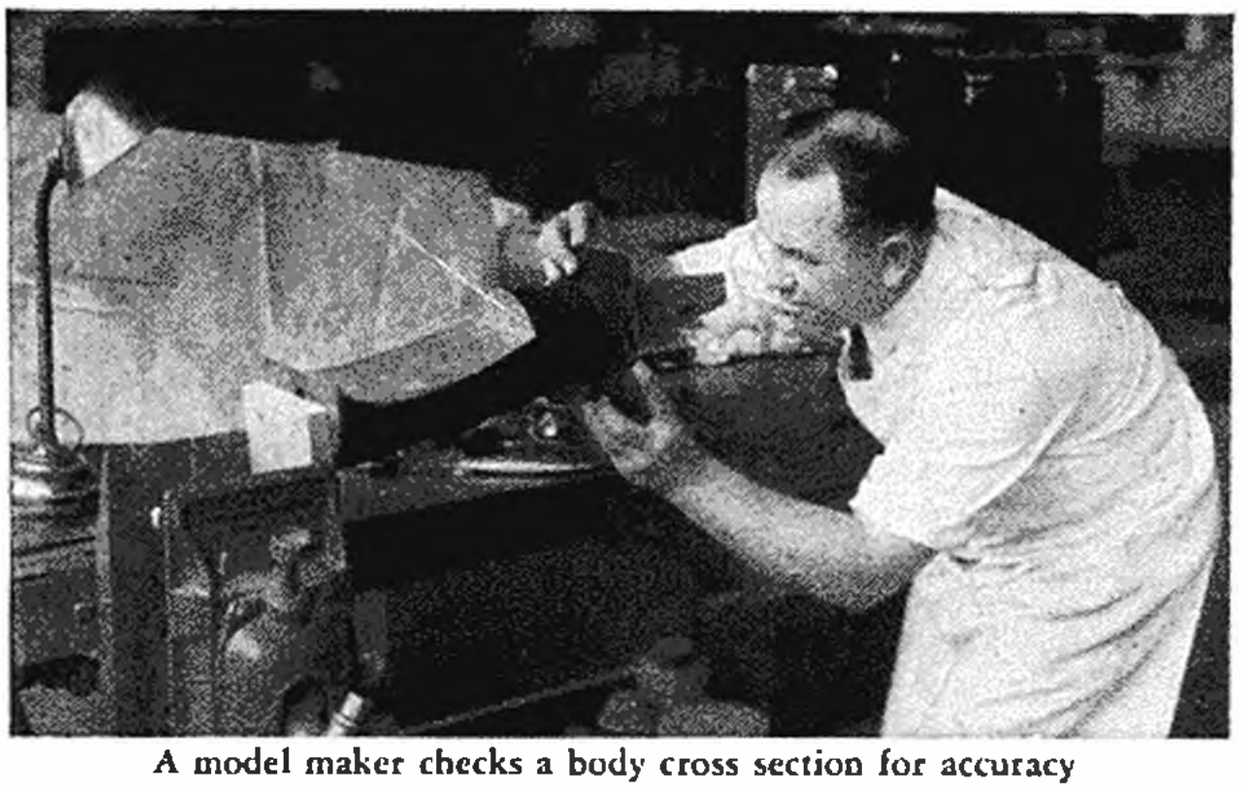
It is an interesting story that surrounds these models which Uncle Sam spends so much time and money to build. Very few people know about them. Those who do are told very little, for these tiny ships hold the secrets that make the army's planes fly faster, farther and higher than those of any other nation. But like all stories there has to be a beginning:

Usually it starts when General Blank of the army air corps receives a confidential report stating that a foreign country has a "new high speed bomber that will do 350 m.p.h. and cruise for 3,000 miles." (He'd be mighty surprised if he learned of such a plane, but, anyway, the idea for a new plane is born.) After carefully studying that report he decides that the army should have a plane "with a speed of 400 m.p.h. and a cruising range of

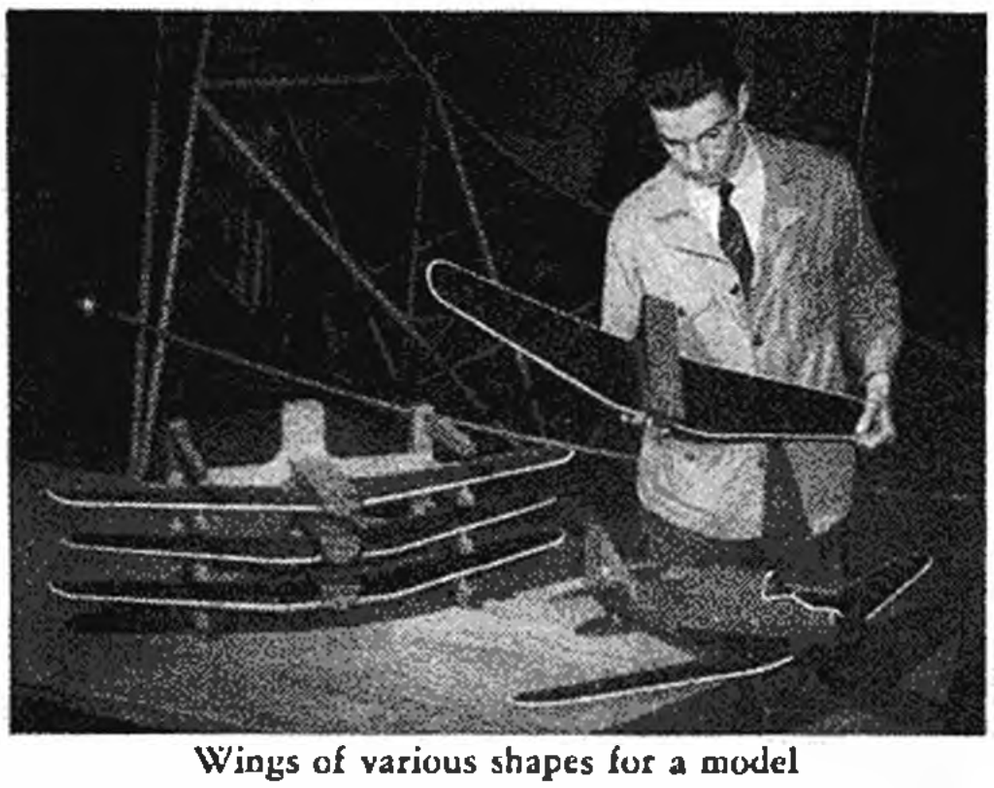
(Continued on page 32)



Studying air-flow on model in tunnel



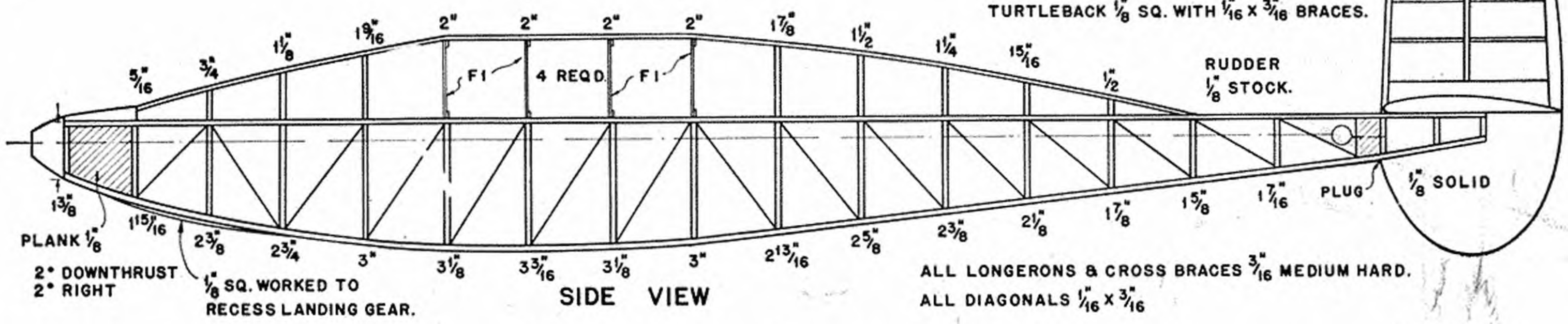
A model maker checks a body cross section for accuracy



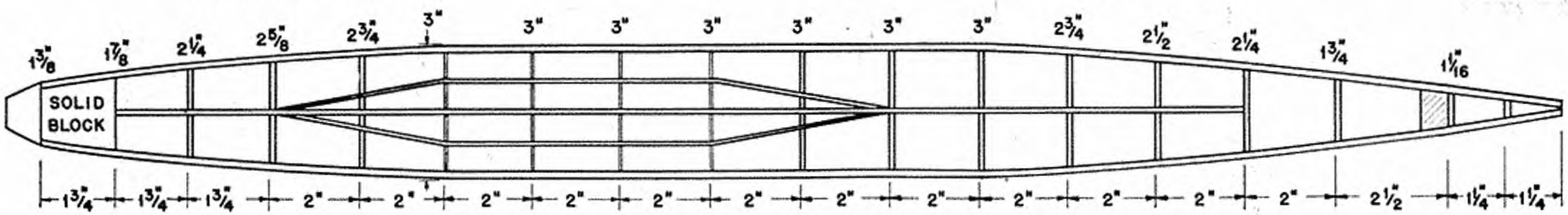
Wings of various shapes for a model

STABILIZER PATTERN - Full Size

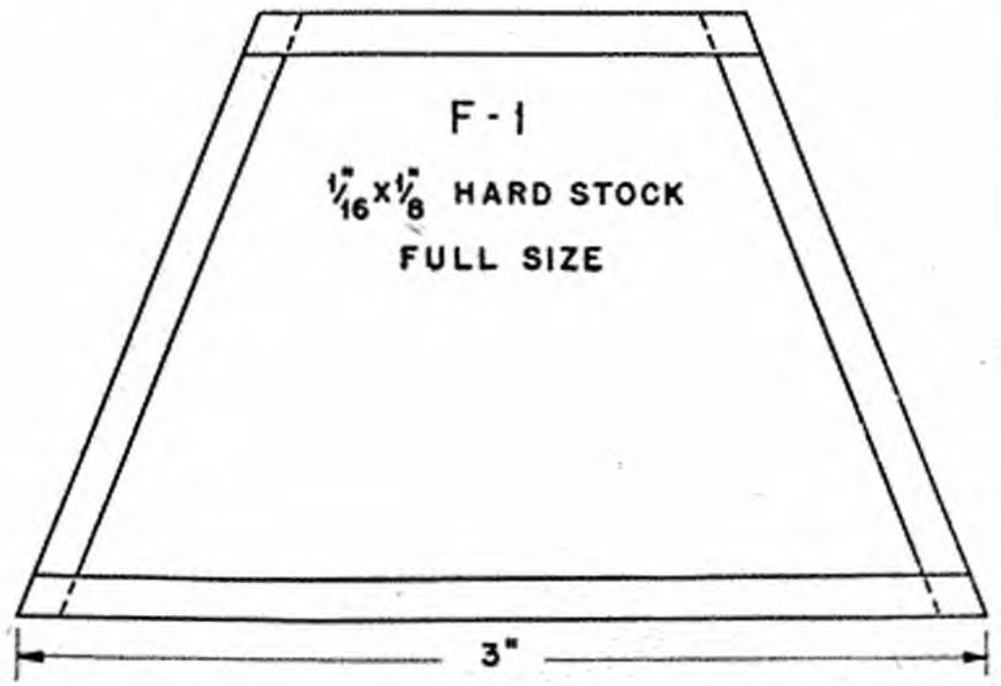
WING RIB PATTERN - Full Size

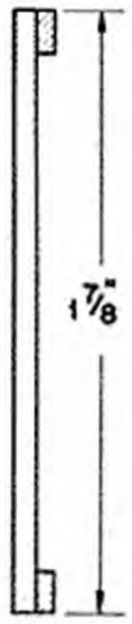


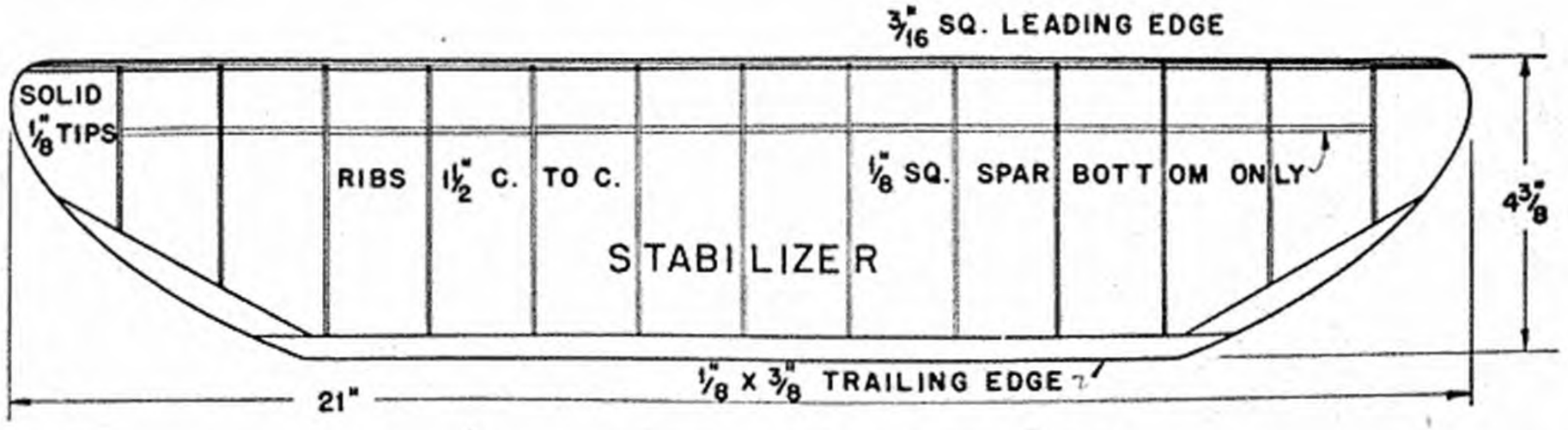
SIDE VIEW



TOP VIEW





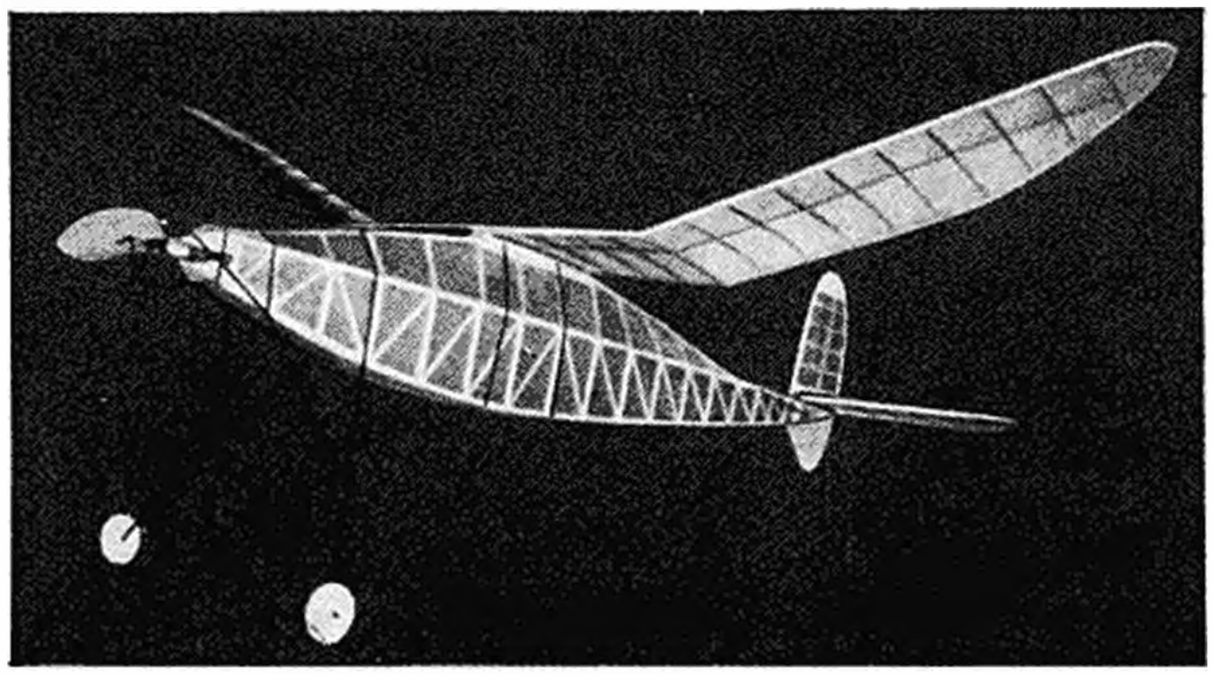


"OOMPH" Scale 1/4" = 1"

Al. Casano - Plate I.

The "OOMPH" FOR WINNING CONTESTS

By AL CASANO



The completed model; simple and efficient

"OOMPH" is the name of the plane in this story, and that just about describes its characteristics, especially its climb. The author has used up a lot of patience, watching five of these planes fly out of sight, never to return, but among the laurels gathered by "Oomph" is the New Jersey State Championship, as well as numerous sectional meets. The crate is a model of consistency and has no bad flight tendencies.

Ease of construction, ruggedness and consistent contest performance should make it worth the prospective builder's while. This job and its five lost brothers have had a total of twenty-three out-of-sight flights, ranging from fifteen to forty-two minutes, which eliminates the cry of "lucky." So let's go to work, remembering that the plane will be no better than the materials and care you put into it. Use the right grade and weight of wood in duplicate. By that we mean do not make one longeron out of rock-hard balsa then use soft stock for its mate, for such practice results in an out-of-line fuselage that does not im-

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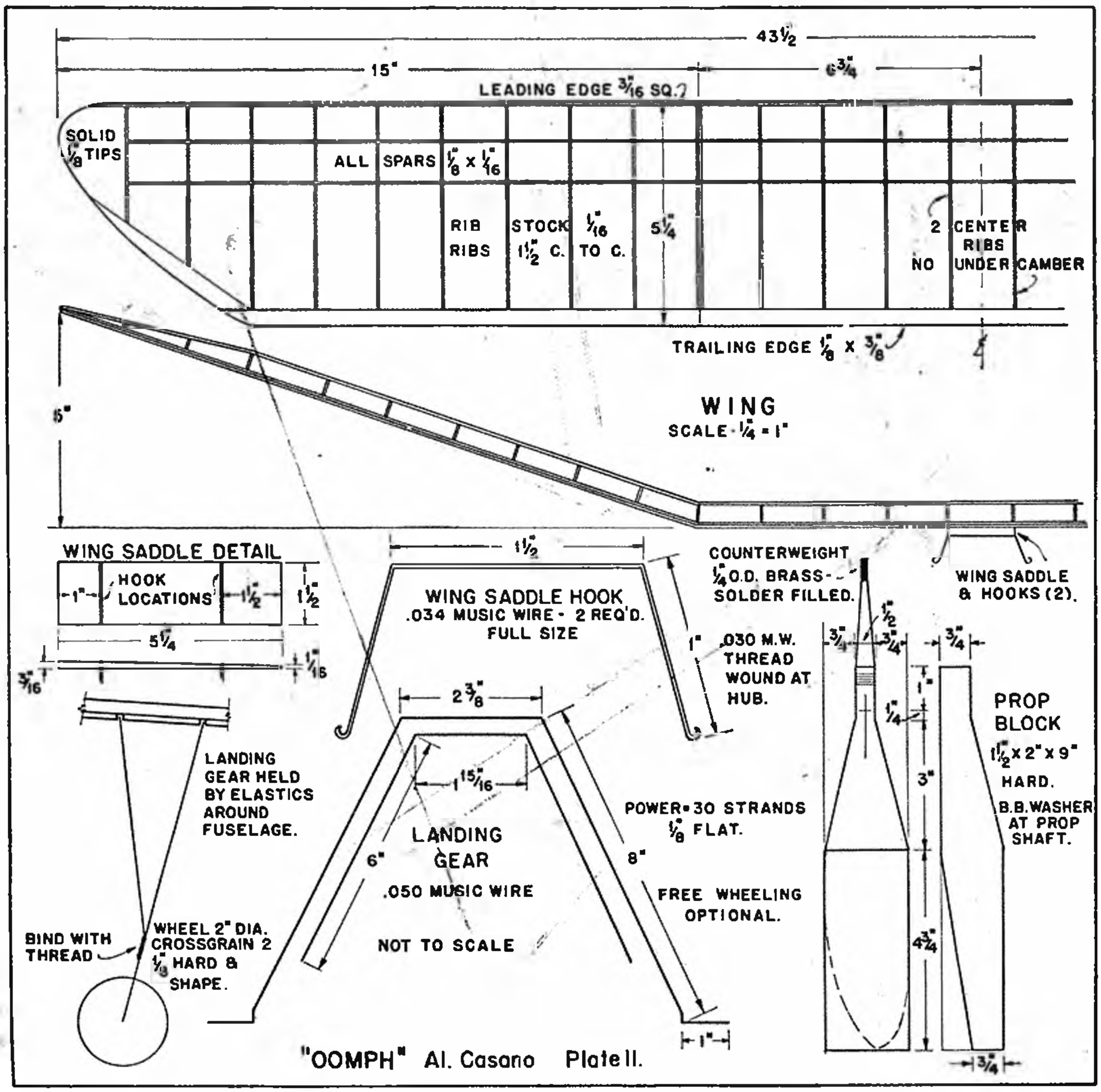
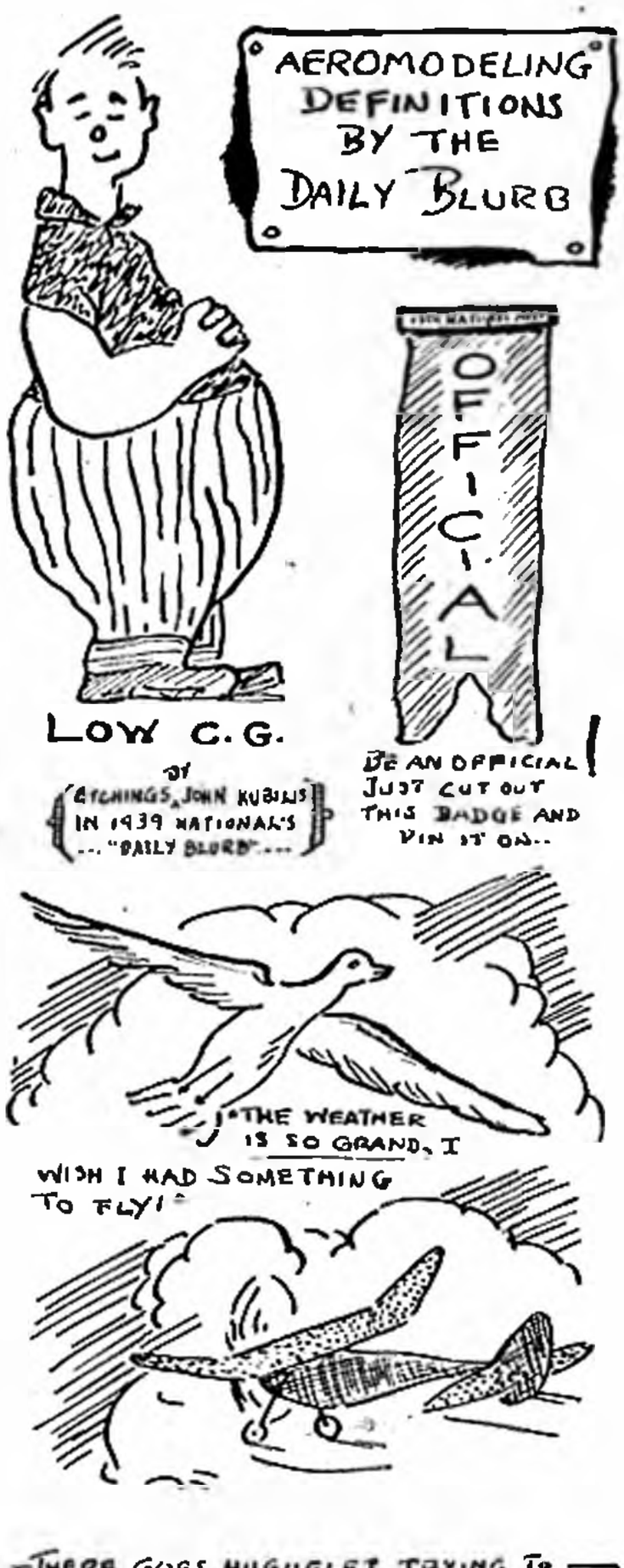
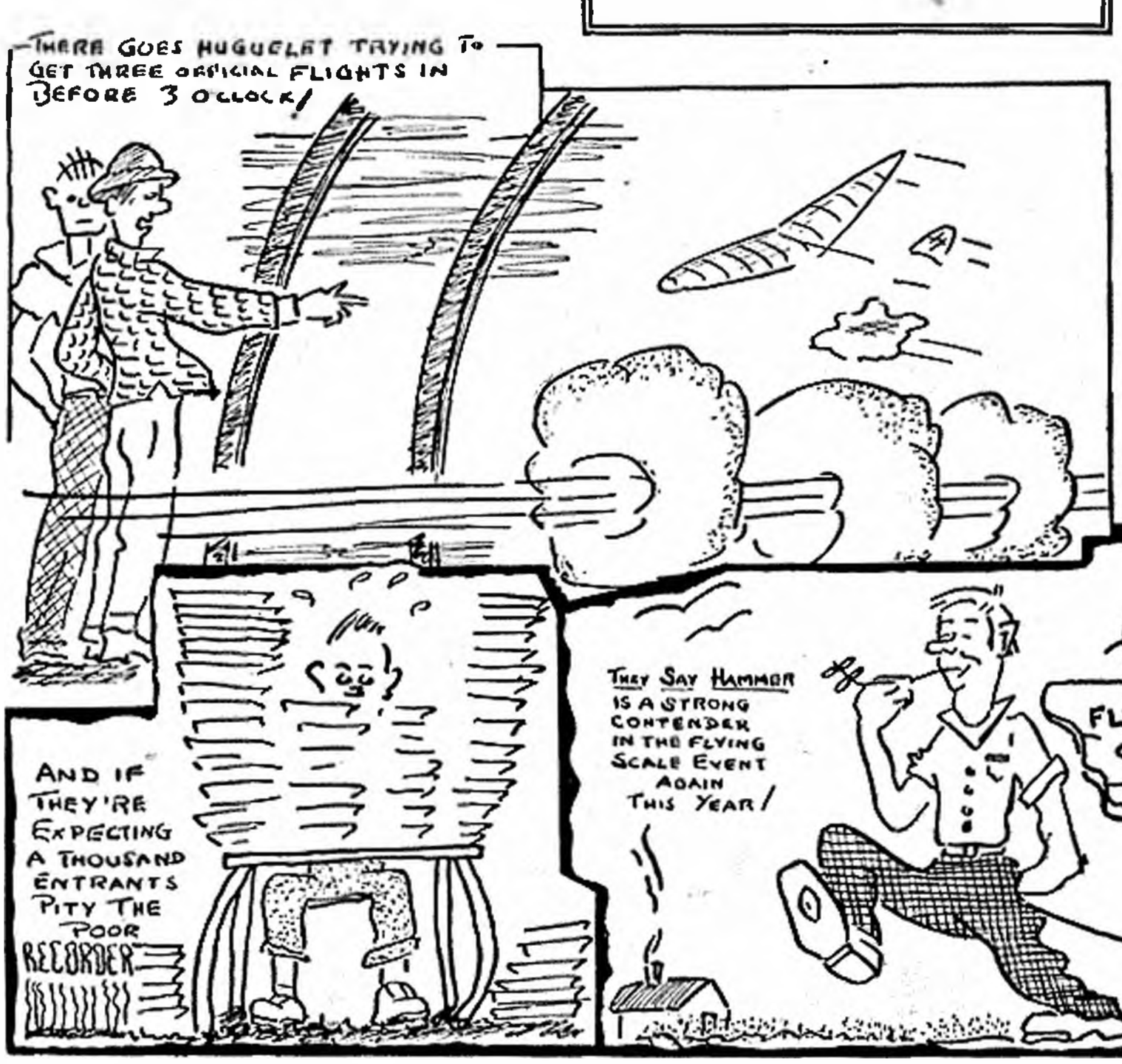


BLOW YOURSELF TO THE NATIONALS

BY ALBERT L. LEWIS





IN THE event you hadn't heard, there's going to be a National Meet this year and it'll be held in Chicago.

In fact, this annual battle bids fair to be the biggest and the best ever staged in this country or anywhere else.

Since this is your correspondent's third M.A.N. "Come to the Nationals" story, it might seem somewhat difficult to wax enthusiastic over the thirteenth National Model Airplane Championship Contest.

Brother, it ain't so!

You may think you've seen some grand competitions in the past. . . . You may look upon your past national contest participation as a high light in your modeling career. . . . You may, in fact, not yet have recovered from the last National meet. Regardless of your condition, you'd better be prepared for the time of your life next July.

As this issue toddles off to press, contest dates are tentatively announced for July 2, 3, 4, 5, and 6, with registration on July 1 at the official hostel, the Hotel Sherman in downtown Chicago. Whether or not the number of competition days can be pared down remains to be seen. Anyhoo—you'd better put the bee on the "Old Man" for an extra dollar or two, for there are many extra-curricular activities scheduled for the thirteenth annual meet and you wouldn't want to miss any because of a depleted pocketbook.

Oh, yes, who's running the meet?

That's a good question, and one which we'll not overlook. This colossal, gargantuan, and slightly terrific fray is being sponsored by the "Chicago Times" and the Chicago Park District. The "Times," as you probably know, has its own model airplane club, the Times Air Cadets, with a membership of more than 40,000 youngsters. The Cadets have been carrying on for about three years and membership is now being extended beyond the Chicago area and already includes many high school and academic groups.

Proof of what may be expected at the

(Continued on page 44)

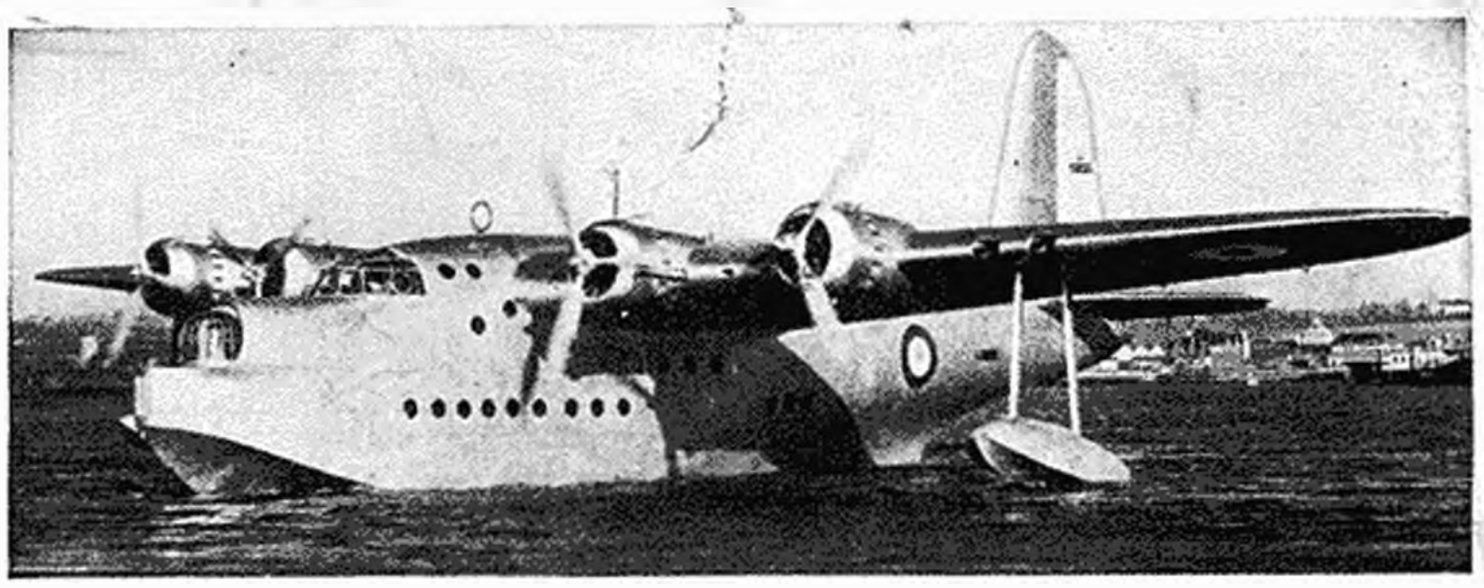
ENTRY BLANKS FOR THE NATIONAL MODEL AIRPLANE MEET

Requests for entry blanks should be sent to Maurice Roddy, % "Chicago Times," 211 W. Wacker Drive, Chicago, Ill. Include 3c in stamps for individual requests; 10c in stamps for half-dozen blanks and rules booklets.

Remember Academy membership is prerequisite for entry in National meet. Has your old N.A.A. flyer's license expired yet?

DREADNAUGHT ON WINGS

THE PLANE ON THE COVER



The British Sunderland flying dreadnaught that whipped 4 German planes

By ROBERT McLARREN

ENEMY naval fleets strike like lightning. This lesson has been learned a thousand times in history. A ship, unto itself, may be comparatively slow-moving, about twenty miles an hour for the giant super-dreadnaughts, but the efficacious time element is involved and when undetected, a fleet, although moving at that veritable snail's pace, will have from five to ten hours to make its approach. Then suddenly the populace of a coastal town will awake one morning to find its harbor filled with the crash of heavy naval guns and the spine-chilling detonation of erupting shells in its city streets.

Therefore naval defense has, through the ages, come to be largely a matter of detection rather than repulsion—and with the airplane has come the maximum scope of detective power.

The discovery, analysis and possible retardation of enemy fleets is the function of the giant military flying boat as we know it today. And it has developed into its present form through thirty years of trial and error. Two problems have instigated and fostered the strenuous work of the military flying boat designers:

One—its strategical employment. Although not directly a designers' problem, the duty lies with them to make the flying boat as flexible and as useful in a military nature as possible. No other single ship combines all the possible military characteristics into one airplane. Fighting, bombing, observation, attack, scouting, etc., all of these various categories we have so long associated with a single airplane are combined into one in the military flying boat. And it is the strategical employment of this single ship into from eight to ten different modes of operation that has been the principal problem of naval aviation.

Second—its aerodynamic form, which has come as a direct result of the first problem. Firstly, it must have a terrific range, the greatest of any flying machine. That means a huge fuel supply which dictates a large-sized airplane. Secondly, it must have a tremendous load-carrying ability, for no other single ship carries half the itemized equipment as the flying boat. And that means a big wing and tremendously powerful motors. Thirdly, it must be fast, speeding out into vast open expanses of water, making record of the enemy fleet's location, its size and its general course as quickly as possible and that means clean aerodynamic

(Continued on page 48)

Your Model and the Law

PART No. 2

By JAMES R. CUSTIN

LAST month we looked at some of the statutes on model airplanes and saw that there are not many laws on the books which specifically deal with models. We noticed, too, that the laws dealing with aircraft do not, in general, apply to model airplanes, since models would probably not come within the meaning of the term as used in the statute. We also considered the question of responsibility for accidents at model meets and saw that the big idea is to be careful—the old "stitch in time" theory.

Comes now the time to see what happens when the old tub suddenly hooks a riser and goes sailing away—off the airport.

Here we come upon some rules governing the operation of full size craft which undoubtedly do govern models, since they are simply matters of applied common sense. The general law is that the ordinary rules of negligence and due care obtain in the operation of aircraft. Every person is bound to use ordinary care not to injure another; and ordinary care is defined as "such care as the great mass of mankind would use under the same or similar circumstances, or such care as the ordinary prudent person would use under the same or similar circumstances."

It would seem perfectly reasonable to believe that even though the courts might be willing to concede that a model airplane builder is not an ordinary person, they would undoubtedly insist that he must use as much care in operating his plane as an ordinary prudent person would use in so doing. In other words, the modeler doesn't have to be an ordinary person, but he must be prudent.

This holds true not only with respect to spectators but also as regards other contestants and full scale airplanes which might be using the airport. We have already seen that the manager of the airport is required by the Civil Air Regulations to supervise model activities on his field. He has, of course, the general duty of keeping runways free from obstructions as far as possible, or of placing markers where required to warn pilots of danger. The N. A. A. Official Contest Manual has a good tip on this subject: "The nearest Bureau of Air Commerce Inspector should be advised at least two weeks in advance of a forthcoming contest so that a warning could be posted in the Bureau's 'Notice to Airmen' advising flyers to be on the lookout for models while flying in that area." (Incidentally, the Contest Manual contains many other suggestions which will help to keep the law on the side of the modeler, if followed carefully.)

Another general rule which ought to be considered in connection with model airplane operations is the one concerning risks due to activities on land. The rule is that the possessors of land must take care that such risks do not become unreasonable as

(Continued on page 38)

1/32" sheet covering

cross pieces 1/16" x 3/32"

longerons 3/32" sq.

nose laminated balsa discs

celluloid

a

b

c1

ribs of both wings cemented to fuselage frame to insure correct placement later

window outlines made by tissue covering

cellophane

"n" strut a bit longer than shown

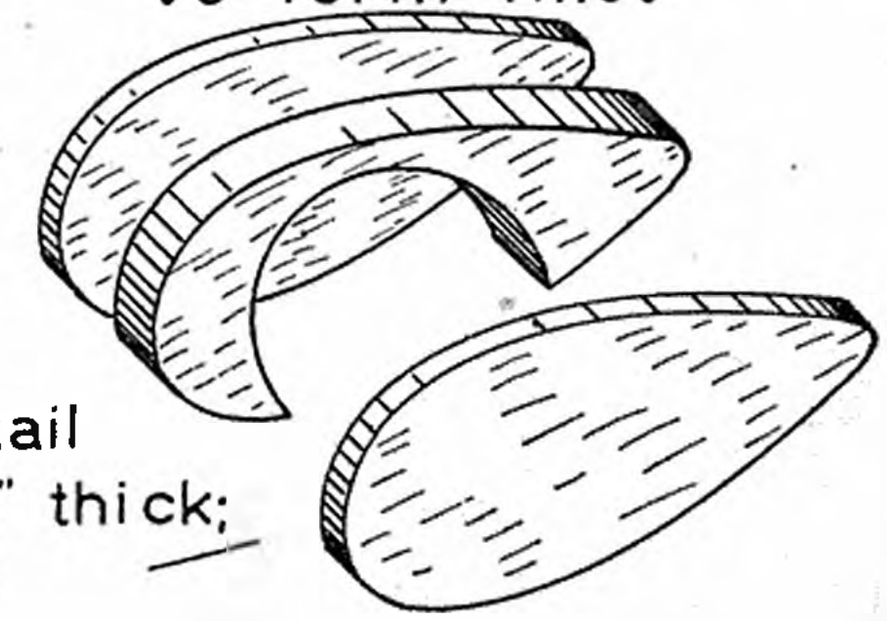
c2

1/16" rib

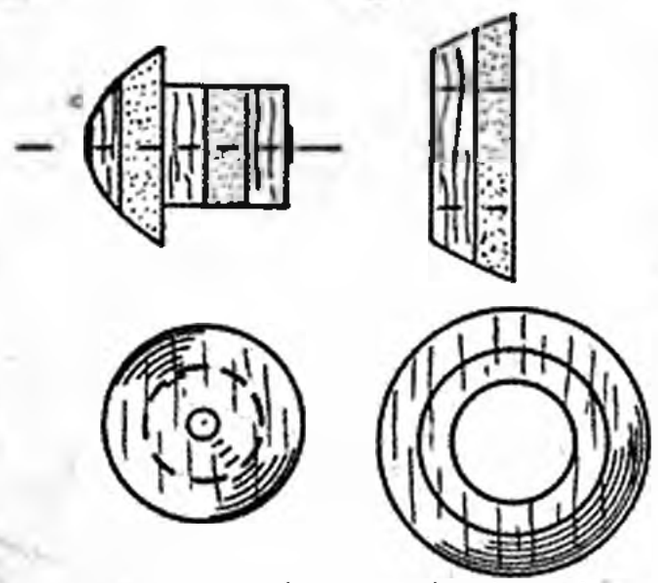
fill-in at rear of rib to form fillet

.028 wire

bamboo



wheel pants detail
center piece 1/4" thick;
sides 1/8" thick



nose plug detail

bamboo pin

.034 wire prop. shaft

freewheel detail

scale

NC 20951

typical tail surface construction

outlines 1/16" sheet

1/2 windshield pattern

stringers are 1/16" sq. sanded smaller

stabilizer position

longerons 3/32" sq.

typical cross section of fuselage

cross pieces 1/16" x 3/32"

section a-a

section b-b

c1

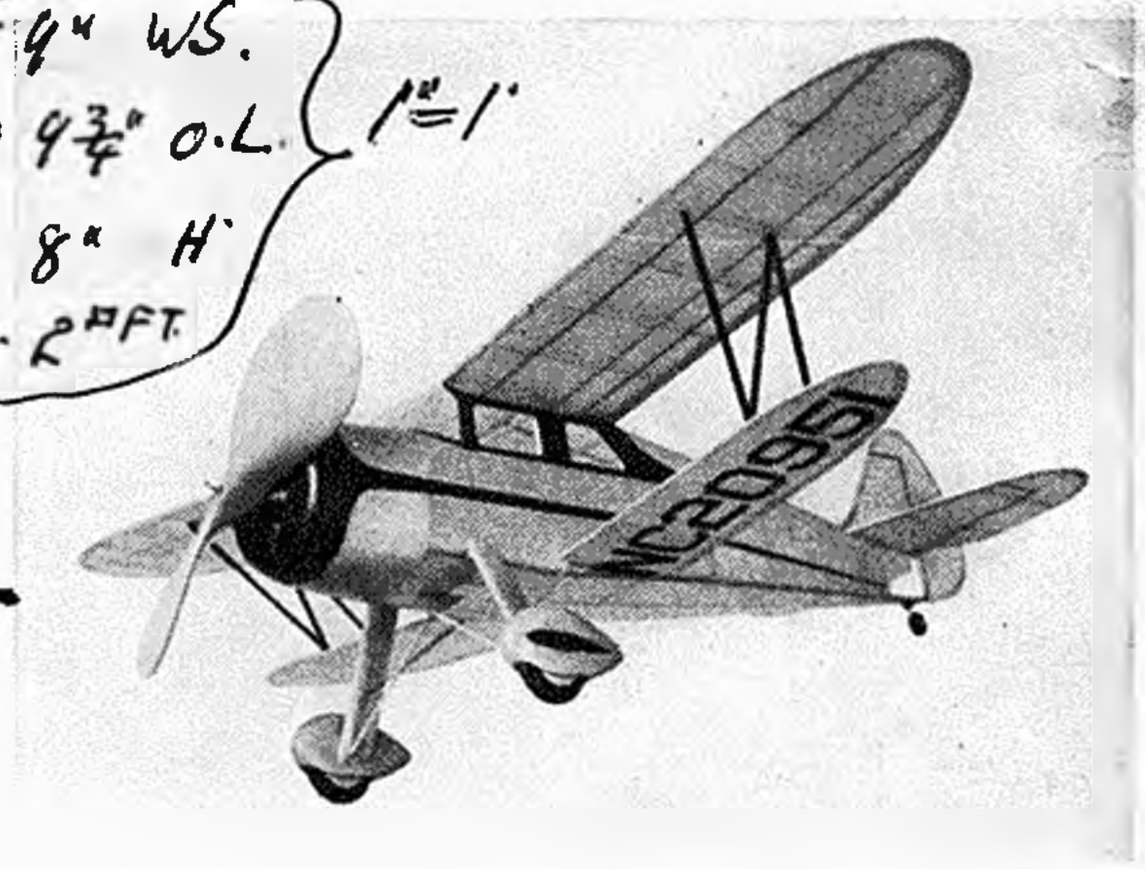
c2

all fuselage formers 1/16" soft sheet

THE WACO E TAKES THE AIR

One of the Most Realistic and Finest Flying Scale Models Ever Designed—A Replica of a Famous Plane

By EARL STAHL



The completed model Waco E

WACO planes are known throughout the world for their fine performance, stamina and distinctive appearance. Newest member of the Waco family of planes is the model "E," a five passenger biplane which is rapidly attaining a full measure of popularity on the skyways of the nation.

Featured in its design is a radical new engine cowling which is an integral part of the fuselage. This eliminates the usual break between the cowling and body and adds to the plane's beauty and performance. A small flap at the bottom of the cowl permits the pilot to maintain any desired engine temperature.

The Waco "E" is available powered with several engines of varying power. The Jacobs engine of 330 horse-power affords a cruising speed of 177 m.p.h. and a rate of climb of 1,170 ft. per min. Fuel stored in synthetic rubber fuel tanks is sufficient for a non-stop flight of 1,100 miles. Electrically operated flaps are employed to slow the speed of landings.

Structurally and proportionally the Waco "E" is an excellent design for a flying scale model. The original proved to be a fine performer; it takes to the air in steep, thrilling spirals and makes flights of over 50 seconds. This model can really "take it," too, for the biplane type of construction is very rugged. Since the size is rather small, it is important that the weight of the various parts be kept at a minimum. The manner of construction is entirely conventional, so little difficulty should be experienced as your Waco takes form.

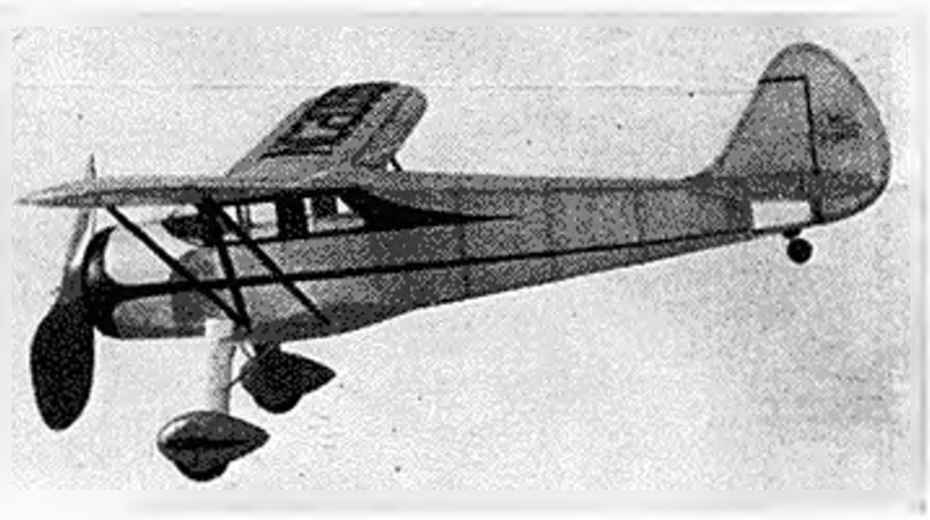
Fuselage

A simple rectangular frame is the backbone of the fuselage structure; it is shown lightly shaded on the plan. Work directly over tracings of the plan and build two side frames, one over the other to make certain that they are identical. Medium grade wood should be used: the longerons are 3/32" square and the uprights are 1/16" x 3/32". Stick pins on both sides of the longerons and cross-pieces to hold them in place until the cement is dry. Separate the frames with a thin razor blade, should they stick together, then invert them over the top view. Cement 1/16" x 3/32" cross-pieces into position at the center of the body and when dry draw the backs together and place the remaining cross-pieces. It will be necessary to crack the longerons in order that they can be pulled into position at the front. Check continually to assure a correctly aligned structure.

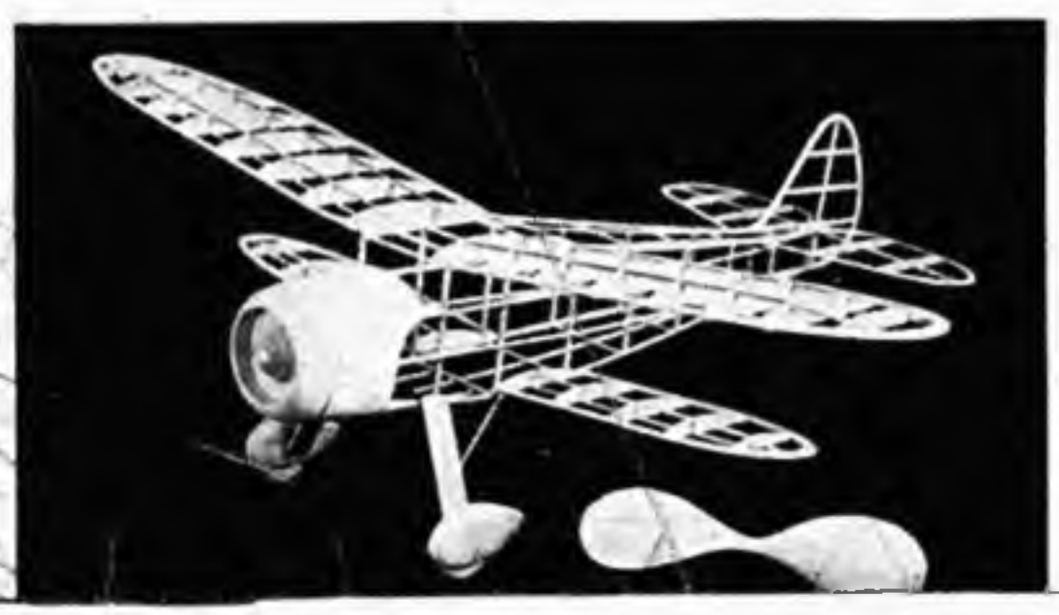
Because of the rather simple structure of the prototype, few fuselage formers are required. The formers are shown full-size on the drawings and they are cut from soft 1/16" sheet balsa. Cut the notches to receive the stringers and then cement the formers to place. From 1/16" sheet cut two top and two lower wing ribs; the shape of these being shown on the side view, first page of plans. Cement the upper wing ribs directly atop the longerons and the lower ones to the sides of the frame, adjacent

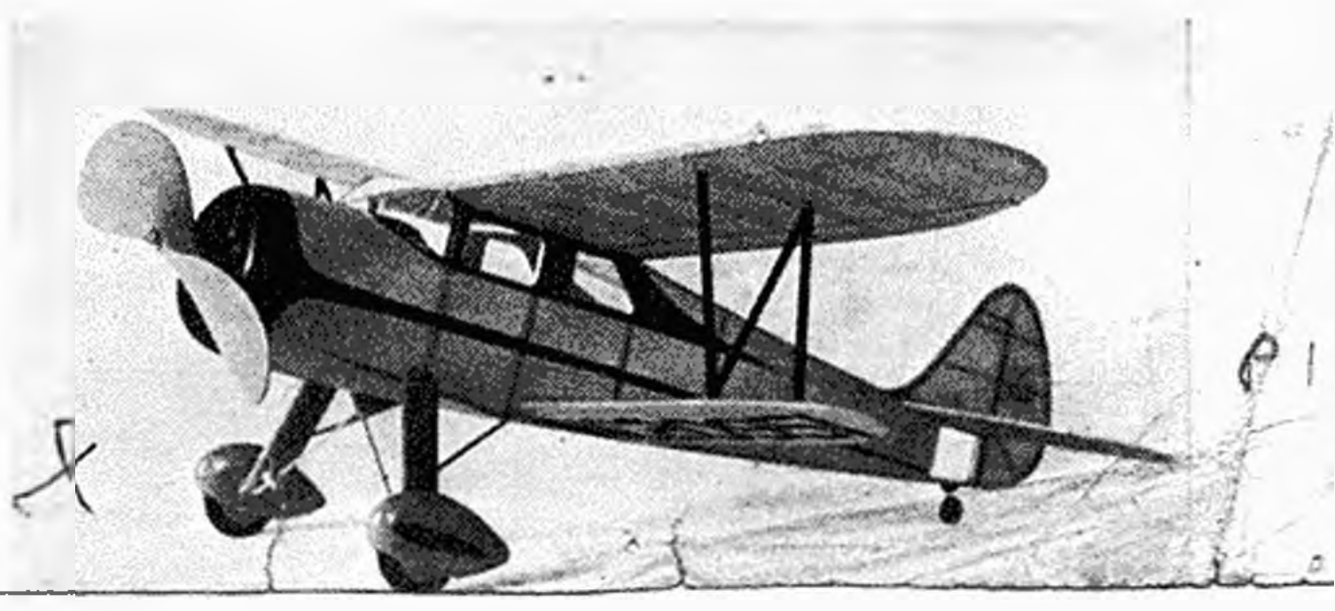
(Continued on page 53)

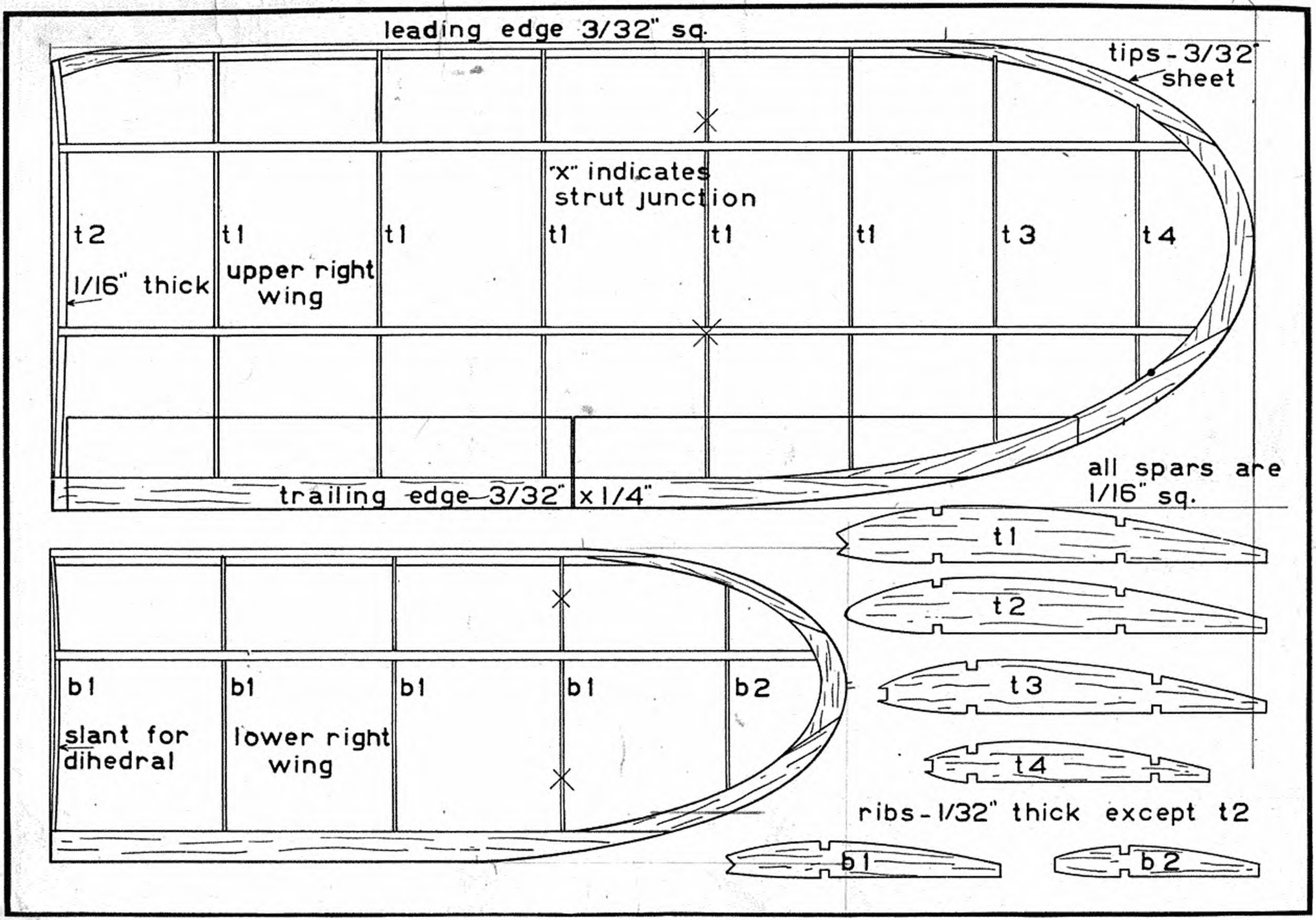
It looks and climbs like a pursuit plane



The construction is light but sturdy



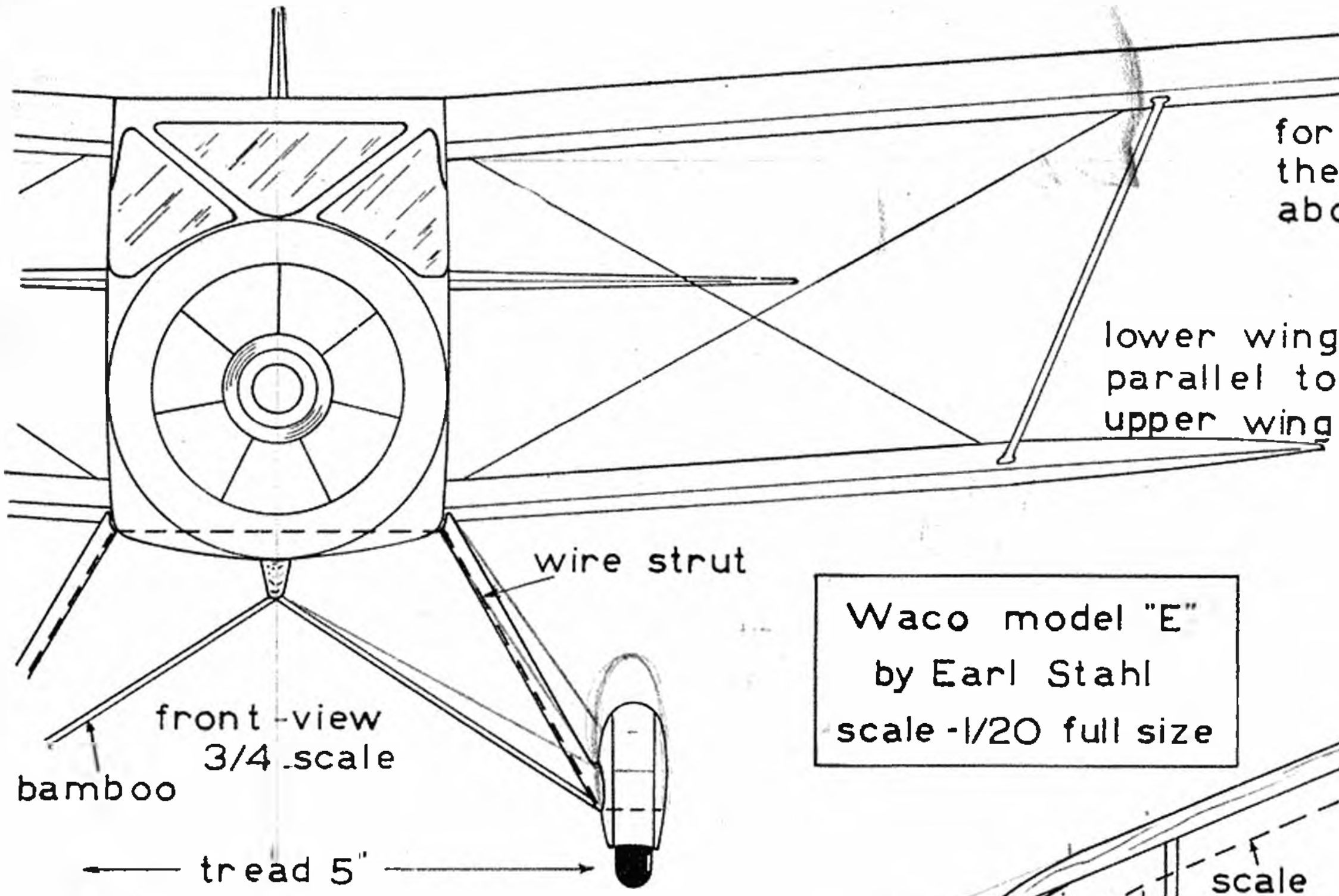


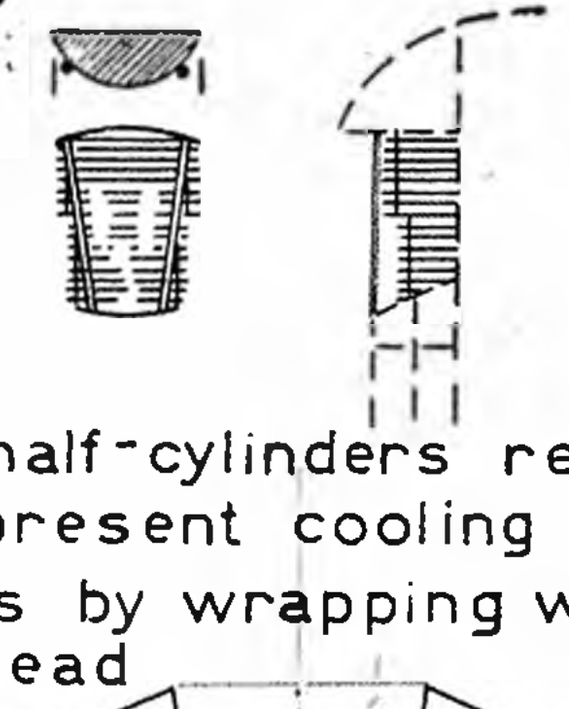

leading edge 3/32" sq.
tips - 3/32" sheet
"x" indicates strut junction
t2
1/16" thick
t1
upper right wing
t1
t1
t1
t1
t3
t4
all spars are 1/16" sq.
trailing edge 3/32" x 1/4"
b1
slant for dihedral
b1
lower right wing
b1
b1
b2
t1
t2
t3
t4
ribs - 1/32" thick except t2
b1
b2

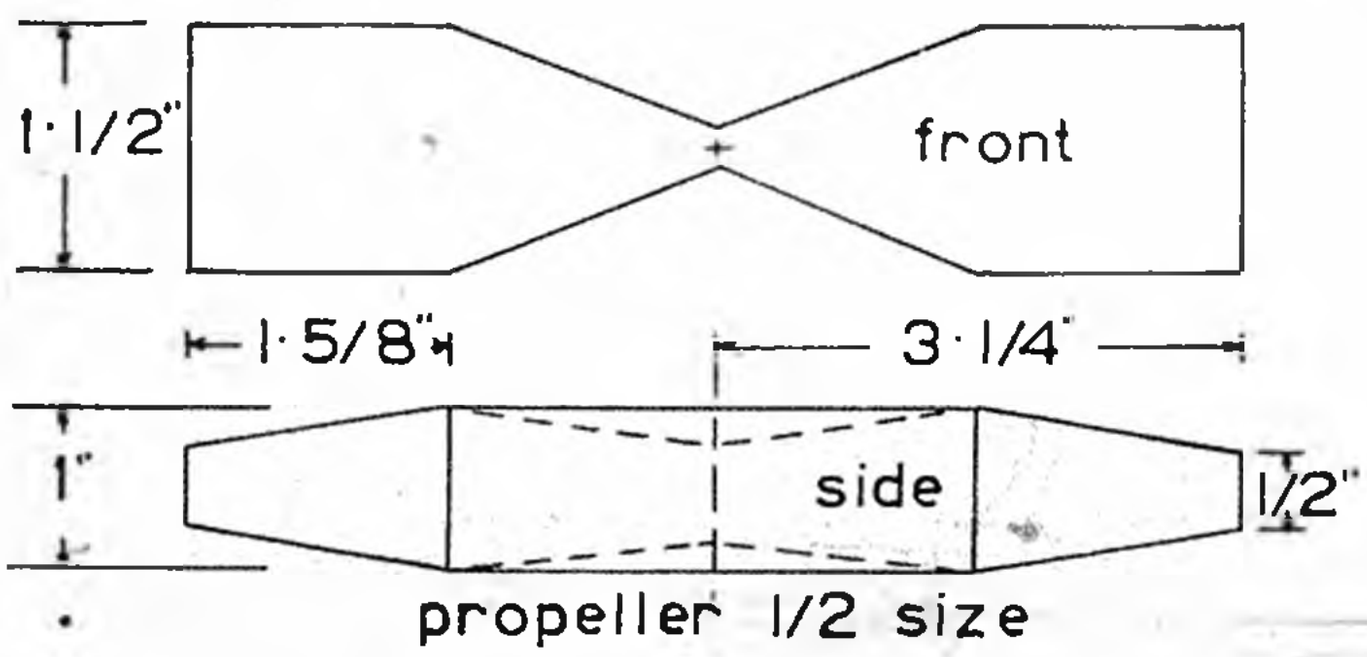
Waco model "E"

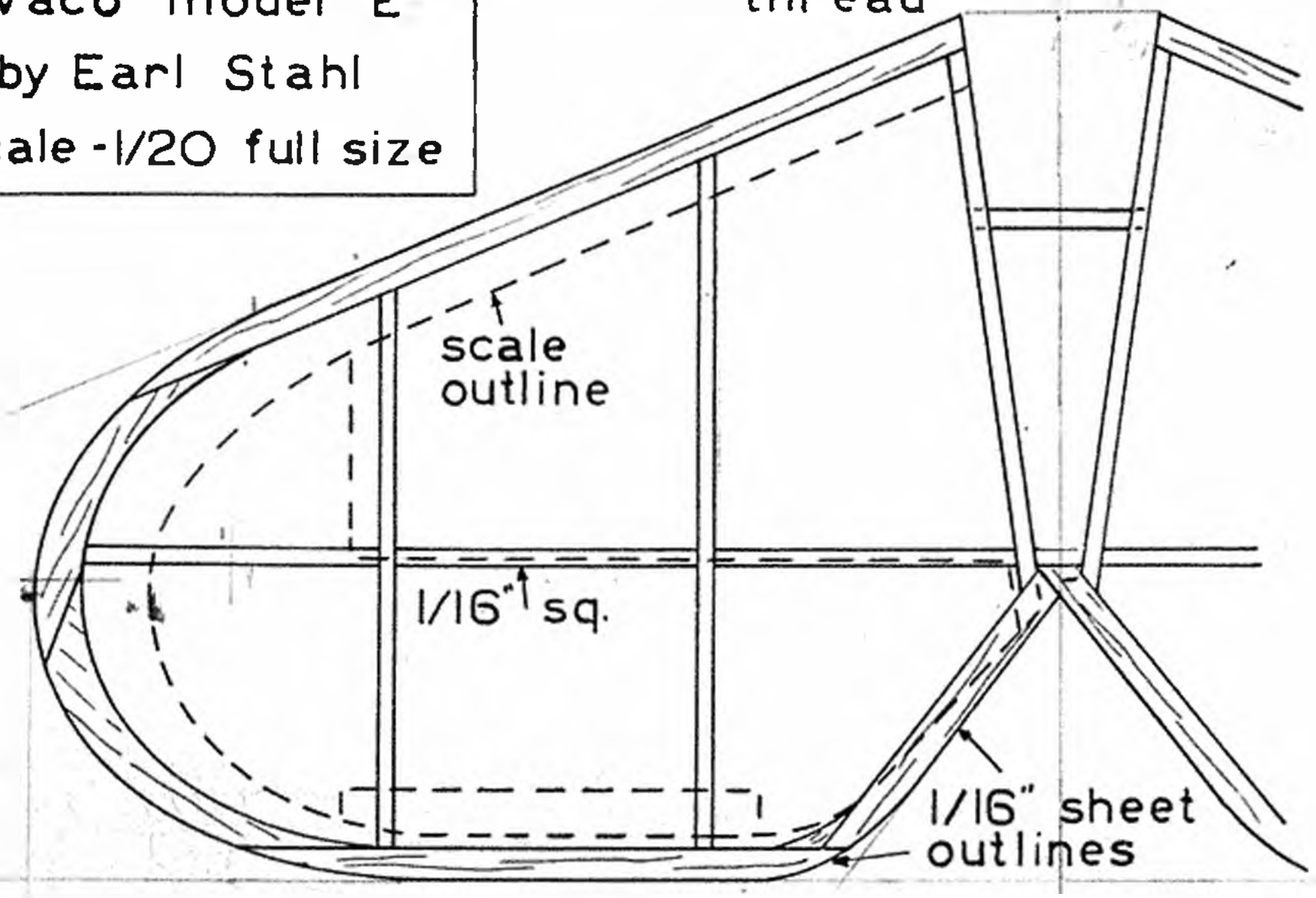
by Earl Stahl

scale - 1/20 full size









Chapter 2—Article 12

By

CHARLES HAMPSON GRANT

FUNDAMENTALS OF MODEL PLANE DESIGN

How to Design Your First Power Driven Model Plane—Laying Out and Drawing the Structure

SO FAR in designing your first power plane, four steps have been taken in the procedure. They were outlined in the preceding article; the last one being "The Establishment of the Aerodynamic Proportions of the Plane."

The next step, No. 5, deals with laying out the design of your plane in the form of outline drawings, embodying the proper aerodynamic proportions. This may be done in three general steps:

First, the material to be used in each part should be decided upon. Second, the general arrangement should be worked out, and, third, details may be put in.

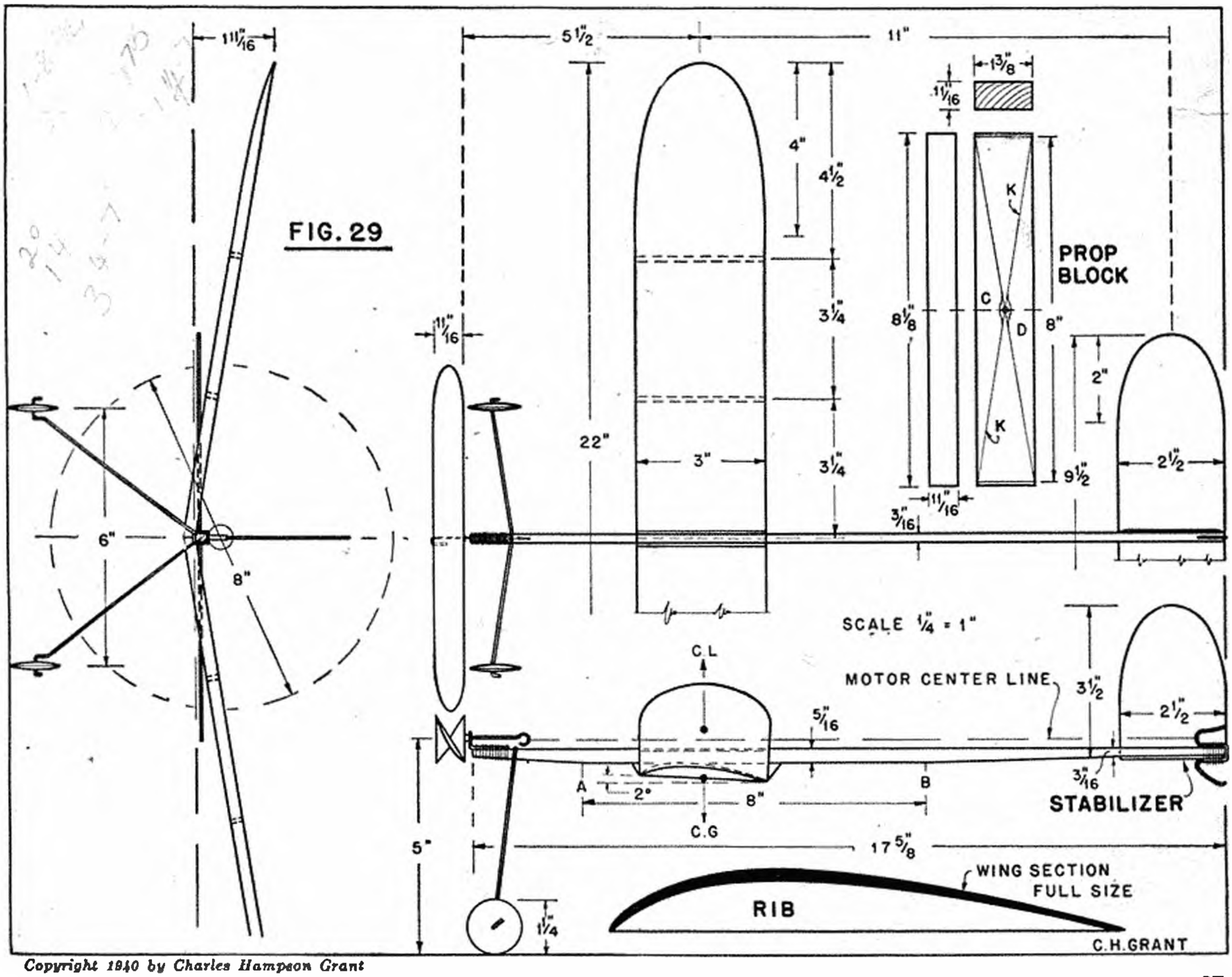
You will find that it will be less work to write out the general structural specifications for the ship before you start the actual lay-out. This will prevent confusion and changes which may be required if you start to make your drawing before you have the complete details of the ship's structure well in mind.

Start with the wing. The size of this has been established. As the ship is to be of simple construction and involves as little complication as possible, it will be well to make the wings of sheet balsa rather than of complicated framework with paper covering. This sheet should be 1/16" thick of medium weight. The final thickness should be about 3/64", the extra thickness should be allowed for sanding. It will be best to have six ribs that will provide the proper curvature. Two of these will be at the center, one on either side of the crease which forms the dihedral, and two distributed at proper distances between the center of the wing and each wing tip. Proper dihedral of such a wing can be made by cutting it at the center and gluing the two halves together, the two center ribs butting up against and being cemented to one another.

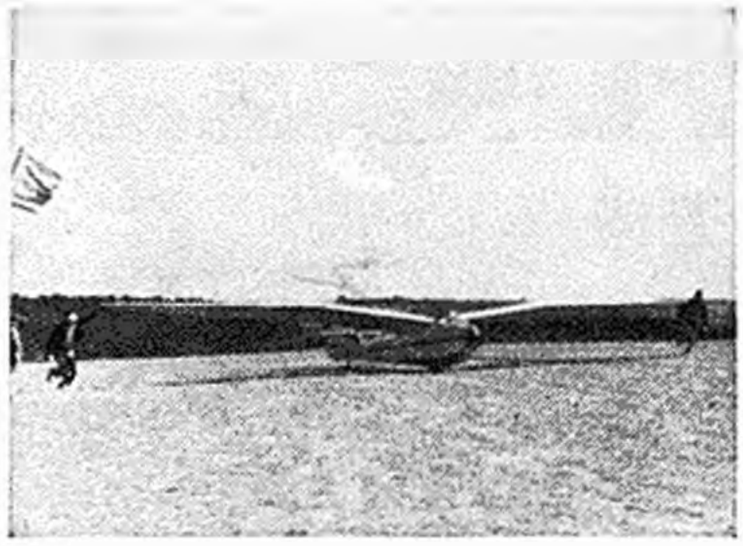
The motor stick should be made of balsa, to the under side of which the wing will be attached. An attachment of some kind must be provided. A satisfactory arrangement is a small balsa block glued to the upper side of the wing at its center, the top of which will be raised up against the under side of the motor stick.

The tail surfaces will also be made of sheet balsa. This part of any airplane should be made as light as possible as this improves its stability. It also tends to

(Continued on page 40)



The soarer [illegible] to go with [illegible]

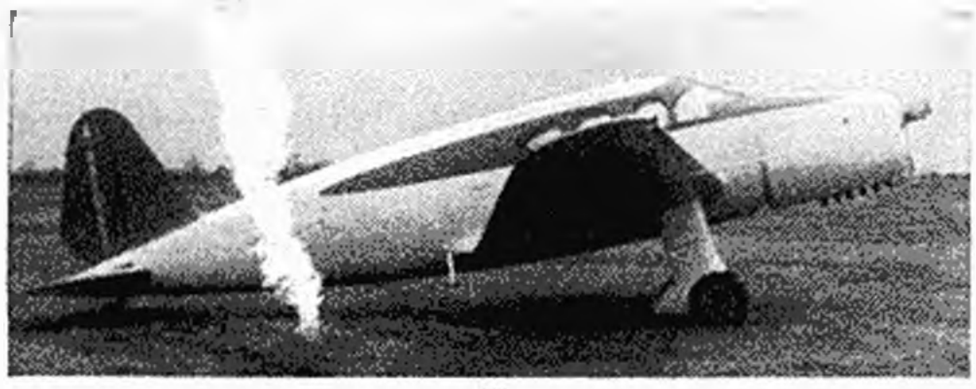


The signal flag waves and the glider starts with the pull of the tow-line

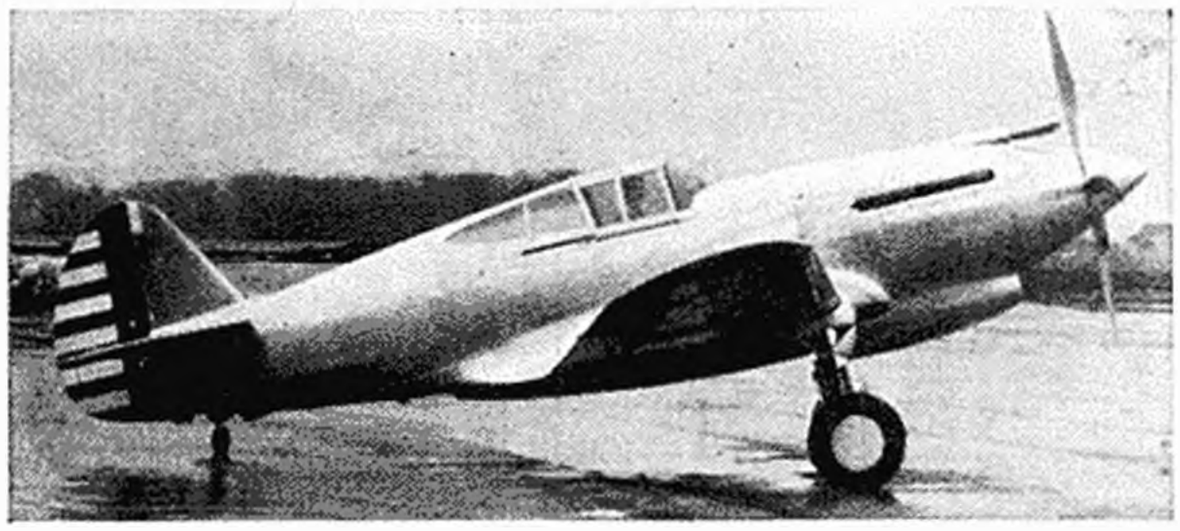
Flying speed has been attained and the ship zooms off the ground for a noiseless flight

FRONTIERS

ONCE . . . a soaring pilot . . . If you have ever conversed with a soaring pilot you will have detected the extraordinary enthusiasm for the sport, and if you cannot soon enough you yourself will be immersed in his thoughts of riding a thermal, silently and gracefully, hour after hour. The soaring pilot will always point out to you as many of the merits of soaring as time will allow and if you "hang" around he will have you believing that sailplanes could be used as silent bombers in wartime and could make hops across the Atlantic. Well, they probably could. However, we ourselves, think soaring is the greatest sport in the world today, and the spirit of the pilots now in the game will make the future of the sailplane a prosperous one.



The Soaring Society of America is now well organized on the West Coast, and under the untiring work of Stan Hall those in that section of the country now have their own publication, "The Thermal," which improves in quality every month. It contains news of the society's activities and helps to "keep things stirring." The soaring pilots design and build their gliders and sailplanes in most cases, and there is now enough business for sailplane manufacturers, notably Briegleb and Bowlus. All this activity means new sailplane designs by both the amateurs and the professionals. Bowlus has produced a new "Super Albatross" similar to the "Baby Albatross" with the tail on a long boom. This new creation has been designed for high speed which makes it adaptable to thermal soaring, whereas the low-wing-loaded ship with slower speed is more proficient at slope soaring. It is said that the new Bowlus lands at about 40 m.p.h., and thus the pilot must pick out his landing spot well in advance.

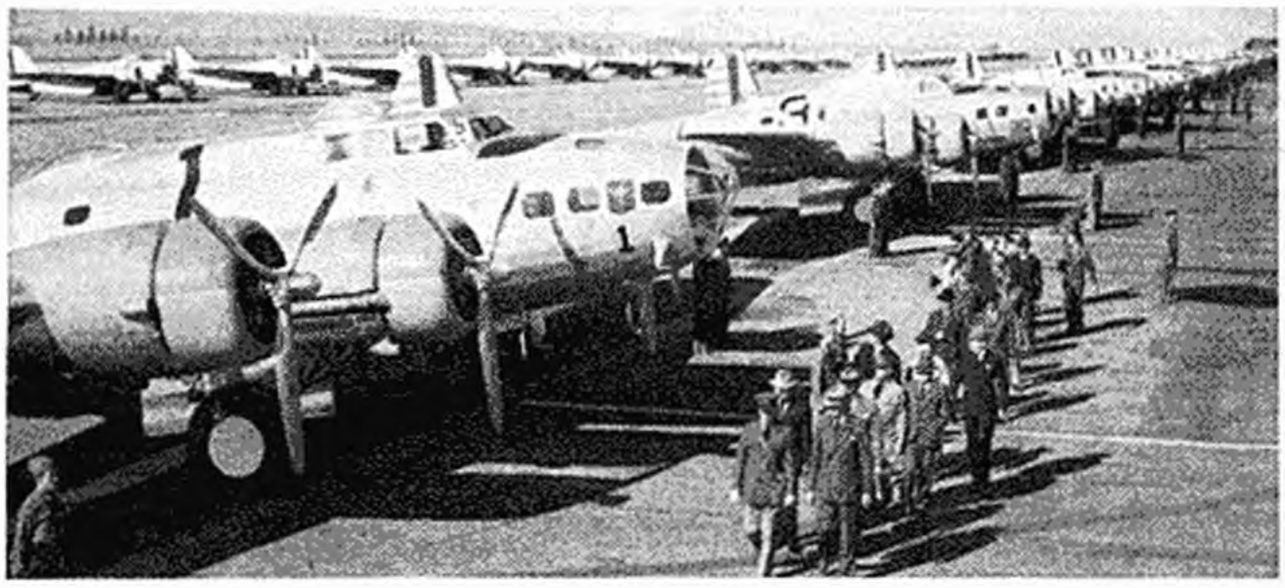


The new Fairchild - Duromold Aircraft Co. 200 m.p.h. moulded Bakelite plane

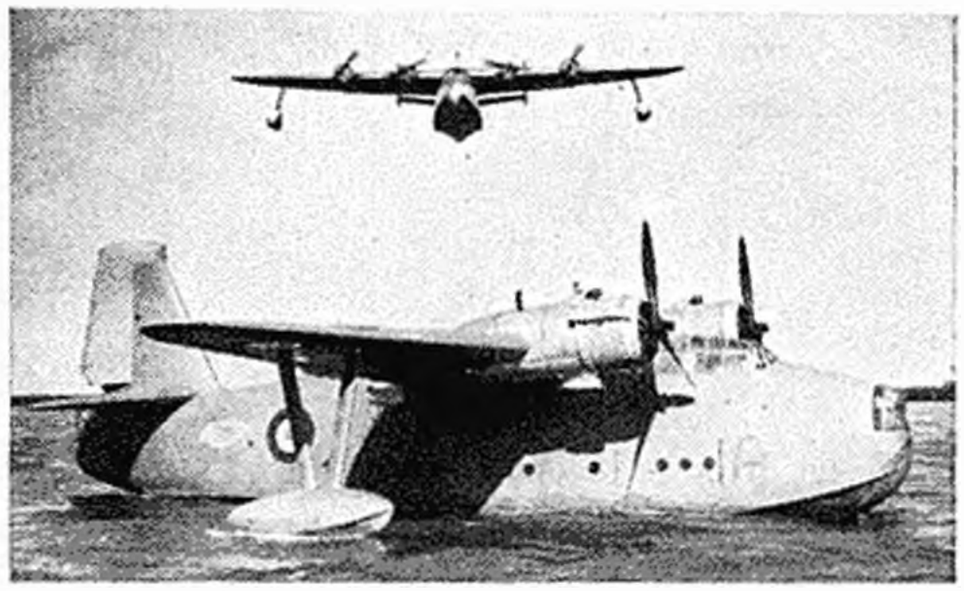
The new 400 m.p.h. Curtiss P-40 which has just been released for shipment to France

One of the most promising sailplanes now in the construction stage is Stan Hall's seventh creation which he has designed and is building himself. Here are the specifications: Span 47′ 10″; Wing Area— 178 sq. ft.; Aspect Ratio—12.5:1; Length—21 ft.; Height—51 in.; Weight—300 lb.; Airfoil (constant)—NACA 4412; Angle of Incidence—3 deg.; Twist (Geometrical)—4 deg.; Aileron

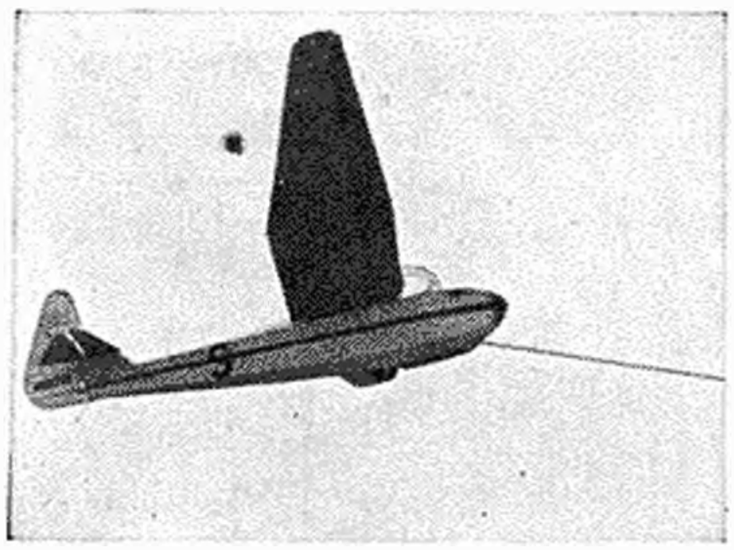
The Blohm & Voss "138" long-range seaplane being used by the Germans for patrol work



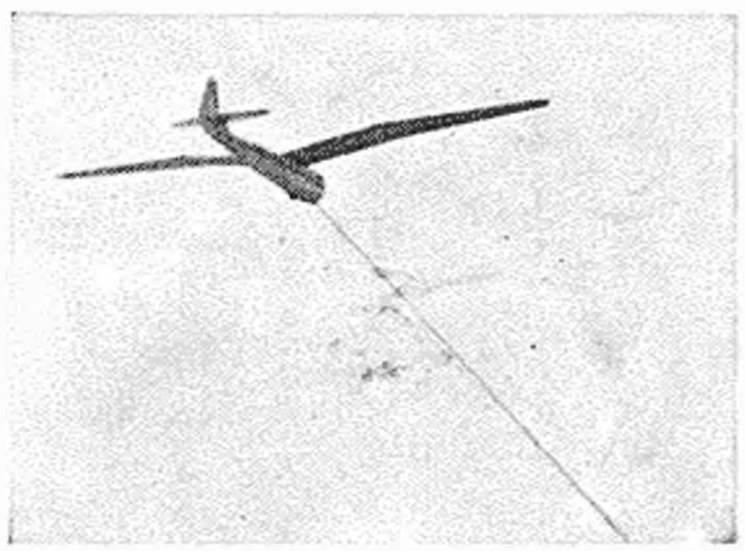
A Congressional delegation inspects U.S. Army bombers and facilities at March Field. In front are 4-motor Boeings, in the rear, Douglas



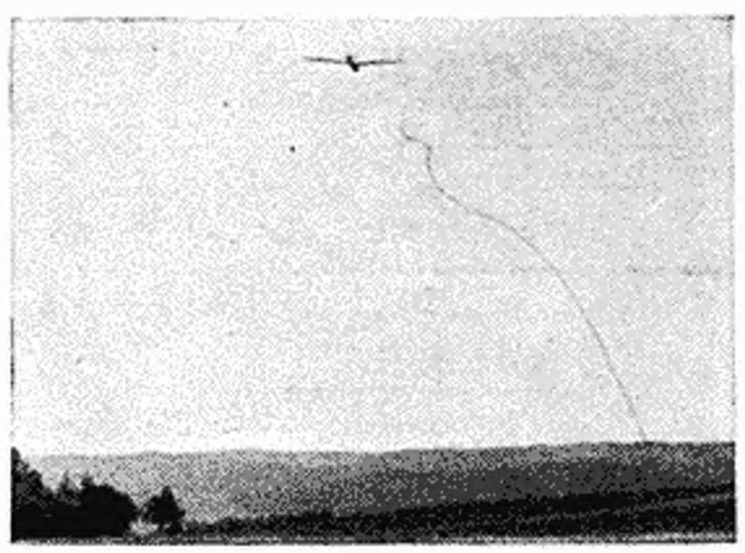
A scale model with 90 hp. engines of a huge flyng boat flies over a British "Lerwick" on its test flight



Gaining altitude rapidly after the take-off. The tow-line is clearly visible



The soarer is about ready to release the tow-line, having gained altitude



The line is cast off and the plane is "on its own" looking for thermals

BY ROBERT C. MORRISON

Range—20 deg. up, and 10 deg. down.

Named the "Apache," the sailplane is of the intermediate type and conventional in appearance with v-strut braced high wing. The four-degree geometrical twist is designed into the wing to provide good spiral stability in steep turns and ailerons are differentially controlled to time with twist. The wing is of two-spar "I" beam, all-wood construction with double drag wire bracing outboard of strut attachment and single bracing inboard. Of interest is the high positive angle of incidence of the wing of four degrees, but this is not extraordinary as sailplanes of recent design have had seven degrees, such as Bob Stanley's noted design. The thin NACA 4412 airfoil section has been chosen to provide light weight construction, speed and slow and smooth stall characteristics. The wing has a design factor of eight for high angle of attack and will be wired for navigation lights. Spoilers are provided and so positioned on top of the wing in order that they will not interfere with the air flow around the ailerons and elevators. These diminish the "floating" characteristics of the sailplane when it is desired to land in a small field. Even at speeds of around 90 m.p.h the spoilers may be lifted flat into the wind (with slot at bottom to provide laminar flow over airfoil) should the pilot desire not to go into a "tempestuous" cloud that may suddenly loom up ahead of him. Raising the spoilers in such a manner literally stops the sailplane, and it goes into a smooth spiral away from the cloud.

In the leading edge of the wing is located a 12 pound, 5 meter radio (transceiver) for short range work with an antenna rod projecting vertically from the top of the wing.

For thermal flying it is best to design a sailplane with a long fuselage to maintain good spiral stability as more turning is done than straight-away flying. The smooth contour nose of the fuselage houses the pilot with the seat adjustable as a bed. Thus at the end of a long distance flight the pilot can rest while waiting for the trailer crew to come and transport the sailplane back to the home base which may be several hundred miles away. It is very likely in this instance that the pilot may have to sleep in his ship all night in the prairie lands until transportation has arrived. For this reason food will be carried in a locker under the floorboards as well as baragraphs when making an official attempt at the endurance or long distance records. In the baggage compartment are disassembly tools and mooring equipment.

The control column extends from the dashboard and is of the wheel type which has proven better than the stick type for long distance flying because only a wrist motion is necessary to move the ailerons. Oxygen brackets will be provided for the installation of tanks for high altitude soaring. Stan Hal emphasizes the importance of static balance, perhaps more so than aerodynamic balance, in the design of a sailplane and in his new "Apache" he will have tanks installed in the nose and stern of the fuselage of five pounds capacity of water interconnected with piping; thus nose heaviness or tail heaviness may be corrected by means of pumping the water from one tank to the other as desired with a hand pump provided in the cockpit.

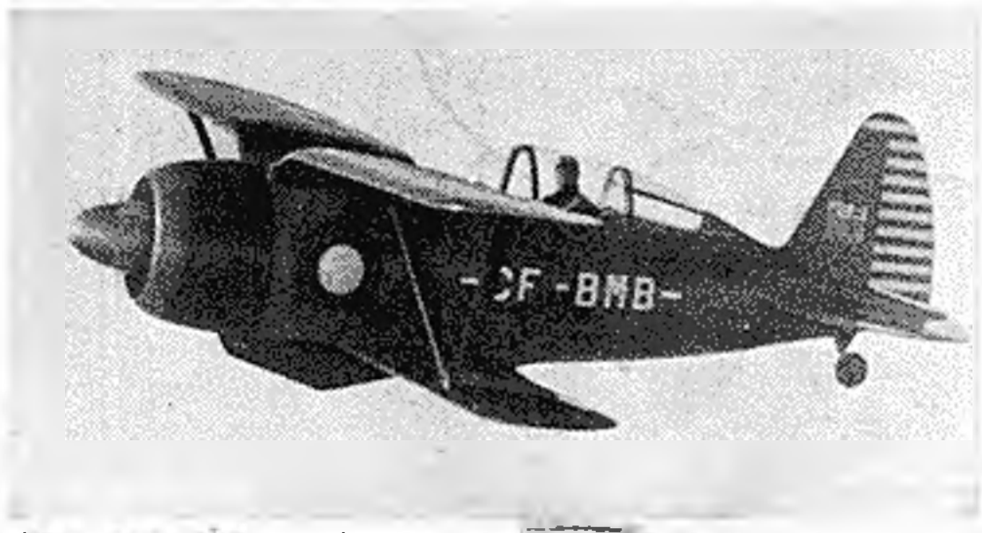
The rudder and fin stays with the fuselage, but the elevators and stabilizer may be removed for transportation to the take-off point. Only two pins are required to hold the horizontal surfaces in place on the fuselage, and the entire sailplane, including the mounting of the wing may be assembled and ready for flight by two or three men in four minutes! A symmetrical airfoil and box beam spars are incorporated in the tail design. Plywood leading edges are provided.

Instruments consist of the following: Clock, Airspeed Indicator, Rate of Climb Indicator, Turn and Bank Indicator, Compass, Altimeter and Free Air Thermometer (Warns of icing conditions). The venturi tubes for operating the gyro instruments are retractable and a hand pump is also installed to provide necessary vacuum.

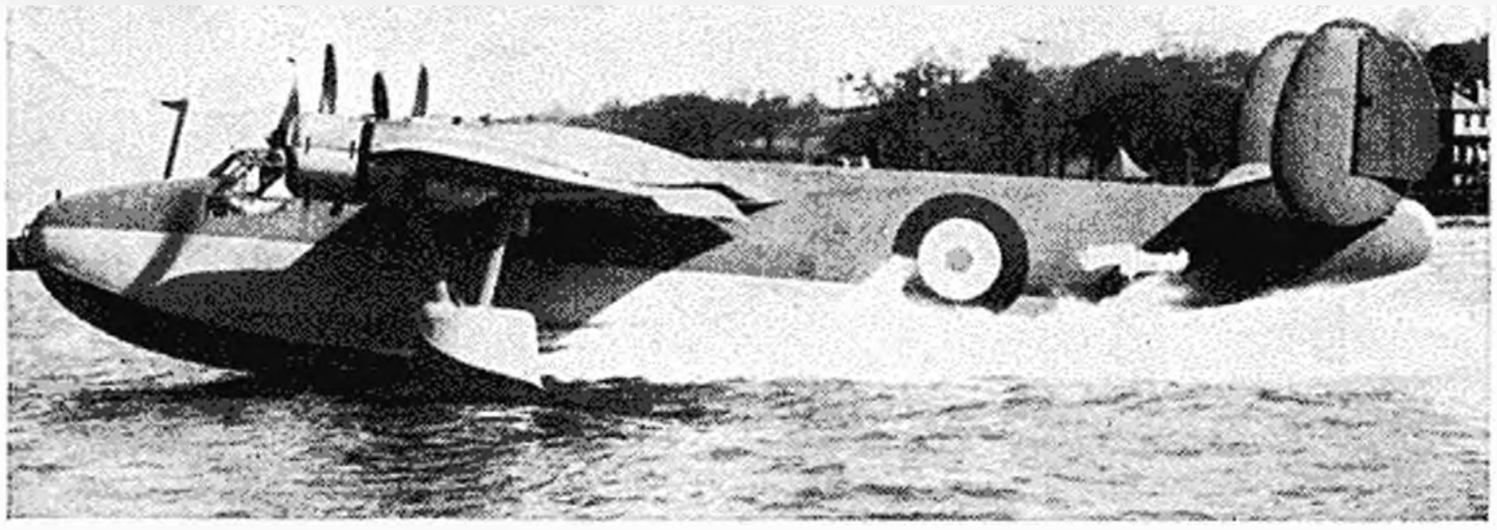
The color chosen for the "Apache" is yellow because it stands out better in the air. During soaring meets several sailplanes may be riding the same thermal together. Just before this article was written

(Continued on page 62)

A new Japanese plane that is making a 36,000 mile round-the-world flight



The new 290 m.p.h. Canadian Car and Foundry single-seater fighter, FDB1, lands at 57 m.p.h.



The man-carrying "model" of the new giant, on the water

CLASS "D" STICK

WING AREA - 200 Sq. IN. WT. 7 OZ.
SCALE - 4"=1' EXCEPT WHERE NOTED.
DESIGNED BY JAMES MOONAN

BAMBOO

2"

4"

THE WING IS BUILT IN ONE PIECE. THEN CUT IN 3 SECTIONS AND CEMENTED

HINGE FOR FOLDING PROP.

1/8" SQ.

1/8" x 7/16"

WING RIB 1/16" SHT.

FULL SIZE

1/8" x 1/2"

4"

4"

PROP. BLOCK SIZE 2 1/2" x 1 3/4" x 16"

BAMBOO

2"

1/16" SHT. FILL IN

1/8" SQ.

2"

FILL IN

1" 1" 1 1/2" 1 1/2"

1/16" x 1/8" x 7" BAM.

RUDDER TIP & TR. EDGE 1/16" BAMBOO

1/8" SQ.

1/8" x 5/16"

1/16 SHT.

1/8" x 1/2"

1/8" SQ.

STABILIZER RIB FULL SIZE

1/16" x 3/16"

5 3/8"

1 3/4"

1/8" SHT.

4 5/8"

WING IS MOUNTED 5" ABOVE THRUST LINE - INCIDENCE +2°

NO DOWN THRUST
SLIGHT RIGHT

FUSELAGE 36" LONG BEST TIME 18 MIN. POWER 18 STR. 1/4" BROWN RUBBER

A CLASS "D" STICKER

A High Performance Plane for Contest Flying

BY JAMES NOONAN

THOUGH this stick model was built from the remains of other models, it has proved to be better than any other similar job the author has ever constructed. Its flight is characterized by a rocket-like climb and a very slow, flat glide; a folding prop and low drag giving it these qualities.

The plan is quarter-size so the first thing to do when starting construction is to draw a full-size layout of the wing, fuselage side, rudder and stabilizer. The method of constructing the various parts follows:

WING: 5" chord, 42" span. Cut the full size pattern of the wing rib from the plan and cement it to a strip of metal, cut from a tin can. Cut it out carefully and file smooth. Punch two holes in the template with a nail. This causes the tin to form burrs which stick to the sheet balsa and permit the making of perfect ribs without sanding. Cut twenty ribs from 1/16" medium sheet balsa. Assemble the wing on a flat surface and when dry sand the leading and trailing edges smooth. Bend the tips from a thick piece of bamboo and cut off the tips as you need them. Cut the wing into three 14" sections and cement to the proper dihedral angle. Reinforce the scraps of 1/16" sheet at the joints of the main spar.

The sticker with propeller folded

Cover the wing with the grain of the

(Continued on page 35)

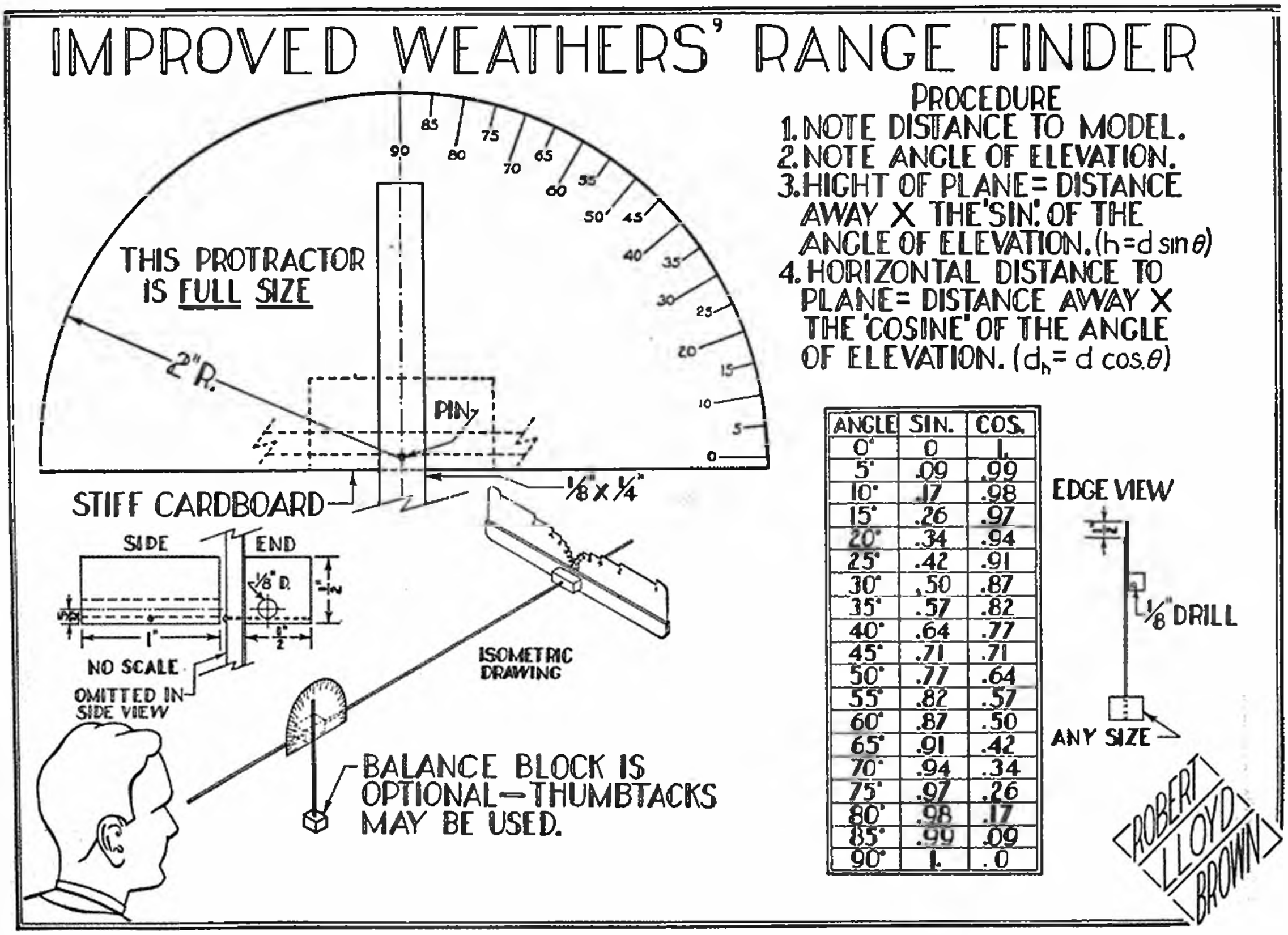
An Improved Range Finder

BY ROBERT L. BROWN

SOMETIME ago it occurred to the writer how much more complete and effective gas model range finder instruments would be if some means were provided by which the angle between the horizontal and the wire support could be measured. If that angle could be found it would be extremely simple (multiplying one or two digit number times another one or two digit number) to find either the altitude at any angle of elevation (not necessarily overhead) or the distance along the ground (horizontal distance) that the plane has traveled. The theory behind the procedure, which is trigonometric in nature, has been reduced to a minimum. The only adherence to trigonometry was in the use of the words "sine" and "cosine" which were only used for lack of any better names. The writer feels that the procedure stated in such a simple manner may be more easily absorbed and comprehended by the reader.

Practical application of this idea showed that the swinging protractor is extremely simple to make. Trace the protractor on moderately stiff cardboard: marking the arc at five degree intervals and placing a dot at the pivot point or center of the semicircle. Glue a 1/8" x 1/4" stick to

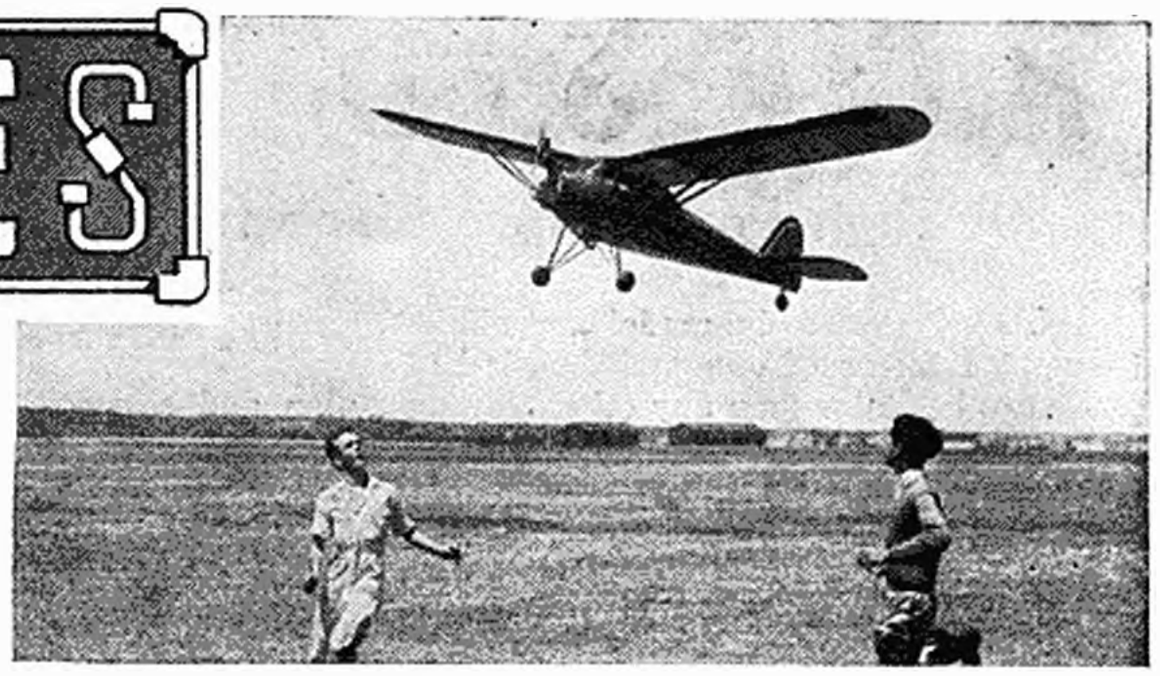
(Continued on page 52)



ANGLE	SIN.	COS.
0°	0	1.
5°	.09	.99
10°	.17	.98
15°	.26	.97
20°	.34	.94
25°	.42	.91
30°	.50	.87
35°	.57	.82
40°	.64	.77
45°	.71	.71
50°	.77	.64
55°	.82	.57
60°	.87	.50
65°	.91	.42
70°	.94	.34
75°	.97	.26
80°	.98	.17
85°	.99	.09
90°	1.	.0

GAS LINES

Gas Model News From All Parts of the World



Pict. 2. Orin Anderson's 13 ft. twin motor plane in flight

MANY young men have taken up model building and flying as a pastime, for the thrill it will give them. These have made it a hobby to help them relax in leisure moments from arduous business responsibilities. Still others, of a more serious turn of mind, have made it an instrument of research in aviation; using models as a means to obtain specific information which will be of help in the development of new ideas. Ideas that will improve production and operation of large airplanes.

Pict. 3. The unique motor mountings on Anderson's plane. One motor is set slightly ahead of the other

Another farsighted group has made model designing, building and flying a primary instrument of education. It has foreseen the possibility of a career in aviation, or of a future need for aviation in which to combat possible aggressive foe. With the rapid trend of events at the present time, aviation is not only a vital part of our economic life as a means of transportation, but will undoubtedly decide whether or not this country retains its freedom in the future. If we would exist it is essential that our young men have a thorough understanding of aviation principles; these principles to act as a foundation for an active part played by them in this great industry.

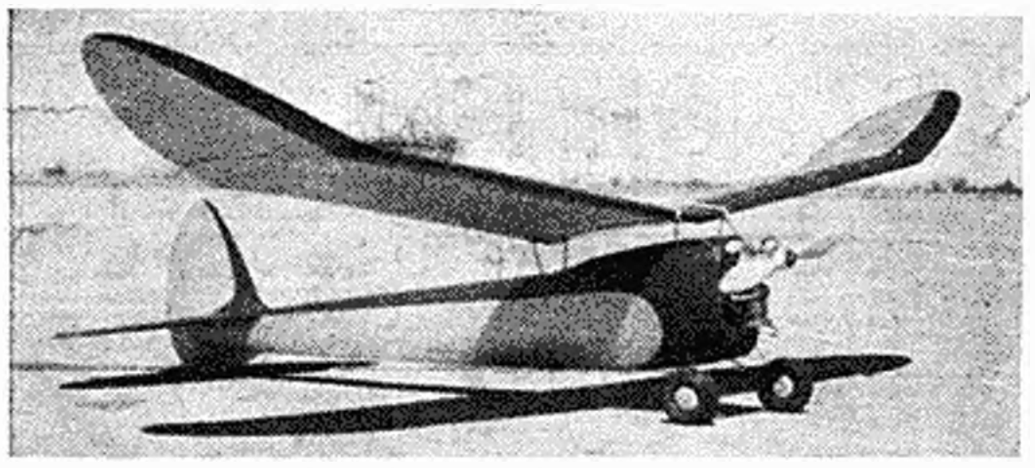
It has been the object of MODEL AIRPLANE NEWS to provide complete information which would be helpful in this respect and which will incorporate the search for aviation knowledge by all who may be interested in model planes. Events of the present day are proving that this effort has not been in vain, for approximately 300,000 model builders now have a knowledge of aeronautics who otherwise would have been entirely ignorant of such matters and consequently deficient in their ability to carry on.

When one realizes how the model airplane can contribute to large aviation and the knowledge of those who participate in it, one is forced to look upon it with greater significance.

All Eastern Championship Contest

When news arrives that the All-Eastern Championship Contest is to take place in a short time, most of us are bound to realize that the gas model season is well under way. This is the first big event which takes place in the East; sort of an "Eastern Nationals," and a preamble to the National Competition held in July. This contest is sponsored by the S.S. Kresge Company of Newark, New Jersey and MODEL AIRPLANE NEWS, and will be held at Hadley Field, N.J., on June 15th. The meet will be divided into two groups, junior and senior, with six places in the senior event and three places in each junior event. Also there will be three places for a pre-determined flight event.

It is expected that the 1940 contest will eclipse the 1939 one, because many of the aviation industries in this locality are cooperating whole-heartedly to make this meet a success. Among those who will donate trophies are: The Casey Jones School of Aeronautics, Hobby Lobby, Scientific Model Airplane Company, Breeze Corporation, as well as the

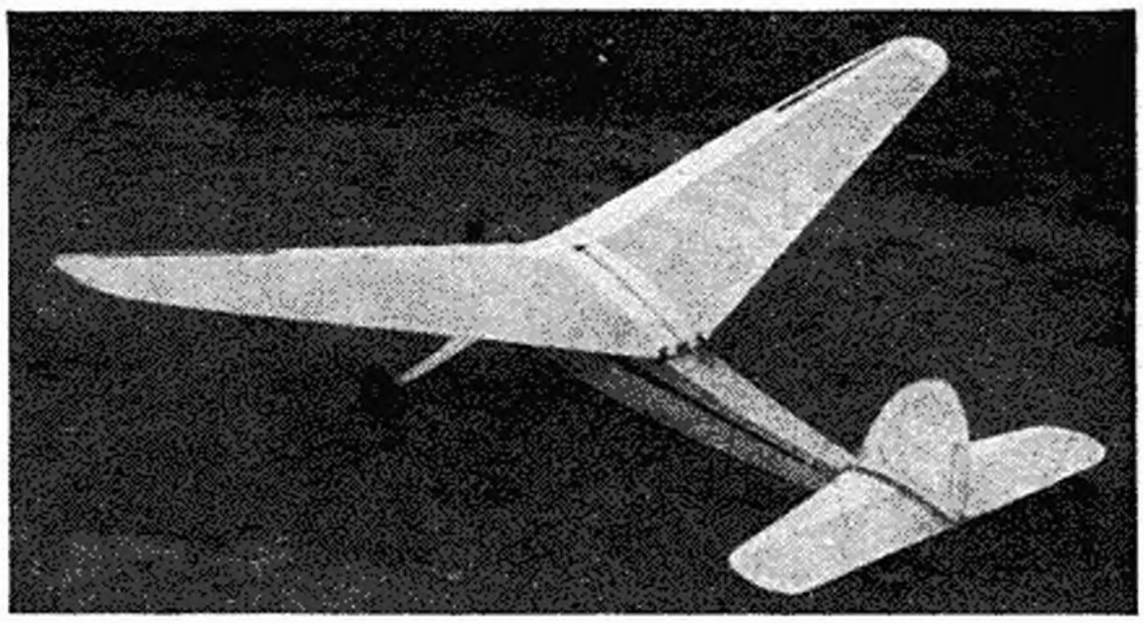


Pict. 6. A ship of perfect aerodynamic design by Rod Doyle

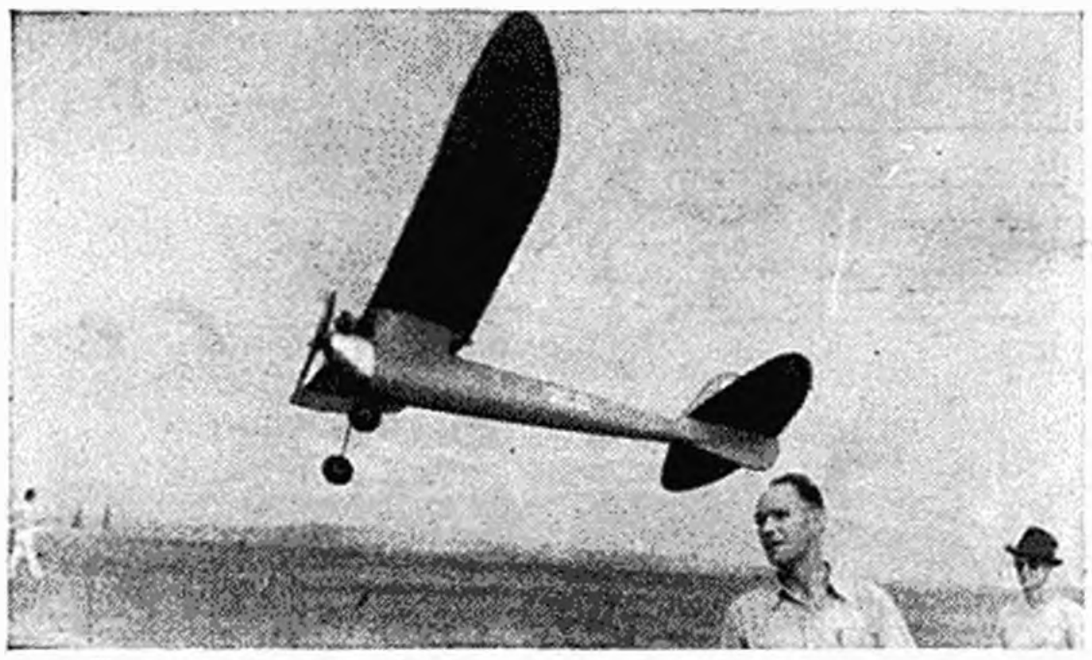
Pict. 7. A fine example of simple construction. The fuselage is tubular

Pict. 8. Ralph Collman's scale Berliner-Joyce biplane; a neatly built craft of 6 ft. span

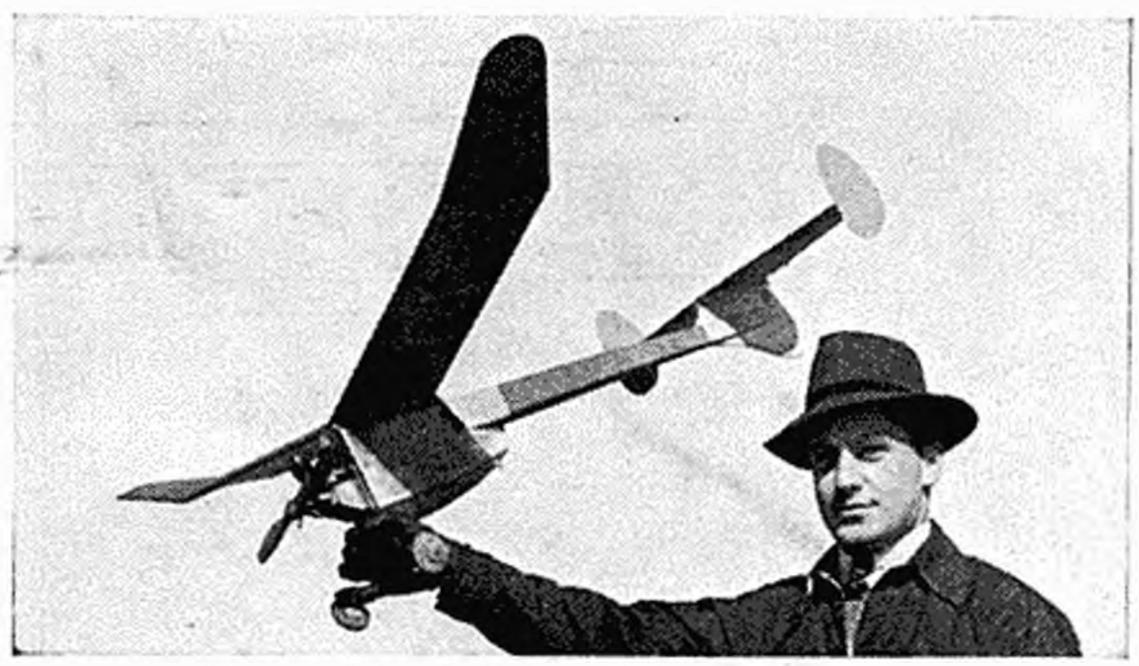
Pict. 9. A. J. Kinast and his twin cylinder motor plane



Pict. 10. A slotted wing model by Lt. Col. Bowden of England



Pict. 4. Percy Oldershaw watching his KGS glide in



Pict. 5. John Ogilvie with his flying Tadpole

S. S. Kresge Company. The Kresge Trophy will be the grand award. This company will also pay the Pullman fare to the Nationals for the winner. Many other awards will be given, such as model motors, kits and silver plaques. At least 300 contestants are expected. At the field there will be a headquarters tent and roped-off areas for spectators and contestants. New take-off runways, designed to NAA specifications, will be provided. At past contests as many as 3000 people have attended, and contestants are expected to be on hand from all states along the eastern seaboard.

If you have not sent in for your registration blank, apply immediately to the Aero Club, Kresge Department Store, Newark, New Jersey. The meet will be directed by Messrs. Charles Hart, Ben Shereshaw, Leon Shulman and Charles H. Grant. Many new designs of gas models will be tried out, so do not fail to be on hand with yours.

Picture No. 1 shows an array of the trophies and prizes at the 1939 contest. This year there will be larger ones and twice as many—so get your entry in!

We have some interesting comments from Carroll Moon of 473 East 9th Street, Brooklyn, New York, who writes:

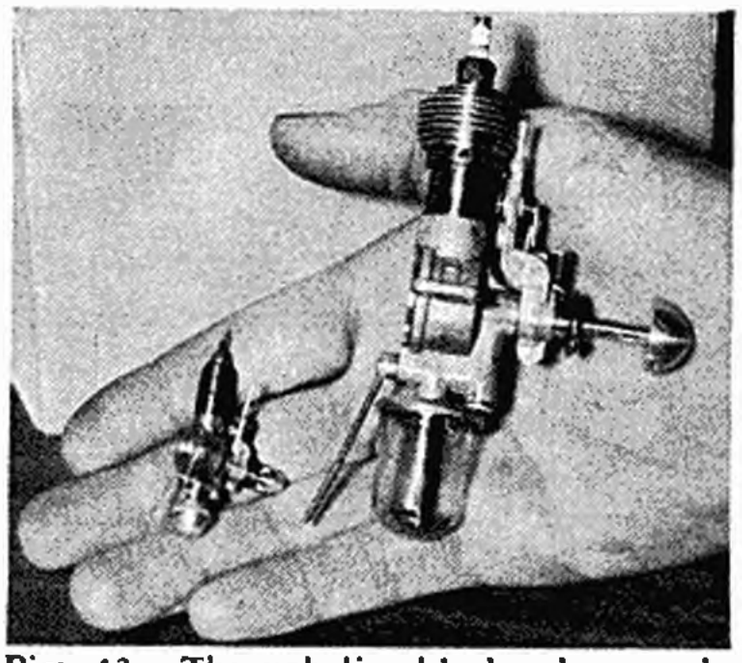
So You Have to Add Weight?

"The country-side is knee deep in young men, holding their 1939 gas models in one hand and a crying towel in the other. Now the poor builders have to add weight to their 1939 planes and in so doing will go way over the eight-ounce minimum rule — Oh the sadness of it all.

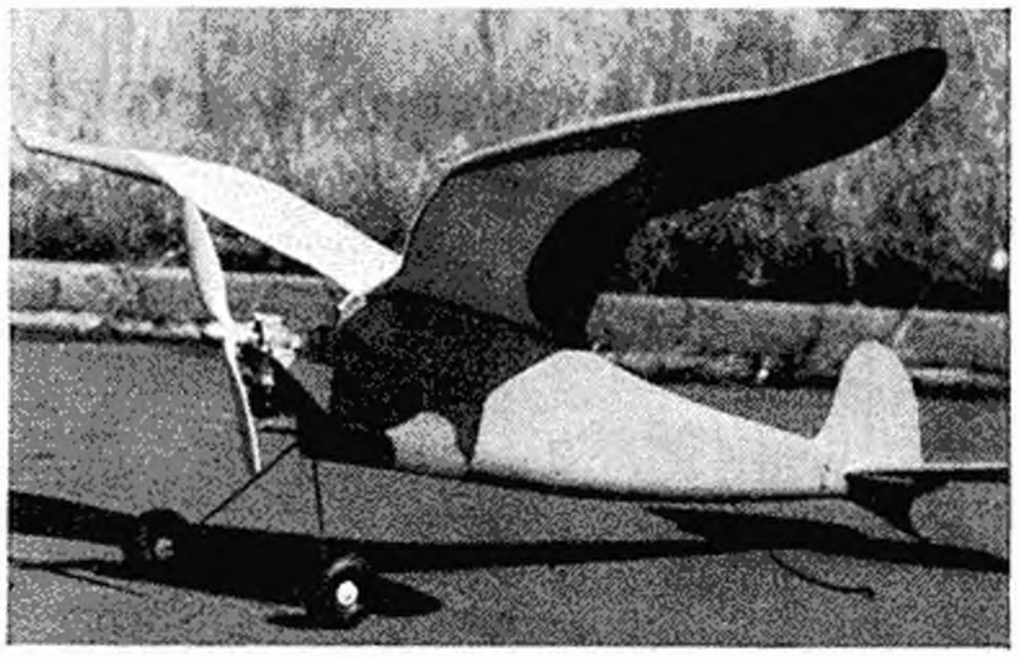
"First, let's make this clear: Nearly all ships which make records are around the ten-ounce-per-square-foot rating, when actually weighed and checked as to exact area. Heavy ships really fly once they get up there . . . and do a much better job than the light ships, as they are steadier and more dependable.

"Let's look at the records: Gordon Murray, of the Brooklyn Sky-Scrapers Club, set a 1940 gas model record on Sun-

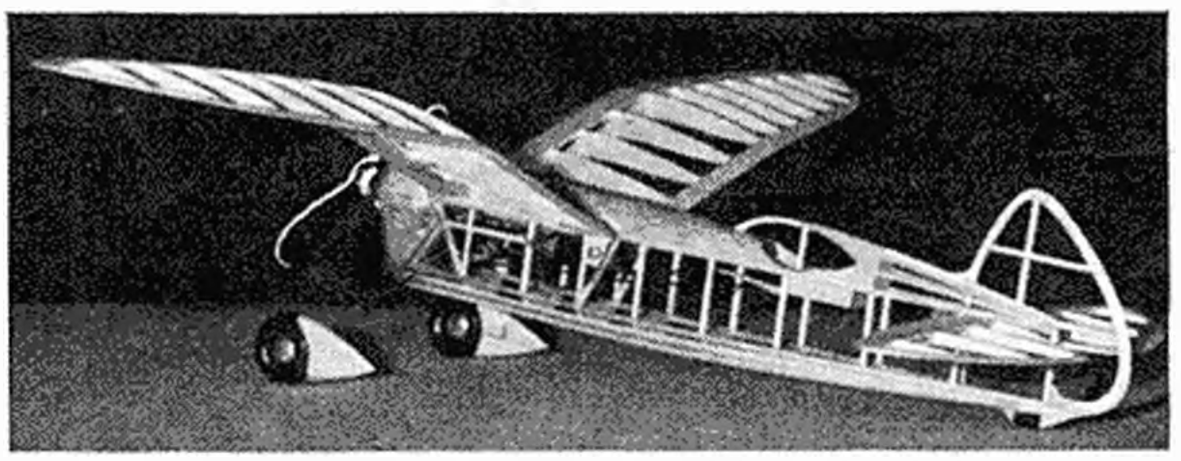
(Continued on page 66)



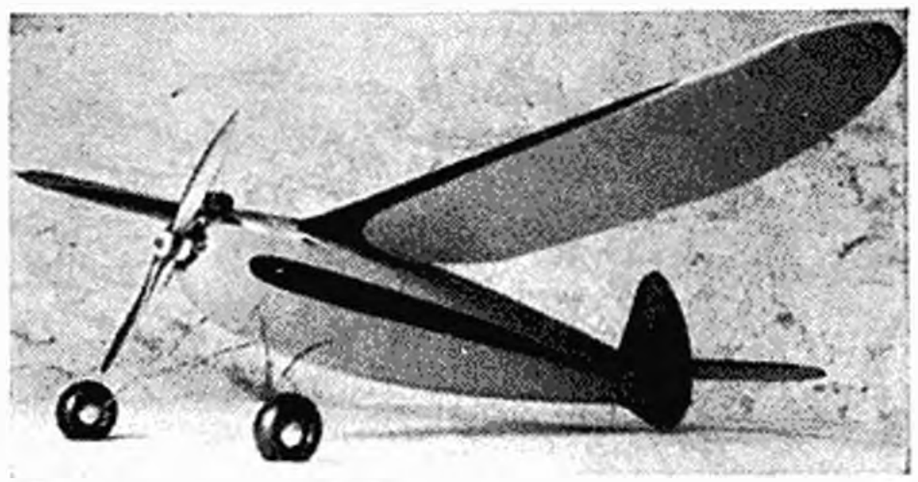
Pict. 13. The unbelievable has happened: Note the size of this motor beside an "Atom"



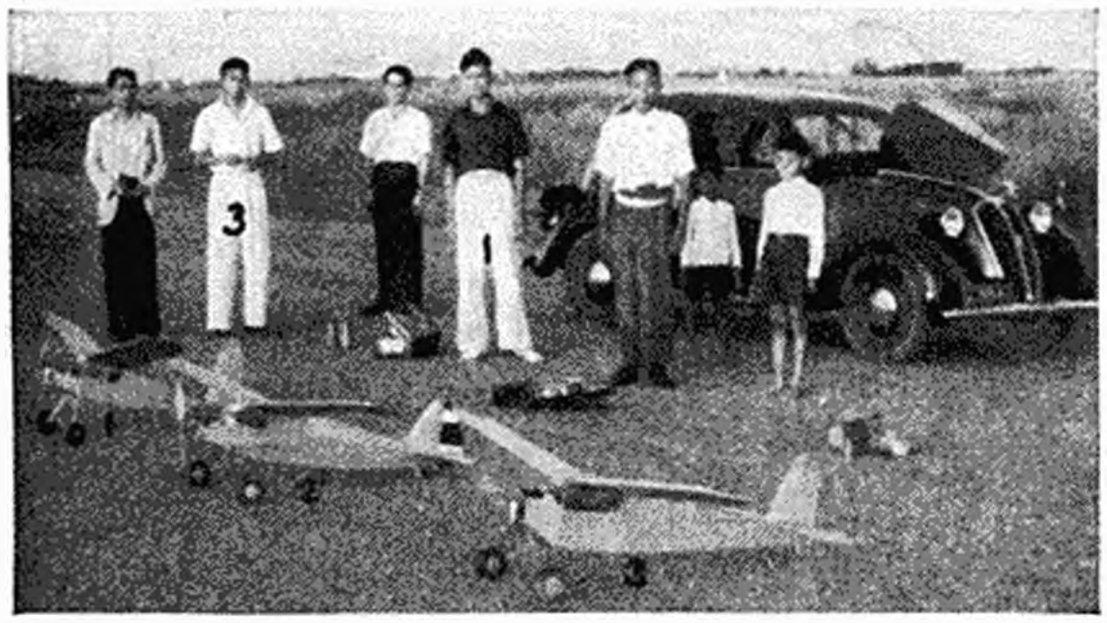
Pict. 12. Speaking of mechanical birds—here's a real one that's a first place winner. (By A. Hoopengarner)



Pict. 14. A gull wing racer of beautiful design



Pict. 15. A fine flying ship by Robert Gurney in which streamlining has been effected to a high degree



Pict. 11. Model builders and their planes in far-off Siam

Pict. 1. Prizes given at the 1939 All Eastern States Contest

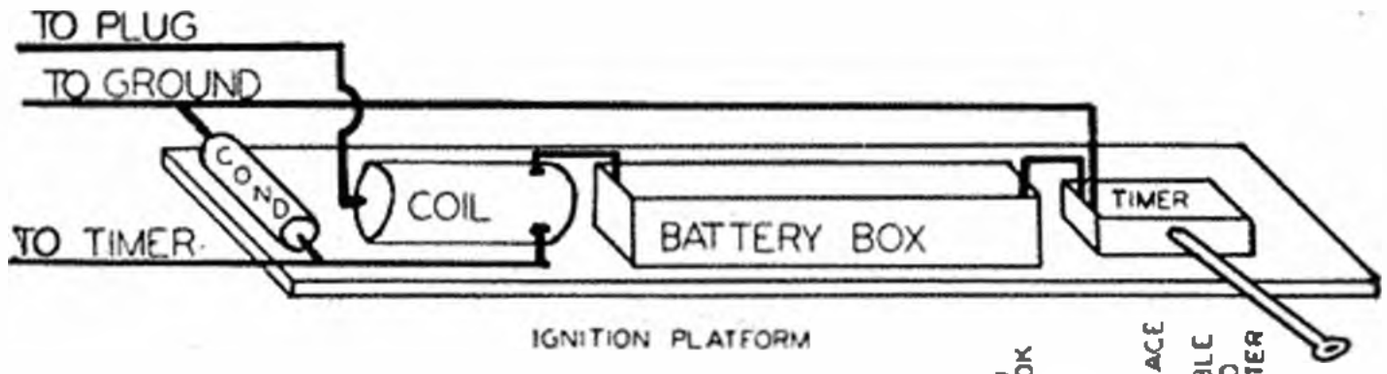
"SKY-SCRAPERS"

DRAWN BY LOU ORTOLANI.

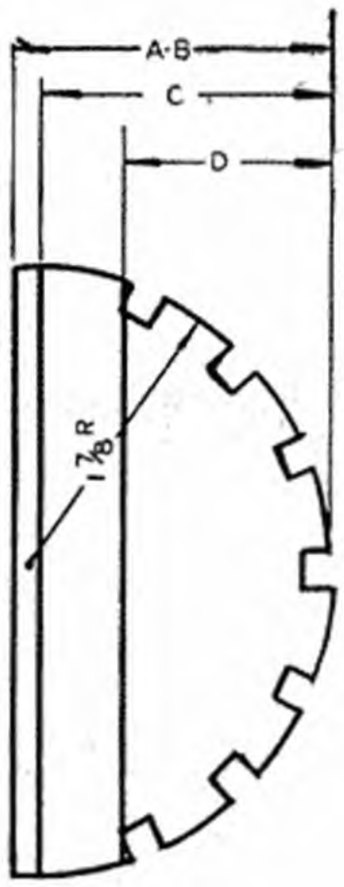
DESIGN BY SAL TAIBI.

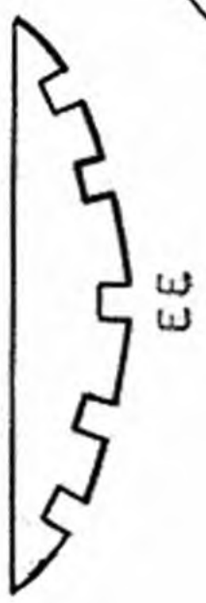
THE HORNET

PLATE ONE



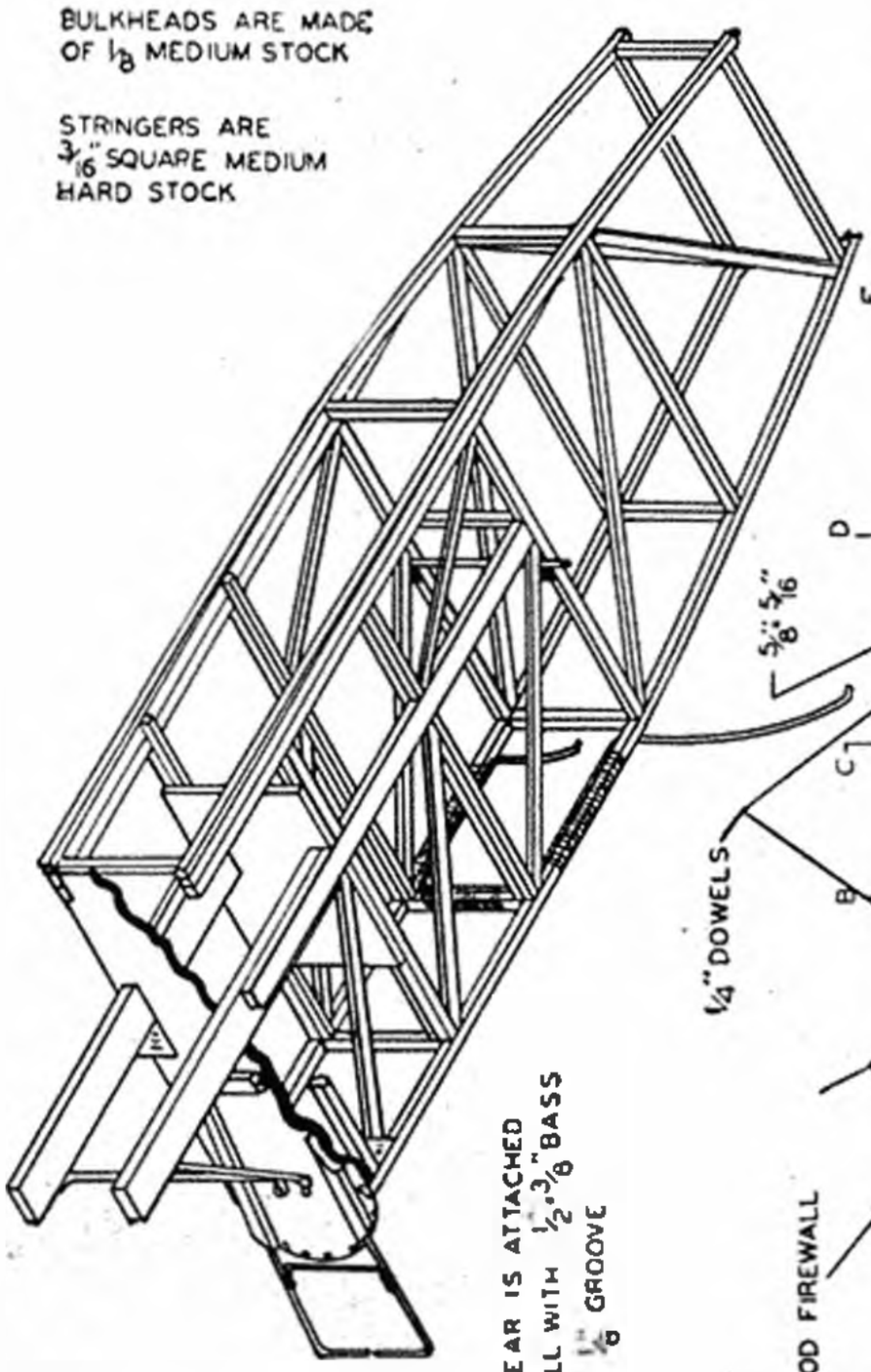
IGNITION PLATFORM



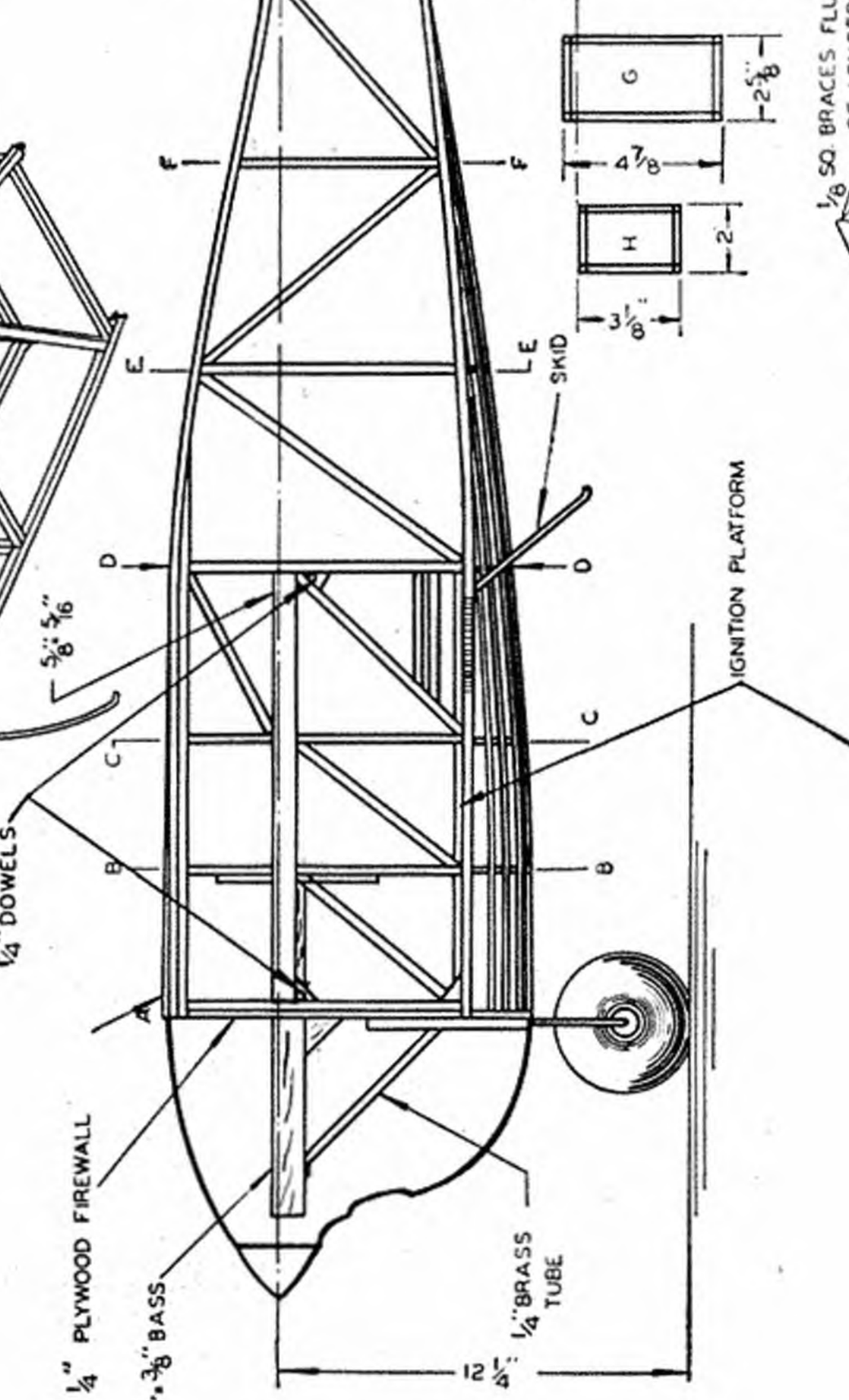


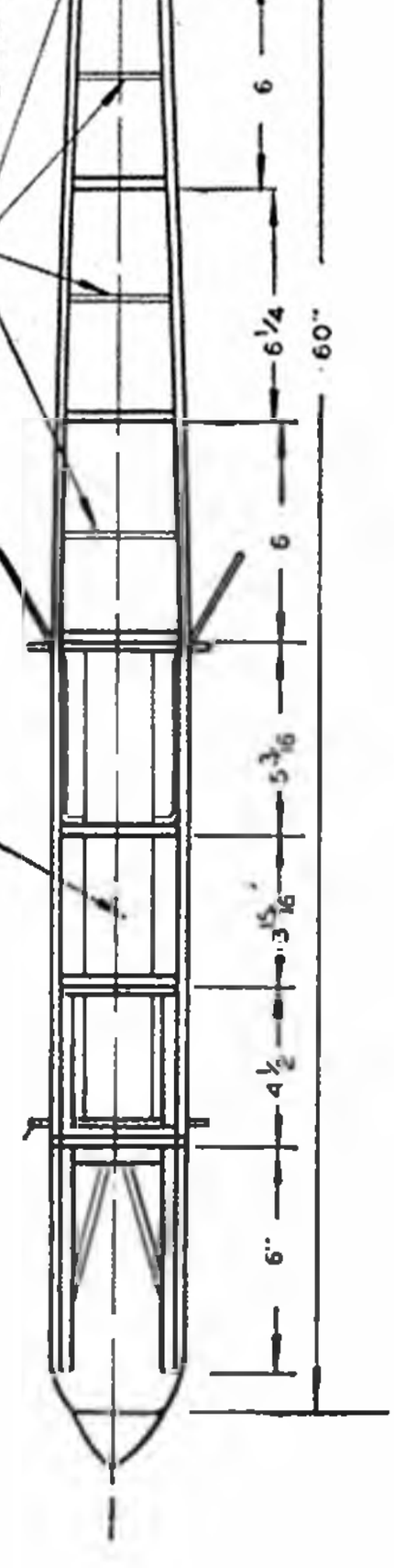
BULKHEADS ARE MADE OF 1/8 MEDIUM STOCK

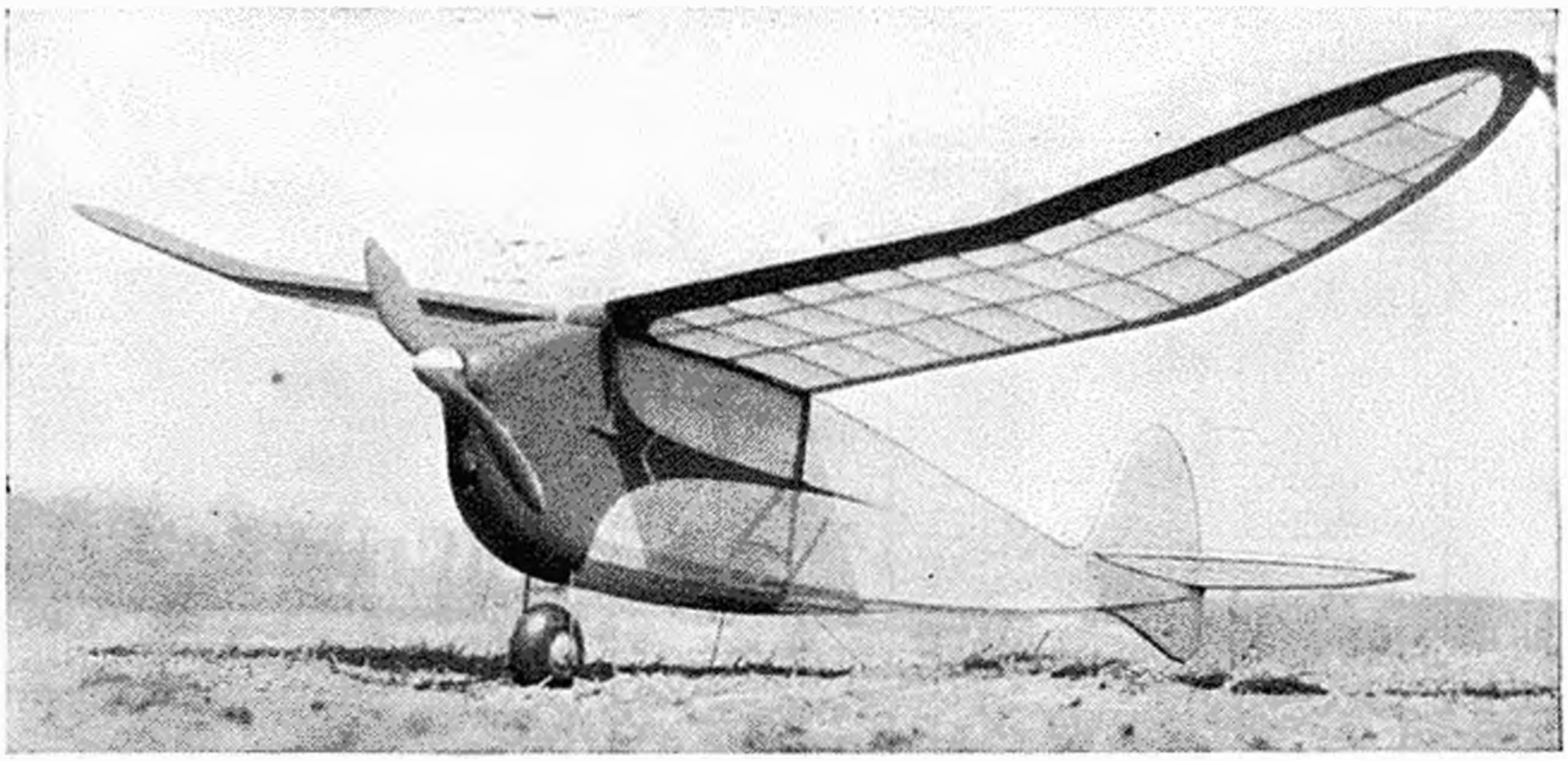
STRINGERS ARE 3/16" SQUARE MEDIUM HARD STOCK



LANDING GEAR IS ATTACHED TO FIREWALL WITH 1/2"-3/8" BASS HAVING A 1/8" GROOVE







The 7'4" Hornet ready to fly. Skids keep it upright. A close-up of the motor is at the left

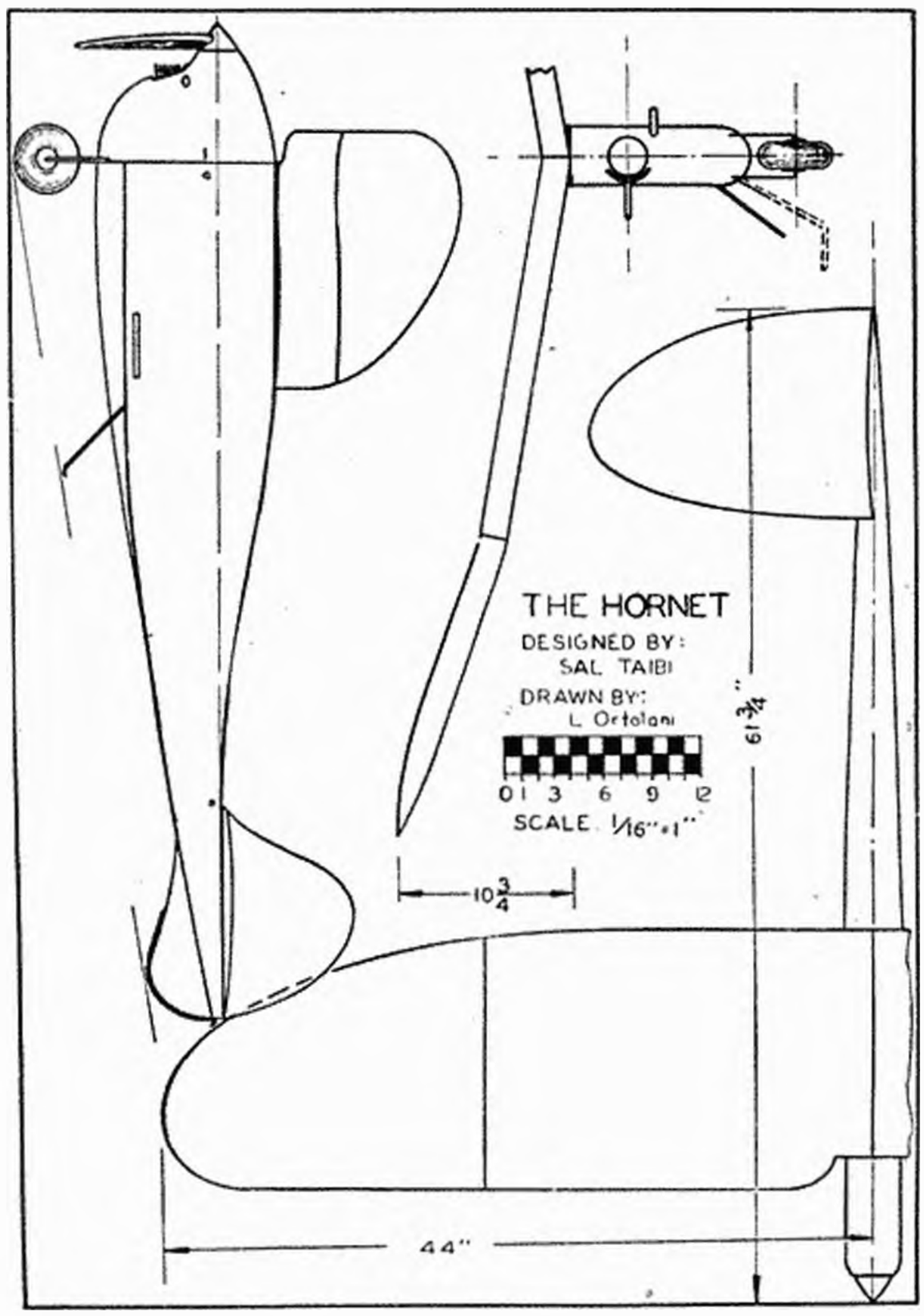
Building The Hornet

Complete Data to Build A Low-Drag High-Performance Gas Model That Gets Up Quickly and Stays There

By SAL TAIBI

WHEN the Academy of Model Aeronautics met some time ago the 1940 gas model rules were devised, and we immediately sat ourselves at the old drawing board and scratched our head in search of a design that would be "tops" under the new regulations.

Of course, we're in favor of big ships with plenty of area and a maximum of stability and performance. Those were our prime considerations and the HORNET finally emerged as the plane we wanted. It combines all the features we desired, PLUS streamlining, in a design that is simple to build, easy to adjust and pleasing to the eye. Under power it climbs in a left corkscrew. At the top of the climb it 'rolls out" into a flat, level glide to the right. The Hornet really performs like a champion and it's our top ship for 1940.



The first test flights were uniformly successful. The first flight, which was made with a 20-second very-low-power motor-run, demonstrated to us that the ship had the inherent stability we had sought and that the glide was perfect. After making minor adjustments, gradual increases in power were made until finally the ship was ready for a real flight . . . and what a performer it proved to be.

From a standing start, with absolutely no hand-guidance, the ship amazed all witnesses by consistently doing 1:40 on a TEN SECOND MOTOR RUN.

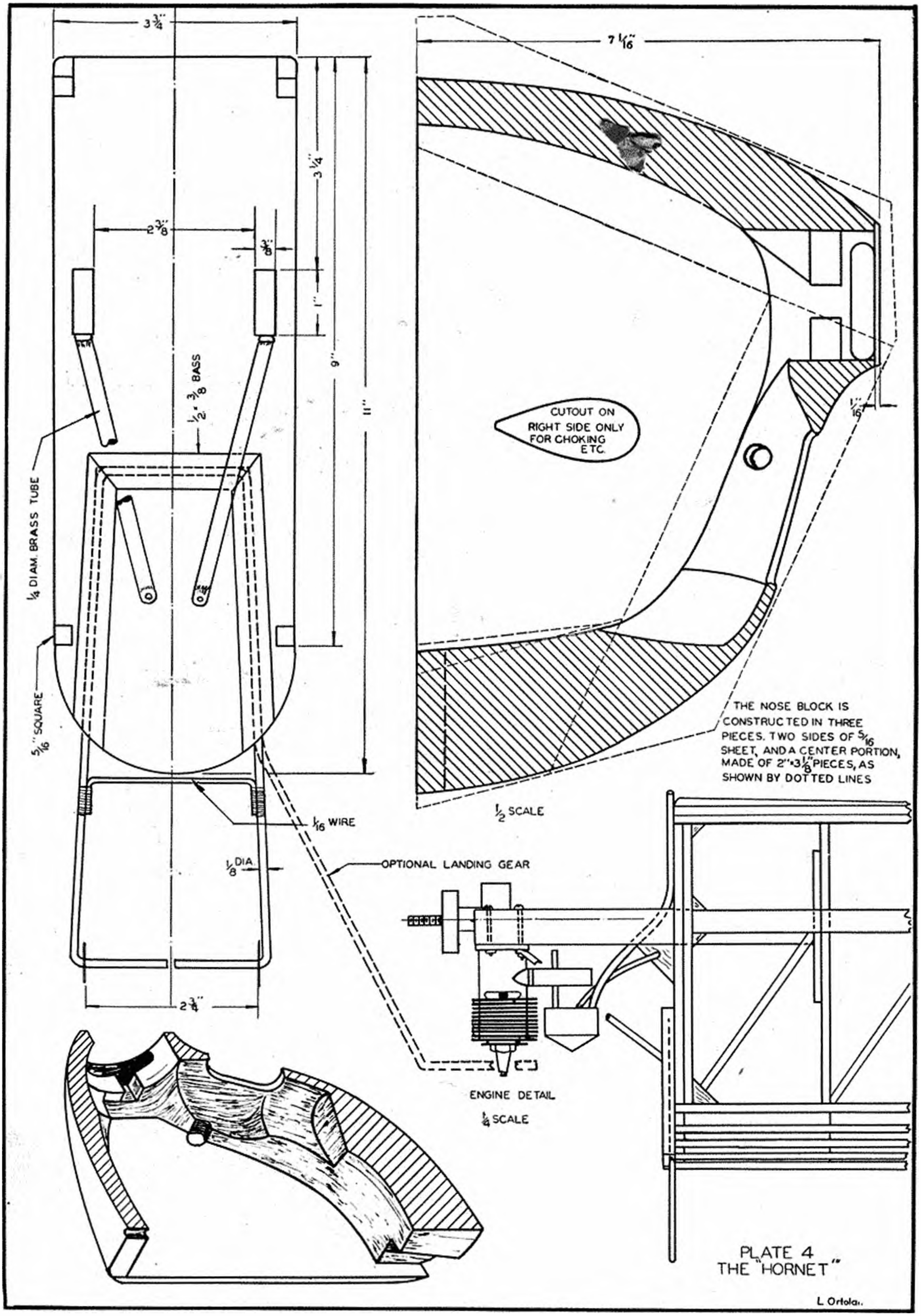
What about a 20-second motor run? Sorry fellows, the ship goes too far and performs too well for it to be risked on test flights, but if you really want to see what it does on a 20-second motor run, we are sure it will live up to this bright promise of long flights.

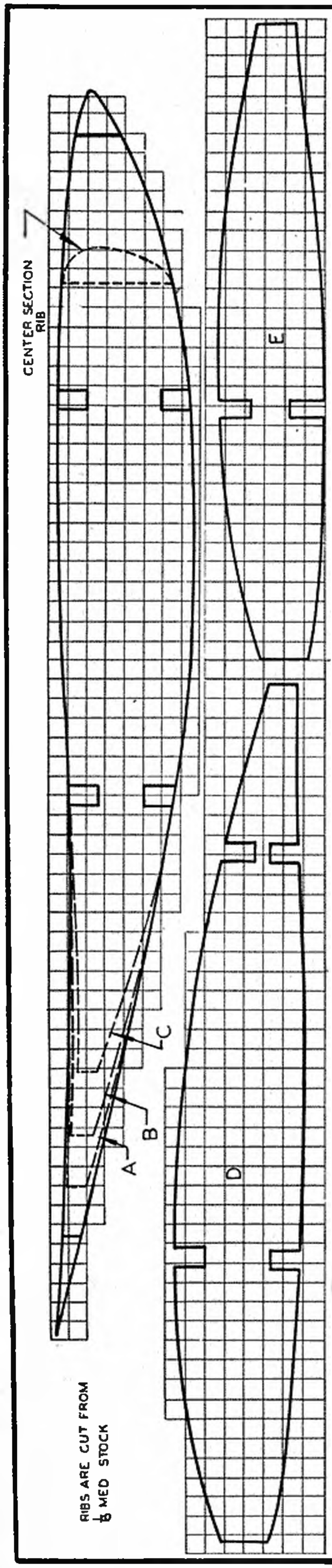
Building and Flying

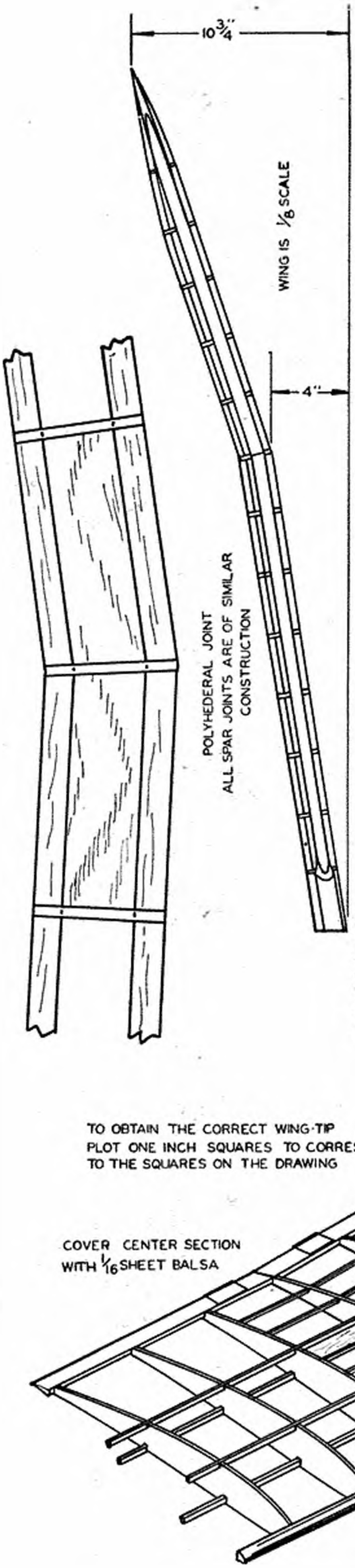
The first step in building the Hornet is to "scale up" the plans to full size. Ordinary bond paper may be used for this process, which may be obtained at any stationery store for about a dime a roll. In scaling up a plan the builder will learn more about the construction of the model than he can in any other way; points of construction which looked complicated in the smaller plates will become perfectly clear when seen in actual size. Scales are given under each particular section . . .

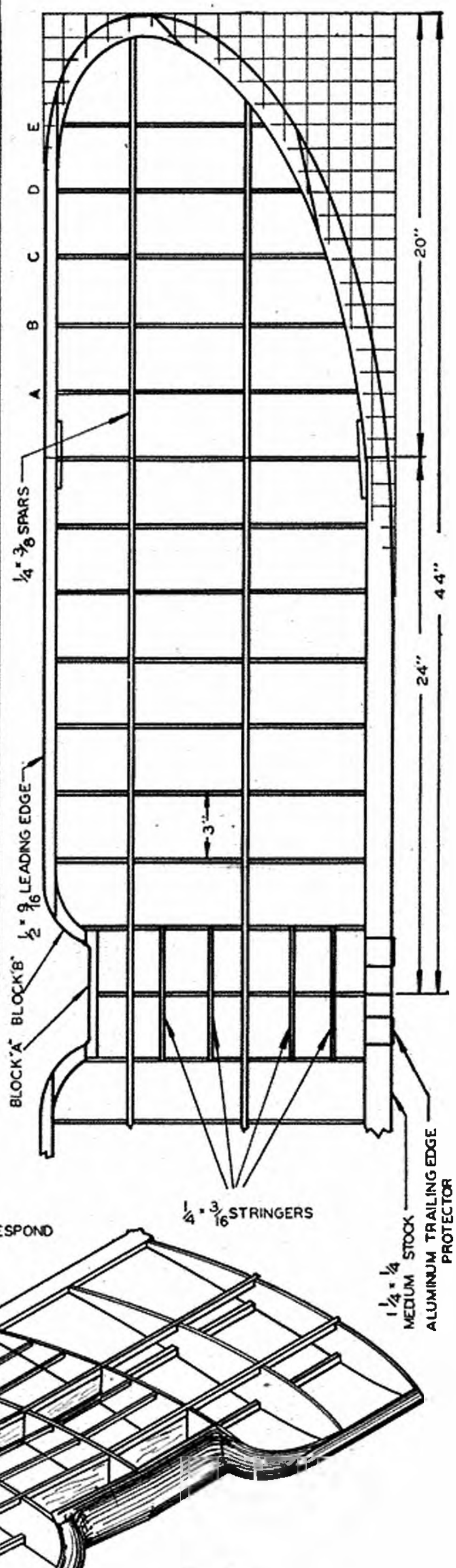
(Continued on page 56)

The large span and clean streamlines provide fine floating qualities. Here it is gliding in to a landing


3 3/4"
2 3/8"
3/8"
3 1/4"
1"
9"
11"
1/2" x 3/8 BASS
1/4 DIAM. BRASS TUBE
5/16" SQUARE
1/16 WIRE
1/8 DIA.
2 3/4"
7 1/16"
CUTOUT ON RIGHT SIDE ONLY FOR CHOKING ETC.
1/16"
THE NOSE BLOCK IS CONSTRUCTED IN THREE PIECES. TWO SIDES OF 5/16 SHEET, AND A CENTER PORTION, MADE OF 2" x 3 1/8" PIECES, AS SHOWN BY DOTTED LINES
1/2 SCALE
OPTIONAL LANDING GEAR
ENGINE DETAIL
1/4 SCALE
PLATE 4
THE "HORNET"
L. Ortola.







TO OBTAIN THE CORRECT WING-TIP
PLOT ONE INCH SQUARES TO CORRESPOND
TO THE SQUARES ON THE DRAWING

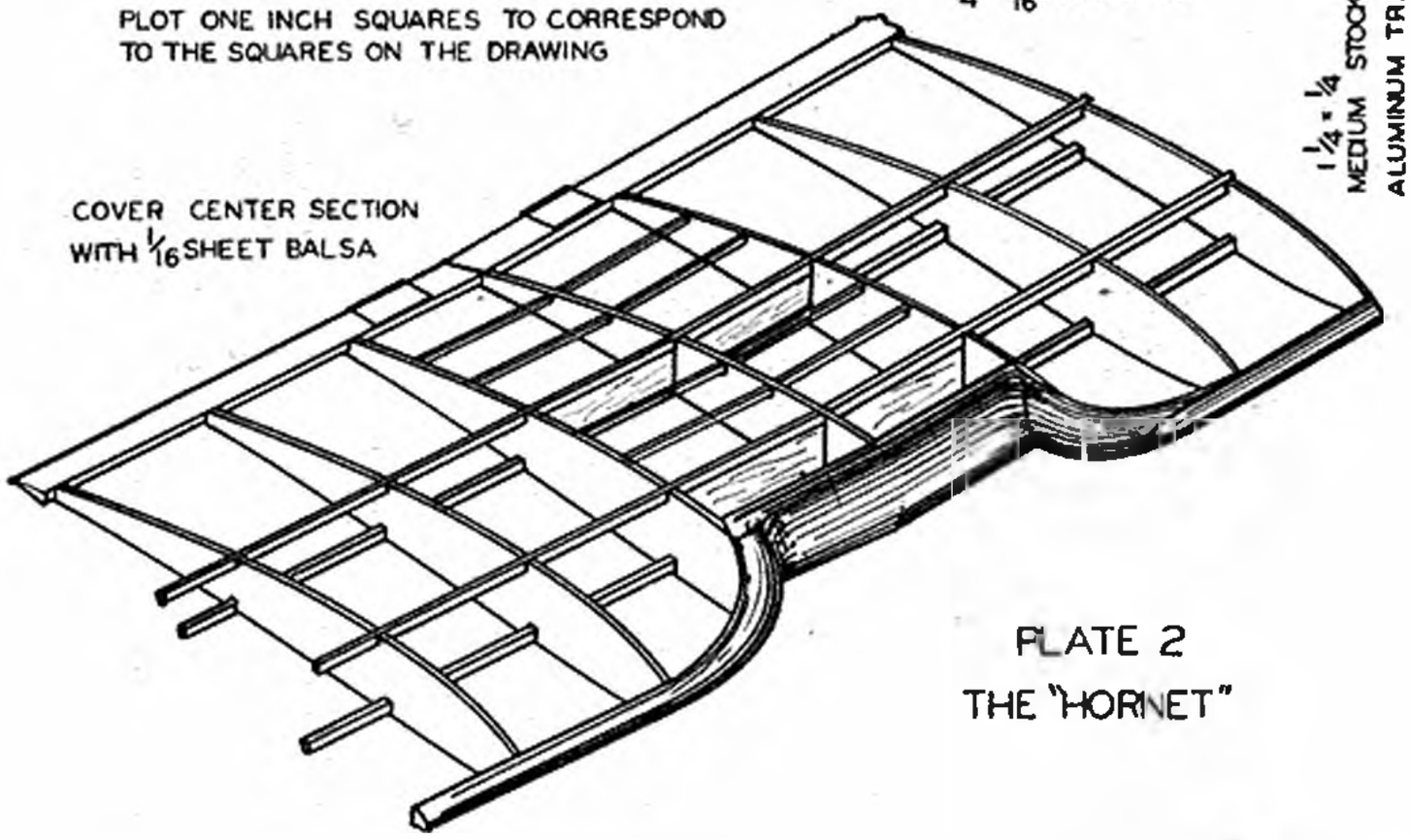
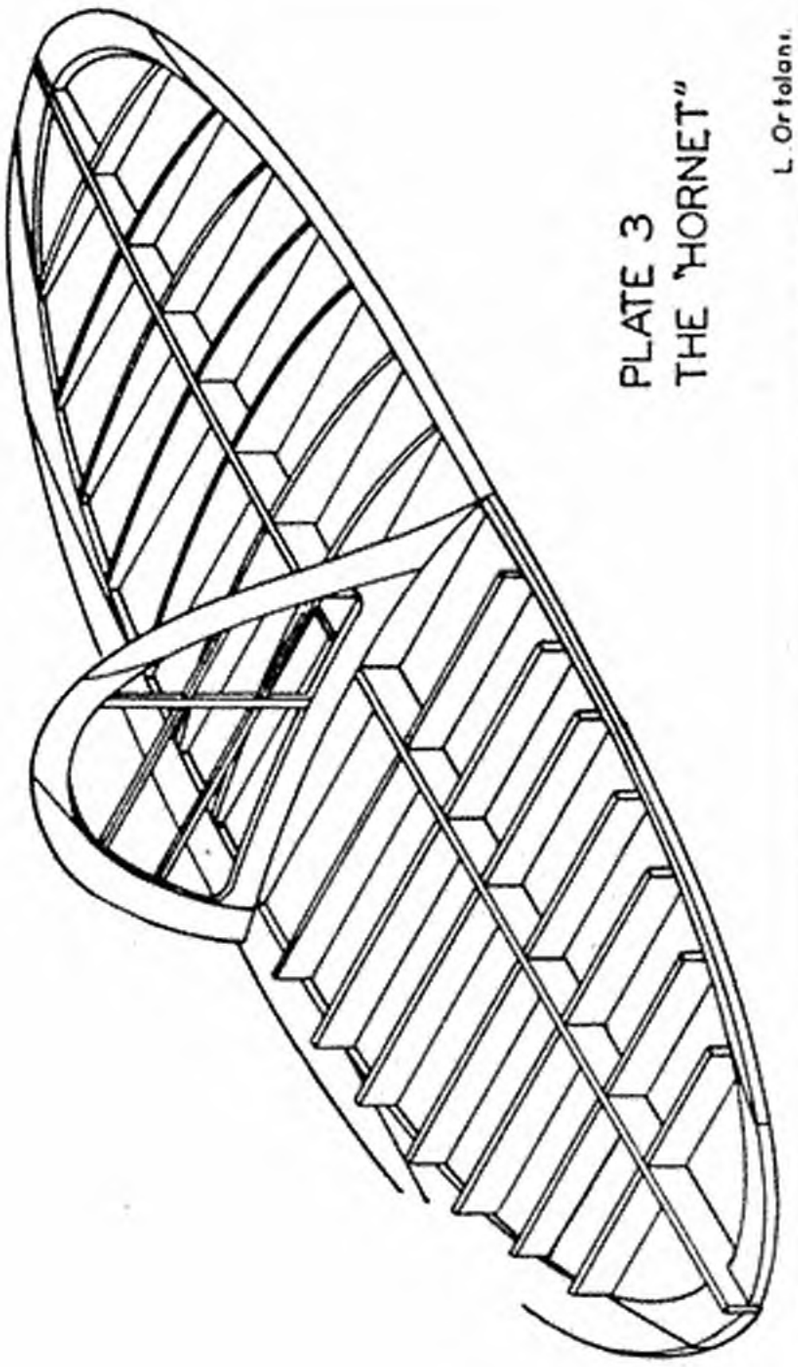


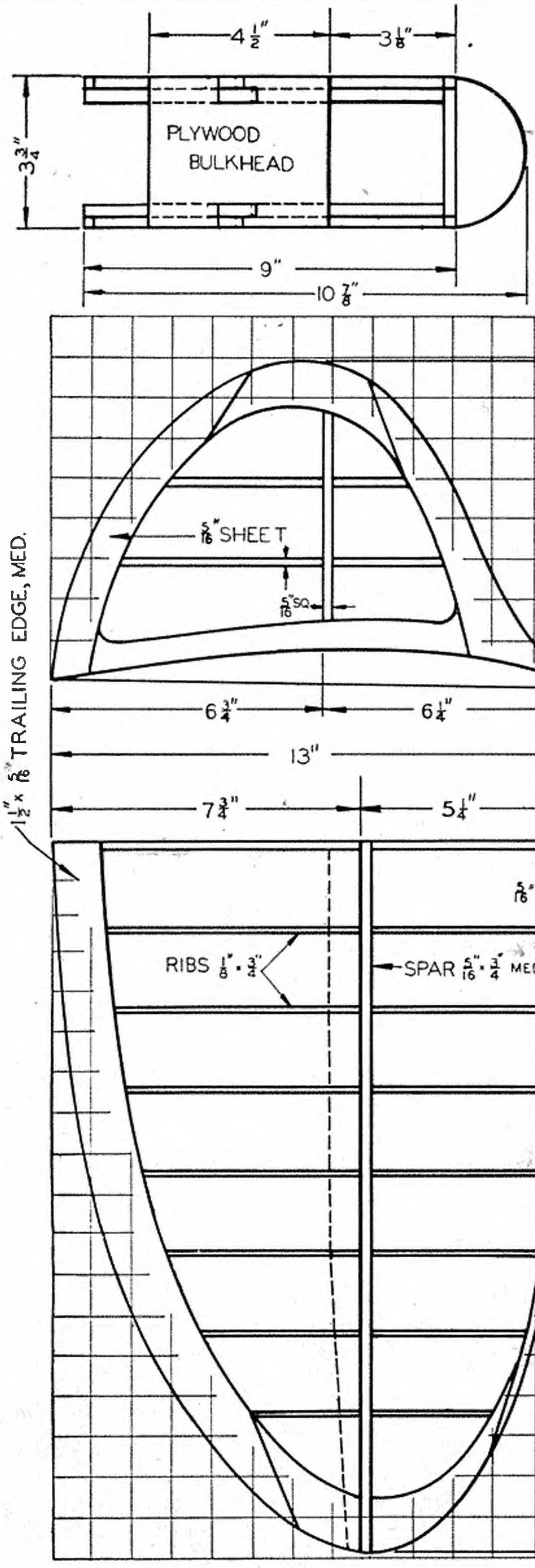
PLATE 2
THE "HORNET"

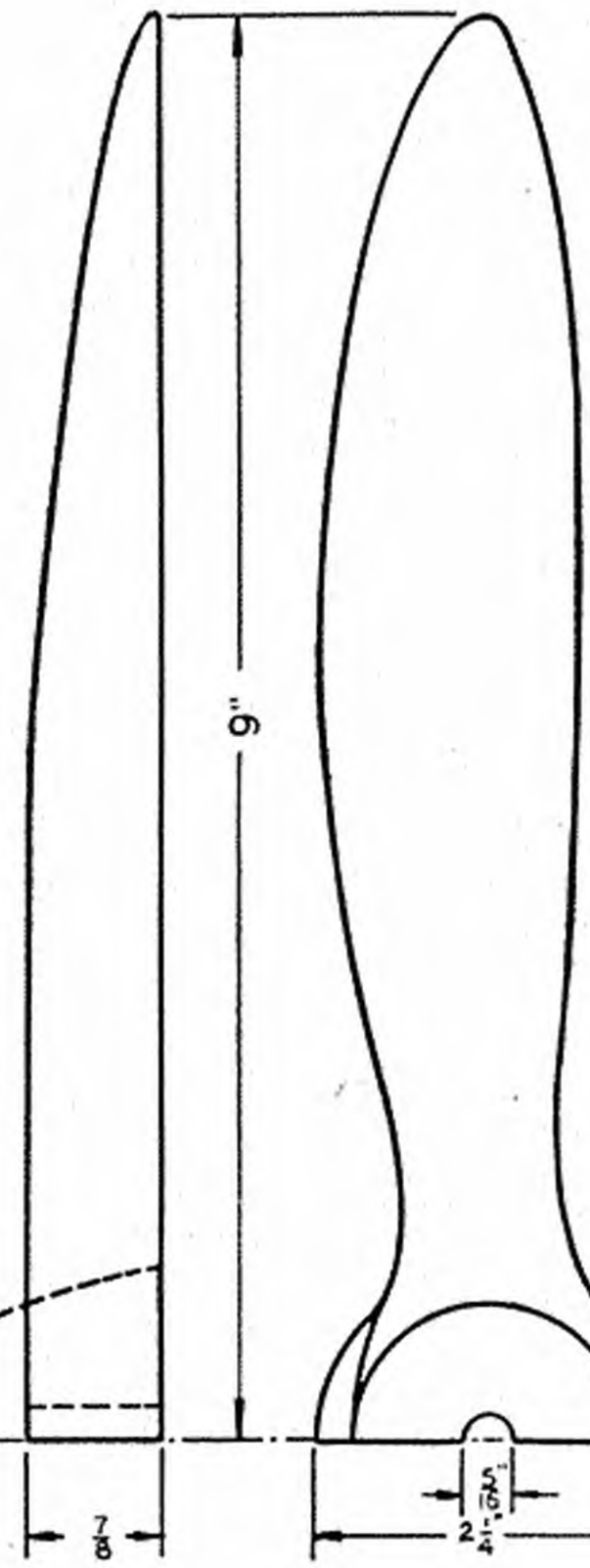
L.Ortolani

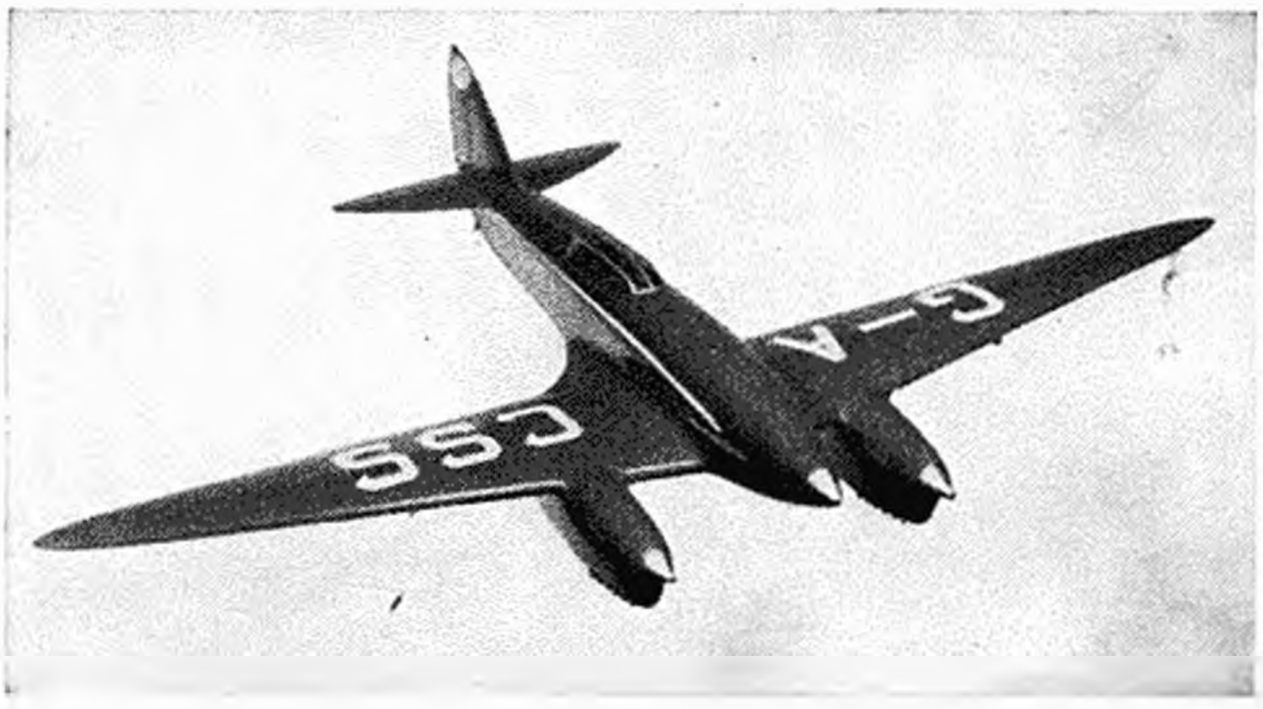
PLATE 3
THE "HORNET"

L. Ortolani.









Pict. No. 1. A realistic model of a Comet Racer, by Don Wilson

Air Ways

What Air Ways Club Members Are Doing to Gain Knowledge of Aviation and Increase Their Capacity for SELF-DEFENSE

IF WE are to judge from results, apparently there is a very great discrepancy between the ability of Great Britain's designers of military aircraft and her designers of racing craft. It is true that designers of the former, at the present time, are doing a splendid job. However, it has been only recently that they have been turning out beautiful, streamline, high-speed aircraft.

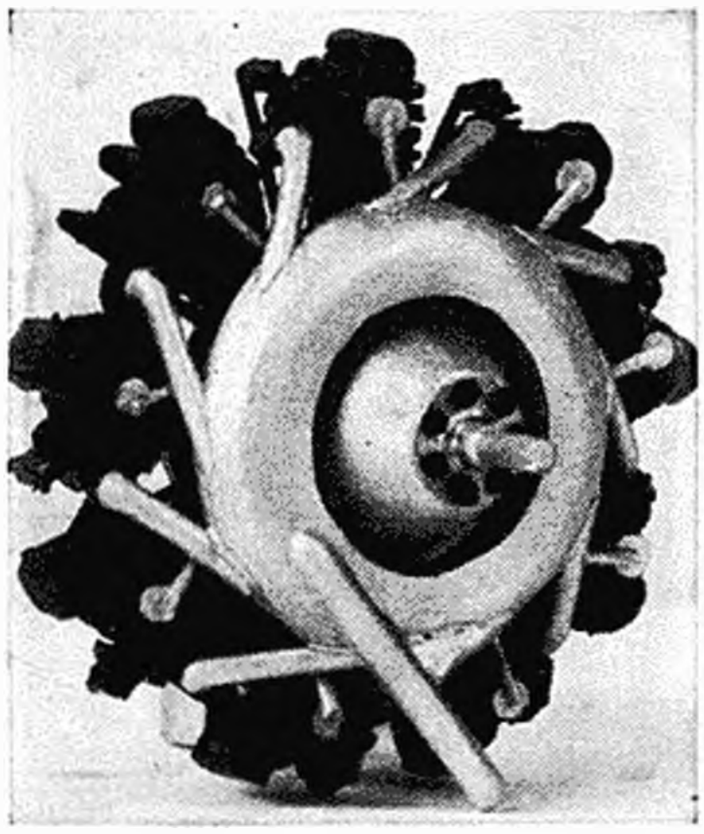
To prove this assertion, we ask you to look at picture No. 1. The full scale craft of which this is a model was the DeHaviland "Comet," the England to Australia racer. This was finished and in operation in 1934, six years ago; and today, 1940, you will look in vain among the British military aircraft for a plane that has the clean lines and has as little head resistance as this Comet racer. It has been six years since this plane made its debut; thus the present designs should be six years in advance of the Comet, which apparently they are not.

Of course there are problems common to military use which must be included in military ships. However, this fact should not make any difference in the external shape or form of the plane. A pursuit plane similar to the Comet in general design would make a worthy competitor to the Messerschmitt Me. 110.

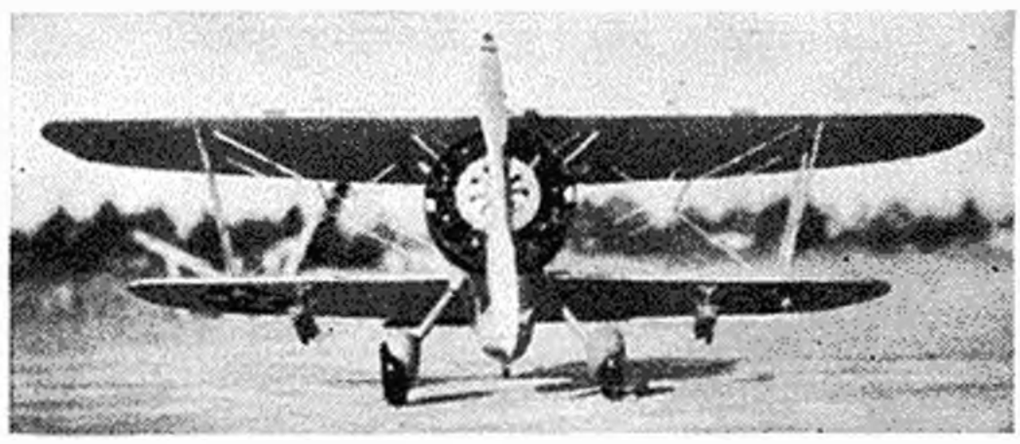
The plane shown in the picture actually is a 22-inch scale model, built by Don Wilson of Dayton, Ohio, Box 431, R. R. 1, and is one of the finest finished jobs which we have seen. Wilson says that wood filler and twelve coats of dope and banana oil were used as a finish on the sheet balsa covering. Each coat was sanded smooth with 400 sandpaper before the next one was applied. White letters are painted on a red background. All the controls operate and cockpit details are complete. More than 325 hours were required to finish the model.

Picture No. 2 shows the front view of a scale Hawk F-11C-2. It has a

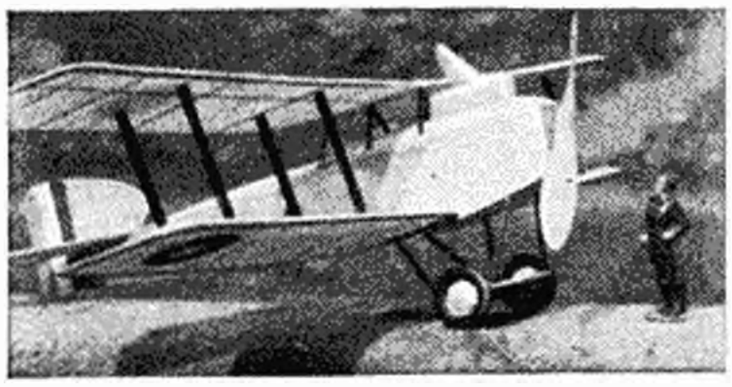
(Continued on page 58)



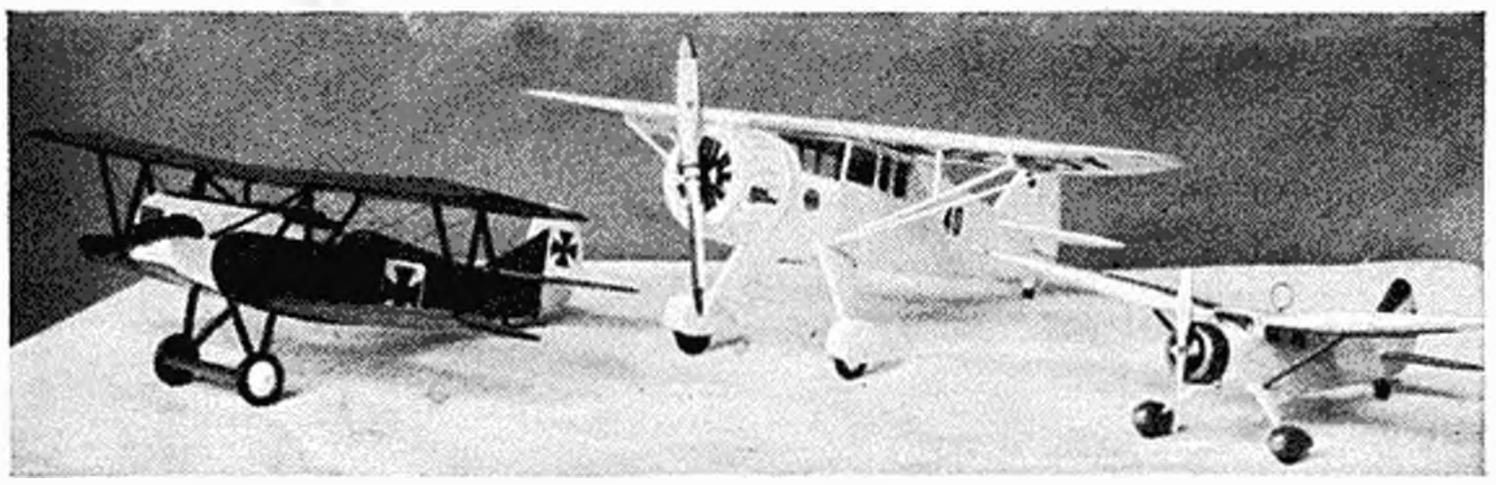
Pict. No. 3. Young's model "Whirlwind"



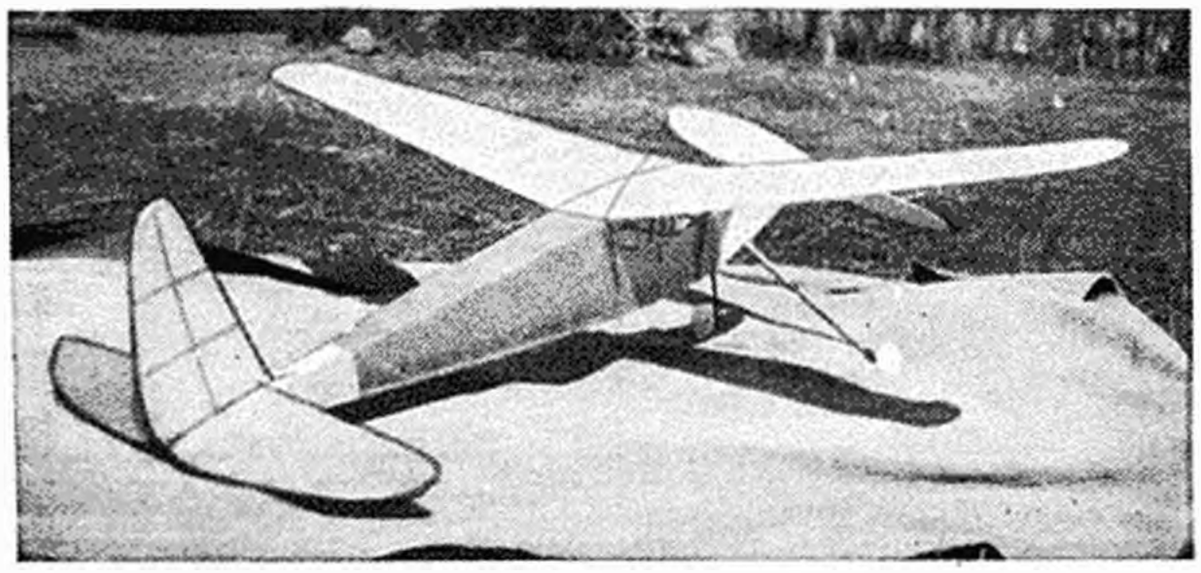
Pict. No. 2. A model Hawk, by R. Hathaway



Pict. No. 4. Flying scale model of a World War Breguet Bomber, by E. Cyril



Pict. No. 5. A Fokker, Mr. Mulligan and a Stinson scale model, by W. Peligoretz



Pict. No. 7. Kuster's duplicate of Canada's Wakefield winner

Pict. No. 6. Winner at Kresge indoor contest

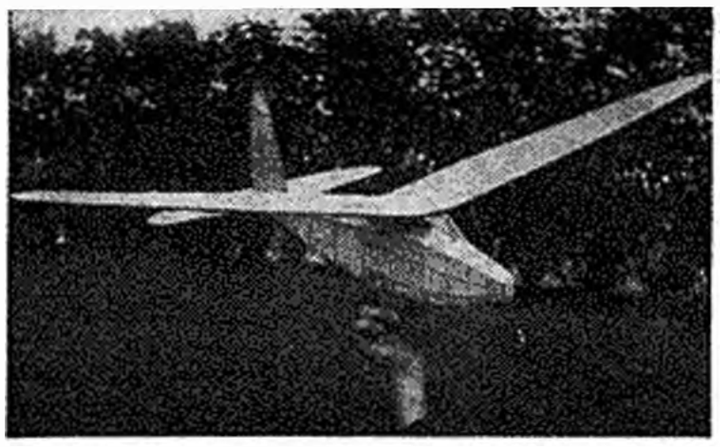
Got Your SPOOK Yet?

SPEED AND FAST SERVICE — have always been a matter of course with us. We used to be surprised to receive letters thanking us for prompt service. Orders shipped from MODELCRAFT have been received in Detroit before articles ordered at the same time were received from New York. This may seem unusual to persons buying model supplies, but it is a REGULAR habit with us. Be sure you have a MODELCRAFT CATALOG — it's FREE! And when you want something in a hurry — TRY US!

Barney

SUPER HOT
New
$1.00 COIL
Weight only
2½ ozs.

New
SMITH
LITEWEIGHT
1½ oz. COIL
FOR SMALL
SHIPS
$1.75



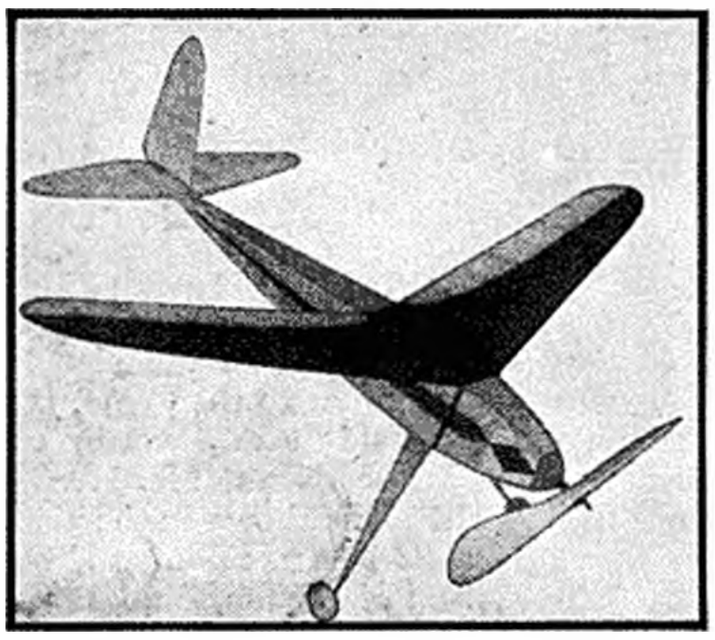
THE ALBATROSS 45 in.

Towline soaring glider. Here is the large glider you have been asking for. Kit is complete. **Add 10c for postage..... 50c**

MODELCRAFT SOARING GLIDER

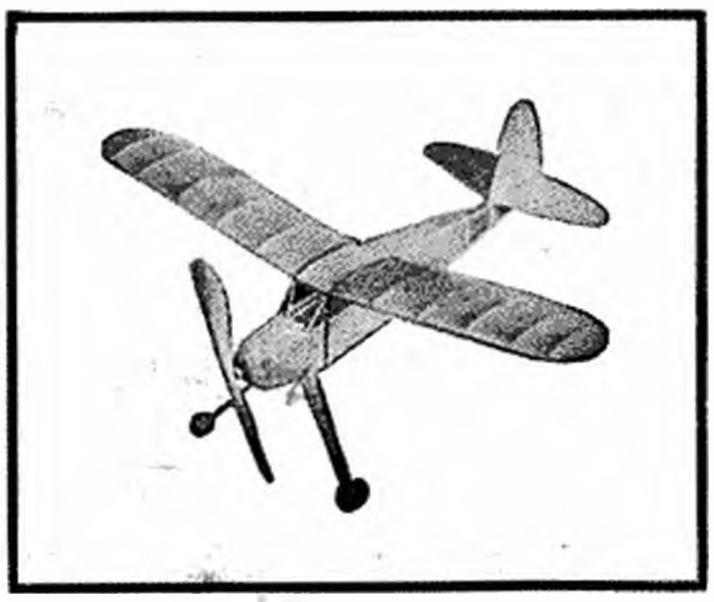
(Towline Glider)

31½" Soaring Glider has turned in many flights of better than one hour. Kit complete. **Add 10c Postage..... 25c**



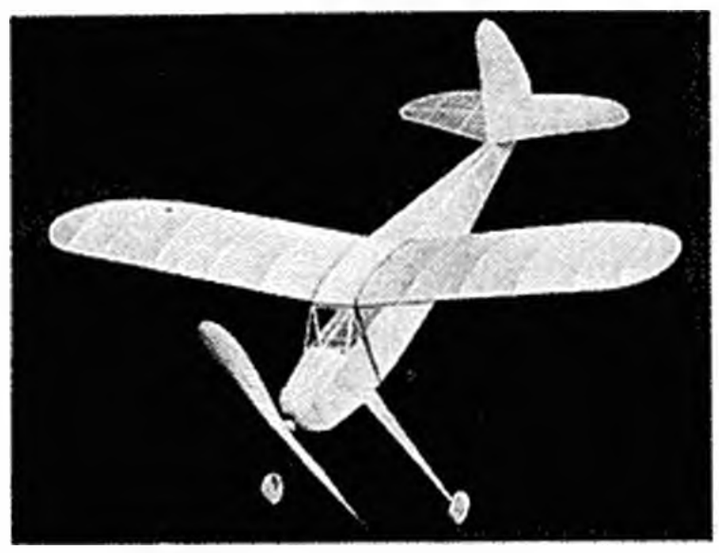
RECORD WRECKER

Newest Modelcraft Sensation! With a 26" span the Record Wrecker includes freewheeling unit, rubber lube, contest rubber, best quality balsa, cement, dope and large full size plans. Add 10c for postage..... 50c



30 in. PACIFIC ACE

A practical and durable commercial model. Easily constructed from well drawn and detailed plans. Kit contains an ample supply of first grade wood and high quality cement. Comparable with and outflies most dollar kits. Add 10c for Postage..... 25c



CLOUD HAUNTER

40 in. model, same ship as Pacific Ace, add 10c postage 50c

W. R. Butterfield of Los Angeles made a flight of 2 hours and 40 min. with his Cloud Haunter.

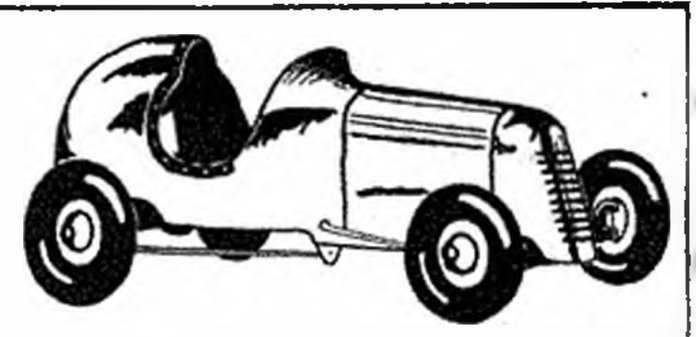
THE CHAMP

Wing Area 191 sq. in.

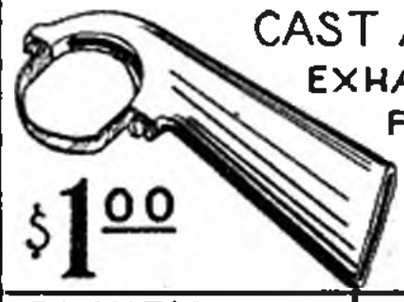
The name Champ tells the story. It will outfly any model in its class. The kit is complete, nothing else necessary to build and fly the model. Includes free wheeling unit, plenty of rubber, rubber lub and the best balsa you've ever seen. Add 10c for postage..... **$1.00**

LOOK! — D-G — GAS MODEL PROPS

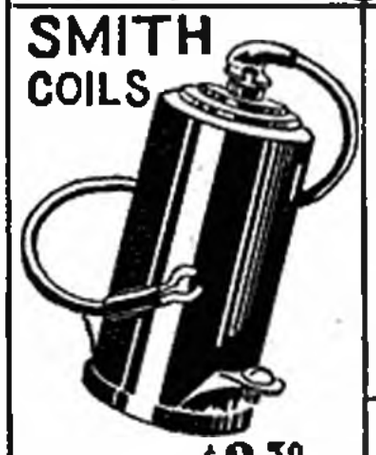
Machine made from straight grain hard wood. Show from 20 to 30% more thrust in every test than any other prop. Put one on your ship and see it climb faster than it ever climbed before. Sold by all dealers and distributors who want to give you the best. Stock up now. Complete range of sizes, 9" 10" 11" 12" 13" 13½" 14" ea. **25c**



SPEED CHIEF
ALL ALUMINUM RACING CAR
COMPLETE KIT (LESS MOTOR) **$12.50**



CAST ALUMINUM EXHAUST STACK
FITS ALL
BROWNS AND MIGHTY MIDGETS
Lite weight Length 3½"
$1.00



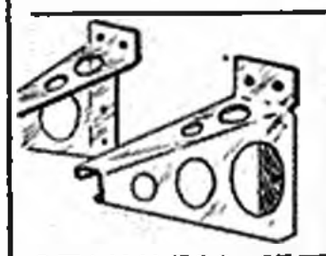
SMITH COILS
$2.50

BATTERY BOXES
PENLITE 40¢
MEDIUM 40¢
LARGE 50¢

PLUG WRENCHES
ANY SIZE **25c**

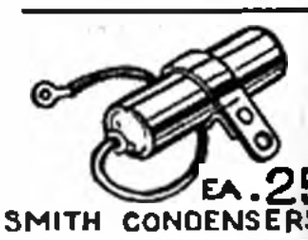
VALVOLINE OIL SAE 70


.10c



STAINLESS STEEL MOTOR MOUNTS
LENGTH 3⅛" **$1.00** Pr.

AUSTIN TIMER
$1.25



EA. .25
SMITH CONDENSERS
ALL METAL CASE

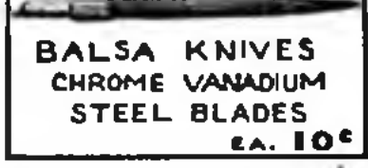
OHLSSON "23"

.50c
EXHAUST STACKS

VOIT AIRWHEELS

2½"	Non-Inflatable	1.00
2½"	Inflatable	1.25
3½"	"	1.50
4½"	"	1.75
1⅜"	TAIL WHEEL	.15

Free-Wheeling Sets
EA. 10c (2 SIZES)

$1.00


STEEL CONNECTING RODS FOR BROWNS

BALSA KNIVES
CHROME VANADIUM STEEL BLADES
EA. 10c

CLASS "A"	½ oz.	.25
CLASS "B"	2 oz.	.50
CLASS "C"	4 oz.	.75

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MODELCRAFT MOTORS

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Model "D" $12.50
Model "C" $18.50
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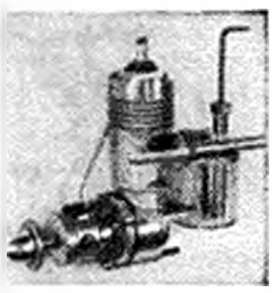
JUNIOR MOTORS BROWNIE Class "B"

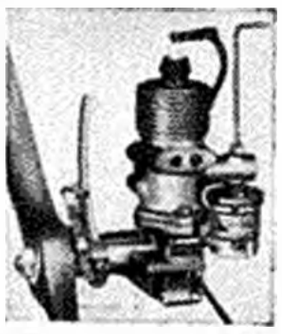
.29 Displacement $7.50
Orders will be filled in rotation as soon as deliveries start.

MADEWELL Class "A"



Perfect for Miss Tiny. .14 Displacement. $12.50

SKY CHIEF Class "C"

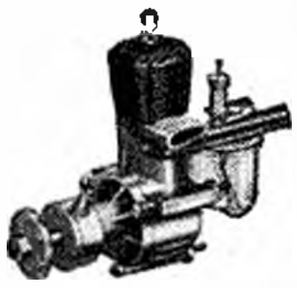


Displacement, 626, ½ H. P., Bore 7/8" Stroke 7/8", weight 10 oz., with condenser and coil $6.95
Postpaid

OHLSSON "19" Class "A"

.19 Displacement Just right for Miss Tiny $14.50

OHLSSON "23" Class "B"

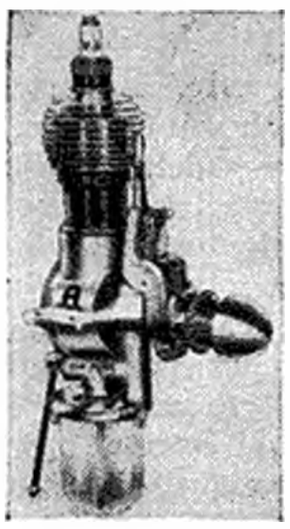


.23 Displacement Just right for Sky Baby $16.50

OHLSSON "60" Class "C"

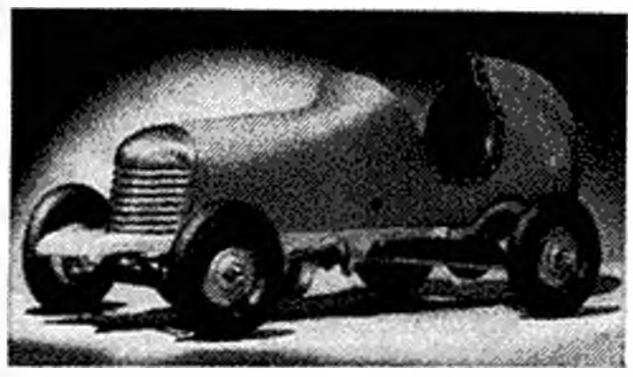
.60 Displacement For Your Spark "72" Pacific Ace..... $21.50

ATOM Class "A"



Bore ½"—Stroke ½" Weight 2 oz. $12.50

"A HOT IRON"



SPEED KING

Gas Model Racing Car. Sleek, powerful looking, aluminum body, cast frame, transverse springs, oilite bearings, special racing wheels, kit **$15.00**

SPOOK 48"
CLASS "A" or "B"

You'll Soon Find Out—
"NO OTHER SHIP CAN CATCH THE SPOOK!"

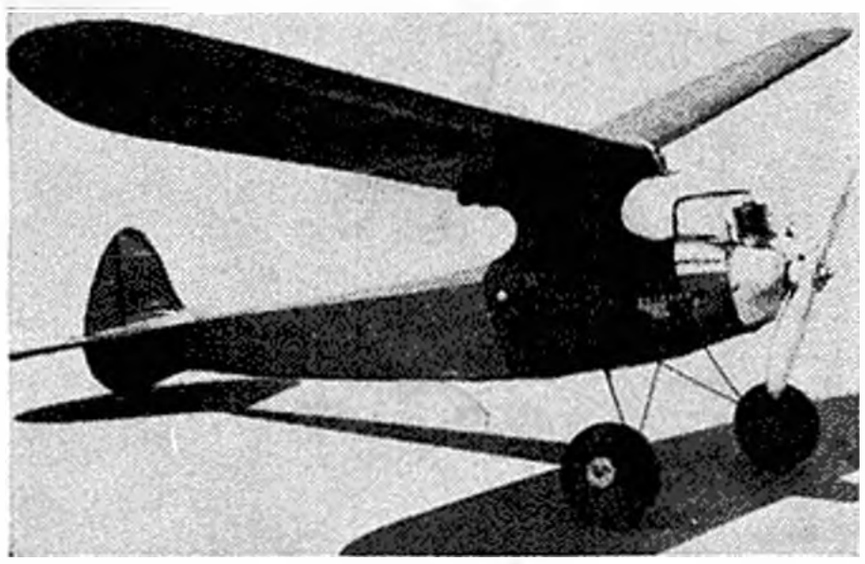
The first model that can handle an Ohlsson "60" at full throttle

STILL TIME TO BUILD YOURS BEFORE THE NATIONALS . . .

THE SPOOK

SPOOK 48 IN. **Specifications:** Wing span 4 ft.; flying weight with Ohlsson "19", 18 oz. Wing loading 8 oz. per sq. ft. Can be flown as class "B" with Ohlsson "23," Hi-Speed or Brownie. Kit complete with cement, dope, covering and wheels..... **$1.50**

SPOOK 72 IN. Wing span 6 ft., flying weight 3 lbs. Power with Brown, Ohlsson "60" or other class "C" engines **$3.95**



INTERCEPTOR—CLASS "B"

World's fastest climbing model. Engine for engine, this ship will grab nearly twice as much altitude with the same engine run. Power with, Ohlsson 23, Ohlsson 19, Brown Brownie, Bantam, HiSpeed Bullet or Torpedo, or similar engines. Wing span 46" chord 7". Kit contains cement, dope, covering, all printed parts, bent landing gears, turned aluminum cowl, and Gas Model Airwheels. Price..... **$2.95**
POSTPAID

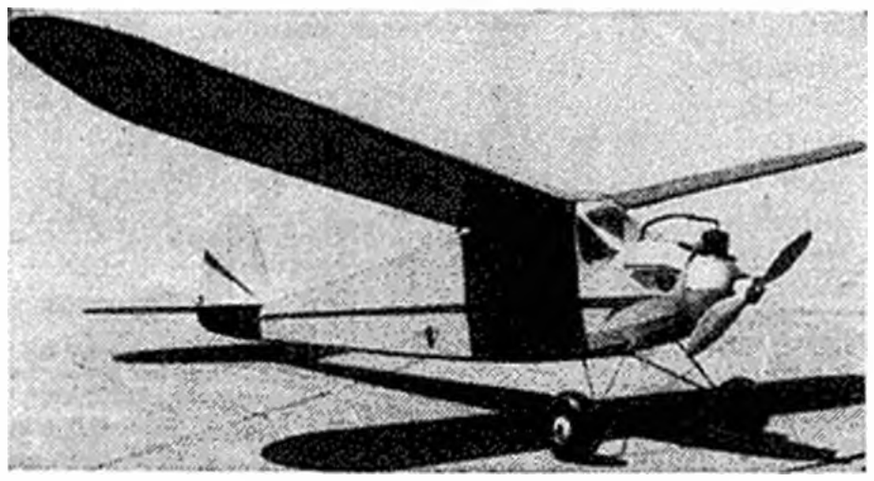
PLANS ONLY..... 25c

MISS TINY—CLASS "A"

May now be flown in two classes. After winning many places in Class "B," including second in the 1939 National Meet, Tiny may now be powered with Ohlsson 19, Bantam, Madewell Mite and other such engines for Class "A." Watch the Tinys take another string of firsts, seconds and thirds in 1940, and watch the present Class "A" records fall to Miss Tiny's superior performance. Get a Tiny and start collecting first place hardware for yourself.

Wing span, 46". **DeLuxe Kit** contains spun cowl, silk, 2½" Voit Air Wheels, cement, dope, die-cut ribs, plenty of good balsa, and full size plans. Price..... **$3.95**

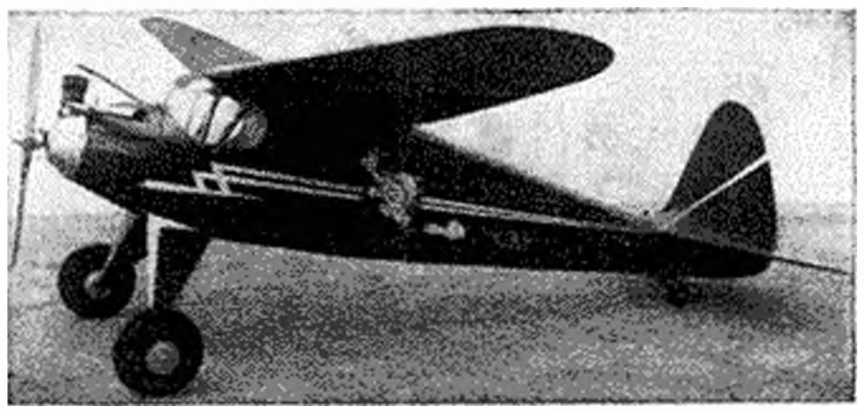
STANDARD KIT same, but with bamboo paper covering.... $2.95
DRY KIT complete except for wheels, covering, cement and dope $1.95
PLANS ONLY..... 25c



SKY BABY—CLASS "B"

Designed for Class "B" engine such as Ohlsson 23, Torpedo, Junior Motors Brownie, this model in its test flights did 15 minutes on a 12 second engine run. Has taken many firsts, including the recent Fresno contest. Wing span 54", chord 7". Kit complete with cement, dope, covering, formed landing gear, air wheels, spun aluminum cowl, etc..... **$3.85**

PLANS ONLY..... 25c



PACIFIC ACE—CLASS "C"

66 in. tapered wing. DE LUXE KIT contains tapered spars, beveled and tapered trailing edge, die-cut ribs, turned aluminum cowl, 1 qt. gas dope, 1 pt. cement, 3½ yds. super silk, formed landing gear, 4½ in. inflatable air wheels, dural wire, alum. tube, washers, bolts, haskalite, dural sheet, hook up wire, switch, selected hard balsa, full sized, black and white, plans with test flight instructions, complete..... **$8.50**

STANDARD KIT with bamboo paper, ½ pt. of dope, 1 pt. of cement and 3½ in. air wheels..... $6.25
DRY KIT same as above without cement, dope, silk or wheels $4.75
PLANS ONLY..... 50c

CRAFT

7306 SO. VERMONT AVE., LOS ANGELES, CALIF.

Planes That Never Fly

(Continued from page 7)

5,000 miles." That's stretching a point, but it brings out the fact that Uncle Sam is always looking ahead, striving to keep well out in front of the other countries.

Conferences with fellow officers and engineers produce specifications which are sent to aircraft manufacturers and Wright Field engineers for them to design the new airplane. In this way the best designers in the country—those who are employed by the commercial aircraft companies and those who are hired directly by the government—have an opportunity to put to test their creative minds. It assures the army of the very best there is. Sometimes it is six months, sometimes three years after the specifications are let out that the plans are completed. Problems that confront the designers are none too few and the solution of each seems, too often, to create another, far more difficult to solve.

Finally, however, the drawings are finished and estimates dealing with performance and costs are outlined. These detailed reports are evaluated by General Blank and Staff who select the ones which best conform with the specifications. From these select few, exact, scale models are built.

Wright Field in Dayton, Ohio, home of the army's twenty million dollar aeronautical research laboratory, is one of the experimental centers where Uncle Sam builds the models and tests them in wind tunnels. Here you will find skilled workers fashioning the small planes. And here are laboratories where engineers and draftsmen work over drawing boards, creating new model designs. Then, too, are well-equipped wood-working shops where special machines aid in building the pint-sized planes.

Here, also, history has an interesting background that concerns models and airfoils, spin tests and wind tunnels. Not far distant from the army's gigantic testing grounds are the buildings where Wilbur and Orville Wright, constructed their early models and tried them out in crudely fashioned wind tunnels. Nor were the Wright Brothers unmindful of the importance that goes with building experimental models and gaining valuable data from them in wind tunnel trials. To this day Orville Wright tells those who talk with him: "Our success was namely due to our experiments with small models in wind tunnel tests."

Consequently, at this field one can learn the details of the army's model building program. How much do these models cost? What is their value? How are they built? What sizes are they? These questions many a tax-payer is entitled to ask. And the answers are easy to find if you look for them.

The models vary in size and cost. Some are small with fifteen- to twenty-inch fuselages; others have fuselages that run as large as seven or eight feet in length. The very cheapest costs about $200, while others run as high as $2,000. "The purpose behind building these small planes," one of the army's experts explains, "is to give the engineer and manufacturer an idea of an airplane's flying characteristics before going into the cost of building a full-sized plane."

There are many facts which cannot be solved on paper. The smooth lines of streamline features can be visualized, but only actual airflow over the surfaces can give proper figures pertaining to the amount of resistance, etc. Other parts such as the rudder and elevators may appear sound enough in the drawings, but often times they have been known to develop extremely dangerous "flutter" when models were tested in the "blowers." Since full-sized experimental aircraft cost as much as $1,000,000 or more, the building of models for as little as $200 may affect a great saving. Various changes necessary to improve performance can be made in the model, correcting certain faults, without the tremendous cost of making the change on the large airplane.

From the models in wind tunnel tests engineers can, by mathematical calculation and the appliance of specified and proven formulas, determine the flying features of a large plane. For this reason many types of models of each airplane are built, which incorporates new design features. This enables the experts to study the airflow, weight-carrying capacity, pressure distribution and other aerodynamic features that affect flying qualities.

The six most important types of models include: The *Performance* model, *Pressure Distribution* model, *Drag* model, *Spin Test* model, *Flutter*, model and the *Free Flight* Model. Each of these has its own special function in producing results for a specified test.

Probably the best in appearance is the Performance model because this ship looks as though it were in a display window ready for sale. But it differs greatly from any which you can buy. This model is exact in every detail to the 1-1000th of an inch and sometimes closer. It is used to determine the general flying characteristics of an airplane and therefore must be accurately scaled from the large plane to enable proper mathematical calculations. This Performance model is the last step. It should have the proper airfoil, the correct weight distribution, exactly the right propeller design, the proper motor nacelles and design features which are to be incorporated in the large airplane. When it is placed in the wind tunnel for testing it should react to the airflow just as the large plane should react when it takes to the air. If there is something wrong then designers have another problem to solve—something they overlooked the first time.

There are some models which are only built in part. One of these is the Pressure Distribution model which consists of only a part of a model, depending upon which portion of the airplane is under consideration. Because air strikes different parts of the airplane at variable pressures this model is used to determine the proper distribution of pressure for the life-sized airplane. In experimenting with high-flying aircraft that will fly in the sub-stratosphere, many tests were made with the pressure model. The wings and fuselage of XC-35—the Lockheed sub-stratosphere airplane—saw many hours in tunnel tests.

In order to determine the resistance offered by various parts of the new airplane design a Drag model is used. This model, like the Pressure Distribution model, seldom is a complete airplane, but rather comprises only some specific part under experimentation. One method used to determine the flow of air over the airfoil surfaces of the wings on this model is to put tiny thread pieces on the wing surfaces and observe their reaction to the flow of air when the fans are started. The threads should conform (stick to) the airfoil and flow straight back. If they fail to do this a better airfoil section is produced.

When the Drag model is suspended in the wind tunnel by wires, the resistance is recorded on balances which are located outside the tunnel. Wires are attached to the wing of the model and as the wind is drawn through the tunnel the model is blown back—how far depends upon its resistance—and as it pulls the wires back with it, the balance scales outside the tunnel record the amount of resistance or "drag" that is encountered. Other wires attached to the fuselage record the model's lifting capacity.

The Spin model is one used in tests to ascertain the spinning characteristics of planes. This test entails one of the most interesting phases of wind-tunnel experiments.

Another test involves the use of the Flutter model in the wind tunnels. This model can be rigged to simulate all types of airplanes from pursuits to transports and bombers. Its versatility is secured by virtue of a design which permits changes in the mass balance of the rudder, the rigidity of rudder controls and fuselage. A new method of spring suspension is employed which expedites the experiments by inciting flutter with a controlled force simulating air bumps. The model has two vibration pick-ups; one follows the motions of the fuselage, the other the motions of the rudder. The amount of vibration, together with the frequency, amplitude and phase relationship, is recorded with an oscillograph on film.

The Flutter model is to be used next in a study of the possibilities of artificial oil dampers in eliminating flutter. Tentatively scheduled is a test in which the model will be set up for investigation of the danger limits of flutter-testing full-scale airplane in flight, by artificially excited flutter.

In the meantime, some consideration is being given to a requirement that manufacturers of unconventional or high-speed airplanes, submit a Flutter test model just as they now submit a Spin Test model and a regular Performance model.

The Free Flight model is used to determine the controllability and stability of the airplane in free flight. It generally is a complete airplane model.

There are many model builders who would give almost anything they own for the facilities that Uncle Sam's model makers have at Wright Field. The equipment is valued at thousands of dollars and the wood-working shops represent a model builder's paradise.

Skilled craftsmen build the models.

Theirs is a background of experience that knows the art of carving, the proper tools to work with and the best suited and select kinds of wood. They work for "hair-line accuracy" for any discrepancies would make the tests in the wind tunnels doubtful. It takes money to hire a trained worker with an art. This factor "ups" the cost of the models; that $200 or whatever the price is, soon dwindles away when skilled labor is at a premium. Workers labor for hours—sometimes as many as 200—on one model because every detail must be perfect.

Before the actual model construction is started special templates are made to insure accuracy. These are usually fashioned from sheet metal and they conform exactly with the blueprints prepared by the engineers. There is no guess work.

With the army, model building is a small industry. Lathes for turning out small, round, fuselage parts are used in the model shops. Jigs for the construction of wing forms and special tools have been designed to aid in the work. The wood used is mostly white pine and balsa because these are the easiest to work with. The soft pine is preferred since it carves best; the balsa has a tendency to "rough up" on curved surfaces. Balsa, however, is used a great deal in wing construction because of its light weight.

Models are never built-up of framework. This would defeat their purpose since they must be strong enough to stand rough treatment in the wind tunnels. It also would require more exacting detail in their construction with no added benefit as to their efficiency. Seldom are cockpits or cabin spaces carved out, but cockpit hoods, or cabin windows are reproduced to the minutest detail.

What are the chances of a job here?

Well, the jobs are not just passed out and they are hard to get. All of the workers, however, are under Civil Service. There are very few positions ever open, but when there are vacancies Uncle Sam files papers with the Civil Service Commission announcing the openings. One's best bet would be to watch the Post Office bulletin boards for the openings, obtain an application blank and rest upon his merits.

There are probably plenty of positions open in the aircraft factories these days, however, along those lines. With stepped-up foreign orders, new demands from the army and an overwhelming commercial trade the aviation industry is on the lookout for new talent. . . . Youth with ideas . . . youth with a good background of aeronautical science will be much in demand.

When the models are finished, complete in every detail, they are ready for the wind tunnel tests. At Wright Field there are two wind tunnels. One of these blowers is five feet in diameter. The other is fourteen inches. The larger one is used for testing portions of models or models of complete airplanes and wings, while the smaller wind tunnel is used for testing propeller airfoils.

Wind tunnels operate differently than most people assume. Air is "drawn" through the tunnel, not blown into it. A suction formed by the gigantic fans draws the air into the tunnel. Using the present facilities at Wright Field tests are ordinarily made at an air speed of about 90 miles per hour in the large tunnel. This means that air is passed over the surfaces of the model at the rate of 90 m. p. h., creating the same effect that the air would have on an airplane flying through the air at that same speed. Only the process is reversed.

There are wind tunnels in existence today that can obtain "speeds" equivalent to 300 m. p. h. and new ones are being designed that will create speeds in "excess of 400 m. p. h." In 1938 more than $3,000,000 was appropriated for the construction of a gigantic wind tunnel—reported to be larger than any in the world—at Wright Field. Work is now being carried out to construct the giant blower.

At Langley Field, West Virginia, full-sized airplanes are tested in the tunnel. Mounted in a similar fashion as the models are mounted, but on a larger scale, the full-sized test planes help engineers work out practicable formulas which can be applied to the model experiments. With this figure as a basis for their calculations (100 m.p.h.) engineers can learn approximately the speed and performance of any type of aircraft in existence today.

As results are recorded from tunnel tests various changes are made in the model's shape. Fillets are molded from modeling clay and added streamline effects are produced around protruding parts, thereby increasing the speed and performance of the airplane. Sometimes for each model there are a series of airfoils and wing shapes designed. These wings can be removed from the fuselage and new shapes tried out without changing the exactness of the model. In this way the best airfoil obtainable is secured for the specified aircraft.

Probably the most interesting of the wind tunnel tests is one which is not carried out at Wright Field. It is known as the "spin tests" in which small models are tested for their spinning characteristics. When a pilot wants to put an airplane into a tail spin he whips the ship up into a stall and lets her fall off on one wing with a little bit of rudder and there it is—the earth whirls dizzily up at him and that's about all there is to it—he's spinning. But when test engineers want to put a spin model into a tail spin that's different.

The test is conducted in a vertical wind tunnel and a special model is used. The model is dropped into the tunnel in which there is air blowing upward to meet it and support its surfaces. As the engineer drops the model into the tunnel he gives the tiny ship a slight twist so that it starts its "spin" and drops at the same time. The model is equipped with a clock timing mechanism which moves the controls so as to cause the model to stop spinning. After the model has dropped for a short distance into the tunnel the clock mechanism goes off, neutralizing the controls and straightening the ship out into a dive. A net stretched across the bottom of the tunnel catches the model and saves it from destruction.

If the model comes out of the spin into the dive, engineers know that the real

airplane will be a good spinner because actually a pilot does nothing in bringing a plane out of a tail spin except set his controls at neutral and "prays he comes out." The rest is up to the airplane. If it is built correctly the ship will recover.

This test has saved many lives.

Regarding these models there is another story of what is to come. Sometime ago Brig. General George H. Brett, chief of the Air Corps Material Division, in an exclusive interview, remarked that there were "planes upstairs on the boards which were representative of tomorrow's ships —planes you won't see until 1943 or 1945."

"These new planes," he said, "may have a definite effect on your life and mine. They may change our daily time schedule and they may change the style of our clothes." He went on to explain that the new ships with higher speeds would bring the world closer together, thus stepping up the tempo of business. At the same time the habits and customs of other nations would be brought closer to home; thus, perhaps even changes in the styles of our mode of dress. And his words recalled the planes that we see today which were the models of yesterday. One feature which was incorporated in a model designed by Maj. Carl F. Greene, creator of the army's strato-plane, is now fast becoming a universal part of military aircraft—the tricycle landing gear. And there are many other examples.

At present engineers are working on a new model of a proposed bomber. They peer through delicate telescopic instruments as the air flows through the tunnel. If you're lucky they will let you take a peep, provided you don't write about it. Looking through the small glass window you can see the ship mounted in the tunnel. It is different from anything you have ever seen before. Perhaps it is that "400 mile-an-hour" bomber General Blank desired. Only time will reveal that answer.

There is a strange feeling as you see these models and then hear the roar of the giant bombers which soar overhead. It is hard to believe a small wooden model —that can't even fly—helped make possible the mighty four-engined giants.

A Class "D" Sticker

(Continued from page 21)

tissue running along the ribs (chordwise). To give a smooth job, stretch the paper tightly along the chord. Dope it with three coats.

FUSELAGE: Build the fuselage of 1/8" square hard balsa. Lay out two sides then assemble, using the side view as a top view. Fill in the nose and tail sections with 1/16" sheet. Carve a nose block of hard balsa. The tail plug is detachable and the rear hook is fastened securely to it. Make the wing mounts, but do not attach them. Cover the fuselage double, crossing the grain of the tissue. Dope this five times. The nose and tail plugs are held in place by small hooks and rubber bands.

EMPENAGE: The stabilizer is built and covered in the same manner as the

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RULE No. 1—All SCIENTIFIC gas models are eligible. They must place in the nationals to win awards.

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CLASS "A"		CLASS "B	
1st	$50.00 CASH	1st	$75 C
2nd	$35.00 Mdse.	2nd	$45 M
3rd	$25.00 Mdse.	3rd	$30 M

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$1.95 P.P.

WINGSPAN—40"
WING AREA—210 SQ. IN.
LENGTH OVER-ALL—27¼"

CLASS "C" ME

WINGSPAN—6 FT.
WING AREA—750 SQ.N.

LIGHTNING

Everything the name implies. All yellow with red lightning flashes on wings and fuselage. A model with real speed and appearance.

Complete kit Postpaid Or at your Dealer 25¢

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FURY

Easy to build and a real flyer too. Has red fuselage and rudder. Wing and stabilizer light blue with red trim.

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A sure contest winner—All white with brown trim. The twin rudders assure greater spiral stability.

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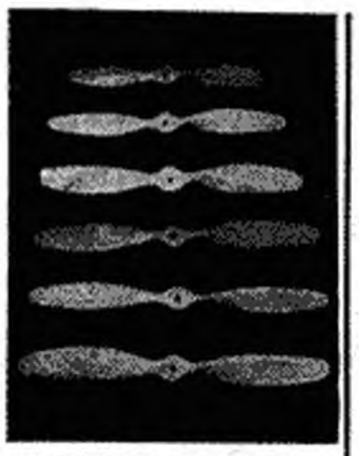
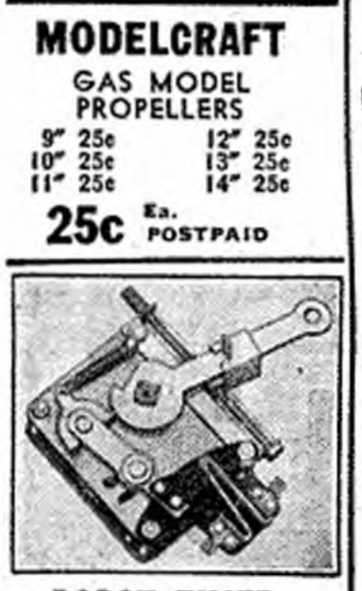


MODELCRAFT
GAS MODEL PROPELLERS
9" 25c 12" 25c
10" 25c 13" 25c
11" 25c 14" 25c
25c Ea. POSTPAID



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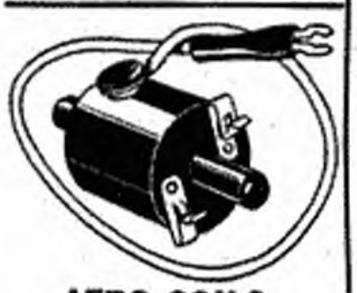
Small size, only 1¼ oz. Setting of a knob gives the desired time 100% accurate and guaranteed. $2.50 postpaid. Same timer without automatic attachment $1.95 postpaid.



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"KNEE ACTION" TAIL WHEEL UNIT
75c postpaid

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Brown Jr. Plug.....65c
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3 oz. bottle.....$ .25
½ pt. can..... .40
1 pt. can..... .70
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25¢ Postpaid

AUSTIN TIMER
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SCIENTIFIC
STAR PROPS
9" 25c
10" 25c
11" 25c
12" 25c
13" 25c
14" 25c
25c EA. POST PAID

SMITH **World's Finest Ignition Coil**
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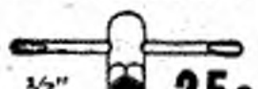
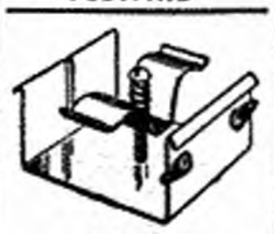


½" ⅜" 7/16"
25c POSTPAID



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Intermediate size, ⅜ oz.....30c p.p.
Regular size ½ oz. .....35c p.p.

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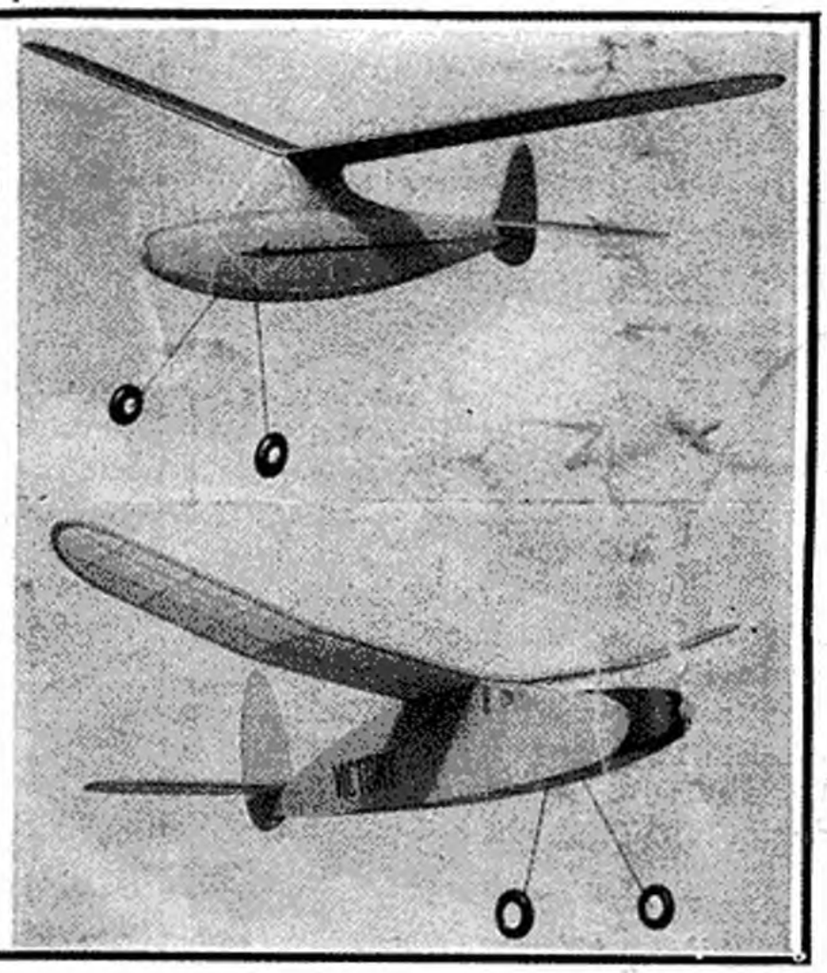
KORDA'S GOLDSTAR
WINGSPAN 32"
LENGTH 22½"
50c P.P.

DICK
KORDA'S VICTORY
WINGSPAN 32"
LENGTH 23"
50c P.P.



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RULE No. 2—National winning ships must be built from SCIENTIFIC kits, and bear decal provided.

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T.
SQ. IN. LENGTH OVER-ALL—52"

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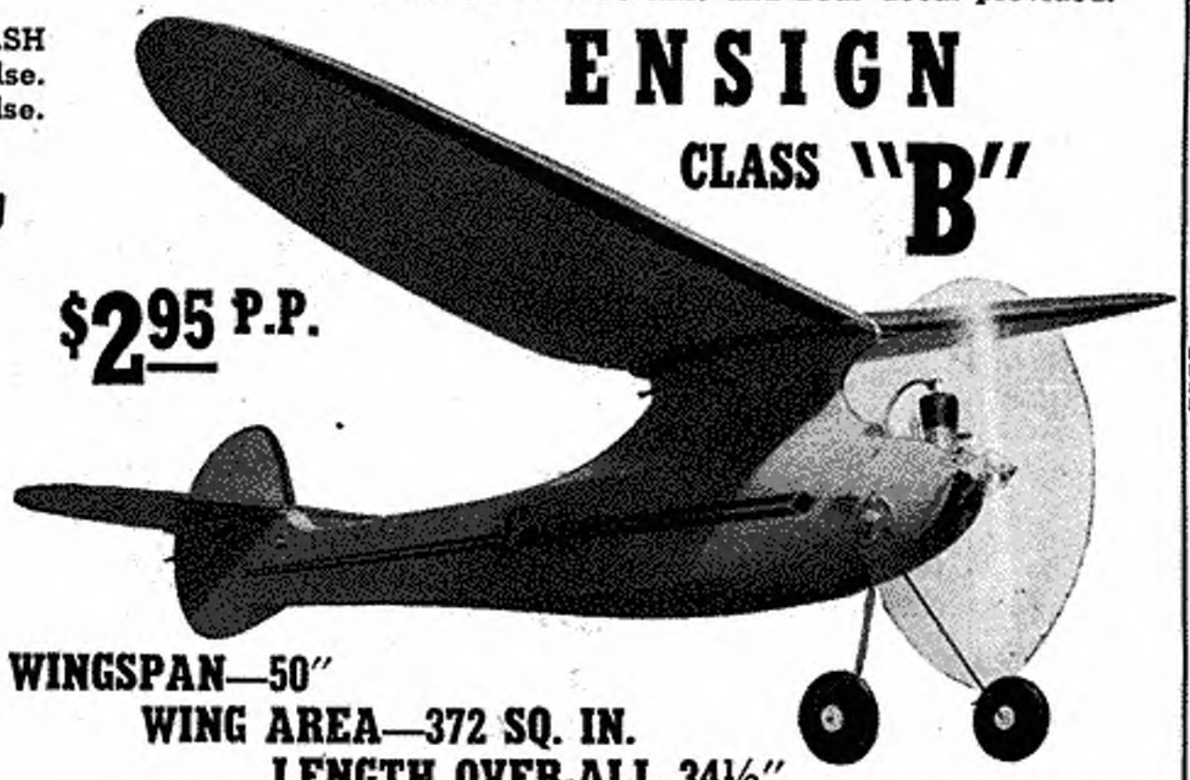
CLASS "B"



$2.95 P.P.

WINGSPAN—50"
WING AREA—372 SQ. IN.
LENGTH OVER-ALL 34½"

wing. Assemble the rudder roughly, using balsa if you have no bamboo on hand. Sand it to a streamline section and cover. Be careful to check for warped tail surfaces.

PROPELLER: Blank out the propeller as shown in the drawing. Carve it in the usual manner, using 3/16" under-camber. Cut the outline of the blades to a pleasing shape, sand and balance. Give the propeller ten to fifteen coats of dope.

To make a folding prop, cement a string of brass 1/2" wide along the back part of the propeller hub. A piece of 1/16" diameter wire is bent into a U shape and attached to the blade. The brass is bent over the wire and soldered, forming a hinge. Bind and cement these parts to the prop. Cut the blades from the hub and move the blades back and forth so they move freely. A drop of oil will help. If your prop does not fold when the motor is unwound, two small hooks attached to the blades, with a rubber band between, will make it snap back and stay. A rubber tensioner is not needed. Use 1/16" diameter prop shaft and rear hook.

ASSEMBLY: Cement the tail surfaces to the fuselage, at zero degree incidence. Attach the rubber motor, (18 strands of 1/4", brown) nose block and prop assembly. Then balance the assembly; noting that the trailing edge of the wing should be 1/2" ahead of the balancing point. Now cement the wing mounts in place, binding them to the fuselage with thread.

FLYING: Lubricate the rubber and see that the propeller rotates freely. Attach the wing, fold the prop. Warp the rudder for a slight right turn and test glide the model until a slow, floating glide is obtained. When power-testing, use right thrust (very little); no down-thrust is needed. Do plenty of test flying before using your model in a contest. When winding for long flights, stretch the motor as far as possible and "pack in" the turns. Launch the ship upward in a slight right bank and start running. The author has obtained flights from two to five minutes in dead air and finally lost the model in a clear sky!! Good Luck!!

Your Model and the Law

(Continued from page 11)

to persons on adjoining land, or travelers making reasonable use of the highways on which the land abuts.

The applications of this rule will usually be as obvious a matter of common sense as the rule itself. Yet, the very simplicity of it may often cause it to be forgotten. After all, your negligence will not be excused simply because the person or property injured by your operations did not happen to be on the particular tract of ground from which the operations began. If your carelessness results in scratching the paint on some car out in the road, you are just as much liable as if that car had been on the airport at the time. The same thing is true if your model lands on someone else's property and does some damage.

And that brings us down to the question of trespassing—a problem which, in one way or another, has confronted every good modeler at some time.

To get a clear understanding of the law on this subject, we have to know that a man's right to the possession of his real estate is said to be absolute. That is a quick way of saying that Farmer Brown owns the Brown farm, he is the only one who owns it, he is the only one who has the right to be on it and he can chase anyone off it who comes onto it without his permission. What is more, Farmer Brown has the exclusive possession of the Brown farm land down to the center of the earth. The law used to go so far as to say that Farmer Brown had the exclusive possession of the air above his land "up to the highest heavens," too—and then the airplane came along.

Now, suppose that Joe Doakes had to stop his Cub at the edge of each farm along the way between here and Squeedunk and ask the farmer's permission to fly over his land, please. You can't imagine such a thing? Well, neither can the law.

So the old common-law right of ownership was limited by statutes passed by Congress and by the states, giving licensed aircraft the right to pass over the property of others at a reasonably safe altitude. A typical state statute on the subject (Wisconsin's) reads as follows:

"The ownership of the lands and waters of this state is declared to be vested in the several owners of the surface beneath, subject to the right of flight, unless at such low altitude as to interfere with the then-existing use to which the land is put by the owner, or unless so conducted as to be imminently dangerous or damaging to persons or property lawfully on the lands or waters beneath."

Thus, the flight of airplanes across the lands of another cannot be said to be a trespass, under the law as it now stands, providing that such flight is made at a reasonable altitude. Notice that the statute does not fix any particular height at which planes must fly, but 500 feet is usually considered to be about right. Even 500 feet could be too low, in certain cases, and there might be times when flights could be made at even lower altitudes without getting the pilot into trouble.

These laws, of course, apply primarily to the big ships, but they do have some application where models are concerned. Especially likely to be enforced against the modeler is the holding that airplanes flying over land at low altitude, frightening animals and game, attracting spectators and thus injuring crops and generally inconveniencing the landowner, render the owner of the planes liable for damages.

But when it comes right down to a fine point, it would seem rather doubtful whether a model flying over land even at high altitudes might not be trespassing. Not so very long ago a chap whom we shall call A shook his fist across a fence at a lad whom we shall call B. The court held that in extending his fist over B's land, A was guilty of trespassing. The same thing has been held of shooting a rifle bullet across another man's land. So you see, it boils down to a question of just how much of an aircraft the courts would consider a model to be, in answering the problem of trespass while in flight.

But once the crate sits down on another fellow's land without his permission—that, chum, is a trespass, and no doubt about it.

Now, if you'll just keep calm for a mo-

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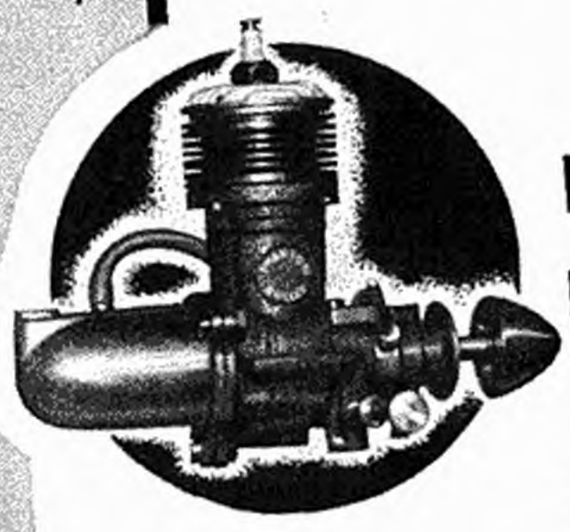
Now you can buy the Phantom built Bullet or Torpedo direct from the factory, at a tremendous savings to you. No in-between profits. We pass this entire savings on to you . . . plus a new improved motor with a new special heavy duty type radial motor mount, and a larger sturdier gas tank made from Magnesium alloy. Newly designed connecting rod. Gas guage (Torpedo only). These are the same identical record breaking motors which proved so popular, and at a much higher price. We can truthfully say, and challenge anyone to show you a finer motor that can be bought anywhere near our new prices. Every motor power tested in our factory and sold to you under a bonded factory guarantee. Order your's now! We'll have your engine on its way in less than 24 hours after we receive your order.



BULLET

NOW $7.25

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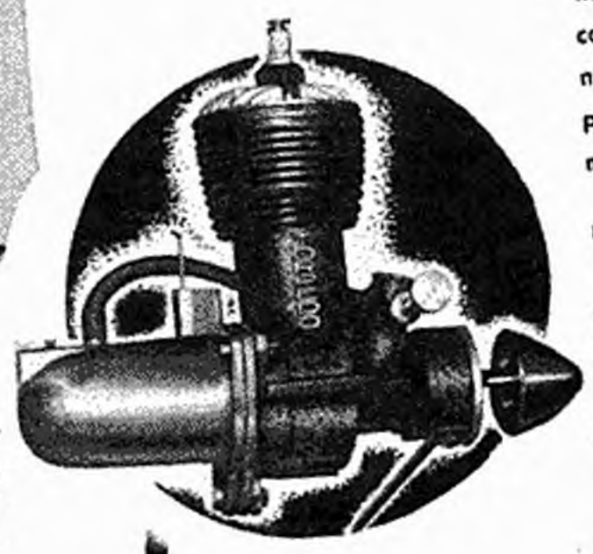
SPECIFICATIONS

1/7 h.p.; 2 cycle rotary valve; ¾" bore; ⅝" stroke; .275 cu. in. displacement; bare weight 4½ oz. Gravity feed carburetion; Diamond bored crankcase; hardened steel timing cam; solid steel case hardened crankshaft; die cast Magnesium connecting rod; lapped alloy steel piston; fully equipped heavy duty radial mounting.



TORPEDO

NOW $10.95

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SPECIFICATIONS

1/7 h.p. @ 14,000 r.p.m.; 2 port 2 cycle type; bore .725; stroke .724; static thrust 30 to 32 oz. plus; displacement .2989 cu. in.; weight 4 ¾ oz.; downdraft carburetion; plus size Magnesium gas tank; Champion V-2 spark plug, exclusive offset principle . . . easier starting, more power; metal enclosed condensers; additional crankcase fins; Diamond bored crankcase; oversize anti-friction bronze bearings; lapped alloy steel piston; die cast Magnesium connecting rod; special new type heavy duty radial mounting.

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PHANTOM MOTORS

ment, we'll try to find out what they can do to you for trespassing. In the first place, they can't put you in jail for an ordinary trespass. In other words, it's not a crime, so cancel your order for hot soup.

What can happen, at the very worst, is that the owner of the land can sue you. That's at the very worst, remember. And even then, if your trespassing hasn't done any real damage, he can only collect nominal damages—six cents or a quarter or some such negligible sum. The court will award him this in order to soothe his feelings, as it were. The traditional six cents is simply a proof that he was right, and that you had no business on his property without his permission. Of course, what with court costs and the other expenses, it will cost you a lot more than six cents before you're through.

Right here we ought to take a good look at this question of damages and settle it, once and for all. Nobody ever has to pay damages for any more than the actual reasonable cash value of the damage he caused. So if all that you did was to walk across Farmer Brown's dandelions, Farmer Brown would be awarded nominal damages—that is, damages in name only—actually some very small sum of money.

Now, if your airplane was trespassing when it landed on the Brown farm without the owner's permission, then what are *you* doing if you go after it without Farmer Brown's consent? Right, Trespassing!

Farmer Brown has the right to use a reasonable amount of force to keep you off his land, in order to enforce his right of absolute possession. But he cannot use an unreasonable amount of force. That is, he can't use buckshot or throw big rocks at you and endanger your life or limb. Of course, if you start to fight with him, he has a right to protect himself—but every modeler is a gentleman.

By this time you must be wondering what you can do in case your plane lands in Farmer Brown's back yard and he gets "ornery" and refuses to let you go after it.

In the first place the plane is still yours. Farmer Brown has no more right to keep it from you than you have to walk around on his land without his permission. But Farmer Brown cannot charge you any more for the return of your model than what his work in retrieving it is reasonably worth.

As to what retrieving a model is reasonably worth—that is a question as between you and Farmer Brown. But it seems reasonable to believe that nobody can expect to be paid five dollars simply for the task of walking out into the back yard, picking up a model and handing it over the fence to you.

Yet, it happens every day and usually the unfortunate modeler pays. What can we do about it, you ask? Well, you can always hire a lawyer and take it to court—but you know what that involves. A better way is to pay and forget it, if the "ransom" demanded is not an unreasonable one. If the property owner holds out for what you consider to be a clearly unreasonable amount, and you can't talk him out of it, then the best thing to do is try the police or sheriff's department. Usually they will convince the "kidnaper" that he is doing you a wrong. If this fails, try the district attorney. Even the toughest customer ought to come across by that time.

Incidentally, if Farmer Brown has wrecked your model in his rage, you have a cause of action against him for the reasonable value of the model—if you want to take it to court, that is.

But always remember that if your plane causes any damage when it lands, you are responsible, and you might as well act like a gentleman and pay for it.

You see, as long as you respect the other fellow's property and exercise a reasonable amount of care in flying your model, the law is entirely on your side.

Some day every farmer—as well as everyone else—may be a model airplane fan, and then we won't have to worry about such things as laws because this will be a perfect country. Until then, we'll just have to make the best of it—and obey the law.

Fundamentals of Model Plane Design

(Continued from page 17)

keep the center of gravity well forward. Consequently the material used for the stabilizer and fin should be thin, light balsa; 3/64" stock sanded to 1/32" will give excellent results. Inasmuch as the wings will pass underneath the stick in the plane, a rubber motor will be located above the stick. Therefore the stabilizer should be glued to the under side at its rear end. The fin may be glued vertically to the right side of the stick above the stabilizer. This will allow the rubber motor to pass to one side of it and to be attached to a hook at the rear end of the motor stick.

Next the propeller should be cut from medium grade balsa stock. The wheels will give best results if made of hardwood veneer, or some fairly heavy material. They should perform the function of weighting the nose of the airplane to a certain degree, as well as allowing the plane to take off and land.

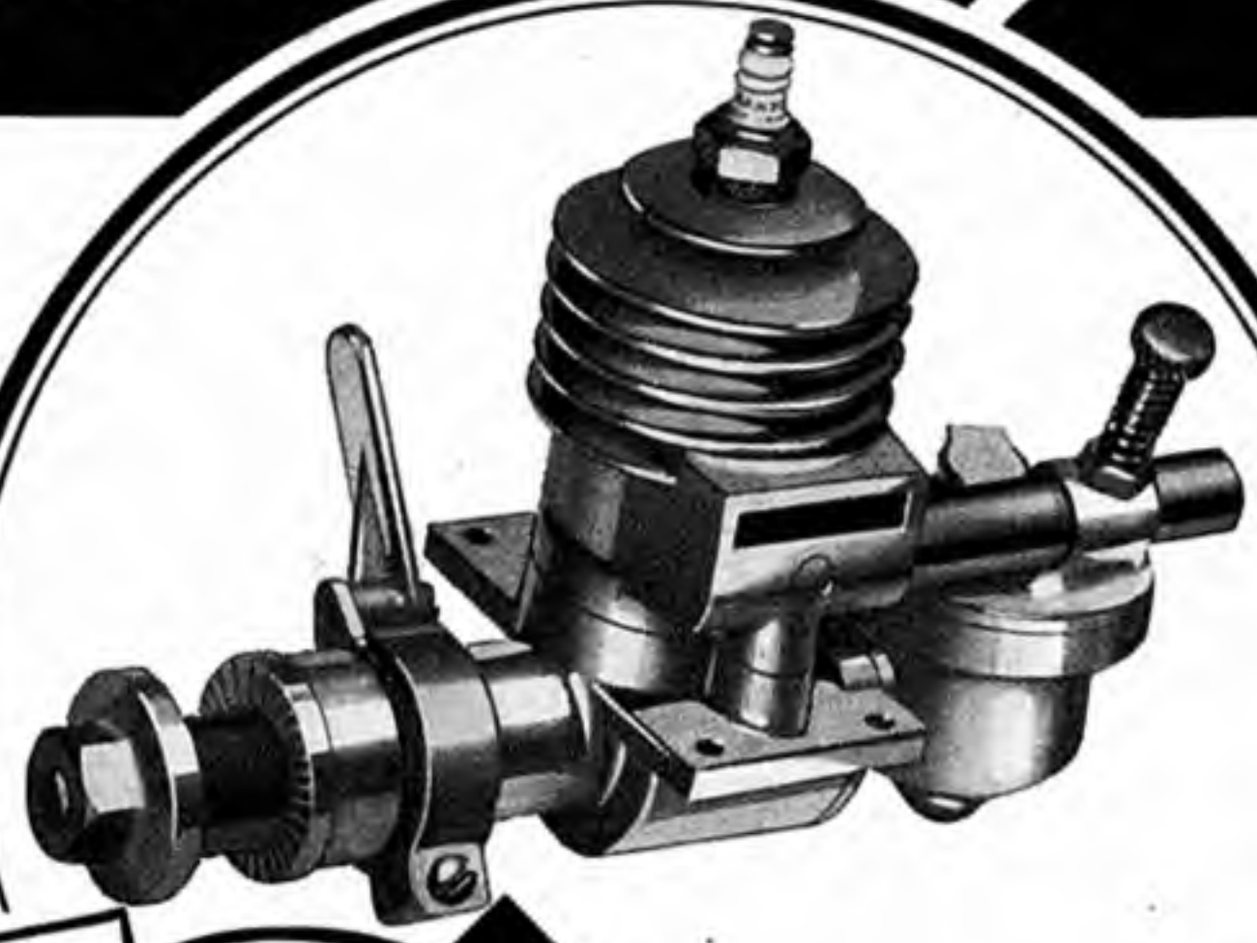
The landing gear will be of the simple single-strut type, made of a piece of 1/32" wire bent to the proper form. A single "L" type bearing may be used for the propeller. This bearing should be of metal and fastened to the upper side of the front end of the stick with cement and thread. A tail hook must be provided to which the rear end of the rubber motor may be attached. This can be cemented to the rear end of the stick. The front of the motor will be attached to the hook at the propeller shaft. This and other wire parts can be made of 1/32" diameter wire.

The model, when finished, will weigh approximately 1-1/4 ounces. This latter figure gives a hint as to the amount of rubber that should be used: With an eight-inch propeller, a plane weighing 1 ounce to 1-1/3 ounces should be powered with about four strands of 1/8" flat rubber. Thus our motor will have this number of strands.

Having worked out the structural characteristics, you may now proceed to lay out on paper the drawing of your craft. Start in with the wing. Draw it in to the proper size; that is twenty-two-inch span and three-inch chord, as shown in the plan view, Fig. 29. In the plans

it's here!

The Greatest of All Achievements in the History of Miniature Gas Engines



SPECIFICATIONS
b-30

Bore, 13/16"	R.P.M., 700 to 15,000
Stroke, 9/16"	Weight, 5¼ oz.
Displacement, .592	May be inverted.
Horsepower, 1/7—1/6	Class B—N.A.A. Rules

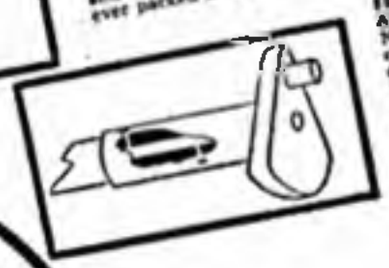
No Other Motor At Any Price Has All These Features

TIMER—The new b-30 does not have contact points. Its revolutionary new design embodies a simple commutator timing mechanism using brush contact. Oil, dirt and grime will not affect its operation. It has continuous, automatic and equal contact pressure. Absolutely free from drag. No gaps to set, no points to file. This new feature alone assures quick starting.

POSITIVE-SET CARBURETOR—By an ingenious coil spring locking device, it is possible to set accurately and permanently, the carburetor adjustment so that maximum results are obtained. Vibration, landing shocks or any other cause will not change this adjustment. It's there to stay. No ratchets or cogs are used to cause trouble or hinder correct setting. Gas feeds from the lowest point of tank at all times.

CYLINDER—The SyncrO b-30 cylinder is really different. Cylinder and manifold are moulded in one unit. The material is a special aluminum alloy which will wear much longer than either cast-iron or steel. The b-30 is the only miniature motor made in this simple, trouble-free manner.

PISTON RINGS—The piston rings in the b-30 are positively the newest development used in any motor. These new rings are narrower and stronger and will wear longer. Three piston rings are used, thus assuring a motor devoid of perfect performance. The larger bore and short stroke of the b-30 makes for smoother, steadier and faster operation. The greatest amount of power ever packed in a B class engine.



FORCED FEED LUBRICATION—Another SyncrO triumph. No more worries about oil-starved bearings. The crankcase pressure forces the oil through the shaft and lubricates the entire bearing. Forced feed lubrication plus an oversized crankshaft bearing assures you of long wear and perfect alignment.

SYNCRO b-30

BEST THAT MONEY CAN BUY

$6.95 complete with coil and condenser

BEYOND COMPARE

HEAD OF THE B CLASS

The result of years of experience and planning and eighteen months of continuous engineering, research, tests, and trials. We had **no Deadlines** to meet — we have never promised you this motor for any particular time, so we have taken the time to make it right. The result is a motor beyond compare. *Nothing like it at any price.*

Truly, the b-30 is TOPS. We have discarded everything which has caused trouble on other motors and replaced these with the best and latest engineering developments science can devise. For instance, the new timer eliminates troubles caused by oil, dirt and grime, improperly spaced or pitted points. There are no points on SyncrO b-30. It is self-cleaning, fool-proof, self-adjusting and self-compensating for wear. The timer lever is conveniently located for finger-tip control, and you can depend upon a hot electric spark at each revolution over the full range of motor speeds. There is no drag on the motor as in the obsolete cam and rocker type timers. Tests have proven it will outlast any timing device on the market today.

Then there's "Positive-set" control on the carburetor. No need to adjust and re-adjust in order to tune the motor for performance. Adjust it once for maximum performance and it stays "put." Vibration, landing shocks or a careless touch, will not disturb its micrometer-like accuracy. This obsoletes the old carburetion controls. *No need to burn your fingers.* Note the position of the adjustment on the illustration.

The moulded aluminum alloy cylinder accomplishes many things. It dissipates heat more quickly. It enables the motor to run at higher temperatures and greater speeds. The relative expansion of both piston and cylinder is equal and higher speeds can be reached and held consistently. *The wearing quality is far greater than either cast iron or steel.*

With such a revolutionary timer, positive carburetor and forced feed oil system to give perfect lubrication, plus 3 piston rings to give maximum compression seal and longer life, plus speed, plus power, plus easy starting, plus light weight—the SyncrO b-30 is truly a "plus" value in miniature gasoline motors.

Ask your dealer about SyncrO b-30; he should have them in stock. If he hasn't, drop us a line and we'll see that you get all the information available. While you're at it, ask for our catalog L40 showing our complete line.

ATTENTION DEALERS:
The SyncrO b-30 is ready now. Your instructions will receive prompt attention
DON'T DELAY • STOCK b-30 TODAY

SYNCRO DEVICES INC.
743 BEAUBIEN ST. DETROIT, MICHIGAN

part of the wing is cut away in order to make the drawing compact. Draw in the curved wing tip, as shown, and establish the location of the ribs. The spacing between the ribs should be approximately 1/3 of the wing span, or about 3-1/4" apart. This will allow a distance of 4-1/2" from the outer rib to the tips of the wings.

Next draw in your motor stick. This should be strong enough to stand the tension of four strands of rubber wound tightly. From experience we have found that a stick of hard balsa, 3/16" wide and 5/16" deep at the center, will prove satisfactory. Therefore lay in the motor stick in the plan view the proper width and length, as shown. This should be long enough to extend rearward to the trailing edge of the stabilizer; the center of the rudder being located eleven inches to the rear of the center of the wing. The motor stick should extend forward from the wing center about 5-3/8". Draw in the stick passing it over the center of the wing.

Next draw in the stabilizer the proper shape. The rear face of the propeller should be located 5-1/2" from the center of the wing, so draw this part on your plan in the proper fashion. Then indicate the bearing and washer with the thread fastening for the bearing, at the front end of the stick. The tread of the landing gear is to be six inches so the wheels should be drawn in, three inches from either side of the stick center line. Place them well forward, as shown, in order to keep the nose heavy and the center of gravity as close as possible to the propeller. When the wheels have been located indicate the wire, struts and landing gear. They may be attached to the stick by forming the wire into an inverted "U" at the upper end of the struts; this "U" being slipped down around the stick and held in place with cement and thread.

One of the hardest problems, structurally, is fastening the wing at the correct angle of 2° to the under side of the stick. The simplest method is to cut a block so that it will fit the upper contour of the wing at the center, when it is cemented to the wing parallel to the chord. The upper side of this block should be straight, as it will press up against the motor stick. The height of the block in the front over the wing leading edge should be 3/32" less than at the rear, over the trailing edge, in order to provide the correct 2° of incidence. On either side of this block two pieces of 3/64" balsa may be cemented, with the grain running vertically. This should be high enough to extend up on either side of the motor stick, forming a cradle in which it will rest. Such a mounting will hold the wing rigidly in place and prevent it from rotating on the stick, when fastened with a rubber band.

Next the side view should be drawn in, including the details already mentioned. In addition the fin should be drawn in at the rear of the stick, according to the correct outline. The motor stick at the center is to be 5/16" deep. In order to keep the stick as light as possible it may be made this depth for a distance of only eight inches, as shown on the drawing. From point A forward and point B rear-

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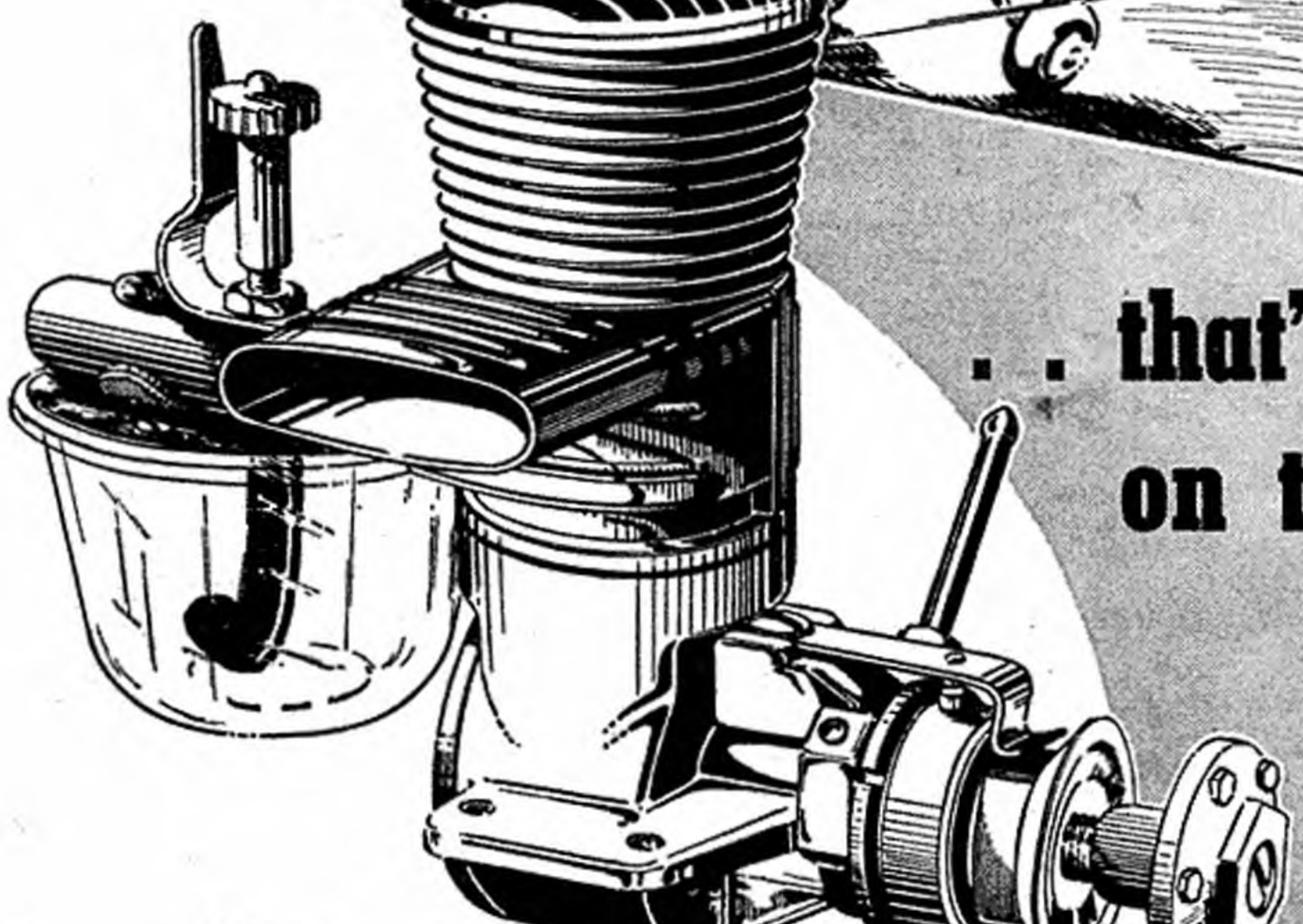

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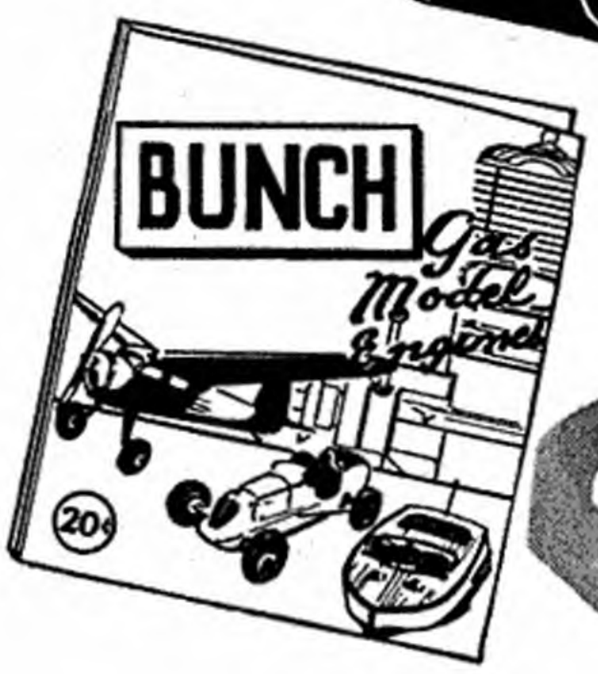

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ward to the front edge of the stabilizer, the sticks may be tapered down to a minimum depth of 3/16". By forming the stick in this manner it will have the greatest depth at the points where the greatest bending moments will occur.

In the side view the curve at the center of the wing should be indicated as raised up closely to the under side of the motor stick. The center attachment block will extend out forward and rearward slightly at angles from the leading and trailing edges (this is indicated in the drawing), and thus will allow the forward and rear ends of the block to be rounded or streamlined.

Next draw in the stabilizer under the rear end of the stick. Then the motor hook may be indicated, as shown on the drawing. The upper end of the wire is bent back to form a hook for the rubber motor. The lower end is bent to act as a tail skid.

Now proceed to draw the front view. First draw in the end of your motor stick. The upper surface of the wing at the center will rest up against the bottom of this. Consequently draw in the lines representing the top surface of the wing at the proper dihedral. Each wing tip is to be raised an amount sufficient to give stability.

It was indicated in one of the preceding articles that the dihedral should be such that the wing tips are raised 1-3/8" at the tips as a minimum. Inasmuch as this plane should be exceedingly stable it is wise to give it plenty of dihedral; thus instead of 3/4" for every foot of span, one inch per foot of span should be used to insure the safe margin. Therefore each wing tip should be raised 1-11/16" above a horizontal line passing through the center point of the upper surface of the wing, as shown in the drawing.

Next draw in the lower wing lines which represent the leading edge. Indicate the ribs at the proper points. The landing gear is to have a tread of six inches so draw in the wheels this far apart. The landing gear struts then may be indicated, as shown. The wire of the gear at the upper end of the struts should be passed up on either side of the stick and over the top. Thread wound around the two legs of the landing gear directly beneath the stick will hold the gear firmly in place.

Draw in the propeller bearing with the shaft hole 1/4" above the upper side of the motor stick.

The final step is to include the stabilizer and the fin. Now that you have your three-view drawing laid out and have shown the general form of your airplane, the details may be put in and the full size patterns for the parts made. First, lay out the outline of the wing. It is necessary only to make a pattern of half the wing. The actual length of half the wing will be 11-1/16". The width will be 3-3/16". The chord of the wing is to be three inches, however when the sheet of balsa is curved in the proper manner the curve of the wing will absorb about 3/16" in this way.

Next lay out the patterns of the stabilizer and fin to the proper outline. The stabilizer is to be 9-1/2" x 2-1/2" and the fin, 3-1/2" x 2-1/2". Draw in the curved tips of both of these surfaces.

Then measure carefully the length of the landing gear. In this case the length of each strut will be about 1/16" longer than shown in the front view, as it bends slightly forward and does not lie in the plan of the paper. Draw the landing gear full size with the struts the proper length and with the proper tread for the wheels which fasten on to it. The axles should be drawn straight as shown, as these are bent up after the wheels are in place.

Following this the other wire parts may be drawn to their proper shape. The propeller shaft will extend to the rear of the propeller approximately 1-1/4". Therefore it should be drawn so that it is about 2-1/2" in length, from one end to the rear of the hook. The piece of wire from which it is made will be approximately 2-15/16" in length. The tail skid should be made so that the "U" is of sufficient width to embrace the motor stick and the stabilizer when it is slipped on over the rear end of the frame. The motor stick is 3/16" and the stabilizer will be 1/32". Therefore the "U" should be approximately 9/32" wide.

The ribs for the wing should be drawn in carefully to the proper curve. An example of the type is shown in Fig. 29, with the wing indicated as cemented to its upper side. Next lay out the plan for your propeller block to the proper dimensions. See Fig. 29. Lines should be drawn across the block 1/16" in from the ends. From the intersection of these lines, with the edges of the block, draw diagonals as shown in Fig. 29. These diagonals will be the guide lines for cutting the propeller.

When this is completed you will have all the information and data that will be necessary for you to build your plane. You will find that proceeding in this precise and careful manner you will have a complete understanding of your plane before you start to build it and, consequently, mistakes and waste of material will be avoided.

Next month we will show you how you can build your plane, step by step.

Blow Yourself to the Nationals

(Continued from page 10)

National Meet is seen in the record attendance figures of a Cadet model meet when 53,000 Chicagonians turned out to see a much-publicized competition. Smaller Cadet meets are said to have attracted between 10,000 and 15,000 spectators.

In the way of contest personnel, Steve Meuris of the Chicago Park District, has been appointed manager of the National meet. His associate, Frank Nekimken of the Recreation group, and well known to all aeromodelers, will serve in the capacity of contest director. Maurice Roddy, commander of the Times Air Cadets and aviation editor of the "Times," is managing director and treasurer of the meet. So if you want to borrow any money, just see Maurice Roddy.

Mr. Roddy, incidentally, is a member of the Aviation Writers Association and a member of the Aviation Committee of the

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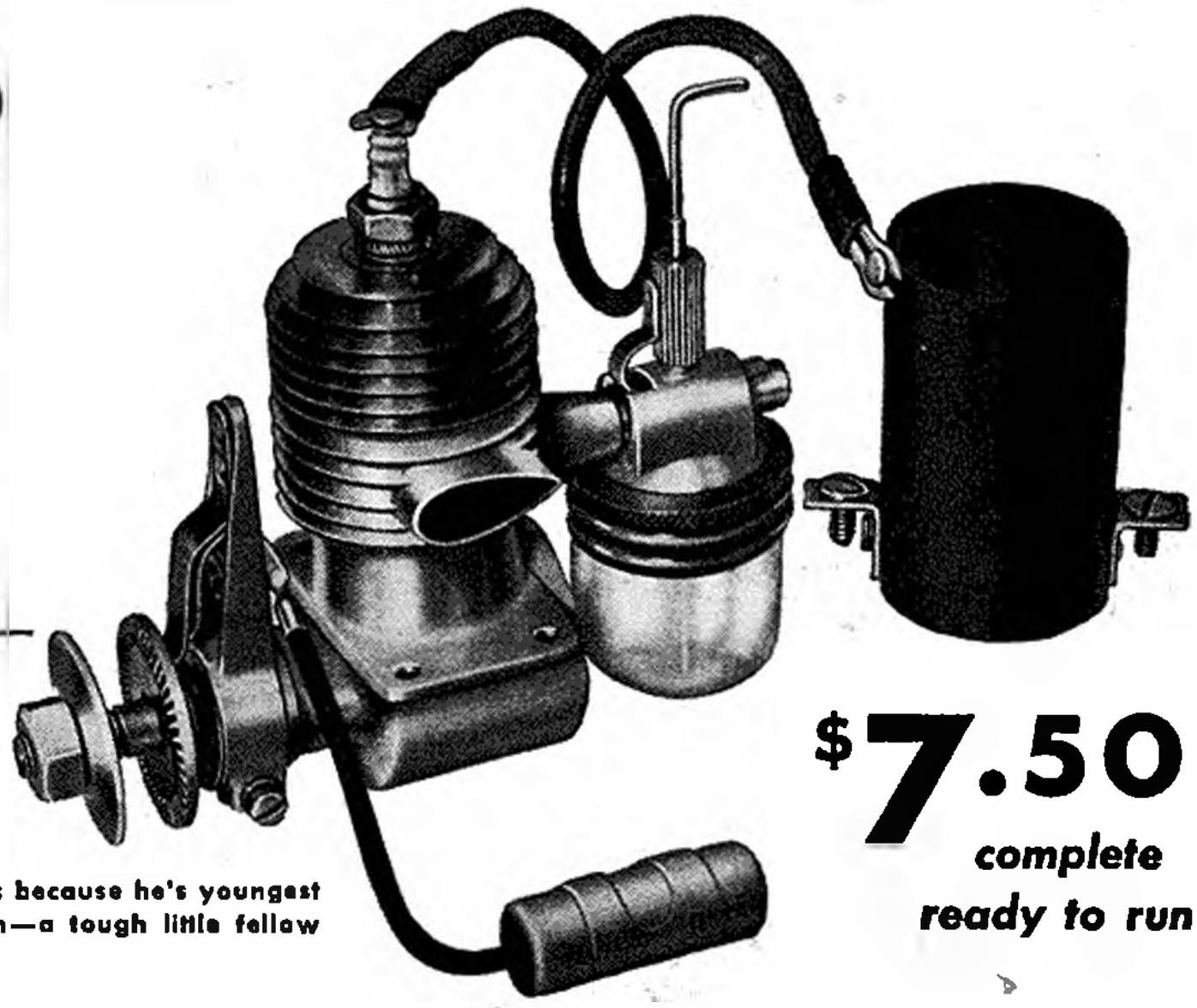

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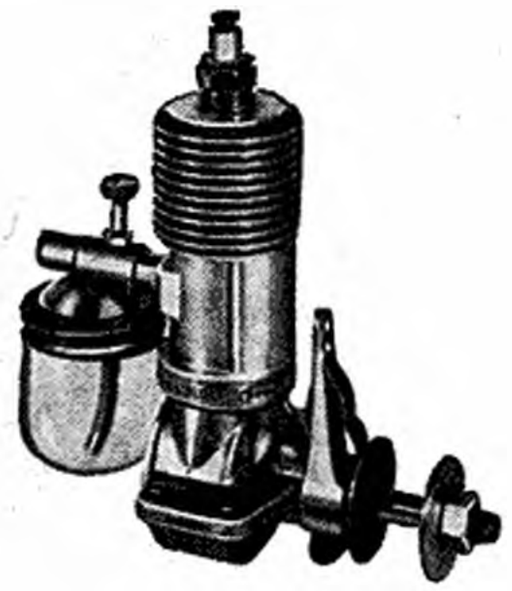

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American Legion and serves on the governing board for the Legionnaires' youth group, Sons of the Legion. All this is assurance that the National meet will be the most publicized one yet conducted, with press facilities set up at the indoor amphitheatre where the indoor flying will be held, and also at the Westchester Airport where the outdoor battle will be fought.

Also cooperating is the National Exchange Club and its Chicago unit. It is interesting to note the participation of the National Exchange inasmuch as the Detroit Metropolitan Council of Exchange Clubs sponsored the competition during the past few years in Detroit.

Many Exchange Clubs throughout the country have already announced Academy-sanctioned competitions to select winners to send to the National Meet in Chicago. Numerous other service clubs, such as American Legion Posts, Rotary groups and others are also sending official representatives to Chicago.

What about awards, did you say?

Well, all the traditional trophies will be included in the annual classic, together with many added prizes for top-place contestants. Good news for aeromodelers is that the Outdoor Hand-launched Stick Model Event will be found in the line-up once again, which automatically places the famed Mulvihill Trophy in competition.

As usual, by train, plane, auto, bus, bicycle and by foot, entrants will be pouring into the Windy City around the first of July. The usual pre-contest rumors flying about the country indicate that hundreds of contestants may be expected from the Detroit area through the cooperation of the Chrysler Boys' Tours, who are supposed to be placing at the disposal of Detroit model airplane club officials the touring trucks which carry a dozen or more passengers, and have ample space for storing luggage and model boxes.

Frank Lucas, of Toronto, Ontario, has assured managing director Roddy that an unusually large number of Canadian contestants will be on hand to pit their skill against their fellow-modelers across the border. The rumor that a Texas delegation may come up by special train is also going the rounds.

It is expected that an opportunity will be offered to try for National records in categories other than those included in the indoor and outdoor events. This can be accomplished without too much difficulty by the meet management providing one or two skilled officials to care for such record attempts. Since many indoor model builders have poor flying facilities throughout the year, it would be a treat for them to try for new National marks in the fine arena where the National indoor events will be held.

In the matter of entertainment, gentlemen, we would like to whisper in your ear that anything else that has happened before can't compare with the fun-fest said to be arranged. According to early announcements, the famed River-View Amusement Park has offered to throw open its entire area to all contestants on one or more evenings during the meet, with free concession tickets available to all, plus gratis admission to an all-star show on the River-View stage.

With all this going on, one might even think that the flying of models is the least important feature of a National competition. Our friends Roddy and Nekimken do not so believe. For them a meet the size of the Nationals requires such incidentals as 15,000 feet of rope, a hundred iron stakes, mountains of stop watches, 12 automatic bell devices for checking gas models' motor runs, 50 plywood take-off panels, 5 blackboards, 5 bulletin boards, 4 public address systems, 15 megaphones, and so on.

Can you blame a fellow for being enthusiastic?

Among the other special events scheduled to take place during the meet is a session of the Academy of Model Aeronautics on one or more evenings during the fracas. Main objective of the meeting will be to adopt a Constitution and By-Laws for the Academy so a most interesting gathering is promised to all Academy leader-members. Because of the growing number of leader-members, the session will be open only to those holding A.M.A. Scientific, Administrative and Industry membership.

Also planned for an evening during the contest is a gathering of officers and advisors of official Academy chapters to discuss and swap ideas for bigger and better club activities.

The big publishing venture associated with each Nationals is the annual "Daily Blurb." This humor sheet, which has become as much a part of the National meet as sunburn and the oft-told tale of "I would have placed first except . . . ", is scheduled to make its appearance again during the Chicago competition. All those who have attended past Nationals are familiar with the type of material presented in the "Blurb"; they and the uninitiated are cordially invited to send any advance "dirt" on the foibles of their fellow model builders to the "Daily Blurb," % Al Lewis, Academy of Model Aeronautics, Willard Hotel, Washington, D. C. In the official hotel a "Blurb" press room will be set up and the usual heavily guarded letter box will be provided in which both contestants and officials may drop daily reports on the amusing antics of one and all.

Undoubtedly you know that all entrants must hold membership in the Academy. Those holding unexpired N.A.A. model licenses are also eligible to compete. Those entering the rubber events may hold the 50c A.M.A. rubber flyers license, or the $1 gas license; all gas entrants must hold the $1 gas license, except those under 14 who hold a rubber license and special "Letter of Acknowledgment" which will permit them to fly in the gas categories.

It will save some folks last-minute preparations by announcing here that all gas models flown by contestants over 14 must bear the official license numeral decals on the upper right wing. Since the new Academy decals sell for a dime a set in both the 2½-inch and 4-inch sizes at Academy headquarters, this is no great financial burden for anyone.

It is very definite that all outdoor flying craft, both rubber and gas, must have a sticker affixed stating flyer's name and address, together with other pertinent information regarding size characteristics of

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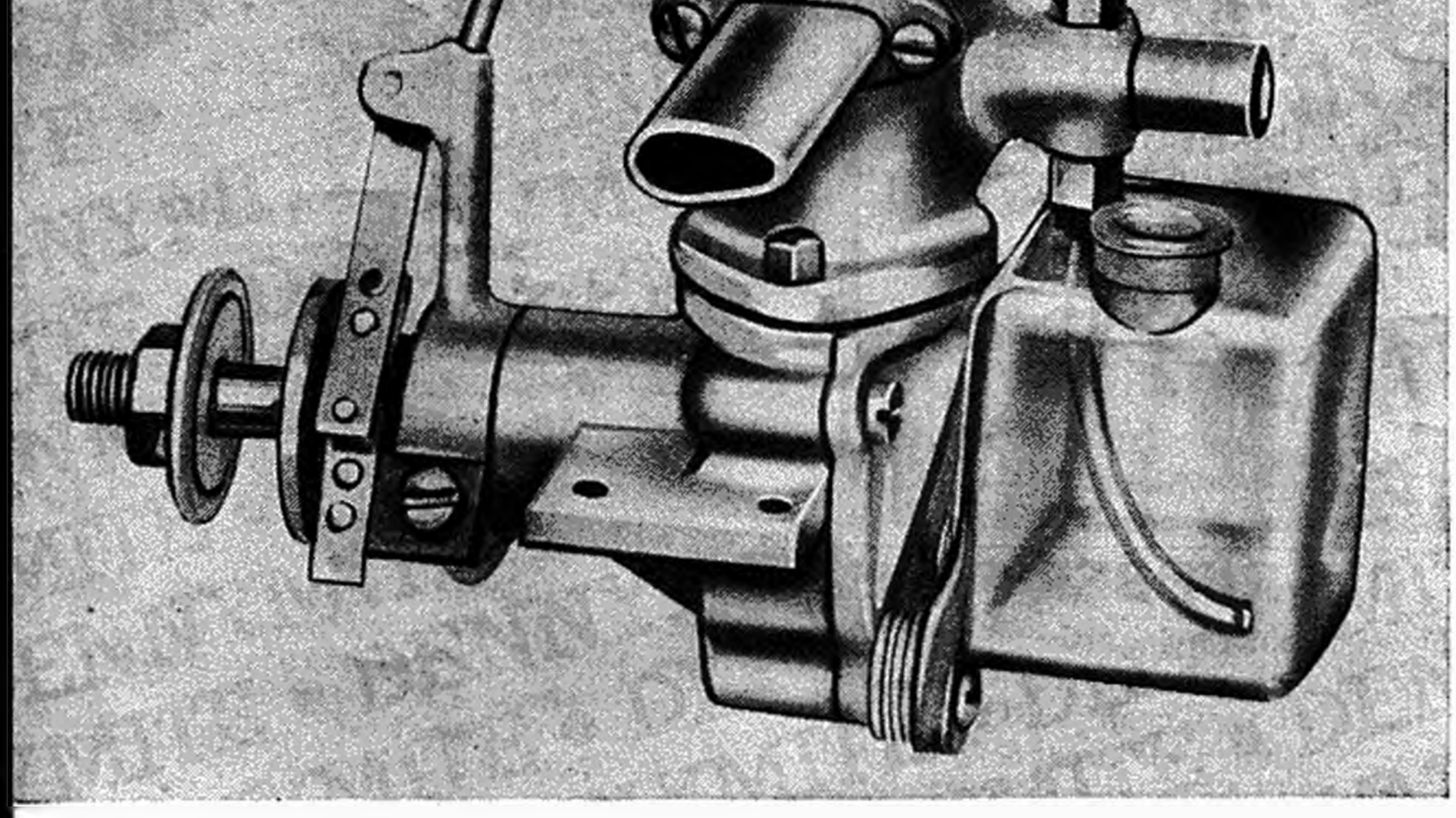

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each model. Official registration certificates for both rubber and gas models are available to all members of the Academy (and those holding unexpired N.A.A. model licenses) at no charge in small quantities. Requests for such labels should be addressed to the Academy of Model Aeronautics, Willard Hotel, Washington, D. C., and should be accompanied by a stamped, self-addressed envelope.

So it's off to the Nationals! And we know you'll pardon us now if we leave to go out and dust the cobwebs off our own competition crates, for if there's any time we like to dream of winning events and walking off with top honors, it's at National meet time.

Bet you're thinking the same.

Dreadnaught On Wings

(Continued from page 11)

lines.

These last three things are the designers' problem. The form of the modern military flying boat has been dictated by a thousand reasonable and exact requirements. And yet no one can dictate efficiency into a flying machine. And when a group of designers achieve the present epitome of military flying boat efficiency that is the SHORT "SUNDERLAND," Great Britain's mighty aerial dreadnaught and our Plane on the Cover this month, they can dictate to all those belligerent nations oppressing them a stern threat.

Thus Britain's present acceptance of the German challenge.

Success breeds success and it was the remarkable Short "Empire" class flying boats which fathered the modern lethal flying battleship that is the "Sunderland." That's true of the external outlines, the hull and wing details and assemblies, but not true of the vast amount of equipment, its arrangement and storage, the ship's accommodations, duties and capacities. From these points of view, every problem was a new one.

The fuselage of the Sunderland is of conventional all-metal monocoque construction, the frames are flanged channel-sections, to which are attached the "Z" section stiffeners. Upon this framework sheet aluminum "Alclad" is riveted, using countersunk heads throughout. There are three major bulkheads constituting four water-tight compartments which may be sealed in emergency. The shape of the hull varies considerably from that of the Empire-class boats, in that the rear step has been considerably lengthened and a knife-edge rear keel designed. This aids in combating cohesion effects of the water and hurries the process of getting the giant bomber up on the front step during the take-off.

The hull has been divided into two complete decks; the upper deck accommodating the flight crew, the lower deck the service and fighting members of the staff. Access to these two decks is gained by two large doors, which are water-tight; one located on the left of the ship near the bow, the other on the right side of the ship just aft of the front step. A large, ample cockpit windshield is provided for the pilot and co-pilot just forward of the wing and circular port-hole type windows are generously located about the hull for the convenience and duties of the crew.

The wing is of full cantilever design and is built up on two spars which are in reality only a single box beam girder. Four extruded "T" sections form the corners of a box beam. These are braced for flying loads by tubular struts and for drag or landing loads by pressed flange members.

The ribs are divided into nose, center and trailing edge sections joined at the two spars. They are built up by extrusions riveted together in the center and aft sections. The nose ribs are pressed-flange aluminum-alloy sheet riveted to the spar flanges. Stringers of "L" modified extrusions are riveted laterally along the length of the wing. This entire framework is covered with flush riveting and presents a clean aerodynamic flow over the airfoil sections.

The motor mounts are full monocoque designs. Their forward face is a circular flange with holes drilled to take the engine mounting bolts. Each of the four engine compartments are provided with two retractable working platforms in which the leading edge of the wing folds forward and is secured by heavy chains. Each power-plant compartment carries three separate oil tanks, the largest located in the leading edge of the wing. Two oil temperature regulators are mounted in the leading edge of the wing vertically beside each engine compartment. Air is taken in on the lower side of the wing, carried upward through a duct to the oil cooler and expelled out the top of the wing.

The outer wing panels are built in a single piece and are bolted to the hull fittings. The ailerons are of all-metal construction and are fabric-covered. The newly-developed Gouge flap design is incorporated in each outer panel just inboard of the ailerons and extending to the fuselage. This type flap favors the famed Fowler flap, well-known in this country, in which a section of the wing moves rearward and down. However, due to the thickness and size of the Sunderland wing, this new design does not require extension tracks aft of the wing trailing edge.

Inboard of the motors and between the two spars are the fuel tanks which are of aluminum-alloy spot-welded construction and are removable for testing and servicing. They are secured in by varnished tank pads and straps. Filler neck and vent lines extend rearward of the tank and terminate near the trailing edge.

There are three fuel tanks in each wing. The inboard pair of tanks have a total capacity of 1,058 gallons, the intermediate pair 711 gallons and the outer pair, which are only used for overload long-range operations, 265 gallons, making a total fuel capacity of 2,034 Imperial gallons of gasoline. When it is borne in mind that an Imperial gallon is 11 1/2% more than our standard gallon we can see the tremendous fuel load the Sunderland carries. The total oil capacity is 128 gallons.

The tail surfaces are of full cantilever construction. The stabilizers are covered with flush-riveted sheet Alclad. The rudder and elevators are fabric-covered and are equipped with controllable trimming tabs.

The wing-floats are of conventional rib, stringer and sheet-covered construction and are attached to the wing by two large vertical struts braced with crossed stainless steel wire.

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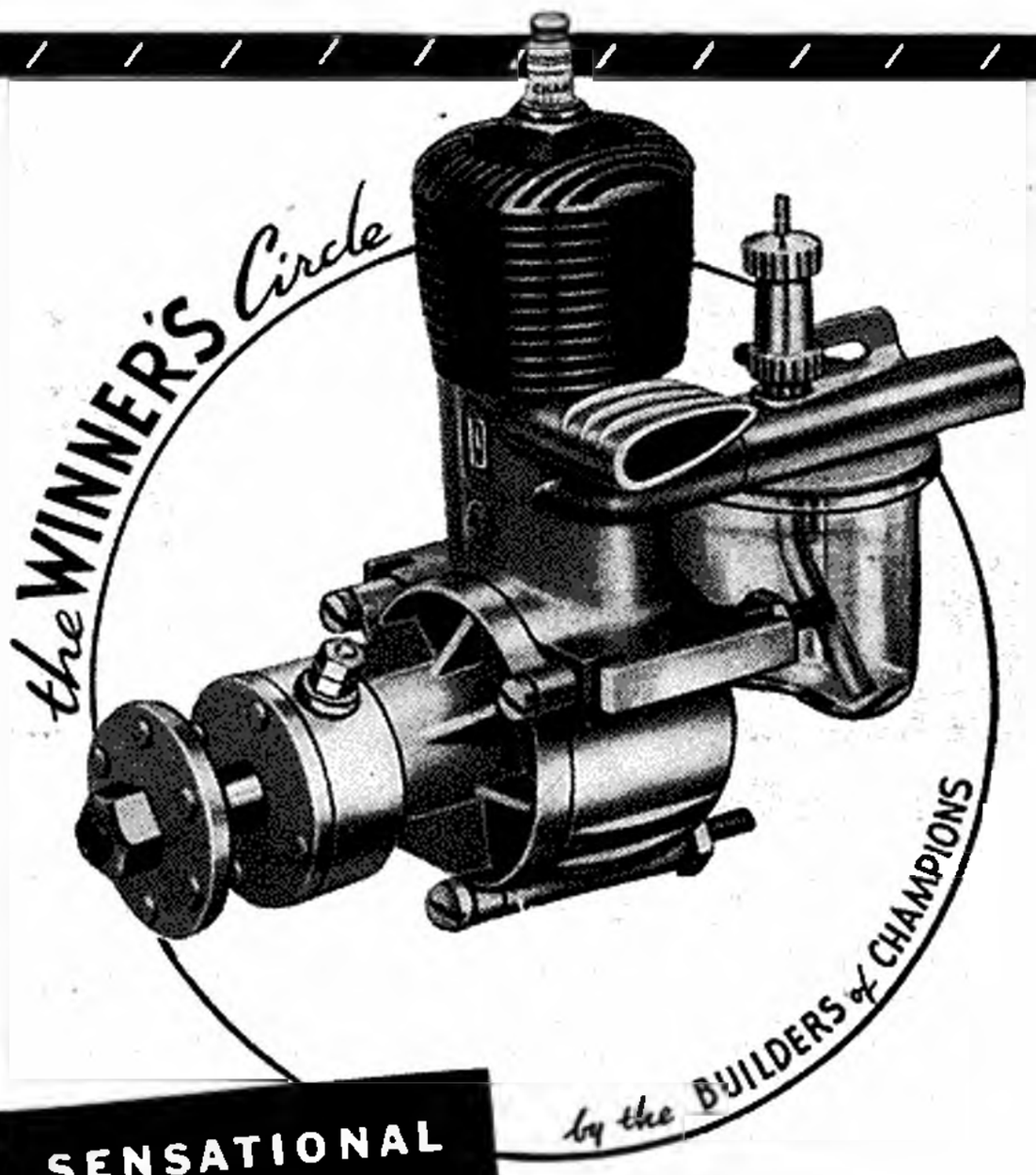

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The front gunner's turret is of the famed Frazier-Nash revolving-retracting type. The entire structure slides rearward into the fuselage, leaving a large open space to be used by the front gunner when the ship undergoes mooring operations. The turret is power-driven and may be set in any of fourteen different positions. A single Vickers machine gun is mounted in the turret gun fittings with spare ammunition drums clipped to the right wall of the turret. A portion of the fuselage nose swings forward and exposes a glassed bomb-aimer's compartment. Immediately aft of the turret the hull divides into two complete decks. On the lower deck is the mooring equipment, consisting of an anchor, an electrically-driven winch, a boat hook and lengths of heavy mooring cable. A parachute is stored on the lower deck for the use of the front gunner, who also fills the position of bomb aimer and mooring man. The left-side entrance door opens into this mooring compartment from which steps lead upwards to the upper deck and the cockpit. To the left of the stairs is the lavatory which is completely equipped with all toilet facilities.

The pilot and co-pilot sit side by side high up atop the fuselage, just forward of the wing. The throttle and mixture controls are mounted on a pedestal between the pilot and co-pilot. The propeller-pitch-control knobs are mounted atop the cockpit on a shelf just above and behind the top windshield panel. Complete flight and engine instruments are carried and are duplicated where required for the pilot and co-pilot. The flaps are operated by an electric motor mounted on the upper deck, which drives a torque shaft through a gear-box arrangement. The flight controls are duplicated throughout and are locked for purposes of mooring by a hydraulic system. There is an auxiliary electric powerplant motor located in the leading edge of the right wing for use in the event of failure of the electric system.

Immediately aft of the pilot's compartment is the navigator's room. He is equipped with a desk, sextant, radio compass loop, marker beacon dials and complete navigational instruments. A large window is located on the left side of the hull for use by the navigator in taking frequent observations.

Aft of the navigator's compartments is the chief radio operator's cubicle, which is equipped with complete radio receiver, transmitter, direction finding, marker beacon receiver and interphone equipment.

Below these two compartments on the lower deck is the crew's sleeping quarters. There are two bunks equipped with sheets, pillows, blankets and storage lockers beneath each bunk. Aft of the bunk on the lower deck is the galley with complete cooking facilities, including gas under pressure, running fresh water, an ice chest and food bins. There are four more bunks in two consecutive compartments rearwards, making complete sleeping, eating and living accommodations for six men at any one given time. As many as twenty-two men may be carried, each with a specific duty to perform aboard the craft, but the normal crew complement is only ten men.

The ship engineer's office is located on the upper deck aft of the radio compartment.

His desk and panel board is the nerve center of the ship's mechanical equipment, including the motors, the electrical and hydraulic systems, the fuel and oil systems and their operation.

Amidship, the upper and rear decks terminate at the twin gunners' compartments. Water-tight hatches may be removed and two Vickers guns mounted on special waist-gun rings fitted. The two gunners stand side by side on a catwalk and small windshields may be lowered to protect their heads and shoulders from the slipstream.

In the aft end of the fuselage just forward of the tail units is the main storage for various articles of equipment, including emergency and pyrotechnic equipment. Mounted on brackets about the walls are the collapsible life rafts, oars, a small workbench with complete tools, including vise and a small lathe, parachute flare racks adjacent to the flare launching tube, sea markers, camera, view-finder and intervalometer equipment and parachute stowage for the gunners.

In the extreme aft end of the Sunderland is the tail gunner's turret, also of the Frazer-Nash power-driven type, which mounts a single Vickers machine gun with spare ammunition drums, parachute storage for the gunner, interphone equipment, a small air-speed indicator and interchangeable telescopic gun sights and nose sights.

As may have been noticed, members of the crew do not wear their parachutes while performing their duties aboard ship, as they would be impossibly hampered in moving back and forth through the catwalks, along the upper and lower decks and in operating the guns. In time of emergency, an alarm is sounded and each crew member snaps his pack (which is stowed convenient to his station) onto his straps and files to the nearest door or emergency exit.

It would be near-impossible to name and describe all the equipment carried in the Sunderland; no other flying machine has ever carried aloft such a complete array of tactical items of equipment.

Reconnaissance flare racks are provided on the upper deck just aft of the engineer's compartment. These are used for illuminating the surrounding ocean, for signal purposes, for landing and for purposes of identification. In the center of the hull, along the lower deck, is storage for beaching gear and landing cradles, an item which has never been carried as standard equipment before. The gun-pit covers are stowed in clips just underneath each gun implacement. The bomb compartment is located amidship with large folding metal doors in the hull of the ship along the aft knife-edge keel. Complete racks for any size bombs are provided. Torpedoes may be carried and even launched from the surface through the use of a compressed air launching tube now carried as extra equipment. Landing lights in pair are provided in each wing, one a two-color light, red for signal purposes and yellow for fog landings. The other light is a powerful white landing light and illumination light when searching for survivors of torpedoed ships and other rescue missions carried out at night.

Power for the Sunderland is provided by four Bristol Pegasus XXII nine-cylinder radial air-cooled engines. Each engine has a maximum power output of 915 horsepower at 2,600 r.p.m. at 6,250 feet, and has 1,010 horsepower at 2,600 r.p.m. available

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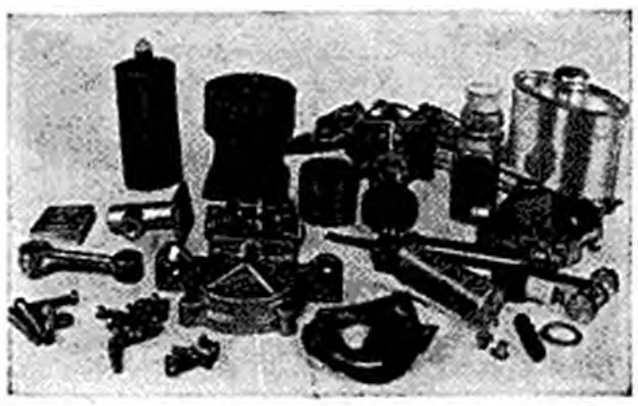
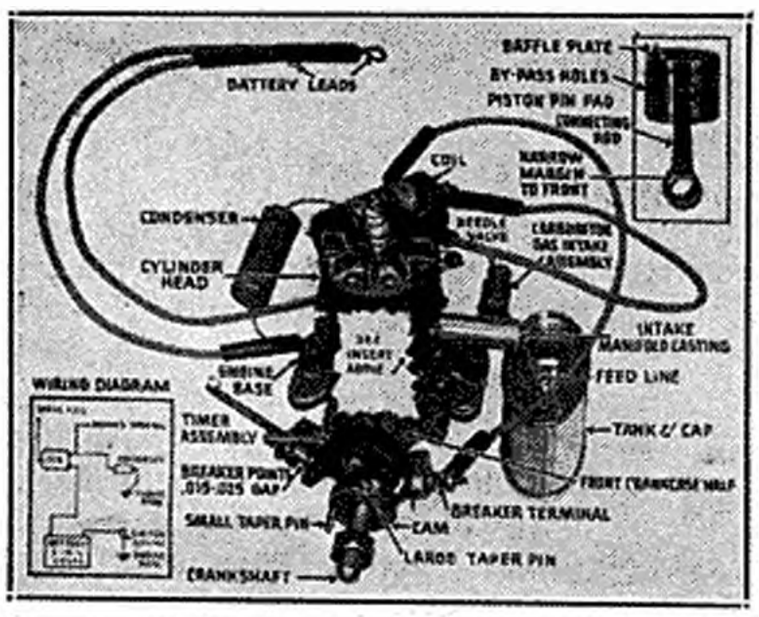


Average Assembly Time 30 Minutes



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The Short Sunderland has a wing span of 112 feet 9½ inches and an over-all length of 85 feet 4 inches. It stands 32 feet 1½ inches high and has a total wing area of 1,487 square feet.

The empty weight of the Sunderland is 28,290 pounds. The normal fuel load of 1,520 gallons weighs 11,400 pounds, the oil load of 92 gallons weighs 830 pounds, and the service load, including the crew (payload) is 5,180 pounds. Thus, fully loaded and ready for service, the Short Sunderland has a gross weight of 45,700 pounds, or close to 23 tons! And with maximum fuel load of 2,034 gallons of gasoline, which weighs 15,250 pounds, 128 gallons of oil, which weighs 1,150 pounds, and an overload service capacity of bombs, pyrotechnic equipment, guns, ammunition, emergency equipment and sufficient food and supplies, the Short Sunderland has a maximum gross weight of 49,870 pounds, or nearly 25 tons!

Thus it would follow that this great weight-carrying flying dreadnaught was the slow, lumbering type of giant. However, perhaps its top speed of 210 miles per hour at 6,250 feet will open your eyes! And bear in mind that nearly 25 TONS are being hurled through the air at that speed!

It has a maximum cruising speed at rated engine speed of 178 miles per hour at 5,750 feet and a minimum flying speed (or landing speed) of 80 miles per hour. However, this is not considered high in seaplane design and particularly in a ship of this huge size with its ample planeing bottom. It has a rate-of-climb at sea-level of 1,200 feet per minute and can take-off in a 10 m.p.h. headwind in just 23 seconds.

But for the real criteria of the Sunderland's performance it has a normal range of 1,670 nautical miles in still air and an overload range of 2,500 miles under the same conditions. Bearing in mind that a nautical mile is 6,080 feet we see, for comparison, that the Sunderland has an actual range of over 2,880 miles!

The first batch of Sunderlands, including the prototype machine, were designed, constructed and flown to far-off Singapore without so much as a single statement to the press, usually amply supplied with information on such a new ship.

Under Britain's present war production schedules, the Short Sunderland is in unlimited large scale production. No orders, as we know them specifying a certain number of ships at a certain price, are being issued in England for military aircraft. It's just: "Build as many as you can as fast as you can and we'll foot the bills!"

Anti-submarine patrol and coastal defense has been and will be the work of the Sunderland throughout the duration of this war, which will last from five to ten years according to England's most respected military experts. And if it's to be a long war, every month will mean more Sunderlands, more searching eyes, more aerial defense against the enemy's fleet, and a tightening of England's naval defense. The Sunderland has a job to do in this war. And no ship of its kind was ever prepared to do that big job in a bigger way.

An Improved Range Finder

(Continued from page 21)

the protractor to keep it always perfectly level. When thumbtacks or blocks of wood are attached to the lower end of the balance stick the protractor will remain horizontal providing the pivot hole is large enough to minimize friction.

Next a block of wood, possibly 1/2" x 1/2" x 1" is drilled lengthwise leaving a 1/8" hole just above the protractor's pivot point. The center of this 1/8" hole should be about 5/32" above the bottom of the block. It is also drilled for a pin or brad on which the protractor pivots. This hole is drilled at right angles to, and as close as possible beneath, the 1/8" hole. Thus, *the angle of elevation is read by the lower side of the wire support.* Attach the protractor to your range finder and it is ready for use.

First, with the range finder, find how far away the plane is. With the instrument still pointed at the plane, turn your head slightly and read the angle of elevation on the protractor. Then multiply the distance to plane times the sine of the angle of elevation; this gives you the altitude of the ship. The value of the sine of the angle is given in the table next to the angle in the column marked "sin." The horizontal distance is equal to the distance to plane times the cosine of the angle of elevation. In equation form: $h = d \sin, \theta$ and $d_h = d \cos. {}^{\prime}\theta$ in which h = height, d = distance to plane, d_h = horizontal distance, θ = angle of elevation, sin. = sine and cos. = cosine. The work involved in multiplying one number by another is negligible when the model builder considers the information valuable. Many builders are extremely desirous of such data and welcome the opportunity to obtain it.

If extreme accuracy is desired a protractor marked at each degree may be made. The sine and cosine of these intermediate angles are easily found by interpolation. Don't let the name scare you because you simply set up a proportion. Suppose, for example, the angle of elevation is 22 degrees. 22 degrees lies a certain fraction of the distance between 20 degrees and 25 degrees. This fraction is obtained by subtracting the lower number of degrees (20) from the number of degrees you wish to find the function of (sin., cos. of 22°) and using the remainder as the numerator (upper part) of the fraction. The denominator (lower part of fraction) is found by subtracting the lower number of degrees (20) from the upper number of degrees (25). Now, you note the function of 20 degrees and of 25

degrees; subtract the two and use remainder as the denominator. The numerator is what we wish to find the value of. In mathematical form: $\frac{2}{5} = \frac{x}{.08}$ read 2 is to 5, as x is to .08. Multiplying means and extremes, we have $5x = .16$ or $x = .03$ approx. This value is then added to the sine of 20 degrees to find the sine of 22 degrees: $.34 + .03 = .37$ = sine of 22 degrees. In other words, 22 degrees is the same proportionate distance between 20 degrees and 25 degrees as the *function* of 22 degrees is between the *functions* of 20 degrees and 25 degrees. As a final word, since the cosine increases just opposite to the sine, the value for "x" must be subtracted from the function of the lower number of degrees, instead of being added as in the case of the sine.

The writer feels that contained in this article are some very important mathematical facts stated much more simply than is put forth in mathematical books. Therefore, perhaps the reader has learned a little more about mathematics as well as how to improve his gas model range finder.

The Waco E Takes the Air

(Continued from page 13)

to the gussets provided at that point. Make certain that the ribs are at the positions indicated and at the exact angle shown. Since the stringers are merely fairing strips, they should be soft balsa. Draw the 1/16" square pieces between fine sandpaper to reduce their size to about 1/20" square. As shown by the view of a typical fuselage cross-section, the stringers are cemented directly to the under-frame, except where there are sheet balsa formers, of course.

The nose is covered with sheet balsa. A soft grade of 1/32" sheet is used and all of the shaded area, as shown on the plan, is covered. Three or four individual pieces will be needed for the job. Cement the covering to the frame using pins and rubber bands to hold the pieces in place until dry. The front of the cowling is made from several balsa discs which are cemented together. First cut the 1/4" thick disc; it is a solid piece except for the hole in the center for the nose plug. The remaining rings are cut from 1/8" sheet and all are glued together. Cement the unit to the formers of section A-A and when dry roughly cut to shape. Use sandpaper to finish the job of making it fit exactly to the sheet covering. Sand the whole nose thoroughly. The nose plug and crankcase are also made from laminated balsa discs. Cut both to shape making sure the nose plug fits neatly to the crankcase. The crankcase is cemented to the cowl-front and the nose plug will be needed later.

Tail Surfaces

The tail surfaces must be kept light since any excessive weight behind the center of gravity must be balanced by additional weight in the nose. The stabilizer is built in one piece so a complete plan must be made; build directly atop the plans. Cut the outline shapes from 1/16" sheet and pin them to place over the plan. The spars and ribs are 1/16" square stock.

When these flat frames are dry, lift them from the plan and cement soft 1/16" x 1/32" strips to both sides of the ribs. These strips are later cut to a streamline shape. Trim and sandpaper the stabilizer and rudder to complete their construction.

Wings

Construction of the wings is very easy. Full size patterns of all the different ribs are given; except where otherwise noted, they are cut from 1/32" sheet. It will be necessary to cut ten of the T-1 ribs, and two each of T-2, T-3 and T-4 as well as eight of B-1 and two of B-2. The wing tip pieces and trailing edges are cut from 3/32" sheet. Assemble the tips and then remove them from the plan for the time being. Pin the trailing edges into place; the ribs likewise. 3/32" square strips set on edge form the leading edges. Make a "vee" cut in the tip where it joins the leading edge so the fit will be better. Raise the center of the tip about 3/32" and then cement fast. All of the spars are medium grade 1/16" square stock. After the completed frames have been in the jigs long enough to prevent any warping, they may be removed and trimmed to shape. The trailing edges are smoothly tapered and the leading edges rounded; tips are neatly tapered, too.

Landing Gear

The wire landing gear strut should be formed at this time. It will first be necessary to make a full-size sketch of the wire which is shown 3/4 size on the front view. Bend the strut from .028 music wire and be sure to make the axles long enough to accommodate the wheel pants. With thread neatly bind the wire to the body at the position indicated.

Although the remainder of the landing gear is not attached at this time, the parts can be made. The wide struts that cover the wire are made from extra hard 1/8" sheet balsa. They are streamlined and a 1/16" deep groove is cut on the inside to hide the wire. The method of making the wheel pants is detailed; roughly cut the pants to shape and then finish with sandpaper. Wheels can be made of balsa, also, but they must be of thin cross-section to fit within the pants. Cement bearings to the wheels so they will revolve smoothly.

Covering

A good covering job can not be made if the frame underneath is rough or irregular; the importance of this can not be overemphasized. Use very fine sandpaper and work over all of the frame that will touch the paper. The corners of the fuselage longerons are sanded round. Once you are satisfied that the frame represents the best of your ability, the model is ready to be covered.

The author finds the regular colored tissue to be the superior covering material for flying-scale models since it can be worked into attractive color schemes and it is much lighter than colored dope. Orange with black trim is the color of the model shown in the photos which accompany this article. Many attractive color schemes can be arranged, provided, of course, a light color is used as the base with a darker color for the trim—obviously a black model can not be trimmed with yellow tissue, etc.

The cellophane side windows must be cemented to place before the fuselage is covered; the whole area below the top wing rib being covered with cellophane since the window outlines are formed by the tissue covering. Banana oil or light dope should be used to stick the tissue to the frames. Cover the fuselage first, cowling included; using many individual pieces to prevent wrinkles. Attach only the outsides of the area being covered. Cover the wings in a similar manner for they will need four or five separate pieces to do a good job. Neatly trim the excess paper with a sharp razor blade. When covering the tail surfaces, care must be exercised to keep the covering from touching the center spar. Once all the parts are covered they are lightly sprayed with water to shrink the tissue. Pin the wings and tail pieces to a flat surface to keep them from warping.

Following is the recommended method of cutting and applying tissue trim: First, a paper pattern of the design is cut to the exact desired shape; for instance, the design on the upper part of the fuselage of the origimal model was cut to shape, windows, etc., included. This pattern is then traced on a sheet of writing paper. Two sheets of black tissue are placed under the writing paper and all three sheets are held to the work board by thumb tacks. Now use a sharp, pointed razor blade and it will be an easy matter to neatly cut the tissue. Make use of a straight-edge when cutting stripes, etc. To apply the trim it is best to first lay it in the exact position desired, and then brush thin dope over it. The method, as described, is used to make all paper decorations, stripes, license numbers, etc.

Assembly

The various parts are now assembled. A half windshield pattern is given on the plan; cut a complete paper pattern to make certain that it will fit your model before cutting one from celluloid. Cement the windshield to place, being careful to prevent cement smears. The stabilizer is placed in position directly on the top longerons. Offset the rudder a bit to counteract torque. The rudder should be perpendicular to the stabilizer. Attach the top wings—this will be an easy matter since their exact position and angle have already been determined. Elevate the tips 1-1/8" for the proper amount of dihedral. Bottles, cans or the like can be used to hold the wings until dry. The lower wings are placed exactly parallel to the top wings. "N" struts are made from pieces of 1/16" x 1/8" streamlined balsa. Assemble the struts in a jig; they are a bit longer than shown on the side view since they set at an angle between the wings. Use the "cut and try" method to fit the struts most accurately. A coat of clear dope can be brushed on the entire model. Do this job in a dry room to prevent "bushing" and exercise caution to prevent any warps. Finish the landing gear next. The wide balsa struts which were made previously are fitted to the wire struts. Do not cement the tops to the fuselage; fill the groove with cement and

then cover the strut with tissue. The back and center struts are rounded bamboo. Paint the wheels before placing them within the pants; the pants being coated with several applications of dope to prepare them for a good paint job. Cement the pants to the landing gear struts.

Minor details are usually the features that "make" the model. Seven half-cylinders are required to represent the engine. Thread wrapped about rounded pieces of balsa can be used effectively. Fit the cylinders accurately and neatly within the cowl front and then paint the inside of the nose black. Push rods can be rounded bamboo or straight pins. Make the license numbers from tissue by the method previously described. Wheel pants, landing gear struts, and the "N" struts are color doped. Control outlines, flaps, a door, etc., can be represented by strips of black tissue. The tail wheel, inter-plane wires and numerous other detail can be added to improve the appearance of your model without seriously impairing the flight ability.

Propeller

Good flights can not be expected unless the model is equipped with an efficient propeller. Select a hard block 6-1/2" x 1-1/2" x 1" for the prop. Drill the tiny hole for the prop shaft, then cut the blank as indicated. A right-hand propeller is carved; thin the blades as much as possible while still retaining the required strength. Broken lines indicate how the thickness of the hub is reduced; also round the tips of the blades. Several coats of dope with light sanding between will make a smooth finish possible. A free-wheel gadget should be used and the simple "dog-tooth" type, as shown on the plan, is suggested; it is made from 1/64" brass. Cement washers to the back of the prop and to the front and back of the nose plug. The prop shaft is .034 music wire and it has a loop on the front to which a winder can be attached. Both propeller and nose plug are color doped.

The test model weighed 1.7 oz. complete and it was powered by four strands of 3/16" flat rubber. The amount of power required for other models will be determined by the weight and the performance desired. Rub lubricant on the rubber strands but remove the excess to prevent its splashing on the sides of the fuselage. A round bamboo pin in the rear of the fuselage holds the rubber motor. Your Waco is now ready for the initial flights.

Flying

The original model was a grand flier and, after more than forty flights, is still in good condition except for a few patches in the covering.

In testing the Waco, it should be flown in calm air over a grassy field. The descent from a hand glide should be flat and smooth but a small weight in the nose or tail will correct any error in balance. Next test for stalling or improper circling by launching with about 30 winds in the rubber motor; any error here can be corrected by offsetting the thrust line so the prop pulls downward to prevent a stall or to the right or left to control circling.

Other adjustments are effected by warping the tail surfaces slightly.

Now your ship is ready for a real flight. Stretch the rubber motor and store up power with a mechanical winder. When you release her she will show you how a really fine model should fly.

The "Oomph" For Winning Contests

(Continued from page 9)

prove with age.

Fuselage

Lay out the two sides of the fuselage in the conventional manner, using three-sixteenths square for the longerons and cross braces, and one-sixteenth by three-sixteenths for the diagonal braces. The two sides are then joined and the four formers, F1, are cemented to the top. One-eighth hard is used to build up the turtle back, with one-sixteenth by three-sixteenth braces. Nose and tail boom sections are planked with one-eighth sheet. At the front of the fuselage, at the bottom, one-eighth square is cemented on as shown in the plans, to hold the landing gear in place in conjunction with elastic bands, which go around the fuselage. This makes the gear removable for convenience in transportation.

The front and rear hooks are .050 wire and the tail boom is held on with Scotch tape. The nose block is three-quarters thick, shaped as shown, and eyelets are used to hold the thrust line right. The good old elastic band method holds the plug in after the power conks. The free wheeling is left to the personal preference of the builder, because of the wide variety of types and preferences.

Rudder and Stabilizer

The rudder is built up of one-eighth stock throughout, with solid one-eighth below the stab. Rudder is set at two degrees, to produce a right turn. The stab is made up of one-sixteenth ribs, with one spar at the bottom, of hard one-eighth square. This will produce a slight elliptical dihedral when covered and doped.

Wing

The wing tips, in common with the stab tips, can easily be plotted and the solid tip construction not only simplifies construction, but adds strength without adding too much weight. All ribs are one-sixteenth stock and four spars of hard one-eighth by one-sixteenth are used, the bottom rear spar being laid on the flat for ease in covering.

There are two end wing panels, left and right, and a center panel, to which is cemented the wing saddle. The arrangement eliminates the sloppy winding of elastic around the whole works and lessens chances of the wing shifting in flight. A five inch dihedral under each tip insures good stability and climb on turns.

Prop

The propeller is small and is a one-bladed affair, which at first glance seems far too small for results. The proof of its efficiency is the terrific climb and the high ceiling attained before the rubber conks. Thirty strands of one-eighth flat, well lubed, drives the prop.

Covering and Doping

The color of paper is left to the inclination and taste of the builder. Don't try to cover everything with one piece; the secret of a good covering job is to use as many separate pieces of tissue as is necessary to eliminate wrinkles. Ingenuity helps a lot, too. Water spray, let dry, then give two coats of dope, watching out for warps when drying.

Flying

Glide the model in calm air, making any necessary adjustments by shifting the wing and warping the rudder, rather than changing the thrust line. After the glide is okay, put in about two hundred turns and try. Everything okay? Swell. Now "pack in" capacity, about seven hundred turns and be sure you have carfare to chase it. The climb is very fast and to the right and a ceiling that must be seen to be appreciated. The glide is also to the right and is slow both in forward motion and sinking speed. The average time on a cool calm evening is about three minutes. Remember, common sense and a little calm reasoning will do more to give you perfect flights than all the hot-headed outbursts against your plane on poor flights. Nine times out of ten it's the bone-headed tactics of the flier that are to blame. Good luck!

Building The Hornet

(Continued from page 25)

some parts have been drawn quarter-size, some full-size, others one-eighth size. Careful study will result in clear, easily understood plans and subsequently in a well-built ship.

The Fuselage

The first step in building your Hornet is to lay the lower longerons on the plan. (Build two sides at the same time—that is lay one logeron atop the other.) These bottom longerons, which take a greater part of the shock, are of very hard stock. Top longerons may be of medium stock and it will be noted that these top longerons are doubled at the cabin. After these longerons have been placed on the plan, the A and D braces are inserted and the thrust-line longeron (which is 5/16" x 5/8" stock) is cemented in place. The remainder of the fuselage is of conventional construction and may be easily followed in the plans.

After the two sides are built allow them to dry for several hours. While these sections are drying, cut out the main bulkhead (A) from 1/4" birch plywood. The sides of the fuselage are then removed from the board. Assembly starts at this point by placing the bulkhead between the fronts of the fuselage sides and cementing in place. This bulkhead automatically squares up the fuselage assembly. The rear of the fuselage is tapered and cemented and the rest of the braces are cemented in place according to plan.

The motor mounts and landing gear are cemented in place. A careful study of the plans will make this process relatively simple. The fuselage skids, of 1/8" wire,

are bound to the lower longeron with linen thread and the "tie" is cemented. The bulkheads and stringers are then cemented in place. The sub-rudder is formed and cemented, and as the final fuselage assembly step, the tail skid and tail hook and dowels to hold swing and tail are inserted in proper places and cemented. All joints should be cemented thoroughly at least two or three times.

Ignition

A carefully wired ignition system will repay the builder many times in efficient operation. The plan should be followed very carefully in this step. All connections should be soldered, as the connections are made on the ignition platform, which is finally cemented into place.

Nose Block

The nose block is a work of art, but is really simple to build. The center portion is built of 2" x 3-1/8" soft balsa, as shown by dotted lines on the plans. After this has dried it is cut to the solid line outline on the plan. Sides are formed of 5/16" sheet which are cemented in place to complete the cowl. The motor should be mounted before the cowl is finished for your mounting may vary in slight respects.

The final interior finishing of the cowl is determined by slipping the block over the nose and letting the motor make an impression on the soft wood of the block. Cuts may then be made to allow better fit, until finally the block rests flush against the fire-wall and the motor is completely enclosed. The hole for the exhaust and adjustment holes for choking and adjusting needle valve may be made.

The final forming of the cowl is done with the aid of a sand block, plenty of elbow grease and an eye to the outline on the plan. Final step is a covering of silk, followed by two coats of cement, sanding with 10/0 sandpaper between coats. The cowl is finally given a few coats of clear dope, sanding between each coat and is then ready for the final color dope.

Tail Assembly

The elevator surfaces are built in the conventional manner. The main spar, the leading and trailing edges are placed on the plan and the ribs (which you will note are NOT cut to an airfoil at this stage) are inserted. After the section has been formed (see isometric view) the entire assembly is cut and sanded to shape.

The rudder is built "flat." All edges are cut from 5/16" sheet. The spar and the ribs are of 5/16" stock. When completed the entire assembly is sanded.

The Wing

The first step in building the wing is the cutting of the trailing edges and tips of 1/4" hard quarter-grain balsa. The wing is built in two halves and tip dihedral is put in after each half is built. The lower leading edge spar is pinned to the board. A half-inch block is placed at the tip and this spar is "cracked" at rib E, this joint being thoroughly cemented. The ribs are then slipped in posi-

tion. However the rib at the tip-dihedral break is left out in this assembly step to make dihedral forming easier.

The two top spars are placed in position and the leading edge is cemented in place on the ribs. The trailing edges and tips are inserted in place, thus completing one half of the wing. Similar steps are used in forming the other half.

To obtain the proper tip dihedral, a block 6-3/4" is placed under each wing tip. The quarter-sheet dihedral braces are inserted in the proper position and the assembly should be allowed to dry for at least an hour.

After the tip dihedral has been put in the wing halves are joined; the dihedral being formed in the same manner as was done in the tips. Block A is cemented in place and allowed to dry about half an hour, then Block B is inserted. The 1/4" x 3/16" stringers are set in the ribs and the center section is then covered with 1/16" sheet.

The original job was covered with yellow paper and trimmed with India red dope; but such color schemes are optional, of course. Don't forget, put plenty of clear dope on the Hornet. This prevents oil-soaking and lengthens the life of the model, besides making for a much neater job.

If additional information is needed, or questions arise, write the author care of MODEL AIRPLANE NEWS, sending a stamped, self-addressed envelope. We will gladly try to assist you.

Air Ways

(Continued from page 29)

span of about 24 inches and has been built in exceptional detail. You will note that even bomb carriers and bombs have been included. The Cyclone engine, as well as all cockpit details, have been made to very accurate scale. In fact no part of the real ship that is movable is neglected in the model counterpart. Ronald Hathaway of 1275 Glen Eyrie Avenue, San Jose, California, is the proud builder.

Sometime ago Edward C. Young of Co. K, 9th Infantry, Fort Sam Houston, Texas, found some plans of a Whirlwind engine in MODEL AIRPLANE NEWS. Young doubted his ability to build the motor in the detail specified by the plans; however he tackled the project, redrew the plans to suit his structural ability and finally built the engine. Picture No. 3 shows the completed work. It is a fine job and worthy of an experienced craftsman.

Picture No. 4 shows an excellent flying scale model, a Breguet bomber, built by Ernesto Cyril of 109-37 164 Street, Jamaica, New York. Cyril made up his own plans before building this ship. It has a two foot span and flies beautifully. The equipment includes machine guns and bombs. The finish is green and silver with mahogany-varnished struts. Apparently the old World War flying scale models are the best fliers.

Walter Petigoretz of 406 Miller Street, Benton Harbor, Michigan, sends us picture No. 5, showing a line-up of three of his scale models. A friend, John Deetjen, made the photograph for him. It is hard to believe, but is a fact, that the Fokker D-7 at the left and "Mr. Mulligan" in the center were both made from ten-cent kits and have a wing span of 16 inches. They are covered with 1/32" sheet balsa. Petigoretz says, however, that many details not included in the kits were added. The Mr. Mulligan model won second place in a recent contest. At the right is a smaller, built-up scale, 12" Stinson.

On March 9th the annual indoor meet sponsored by the Kresge Aero Club of Newark, N. J., was held in the Newark Armory. Picture No. 6 shows Charles Broadhurst, left, former New Jersey glider champion and famous stunt pilot, presenting the Senior Class B and C Indoor Stick Model Airplane Trophy to Henry Struck of Jackson Heights, N. Y. Henry's model stayed aloft for 9 minutes, 46 seconds. Julius Rudy of Newark, center, placed second in the Junior Class B and C. Frank Haynes of New York and Sydney Reich of Newark, left, placed second and third respectively in the Senior event.

We hear from Norman W. Kuster of Swift Current, Sask., Canada, Box 413, who sends us picture No. 7. This is a duplicate of Raymond T. Smith's Wakefield winner. Mr. Smith placed first for his team in Canada during the 1939 Wakefield eliminations. The ship has a 45-inch wing span and a 15-inch prop. It is powered with sixteen strands of 1/8", flat, lubricated, Brown rubber. Smith's original model in the official Wakefield event remained aloft for about sixteen minutes, to take second place in this international contest. Kuster says he has had some fine flights with this ship but it has never been wound to its fullest extent for fear he would lose it.

Ernest Dennis of Denholm, Sask., Canada, writes us as follows:

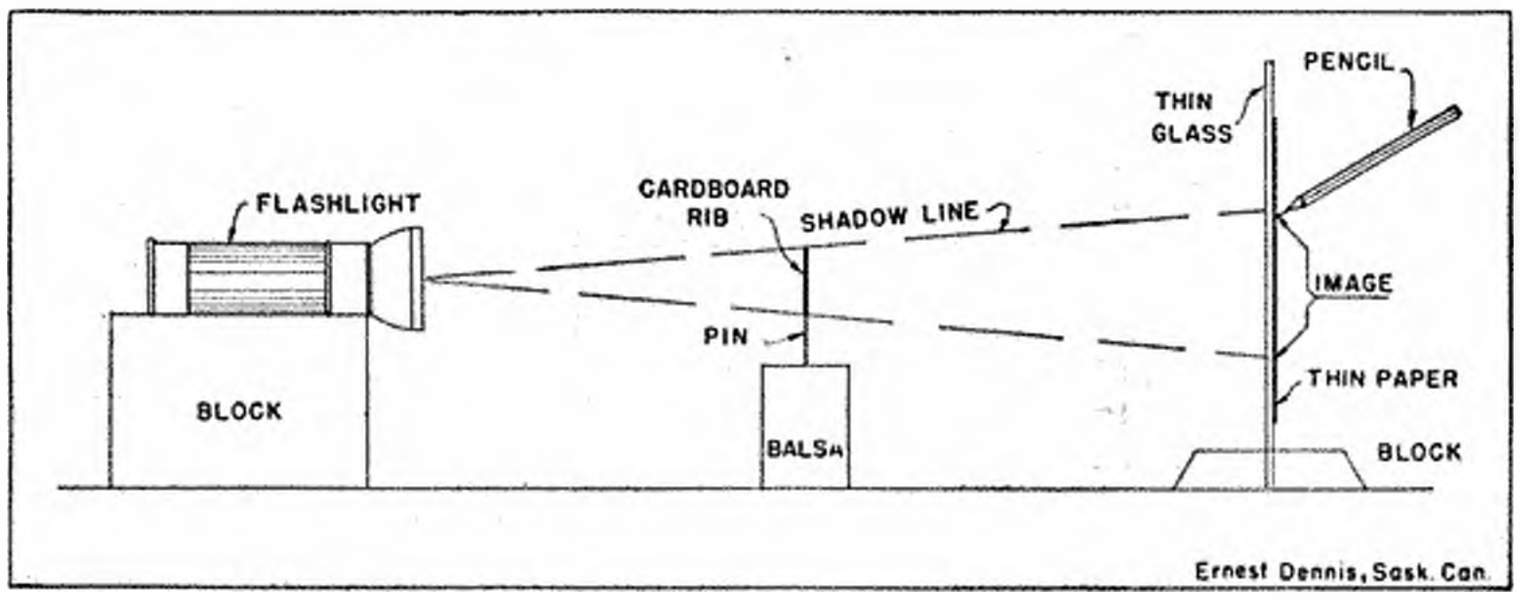
"In the November 1939 issue of MODEL AIRPLANE NEWS there was an article entitled 'Tailor Made Ribs.' Since then I have found an occasion to use the shading method, as explained in the article. There was one objection to the system, however, and that was it was difficult to make a good outline, as I could not keep my hand steady enough or out of the way of the light.

"However, thinking it over, I tried the method illustrated in picture No. 8 and found it quite successful. This is the same method as explained by Mr. Kernahan, except that instead of using a drawing board as a screen, I used a piece of glass with a paper on the far side of the glass from the light. The image was then thrown on the paper and could be easily drawn without the hand interfering with the projected image. Thin paper was used and held in place with rubber cement. Thin glass is best because it allows a sharper shadow."

Picture No. 8 is a diagram which explains this system which may be used with great success in making various size ribs from one master pattern.

Air Youth

The first Air Youth Awards "to encourage wider participation in the competitive flying of model planes" during the com-



Pict. 8. How to make ribs of various sizes with one pattern

ing summer months are announced by Ernest Gamache, Executive Director of Air Youth. The Awards, consisting of gold, silver and bronze Air Youth medals, will be offered in recognized state contests held during June, July and August, for the best performances in rubber-powered cabin model events.

Arrangements are now being completed with officials in fifteen states to include the Air Youth event in their regular scheduled state-wide contests. Although only one set of awards will be made in each state, awards will be made in addition to those already listed, where recognized state-wide meets are scheduled, if information concerning them is sent promptly to Air Youth headquarters.

"We expect that there will be at least two million boys and girls flying model planes this summer—thousands of them for the first time. Many of them will represent Boy Scouts troops, Boys' Clubs and Y.M.C.A. groups that are taking up model plane activities for the first time. Air Youth wants to encourage these groups to participate in the recognized model plane contests in their states," Gamache said.

Brooklyn

Mr. M. Irwin Wrath, publicity director of the Williamsburg Model Craftsmen, sends us a short history of his organization:

"The Williamsburg Model Craftsmen were organized on December 24, 1939. On March 17th the first club contest was held, consisting of a rubber and glider event. There were twenty-four entrants out of twenty-eight members. On April 1st we officially became an N.A.A. chapter, including an official N.A.A. Contest Director.

"The officers are: President, Sid November; Vice President, Stan Pillersdorf; Secretary, Nat Gordon (also Contest Director); Treasurer, Marx Brook; Publicity Director, Mac Wrath.

We would like to extend an invitation to all experienced modelers who are interested in joining our organization to get in touch with Mr. Nat Gordon, 12 Lee Ave., Brooklyn, N. Y."

Binghamton

S. A. Zalutka of the Model Builders Workshop, 213 Court Street, Binghamton, New York, writes the following about his club:

"A new model builders' club is being organized to conform with NAA rules under the sponsorship of Model Builders Workshop in Binghamton, Johnson City and Endicott, N. Y. Those interested in joining the club should write to Maurice Harvey, 21 Bayless Ave., Binghamton, N. Y.

"A contest is now under way with a Grand Prize of a race car and four gas

model kits, plus forty other prizes, for the best model submitted. All members of the club are urged to join. Moving pictures of airplane meets held in New York State will be a monthly feature on meeting nights. Our first speaker guest will be Mr. Stanley Metzger, Dean of the Benjamin Franklin School, who will talk on 'Hobbies."

St. Joseph

Robert W. Achterberg of 718 Court Street, St. Joseph, Missouri, writes and tells us that a new club has been formed in this city, of which he is president. It is known as the Twin City Model Airplane Association. He says:

"The organization is a combination of gas and rubber-powered model builders. We started with eight members and at the present time, two weeks later, we have fifteen members, and we hope to have twenty-five members very soon. The present plans are that we will have two contests a month among the members of the club and at least two contests a year that will be invitation contests.

"The club plans to become a chapter of the Academy of Model Aeronautics. We also expect to become affiliated with the newly-organized Michigan Model Airplane Council."

Mr. Glen "Pete" Rymer of 200 W. 9 Street, Wilmington, Delaware, is an ardent scale model fan. However he feels, as many others do, that there is a lack of uniformity in the requirements for winning flying scale meets. Therefore it is difficult to judge the winners in various contests in which these ships are entered —each one seems to have a varying degree of detail incorporated in its structure. Rymer makes the following suggestions to insure uniformity:

The Academy of Model Aeronautics should, after careful research, choose four airplane designs each year. Entrants in scale model events should be required to build models of any one of these four planes, under these rules:

1. They must be entirely to scale as shown in the plan.
2. Any length of rubber motor desired may be used as long as it is kept inside the fuselage.
3. The landing gear must be kept to the scale shown on the plans.
4. The amount of dihedral used should not be more than 1/16" for every inch of wing span.
5. The builder must have all parts and accessories on his plane that the plans include.
6. The propeller must be the same diameter but any shape or number of blades.
7. The plane is to R.O.G. from a standstill, hands off.
8. No weight rule for this event.

We think this is rather a clever idea and hope the Academy of Model Aernonautics will see fit to take these steps.

Florida

Miss Ila Rickel of 3127 S. W. 21 Street, Miami, Florida, writes:

"I seem to be deep in the dog house, and I bow by head in shame, ask the remainder of my readers to take their hats off to Mobile, Alabama. I wish to take back a statement made in the April issue of Model Airplane News about Mobile. Quote—

I'm taking two cities at once this time because both of them have the same trouble. New Orleans and Mobile. What's wrong with these cities? The newspapers, chamber of commerce and people walking down the street all know there are some model builders and they think they have a club, but nobody can tell you where it is and who any of the boys in it are. I think it would be a good idea for these clubs to get someone to back them so that if any one else goes to the city for the first time they won't have to go away, after asking everyone they could find, disgusted. End quote.

"When I came home from school the other day I received the following letter:

"'55 Semmes Avenue,
"'Mobile, Alabama,
"'Thursday P. M.

"'Dear Miss Rickel:

"'From beneath this heavy coat of shame I poke my head to say, Man, did you pile it on. Really, though, we are not as bad as you picture us. Ask New Orleans and Pensacola if we are modeless or not.

"'When you visited Mobile last summer we had no club, but there were at least fifty active members of 16 years or better carrying on from the local supply store—The Music Box. (No wonder you couldn't find us.) We went to Pensacola and brought home everything but the judges' hat. Later we took New Orleans and brought home five of the twelve prizes offered. So you see, now, we do fly.

"'In the early fall—October, I think—we organized under the name Mobile Model Aero Club and at this time we still have regular meetings although our activities are rather few and far between. But wait till spring. I think now that the Junior Chamber of Commerce has definite information regarding us. We helped them with displays during "Aviation Week" and gave exhibition flights at an air show sponsored by them.

"'But we definitely do not want some one to back us. We get along fine in a drifty sort of way and do the things we want to do. And too, when we get up it is on our own boot-straps.

"'If your feet get itchy next summer drop by Mobile and I'll personally see that you see Mobile modelers at their best.

"'Sincerely,
"'Jacque Houser,
"'Sec., Mobile Model Aero Club.

"'P. S. That address is 55 Semmes Ave . Phone Dex 2951-W.'

"Well, I'm sure readers can understand why I want them to take their hats off to the Mobile Model Aero Club.

"Any club that can do as well as they have without the aid of anyone certainly deserves all the success in the world.

"If one club can do it why can't we all do it? Let's see how many clubs can spring up without the aid of some older person or firm supporting it.

"And now to Jacque Houser and the Mobile Model Aero Club may I send best regards and hope that they continue their success throughout the coming years. Just remember it takes plenty of cooperation in all we do and every member, whether an officer or not, is needed to make everything the club undertakes a success. You

are out 'on your own' and it takes plenty of skill to run a club and get the things needed for meets, displays and anything else you might enter into.

"I believe everyone, after reading this, will be willing to agree to give you and New Orleans all the help you need in future dates.

"Now for some local Miami activities:

"'Stealing' practically all of the first place prizes at the Miami Herald Model Flyers Meet on Sunday, April 21, was 20-year-old Ed McIntyre of 78 N. W. 52 Street.

"Wind or no wind, Ed was going to win the prizes. To prove it he won first place in the glider and Class A gas model event, fourth place in the Class B gas model and third place in the stick models. He took home three nice trophies and a silver, wrist stop-watch.

"Not far behind him was that ever-enthusiastic flier, Stanley Calloway of 5825 N. W. 5 Court. This ambitious 14-year-old lad won first place in Class B models, second in Class A, fifth in Class C and fourth in the rubber fuselage events.

"I'll always remember Stanley Calloway for one instance. One Sunday at a Herald Meet, Jack Stark, the Herald aviation editor, left me in charge of the entries. Taking each event separately, I began taking down names of the boys for each event. For at least five different events I had heard Stanley give me his name when I became curious to see where all his planes were, and if he wasn't just kidding me by only giving me his name, without a plane at all. To my surprise I was told to look at thirteen planes he had brought to the field with which to win some prizes. I wonder how many of our older model builders could account for one time that they brought thirteen planes to one contest. To top it off, he didn't stop at just one winning; he won several times during that day.

"Walter Seegmiller, 17, of Lakeland took home the prize for the fuselage rubber-powered event, while his brother Bill, 15, won first place in the stick model contest.

"Gene Chaille, President of the Herald Club, took a winner with an average of 1 minute and 15 seconds for three flights. In second place came L. B. Harvey, 22, of 2357 S. W. 11 Terrace and third place saw Buddy Armstrong, 16, of 834 S. W. 13 Court. This all happened in the large scale gas models of Class C.

"It was a big meet, and put over very well by that ever-popular Miami Herald Model Flyers Club in Miami, Florida."

Institute of Aero. Sciences

The National Aeronautic Association has placed its library on loan in the Aeronautical Archives of the Institute of the Aeronautical Sciences, Rockefeller Center, New York. As many of these books were in the library of the original Aero Club of America, they are some of the rarest in aeronautics. By the addition of this collection to the Burden Library and the Institute Library, engineers, students and writers will have an invaluable source of reference material in aeronautics.

This should be a valuable source of information to model engineers.

Hartford

Boston lads capture major honors at Yankee Indoor Championship Contest at Hartford, Conn. Flying in the large State Armory all day on April 7, the Boston boys took 10 of the 15 places and all of the first prizes. Ralph Brown won two firsts and a fifth to capture the high point award. Herby Greenberg was runner-up with three second places, and Harry Lerman next with a first and a fourth.

High time in each event was: Stick H. L. (Class B)—R. Brown, 13:58:4. Stick R.O.G. (Class A)—H. Lerman, 10:28. Fuselage R.O.G. (Class B)—R. Brown, 9:36.

Coming Events

The annual Tambe contest will be held on Saturday, June 29th, at Gerritsen and Eden Avenues, Brooklyn, N.Y. There will be cabin, stick, hand-launched and towline glider and speed events; all rubber-powered. All flights to be under N. A. A. rules. For further data write Leonard Rappaport, 1116 Chestnut Avenue, Brooklyn.

The Pittsburgh Model Wings will hold the following contests at their model airport near Pittsburgh:

June 16, Goal Contest. June 23, Engine Starting Contest. June 30, Regular—Gas and Fuselage. July 7, Nationals. July 14, Regular—Special Prize for Class A. July 21, Estimating Time Before Flying. July 28, Slow Speed Contest.

The Junior Chamber of Commerce of Topeka is sponsoring a state-wide model plane contest on June 16th at the Municipal Airport. The estimated number of entrants is 125, with an attendance of 10,000. Entry blanks may be obtained from Dr. Hugh Wilson at the Chamber offices, 7th and Jackson Street, Topeka, Kansas.

The Gulf States Model Airplane Meet will be held in New Orleans, La., August 24th and 25th. Events as follows:

Flying Scale, Endurance Class C and D, Glider HL Class B, Gas Model Class Senior and Open.

This great event has been growing by leaps and bounds in the past two years and each year was restricted by invitation to the Gulf States only. However, this year it is open to all model builders who care to enter. The same handsome tro-

phies will again be offered including cash, medals and merchandise prizes.

The annual model aircraft contest held by the T. Eaton Co. Ltd. of Toronto, Canada will take place at Armour Heights, Toronto, corner Wilson Ave. and Avenue Road, on Saturday, June 15th. A truck to transport contestants will leave from the Eaton store at 8:30 a.m. and 12:30 p.m. Full details may be obtained from the contest director, Mr. Frank E. Lucas, The T. Eaton Co. Ltd., Toronto, Canada.

The Minneapolis Model Aero Club will hold its annual spring contest very soon, though date is not definite yet. Further details may be obtained from George Johnson, 3853 46 Avenue South, Minneapolis, Minn.

The American Legion Lincoln Post No. 3 of Lincoln, Nebraska, will hold its annual state-wide model plane contest in Lincoln on June 23rd. The meet will be under the sponsorship of the Lincoln newspapers. An auspicious array of prizes will be awarded to winners. Entry blanks may be procured from Glen H. Foe, contest director, at the Legion.

The Eleventh Annual National Gliding and Soaring Contest will be held at Elmira, New York, from June 29th to July 14th. Those who have attended other competitions will remember with pleasure the many thrills that this event gave them. We suggest that all model builders attend this meet, if it is at all possible. Anyone with a glider is invited to enter and share in prizes and awards. Further details may be had by writing Maurice L. Waters, Elmira Aero Soaring Corporation, Federation Building, Elmira, N. Y.

Frontiers

(Continued from page 19)

Stan Hall made a flight of 5 hours 6 minutes in his two-place "Cherokee" sailplane.

Among new navy acquisitions will be the new Grumman twin-engined XF5F-1 and a revamped version of the Bell Airacobra. The Grumman has been in process for many months, to which we have given spasmodic reference. Now at last is a more detailed description of the airplane that is going through its test paces. The fuselage of the little airplane begins at the leading edge of the wing between two large engine nacelles and goes aft to a double ruddered tail. The single pilot sits up "high and dry" with all the visibility in the world at his disposal. The engines, which appear to be small radial Pratt & Whitney Wasps are mounted close together, side-by-side, in the leading edge of the wing. The airplane has plenty of speed, though we do not think it will approach the top speed of the Lockheed P-38 interceptor. From all appearances the XF5F-1 looks as though it would be adaptable for carrier landings and would therefore mark the first time a twin-engined fighter was used regularly for aircraft carrier duty.

Following Grumman's late practices, all control surfaces and wing tips are of the sharp-cornered, stub-type, and we much prefer it to the XF4F-1. Two light aircraft cannons or six machine guns may be installed in the sleek little ship. It is something that would fit well with that war in Europe and would run "rings around" Germany's twin-engined Messerschmitts.

We have not as yet grasped any details on Bell's fighter for the navy. Both the Vought-Sikorsky XSO2U-1 and Curtiss XSO3C-1 powered by Fairchild Ranger engines have been accepted by the navy.

The navy's largest venture, one of super colossal proportions, is the patrol bomber reported to be under construction at the Glenn L. Martin plant in Baltimore, Maryland. First reports say that the airplane will have a wingspread of 230 feet and six 1500 hp. engines. The design may be changed somewhat for larger powerplants now available, however. Weighing 84 tons, gross, this new gigantic flyingboat will carry a useful load of 30 tons, a good portion in the form of T.N.T.! The maximum range will be 12,000 miles though, with the way the situation is in Europe, the plane will not have to go that far to get into trouble. We think somebody slipped on that 12,000 miles business; 6,000 miles would be more reasonable. Anyway the airplane will be the largest ever, and with the navy paying all the experimental expenses, the airlines will then be able to step in and order a few for possible trans-oceanic service. Comparing the loads of the Martin to the new Douglas B-19 bomber we see that the B-19 has a gross weight of 70 tons with a useful load of 28 tons . . . and here is a little information on the power-plants that will be used on Douglas's new four-engined 210 foot goliath. The engines used will be 2000 hp., 18-cylinder, double-row Cyclones designated SI-FC-A-R-18. They will turn 16 foot, three-bladed propellers.

Boeing has just received a brand new order of $8,000,000 from the U.S. Army Air Corps in addition to the equally as large one they received a few months ago. This time it is for B-17D bombers that will be considerably larger than the present "Flying Fortresses" . . . almost the same size as the DC-4.

While Boeing, Douglass and Martin go larger, larger and larger, Curtiss about faces and diminishes the depth of the cockpit on her new P-40D pursuit by two feet, thus less frontal area and more speed. The Vega subsidiary of Lockheed has now gone into the production of armament, such as motor-driven gun turrets, bomb racks and other miscellaneous machine gun and aircraft cannon installations. They also have a new airplane project on the fire and hold a contract from the U. S. Army Air Corps for the development of radio controlled target aircraft.

It is very problematical indeed that the Northrop and Douglas airplanes ordered by Norway will ever reach there. However Douglas received an order for light, single-engined bombers similar to the A-17 and Northrop is in receipt of a smaller order for 24 single-engined patrol bombers equipped with floats. Designated N-3-PB, the Northrop carries a crew of three and five .30 caliber machine guns. Wingspread, 47' 8"; Length, 34' 6". A radial engine will be in the nose of the 10,000 pound craft. Something unique in the design of tail surfaces will be incorporated. Mr. Northrop plans the production of a series of different types of airplanes, all based on one general design, and is said to have in mind four different airplanes to be built presently. One will be a high speed twin-engined military

creation of which an actual man-sized flying model is now being completed preparatory to tests!

From the Spartan Aircraft Company comes the following information on their new primary trainer, NS-1. Both army and navy versions are available and have already been under test by the two units. The airplane is an unstaggered biplane with wings of equal chord and has a slight overhang on the upper panels. The wing is of spruce spar and rib construction, fabric covered. Aluminum alloy wing tips are removable. Wing tanks in the upper panels hold 34 gallons of fuel. The fuselage is of steel-tube frame construction with removable side panels adjacent to the two cockpits to facilitate servicing and maintenance, a feature that made North American trainers famous. This feature is equally important in the production of the airplane as it tremendously facilitates the installation of the intricate controls and equipment in the cockpits. Throughout the airplane much attention has been made to servicing facilities. Since speed is not of great consideration in the design of a training plane, the servicing and maintenance features are almost as important as the flight characteristics, especially in wartime when the airplanes must be maintained in flying condition as much as possible. France and England especially are in need of many more trained pilots and the time of overhaul periods must be kept at a minimum. That is why the French are so pleased with our North American trainers. They have been flying the airplanes ten hours a day from very bad, mud-ridden fields in all kinds of weather, but the airplanes are so well designed that any part can readily be inspected, overhauled or repaired in such a short period that there is scarcely any loss in flying time.

The landing gear of the Spartan trainer has a very wide tread and is equipped with oleo shock absorbers. Hydraulic brakes, including a parking brake control and steerable tail wheel are other features. A Lycoming R-680-7 engine of 220 hp. is the powerplant. Specifications follow:

Span—33 ft. 8.5 in.; Length—24 ft. 2.75 in.; Height—9 ft. 4.25 in.; Wing Area—301 sq. ft.; Gross Weight—2,800 lb.; Top Speed—115 m.p.h.; Cruising Speed—100 m.p.h.; Landing Speed—45 m.p.h.; Rate of Climb—880 ft./min.; Service Ceiling—15,000 ft.; Cruising Range—350 miles.

Aeronca is offering their new tandem trainer with Lycoming, Continental or Franklin 50, 60 or 65 hp. engines. Prices range from $1390 to $1590. Following are the figures that usually bring the sales:

	50 hp. Models	*60 hp. Models*
Top speed—	92 m.p.h.	100 m.p.h.
Cruising speed—	82 m.p.h.	90 m.p.h.
Landing speed—	35 m.p.h.	35 m.p.h.
Service ceiling—	15,000 ft.	16,000 ft.
Rate of climb—	500 ft./min.	600 ft./min.
Range—	250 miles	250 miles.

We shall enumerate a few salient features that the designer has to consider for this type of plane besides the usual routine procedure:

1. Rear brace strut easily adjustable to correct for wing heaviness. 2. Metal wing ribs used. 3. Excellent stalling characteristics are provided by the wing design. 4. Oil and spring oleo used in landing gear. 5. Cabin has sufficient leg and head room for the use of parachutes. The rear seat is elevated five inches above the front seat to provide better forward visibility from the rear seat. 6. The all-around visibility is excellent due to the number and large size windows. 7. Aileron tables are mostly concealed behind the upholstery for better appearance. 8. All necessary flight and engine controls are available from either seat. 9. The instrument panel is visible from either seat. 10. The wing struts are swept forward and a large door and step are provided to allow easy entry or departure from the cabin. 11. Pilot and passenger must enter cabin from aft of the wing brace struts and thereby stay clear of the propeller. 12. Dual controls are supplied with the passenger's seat being removable. 13. There are removable bush-

(Continued on page 65)

CLASSIFIED DIRECTORY

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BROWN AERO RUBBER—Hodgman Rubber Company, 261 Fifth Avenue, New York City. Chicago Office: 412 South Wells Street. Dealers and manufacturers only.

1940 GMS catalogue lists "Everything for Gas Models." Airplanes — Boats — Race Cars — Motors—Supplies. Gas Model Specialties, 128 W. Washington, Syracuse, N.Y.

MODELBUILDERS! Send dime for giant surprise catalog of gas and rubber supplies. Dime refunded first order. Wholesale and Retail. Fireside Hobbies, 2502 Webster Ave., Bronx, N.Y.C.

NEW Comet Zipper Jr. Aeroplane kit—$1.00, Sky Chief Motor $6.95. Complete line of Hobby Craft and Supplies. Aeroplane—Racing Cars—Boats—Railroads—Motors—Stage Coach—Balsa Wood—Props. Send 5c for 1940 Catalogue. Teyuo Hobbycraft, 85A Cortlandt St., N.Y.C.

HIGHEST allowance for your motor in trade for new Ohlsson, O.K., Dennymite, Forster, Hi-Speed, others. Write for information or send old motor for estimate. Sieluke Motor Service, Waterford, Wis.

REMOTE Control Needle Valves for Baby Cyclone or Torpedo, 25c postpaid. Race Car Fans—Put your colored lacquer on to stay. Our Zinc Chromate Primer guaranteed. Two ozs. 25c postpaid. Aero Supplies, 1817 Third Ave., Los Angeles, Calif.

RUBBER by the skein postpaid. 1/8—65c; 3/16—70c; 1/4—90c. Modelcraft Distributors, 1336 So. Mississippi River Blvd., St. Paul, Minn.

PHILMOLUBE. The Superior Pennsylvania Lubricant for Midget Gasoline Motors, is our specialty. 8 oz. can 50c postpaid. Phillips Model Supply Co., 11 A Harvard St., Montclair, New Jersey.

GET on our mailing list. Guaranteed supplies, cut rate prices. Latest items. Capital City Model Shop, 71 E. Arch, St. Paul, Minn.

MOTORS, All Makes. Send for Price List. Highest Price paid for your old motor. Write before you buy and save money. Huber, 58 Tariff St., Sayville, N. Y.

ATTENTION Model Builders—Made-to-order spun aluminum cowlings ¼ to ½ inch dia. 25c; 9/16 inch to 1 inch dia. 50c postpaid. Enclose sketch of cowling wanted, make and scale of model. Model Aircraft, 9206 Aviation St., Love Field, Dallas, Texas.

MANUFACTURERS, Jobbers, Dealers: Washers, thrust bearings, propeller shafts, hard wood wheels and other supplies. New Flexo gas model propeller, a new plastic material, will not break or flutter. For prices and information write Kaywalt Manufacturing Co., 2702 Dwight Ave., Dayton, Ohio.

HAND CARVED props, for fuselage or flying scale models, to your specifications. Highly polished, ready for use. Send for price list. Marhion Hobby Shop, 2126 So. 6th St., Milwaukee, Wis.

DEALERS: For faster service, better values, deal with Capital City Model Shop, 71 E. Arch, St. Paul, Minn.

LAMINATED Gas Model Props. 8" to 11"—20c; 12"-13"-14"—25c; 15"-16"—30c; 17" to 20"—35c. Red, White & Blue laminated. Varnished with stars add 15c. Standard props 1c an inch. Walt Schmitz, 5160 Bryant, Denver, Colo.

SAVE! Highest prices on engine trade-ins. Will meet any other offer. Send engine for estimate. All motors sold. Charles Folk, Simpsonville, South Carolina.

PATENTS—PHOTOS

INVENTORS—Registered Patent Lawyer will answer, FREE, questions regarding the obtaining of Patents. Box 4286, Washington, D. C.

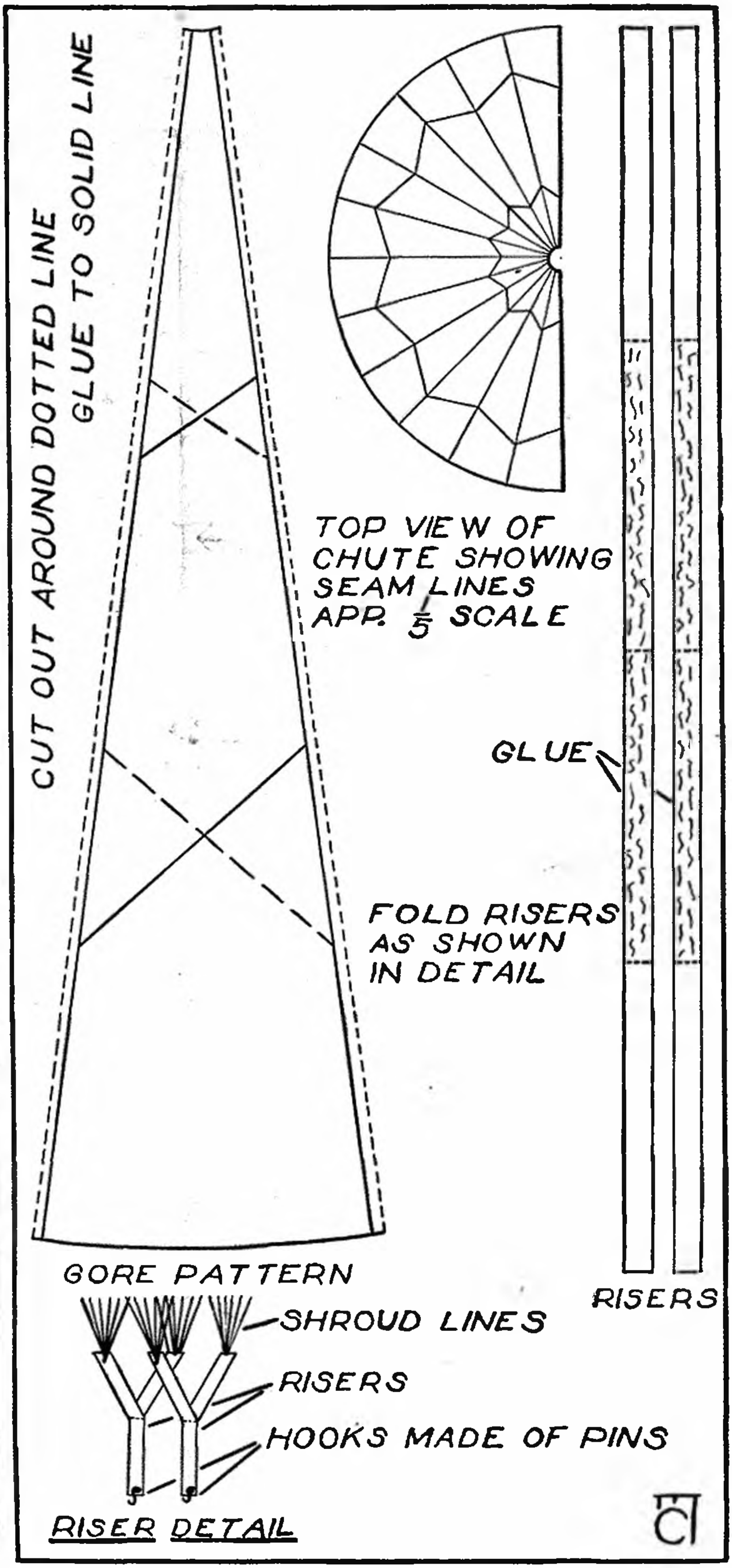
ROLL DEVELOPED. 16 Artistic Deckled Edged Permanent Prints, 25c. Reprints, 3c each. 100 Reprints, $1.50. "As Reliable As Uncle Sam's Mail!" Midwest Photo, Room 324, Janesville, Wis.

AUGUST ISSUE ON SALE JULY 8th

BLUE-BIRD Racer for Ohlsson 23 or Brownie Motors Complete Kit including fly wheel—$7.50 PP.

Postcard brings circular on Blue-Bird Racer and four different types of motor boat hull kits: step-hydroplane speed hull (C motor); displacement type hull, air-drive hull and single-plane speed hull all for B motors.

Morristown Boat Works Co. **Morristown, New Jersey**



MODEL PARACHUTE PATTERN

Frontiers

(Continued from page 63)

ings used throughout the structure so as to allow easy replacement of parts subject to wear. 14. The fuel system is designed so as to supply fuel in any flight attitude except inverted flight. 15. Numerous inspection plates are provided in the fabric covering. 16. Fuel lines are made of Resistoflex tubing to prevent breakage due to vibration or crystallization.

The single seater fighter FDB1 was developed by the Canadian Car & Foundry Company, Limited, keeping in mind the need for aircraft best suited for modern military air operations.

Initial flight tests have shown that the FDB1 is not only in the class of 300 m.p.h ships, but the landing speed is less than 57 m.p.h. This gives an exceptional range of operating speeds. A ratio between high speed and landing speed of about 5 is thus obtained. As the power employed is only 750 H.P. room is given for further improvement in performance if such improvement is deemed necessary.

Particular attention was given to obtaining a high rate of climb at various altitudes, as well as a high degree of maneuverability so essential for fighting quality of aircraft, and to the possibility of using such an aircraft for temporary landing field operations as case will present itself in actual military operations.

The small overall size of this aircraft is responsible for its high factor of maneuverability, and also facilitates easy storage and shipping.

By means of a combination of lift increasing devices, such as flaps and slots, hydraulically controlled by the pilot, either by means of an engine pump or by emergency hand pump, the FDB1 is under full control through all ranges of speed, including landing speed. These characteristics will be readily appreciated not only for forced or emergency landings, but also when in times of emergency less experienced pilots must be used for military operations.

Ease of handling will further help to reduce the cost of training pilots and much valuable training time will be saved.

The FDB1 is an all metal biplane, with wings and movable control surfaces fabric covered. "Gull" wing construction of the upper wings provides the necessary visibility for the pilot in flight, as well as for gun sighting with a minimum blind area obstructed in any direction.

The fuselage is of semi-monocoupe construction which tapers sharply aft, and which is built up of dural stringers and bulkheads, covered with a flush riveted stressed skin covering. The wing center sections are integral with the fuselage. The tail cone is removable.

The cockpit located aft of the trailing edge of the upper wing is equipped with a sliding type canopy top made of a transparent, plastic, shatterproof material which is also used for the windshield. A locking device operated either from inside or outside the airplane allows the top to be locked in several intermediate positions and either fully open or fully closed. The canopy top is also provided with an emergency release, which allows for quick detachment of the canopy top from the aircraft. Good vision is afforded in all directions. The pilot's seat is of the adjustable type.

Equipment in the cockpit includes controls for the propeller, engine, gills, oil coolers, trim tabs, flaps and slots, fire extinguisher, brakes, landing gear and tail wheel lock; complete flight and engine instruments, landing gear warning light, rheostat controlled cockpit and instrument panel lights, oxygen equipment, first aid, map case, electric starter engaging device, engine primer with shut off cock, and wobble pump.

The wings are of two spar dural construction, built up with dural compression ribs, and braced for rigidity and stiffness of tip by double stainless steel drag wires. The leading edges are dural covered and the balance of the wings fabric covered. The upper wing is equipped with flaps and slots, the lower wing with flaps. The flaps are all dural of split type construction. The wings are strut braced.

The ailerons are of Frise type construction with dural leading edges and fabric covered surface. The ailerons are dynamically balanced.

The stabilizers and vertical fin are of all dural construction and are fully cantilevered.

The elevators and rudder are of dural construction with dural leading edges and fabric covered surfaces. Both the elevators and the rudder are equipped with trim tabs, adjustable in flight. The elevators and rudder are dynamically balanced.

All movable surfaces are controlled by a system of push-pull tubes, with the exception of the rudder which is partly cable controlled; ball bearings are used at all joints.

The split type landing gear is fully retractible, retracting flush into the fuselage forward of the lower wing. The gear is hydraulically operated either by engine pump, or emergency hand pump. Emergency release allowing the under-carriage to drop to landing position is also provided. Gear equipment includes pneudraulic shock struts permitting 6½" of wheel travel, 24" Hayes streamline wheels, Goodyear 24" 6-ply streamline tires and hydraulically operated brakes.

The tail wheel is a 10.5" streamline wheel fully swivelling with pilot controlled locking device. It is mounted on a single fork, and equipped with a streamline tire and pneudraulic shock strut.

Tankage is provided for 81.0 Imperial gals. gasoline and 6.7 Imperial gals. of oil. Installation consists of two tanks side by

See page 5!

side in the center section of the fuselage, one tank holding 37.0 Imperial gals. and the other 44.0 Imperial gals., each tank is equipped with electrically operated fuel gauges.

Gas Lines

(Continued from page 23)

day, April 28, when his Class C ship averaged 8:36.5 for three flights in a "Day of Records" staged at Creedmore, L.I., by the Metropolitan Model Airplane Council, Inc. Murray's plane—a five footer powered by a Dennymite—weighed FOURTEEN OUNCES PER SQUARE FOOT OF AREA. Still it out-performed all of the lighter ships on the field. It gained amazing height on its flights and responded to the merest puff of a thermal. His flights were 7:47 o/s, 1:32, and 16:30 o/s, which ought to end the arguments to preserve the dear old eight ounce rule, as far as its contribution to longer flights are concerned. Out in California we note that the champ plane in a recent meet weighed 17 ounces per square foot, while Elbert Weathers continually builds heavy ships and wins with them in a most dismaying manner.

"The matter of adding weight to 1939 models is something most builders are concentrating on at the present moment. Of course added weight will bring up the wing loading, and perhaps your ship will fly better under a few more ounces. The problem of increased weight should never be solved by the old reliable adding of a bar of solder somewhere in the framework. One of the best answers is substituting heavy (or large size) flashlight cells. This often helps the motor, giving a hotter spark and practically eliminating the need for outside starting boosters. Additional gussets may be installed in the ship and those very light balsa wheels, which never did function very well, may be replaced with real air wheels which can take a shock and still remain in one piece. A heavier coil—one of the old-timers that really gave a jolt on 3 volts—can be substituted; but better still add another coat or two of color dope, replace that mush-wood with real hard stock balsa, and you'll find your plane standing the rigors of contest flying in much better shape. Numerous gadgets, such as heavier ignition wire (which doesn't offer as much resistance to current) bigger condensers, more cowling, also add weight and improve the ship.

"If you're building a new ship, sheeting the leading edges of the wings is almost a necessity. Hard balsa should be used for as much of the fuselage construction as possible, and in many cases the main longeron of quarter-square (in a Class C ship) can be increased to quarter by one-half with good results. More cement may be used in the joints—three or four coats for added strength. Heavier fire-walls, up to a quarter-inch birch plywood, may be installed and landing gears of heavier wire may be used in the interests of good construction, good flying, and added weight.

"Yessir, now you can build them heavy and build them to last, still have them excellent ships for contest work. It's no trick to add weight, but put the weight where it will do the most good.

"In the same 'Record Field Day' where Gordon Murray set the new Class C record, several other marks were established. A fine pair of flights established a Class C fuselage ROG record in the senior grouping for Jerry Stoloff of the Sky-Scrapers, whose ship turned in an average of 3:16.6. High flight was 7:55 out-of-sight, the ship being lost for the day . . . thus only two flights. Marx Brook of the Williamsburg Model Craftsmen, turned in an average of 1:15.5 to set up a 1940 standard for Class B hand-launched gliders. His times were 32 1/2, 34, and 2:30 o/s. Art Mansfield of the Sky-Scrapers, posted new highs in open class for Class B, C, and D hand-launched glider events."

Sometime ago a Sergeant and airplane mechanic at Kelly Field, Bill Hewgeley by name, built a thirteen-foot radio control model. This ship was designed to hold three separate units of radio control. However, due to unforeseen difficulties, this idea was abandoned and the ship was turned over to Mr. Orin Anderson, a member of the San Antonio Gas Model Club, in trade for some model parts. Originally the ship had moveable aileron, rudder and elevator which were to be controlled by radio; but now Orin has made the controls fast and the plane is flown as an ordinary gas model.

Picture No. 2 shows the monster ship in flight. One of its unique features is the type of motor mounting. This ship is a twin engine ship; the two motors being mounted in the nose, in staggered position, one above the other. Anderson lives at 634 Bailey Avenue, San Antonio, Texas.

Picture No. 3 shows a close-up of the motors and their mounting. The upper propeller, as you can see, is a little forward of the lower one. The ship has an area of twenty-four square feet and weighs eleven pounds.

Clyde R. White of 1109 L Street, Bakersfield, Calif., sends us the results of the Bakersfield Gas Model Association Annual Contest, held on April 7th. They are as

follows:

William H. Lain of Hollywood, first, with 35 min. 40 sec.; winning the Modelcraft Trophy and $100. Jack Leight of Taft, second, 26 min. 2 sec.; winning the Advance Engineering Co. Trophy and $60. Ted Gillette of Hollywood, third, 18 min. 7 sec.; winning $40.

In the best-finished plane event, in their respective order, the winners were: Ken Hall, San Francisco, winning the Vincent's Cyclery Trophy. Elbert J. Weathers of Los Angeles and Art Gregr of Taft. Weathers' "Mystery Man" won for him again; this same ship won 2nd place in the endurance event last year.

Mrs. Vernon Oldershaw, Bakersfield, won the Tanner Watch Shop Trophy with her Original Ohlsson "23," making a flight of 2 min. 49 sec.

A total of 399 planes were entered, a record for a western meet. 8,000 persons viewed the contest, with entries from San Francisco to San Diego. Eleven came from Phoenix, Arizona.

Picture No. 4 shows Percy Oldershaw and his KGS, which is flying in to a landing at the contest. Oldershaw is president of the Bakersfield Gas Model Club.

Many unusual designs have appeared at contests this year. Picture No. 5 shows one which is extremely original, held by its builder, John Ogilvie. It has been nicknamed the "tadpole." We are told that this ship made some very fine flights.

Picture No. 6 shows a ship built by Rod Doyle, the 1936 California State Champion. It is a six-foot plane, powered with a Baby Cyclone E and weighs 2-1/2 pounds. This plane took second place in the 1937 State Fair, senior event. It is an unusually fine design with high thrust line, large center of later area and a beautiful high wing. We are indebted for this picture to Mr. Peter Bowers.

Picture No. 7 is a very unusual job in a number of respects. First of all, it has a wing span of only thirty-six inches and weighs just 11-1/2 ounces. It has been designed with an eye for production; the construction being made as simple and as fool-proof as possible. For appearances, the fuselage is merely a cone of balsa flattened at the rear. Tail surfaces are made of balsa sheet. Martin Toggweiler of 2311 N. 30 Street, Philadelphia, Pa., is the builder.

One of the most fascinating accomplishments in the gas model game is to make a biplane that will fly successfully. Picture No. 8 shows Ralph Collman's ship, which is an unusual flier. He lives in Ireton, Iowa. It is a scale model of a Berliner-Joyce pursuit plane and has a wing span of six feet, weighs about 4-1/2 pounds minus motor and batteries. It required about three months to complete.

Picture No. 9 shows another unusual plane, with a ten-foot span. This ship is powered with an O.K. twin cylinder engine. Its builder, Mr. Adolph J. Kinast, 40 Brookside Avenue, East Paterson, N.J., says that the vibration which was encountered with a one cylinder engine has been entirely eliminated. Complete with the engine the plane weighs 13 pounds 6 ounces. It takes off from the ground, without assistance, after a run of twenty-five feet.

Undoubtedly most model builders have heard of Lt.-Col. Bowden of England, who was the first one to design and fly gas powered model airplanes. He has been kind enough to send us picture No. 10, which shows one of his latest ships. The unusual thing about this plane is the wing slots at the tips. Col. Bowden says that in stalling climbs these slots are very effective and prevent the plane from stalling suddenly. The plane has a span of about four feet. At present Col. Bowden is located at Bush Steep, Porlock, Somerset.

Picture No. 11 is a very unusual one; it was sent to us by Boonson Satrabhaya, all the way from 1650 Pramual Road, Bangkog, Thailand, Siam. It shows a group of enthusiastic model builders of this country, with their ships. No. 1 is M. Somevichien; No. 2, Maj. Luang Korn Koeyakaj; No. 3, B. Satrabhaya. The following is Mr. Satrabhaya's letter, just as he sent it to us:

"The model airplanes are few, owing to the lack of material locally and the excessive cost when ordering from abroad, especially from U.S.A. For the rubber models we got to have balsa and rubber, both we have none. So we have advanced a step forward. (I had experience in the rubber models when I took up civil engineering in the Philippines five years ago.)

"Now we have gas models. As for the material we can have pine, spruce and the scraps from the airplane parts, and soap boxes. As for the engines we purchased several of the American make. And now we can build our own of any horsepower suitable for our planes. The wheels are cast locally. So I might say that the planes are local made with the help of the Thai Royal Air Force. For the most valuable information and knowledge we cannot but be grateful to M.A.N. and Mr. Grant.

"Here are the facts about the planes themselves: We have built the planes from

the will-not-fly to a 15-foot radio-controlled which has not been tested. Most models are fairly good fliers. The average time is about 5 minutes on the 30 seconds engine run. But more often we let the planes go wild for five seconds and have the fun of chasing them for five hours afterward.

"The gas models are very expensive and very few play them. If the rate of exchange is better I shall order plenty of stock and I can boost up activities.

"This year I am afraid I shall miss the fun of the model airplanes as I shall be out in the jungle doing road construction, unless I quit the present job and join the R.A.F., which I hope I will. Last year I was able to construct a few planes while in charge of a bridge construction in the jungle."

If you wish to see an outstanding gas job, look at picture No. 12. A model builder can imagine the difficulties in building this type of wing—it is no easy task. However, evidently the trouble was worth while, for Mr. Allyn Hoopengarner of 2077 West 91 Street, Cleveland, Ohio tells us that with it he won first place at the Lorain Gas Contest on April 7th and two thirds at a Cleveland contest. It has a wing area of 348 square inches, span of 52 inches and a wing loading of 8 oz. per square foot. It weighs 20 ounces, powered with an Ohlsson "23."

Picture No. 13 shows a model of a model. Yes, the little motor actually runs. On the right you see the Atom, which most builders know is very small. You can see for yourself the difference in size between this and its "little brother." Not satisfied with having designed the smallest production two cycle gasoline engine, Mr. Ray Arden of Baldwin, New York, built this tiny motor which has a bore and stroke of 5/16". It spins a propeller at 15,000 revolutions per minute. Complete with propeller, this little Atom weighs only 215 grains, approximately 3/8 of an ounce. The spark plug alone took 100 hours to make, and weighs 4-1/2 grains. The engine measures 1-1/16th inches high and 7/16ths of an inch wide. The gas tank holds four drops of gasoline and is filled with a medicine dropper. The jet through which the fuel enters the cylinder is so small that it can only be seen through a magnifying glass. The engine will run four minutes on a full gas tank.

This engine, using a new principle of design, develops greater power for its displacement than any gas engine in existence.

The larger engine using the exact same principles and having a bore and stroke of 1/2 inch, weighing 1-3/4 ounces, has been put on the market and is sold to hobbyists and model builders for powering tiny airplanes, race cars, and power boats.

Picture No. 14 shows LeRoy Erickson's gas job racer, which is a very neat example of design and construction. A high wing effect is obtained by making the wings of the gull type. Erickson tells us that it is an extremely fast job and looks like a real racing plane in flight. He lives at 6503 Leighton Avenue, Lincoln, Nebraska.

One of the most symmetrical streamlined jobs we have seen is shown in picture No. 15. It is a model built by Robert D. Gurney of 15 Spruce Street, Jamestown, New York. The ship has a span of forty-four inches and weighs just twenty-two ounces, with a wing loading of 9-1/2 ounces per square foot. The motor mount is completely removable. The model has an extremely fast climb and a fine glide. The fuselage is of the built-up type, employing bulkheads with longitudinal stringers. The whole is covered with paper.

The Sage Hoppers Club of Reno had a contest on April 21st, in which Jack Glynn lost a model on an unfortunate unofficial test hop. Reno, in spite of its 4400 feet altitude, has some ideal spots for gas job flying. Glynn had a 45 second engine run on his ship and it was about 200 feet high when the motor cut. When last seen at 20-minutes plus, it was over 2,000 feet from the ground, which means it was approximately 6500 feet above sea level.

COMING GAS EVENTS

The Sacramento Model Airplane Club is sponsoring the California State-wide N.A.A. Gas Powered Model Contest on June 16th at Mather Field, Sacramento. Entry blanks may be obtained from Theodore L. Ravellette of 3124 4 Avenue, Sacramento, California.

The American Airlines Gas Model Club of 9609 Lorain Avenue, Cleveland, Ohio will hold its second annual contest on Sunday, July 14th, at Cleveland. The meet will be directed by H. D. McCall and Mel Triggs. Entry fee will be $1 for each class entered by the contestant. All persons and clubs wishing to attend this contest should communicate direct with the Club.

The Pennsylvania State Exchange Clubs Model Airplane Meet will be held in Williamsport on Sunday, June 16th. The Meet is N.A.A.-sanctioned and will be held at the Williamsport Airport, Montoursville, Pa. The contest is for gas models only in Classes A, B, C. It will be directed by Dr. John L. Holmes, from whom entry blanks may be obtained by writing 143 W. 4 Street, Williamsport, Pa.

The American Legion, Harry Hansen Post No. 163 of Fords, New Jersey will stage a monster gas model airplane contest at Hadley Airport, New Jersey on Saturday, August 3rd. Entry fee will be 50c for Classes A, B, C, payable at the field. Many prizes, including a $150 scholarship in the International Correspondence School, will be awarded. Further details may be obtained from Sidney B. Dell, 33 Fifth Street, Fords, New Jersey.

The Inter City Model Club plans to hold a state-wide contest for Classes A, B and C gas models, Moffet-type fuselage models and Mulvihill-type stick models on Sunday, June 23rd at Port Huron. Write Edwin Bryan, 1708 Eighth Street, Port

Memo to all Hobby Dealers

Be sure and read the important announcement on page 58. It's a sales tip that should be heeded!

Huron, Mich., for entry blanks and details of the advance entry contest in which a class B motor and kit are being given away. Lots of cash and merchandise prizes for winners of meet. Entry fee 50c per event up to $1.50, which covers all five events.

The Garden Spot Model Airplane Association will hold its fourth annual gas model and rubber powered contest on Sunday, July 14th. Rain date is July 25th. Meet will be held at the Lancaster Municipal Airport. Entry blanks may be obtained from Walter Auker, Garden Spot Model Airplane Association, Lititz, Pa.

The All-Iowa Model Meet, open to all Midwest modelers, will be held at Ottumwa on July 28th. It is under the direction of Clifton P. Oleson, N.A.A. governor of Iowa. N.A.A. rules, senior and open gas events, with $200 in prizes. For entry blanks and full information write Claude McCullough, Rural Route 5, Ottumwa, Iowa.

The Hornet Model Club of Ypsilanti, Michigan, is holding a flying gas model contest on June 23rd. All classes are invited and suitable prizes will be given in each class. For full particulars please refer inquiries to Donald J. Gridley, 192 Oak Street, Ypsilanti.

Flashes from Nationals Headquarters, Chicago

The 1940 National Model Airplane Championships will be conducted for the first time in Chicago. The event has been sanctioned by the National Aeronautic Association and will be sponsored by the "Chicago Times" and the Chicago Park District. All traditional trophies will be included in the annual model air classic, together with many added prizes for winning contestants. Elaborate plans have been made by "The Times" and Park District for the contestants during their visit to Chicago. Expectations are that the 1940 Nationals will be the biggest and best ever held.

Many world-famous pilots will also appear at the Westchester Airport, where the meet will be held, and at the victory dinner, which will be staged on the evening of July 6 at the Sherman Hotel, which will be official Headquarters for the meet. Contest dates are July 2, 3, 4, 5, and 6, with registrations on July 1st at the Sherman Hotel. Registrations may also be mailed to Maurice Roddy, Commander of the Times Air Cadets, c/o "The Chicago Daily Times," 211 W. Wacker Drive, Chicago.

Other contest officials for the meet include Steve Meuris, of the Chicago Park District, meet manager; Frank Nekimken, Chicago Park District, contest director, and Maurice Roddy of the "Chicago Times," managing director and treasurer.

The National Exchange Club has also indicated that it plans to cooperate in making the 1940 Nationals a big success. Many other civic groups are also participating in the program.

Carrying out the traditional customs of the annual National Model Airplane Championships, there will be a trade exhibition in connection with the model classic. Arrangements have been concluded for exhibition space in the Hotel Sherman which will be official Headquarters for the 1940 Nationals. This space is located on the mez-

zanine floor opposite the grand ballroom and ajoining the exhibition hall, which will be used as a work shop for contestants competing in the Nationals. Many applications for exhibition space and program space are already being received to aid in making the Nationals bigger and better than ever.

Model Airplane Club of the Air Contest

Those who attend the N.Y. World's Fair on Wednesday, July 10th, will have an unusual treat. The Model Airplane Club of the Air is holding a Mammoth Model Plane Show and Contest on that date, in the Hall of Special Events, formerly the Netherlands Building. Every type of model will be on display. Some of the events will be as follows:

Scale Accuracy, Structural Craftsmanship, Finish, Original Design, Detail and Radio Control Operation on Ground.

Spectators will be thrilled with the flight of indoor planes. A huge number of prizes will be given to winners. Also there will be a special broadcast and prominent speakers in the afternoon. This day will be called the Model Airplane Club of the Air Day.

If you wish to hear more about this great event listen to the program, "The Model Airplane Club of the Air" at 8:30 A.M. every Saturday morning, over the Mutual Network. The display and the Club is sponsored by Messrs. John Gambling and Stan Coe. Write to them for further information.

FLASH NEWS

Definite engineering plans to construct a 3080 h.p. engine and begin production within a year have been announced by A. E. Shelton, president of Menasco Manufacturing Company. Production will begin late this year on a 770 horsepower 12-cylinder Vee-type motor. The design will be utilized as a Unitwin arrangement and four of these motors would deliver the 3080 horsepower required for modern military aircraft.

Two factories have announced plans for transferring their manufacturing facilities to Florida. Monocoupe Aircraft Corporation will forsake its long occupancy at Lambert-St. Louis Airport in Robertson, Missouri, and construct a $150,000 factory in Orlando, Florida, where the famed light-cabin planes and twin-engined transports will be constructed. The Babcock Aircraft Corporation, a newly-formed organization, will construct its two-place side-by-side light-plane in new quarters in Deland, Florida. Former Monocoupe facilities have been taken over by McDonnell Aircraft Corporation of St. Louis.

Charles Babb's new freighter of the air has been completed in engineering form and negotiations are now under way for its construction. Parts will be farmed out to various manufacturing companies and it is believed that final assembly will be completed by early spring of next year. Details of the twin-engine, all-metal high-wing monoplane have not been released but, according to Babb, it will utilize half its gross weight as payload and incorporate new and novel features as yet untried in a ship of its type.

Vultee's new basic trainer, the BT-13, has been delivered to the air corps at Wright Field and production is under way in the Downey plant on an order for 83 of the low-wing, fixed-landing-gear model. It has a wing span of 42 feet and is powered by a single Pratt & Whitney Wasp Junior of 450 horsepower.

America's aircrait industry produced 2,141 military planes in 1939 but it is expected this amount will exceed 9,600 this year, it was reported by General Arnold. A renewed effort on the part of military aircraft designers must be made before we expect to catch modern European fighting craft, he said. Of the 2,700 front line military ships we now have ready for action, 2,648 are obsolete according to present European standards, he further stated. Late designs, however, show great promise especially in the light-bomber class.

France's aircraft production speeding ahead! This is great news for there were many problems to be solved before she could straighten her devitalized aircraft industry into wartime production. Now in mass production is the Bloch 151 and Dewoitine D.520 single-seater fighters, two types which were shown for the first time a little less than a year ago. Most potent and effective French fighting ship yet produced is the tiny, powerful Brequet 691 two-motor fighter, a type most sorely needed in this conflict.

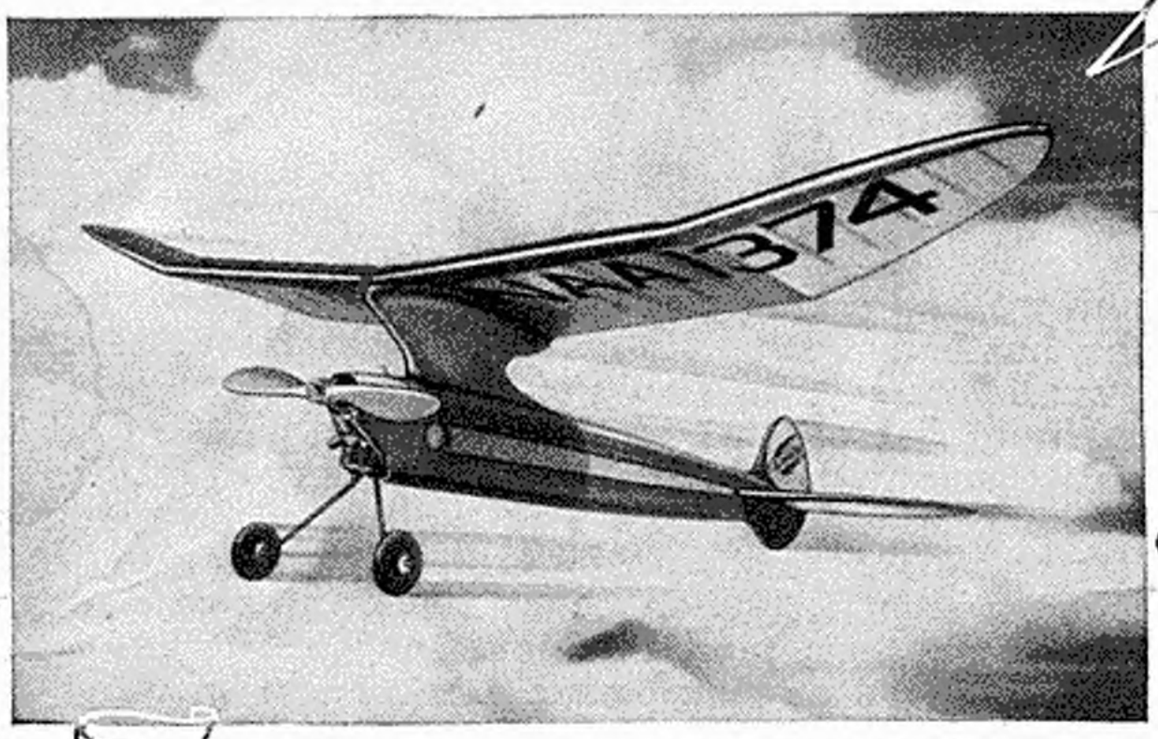
Germany's most effective fighting plane, her deadly Messerschmitt Me 110 twin-engine fighter, has been considerably redesigned in the production version. The entire nose has been glassed in and location for a bombardier-fighter has been included. Two forward firing aero cannons are now mounted in bulges beneath the fuselage. Top speed is officially 395.3 miles per hour, 30 miles per hour faster than England's best Spitfire and Hurricane fighters.

1930 Comet Jubilee Year 1940

CALLING THE ROLL OF COMET GAS MODELS

COMET

The COMET ZIPPER



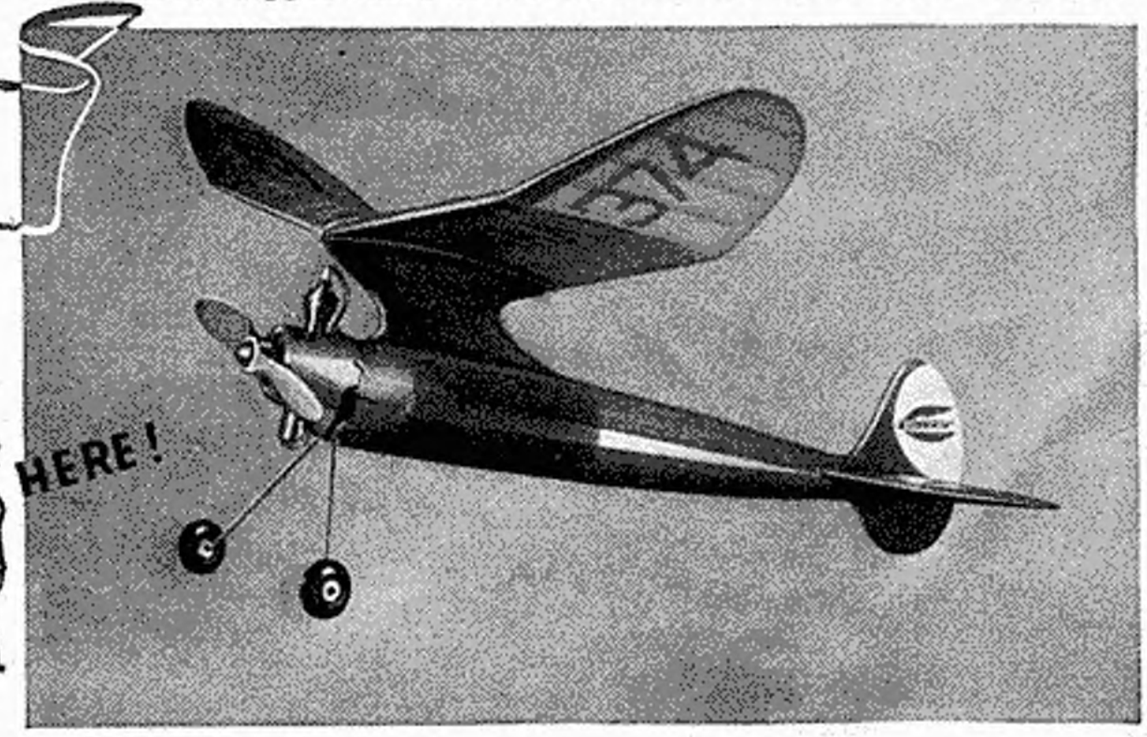
(*At Left*) Carl Goldberg's Zipper, most sensational, popular and imitated gas model in history, is still defending its honors under the 1940 rules. Its astonishing climb, superb glide, exceptional stability and ease of construction keep the Zipper out in front! And it is *still* eligible—and winning contests—under the 1940 rules! Use motors around .30 to .45 displacement for Class "C". Motors of .23 to .299 displacement in Class "B". KIT No. T10..... **$3.95**

HERE!

Chas. Koby of Van Nuys, Cal., took 1st place in the San Diego 5th Annual Gas Model Contest, April 28, 1940, with his Zipper, powered by a Brown B motor, with a time of 19:30:5 min. Other contestants flying Zippers took 2nd, 3rd, 5th and 7th places, a Mercury took 6th and a Clipper 8th! 7 out of 10 places won by Comet Gas Models!

The ZIPPER "A"

(*At Right*) This combination of the proven Zipper design, scaled down, and the powerful little Atom motor, make the Zipper "A" a choice model for sport or contest flying. Its small size makes it easy to build, easy to handle and hard to break. A pocket-size performer, surpassing many larger models in its truly excellent climb and floating glide. KIT No. T12—($1.75 West of Rockies) **$1.50**



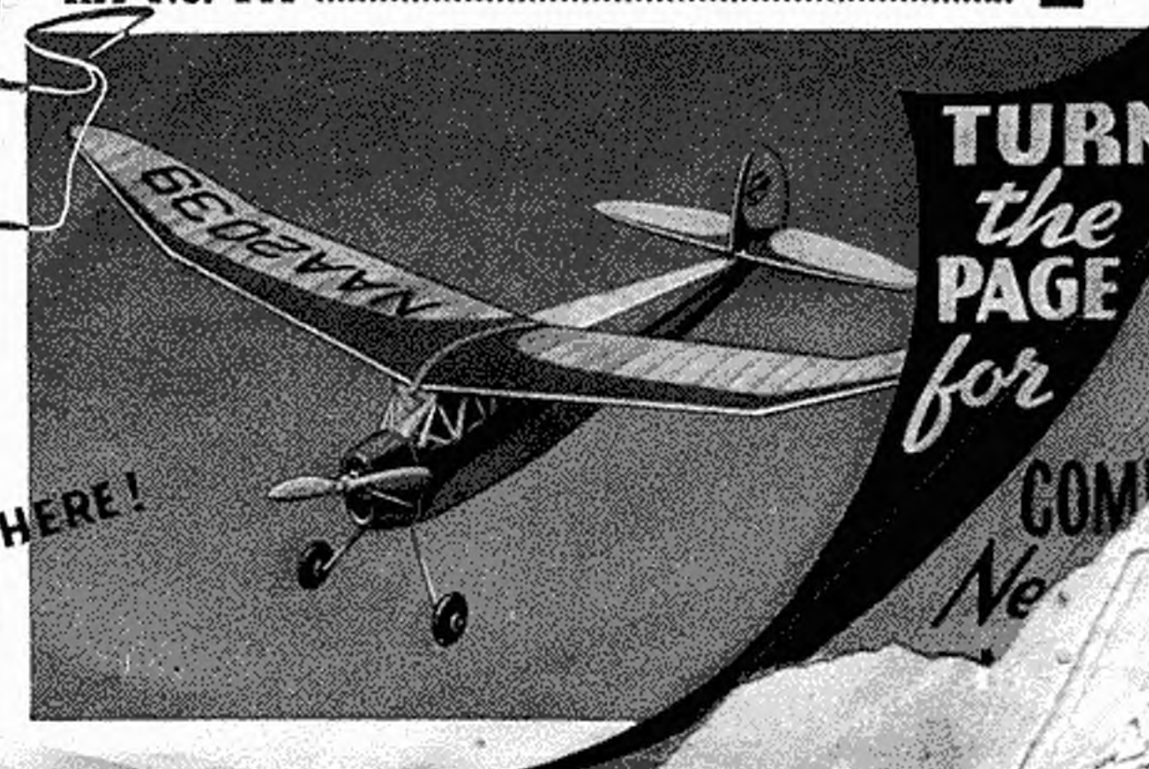
HERE!

The COMET MERCURY

(*At Left*) The Comet Mercury, champion Class "B" gas model at the 1939 Nationals and winner of more Class "B" contests than all other Class "B" gas models combined, may now be flown in both Class "A" and Class "B" by simply changing motors. So sound is the Mercury design, so simple its construction, that recent sales indicate the Mercury will continue its winning way through 1940. The Comet Mercury can be flown with *any* Class "A" or Class "B" motor. KIT No. T11 ..... **$2.95**

HERE!

The COMET CLIPPER



(*At Right*) The new 1940 rules have again increased the popularity of the Comet Clipper. Its simple, sturdy construction, realistic appearance and proven flyability make it an excellent model for Class "C" contest flying. Incorporating many of the newest ideas in gas models, it will be one of the sweetest and most frequently seen models in 1940! ...be used with any class "C" motor having ...30 to .65 cu. in. displacement. KIT No. T7..... **$4.95**

HERE!

...y of the above models, 25c; none if ordered from dealer.

...ODEL AIRPLANE & SUPPLY COMPANY

...St., CHICAGO 688 Broadway, NEW YORK

The GAS MODEL you have

COMET *and* CARL GOLDBERG *bring you a* MODEL *which meets the* NEW RULES... YET REACHES A NEW HIGH *in*

PERFORMANCE!

WHEN the 1940 gas model rules were announced (80 oz. per cu. in. disp.), many took it for granted that it meant a backward step in gas model performance. But Comet and Carl Goldberg were determined, in meeting the new rules, to create an even higher standard of performance! The result is the truly amazing Comet Sailplane Gas Model!

Working under the inspired direction of Carl Goldberg, Comet devoted all of its facilities to the design and manufacture of the Sailplane—and when it was done, we knew we had a ship that could not only *match* last year's jobs, but *beat* them with ease! The climb was terrific—never before seen in a ship of this size! Its glide was as strikingly flat as that of a majestic sailplane. And the consistency with which it turned in superb flights was most impressive of all! • The Sailplane was perfected after months of testing wings, airfoil sections and flight characteristics, in which every defect was ironed out. Here is the gas model achievement of all time—destined to make as impressive a record in winning contests as its great predecessor — the Zipper!

1930 Comet Jubilee Year 1940

COMET Welcomes You to the Nationals in Chicago—July 1st to July 6th

The Sensational COMET