MODEL AIRPLANE NEWS

MAY
1936
20c

The Vultee Light Bomber

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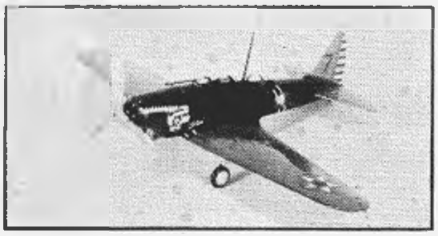

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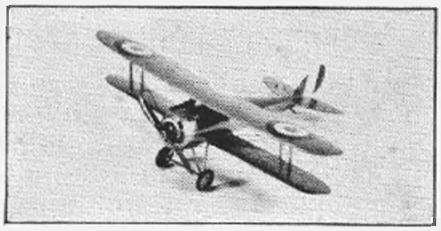

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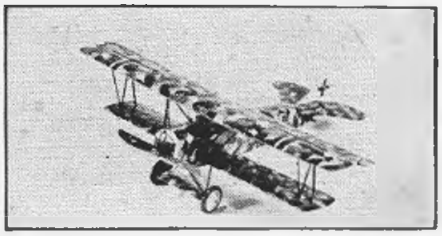

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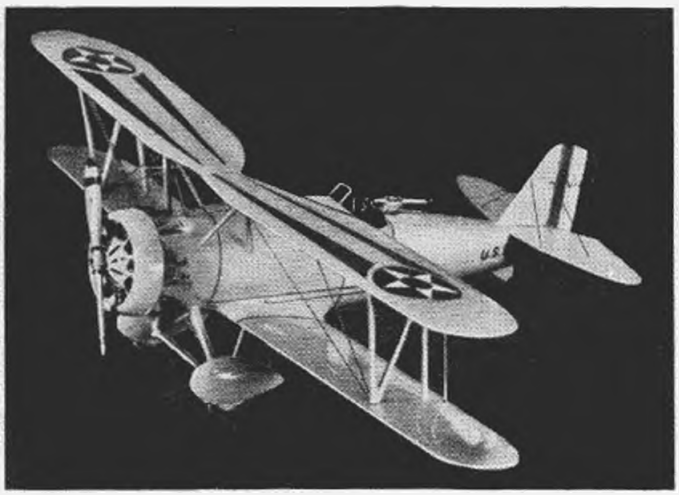

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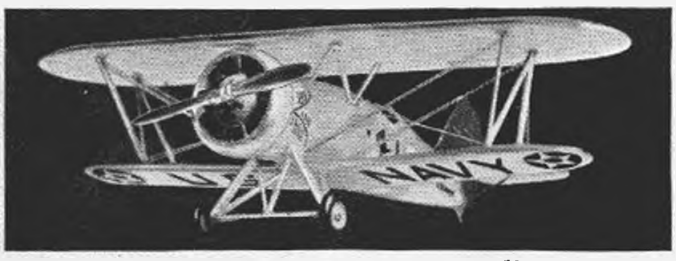
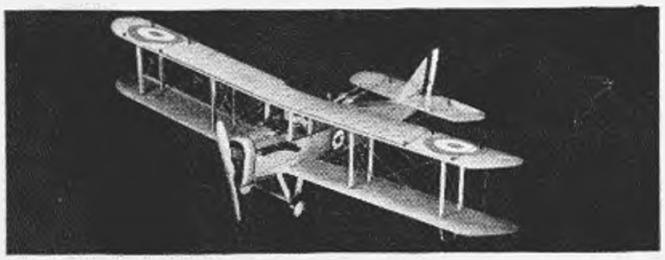


BOEING F4B-4 (re-designed)



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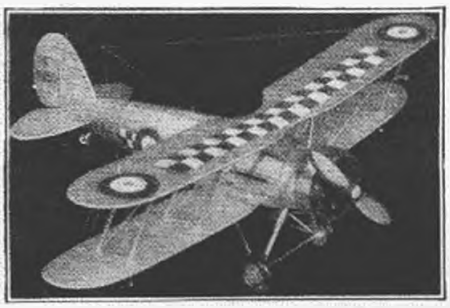

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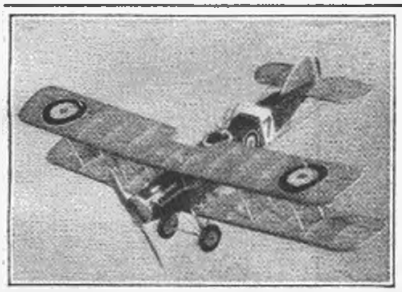

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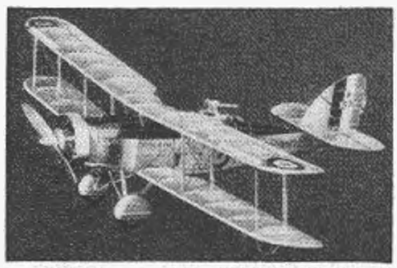

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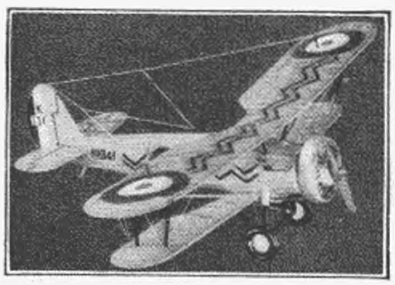

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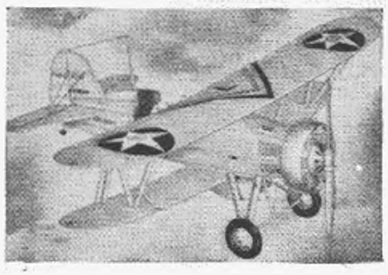

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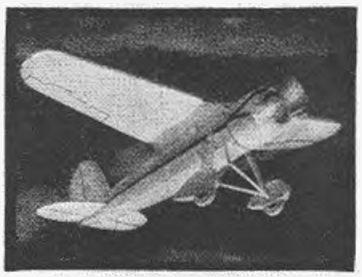

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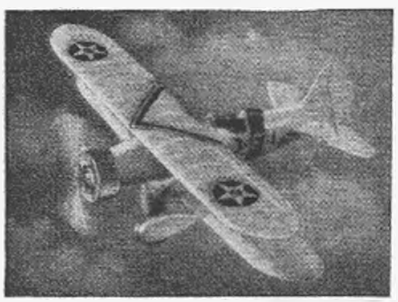

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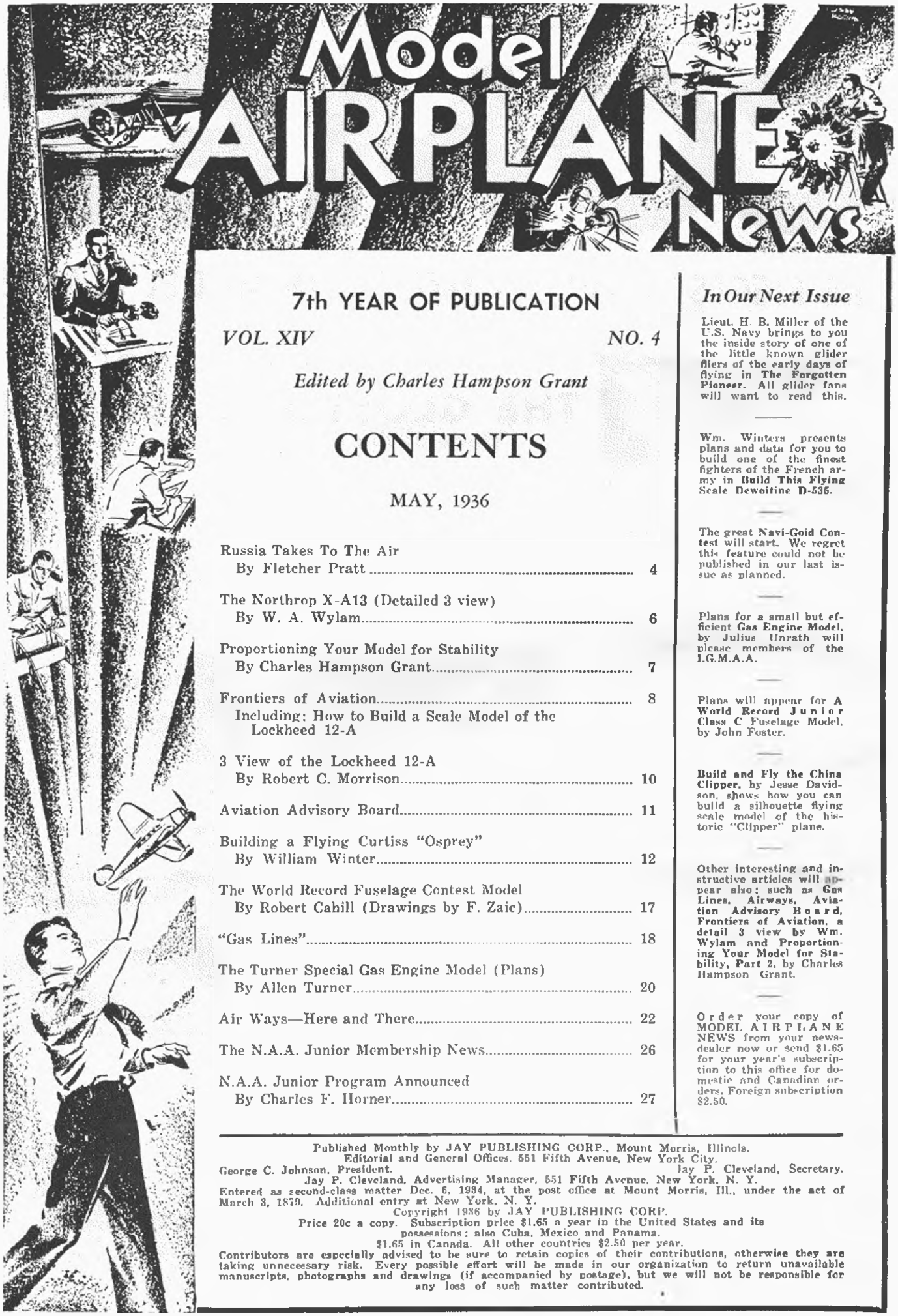

7th YEAR OF PUBLICATION

VOL. XIV *NO. 4*

Edited by Charles Hampson Grant

CONTENTS

MAY, 1936

In Our Next Issue

Lieut. H. B. Miller of the U.S. Navy brings to you the inside story of one of the little known glider fliers of the early days of flying in **The Forgotten Pioneer.** All glider fans will want to read this.

Wm. Winters presents plans and data for you to build one of the finest fighters of the French army in **Build This Flying Scale Dewoitine D-536.**

The great **Navi-Goid Contest** will start. We regret this feature could not be published in our last issue as planned.

Plans for a small but efficient **Gas Engine Model,** by Julius Unrath will please members of the I.G.M.A.A.

Plans will appear for **A World Record Junior Class C** Fuselage Model, by John Foster.

Build and Fly the China Clipper, by Jesse Davidson, shows how you can build a silhouette flying scale model of the historic "Clipper" plane.

Other interesting and instructive articles will appear also; such as **Gas Lines, Airways, Aviation Advisory Board, Frontiers of Aviation,** a detail 3 view by Wm. Wylam and **Proportioning Your Model for Stability, Part 2,** by Charles Hampson Grant.

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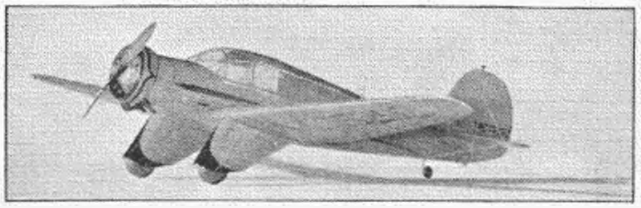
BUILD THIS 1936 LOW WING AERONCA MODEL



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HOW TO WIN! Merely build the best scale model of the famous new 1936 Low Wing Aeronca, adhering to the Official Contest Plans, and send it in for judging as outlined in the Contest Rules.

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• RULES

1. Prizes will be awarded in two divisions: *"Seniors"* (those 16 years or over); *"Juniors"* (those under 16 years).
2. Prizes will be awarded for the best models of the new 1936 Low-Wing Aeronca in each division.
3. Models built before March 1, 1936, may not be entered.
4. All planes must be received at Aeronca Contest Headquarters, Cincinnati, Ohio, not later than Monday, July 6, 1936.
5. Judging will be held during week of July 6.
6. Decisions of the Judges will be final and incontestable. All contesting planes will be returned.
7. Models will be judged according to craftsmanship, points being awarded as follows: Accuracy of scale, 30 points; workmanship, 30 points; covering, 20 points; finish, 20 points.

• PRIZES

SENIOR DIVISION (those 16 years or over)		JUNIOR DIVISION (those under 16 years)	
1st Prize—Amateur Pilot's Flying Course and 6 Weeks' Room and Board in Cincinnati, or Cash Equivalent		1st Prize — $100 Cash Award. A good start on a fund for learning to fly when you are 16.	
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6th	15.00	6th	15.00
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Mr. Roger Schlemmer, Chief Engineer, Aeronautical Corporation of America

Mr. Giles Barton, Designer of the Aeronca Low-Wing

Mr. H. E. Coovert, Aeronautical Engineer

Mr. Seymour Dunham, Aeronautical Engineer

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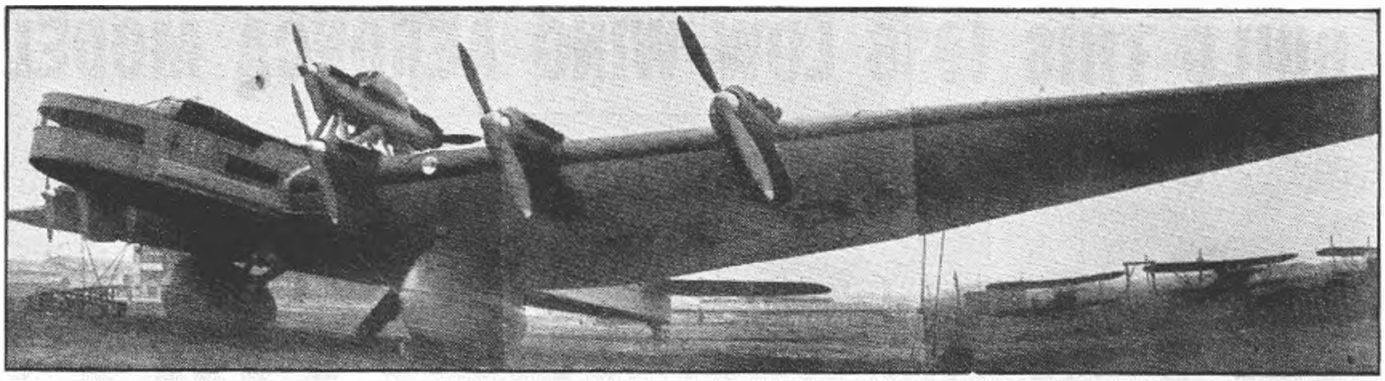


Russia's largest airplane with 215 ft. span. It crashed several months ago but others like it are being built

Russia Takes

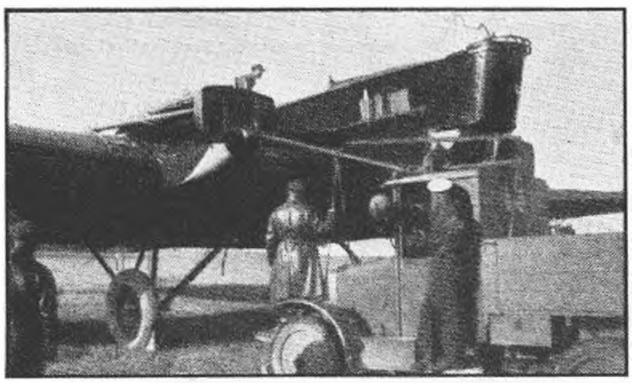
What the Russians Are Doing to Make Their Air Force the

By FLETCHER PRATT

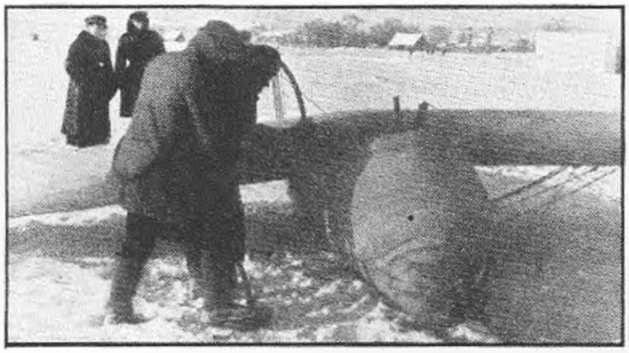
THERE was an item thoroughly characteristic of the Soviet Russian air service in the papers a few weeks ago. It told how a flyer named Arefyev cracked up two brand new pursuit ships in May, one in some electric wires and the other in a forced landing. In July he tried out another new plane and again he cracked up, without damage to himself, but with pretty complete damage to his plane. In August the Soviet authorities started investigating Mr. Arefyev; in October they had him shot as a counter-revolutionary spy.

The Russian plane that set the world's altitude record of 14,575 meters, about 46,700 ft.

Unique designs are popular. Here's a tailless glider



A Red Army bomber of 1932 design. Note the unusual starting device being used



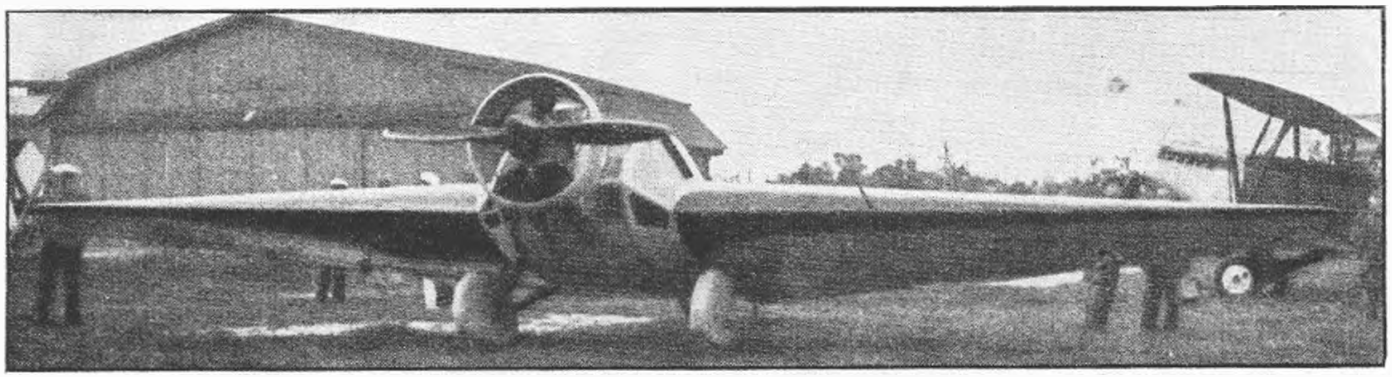
A fairy tale comes true; a collapsible glider that can be "blown up" with air when it is to be used

The point about this little true fable of today is that nobody, not even the Russians themselves, knows how good their air service is or what sort of material it contains. In connection with the famous Five-Year Plan the government set out to dose a whole nation of two or three hundred million people with air-mindedness as a doctor would dose his patient with pills. Air routes were set up across the whole of Siberia and European Russia, though their landing fields were mostly pastures and during the first few months there were more forced landings than schedule stops. The highest honor offered by the Soviet government to its deserving workers was an air trip in a new giant plane. A determined effort was made to capture the world's altitude record; aviation factories were set up all over the country, model-building became a compulsory course in Soviet schools and gliding was made a popular sport by offering sightseeing trips and prizes for the best gliders and the longest glides.

The question as to whether the result of this dosing has been kill or cure is not quite decided, but the patient seems to be doing fairly well; better at least than he did a few years ago. In every statistical respect Russian avitation has shown large and impressive gains. Flights of commercial airlines jumped from 5,000 kilometers in 1925 to 51,000 kilometers in 1933 and something over 60,000 kilometers in 1934; the number of persons carried on regular air lines from 6,000 to 45,000; the freight carried from under 75 tons to over 3,000 tons.

Soldiers with machine guns can drop in parachutes behind the lines like this

Naturally the number of pilots has been increasing at the same rate, and when the magic year 1937 is reached it will increase still faster and the pilots are expected to show a sharp jump in skill. It is very likely that the quality of Russian planes will begin to go up at about the same time, and so will the total number of pilots.



The Russians are ingenious designers, as indicated by this "LK-1" light five-seater plane

To The Air

Greatest in the World—The Trend of Development for the Future

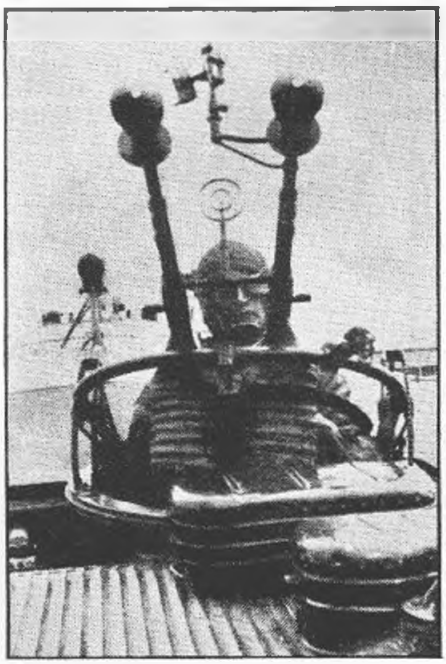
To explain why this is so, it is necessary to go back in Russian history to the Soviet revolution, the revolution of 1917. When that event took place all the aviators were military aviators, and as they were officers most of them belonged to the old privileged nobility. When the revolution got through revoluting there were precious few of them left, and after the Soviets got things cleaned up in a political sense, they found they had to start flying from the bottom. They went at it with boundless enthusiasm and no technical knowledge to speak of. The result was that the early fliers of the Soviet republic were young men and women who were more interested in politics than in the air and who had taken it up as a sort of patriotic duty. They knew a lot about political theories, but nothing at all about getting out of a spin, with the result that as aviators they were "not so hot."

This has changed a good deal, of course: those early enthusiasts have had several years' flying experience and several classes have come up out of the schools to help them, but nevertheless, everybody is looking forward to 1937 as the big year. For in 1937 the first class of boys born under the Soviet will reach the age of 20 and will therefore pass out of the schools into active flying service. They won't bother about politics because they have grown up under the Soviet regime; the only thing they are interested in is flying. And in flying they have had a course of training at least as good as that offered the boys of any other country, and better than most.

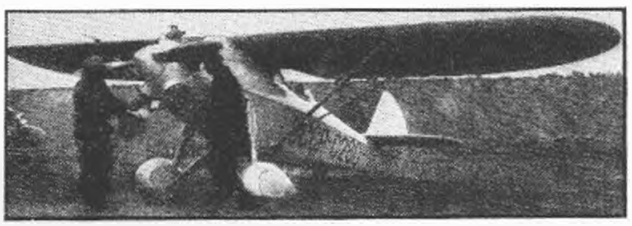
They began it in their primary schools, when they were taught model-building and model-flying along with their ABC's. They kept it up through the higher schools, where they were taught airplane designing and glider flying along with their algebra. Some of them have shown skill as mechanics or designers and have been drafted off into the government airplane factories. Some of them have shown skill in handling gliders, perhaps have attended one of the great annual glider-flying competitions and won prizes there. They will go direct into the flying services, spending a year or two more as kiwis before they take the air at the stick of a plane, but when they do this, they will know all about that plane and how to handle it.

So from 1937 on, the Russian air service is not going to lack for good pilots.

(Continued on page 32)



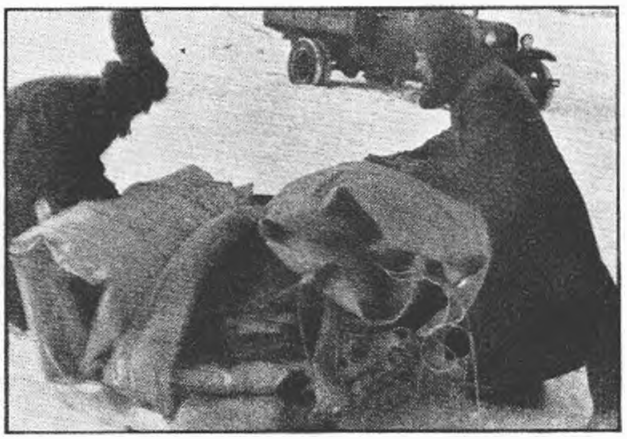
A double barrelled machine gun and gunner on a Russian bombing plane



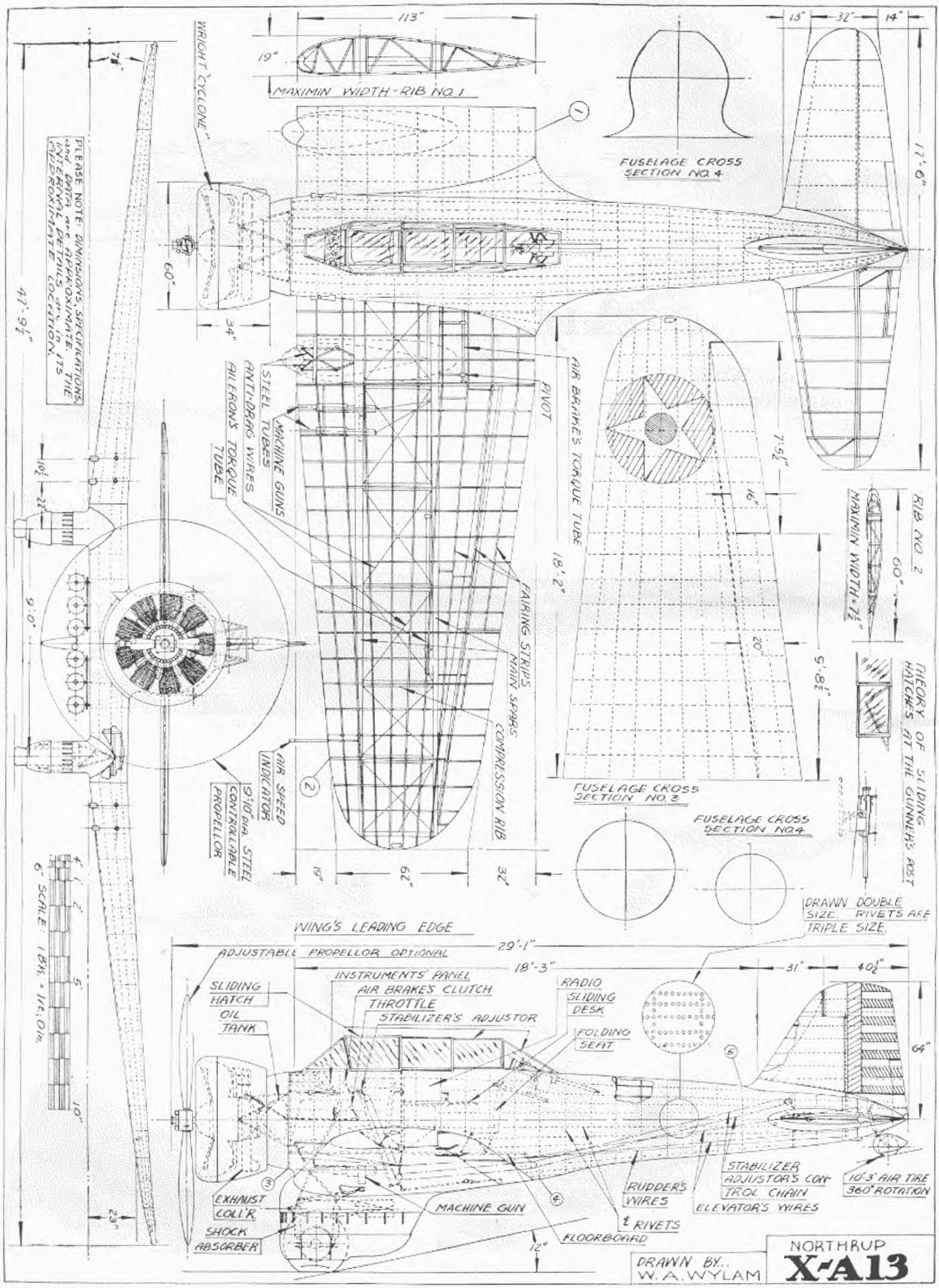
The Grobovsky sportplane G-10, one of many of this type being developed

An "ASK" Amphibian designed at the Institute of the Civil Air Fleet, Leningrad

One of the fine but little heard of Russian seaplanes, the USSR-N-53



Rolling up the collapsible glider into a 93 pound bundle, after it has been deflated. (Believe it or not)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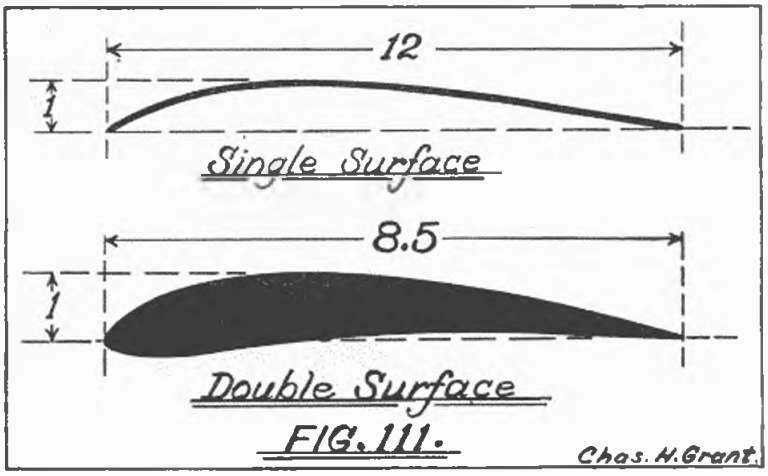
WRIGHT "CYCLONE"
113"
19"
MAXIMIN WIDTH - RIB NO. 1
FUSELAGE CROSS SECTION NO. 4
13"
32"
14"
17'-6"
47'-9½"
60"
34"
STEEL TUBES
MACHINE GUNS
ANTI-DRAG WIRES
AILERONS TORQUE TUBE
PIVOT
AIR BRAKE'S TORQUE TUBE
18'-2"
7'-5½"
16"
20"
5'-8½"
MAXIMIN WIDTH - 21½"
RIB NO. 2
60"
10½"
22"
9'-0"
FAIRING STRIPS
MAIN SPARS
COMPRESSION RIB
AIR SPEED INDICATOR
9'-10" DIA. STEEL CONTRALLABLE PROPELLOR
FUSELAGE CROSS SECTION NO. 3
FUSELAGE CROSS SECTION NO. 4
THEORY OF SLIDING HATCH'S AT THE GUNNER'S POST
19"
62"
32"
DRAWN DOUBLE SIZE. RIVETS ARE TRIPLE SIZE.
WING'S LEADING EDGE
29'-1"
ADJUSTABLE PROPELLOR OPTIONAL
18'-3"
31"
40½"
INSTRUMENTS' PANEL
AIR BRAKE'S CLUTCH
THROTTLE
STABILIZER'S ADJUSTOR
SLIDING HATCH
OIL TANK
RADIO SLIDING DESK
FOLDING SEAT
64"
6" SCALE: 1 IN. = 1 FT. 0 IN.
4"
2"
5'
10"
23"
EXHAUST COLL'R
SHOCK ABSORBER
MACHINE GUN
RUDDERS WIRES
& RIVETS
FLOORBOARD
STABILIZER ADJUSTOR'S CONTROL CHAIN
ELEVATOR'S WIRES
10'-3" AIR TIRE 360° ROTATION
12"
DRAWN BY.. W. A. WYLAM
NORTHRUP
X-A13

Proportioning Your Model For Stability



Designing the "Units" Composing Your Model and Factors That Determine Their Proportions

By CHARLES HAMPSON GRANT

Article No. 50 Chapter No. 5

IT HAS been shown in preceding discussions that the best type of model for "stability" is the single propeller tractor monoplane; first because of its simplicity and second because the arrangement of parts (such as propeller, wings, etc.) and the weights, make it possible to produce an exceedingly stable flight force arrangement.

Size of Model

Having decided upon the correct type of model for any desired purpose, the next question that will present itself to the model designer or builder will be: *"How large shall the model be made?"* The characteristic quality of airplanes that determines their size when stability is the consideration is one to which few model fans have given consideration. It is the same quality or natural law which causes a short pendulum to oscillate rapidly and a long one to swing slowly.

The movements of a small plane will always be comparatively sudden and erratic, while a large model will be more deliberate in its maneuvers. Many readers without question will recall from their own experience, the difficulty they have had in making some "midget" model fly with a reasonable degree of steadiness and consistency. Usually such planes "bob" around here and there with the alacrity of a "bot-fly" in mid-summer. In all cases of midget planes, it is comparatively difficult to adjust it for consistent flights.

On the other hand, the movements of very large models are often more deliberate and slower than one would desire. If a model of this type is suddenly turned up on its beam ends while in flight near the ground, there is often a question whether or not its recovery to stable flight will take place before it drops far enough to crash. It is always desirable to have your model recover its true flight attitude quickly in order to prevent the loss of altitude and possibly a crash. This recovery action is quick in a small model it is true, but such planes are generally too sensitive to adjustment.

There is a happy medium in size which embraces ease of adjustment and reasonably quick and positive recovery when disturbed in flight. Models of eighteen inches to thirty inches wing span may be put in this class. Of course smaller and larger models will fly steadily but *it is easier to stabilize models of this intermediate size.*

Proportions of the Model

Now that the general size of the model has been determined, it is necessary to establish the proportions or relative size of the parts of the model. Two things must be kept in mind while doing this. The model should be proportioned to induce first the greatest possible amount of stability, and second, aerodynamic efficiency.

Let us see what structural units are required in this type of plane. There must be: 1. One wing (means of lift). 2. A propeller (means of propulsion). 3. A stabilizer to enhance longitudinal stability. 4. A fin to insure directional stability. 5. A landing gear. 6. A motor to drive the propeller. 7. A frame to hold rigidly all these parts in their correct relative position.

Span

The structural size of any model is classified by the span of its wings so this must always be the starting point of proportioning your model plane. A wing span that is convenient and well within the range of good stability is twenty-four inches.

Chord

The next consideration to establish the proportions of your wing is the *chord*. This is the distance from the leading to the trailing edge. In a normal straight wing this distance is the same along the entire wing span except for a small portion near the wing tips which is rounded to reduce the drag which would be induced by sharp wing tip corners. In tapered wings, the chord is large at the center and becomes smaller at each point nearer the wing tips. The first chapter discusses these characteristics if you will recall. However, in the discussion of arrangement of weights, it was decided that a common straight wing would serve the purpose of stability equally as well as a tapered one. Therefore a constant chord length should be chosen.

Choosing a chord length entails the consideration of aspect ratio. In chapter one it was indicated that any chord length of one-sixth to one-tenth the span was advisable. Several things must be kept in mind in establishing the aspect ratio; i.e., a small aspect ratio is less efficient than a large one, while a very large one produces the problem of directional instability. A medium aspect ratio value therefore should give reasonable efficiency without producing insurmountable difficulties in the realm of directional stability. An aspect ratio of eight therefore is suggested. If the span is twenty-four inches, this means that the chord should be three inches, or one-eighth the span.

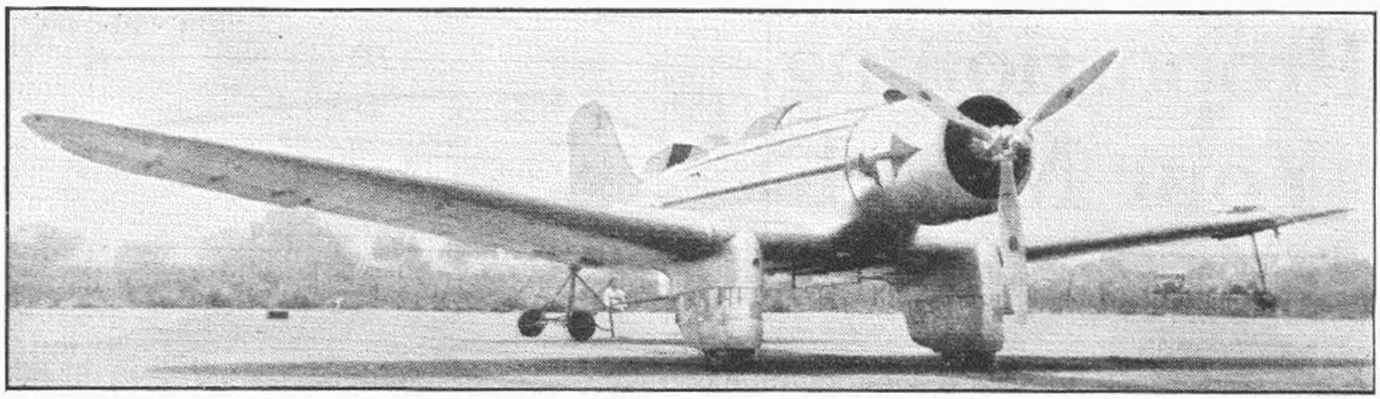
Camber

The next wing characteristic that should be established is the *camber*. This is the height of the wing curve. In the previous discussion of camber in chapter one it was learned that a low camber, which gives only a slight curve to the wing, produces fast flight while a high camber causes the plane to fly more slowly.

The establishment of a value for the camber depends on the wing section that is to be used. If a single surface wing is used (such as a sheet of balsa wood) the cambers of the upper and lower surfaces are the same and only one camber is to be considered. However if a double surface (built up) wing is decided upon, the average camber must be determined from the combined cambers of the upper and lower wing surfaces. The camber of a single surface wing or the *average camber* of a double surface wing should be of medium height in the case of a model designed primarily for stability. A medium high camber is equal to about *one-twelfth* the chord length of the wing. This value is chosen because the higher the camber, the slower the model will fly and a slow flying model is usually more stable than a fast ship. On the other hand, a very high camber is not as efficient aerodynamically as a low camber, for the $\frac{L}{D}$ ratio is not as high in such cases. The best results from all standpoints will be obtained if a compromise is made between a very low and a very high camber.

Another consideration enters our problem here. A single surface wing is not as stable as certain forms of double surface ones. Therefore as a rule, double surface wings can be used with a higher camber than single surface ones. A camber of one-tenth the chord may be used on a *single surface wing* but its efficiency would not

(Continued on page 39)



The Northrop Gamma 2-G Special with a 700 hp. twin Wasp Jr. Flown by Howard Hughes to a record. (McLarren)

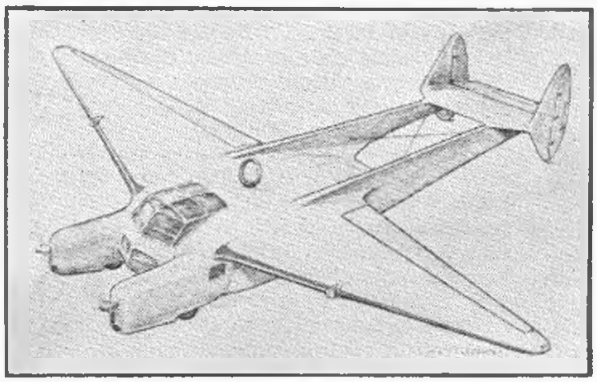
Frontiers Of Aviation

Previews and Latest News of Planes That Soon Will Be Plying the Sky Ways—Lockheed 12-A Plans

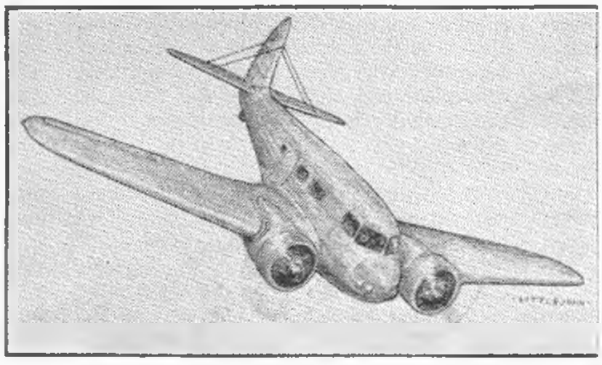
By ROBERT C. MORRISON

MORE than a year ago in these columns we emphasized the fact that the United States was almost completely lacking a good, small twin-engined plane for the sportsman and for light commercial use. It seems now that we shall not have cause to mention that fact again, for from every part of the country comes word that twin-engined six-place airplanes are now under construction. Way up in Michigan comes word that Stinson has come forth with such a type of ship. In Wilmington, Delaware, Bellanca is said to be producing a twin-engined six-place airplane; from Wichita, Kansas, Beechcraft has entered the race; from Keyport, New Jersey—Burnelli; from Robertson, Missouri—Lambert. On the west coast Lockheed and Kinner are both building such planes. Grow, Joy and Co., have also designed one and even Lawrence W. Brown, famous racing plane designer, has been considering building a small twin-engined plane.

In past issues we have described the Lambert and Beechcraft planes. The new twin-engined Stinson is of striking design and it originated from the popular three-engined low-wing transport now being extensively used on three of our major airlines. It is very similar to the trimotor but it is smaller and does not have an engine mounted in the nose of the fuselage. Structurally it is also about the same as its predecessor. The plane will sell for $19,950. A baggage compartment and lavatory is in the rear of the six-place cabin. The swift low-wing will carry 150 gal. of fuel and 10 gal. of oil.



The latest Burnelli 400 hp. transport

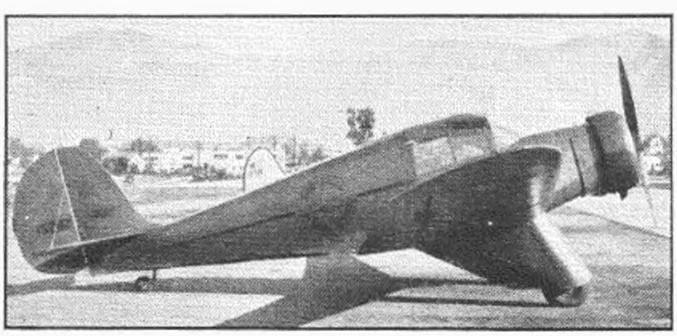


The twin-engine six passenger Kinner

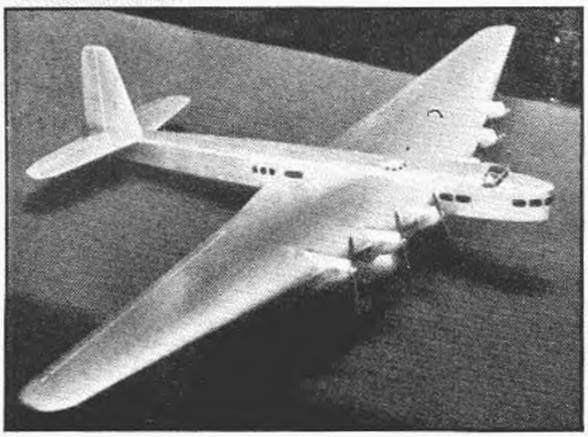
The new 1936 Stinson Reliant made its first appearance at the Pan-Pacific Aircraft and Boat Show. A striking change in the design of the wing has been made and is of the gull wing type like that on Stinson's bi-engined and tri-engined ships. All around performance of the Reliant has been improved enormously by the new wing which adds greatly to the beauty of the plane. Cruising speed is now 15 m.p.h faster than last years' model! The wing would be full cantilever if it were not for two small wing struts. We will bring you further news of this plane next month. Too much praise could not be given the 1936 Stinson Reliant.

Lockheed intends to produce their new twin-engined plane with a variety of power plants. The Lockheed 12A will be powered by a Pratt & Whitney Wasp, Jr., of 450 hp., 12B by a Wright R975E3 of 440 hp., 12F by a 320 hp. Wright R760E3, and 12M by a 290 hp. Menasco engine according to information released by the Lockheed Company. The Lockheed 12

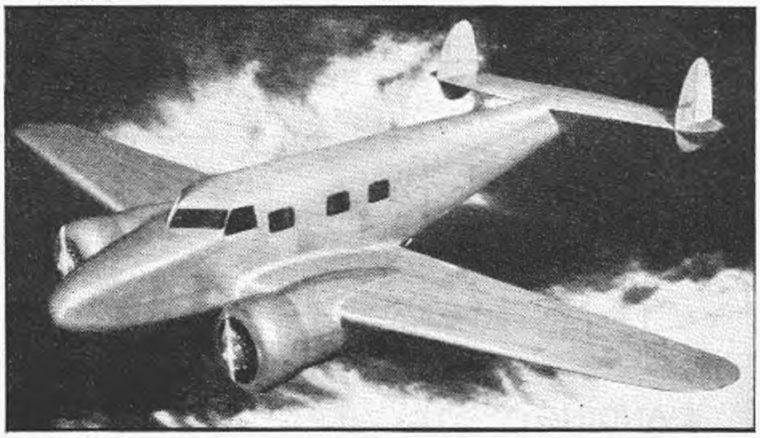
Here is the new Bird "Speed" powered with a LeBlond 90hp. engine



The latest Aeronca low wing with a LeBlond 65 hp. engine (Martin)



A model of the Maxim Gorky mammoth six engine 60 passenger plane, sixteen of which are now being built by the Soviets, span 63 meters. Total horsepower, 7,500



The new twin engine 7 passenger Lockheed Electra 12-A

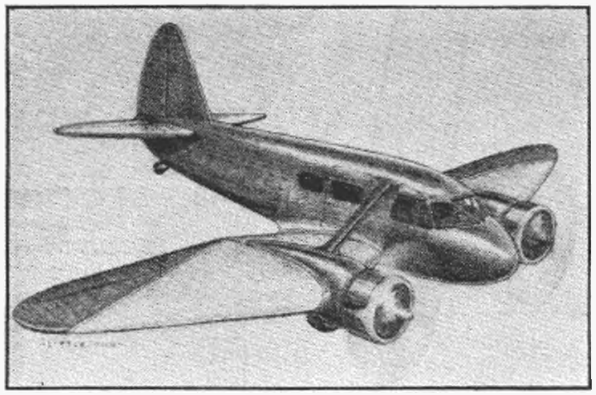
is of 24st Alclad construction and is very similar to the Electra. There is room in the sound-proofed cabin for six passengers and a crew of two. The Lockheed 12 should be the fastest commercial plane in the United States. It will be used for feederline work and private owner use.

The Lockheed Company plans a gradual development of military planes for our Army and Navy during 1936. Their engineering department is now very busy with the design of such planes.

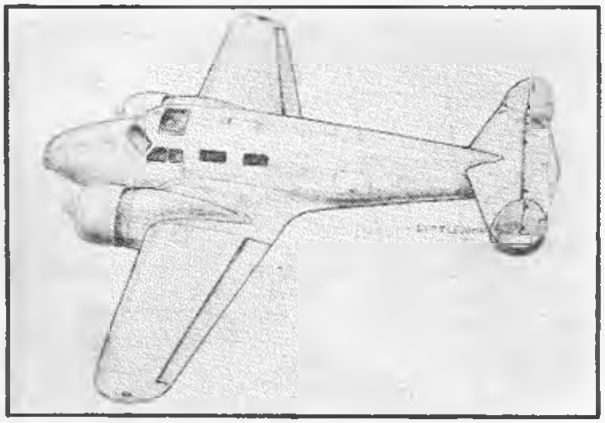
The new Kinner twin-engined ship is of the low-wing conventional type with wood wings covered with plywood. The fuselage is of chrome molybdenum tubing covered with fabric and seats from six to eight passengers. It will be powered by the new C-7 Kinner engines recently put on the market.

Kinner is said to be working on three different types of aircraft engines for the U.S. Navy. The smallest of the three was exhibited for the first time at the National Pacific Aircraft and Boat Show. Painted in black and orange, it attracted much attention and was a great advertisement for Kinner. The engine is of the twin-row radial type with fourteen cylinders and delivers approximately 1,200 horsepower. A Naval guard was stationed close to the huge engine at all times and no performance data was disclosed.

Also on display was the new supercharged 370 hp. C-7 Kinner seven-cylinder engine.



The new Stinson twin-engine transport



The all-metal Grow-Joy Twin transport

Bellanca is said to be building a twin-engined plane which may be powered by Menasco engines.

The Burnelli design also calls for engines of the Menasco 200 hp. type, but since the introduction of a new 250 hp. Menasco this later model may be used, thus increasing the performance of the plane considerably.

The Grow, Joy transport greatly resembles the Lockheed 12 and the Electra, and like them it is of all-metal construction.

This sudden mania for two-engined light transports was undoubtedly stimulated by the Bureau of Air Commerce's call for bids on such a type of plane.

The National Pacific Aircraft and Boat Show held on February 1-9 at the Pan-Pacific Auditorium was a huge success. Many new planes and engines were shown to the public for the first time. Besides the Stinson Reliant and the Kinner engines, other new features were the huge Lawrence Brown sport plane that promises to be one of the outstanding sport planes of this year. In its nose was one of the new 250 hp. Super-Buccaneer Manasco engines. We hope to bring drawings and performance data on this plane next month. Performance tests were scheduled to take place after the show. Handley-Page slots are one of the main features of the plane.

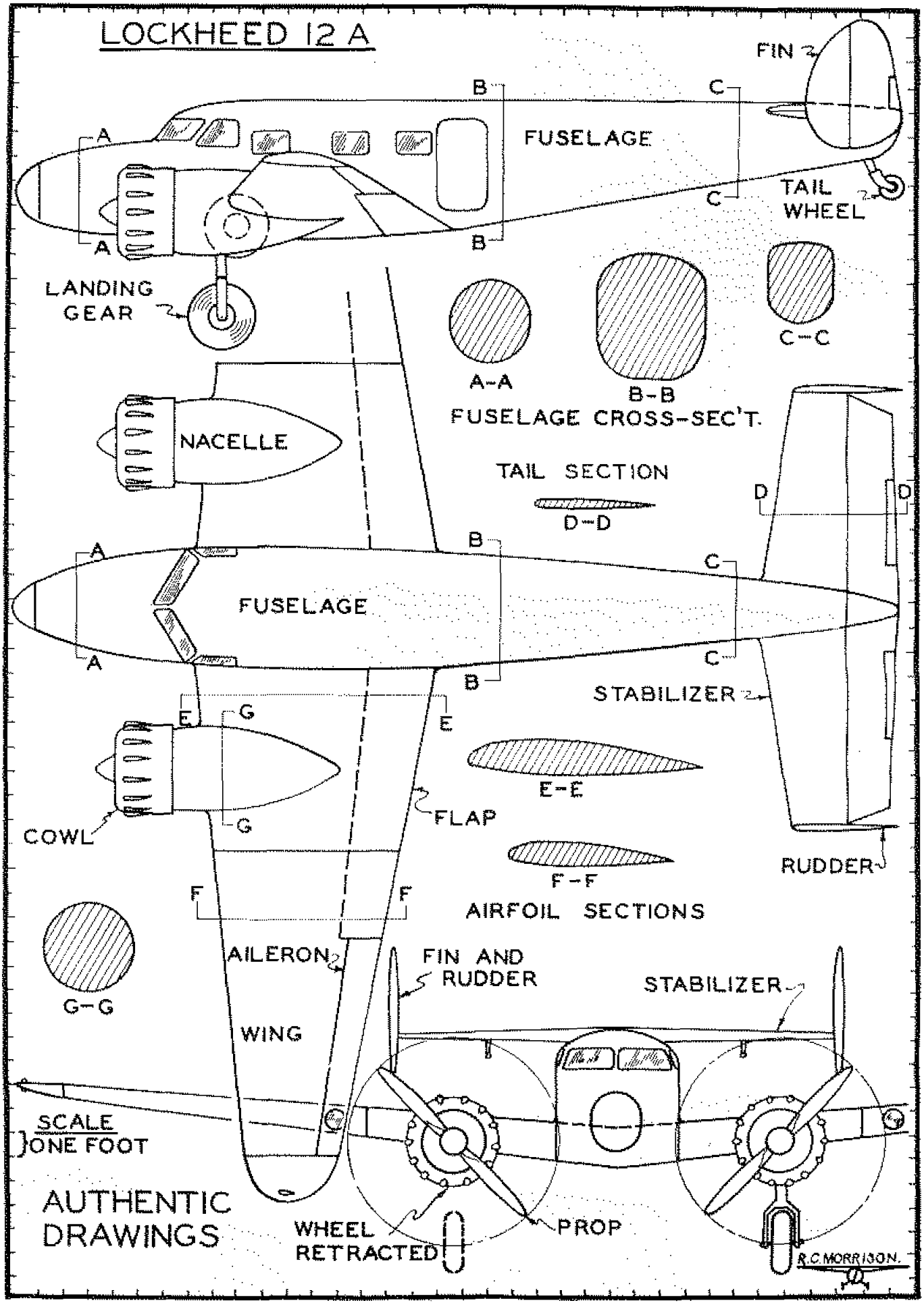
The Menasco Manufacturing Company also had a booth where they exhibited their new 250 hp. engine. This engine promises to be very popular.

American Airlines' Douglas sleeper was the largest plane at the show. The fin area has been increased on the huge plane by the addition of a fairing along the top of the fuselage about a foot high at ats highest point. This addition is needed only when the plane is equipped with a robot pilot so as to in-

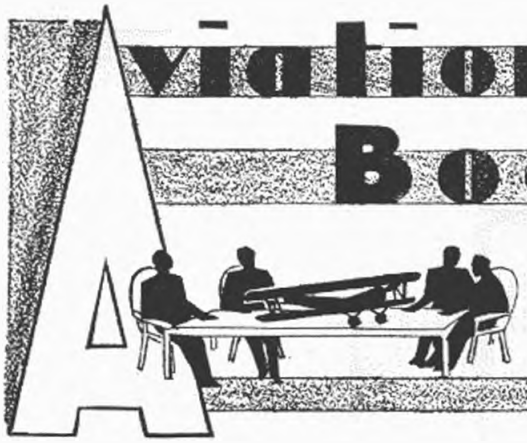
(Continued on page 36)

France's latest bomber, the Breguet 460-M5. Power, 1800 hp., speed 240 m.p.h., load 3200 lbs. of bombs

France's new reconnaisance and bombardment plane, Le Potez 39A-2. Hispano Suiza engine


LOCKHEED 12 A
FIN
B
C
A
FUSELAGE
TAIL WHEEL
A
B
C
LANDING GEAR
A-A
B-B
C-C
FUSELAGE CROSS-SEC'T.
NACELLE
TAIL SECTION
D-D
D
D
A
B
C
FUSELAGE
A
B
C
STABILIZER
E
G
E
E-E
COWL
G
FLAP
F-F
RUDDER
F
F
AIRFOIL SECTIONS
G-G
AILERON
FIN AND RUDDER
STABILIZER
WING
SCALE ONE FOOT
AUTHENTIC DRAWINGS
WHEEL RETRACTED
PROP
R.C.MORRISON.

Aviation Advisory Board



Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U.S. Army

IT IS apparent from the letters received from young men that a large number of them are interested particularly in their aeronautical education and careers. It is fitting, therefore, to answer several questions which have been submitted by Louis Wing Tong of 848 Stockton Street, San Francisco, Calif. Mr. Tong wants to become an aeronautical engineer and asks:

Question: What sort of difference is there among the following engineers, in regard to the effectiveness of their education in aviation: Mr. Anthony Fokker, Mr. Igor Sikorsky and Mr. William Boeing. I know Mr. Fokker never went through a four years course in aviation engineering, but he is one of the best known engineers. Mr. Igor Sikorsky, the famous engineer, did take a four years engineering course.

Answer: In preparing yourself to enter any business or undertaking, it is necessary to thoroughly educate yourself in the particular line which you wish to follow. The difference in the form that anyone's education takes is dependent upon various circumstances. Financial circumstances sometimes affect it, and at other times the period of history in which one lives. For instance, Mr. Anthony Fokker attained his aeronautical education at a time when there were few, if any, organized engineering courses. Consequently, it was necessary for him to obtain his knowledge of aviation through practical experience and study on his own behalf.

Evidently engineering knowledge was obtainable during the time Mr. Fokker was developing into an engineer. Unquestionably he read all available literary works of an aviation nature, gleaning from these works such information as possible. In other words, he pursued a "home study" course, combined with every-day practical application.

Mr. Sikorsky gained his experience at a slightly later date. Besides pursuing a practical application of his genius as an engineer, he was fortunate enough evidently to go to a university. Here he obtained information pertaining to engineering matters. In other words, Mr. Sikorsky obtained part of the knowledge at a university which Mr. Fokker acquired through home study.

The main point to consider is that it is necessary to acquire certain knowledge in order to be a competent engineer. The manner of obtaining this knowledge is unimportant, unless you wish to consider the prestige of a diploma from some recognized educational institution. A diploma sometimes has an extreme psychological effect in obtaining a position.

If possible, I would advise Mr. Tong to go to some university and obtain as much engineering knowledge as possible through this means. A two years course is an abbreviated preparation for aviation engineering, and much fundamental and important information cannot be obtained in so short a time. Unquestionably four years of study will give you a better knowledge of the subject. While pursuing theoretical studies, it is always wise to undertake some practical application of the subject. In other words, if you can work at your chosen field while studying, the best results will be obtained.

If it is impossible because of financial conditions to follow a course of study at a university, I suggest that you get some sort of job in the aviation field. This will teach you one very important thing; and that is, whether or not you actually wish to follow aviation and in what branch you wish to divert your energy. Much time may be saved by this procedure.

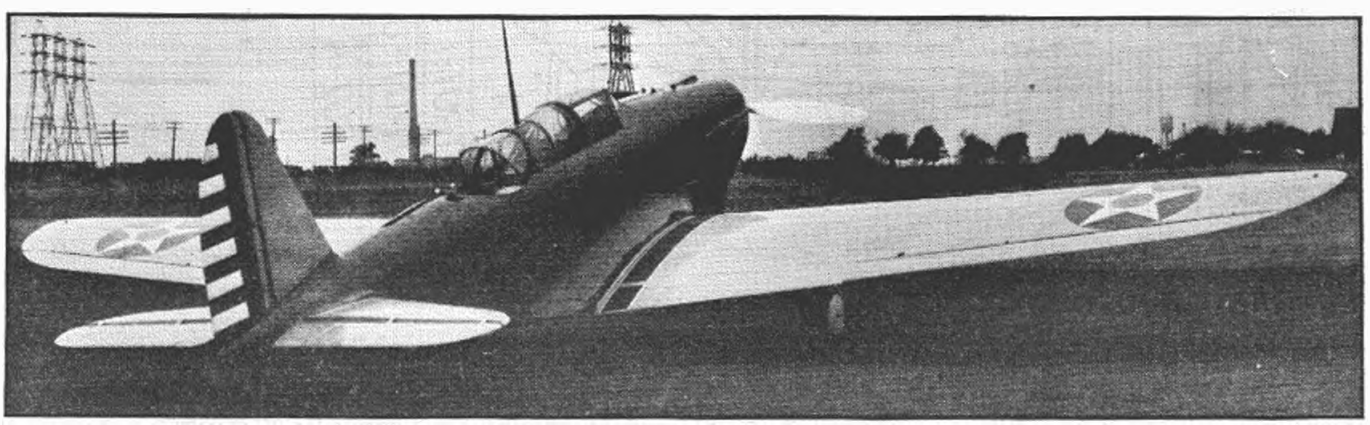
If you have the will to become prominent in aviation, the lack of a college education should not stop you, for the determination to succeed is the most important quality for success. By following some practical form of work and understanding thoroughly everything with which you come in contact, you will be prepared to assimilate with understanding the theoretical course in aviation to a much higher degree. Follow your practical work until you are able to go to a university for theoretical study.

There are many good universities. Some of them are: Massachusetts Institute of Technology, New York University, University of Michigan, Carnegie Tech; all of which have four year engineering courses. If it is impossible to spend this amount of time upon study, I suggest that you then go to some school such as Curtiss-Wright Technical Institute in Glendale, Calif., or the Aeronautical University of Chicago.

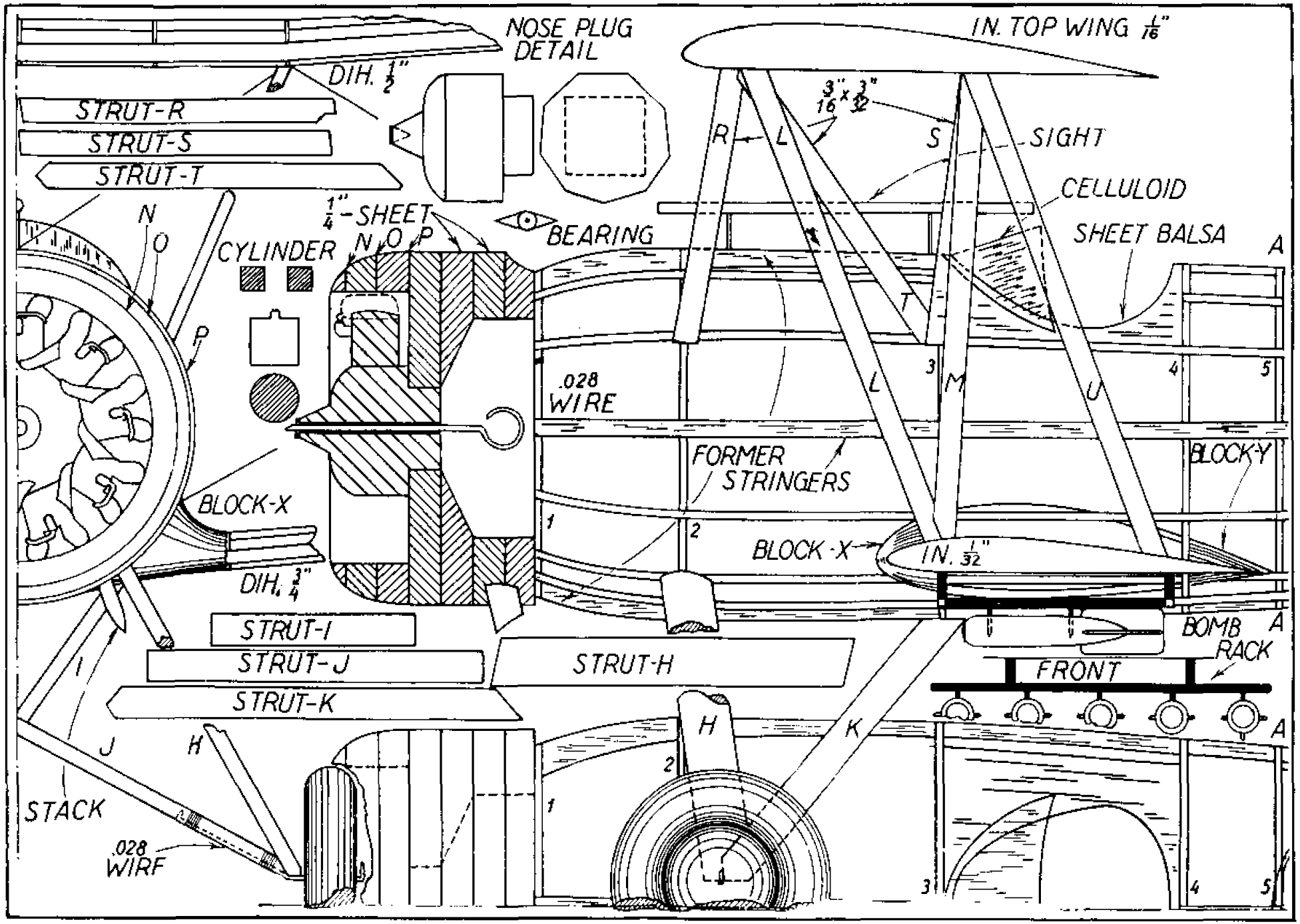
Question: Does the engineer who designs the airplane have to understand all the details that enter into its construction?

Answer: Yes, and more too; especially so in airplane work inasmuch as the design of any one part depends upon the design of every other part of the machine. This is true because if the weight of one part is changed, the stresses occurring in all other parts of the structure also change.

(Continued on page 48)



Here is one of the U.S. Army's latest attack and high performance, two-seater fighter airplanes, the A-11, manufactured by the Consolidated Aircraft Corp. This plane has a high speed of about 240 miles per hour. It is powered by a Curtiss "Conquerer" liquid-cooled engine of 700 hp.


NOSE PLUG DETAIL
DIH. 1/2"
STRUT-R
STRUT-S
STRUT-T
N
O
P
CYLINDER
1/4" - SHEET
N O P
BEARING
.028 WIRE
BLOCK-X
DIH. 3/4"
STRUT-I
STRUT-J
STRUT-K
STRUT-H
STACK
.028 WIRE
IN. TOP WING 1/16"
3/16" x 3/32"
R
L
S
SIGHT
CELLULOID
SHEET BALSA
A
T
3
4
5
L
M
U
FORMER STRINGERS
BLOCK-Y
1
2
BLOCK-X
IN. 1/32"
BOMB RACK
FRONT
A
H
K
J
H
2
1
3
4
5

Building A Flying Curtiss "Osprey"

How You Can Create One of the Finest Flying Scale Models You Have Ever Built

By WILLIAM WINTER

THE OSPREY, an all around military plane, has proved itself one of the best of the export fighters. Shipped principally to South American countries it does yeoman's duty there as a combination pursuit, attack and bomber. The high speed of 174 m.p.h. and the climb of 1620 ft. per min. insures the purchasing government of capable accomplishment of a wide range of missions.

Coupled with its trustworthy performance is its ever present ruggedness. The export fighter must be equally adept at zooming out of rough or tiny fields, lugging a load of eggs over scraggy peaks or at tearin over jungle tree tops through a rain of missiles to strafe a tenacious foe.

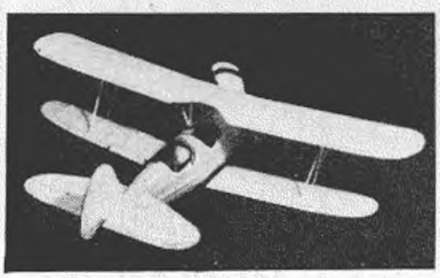
The constructional method employed on our Osprey is as fool-proof as possible. By cutting the four main stringers from sheet balsa, to a patterned shape eliminates all that is undesirable in the building of a bulkheaded fuselage. Not only is the fuselage interesting to construct in this manner but it necessarily must be true. The weight increase is negligible, the finished plane weighing approximately the same as one of conventional build and less than others of a special technique. The strength of the finished Osprey will be evident when it starts to take punishment.

In flight this little ship is a revelation. The model is not a fragile floater but a well balanced, snappy imitation of its prototype. Like its big brother, it needs to ask no quarter when it comes to flyability.

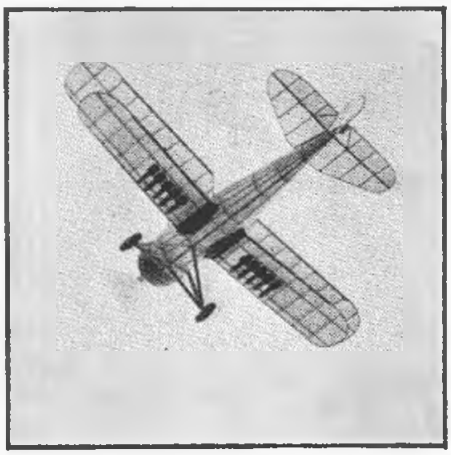
Fuselage

Using the patterns given, cut the former stringers from a medium piece of 1/4" sheet balsa. The bulkheads are cut from 1/16" sheet. Cement the side stringers in place on two of the widest bulkheads and allow to dry. Place the remaining bulkheads in position between the same two stringers. Locate the top stringers and the bottom stringers after checking the frame for alignment. The auxiliary stringers of 1/8" sq. stock are cemented in place. In making the original, the notches for these stringers were cut as the work progressed, their positions having been marked in pencil. The rudder post of 1/8" sq. is inserted and glued in place. The hook of .028 wire is bent and sunk in the rudder post. The cockpits are made by bending 1/32" sheet balsa. The sheet is at first glued in position. After the cement has set, mark the outline of the cockpits and cut out with a sliver of a razor blade.

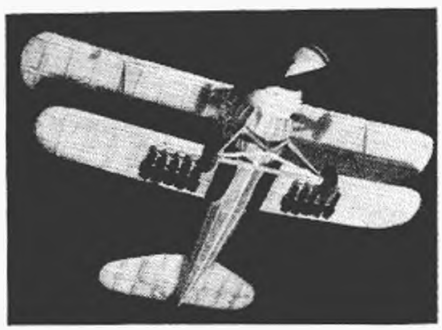
Cut two pieces of sheet balsa the patterns for which are marked V and insert between the fillet extensions of No. 3 and No. 4 bulkheads. The points mentioned are marked Z and ZZ on the bulkhead sheet.



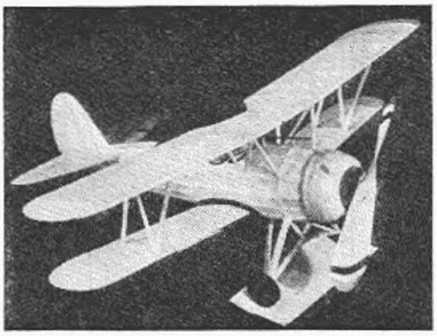
Large tail surfaces make it an unusually steady flier



The completed model in full flight with bombs showing



Miniature bomb racks give a very realistic appearance



Though of biplane type it has excellent flying qualities

To cover, use narrow strips of tissue to avoid wrinkles. Be sure that the grain is not varied in covering. Trim the surplus paper frequently and dope down the frayed edges. If the paper is to be sprayed, do it lightly and evenly. A coat of clear dope is given the finished covering.

The fillet blocks X and Y are shown in detail. Fillet block X is shaped as shown and cemented to the fuselage side, its rear face coinciding with the extension of No. 3 bulkhead and is cemented to it. In like manner, attach fillet blocks Y.

Trim the cockpit edges with black enamel dope or lacquer. The telescopic sight is a rounded 3/32" balsa strip. The windshields are cut to shape from celluloid and cemented in position.

Landing Gear and Tail Wheel Assembly

All the struts are marked by letter. Their positions on the model are marked with the corresponding letter. The two main struts are cut from 1/8" x 3/4" stock and streamlined. The remaining struts are 1/8" x 1/4". Scrape a tiny piece of paper away so that the wood is exposed at all the intended joints. The main struts H are cemented to the fuselage at the position designated on the side and front views. Use pins to hold the work in position until the cement has set. In mounting the other struts I, J and K, be sure that the joints are neat and well cemented. The assembly is noticeable on the pictures.

The axles of .028 wire are bent to shape with the wheels in place and bound as well as glued to the struts marked J. The wheels should be of medium weight.

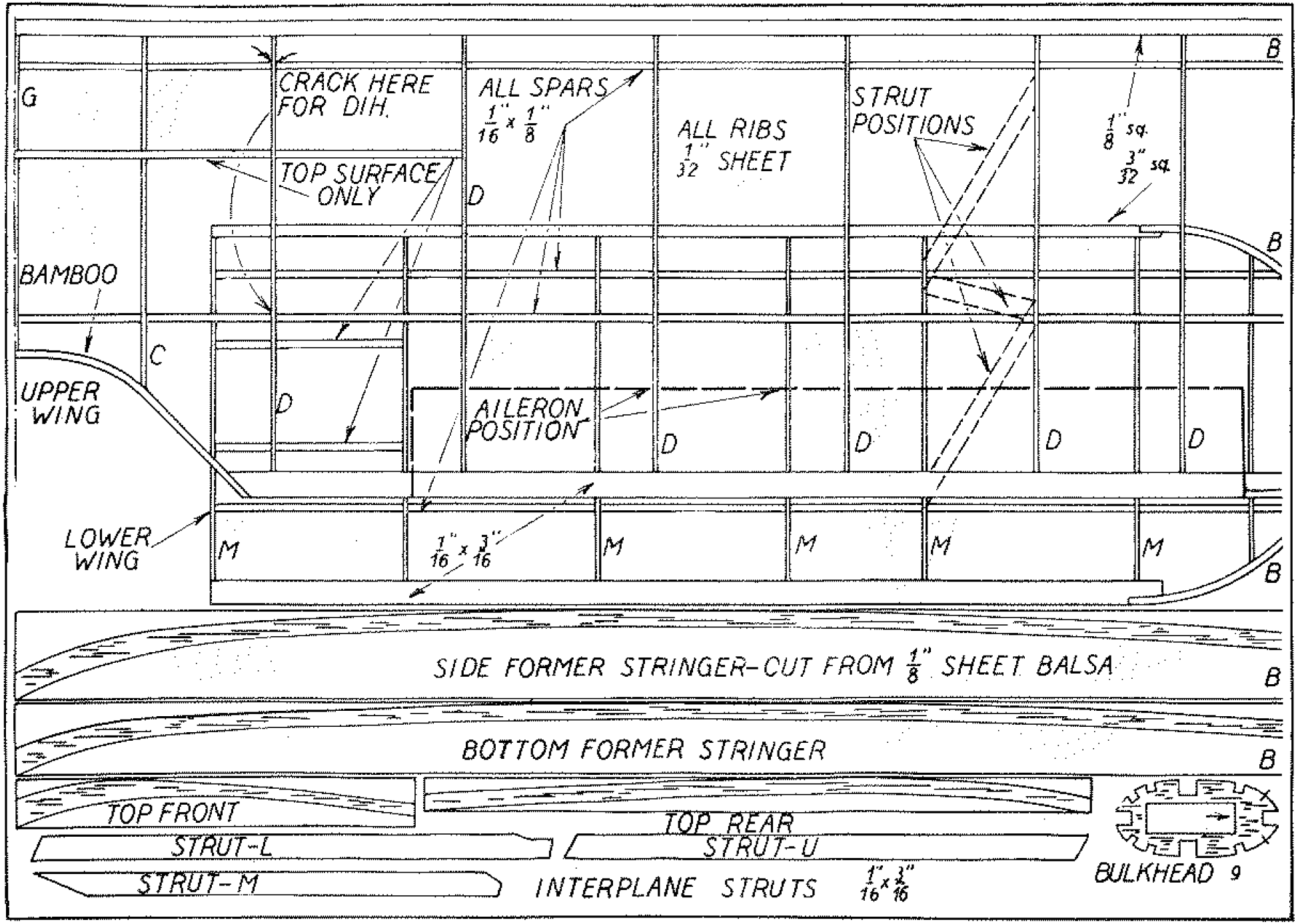
The 5/8" tail wheel is mounted on the .014 wire axle. The axle is attached to the rudder post and braced as shown with 1/32° sq. bamboo. The assembly is shown in detail.

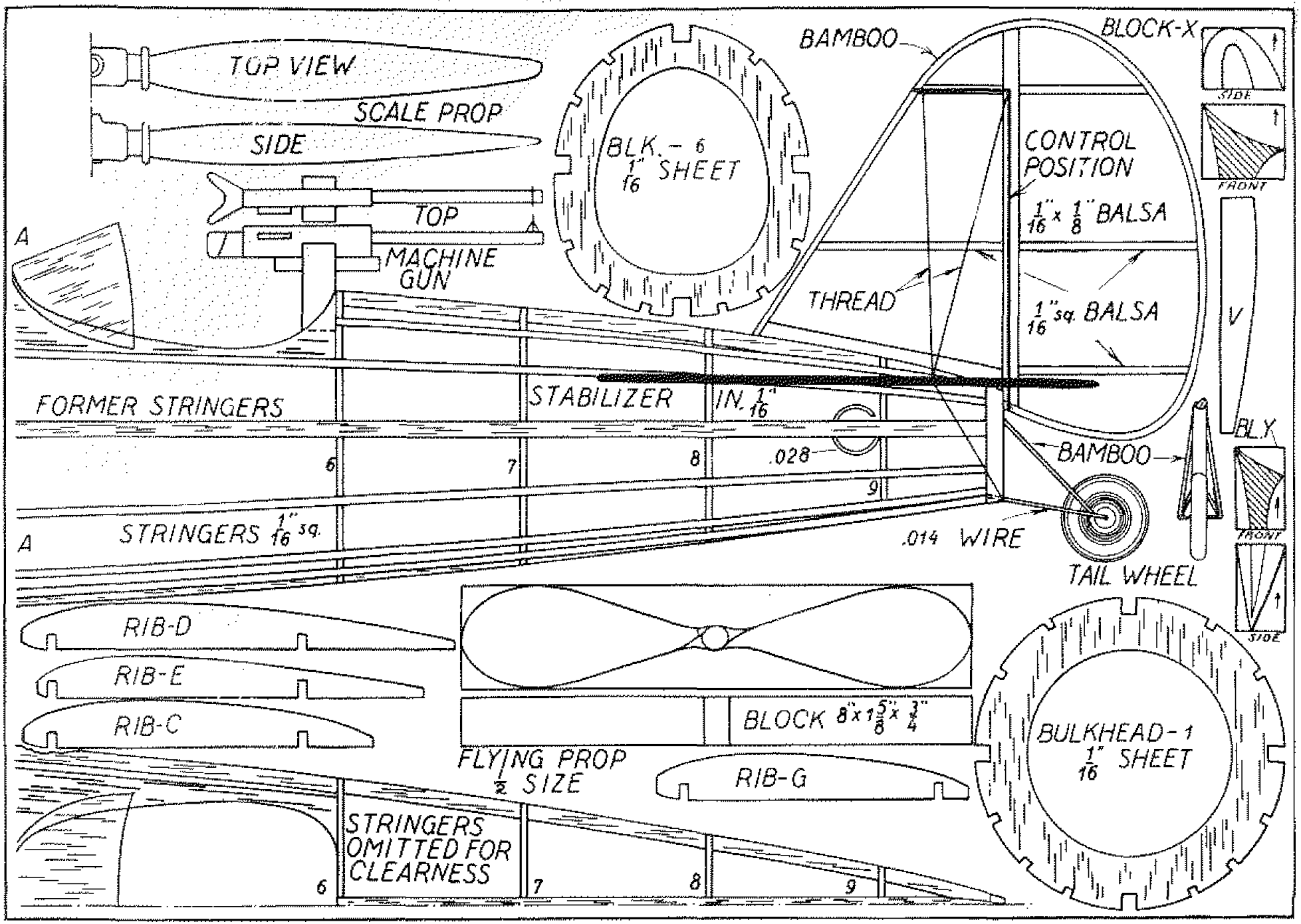
Tail Assembly

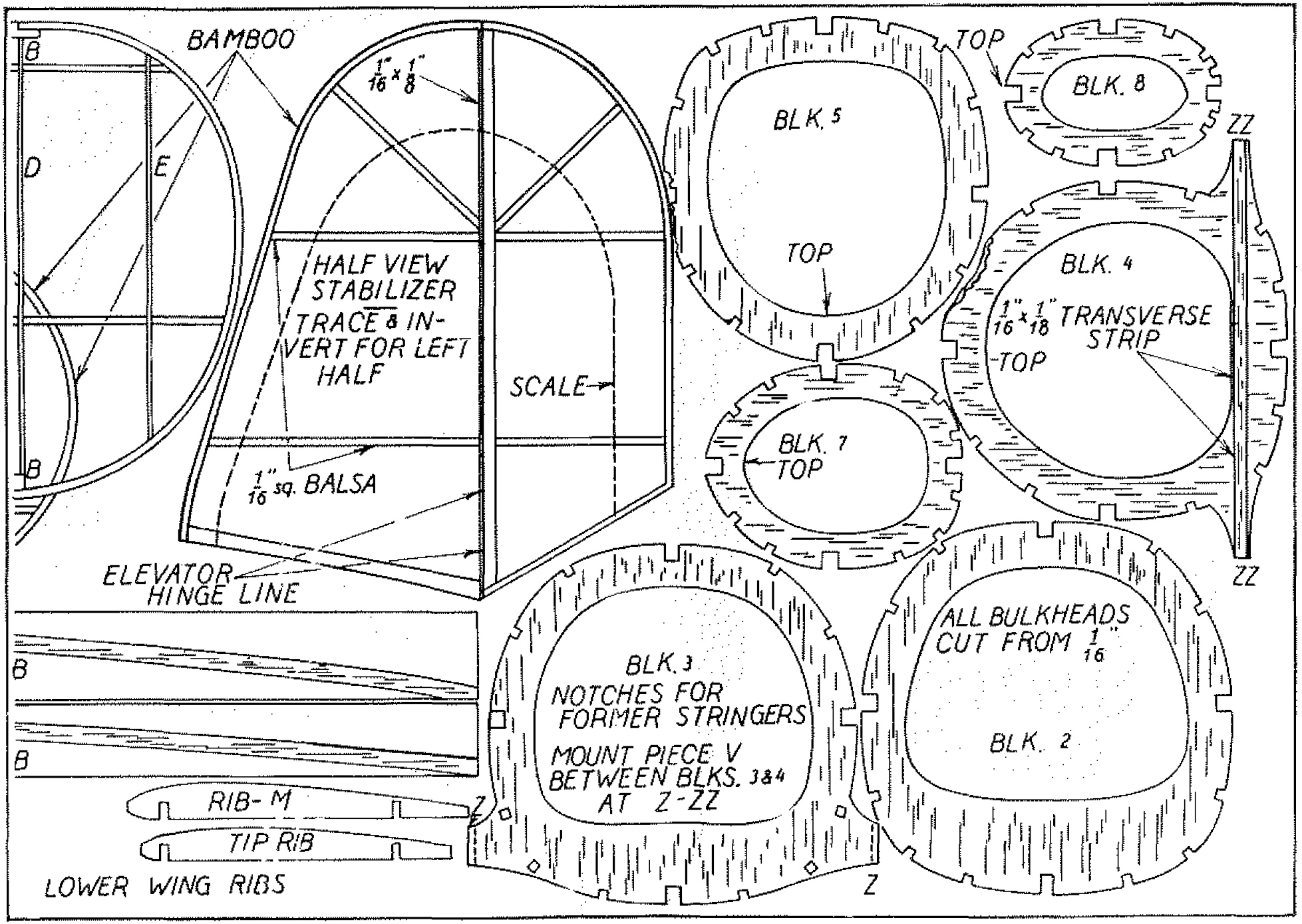
The main spars of 1/8" x 1/8" are pinned flat to the bench. The cross pieces of 1/8" sq. are cut to the required lengths and are cemented in place. The bamboo edges are bent to shape, preferably by candle flame. So that the contour of the fuselage at the points of attachment will be matched by the innermost cross pieces of both stabilizer and rudder, these pieces are cut to the required shapes from 1/8" sheet.

Cover each side of both surfaces with a separate piece of tissue. A light coat

(Continued on page 34)


G
CRACK HERE FOR DIH.
TOP SURFACE ONLY
ALL SPARS 1/16" x 1/8"
ALL RIBS 1/32" SHEET
STRUT POSITIONS
1/8" sq.
3/32" sq.
B
D
BAMBOO
C
UPPER WING
AILERON POSITION
LOWER WING
M
1/16" x 3/16"
SIDE FORMER STRINGER-CUT FROM 1/8" SHEET BALSA
BOTTOM FORMER STRINGER
TOP FRONT STRUT-L
TOP REAR STRUT-U
STRUT-M
INTERPLANE STRUTS 1/16" x 3/16"
BULKHEAD 9


TOP VIEW
SCALE PROP
SIDE
TOP
MACHINE GUN
A
BLK. - 6 1/16" SHEET
BAMBOO
BLOCK-X
SIDE
FRONT
CONTROL POSITION
1/16" x 1/8" BALSA
THREAD
1/16" sq. BALSA
V
BLX
FRONT
SIDE
BAMBOO
FORMER STRINGERS
STABILIZER IN. 1/16
6
7
8
9
.028
.014 WIRE
TAIL WHEEL
A
STRINGERS 1/16" sq.
RIB-D
RIB-E
RIB-C
BLOCK 8" x 1 5/8" x 3/4"
FLYING PROP 1/2 SIZE
RIB-G
BULKHEAD-1 1/16" SHEET
STRINGERS OMITTED FOR CLEARNESS
6
7
8
9


B
D
E
B
BAMBOO
1/16 x 1/8
HALF VIEW STABILIZER TRACE & INVERT FOR LEFT HALF
SCALE
1/16 sq. BALSA
ELEVATOR HINGE LINE
BLK. 5
TOP
TOP
BLK. 8
ZZ
BLK. 4
1/16 x 1/8 TRANSVERSE STRIP
TOP
BLK. 7
TOP
ZZ
ALL BULKHEADS CUT FROM 1/16
BLK. 3
NOTCHES FOR FORMER STRINGERS
MOUNT PIECE V BETWEEN BLKS. 3&4 AT Z-ZZ
BLK. 2
Z
Z
B
B
RIB-M
TIP RIB
LOWER WING RIBS

The World Record Fuselage Contest Model

How the World Record Was Captured and Instructions to Build the Plane That Accomplished This Feat

By ROBERT CAHILL

Drawings by
Frank Zaic

THE day of the 1935 National Contest in St. Louis, as anyone who was there knows, was an ideal one for outdoor models. The Indianapolis group was the first to arrive at the field in the morning and we were soon giving our models the final touches. At about ten o'clock the flights started and there was a rush to get the flights for the Moffett eliminations off. By noon, I had made two flights; the first poor, the second about three minutes with what appeared to be the right adjustment. Reports began pouring in about the good times being made, and it soon became evident that the low elimination times of the previous year were much out of order.

At about one o'clock, offering a prayer to the thermals, I wound the ship up for the final try. Having put on a few more turns than I should, I hurried over to the concrete runway to get the plane off. She started off smoothly and seemed to be away to a good flight. I hopped onto the waiting car and started across the airport. At about a minute and a half, the power kicked out, but the plane had climbed beautifully all the time and was up high enough for a good chance to get into a current. At three minutes she was gaining altitude slowly and I knew that we were in for a chase.

We soon left the airport and started across country after the rapidly climbing ship. It became quite a task to see even the black covering on the bottom of the ship against the light sky. Several times it was necessary to stop the car to be sure that both timers had the ship located. At times we would be traveling at top speed along one of the roads trying to keep up with the speck in the sky, only to find that it had reached a different stratum of air and was going in the opposite direction, necessitating an about face and top speed back in the other direction.

At about twenty-three minutes, the model started coming down rapidly and I though for a while I would soon have it. But just as the different parts were becoming easily discernible, another thermal caught it and away it went back to the clouds. We kept as close to it as possible, but it soon started off in a direction in which we could not travel because of lack of roads. At thirty-three minutes we lost complete sight of it, and a long vigil of sky-staring after that failed to reveal its faint outline again. We finally gave up and started back to the port, a little disappointed at losing the plane and with decidedly stiff necks, but quite sure that we had watched a good flight.

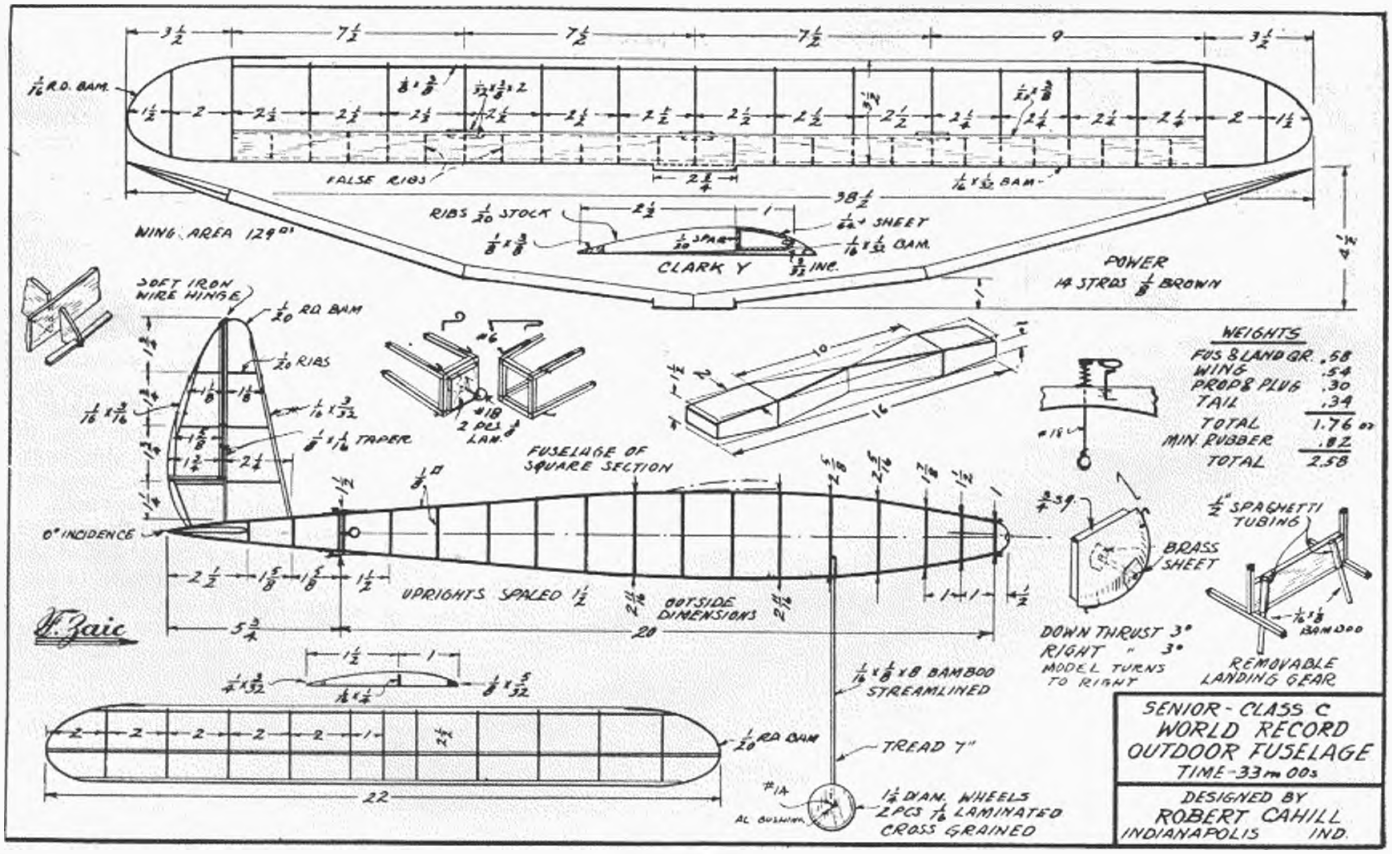
The shortest route back to the airport was a little under nine miles, and when we got back to the airport we found that the other timers for the group had been out for over half an hour on a long flight by Vernon Boehle. Soon after, they came in to report a flight of twenty eight and a half minutes made starting soon after my flight. All of which goes to show that conditions at that time were just right for a long flight.

Several weeks later I received word from the airport manager that the plane had been found by a farmer living some twenty-eight miles from the airport. There was not much left, but I did manage to salvage the wing and the prop and a part of the tail, and they are still flying as parts of an outdoor tractor.

Construction

In the construction of any model, the first thing to be considered is the approximate size. In this case the model of approximately 125 sq. in. area was made because of previous experience with this size model. The model was originally built for the Nationals in Akron in 1934 at a time when the writer had but little over

(Continued on page 30)



"Gas Lines"

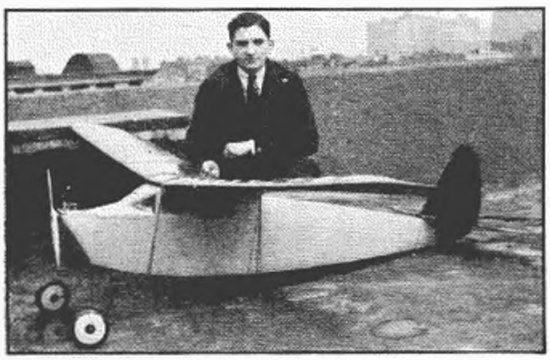
A Presentation of Who's Who in Gas Model Designing, Building and Flying

Don Warner's 8 ft. amphibian. Pict. No. 1

Warner's plane as a land job. Pict. No. 2

Don Donahue's job is well cowled. Pict. No. 5

M. D. Anderson takes first place in San Diego. Pict. No. 6



H. Stadelmeier with his consistent winner. Pict. No. 7

Freshman's model gets off on its first flight. Pict. No. 8

Now you can join the *International Gas Model Airplane Association*, the only organization of its kind in the world. A membership card will be sent to all gas model fans who qualify. Fill in the coupon at the end of "Gas Lines." Join ! ! !

MOST gas model fans will be interested to know that the International Gas Model Airplane Association is now well under way. At the time of writing there are a hundred and ten members, and applications are continually being received. It is expected that this club will grow throughout the coming year to at least one thousand young men who are actively interested in designing and building gas models and who will eventually become leaders in aviation.

The first gas model unit has been formed in Brooklyn under the guidance of Mr. Allen Turner. There are eight members in this unit at present, but Mr. Turner tells us that the difficulty is not in getting members but in keeping down the size of the unit to a few highly scientific and active members.

We have good news for Jersey fans. A unit has been formed under the name of the North Jersey Gas Model Airplane Club under the sponsorship of the "Newark Sunday Call." This is unit No. 2. The director is Mr. E. B. Berlinrut, who in the past has promoted glider activities among young men of Newark and the vicinity. Mr. Berlinrut has been quick to see the possibilities in an active gas model unit in his locality. The first meeting was held on February 14th at which the members voted to join the I.G.M.A.A. Subsequent meetings will be held once a month in the Y.M.C.A. building at Newark. An interesting program of talks by gas model experts and contests are planned for the coming season.

Girard Sanderson and his high-wing cabin job. Note the three bladed prop. Pict. No. 3

At the first meeting a number of speakers told of their experiences with gas models and gave helpful pointers that will enable other builders to design and build more successful ships. Speakers at the meetings were:

Mr. Berlinrut, club leader; Mr. Phil Zecchitella, who injected considerable humor into the occasion. Many builders know that he is considered to be a wit in the model airplane field. Other speakers were: Mr. Irwin Polk, Mr. Nathan Polk, Mr. Benjamin Shereshaw, Mr. Jesse Bieberman, who came all the way from Philadelphia especially to attend this meeting; and Mr. Charles Grant, editor of MODEL AIRPLANE NEWS and Director of the I.G.M.A.A.

Unit No. 3 of the I.G.M.A.A. has been formed in Pittsburgh under the leadership of Mr. Robert K. Allen. Mr. Allen is the director of the Gimbel-Pittsburgh Model Airplane Club, a chapter of the Junior National Aeronautic Association. Unit No. 3 consists of the gas model division of this club. Mr. Allen believes that this unit will be one of the largest and most active units in the country in a very short time, inasmuch as he has a vast number of boys to draw upon who are interested in gas model aviation. Mr. Allen makes a very fine suggestion which is as follows:

"I would like to suggest that a system of licensing, gratis, gas models under the category of this club would be highly desirable. Several reasons are:

"It would enable the regional director and headquarters to identify a particular ship more easily than if there were no markings. A builder would be able to have two or three ships and keep an accurate log of the flights he has succeeded in getting. This system would prevent undue criticism of the organization due to damage and careless flying by 'outlaws.' This last can be explained further by saying that all flights of organization members should be directed and overseen by a responsible director, including test flights, thereby eliminating dangerous practices such as flying

What Would You Like To Fly?

If you had enough money to buy an airplane for your own use what would you buy? Amphibian.....; Landplane.....; Hydroplane .....; Autogiro.....; Biplane.....; Monoplane.....; Price preferred.....; Price possible to pay.....; Cruising speed .....; Landing speed.....; One-seater.....; Two-seater .....; Three-seater.....; Cabin.....; Open.....; Lowest cruising range to be tolerated.....; Power.....; Large Wing Spread.....; Small spread .....

Signature .....

Address .....

these models in locations not suited for that sort of activity. This license could be something on this order—GMA-20 (Gas Model Association, 20th plane registered)."

Possibly IGM would be a better prefix to the registration number. We will be very pleased to have the ideas of other gas model readers and builders in regard to this suggestion of Mr. Allen.

Mr. Allen, in his letter, gives us some news concerning his club, as follows, which may be of interest to rubber fans as well as gas model fans:

"The Gimbel-Pittsburgh Model Airplane Club, a chapter of the Junior N.A.A., is making plans for the 'Nationals' this summer. We are now scheduling elimination contests to be held in the meantime, in order to choose two model builders to represent us there. The two chosen will have all expenses paid to and from and during their stay at the Junior National Aeronautic Association National Contest, by Gimbel's. We are also furnishing a number of loving cups to be competed for during the coming season and to become the property of the contestant winning them twice in succession. A number of contests for the younger group; that is, under fourteen years of age, have been planned with merchandise awards as prizes. Our Gas Division will also be favored with awards not yet decided upon. Our slogan shall be, 'The Most Active Club in the Country'."

Builders of gas models all over the country have signed up as members of the Association. Builders are urged to form units in their vicinities under competent leaders. A list of the members of the organization appears at the end of gas lines.

Fans have sent in some interesting data and pictures to us. In fact, many more than we can print in one issue. Donald C. Warner of 3 Sachem Place, South Norwalk, Conn., has supplied a picture of a very interesting model which he has just completed and test flown. It is shown in picture No. 1 as a hydro and in picture No. 2 as a landplane. He says that he commenced its design about a year ago. This ship can be set up as an amphibian also. It was entered in the Junior Birdmen Gas Model Races at Lakehurst, New Jersey, but due to an accident to the stabilizer on the way down, it was not until late in the afternoon that it was repaired. On the official flight, without any test flying or gliding, the model took off perfectly in about eight feet. Due to too much allowance for motor torque it turned to the right and plowed into the ground after making two or three turns.

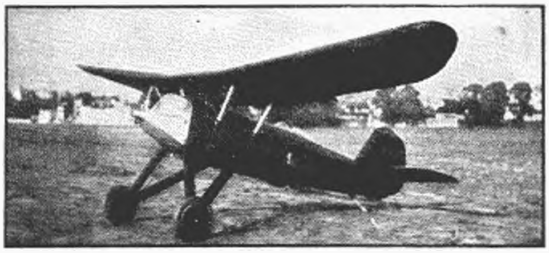
Now, however, it is fixed up as good as new, and as soon as the ice breaks up, Warner plans to give it a thorough test as a hydro. It has a span of eight feet and is five feet long.

An interesting gas model has been built by Girard Sanderson of 1016-D-7th, Santa Monica, Calif. It is shown in picture No. 3. Its resemblance to a Stinson is notable. One of the interesting features of this model is the three bladed propeller which took the ship recently to a 3000 foot altitude in one and a half minutes on six eye-droppers of fuel. This flight resulted in a chase by its builder for five miles before it was recovered. The estimated speed is forty-five miles per hour. The flight lasted forty-five minutes from the time it left the ground until it landed.

Mr. Sanderson not only built the model but also constructed the engine, which powers it. He contemplates giving it a test in the near future with a two cylinder experimental engine which he is now

(Continued on page 28)

Our glider expert has gone "gas job" Pict. No. 4

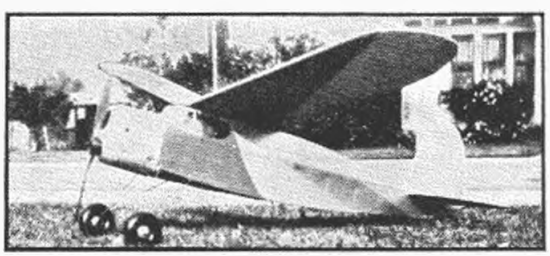


Van Wymersch's contribution from Belgium. Pict. No. 9

E. J. Weathers persuades a cranky prop. Pict. No. 10

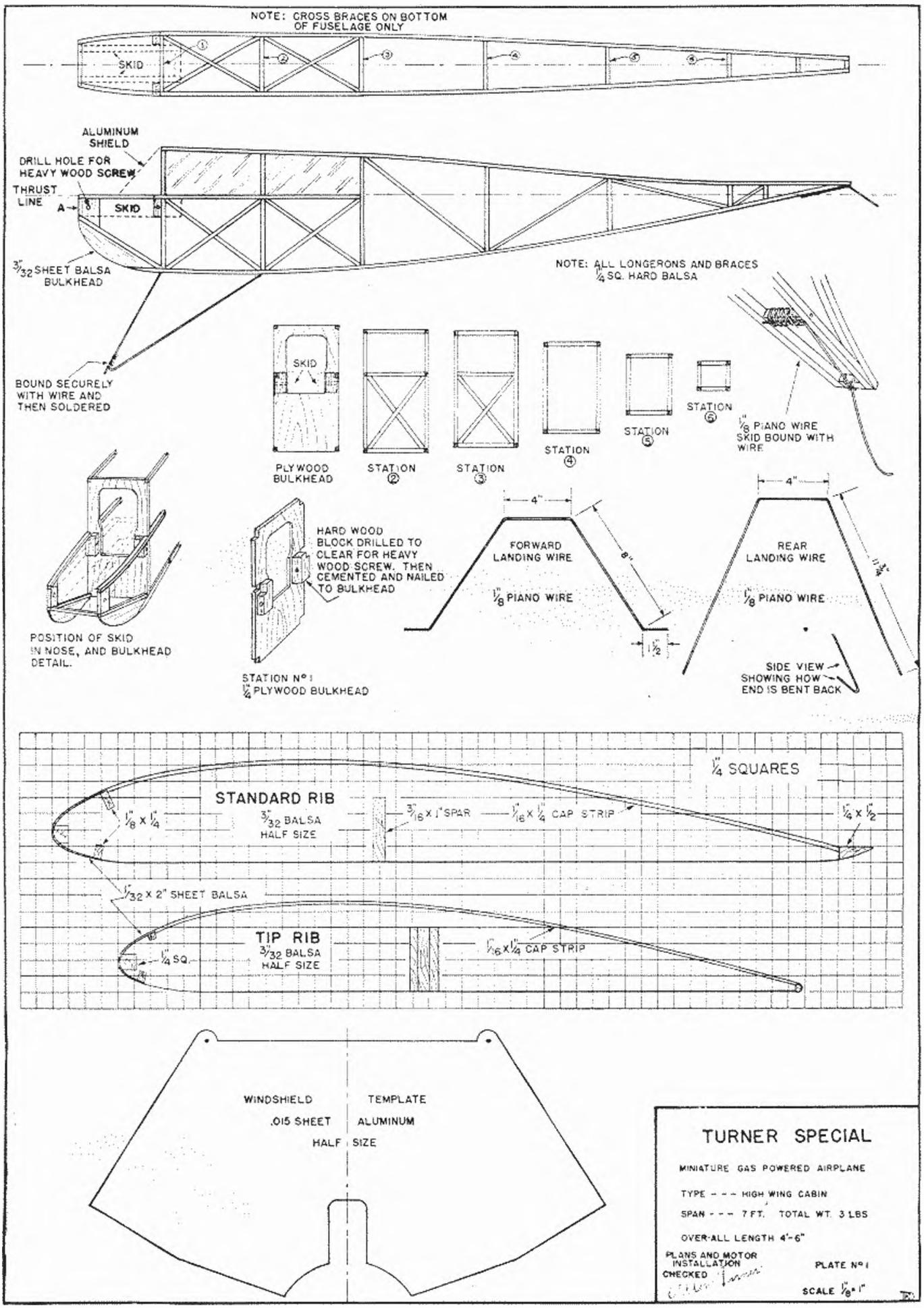
L. Schroeder and his realistic cabin job. Pict. No. 11

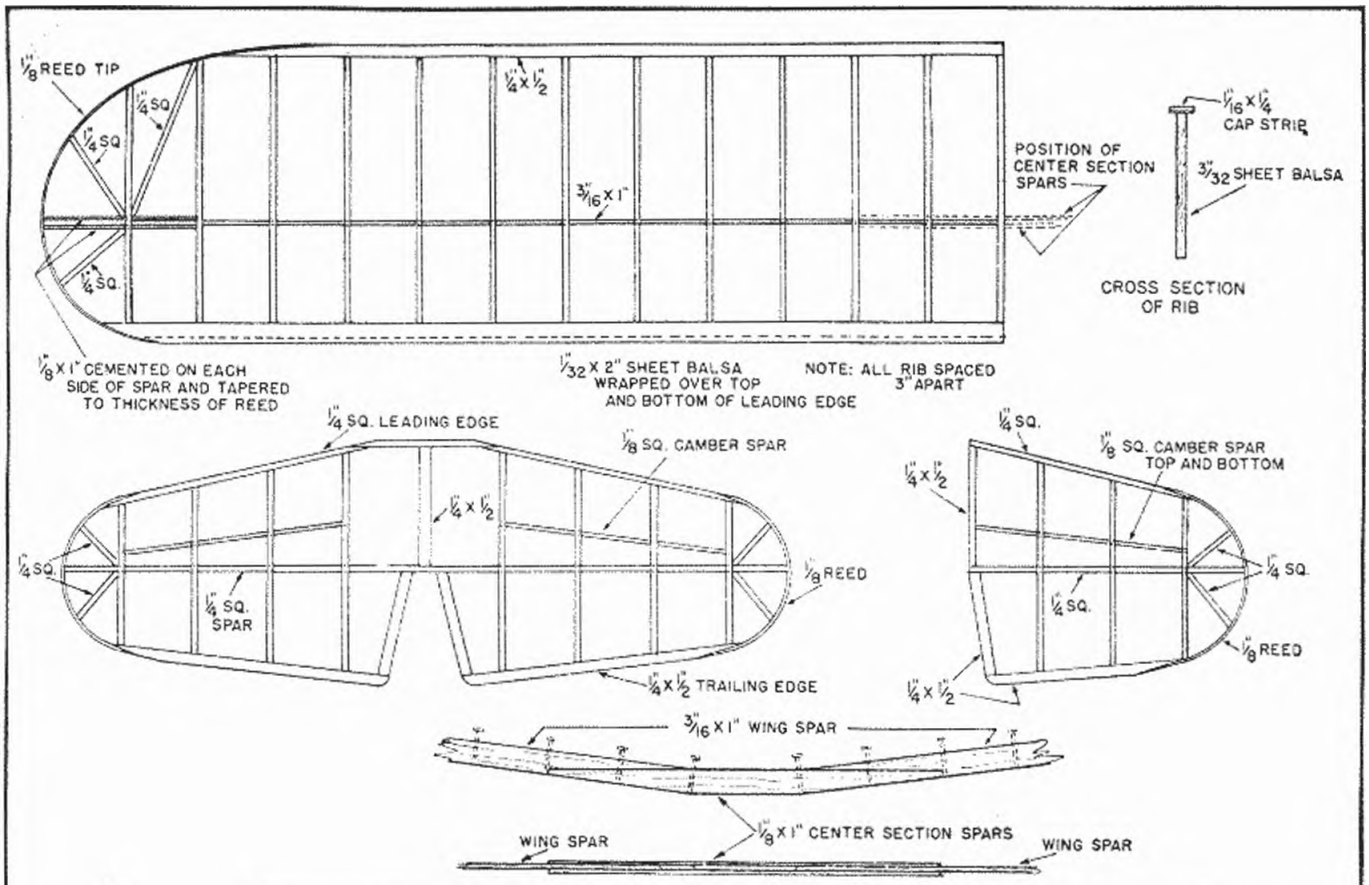
Pouch's Lockheed Vega is built to scale. Pict. No. 12

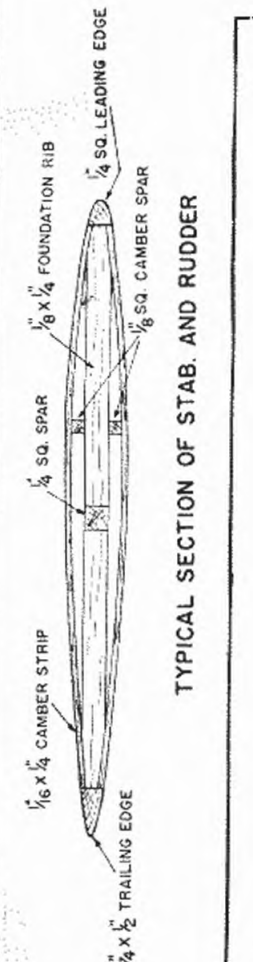


Ed Swan Jr.'s ship has made many flights. Pict. No. 13

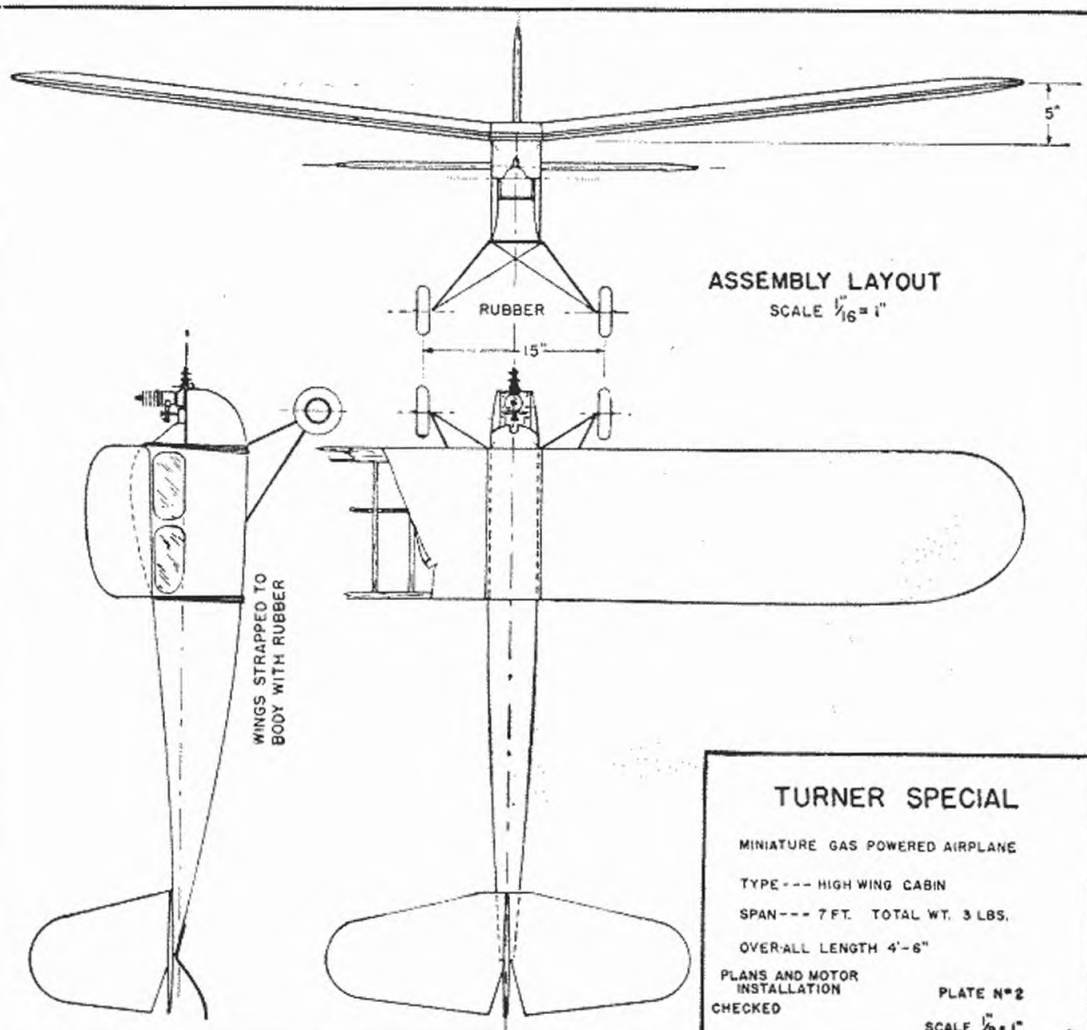
Look what this fan did to a KG. Spread 6 ft.; motor, ½ hp. Forster Bros. Pict. No. 14


NOTE: CROSS BRACES ON BOTTOM OF FUSELAGE ONLY
SKID
ALUMINUM SHIELD
DRILL HOLE FOR HEAVY WOOD SCREW
THRUST LINE
A
SKID
3/32 SHEET BALSA BULKHEAD
BOUND SECURELY WITH WIRE AND THEN SOLDERED
NOTE: ALL LONGERONS AND BRACES 1/4 SQ. HARD BALSA
SKID
PLYWOOD BULKHEAD
STATION ②
STATION ③
STATION ④
STATION ⑤
STATION ⑥
1/8 PIANO WIRE SKID BOUND WITH WIRE
POSITION OF SKID IN NOSE, AND BULKHEAD DETAIL.
HARD WOOD BLOCK DRILLED TO CLEAR FOR HEAVY WOOD SCREW. THEN CEMENTED AND NAILED TO BULKHEAD
STATION N° 1 1/4" PLYWOOD BULKHEAD
4"
FORWARD LANDING WIRE
1/8 PIANO WIRE
1 1/2
4"
REAR LANDING WIRE
1/8 PIANO WIRE
SIDE VIEW SHOWING HOW END IS BENT BACK
1/4 SQUARES
STANDARD RIB
3/32 BALSA HALF SIZE
1/8 x 1/4
3/16 x 1" SPAR
1/16 x 1/4 CAP STRIP
1/4 x 1/2
1/32 x 2" SHEET BALSA
TIP RIB
3/32 BALSA HALF SIZE
1/4 SQ.
1/16 x 1/4 CAP STRIP
WINDSHIELD TEMPLATE
.015 SHEET ALUMINUM
HALF SIZE
TURNER SPECIAL
MINIATURE GAS POWERED AIRPLANE
TYPE - - - HIGH WING CABIN
SPAN - - - 7 FT. TOTAL WT. 3 LBS
OVER-ALL LENGTH 4'-6"
PLANS AND MOTOR INSTALLATION CHECKED
PLATE N° 1
SCALE 1/8" = 1"





TYPICAL SECTION OF STAB. AND RUDDER



ASSEMBLY LAYOUT
SCALE 1/16 = 1"

TURNER SPECIAL

MINIATURE GAS POWERED AIRPLANE

TYPE --- HIGH WING CABIN

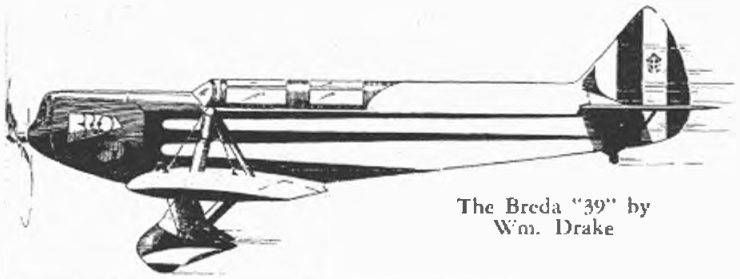
SPAN --- 7 FT. TOTAL WT. 3 LBS.

OVER-ALL LENGTH 4'-6"

PLANS AND MOTOR INSTALLATION CHECKED

PLATE N°2

SCALE 1/8 = 1"

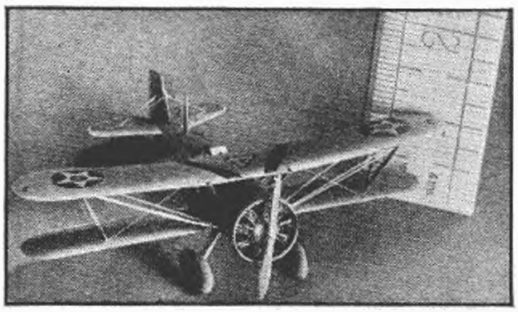


The Breda "39" by Wm. Drake

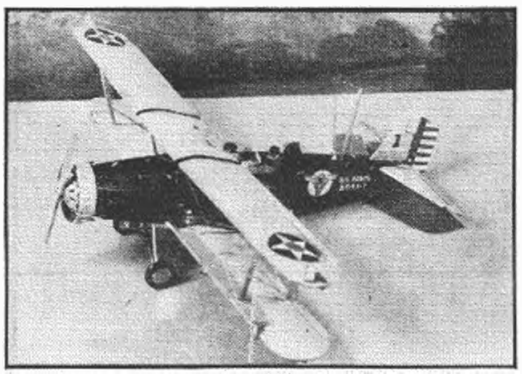
AIR WAYS

HERE AND THERE

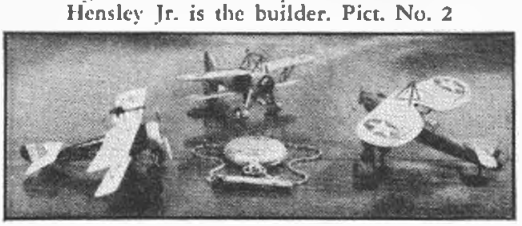
What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments



A perfect 3½ inch Curtiss Seahawk by Bill Frey. The motor is detailed. Pict. No. 1



A Douglas 0-38 with complete details. Glenn S. Hensley Jr. is the builder. Pict. No. 2



Three of the most perfect miniature models ever Produced, by Don Ludwig. Pict. No. 3

A pair of "Lilliputians" beside a model Falcon 01-E, by Henry Clark. Pict. No. 4

A perfect Stearman "80" scale model by K. O. Wilson and P. W. Moscyzna. Pict. No. 6

MEMBERSHIP cards are now ready and will be sent out to all model builders who wish to join the Air Ways Club. In effect, a membership card in the Air Ways Club is recognition of the member's contribution to the art of model building, and to general aviation knowledge. Every young man, large or small, who builds model airplanes is adding to the great store of knowledge which is helping to promote this new and remarkable means of transportation. With each day, membership in the Air Ways Club is growing. Shortly every state in the union will be represented. In coming issues activities of the Club which are of interest to its members will be announced. Join by filling in and mailing the coupon at the end of Air Ways to MODEL AIRPLANE NEWS, 551-5 Ave., New York City.

We have heard from a number of our old friends who have sent us a few interesting pictures, which are shown here.

William Drake of 3 Pine Street, Malden, Mass., is the artist responsible for the Italian Breda "39", one of the latest sport planes.

Picture No. 1 is one of the finest specimens we have received this month. It is a Crutiss Seahawk built by Bill Frey of 220 Zara Street, Pittsburgh, Pa. The section of the ruler showing at the right of the picture will give you some idea as to the size of this model. For such a small model the details have been beautifully carried out. Frey is a member of the Gimbel-Pittsburgh Model Airplane Club, which is directed by Mr. Robert K. Allen.

Another excellent scale model is shown in picture No. 2. This was built by Glenn S. Hensley Jr., of Stanberry, Missouri. The ship is a Douglas 0-38, which required three months to complete. It is built to scale of one-half inch to the foot. To show the completeness of this model we list here some of its details:

Electric landing lights operated by a switch in the cockpit.

Movable controls from cockpit.

Aerial camera with lens that focus on piece of ground glass.

Metal wing walks.

Two bombs.

Entirely hand made motor, propeller, and drag ring.

Radio antenna that has actually been transmitted over.

Gusset plates around the aileron push rods.

Hand-made metal step plates.

The rear cockpit contains the following:

Radio control panel.
Bomb toggles.
Radio key.
Earphones on hook.
Map on map board and map case.
Fire extinguisher.
Man with silk scarf.
All necessary instruments.

Front cockpit.
Stabilizer control.
Throttle.
Spark.
Light switch.
Wheel brakes.
Flying controls.
Man with silk scarf.
All instruments.

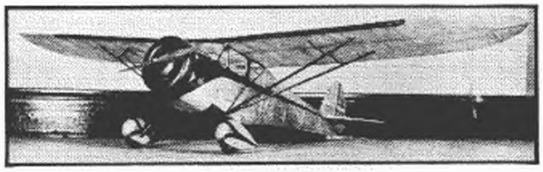
The insignia denotes the first photo section of Brooks Field, San Antonio, Texas.

If any reader is interested in very small models, he will be interested in picture No. 3, sent to us by Donald Ludwig of 42 Channing Street, N.W., Washington, D.C., who built the planes shown. The watch shown in the picture will give you an idea of the size of the models. One of them is the Akron Fighter which was made from three-view plans by Joe Battaglia. It is made of a various assortment of materials,

A group of model builders at the first annual Conference of the New Zealand Model Airplane Association, at New Plymouth. Pict. No. 10

including mahogany, white pine, balsa, bamboo, reed and metal. The radial engine is carefully built up. The wheels turn in mahogany pants. Even the telescopic gun sights are in detail.

The small Rickenbacker Spad has all controls movable and a dummy pilot.



Here is a beautiful compressed air Mono-coupe that is a fine flier, built by Ben Meskewski. Pict. No. 5

Henry Clark of 46 Fort Washington Avenue, New York City, is an old model builder. He sends us picture No. 4 which shows his Curtiss Falcon O1-E. This is not a real ship as you may imagine from the figures which are standing beside it. It is just another case of "trick photography," which seems to be a mania so prevalent among model builders. Clark writes:

"This particular photo is one of my 'trick' shots that I have had much success with lately. The model itself is one of thorough detail. It is a built up job and was made from a kit of one of your popular advertisers. It is rather an old model and has taken a terrific beating in its time. This was when I used it for flying purposes. It used to perform well with sharply dihedraled wings, but when I made it over into a scale job, I had to build new wings, of more rigid construction. You will notice a pilot in the cockpit. This is a carved image of a rather stern looking commander, and capable pilot."

A number of model builders are interested in compressed air planes. Picture No. 5 shows a very excellent one built by Ben Meskewski of 3111 West 25th Street. It is a well constructed job and has made a number of fine flights. However, Meskewski has now given up compressed air for gas models. He seems to prefer this branch of the spot.

One of the unusual scale models received this month is shown in picture No. 6. It is a Stearman "80" built to a three-quarter inch scale by K. O. Wilson and P. W. Woszczyna of 7607 Stockton Avenue, Detroit, Michigan. This job has been beautifully constructed, and in fact it is difficult to tell it from its big brother. The spread is 26¾ inches. It weighs 2½ pounds. Examination will show careful attention to details, especially in the landing wires. A more finished job has not been sent to us in some time.

A picture of one of the neatest looking fuselage flying models is picture No. 7, sent to us by J. G. Wheeler of 966 Bank Street, Victoria, B.C., Canada. Wheeler tells us that this is his first model of this type, all of his models having been flying scale planes. He says that he was converted to flying models because of the unusual success he had with Gordon Light's hydro which appeared in Model Airplane News in the September 1933 issue. In referring to the model shown in the picture, he says:

"As yet I have not had an opportunity to give the plane a thorough tryout, but from short test hops it gives every indication of being a really good flier. It took first prize in the Y.M.C.A. Victoria Hobby Fair, 1936, class "D" open to all ages. The plane was constructed from a kit and plans supplied by one of the more recent advertisers in Model Airplane News. The model is convertible for skis, pontoons or air wheels, as shown in the photograph. I am looking forward to flying it as a seaplane this summer."

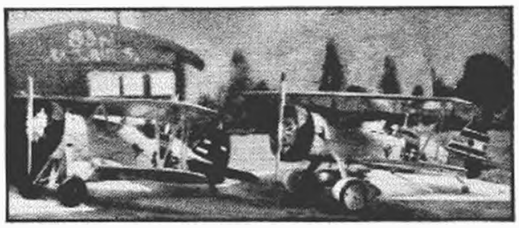
Picture No. 8 might be a scene at one of the Army airports, but actually it merely shows two models built by Herbert F. Kelley of 340 North Ellsworth Avenue, Salem, Ohio, posed on his model airport. They are a Boeing F4B-3 and a Curtiss F11C-2. Both ships are equipped with electric motors, controls piloted through the cockpit and are entirely covered with aluminum foil which gives them a beautiful appearance. The Boeing was made by Al Juhn and the Curtiss by Kelley, who is a lieutenant in the Salem Junior Aero Club.

One of our readers appears to be a very mysterious person, for he sends us picture No. 9 and merely signs his initials—R.A.W. We do know that he lives in Superior, Wisconsin. Here is a chance for a little detective work on the part of the readers. A mystery to be solved—Who is the unknown model builder? The picture shows part of the shop of "R.A.W." with a few of his models. In the foreground is a Polish Fighter PZL-1 which he has recently built. We might say that this picture shows the "inside story" of a model builder's life.

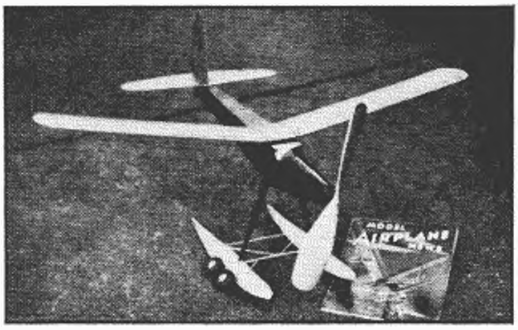
(Continued on page 42)

Some of the models at the 1st annual Conference at New Plymouth, N.Z. Pict. No. 11

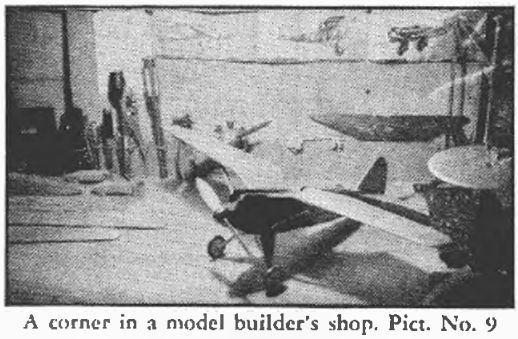
M. Legros converses with Gen. Denain, Min. of Air, at the A.C.F. Exposition. Pict. No. 14



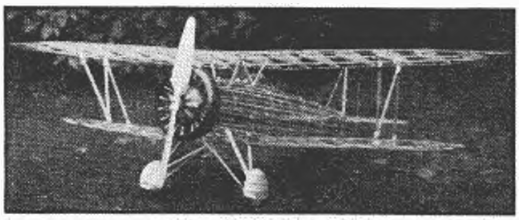
Not real planes, just two perfect models on H. T. Kelley's model airport. Pict. No. 8



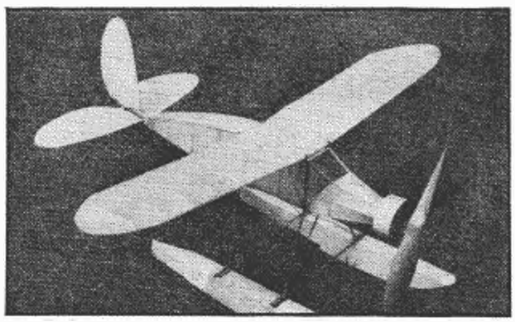
A fuselage model of excellent design made from a kit by J. G. Wheeler. Pict. No. 7



A corner in a model builder's shop. Pict. No. 9



A Jap. Navy fighter No. 90 of fine workmanship, by Toshio Kamei. Pict. No. 13



Primrose's Gordon Light hydro. Pict. No. 12

Here are 62 (31—½" Dwarf / 31—¾" Scale) Reasons Why YOU should join the growi

4-WHEELED HOWARD RACER "IKE"

Span 10½". Flies and climbs beautifully. Also data for "Mike." Suggested coloring: White, black details. Dry Kit D-42.............. **25c**

GB SUPERSPORTSTER

Doolittle's 1932 Thompson winner—and a beauty. Fast flights. Span 12¾". Suggested coloring: White, red scalloping. Dry Kit D-27.............. **50c**

LOCKHEED VEGA

A picture for beauty—a wonder for flights. Span 20½". Suggested coloring: brilliant red and cream. Dry Kit D-24.............. **85c**

COMPER SWIFT

Redesigned. Excellent flights. Span 12". Suggested coloring: Beautiful green, with black fuselage design. Dry Kit D-38.............. **30c**

TRAVEL AIR MYSTERY

Completely redesigned. Span 14⅛". Beautiful solid appearance. Suggested coloring: Red, black scalloping, green trim. Dry Kit D-2.............. **50c**

FOKKER TRIPLANE

Plane of Germany's greatest ace, Von Richthofen. Span 11⅜". Suggested coloring: New authentically colored silver nose, white rudder and markings. Dry Kit D-14.............. **45c**

HOWARD "PETE"

An easy to build Air Race model—fine flights. Span 10". Suggested coloring: All white. Black details. Dry Kit D-18.............. **30c**

MONOCOUPE

Span 16". Suggested coloring: Cream and orange. This design has won many first prizes for model-builders. Dry Kit D-28.............. **45c**

Everybody wants 'em, and when they get 'em, they want more!

• • •

CONNECTICUT writes: "It was through building C-D Kits that I have the job I enjoy today."

• • •

"I have been a model airplane builder for seven years and never yet have I come across a line of kits as authentic and complete as yours. Send me Kit SF-43." Penna.

• • •

Modelbuilders tell us we have the fastest delivery service in the land.

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This is What Every ¾" C-D Kit Brings You:

1. Full size assembly drawing. 2. Blocks and coloring for pilots. 3. Coloring for propellers, whether metal or wood. 4. Black for all details. 5. Thread for all bracewires (mostly new silver grey). 6. Printed out wood, not a few places rubber stamped, but every necessary curved piece printed out clearly on the finest grade of balsa wood obtainable. 7. All strip wood necessary. 8. Sufficient dope for the model, cement for glueing it together and tissue cement for applying the paper and coating. 9. Complete material for scale propeller as well as that for flying propeller. 10. Authentic rib and stringer material supplied now in all Kits (many filled-in fuselage jobs, too). 11. And, of course, all necessary insignia, color for striping with tape, special new shaped wood blocks, etc., where needed.

From BRITISH COLUMBIA: "Sending $.... for the biggest Kit you have to prove Canadians found out long ago that C-D Kits are the best."

• • •

From CHICAGO: "Your P6-E in the ¾" scale is the finest model airplane Kit I have ever seen. C-D's are sure the 'tops'!"

• • •

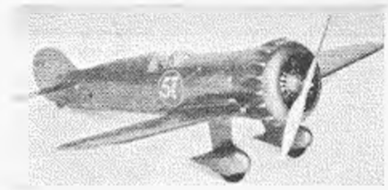
"In all the models I've ordered from you, I've never been disappointed." INDIANA.

• • •

"I say Cleveland designs, selects and packs the best Kits." TORONTO, CANADA.

• • •

From PENNA.: "Have built several C-D's and think they are better in every way than those of other companies."



Turner's Wedell Williams Racer

Capt. Roscoe Turner with this ship won the '33 Bendix race and '34 Thompson race. Plane holds record for crossing the U. S. both ways. Forced out of first place in '35 Thompson race due to broken oil line. Span 18". Suggested coloring: Wendell-Williams gold. Dry Kit D-48 .... **50c**

CURTISS HAWK P6-E

Suggested coloring: like Hawks in 17th Pursuit group, yellow, olive drab, black and white. Our redesigned model is the most advanced type to be found anywhere. Many details. ¾" size is built by the best model builders when "first prize" is sought like our D-49. Fast flights. Span 15¾". Dry Kit D-21.............. **75c**

U. S. ARMY HIGHSPEED MARTIN BOMBER

Claimed fastest service bomber in world. Span 35⅝". Suggested coloring: standard U. S. Army yellow, olive drab, details black. Novel and strong method of duplicating an almost impossible landing gear (but not retractable). Complicated fillets beautifully (and easily) duplicated. Nothing ever before like it—even our Boeing 247. Turned Balsa invisible hub wheels. By simply removing motor spars (the only time-proven efficient methods of multi-motor powering) model is ready for exhibition. If sold 5 or more years ago, would easily command twice the price. Dry Kit D-45, postfree.............. **$2.50**

Curtiss (Goshawk) F11C-2 Fighter

High speed U. S. Navy shipboard fighter. We claim our Hawks (21, 49 and 50) the most accurate and finest to be found anywhere at any cost. Designed for advanced model builders who want a thoroughly detailed scale model and one which, when completed, represents the acme of perfection in model building. Span 15¾". Suggested coloring: Silver, yellow, gray and green. Dry Kit D-49 .... **85c**

WACO "C" CABINPLANE

The most popular fast cabin biplane in the world. Used by many sportsman pilots and business men. This model was designed for advanced model builders. It is a good flier, is neat in appearance, and not too hard to construct. Span 16½". Suggested coloring: silver and red. Dry Kit D-37 .... **75c**

Great Lakes Sport Trainer

This beauty is probably the best liked and most maneuverable 90 H.P. plane in its class. An attraction wherever displayed with its interesting swept-back wings similar to modern dive bombers. Model has good flying qualities, span 13⅜". Suggested coloring: orange and cream. Dry Kit D-1.............. **65c**

VOUGHT CORSAIR V-65

Used by U. S. Navy as two place shipboard fighter, dive bomber and executive transport, this Cyclone powered plane is fast and maneuverable. It is very completely detailed and intended for advanced model builders. Span 18". Suggested coloring: blue, yellow, red, black and silver. Dry Kit D-41...... **85c**

DOUGLAS O-38 OBSERVATION

Very beautiful and unusually well detailed model. Authentic only as "Cleveland" makes 'em. Span 20". Suggested coloring: Yellow, olive drab, black details. 2 pilot blocks. Dry Kit D-43.............. **85c**

They're Wo... Prizes and ... than Any Ot...

• • •

ILLINOIS ... satisfied, ... Monocoupe, Vought ..., Goshawk, P6E, and F4B...

• • •

MICHIGAN ... to buy more of ... ing 1936."

• • •

"By mistake ... instead of what I ... now, for I ... pleteness." GE...IA.

★★★★★★★★★★★

★Complete Line

CLEVEL... DESIG...

Authentic Flying...

These Kits ... the very la... realism and ... with compet... the most ... America.

★★★★★★★★★★★

"More than ... Kits purchased NEW..."

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From IOWA: "... plete satisfaction ... model."

NO ... included in DWARF ...

"Even Better Than Advertised"

Read Before Ordering!

Try your dealer first. If he hasn't what you want, order direct, enclosing check or money order—cash at your own risk. No C.O.D.'s. Please mention dealer's name and address. Canada, Mexico, British Isles customers add 10%; all other countries, 20%. Send 3c for complete C-D catalog.

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JUNIOR N.A.A. NEWS

Prepared by National Aeronautic Association, Washington, D. C.

1936 National Championship Meet

AKRON, Ohio, the scheduled location for the 1936 National Championship Model Airplane Meet, which will be held June 30 to July 2, is working on the detailed plans for the meet and for the entertainment of the contestants and their friends. Due to the present unsettled labor difficulties in Akron, the committee is having more than a fair share of hard work and uncertainty. If the present labor troubles are not settled in time for the meet, plans have been worked out for holding the meet in a substitute city. However, it is hoped and believed that the meet will be held in Akron as scheduled.

By the time this is in print, more definite information should be available and the final arrangements completely settled. Full information and entry blanks may be obtained by writing to National Aeronautic Association, Dupont Circle, Washington, D.C., after April 30. Be sure to send with your request, a large self addressed and stamped envelope. The entry blanks and instructions will be returned to you promptly.

Regardless of the location of the meet, the various events on the program will be as listed below. The following brief specifications and rules are intended as a guide to enable contestants to make early preparations. The meet will be conducted under N.A.A. Contest Regulations. Only N.A.A. members may compete, an exception being made for foreign contestants who must be accredited by their own countries' model plane governing authorities. Any contestant under twenty-one may apply for Junior N.A.A. membership. The coupon printed below may be used for this. Those over twenty-one may apply for regular N.A.A. membership at $3.00 per year, or may apply for a Special Model Flying Permit at $1.00 per year. Just address a letter stating name, address and age, to National Aeronautic Association, Dupont Circle, Washington, D.C. Upon receipt of your request with the required dues, credentials will be mailed to you.

Condensed Rules and Specifications

EXHIBITION SCALE MODEL CONTEST, NON-FLYING, for MODEL AIRPLANE NEWS TROPHY and other awards. This contest is open to all ages. Models must not exceed 48 inches in any dimension and must be at contest headquarters not later than June 25. Contestants need not accompany models; entry blank only, is needed.

OUTDOOR STICK MODEL CONTEST, hand-launched. Contestants under 21 years of age compete for MULVIHILL TROPHY and other awards. Those over 21 compete for BALFOUR TROPHY and other awards. This contest is for any type of stick model whose main wing area is over 100 but under 300 square inches. Any type of power is permitted. Models must meet N.A.A. weight rule requirements.

OUTDOOR CABIN MODEL CONTEST, r.o.g. Contestants under 21 compete for STOUT OUTDOOR TROPHY and other awards. Those over 21 compete for special awards. This contest is for cabin models, N.A.A. weight rule and fuselage cross-section, with main wing area over 100 but under 300 square inches. Any type of power may be used.

WAKEFIELD INTERNATIONAL CONTEST. This contest is unlimited as to age of contestants. A team of six members may represent any one country. American and Canadian teams will be selected by elimination trials at the time of the meet. Foreign entries, except Canadian, may be flown by proxy if owners are not able to attend. This contest is for cabin models with main wing area not less than 190 nor more than 200 square inches. Models must weigh at least four ounces avoirdupois. Only one model is permitted for each contestant. Winner is determined by average of three flights. Rubber power only may be used.

MOFFETT INTERNATIONAL CONTEST. This contest is unlimited as to age of contestants. A team of six members may represent any one country. American and Canadian teams will be selected by elimination trials at the time of the meet. Foreign entries, except Canadian, may be flown by proxy if owners are not able to attend. This contest is for cabin models with main wing area not less than 100 nor more than 200 square inches, weighing at least one ounce avoirdupois for each fifty square inches of main wing area. Only one model is permitted for each contestant. Winner is determined by best one of three flights. Any type of power may be used.

Note: In both Wakefield and Moffett contests, the fuselage must comply with the $L^3/100$ rule. The two contests will be held on separate days if possible. A model may compete in both contests provided it fulfills all the required specifications.

OUTDOOR GASOLINE POWERED CONTEST for cabin r.o.g. models that are powered with internal combustion engines. This contest is limited to contestants who are over 16 years of age. Those under 21 compete for the TEXACO TROPHY and other awards. Those over 21 compete for special awards. Models may weigh no more than seven pounds. Fuel allowance is one quarter ounce of liquid fuel for each pound of model's weight. Models must meet fuselage cross-section rule $L^3/100$.

OUTDOOR RADIO CONTROLLED CONTEST for models of any type with any method of propulsion. Models must be under radio control as to direction and climb throughout the duration of the flight. This contest is limited to models of less than twelve pounds weight. There is no age limit except that no fuel powered model may be flown by anyone under 16 years of age. Special awards will be made.

INDOOR STICK MODEL CONTEST, hand-launched. Contestants under 21 years of age compete for STOUT INDOOR TROPHY. Those over 21 compete for SPRINGFIELD TROPHY. Other awards will also be offered. This contest is for any type of stick model whose main wing area is less than 150 square inches, without any weight limit.

INDOOR CABIN MODEL CONTEST, r.o.g. Contestants under 21 compete for the BLOOMINGDALE TROPHY. Those over 21 compete for special trophy. Other awards will also be offered. Any type of cabin model may be used provided it complies with N.A.A. fuselage requirements. The main wing

(Continued on next page, bottom of first column)

NATIONAL AERONAUTIC ASSOCIATION
DUPONT CIRCLE
WASHINGTON, D.C.

I hereby make application for membership in the National Aeronautic Association as a Junior Member, I am under twenty-one years of age.

☐ I enclose fifty cents for annual dues (Use check or money order).

Name.....
(Please print or type)

Street.....

City..... State.....

Date of Birth.....
(Month, Day, Year)

Approved.....
(Parent sign here, if applicant is under eighteen)

Junior N.A.A. Program Announced

By CHARLES F. HORNER
President, National Aeronautic Association

ONE of the major objectives of the National Aeronautic Association for 1936 is to achieve a nation-wide organization of young people, and through it to stimulate interest in aviation, and to furnish methods and means for instruction and supervision in model plane building and flying, and to organize and disseminate necessary informative material in relation thereto.

Youthful interest in aviation is ardent and widespread. Probably no other current activity has more completely grasped the imagination of the boys. The intelligent consideration which boys are giving to aviation, and the understanding which they possess, are quite beyond the concept of most adults. It is not a temporary interest. It is different from that of similar activities because a youthful regard for flying is carried by the average boy into maturity.

While the N.A.A. has provided for a Junior Membership, it has not heretofore been in a position to give to the lads the service and supervision that is very much needed at the present time. The Administration of N.A.A. believed that its first duty was to foster and establish competent adult organizations before proceeding vigorously in an organization for the boys. Moreover, it seemed desirable to make a careful study of needs and possibilities before proceeding with an aggressive plan of action. The preliminary work has been done. N.A.A. Chapters and affiliated local groups may now expect active cooperation and a constant flow of necessary material.

To make sure that Junior activities will be carefully directed and supervised the Association must require that a responsible adult organization in each community will take the initiative in the junior group and assume proper responsibility in its direction and supervision. So far as the National Association is concerned, the responsible organization must be the Local Chapter, Aero Club, accredited N.A.A. Committee, or other approved group.

Boys under 21 years of age will be admitted to Junior Membership. Each will be provided by the National Association with an attractive insignia, identification and membership credentials. The N.A.A. proposes to provide each local sponsoring organization with complete plans for procedure, instructions for directors, and frequent bulletins which may be reproduced and distributed to the individual boys. (The local chapters will, of course, determine whether to make girls and boys members of the same chapter or to encourage separate organizations.)

Plans call for regular instruction in model building and flying, for contests at appropriate intervals, for grading and classification according to progress made, and for the certification and keeping of records.

In most cases the local airport manager is designated as the N.A.A. Contest Representative and it is urged that so far as possible the local airport, or some nearby spot, with its facilities, be utilized as occasion demands, in the required study. Sponsoring groups are also urged to secure cooperation from instructors in aviation and allied subjects in schools and colleges and to endeavor to secure for this and other purposes the interest of established educational institutions.

Existing Junior Chapters will not be disturbed, for the present, in their relations with the National Association but, in the future, all new Junior Chapters must be organized under the supervision of adult groups as above indicated.

No lines are drawn for or against other existing junior groups. On the contrary, it is suggested that it is advisable to cooperate, when possible, with contemporary boys' clubs.

N.A.A. sponsorship and supervision of model plane building and flying is highly important and, indeed, necessary to orderly development. As a result, proper standardization in all parts of the country may be achieved, and requirements and records in achievement classified and systematized.

It seems necessary for the Local Chapter to provide a center of operations which may be used as a mailing address, for the distribution of material and necessary conferences. In some instances, such accommodations might be furnished by the Chamber of Commerce, the Junior Chamber of Commerce, the N.A.A. Hotel, or a department store, newspaper, or other suitable institutions.

The interest of city government officials and school and college authorities should be enlisted whenever possible to the end that public parks and the school or college facilities might be secured for outdoor meets.

It is important that work for 1936 should start immediately so that, during the season, arrangements may be made for one or more contests in different areas of a given city, these to be followed by city-wide contests and, finally, by State and National tournaments. It is advisable, therefore, that local sponsoring groups select Junior organization as an important feature of their program of activities for the current month.

Sponsoring organizations can secure prizes which may be awarded for proficiency and rate of advancement. It is important that a survey be made at once to determine the availability of model equipment. Merchandise is usually on sale or can be placed on sale in local business institutions. A list of manufacturers is easily secured.

The Junior Membership fee is 50 cents a year, which covers the cost of the membership pin, credentials, and such material as it is possible for the Association to supply. When desirable, the local sponsoring organization may charge a somewhat higher fee—it should not exceed a dollar a year—and the sum charged in excess of 50 cents shall be used for necessary local expenses.

The Junior N.A.A. will be supervised by the Model Committee of the Contest Board for the National Association, of which Major Alford J. Williams, Vice President of the National Aeronautic Association, is Chairman. Other members of the Committee are: H. W. Alden, Robert K. Allen, Willis C. Brown, Claude E. Carmichael, Paul Garber, H. M. Jellison, George C. Johnson, Sanford Kellogg, John Williams.

An outline and chart for organization will be mailed to each N.A.A. Chapter and to such N.A.A. Committees as may request the same. Such committees should address: Junior N.A.A., National Aeronautic Association, Dupont Circle, Washington, D.C.

(Continued from page 26)

area shall not exceed 150 square inches. There is no weight restriction.

In all of the scheduled contests on the meet program, N.A.A. definitions and specifications apply. This concerns such details as "hand-launched," "cabin fuselage model," "stick model," "R.O.G.", number of official flights, etc. It should also be noted that contestants under sixteen may not fly models that use fuel.

There is no limitation to the length of fuselage, motor stick or rubber motor. Any number of motors may be used. Gears, chain-drive, belts, or multi-propellers may be used. Models may be either tractors, pushers, or a combination of the two. Wings may be either single or double surfaced. Any type of power, except rockets, is permissible excepting where specifically prohibited in the rules for a particular event. In a fuselage (cabin) model, when rubber is used for motive power, it shall be enclosed entirely within the fuselage. When fuel power is used in any model, N.A.A. fuel allowance rule must be observed.

"Gas Lines"

(Continued from page 19)

working on.

In the last issue we showed the ten foot model which Bob File of 502 Seymour Avenue, Columbus, Ohio, the glider expert, was building. He has finally gotten it completed and sends us a picture of himself with the model. We still anxiously await Bob's story of the test flight. Pict. No. 4.

One of the slickest looking jobs that we have seen has been built by Don Donahue of 1214 Saginaw Street, Eagle Rock, Calif., and is shown in picture No. 5. The model has a five foot wing span and is of the high wing type with an open cockpit. One of the features is the inverted motor which has been beautifully cowled as can be seen from the picture. We are sure that many gas model fans would be interested in hearing how such a cowl was made. It appears to be made of metal. The technique of shaping metal is quite difficult.

The motor was built by Owen Chapman and has a ¾" bore and a 13/16" stroke. It turns a propeller 4200 revolutions per minute, putting out thirty-six ounces of static thrust. On many inverted motors the spark plugs have a tendency to foul. However, Owen has prevented this by designing a special plug. The total weight of the model is three pounds, three ounces. The wing, being fixed to the fuselage, the adjustment of balance is attained by moving the batteries, which are mounted on a track, back and forth.

The best flight up to the present time lasted for six minutes, at the end of which time the model passed out of sight. The usual chase in an automobile resulted. Finally the model was sighted and it was seen to land perfectly in a road. The landing gear is made of ⅛" x ⅜" dural, filed to a streamline shape. It is equipped with knee action shock absorbers.

The gas model craze has directed many older builders to the hobby of model airplane designing and flying. One of these is Mel Anderson, who is shown in picture No. 6, holding his low-wing gas job. He was a winner at the recent first annual Aviation Advancement Club, Southern California Gasoline Model Airplane Contest, held at San Diego on January 26th. Twenty-two models were entered but Anderson won the event with a flight of slightly less than fourteen minutes. His ship was powered with a Baby Cyclone Engine. This is the first contest we know of in which a low-wing gas model took first place.

Bill Atwood, the famous gas model builder, took second place. The contest was run under N.A.A. rules with the exception that only ⅛ ounce of gas was allowed per pound of weight, instead of ¼ ounce per pound.

We wish to call attention here to the fact that Mr. Mel Anderson's gas model apparently does not fulfill the demands of the fuselage model rule. From questions asked by many gas model fans, we get the impression that they do not realize that the National Aeronautic Association does not recognize any flights made by Class E gasoline models unless the fuselage rule is complied with. Under these conditions Anderson's flight cannot be held official. We suggest that Anderson and his club look into this matter carefully.

An interesting ship is shown in picture No. 7, and was built by Henry Stadelmeier of 132 St. Marks Place, Brooklyn, New York. He says:

"It has a very high climbing angle and is very stable. It is built up of balsa throughout and is covered with bamboo paper which makes it very light for its size. A feature of the ship is a high line of thrust."

Apparently this ship with its large fuselage would give the impression that it offers considerable resistance in flight. However, it appears that some of the fuselages that have large cross sections do not give any more resistance than some of the slimmer variety. Streamlining and shape have a great deal to do with this. This appears to be the case with Mr. Stadelmeier's model, for he has placed first in the Bamberger Aero Club Contest at Hadley Field, New Jersey, and has won two third places; one at the Junior Birdmen Contest at Lakehurst, N.J., and one at the Kresge Aero Club Contest at Caldwell, N.J. These events were won against a large field of contestants.

The model has a span of eight feet and is powered by a Brown Junior engine. The landing gear is made of .096 music wire which makes an excellent shock absorber.

Now we jump half-way around the world to Australia. It appears that the Australian boys are running "neck and neck" with American builders in the gas model field. Picture No. 8 shows a model on a take-off. It was built by Mr. Ivor Freshman, director of the Model Flying Club of Australia. Incidentally, this was the first take-off of this model. Mr. Freshman has been honest enough to say that on this flight the model crashed.

A point of interest is the usual large group which attends gas model airplane contests. It appears that Australians are no different than Americans in this respect.

Another country has been heard from this month; for we have received word from Mr. Alfred Van Wymersch of 14 Rue Berkendael, Forest, Brux, Belgium. Mr. Van Wymersch has built the gas job shown in picture No. 9. The ship has a six foot span and is powered with a Brown Junior. It was finished late last fall but two test flights have been made, each of which was about four minutes' duration. Each of these was made with only enough gas to run the engine for thirty seconds "so I thought," quotes Mr. Van Wymersch. Van Wymersch tells us that he has started a gas model club in his town in Belgium. We sincerely hope that he keeps us informed as to his activities.

Picture No. 10 shows a picture of Elbert J. Weathers of 2720 Poinsettia Drive, San Diego, Calif., tuning up his miniature gas job for a flight. This model has a wing span of only four feet. Mr. Weathers says that the trouble which he has been trying to eliminate is with the stubborn propeller. Apparently it cannot be adjusted on the shaft to his liking.

Lloyd Schroeder of 1621 Hillger Avenue, Detroit, Michigan, sends us picture No. 11 of himself holding his latest gas job. It is an exceedingly fine looking ship. The wing had a span of six feet and a chord of ten inches. The machine is made entirely of balsa covered with bamboo paper. Two coats of dope were used. Minus the power plant its weight is 1¾ pounds. As yet flights have not been made with it, but news of the test has been promised by Mr. Schroeder.

The advance in gas model construction may be noted by the reduction in the weight of the models, which is gradually taking place. With refinements of structural design, unquestionably, weights will be reduced still further.

Mr. K. A. Pouch of 83 Low Terrace, New Brighton, New York, sends us picture No. 12 which shows a very beautifully made gasoline model of the Lockheed Vega. The interesting part about this model is that it has no dihedral on the wings, but is made like the large ship. The model has a seven foot wing span and is powered with a Brown engine. Mr. Pouch says that this model is practically crash-proof. We are sure readers would appreciate more details as to how he obtained this quality.

The model shown in picture No. 13 was built by Edward Swan, Jr., of 620 McKinley Drive, Redlands, Calif. He says:

"The job was built around plans of Irwin G. Ohlsson of Los Angeles, but with several changes in the construction; an extra wing spar, different type landing gear and an entirely different method of stress bracings in both wings, fuselage and empennage. Ohlsson's job ready to fly weighs 2¾ pounds, my ship weighs 4¼ pounds, which I believe makes for a more stable flying plane. I believe that by getting the wing loading more in ratio to the 'big job' will do more to advance the knowledge of aeronautics than by building veritable 'floaters.' However, I certainly don't wish to be looked upon as an authority in this respect, for this is my first attempt at gas jobs. To date I have had about twenty very successful flights."

We are indebted for picture No. 14 to a young man who is evidently very bashful. He lives at 557 Maple Avenue, Barrington, Rhode Island, but he failed to sign his name to the letter which accompanied the photograph. However, he tells us that this is a six foot gas powered Monocoupe and is his second gas job. Looking closely at the structural features gives rise to the conviction that this job was built around Joe Kovel's design. The fuselage and landing gear are exactly like the KG except that a cabin has been added and streamline to the body.

Those who wish a cabin job can have one easily by changing the KG plans which appear in the April and May 1935 issues of Model Airplane News. Those who wish the plans may purchase them by writing into this office for reprints.

The ship, though of small span, is pow-

(Continued on page 45)

The World Record Fuselage Contest Model

(Continued from page 17)

a week to build planes for all events. This immediately eliminated indoor models and necessitated some duplication of models to enter the three outdoor contests. Two planes like the present record model were built for the Stout and Moffett contests, and a fuselage of smaller cross section and greater length was built without landing gear for use in the Mulvihill event. This arrangement has proved very satisfactory except for times when one plane is lost, leaving the disgruntled owner with just a fuselage and propeller for the other events.

The ship did not fly well at Akron because of an almost imperceptible amount of wash-in on the lower wing. When an attempt was made, the model circled to the right; adjustment was too critical for consistent results. Then the model was made to turn with the torque, but the performance was not good. The next year, hurried revisions were made to enter it in the St. Louis contest. These were mainly a new wing and smaller rudder. The model was tested twice before the contest and seemed to be flying well, so off to St. Louis!

First it might be well to give reasons for some of the elements of design in the model. The wing construction was adopted following the design of modern soaring gliders. The writer is thoroughly convinced that this type has a very definite future in construction of outdoor planes, especially in larger models. Besides giving an almost unbelievable strength, it has a quality of durability that it is not exceeded by other constructions. It also eliminates the troublesome wrinkles that are so apparent on the front portion of paper-covering wings. The aspect ratio of over 11 was used because of the definite gain in efficiency of the high aspect ratio wing in a climbing attitude (at high lift coefficients) and to take advantage of the type of construction used. The wing could be made at least fifty per cent longer without having to increase the size of the spars, and still have excess strength.

The larger aspect ratio was used on the tail because of the known increase in stability with a high aspect elevator. Technically, this is because of the increase of the slope of the lift coefficient curve. The rudder was made adjustable because experience has shown that it is almost a necessity that it be so. Very often it is not the best designed plane that wins, but the one that is adjusted best.

An effort was made to keep the fuselage as short as possible to keep down the cross sectional area. The intention was to use a short fuselage and use slack in the rubber for the proper length to bring the plane up to weight. Too much slack, however, will tend to slide back and forth in the glide and ruin the flight. The square construction of the fuselage was used because of simplicity, since time required in making the plane was one of the prime factors in design considerations. The single strut bamboo landing gear is very satisfactory for small planes, and is the clearest aerodynamically and the most convenient that I know of.

The wing is constructed in the usual manner, except that the front portion is covered with thin sheet balsa before covering the rest with paper. This is done by assembling the wing as shown in the sketch and cementing the balsa sheet to the bottom of the spar, steaming around the nose, allowing to cool, and then cementing the remainder, holding it in place with pins. The rest of the plane is constructed along conventional lines and is very simple to make.

Flying the Model

The model is adjusted to fly to right or against the torque. This is accomplished without warping the wings for overcoming the torque as the nose plug is made to have a side thrust. A slight rudder is also used to turn the model right. Most of the adjusting time should be spent on the nose plug in changing the thrust line. This adjustment gives you the right thrust line angle so that the model may climb without stalling and at the same time have a flat glide. The offset angles can be only obtained by tests flights as every model has its own characteristics.

The position of the wing is approximately on the point shown on the drawing. The C. G. should be near the trailing edge of the wing because of the lifting tail. Once you have the wing set at this position do all your adjusting with the prop, plug, rudder and stabilizer. You might have to change the incidence, plus or minus, but keep the wing in one place as that will make adjusting easier.

If the builder contemplates any trouble in launching the model on a gusty day, adding of two or four strands of motor will help considerably. I have flown the ship quite a bit on eighteen strands and it is possible to launch it straight up from its tail.

To convert this fuselage model into a tractor which will consistently do three minutes, build a fuselage about twenty-four or twenty six inches, to fit the tail, and with a maximum cross section of about 1¾x1¾. A seventeen or eighteen inch prop should be used with about fourteen strands.

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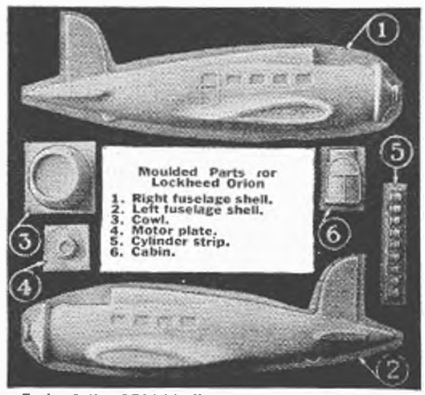

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Russia Takes to the Air

(Continued from page 5)

expertly trained, and as anyone knows, an air service is no better and no worse than the pilots it has, no matter what kind of planes they are flying. Nineteen-thirty-seven is important in the Russian book for another reason, too. In that year they expect to have their whole air service on a home production basis. The planes are largely Russian-built now; motors are still bought abroad for the most part, but the motor factories are speeding up.

The Russians started in 1925, as you would expect, with planes as well as motors bought outside the country. The first type of machine they put in large-scale production was the British DH9A. Because it is a good, sound machine, one on which it is difficult for even inexperienced mechanics to make mistakes and difficult for even inexperienced flyers to crack up, it proved a great success. As little as two years ago there were still some 3,000 of these DH9As in the Russian air service; fitted with Russian-built Liberty motors or French-built Lorraines. It is doubtful whether even the Russians ever considered them as first-line fighting craft. They would do in a pinch, of course, for almost any military job—observation, day bombing, two place fighters, and as Russian air strategy seems to be based on the idea of concentrating huge squadrons, they could count on a numerical superiority in almost any kind of fight. But the DH9A is too generalized and too slow a type for modern high speed air combat, and the main idea of the Russians in building them seems to have been the training of the factory hands and mechanics who would later be called upon to build faster and better machines, and the training of the aviators who would later be called upon to fly these better machines. The DH9A is still being built, but those in service seem to be in the process of retirement to work as training ships and as reconnaissance planes.

Meanwhile, there is evidence that the Red air service is working away from the DH9A. The great Fili Aircraft Works near Moscow, which specializes in the construction of wood and fabric planes for the military services, is understood to be concentrating now on a Heinkel model of greater speed and manoeverability to meet the need for a generalized type of military plane. The basic model is the Heinkel 63; it has been somewhat altered in this case by the Russian designers to fit the requirements of their mass production. Finished it comes out as a low wing, two-seater monoplane, with sharply tapered wings and retractable landing gear. Just what its performance is nobody knows; the motor is a Russian-built B.M.W., of which the German model would not make it go any faster than 180 m.p.h. But the Russian air service doesn't seem to worry much about high speeds and never has worried about them. Its plans are based on mass; on filling the sky with such huge clouds of planes that no enemy can possibly get through.

It is also interesting to note that the last order placed with the Fili factory, some hundreds of planes, called for more than half of the new ships to be single-seater pursuit models. These pursuit planes are of the 14 model, which is a twin brother to the French Dewoitine; a very high-winged monoplane, almost like a Morane parasol, an exceptional climber with a radial motor. This represents something altogether new in the Red air service; two years ago all the attention was being concentrated on bombers. And in turn the shift from bombers to pursuit ships represents a change in Red air strategy.

A couple of years ago, when factory production was being turned in the direction of huge fleets of bombers the leading enemy was Japan. Now most of the Japanese military and industrial centers are within easy reach of a bombing raid from Vladivostock or other air bases on the Siberian coast while none of the important Russian centers could readily be reached by an air fleet from Japan. Therefore the obvious Russian air strategy was based on bombers and more bombers. Hundreds of them were turned out with special emphasis laid on the huge ANT6 four-engines ships (from the Fili factory), big monoplanes with their four motors on the leading edge of the wing.

They are still being built, but one can expect the new models to have a few American features, for A. N. Tupolev, the leading Russian designer, has just been in this country, studying the work of the Douglas and Martin factories. In addition the Taganrog plant, on the Sea of Azov, which specializes in all-metal construction, was turning out Junkers Ju60 three-engined seaplane bombers at the rate of 10 a month. Over 50 ANT6s flew over the May Day parade at Moscow in 1932; two hundred of the Junkers and ANT types staged a great air parade at Vladivostock.

But that was in 1932. Since then Russia and Japan have settled their differences without fighting about them. Nobody any longer anticipates trouble in the Far East for some time to come. On the other hand, Hitler had meanwhile come into power in Germany and one of the first things he did was to issue this extraordinary statement:

"We (the Germans) are passing to . . . the policy of territorial conquest. . . . We can have in mind only Russia and the

border states subordinate to her."

If not a direct declaration of war this is obviously at least a declaration of an intention to make war as soon as possible, and the statement was quickly backed up by the announcement that Germany had discarded the Versailles treaty and was building a powerful new air fleet.

As between Germany and Russia the shoe is on the other foot than in the case of Japan. From Koenigsberg and other East Prussian towns it is a comparatively easy run for a big night bomber to the heart of the Russian industrial area. Moscow, the capital, Leningrad, Magnetogorsk, the big new industrial city, are all within range of German bombers. On the other hand it's a long hop from the Russian air bases to the German ceters around Berlin, and it has been no secret for a long time that the Germans have one of the best anti-aircraft defensive systems in the world.

In other words the Russian problem against Japan was that of finding a method of attack; against Germany it is that of finding a method of defense, and even more, of providing whatever bombers do go out with protection against the German defending planes. This is the reason why we see the Soviets turning to pursuit types after having neglected them for five or six years.

It is also the reason, probably, why another new type has emerged in the Russian air service—a copy (with some alterations as usual) of the big Dewoitine 300 series "Flying tanks" on the French air service model, three motored ships big enough to be bombers, but carrying only a small load of the explosive eggs, a big load of machine guns and a light coat of armor. They are supposed to take care of themselves against any type of fighting plane whatever, and though their rated sped is not high, they would probably do even better than pursuit in protecting a squadron of bombers during a long raid.

Another development brought about by the change in Russian air policy is the construction of huge squadrons of all-metal seaplanes, mostly light scouts which cary only a bomb of two but can fly long distances and ride out heavy weather on the water, a type very useful for service in the Baltic Sea. They are a single motored job, with the pusher propellor and motor high over the wing, copied from the Italian Savoia, model S-62, to which company the Russian government is paying patent fees for the design. Latest reports from the Taganrog factory say these ships are being stepped up into quantity production and are being turned out at the rate of one or two a day.

All this leaves out two of the most important features of the Russian air service, the two features that set it apart from all the other great flying fleets of the world. One is the energy with which

the Soviets are pushing forward dirigible construction. General Umberto Nobile, the Italian designer who was the head of the ill-fated Polar expedition, was disgraced in his own country. He went to Russia, and is there yet, with the Red government making the utmost use of his talents as a designer of the big blimps. One recent report had it that the government had ordered ninety-four dirigibles of a new type designed by Nobile. Ninety-four seems a lot, both in view of the difficulty of building them and in view of the dirigible's somewhat shaky reputation for reliability. One can only wonder what the Russians expect to do with this many airships, which is more than three times as many as the Germans had at any period of the war. Of course, there is helium in Russia, but something more than this is necessary. One can only suspect that Nobile has gotten hold of some new and important principle in dirigible construction, for no details of his design have been released.

But it is pretty well established that six of the new blimps have already been built, one having the very respectable gas capacity of 600,000 cubic meters, and it's a cinch they wouldn't invest in a ship like that unless she was pretty good.

The other extraordinary feature of the new Russian air service is the attention that has been given to parachute jumping. Russia is the only country in the world that has made this form of exercise a popular sport. The student Russian flyers practice it all the time as a matter of pure amusement, which is nobody's idea of fun but a Russian's. A picture with this article shows fifty parachutists floating through the air at once in a review near Moscow, and no less than 1500 were recently released from a big fleet of bombers in manoeuvers. If they can drop 1500 men at once there seems no reason why they can't drop even more; and even 1500 men make up three battalions of troops.

Suppose there were a war on, with two armies locked in position along a long battle front. Suppose a Russian bombing fleet went over the lines and dropped 1500 machine-gunners in the rear of the enemy army or right around the enemy headquarters where all the generals were. The chances are that they would deal a more staggering blow than the same weight of bombs. And there is the best of reason to think that the Russians are supposing just this set of conditions and preparing for just this sort of attack. Which would make Russia a very dangerous country indeed to engage in a war in the air.

Building a Flying Curtiss "Osprey"

(Continued from page 13)

of dope is sufficient to tighten the paper. Do not spray with water as warping is likely.

In attaching the completed units to the fuselage, be sure that the 1/16" positive incidence called for is incorporated in the stabilizer setting. The thread bracing shown is attached after the cement has dried. Notice that the stabilizer is mounted forward of the rudder.

Propeller, Cowling and Motor

The cowling is built up of soft balsa discs cut from 1/4" sheet. The foremost disc is of 1/16" sheet. The diameters of the various sizes can be found keyed as N, O, P, on both the front and the side views. The amounts cut out are to be found on the cross section of the cowling. The sheet that supports the detachable motor plug has a square hole cut in it to support the plug. The cowling is completely glued up before any shaping is attempted. The shaping is done with a razor and fine sandpaper. Attach the finished cowling with cement to bulkhead No. 1.

The crankcase is cut to the required shape and diameter from a soft block 5/8" thick. The square at the rear of the plug is cut from 1/16" sheet. The cone shaped extension at the front is shaped from a scrap. The bearing the pattern for which is given, is bent and sunk in this extension. The cylinders are rounded from a piece of 1/16" sq. They are nine in number and are attached permanently to the crankcase. The rocker arm housings are formed from 3/16" sq. scraps. The exhaust pipes shown can be cut from 1/8" sq.

The propeller blank is cut from a block 8" x 1 5/8" x 3/4". The carving is done in the usual manner. The proper balance is important to good performance and deserves an extra share of caution. The propeller blades should be sanded to the smoothest surface obtainable.

The shaft of .028 wire is bent to shape

at the prop end and imbedded in the hub. Force a bearing similar to the one used on the plug into the rear face of the hub. Place a loose washer and the plug on the shaft before bending the rubber hook.

The motive power is eight strands of 1/8" flat rubber and should be lubricated if the maximum performance is hoped for.

Wings

Using the rib patterns provided, cut the ribs from 1/32" sheet. Pin each set of the main ribs together and sand until uniform. Cut the notches required to receive the spars. The spars of 1/16" x 1/8" are pinned to the bench. To them are cemented the ribs at the proper spacing. The leading edge of the top wing is 1/8" sq. That of the lower wing is 3/32" sq. The trailing edges of both wings are shaped from 1/16" x 3/16" stock. The wing tips and the center section cut out are of 1/16" sq. bamboo bent by candle flame to the required shape.

The dihedral of the top wing is 1/2" and is incorporated by cracking the spars at the points designated. The tips are supported by blocks until the recemented spars have dried. The 3/4" dihedral in the lower wing is attained by slanting the first rib. The first two ribs on the bottom wing are supported by inserted pieces of 1/16" sq. as seen on the wing plan. The top wing is also braced by 1/16" sq. at the designated locations.

To cover, use separate pieces of tissue for both sides of the lower wing panels. The lower surface of the top wing is covered with one piece. Three pieces of tissue are needed to cover the upper surface of the top wing, one for each flat section. The finished covering is lightly doped.

Center Section and Interplane Struts

The center section struts are sanded down to 3/32" x 3/16" and streamlined. The interplane struts are 1/16" x 3/16".

Attach the center section struts to the fuselage at the proper locations. Check them for alignment before the cement has set. Scrape away a small piece of paper at each of the points on the wing surface to which the struts will be glued. The wing is glued to the center section struts and temporarily fastened by pins. The lower wing panels are attached to the fillet structures. The incidence of the top and lower wings is 1/16" and 1/32" respectively.

Place some convenient object under each of the lower wing tips to support them at the proper dihedral until the interplane struts have been attached. These struts are attached at the positions shown on the side view and on the plan view of the wing framework. The load and lift wires are black thread. They are fastened to the strut ends with a drop of cement.

Bomb, Rack and Machine-Gun

The bombs and machine-gun are made of scraps of soft balsa. The fins on the bombs are cut from stiff paper. The bombs are slotted to allow placement of the fins.

The rack consists of a frame of 1/16" sq. Two parallel strips are suspended

lengthwise below the wing. Small perpendicular strips hold the main frame to the wing ribs. They are attached to the second and third ribs of the lower wing. Small pieces of wire are forced into the rack and into the bombs below so that the assembly appears as designated on the side view. The bombs are intended on the model to be of ornamental use only.

Paint the bombs and gun black.

Flying the Model

If possible, test the ship over deep grass. If none is available, fly the model on a few turns R.O.G. As the correct balance is ascertained the turns may be increased. If it is necessary to warp the elevators more than 1/16", a small weight should be used for balancing purposes. The original flew without adjustments of any sort. If the Osprey is correctly built, you can expect it to speed at least four hundred feet when a winder is used. If you value your model, fly it in the open. The distances that it is able to cover in a few seconds are exceptional for this type of model.

Bill of Materials

Strip Balsa

4—1/8"x1/8"x36". Wing and tail spars.
5—1/8" sq. x 36". Stringers and tail.
1—1/8"x3/16"x6". Landing Gear.
1—1/8"x1/4"x14". Landing gear.
3—1/8"x5/16"x24". Interplane struts and trailing edges.
1—1/8"x5/16"x24". Center section struts.
1—1/8" sq. x 24". Leading edge.
1—3/32" sq. x 24". Leading edge.

Sheet Balsa

1—1/32"x2"x24". Ribs and cockpits.
1—1/8"x2"x28". Former stringers and cowling.
1—1/8"x3"x24". Bulkheads.
1—1/4"x3"x18". Cowling.

Block Balsa

2—5/8" sq. x 1/2". Fillets.
2—5/8"x1 1/8"x3/8". Fillets.
1—8"x1 3/8"x3/4". Prop.
1—5/8"x1" sq. Nose plug.
1—3/8" sq. x 4". Cylinders.

Miscellaneous

1—1 oz. cement.
1—2 oz. clear dope.
1—pr. 1¾" wheels.
1—5/8" tail wheel.
1—scrap celluloid.
8 ft. 1/8" flat rubber.
2—white tissue.
1—1/8" washer.
1—scrap bearing tin.
1—8" .028 music wire.
1—2" .014 music wire.
2—1/16"x1/4"x12" bamboo.
1—black paint for trim.
Black thread for wires.

Frontiers of Aviation

(Continued from page 9)

crease stability. The additional fin area adds to the appearance of the airliner.

In the shadow of the Douglas sleeper was one of the latest Northrop attack planes much resembling the Northrops built for China. This plane was also for export and its new features was a twin-row Wasp engine, redesigned rudder and other tail surfaces, and a revamped retractable bombing tube. The cockpit enclosure was much like that on Northrop's attack that has been ordered by our government in large quantity.

The famous four-passenger Shelton Crusader was also on display. This plane is soon to be manufactured by the Timm Aircraft Co. in their hangar at Grand Central Airport, Glendale, Calif. The later models will be of the six-place type instead of the four-place type.

The Curtiss-Wright "Bunting," built and designed by the students of the Curtiss-Wright Technical Institute, Glendale, Calif., was one of the main attractions. It was recently completed by the students and will undergo load tests before being subjected to test flights. The plane is a single-place mid-wing monoplane of unusually clean design. A two-cylinder Aeronca engine is the power plant.

Roscoe Turner was present with his famous Wedell-Williams. A huge parachute, the largest ever made, has been completed for him by the Irvin concern. It was made to hold a full-size airplane! Roscoe is still set on flying around the world at the equator and claims he has a new type of plane that he wishes to build for the trip. Clyde Pangborn will start on his trip non-stop around the world this summer in his new Burnelli from San Diego, refuelling in the air at New York, Rome, Allahabad, Manila and Honolulu. Art Goebel has also cherished the hope that he will be able to fly non-stop around the world if sufficient backing could be found.

There were many other exhibitors at the show whose products have already been described in past issues.

The situation concerning new four-engined giant transports promises to be very interesting. It appears that there may be plenty of competition among our leading aircraft companies. United Airlines have called for bids for a huge four-

engined airliner, and it has been said that Sikorsky, Curtiss, Boeing and Douglas are interested in the venture. The Curtiss-Wright Airplane Company has completed the make-up and has now under construction a forty-passenger four-engined all-metal low-wing transport for the sub-stratosphere. The plane will be completed early this summer. The pressure-cabin is built for flying at 30,000 feet altitude. Sikorsky's plane may be a commercial version of their four-engined 210 foot land bomber now in the process of construction. Douglas' plane has already been described in the last issue of MODEL AIRPLANE NEWS. It has been said that a wheel will be used in the nose of the fuselage with the two main landing wheels near the trailing edge of the wing such as on the Waterman Arrowplane. The Boeing plane will probably be similar to the Boeing Model 299 bomber in general characteristics.

Lately such large transport companies as Eastern Airlines, American Airlines, Pan-American Airways, TWA, United Airlines, and KLM (the Dutch line) have been considering the pooling of their money for the purpose of developing one single type of four-engined transport. In this way the transport chosen could be produced in quantity and thereby the cost reduced.

Kieth Rider, popular for the wonderful racers he has built and designed, is said to have designs for two super-racers for the 1936 National Air Races. Many new racing planes are expected to participate because of the increased amount of money offered the race winners.

The Aero Engineering Company is now producing a new low-wing Menasco-powered sport plane very similar to the Northrop Beta model. We will bring you further news of the plane when it is completed. It has been designed by some very prominent aeronautical engineers and promises to be a very interesting little plane.

The proposed Howard sport plane will cruise at about 198 m.p.h. and have a range of 800 miles. Landing speed will be 45 m.p.h. The power plant will be a seven-cylinder Wright Whirlwind of approximately 300 hp. There will be room for four parachutes and all necessary baggage. Split trailing edge flaps employing a special automatic control will be used. When the pilot slows the speed of the plane for a landing, the flaps automatically drop down. If the pilot then decides not to land, he gives the plane "the gun" and the flaps automatically come up into the wing again. However, they rise very slowly so as to keep the plane from stalling.

Another new sport plane is the Pasped low-wing monoplane. It is a side-by-side open cockpit plane much resembling the Kinner ships of that type. A Warner engine is the power plant.

Mr. Lawrence W. Brown has designed an Army trainer which is similar to his B-3 sport plane.

Three planes of the ill-fated "Lieutenant de Vaisseau Paris" giant six-engined flyingboat type are now under construction in France for trans-Atlantic service.

The "Lieutenant de Vaisseau Paris" was sunk at its mooring in a storm at Florida the day after its completed flight from France to this country.

The twin-row radial engines used on the Martin Clippers, have been supplanted by those of the nine-cylinder type as used on the Douglass DST and Howard Hughes record breaking Northrop. The Hughes Northrop is the one formerly used by Jacqueline Cochran.

Specifications have been released on the Grumman pursuit plane and the Consolidated A-11 attack. They follow:

	Grumman F2F-1	Consolidated A-11
Wing Span	28'—6"	44'
Overall Length	21'—1"	29'—4⅝"
Overall Height	8'—6"	8'—6"
Wing Area	230 sq. ft.	299 sq. ft.
Power Loading	5.74 lb./hp.	8.19 lb./hp.
Wing Loading	16.25 lb./sq. ft.	18.47 lb./sq. ft.
Weight Empty	2575 lb.	3508 approx.
Useful Load	1160 lb.	2017.38
Gross Weight	3735 lb.	5525 lb.
Top Speed	240 m.p.h.	227 m.p.h.
Landing Speed	66 m.p.h.	67.5 m.p.h.
Rate of Climb	2000ft./min.	1500 ft./min. approx.
Service Ceiling	28,000 ft.	23,300 ft.
Horsepower	650 at 220 r.p.m. at 7500 ft.	675 at 2450 r.p.m. at sea level.
Range (cruising)	650 mi.	1260 mi.—680 mi. at full speed.

The above mentioned planes have been designed for entirely different types of military work. The Grumman has been accepted by the Navy as a pursuit plane after a strenuous competition with such planes as Boeing, Curtiss, and Northrop pursuits. Many of these Grummans are now being delivered to the U.S. Navy.

The Consolidated A-11 is an attack plane built for the U.S. Army Air Corps but has not been ordered in quantity. The above A-11 dimensions are of a slightly different model than that described in February issue of M.A.N. It is understood that development work is still going on with the A-11. Also under development is their X2BY-1 Navy dive-bomber.

Douglas' latest order for 114 torpedo-bombers amounting to $3,636,000 puts the total amount of Douglas orders now on hand to about $25,000,000! The Torpedo-bombers are large low-wing monoplanes of conventional design for the U.S. Navy. Their wings fold up over the fuselage for carrier deck use. They are more or less an enlarged version of the Northrop Navy bomber. Curtiss's twin-engined attack A-14 is said to have a top speed of 270 at 10,000 feet altitude, a very high speed for an attack plane.

	Stinson	Burnelli	Grow, Joy	Kinner	Lockheed 12A
Wing Span	52'-6"	45'-4"	52'	50'	49'-6"
Overall Length	31'-8"	34'-7"	37'	33'-9"	36'-4"
Overall Height	10'-6"	9'-10"	10'-4"	10'-7"	9'-9"
Wing Area (sq. ft.)	357 sq. ft.	335.3	354	396.6	352
Wing Loading (lb.)	18.5	17.3	19.2	21.4	22.5
Power Loading	12.7	14.5	10.68	11.5	8.81
Empty Weight (lb.)	4500	3476	4199	5870	5355
Useful Load (lb.)	2100	2323	2624	2635	2570
Payload (lb.)	1150	.....	.....	.....	1465
Gross Weight (lb.)	6600	5808	6800	8500	7925
Top Speed	.....	186	192	211	231
Cruising Speed	160	157	181	190	209
Rate of Climb	1150	1040	1640	1255	1400
Service Ceiling	16000'	16200'	22550'	22800'	24800'
Cruising Range	900	529	906	745	650
Take-off Run	650	.....	.....	.....	600
Total Horsepower	520	400	680	740	900

Instructions for building the Lockheed 12 are the same as for the Douglas Sleeper, instructions of which were included in the April issue of Model Airplane News.

If you wish to square-off the plans, connect the corresponding dots on the border with straight pencil lines. Each square will equal one square foot. Balsa wood should be used in making the model. Use modeler's cement for connecting parts. A chisel, razor blade and jig saw should be used for cutting out wood.

Draw outlines of wing, fuselage, tail units and other parts on wood from plans and cut to shape. Sandpaper thoroughly and then give each part several smooth coats of dope (silver). Then assemble the model with accuracy and touch up connections with silver dope once more and the model will be completed.

Proportioning Your Model For Stability

(Continued from page 7)

be very high and the stability would be comparatively poor due to the large center of pressure movement. Therefore in the case of this type of wing, a camber not greater than *one-twelfth* the wing chord is recommended.

If a double surface wing is to be used the lower surface may be so designed that the center of pressure movement is small, and therefore a very high camber on the upper surface may be established to compensate for the low camber or "zero" camber on the lower surface. In such cases an *average* camber of *one-tenth* the chord is customary. A higher average camber than *one-tenth* the wing chord may be used without detracting from the stability of the plane to an appreciable extent but the aerodynamic efficiency would be considerably less than for the lower *average camber* of one-twelfth the chord.

The average camber of a double surface wing may be found by taking the camber of the lower surface, adding three times the camber of the upper surface and dividing by four. A formula is given for this in chapter one. It is: $Ca = \left(\frac{Cu+Cu}{4}\right)$

where Ca = average camber
Cu = camber of lower surface and
Cu = camber of upper surface.

If the lower surface of a double surface aerofoil is flat then the height of the upper surface should be one-ninth the wing chord in order to establish an average camber of one-twelfth the cord. For an average camber of *one-tenth* the chord, the upper surface camber should be 1/7.5 the chord, which equals 13.33% of the chord.

Briefly the camber of a single surface wing and the *average* camber of a double surface built-up wing should be equal to about one-tenth to one-twelfth the wing chord. Either type of wing with these values of camber will be equally suitable for a stability model. Because of the simplicity of a single surface wing, it is suggested that this type of wing be used, especially if you have not had long experience in designing and building model planes. Fig. No. 111 shows the section of a single surface wing with a 1/12 camber. It also shows a double surface wing with an average camber of 1/10 the chord. This section was developed by the author. It gives high lift and has proved to be highly efficient, having been used on two contest planes both of which placed first in their class in the New England Championships of 1931 and 1932. It has not been flown since that time in a contest.

It is suggested that this wing section or a similar one be used by designers who wish to equip their stability models with a double surface wing.

Other sections which may be used for such a model because of their combined low center of pressure movement, high lift and efficiency are: N.A.C.A.-2410 and N.A.C.A.-23010.

A single surface wing of 1/12 camber will be used on the stability model which is being developed as we proceed with our discussion. So far we have established the

wing of the model as having a span of twenty-four inches, a chord of three inches and a camber of one-twelfth the chord, or one-quarter inch. The angle of incidence should be about 2½ degrees or a leading edge rise of ⅛" in 3".

Establishing the Design of the Propeller

The next problem of the model engineer when designing a rubber powered model is the design of the propeller, because the characteristics that must be given to this important factor of the model depends directly on the design of, and consequently the flight characteristics of, the wing. The action and efficiency of any propeller when mounted on a particular model plane depends upon the relation of the propeller diameter, pitch, blade area and shape to the resistance and flight speed of the plane. A propeller may act efficiently on one model but not on aother.

Diameter

In chapter two on propellers, a general rule is given for propeller diameter. It states that the propeller diameter should be from *one-third* to *one-half* the wing span. Though large diameter propellers are efficient from a duration standpoint, they create a large torque compared to the wing span. Therefore, a propeller of comparatively small diameter is more suitable when the primary consideration is stability. One-third the span, or eight inches when the span is twenty-four inches, is the minimum advisable for good flights. A nine-inch propeller on the model we are considering would be near this low limit and should prove to be very satisfactory from an efficiency as well as a stability standpoint.

Pitch

The next concern is the *propeller pitch*. This is a function of the diameter and the propeller blade angle where stability and good performance is to be considered. In such cases the pitch should not be more than (1.57) times the diameter, or in this particular case about 14.13 inches. This proportion of pitch to diameter requires that the propeller be cut from a block nine inches long and with a width which is about *twice* the depth. This width to depth ratio determines the blade angle. If the pitch was larger, the blade angle would be greater and greater torque would be generated.

This torque would tend to turn the model over sideways thus creating an unstable reaction. If the blade angle is made smaller than that established by a two-to-one width-depth ratio there will be less torque reaction but also less flight duration will be possible. For the sake of stability a little duration may be sacrificed. Therefore it is suggested that in models designed for stability, that a pitch be chosen which is equal to about (1.4) times the diameter or in this case 12.6 inches. Insomuch as the pitch and diameter of a propeller determines the depth-width ratio from which it is to be cut when the "diagonal" method is used, it is now necessary for us to find out what depth-width ratio will produce a pitch of about 12.6 when the diameter is nine inches. By examining tables No. 1, page 35 of the October 1932 issue of MODEL AIRPLANE NEWS it can be seen that a depth-width ratio of 1 to 2¼ will provide a pitch of 12.6 when the diameter is 9 inches, which is exactly what is desired.

Blade Area

Now the question of the correct amount of propeller blade area enters the problem, for though the *proportions* of the block may be determined from the pitch-diameter ratio, the exact dimensions which are to compose this ratio cannot be determined until the required blade area is known.

In order to know how much blade area will be required, the effect of large or small blade area should be considered in the light of stability.

If the blade area is small in comparison with the resistance of the plane to forward motion, the slip on the propeller will be large and the blades will pass through the air at a high angle of attack. At high angles of attack the $\frac{L}{D}$ of the blades is low. This means that the thrust

is small and the resistance on the blades is high. Thus the power of the motor is transformed into resistance and consequently if the resistance is large the propeller torque is large.

It can be seen readily from this that large blade area will reduce the slip, resistance and resultant torque. This *lack of torque* enhances the stability of your plane.

Tables No. 2 on page 36 of the October 1932 issue of MODEL AIRPLANE NEWS indicates the amount of blade area, in *per cent of wing area*, required to give various performances when various width-depth ratios of the block from which the propeller is to be cut are used.

First of all the amount of blade area to be used, in per cent of wing area, must be decided upon. We know that the per cent of area must be fairly large in order to keep "torque" at a minimum, especially as the medium high cambered wing will give a fairly large amount of resistance for its area. Therefore a value must be selected from the table which lies in the "High Climb" column, and which is produced by a block whose depth-width measurements are in the proportion of 1 to 2¼. In this way the exact measurements of the block from which the propeller is to be cut by the diagonal method can be determined.

In the third column of the second group of tables No. 2, the blade area percentage for a high climb is indicated as 11.87%. This value is for a depth-width ratio of 1 to 2¼ as indicated at the head of the column, and is the value of blade area suitable for your stability model (when single surface wings are used. About 20% less area should be used with double surface wings of the same average camber).

Now the actual blade area must be determined. It will be 11.87% of the wing area which is about seventy square inches, allowing a deduction of two square inches for rounded wing tips. 11.87% of 70=8.31 square inches, which is the area the propeller blades should have, in combination with a single surface wing. 6.7 square inches of area is sufficient when double surface wings are used.

Now in order to determine what size block with a depth-width ratio of 1 to 2¼ will give a total blade area of 8.31 square inches, tables No. 3 should be consulted. In the 9" diameter column a value of 8.02 is given by a block 11/16 x 1⅜. This is a little below the 1 to 2¼ ratio. In the space adjacent to this value, a value of 8.42 is given by a block 11/16 x 1½. This is a little larger than the 1-2¼ ratio. The blade area value of 8.31 lies between these two block measurements so if the block depth is made 11/16 and the width 1 7/16 it will give an area approximately of 8.3 square inches.

The size of the propeller block from which the propeller should be cut by the diagonal method, then should be 9" x 1 7/16" x 11/16".

Next month will be shown how the blade area may be calculated from the formula for blade area. This takes into account factors such as the camber and the angle of incidence. Other proportions of the Stability model will also be determined. Until then, "soft landings."

Many have realized this but few have taken the initiative to organize and develop a club to attain these ends. However, recently such a club has been organized.

"This club known as 'The Vermont Model Airplane Society' held its first meeting at the Community 'Y' last Saturday afternoon. The organization committee, John Webb, Jr., Chairman; Clifford Backup, Secretary; Frederick McGee, Treasurer; and Sam Card, Advisor; discussed plans for the club and enrolled the following as charter members with the acceptance of the fact that they are to further the advancement of model aviation in Vermont: Donald Boardman, Allan Metcalf, Richard Simpson, Wayne Culner, Donald Prim, Charles Morrison, William Cooney, Deal Asseltine, Bernard Bullis, Harrison Wishart, Jr., Clifford Backup, Decowood Glidden, Graham McGowan, Sam Card, John Webb, Jr., and Frederick McGee."

Philadelphia Model Airplane Association

At the Junior meet held on January 25, Robert Jacobsen continued his winning streak and now has a record of six straight first places. This was Jacobsen's last meet as a junior as he has just passed his sixteenth birthday. No outstanding flights were made at this meet, due principally to the extremely cold weather. The armory in which the flying is done is not heated. The senior meet held on February 8 found weather conditions much better, and as a result a number of good flights were made. The outstanding performer was the well known Hyman Oslick, who made the excellent time (for our armory) of over ten minutes with a class B stick model R.O.G. This is Oslick's fifth consecutive first place and puts him just behind Jacobsen in the battle for the senior individual title. Several flights of over nine minutes were made at the same meet. The combined score of these two meets gave the Caterpillar chapter a slight lead over the Northeast fliers for the month, and puts the Caterpillars ahead in the race for the season chapter championship.

Boston, Mass.

Mr. Al Lewis is now attaching a technical supplement to "Wing Overs," the official paper of the Jordan Marsh-Boston Traveler Junior Aviation League. Many model builders will find helpful suggestions in the articles appearing in this supplement. We suggest that they write to Mr. W. Tyler, care of the League at the Jordan Marsh Company, Boston, Mass.

APPLICATION FOR MEMBERSHIP IN THE AIR WAYS CLUB

Please enroll:

Name .....

Address .....

Number of Models Built .....

Type .....

Date .....

"Gas Lines"

(Continued from page 28)

ered with a ⅓ horsepower engine. Test flights are being postponed until weather conditions are favorable.

James P. Martin of 217A South Broadway, Redondo Beach, California, has evidently taken exception to Mr. Bristol's remark concerning the "switch and string" attachment for test hopping models. He says:

"Be it beyond me to perpetuate an argument, but Mr. C. L. Bristol should be advised to take a squint at the photograph accompanying Mr. J. Condon's article. I am sure he will see that a young man can stay within yanking distance of the plane for a moment at least.

"But maybe Mr. Bristol can be excused, for he seems to have the quaint idea that the flier is supposed to speed over the landscape with a string clutched in his hand and trying vainly to keep up with the plane.

"I don't blame him for doubting the runner's ability but he should be enlightened.

"The idea is to analyze the plane's actions before and just after the take-off and determine whether the plane is going out of control or not; if it can be seen that it is going to behave properly there's no use chasing it or even trying to. The model doesn't have to hit 30 m.p.h. and cross two states before showing signs of improper adjustment."

On the other hand, Mr. Barney Snyder of 2125 West 54th Street, Los Angeles, Calif., agrees with Mr. Bristol and he says:

"I read the article describing the testing of a gas model. It was interesting but impractical unless the builder had a flying barn door. It might work with the 8 to 12 foot models built in the east, but out here we seldom see a model over 6 ft. For that reason I offer a method of setting a new ship up for a safe test flight that has been very successful. It is based on a common practice before the Dept. of Commerce ruined things.

"We assume you have a ship that is going to get off the ground in about its own length, which any good gas model should. You have designed it yourself, and hope for the best but have some private doubts. Many set the ship up complete with motor and batteries and then glide it. With all this weight it is nearly impossible to tell anything about the glide, unless you can run as fast as the boy with the string fastened to the switch, described in a past issue.

"I suggest that you cover the wings and tail surfaces and set the ship up. Your fuselage is uncovered, no motor and no batteries. Your ship is as light as it can be and still glide. Put enough weight on the nose to make the job balance at about ⅓ the chord, and glide it. Add enough weight to make it glide in fast, that is essential if you are to have a good test flight. A long flat glide may mean the ship will have too steep a climb under power. When the best gliding point has been found, balance the ship and mark the point of balance on the wing.

"Now finish the ship complete with motor, batteries, paint and all, slide the batteries back and forth until the completed ship balances at the same point at which you obtained the fast glide. Set the fin over about ⅛ inch for torque and fly the crate.

For the first flight rev the motor up just enough to run smooth, just over the 4-cycling stage, but not enough to get the high pitched whine you get when really opening it up. Put in enough gas for about 40 seconds. You want the first flight to be short, just in case, need I say more?

"If the wing and tail surfaces are lined up, not warped, and the design is anything at all you will have no trouble. Minor adjustments will have to be made but the first flight won't be a crack up.

"Why glide it without fabric on the fuselage? Because you might have a weak member that will give, it's easier to fix it, and you will do a better job if you don't have to think about the silk."

What Mr. Snyder says cannot help but prompt us to ask if his model glides with the same balance when the fuselage is uncovered and when it is covered. This fact in many cases would change the position of the line of resistance and in turn this would affect the balance of the model in flight as compared with its balance when fully covered.

Julius Unrath of 3999 Barnes Avenue, New York City, tells us of a few sug-

gestions which will help you to get more revolutions per minute from your two stroke motor. He writes as follows:

"This was written for the fellow who has enough mechanical ability to tear down and assemble his miniature "two-stroke" motor without damaging the delicate parts. It is advisable to study your motor and the two stroke cycle theory before attempting to work. However, the trouble involved is well worth while.

"Begin by completely disassembling your motor. Place the nuts, bolts and washers in a small tray filled with gasoline. All the other parts should be placed in another tray also filled with gasoline. This is done so that a nut or bolt may be easily found. Allow these parts to soak for a while then carefully remove all gaskets taking care not to mar the surface of the metal. Thoroughly dry all parts except the nuts and bolts and you will be ready for the next step toward "suping-up" your motor.

"Take the cylinder and by means of a scraper, emery cloth, or "Handy-grinder" and dentists drills, polish all port passages so that the least amount of friction will take place during the time the gas mixture enters the crankcase until it reaches the combustion chamber. Next file out all the webs between port holes taking extreme care not to file the opening in the direction of the stroke otherwise the timing of the ports will be changed and probably prevent your motor from running smoothly. Round the corners of the port openings on the outside of the cylinder wall again, taking care not to change the opening of the port in the direction of the stroke on the inside of the cylinder wall. This is very important to insure smooth running.

"If your motor has been running for quite a while, it is advisable to fit new bearings and piston if necessary. If you don't know whether or not you need this, send the parts to the manufacturer, who, I am sure, will tell you if you need to renew these parts.

"Procure some clean gasoline and thoroughly scrub the motor parts using an old toothbrush. Don't use a file, emery cloth or wire brush because you might damage the surface of the metal. Make a new set of gaskets of the same material used by the manufacturer. If any of the bolts, nuts, or washers are damaged it would be a good idea to replace them with new ones.

"You are now ready to reassemble your motor. Obtain a sheet of clean white paper or cardboard on which to work. Wash your hands thoroughly and brush your work bench clear of all filings, etc. When assembling, use a good grade of heavy oil on all moving parts and gasket shellac (very little) on all gaskets. Adjust your spark plug and breaker points to manufacturer's specifications and attach your motor to the motor mount. If these instructions have been carefully carried out your motor will have from 10 to 15 per cent more r.p.m."

Mr. Joseph F. Morris of R.F.D. No. 2, Box 26, Selah, Washington, writes that he is looking forward to the day when gas models will be less expensive to build. He wishes to know what other fellows think about the cost of building gas models.

The cost for building models is a talking point for gas model builders to form a unit and join the International Gas Model Airplane Association. Eight boys in a group can design and build a gas model as a unit with little cost to each member. When young men are building their first gas model it is advisable to attack the problem in this manner; for in this way they may all become familiar with the problems involved. Then, when the individual members build gas jobs of their own they will not only be able to build them more cheaply, but due to their familiarity with the subject they will be able to prevent crashes and attain more successful flights.

The Metropolitan Gas Model Club is now being formed by Nathan and Irwin Polk. Its headquarters will be Polk's Hobby Shops at 263 Halsey Street, Newark, New Jersey, and 720 7th Avenue, New York City. It is suggested that any gas model builders living in the vicinity of these addresses join these progressive units of the I.G.M.A.A. Readers may recall that Mr. Nathan Polk is Field Director of this organization.

The 1936 Eastern States Gas Model Contest is drawing closer. May 9th will be the eventful day, so get the "gas buggies" tuned up. It will be held at Hadley Field near Dunellen, New Jersey. Some may remember the great contest held there in May 1935. The contest will be organized and directed by Mr. Nathan Polk. All who wish to enter should write to him at 263 Halsey Street, Newark, New Jersey, for complete information.

This will be the first contest run under the sponsorship of the INTERNATIONAL GAS MODEL AIRPLANE ASSOCIATION. Fans who have read "Gas Lines" regularly will be familiar with this organization. Only members of the Association will be eligible to enter the contest. Applications for membership must be at Association headquarters, 551 Fifth Avenue, New York City, c/o MODEL AIRPLANE NEWS, on or before May 5th in order to be eligible to compete in the contest.

All contestants who take first places will be record holders as no records stand at present under the Association. The rules are as follows:

1. All models shall be limited to a maximum weight of 7 pounds.

2. All models shall be of the fuselage classification as established by the National Aeronautic Association and shall conform to the proportions established by N.A.A. Rules. The maximum fuselage cross section shall not be less than $L^2/100$, where (L) is the overall length of the airplane.

3. The amount of fuel that may be used for any official flight shall not be more than 1/16 oz. (liquid measure) per pound of weight of the airplane.

4. No flight shall be classified as official in which the airplane does not take off the ground under its own power without "pushing." The plane may be guided by ONE attendant through contact with ONE WING TIP. Such action will not be termed "pushing."

5. Flights may be termed "official" only when recorded by a stop watch by an official of the contest.

6. All officials must be approved members in good standing of the I.G.M.A.A.

7. All assistants to contestants are required to be members in good standing of the I.G.M.A.A.

8. A flight may not be termed "official" when made by a contestant who is assisted in the preparation for flight by one who is not a member of the I.G.M.A.A.

9. A model is eligible for entry in the contest only when it has been built by the contestant who flies it.

10. Models built by two or more contestants may be entered "under a team" contestant classification.

Mr. Louis Faerman of Box 35, Houston, Texas, makes some very pertinent remarks regarding the elimination of personal danger and model crack-ups at contests. He says:

"I believe it is because of poor judgment on the part of directors that there has been so much talk concerning the danger of gasoline powered models. For instance, at the Junior Birdmen contest the wind direction should have been noticed and the crowds should have been roped away from the direction of the drifting gas jobs. No accidents would occur if such conditions are properly handled at contests."

We hope that all gas model fans will join the I.G.M.A.A. This is the only organization of its kind in the world. Its purpose is to promote gas model designing, building and flying, and to help its members to gain and exchange information concerning airplane design and its allied subjects. To join, fill in the coupon appearing at the end of this article and mail it to the International Gas Model Airplane Association, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City. There are no dues. A brief history of your experience and activities should accompany the coupon. Your membership card will be mailed to you promptly. Following is a list of the new members of the I.G.M.A.A., up to the time of writing.

Harry Fonseca, Victor Bohsen, Robert Stevens, George Siggins, Richard Tonks, Michael Granieri, O. W. Stevens, Leonard Noonan, John Cregge, John Herbert Jr., Fred Willis, Philip Stein, Richard Catlett, Frank Gerstenmeier, Glyn Lewis, Julius Gottlieb, Bill Breathed, Ortio Stevens, Otto Mueller Jr., Henry G. Hohner, Frank Ehling, George Morris, Walter Hayas, Bill McCluskey, Bill Nesbit, Louis Shumsky, Walter Caracciolo, Dick Calhoun, Bob Schiffman, Harvey Prochnow, Herbert Boen, Bruno Kosloff, Jack Schwartz, Lewis F. Strong, Thomas Barnes, Earl Simson, Lloyd Schroeder, Bill Effinger Jr., David Hernandez, Zbignew Puchalski, Alfred Van Wymersch, Mac Adams, Paul K. Hoffman, C. Wil-

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(Continued from page 11)

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Question: What happened to Mr. Anthony Fokker? Does he still design airplanes?

Answer: For the past few years Mr. Anthony Fokker has been in Holland, his native country. He has been active in designing various types of airplanes.

Question: What is the best wing curve for a standard pursuit plane of the monoplane, low-wing type?

Answer: There is no such thing as "the best wing curve" for a pursuit plane of this type, inasmuch as there is no standard pursuit type. Pursuit planes of this type vary in details of design, which details affect the type of wing curve necessary.

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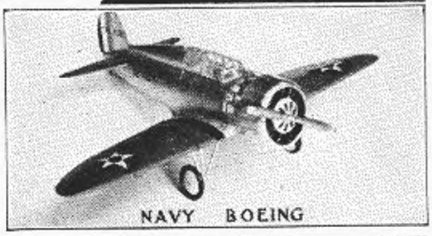

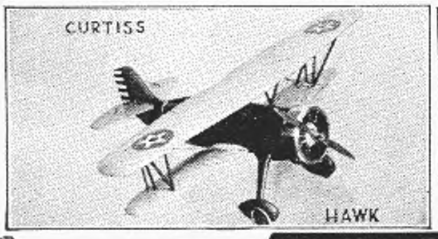

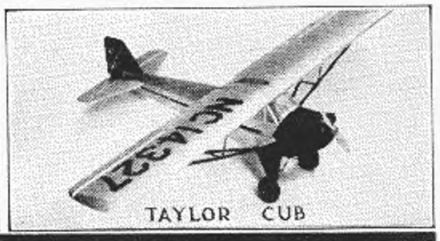

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