MODEL AIRPLANE NEWS

7th Year of Publication

OCTOBER
1935
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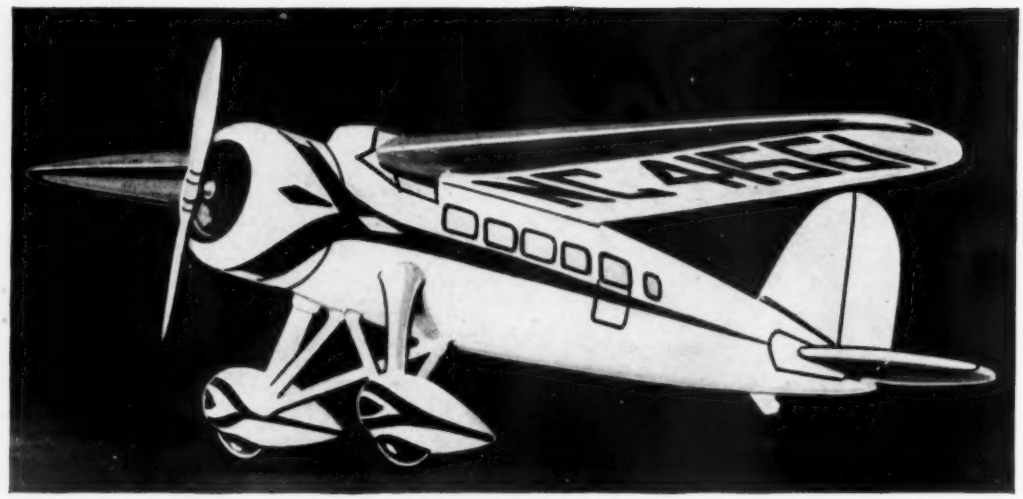

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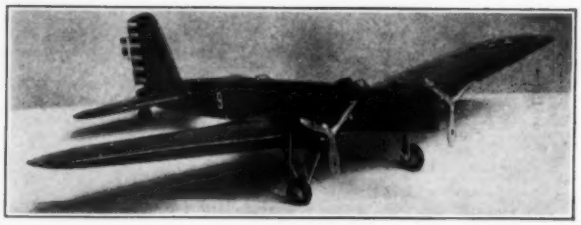

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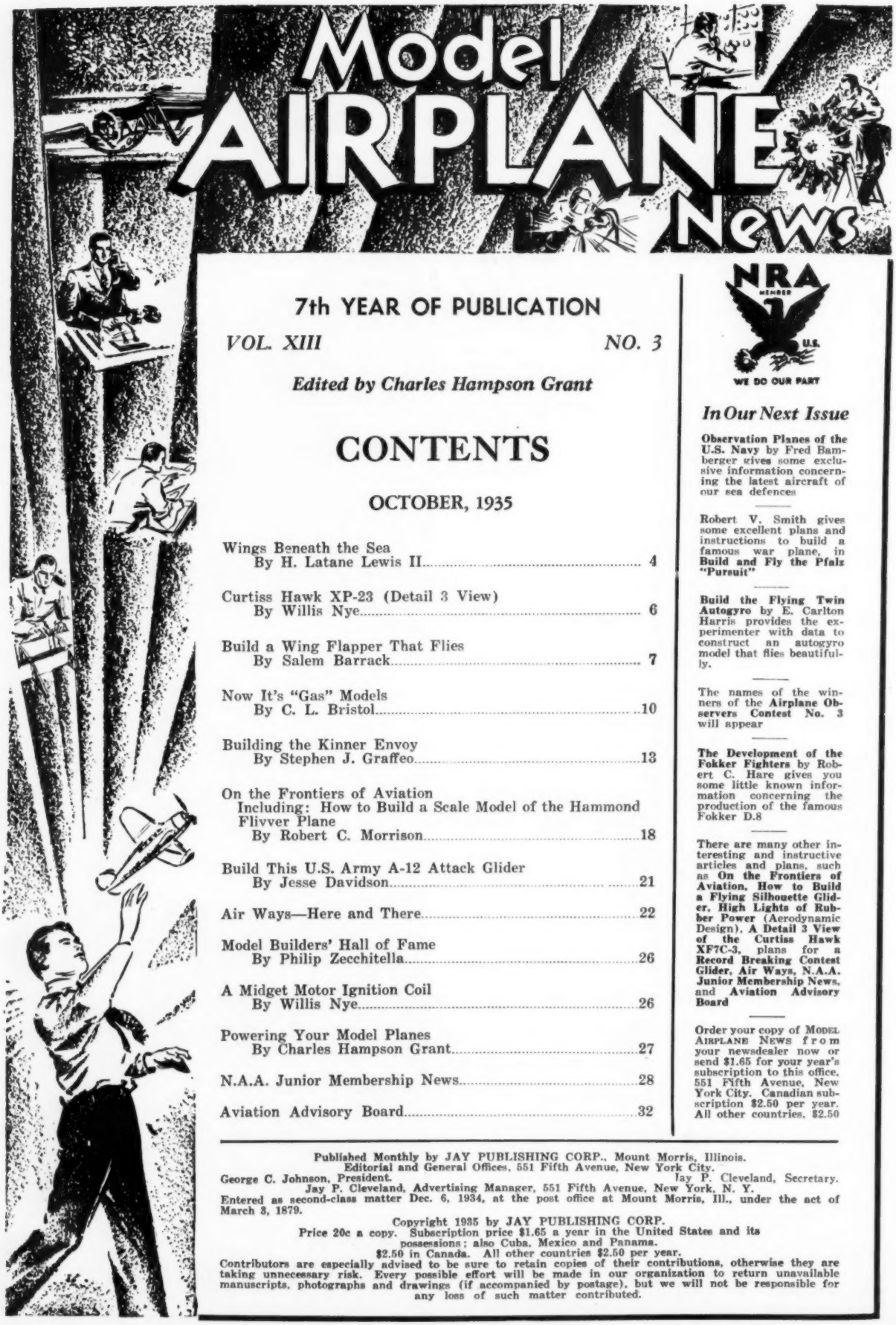

7th YEAR OF PUBLICATION

VOL. XIII *NO. 3*

Edited by Charles Hampson Grant

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OCTOBER, 1935

In Our Next Issue

Observation Planes of the U.S. Navy by Fred Bamberger gives some exclusive information concerning the latest aircraft of our sea defences

Robert V. Smith gives some excellent plans and instructions to build a famous war plane, in **Build and Fly the Pfalz "Pursuit"**

Build the Flying Twin Autogyro by E. Carlton Harris provides the experimenter with data to construct an autogyro model that flies beautifully.

The names of the winners of the **Airplane Observers Contest No. 3** will appear

The Development of the Fokker Fighters by Robert C. Hare gives you some little known information concerning the production of the famous Fokker D.8

There are many other interesting and instructive articles and plans, such as **On the Frontiers of Aviation, How to Build a Flying Silhouette Glider, High Lights of Rubber Power** (Aerodynamic Design), **A Detail 3 View of the Curtiss Hawk XF7C-3**, plans for a **Record Breaking Contest Glider, Air Ways, N.A.A. Junior Membership News,** and **Aviation Advisory Board**

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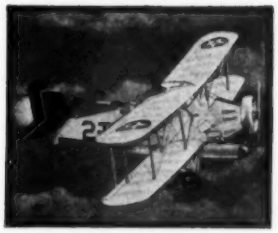

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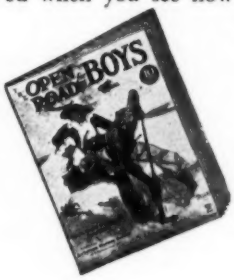

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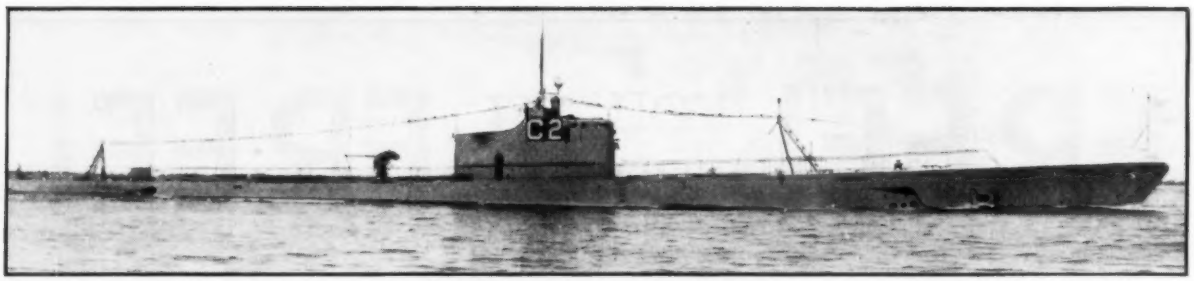


The U.S.S. Cuttlefish, one of Uncle Sam's latest submarines that carries two airplanes

Wings Beneath the Sea

How the Submarine Airplane Was Developed and Its Possibilities as an Important Weapon in Time of War

By LT. H. LATANE LEWIS II

AIRCRAFT carriers operating hundreds of feet beneath the sea; sneaking under blockading battleships, suddenly to bob to the surface within the enemy lines and release their flying fighters!

It may sound fantastic but it can actually be done. And the reason you haven't heard more about it is that Uncle Sam is guarding with ironclad secrecy every development. However, our Navy hasn't a monopoly on the idea. One other country, at least, has started to work on it. England has conducted tests which, so far as we have been able to learn, were highly successful. But whether or not other foreign powers have undersea aircraft carriers, we frankly don't know. They are just not making any statements, and it would take an international spy with the wiles and dodges of a Mata-Hari to find out.

The Glenn Martin MS-1 that was developed to be carried by a submarine and flown from it at sea

However, certain developments which have been made in this country are known. The carrier used in the experiments is a submarine fitted with an 8-foot cylindrical tube on the bow deck, just forward of the conning tower. The airplane can be dismantled and stowed in this small space. For launching the plane, the submarine rises to the surface. Immediately a special crew wheels the fuselage out and extends the folding wings, fitting the locking pins in place. The whole process is done with unbelievable rapidity, taking but a few minutes. The engine is started and warmed up. Then the plane is ready to take off from the sea.

The English system is slightly different and has been found to be quite efficient. They have developed a two-seater biplane fighter with folding wings, known as the Parnell *Peto*, powered with an Armstrong-Siddeley *Mongoose* engine. The submarine which is converted to carrier purposes is the M-2, the largest British submarine afloat, with a displacement of 1950 tons.

As soon as the sub reaches the surface, a crew of specially trained men swing open the door of the container, which is an old gun turret. This door is constructed of heavy steel to make the "hangar" watertight and it folds outward and down. A trolley system is quickly laid which connects the hangar with a catapult, and as the fuselage is wheeled out on these rails by one group of men, another group is fitting the wings into place. As soon as the plane reaches the catapult, it is made fast and the engine started, while the submarine swings around into the wind.

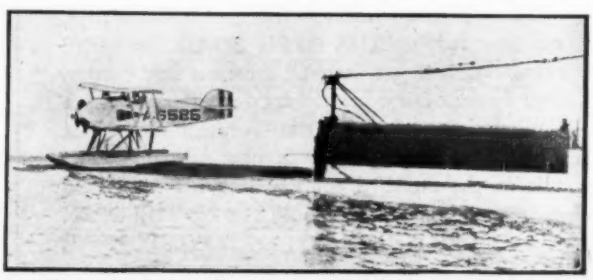
While the submarine speeds forward, the pilot pours the soup to the engine and signals that he is ready to take off. A release is pulled, the catapult carriage shoots forward down the rails and the plane is hurled into the air. The system is operated by means of compressed air.

When the pilot returns, he lands in the water alongside and is hoisted aboard by means of a special derrick. The plane is again placed on the hangar rails and as it is being wheeled back into its container, the wings are being folded into the position for stowing.

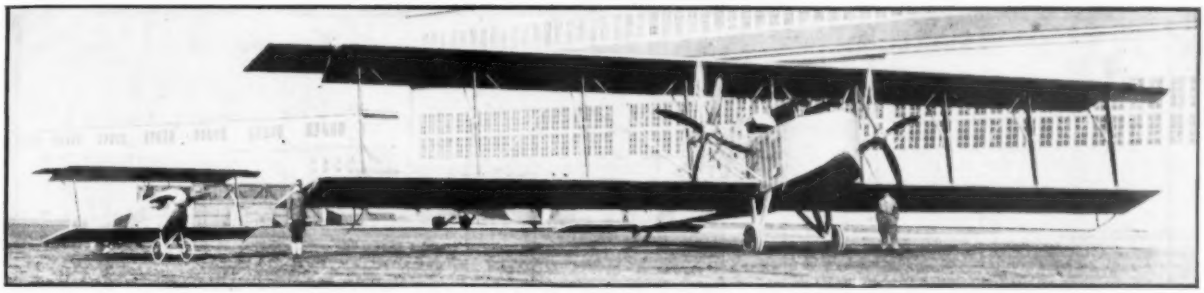
While this system may sound a bit complicated in the telling, it is really remarkably simple and the British have proved that a well-trained and competent deck crew can perform it in an amazingly short time, the take-off and landing operations requiring but a few minutes each.

In this country, the idea of operating airplanes from submarines first attracted attention during the World War. Editorials were written in American newspapers suggesting the possibility of German

James V. Martin and his two-bay submarine plane. This ship was developed from the smaller XS-1



A submarine plane ready to be launched from a submarine. The large cylinder is its hangar



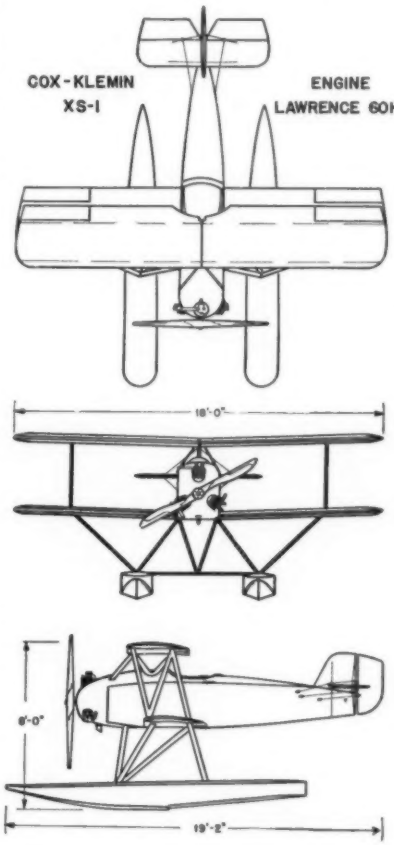
The first baby sub plane, J. V. Martin K-III, beside the giant Martin Bomber

undersea craft sneaking into our harbors and releasing scores of airplanes to lay waste our cities. This prophecy was a little premature at that time but it set aviation and naval men to thinking. Shortly after the war, they began to cast around for a plane that would meet the requirements, which were rather exacting.

During the war, an aeronautical engineer, Capt. James V. Martin, had developed a rather remarkable little ship for use as an altitude fighter. This vest-pocket plant, which now rests in the National Museum at Washington, looked almost like a toy, the top wing scarcely reaching above the average man's shoulder. It was known as the K-III.

The fuselage was designed to combine lightness and strength and was entirely of 3-ply wooden construction. The wing bracing was exceptionally clean for that time, employing struts shaped like the letter K. Martin had noticed that birds drew up their legs while in flight and decided that there must be a good reason for it. So he made the landing gear of this little plane retractable—one of the first to employ this feature—the wheels being drawn up in flight by means of a crank in the pilot's cockpit, which increased its speed 12 percent. It was powered with a British Gnat A.B.C. engine of 45 horsepower, had a speed of slightly better than 100 miles per hour, and a duration of two hours. A 9-gallon tank was mounted in the upper wing. It became the first submarine plane.

The plane proved that it was possible to construct a seaworthy and airworthy ship small enough to operate from a submarine and gave new impetus to the plan.



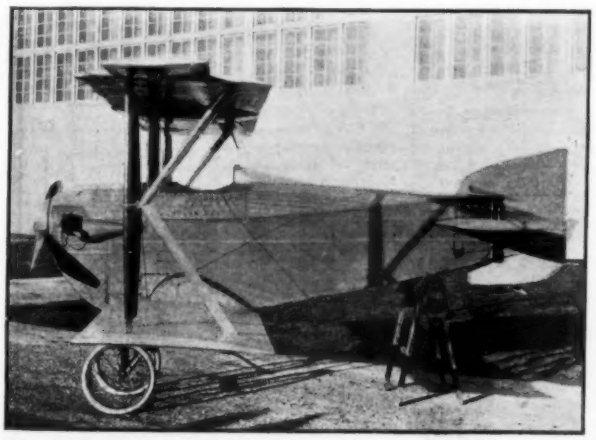
It wasn't until some years later, however, that a plane designed specifically to meet the needs of submarine operation appeared. It was Glenn Martin's MS-1 and it is still regarded as a highly efficient ship. This plane is almost as diminutive as the K-III and when seen perched on the bow of a ship even as small as a submarine, it looks like some kind of insect.

It is a single-seat tractor bi-plane of 1-bay construction. Power is furnished by a Wright air-cooled engine of 60 horsepower. Twin floats are provided. The fuselage of the plane is of welded steel tubing and the wing and tail surface frames are of duralumin sheet. The whole construction is designed to make the plane easily and quickly demountable. It has a span of 18 feet; length, 17 feet six inches; and height, 7 feet 6 inches. It weighs only 650 pounds. Its high speed is 100 miles per hour and it has a range of 200 miles.

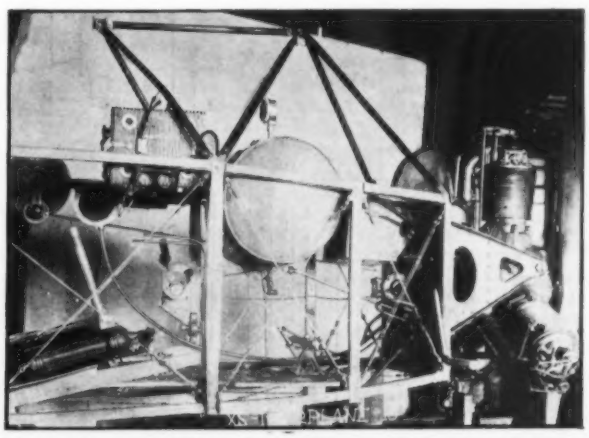
With this plane, the Navy really learned its lessons about aircraft operation from submarines. Over and over again it was used in trials on the water under a variety of conditions and valuable data was collected. It taught the Navy the real worth of this type of aircraft and the development was continued.

Another very efficient little submarine plane is the Cox-Klemin XS-1. This is a tractor biplane with a wing span of only 18 feet. It is mounted on twin floats. The wing struts are steel tubes and the whole rigging is arranged for high speed assembly and dismantling. The engine, a 60-horsepower air-cooled Wright, is started by means of a crank placed in the pilot's cockpit. The little plane has a speed of

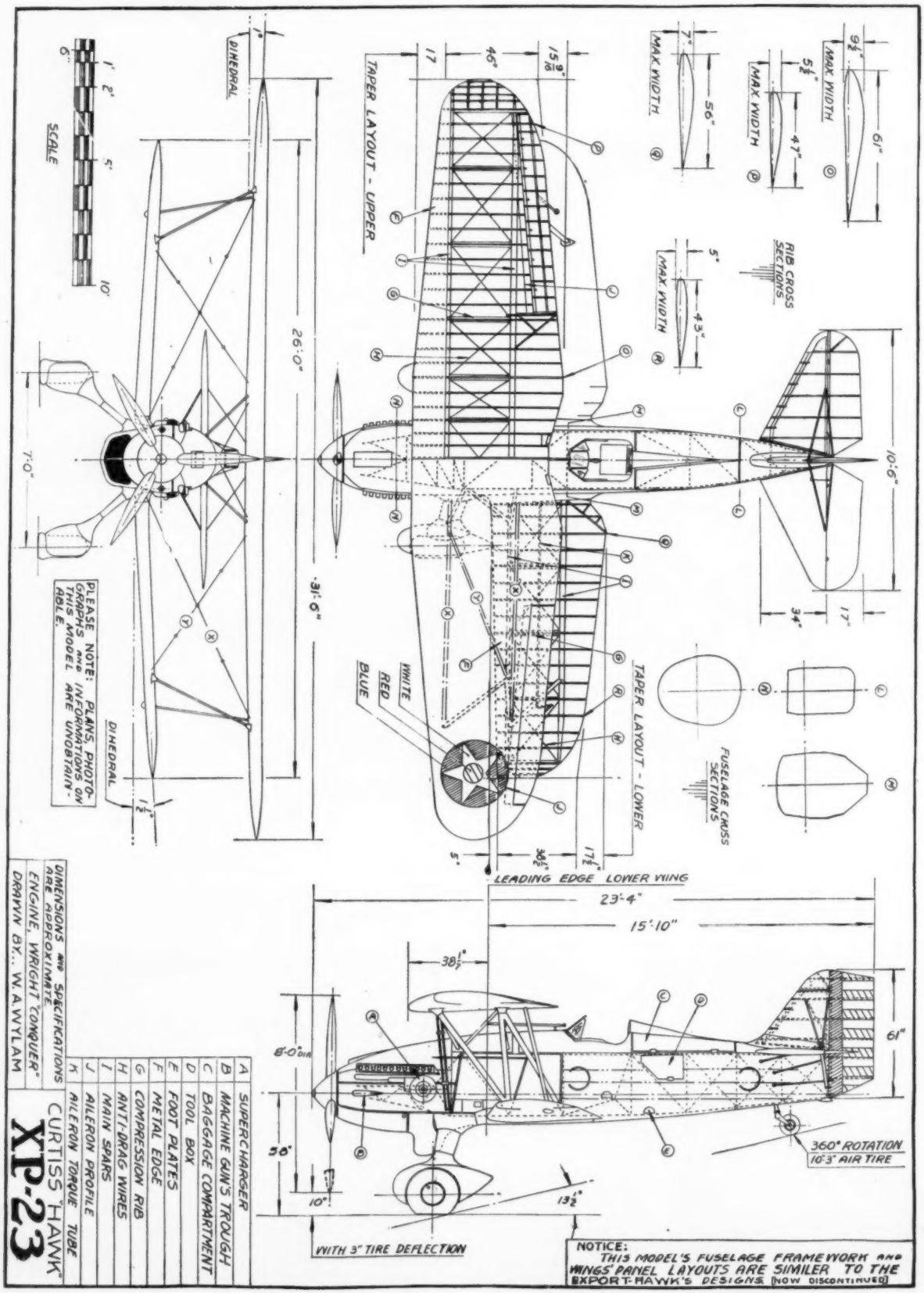
(Continued on page 42)



The James V. Martin K-III, the world's first submarine airplane. Its speed exceeded 100 m.p.h.



The fuselage construction of the XS-1 showing its compact form. The pilot warms his feet on the engine


SCALE
1' 2' 5' 10'
DIHEDRAL
1°
26'-0"
31'-6"
7'-0"
DIHEDRAL
1½°
PLEASE NOTE: PLANS, PHOTOGRAPHS AND INFORMATIONS ON THIS MODEL ARE UNOBTAINABLE.
TAPER LAYOUT - UPPER
46°
15 9/16"
17"
MAX WIDTH
7"
56"
MAX WIDTH
5½"
47"
MAX WIDTH
9½"
61"
RIB CROSS SECTIONS
MAX WIDTH
5"
43"
10'-6"
34"
17"
WHITE
RED
BLUE
TAPER LAYOUT - LOWER
FUSELAGE CROSS SECTIONS
5"
36½"
17½"
LEADING EDGE LOWER WING
23'-4"
15'-10"
38½"
8'-0" DIA
30°
10"
13½"
WITH 3" TIRE DEFLECTION
61"
360° ROTATION
10'-3" AIR TIRE
DIMENSIONS AND SPECIFICATIONS ARE APPROXIMATE.
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CURTISS "HAWK"
XP-23
A SUPERCHARGER
B MACHINE GUN'S TROUGH
C BAGGAGE COMPARTMENT
D TOOL BOX
E FOOT PLATES
F METAL EDGE
G COMPRESSION RIB
H ANTI-DRAG WIRES
I MAIN SPARS
J AILERON PROFILE
K AILERON TORQUE TUBE
NOTICE:
THIS MODEL'S FUSELAGE FRAMEWORK AND WINGS' PANEL LAYOUTS ARE SIMILER TO THE EXPORT-HAWK'S DESIGNS. (NOW DISCONTINUED)

Lt. Lane sign

Build a Wing Flapper That Flies

How You Can Make and Fly an Ornithopter Model Successfully That Has Soared for Nearly One and One-Half Minutes

By SALEM BARRACK

WING flappers, technically known as ornithopters, were the first type of aircraft to be experimented with. Penaud, one of the pioneers of aviation, is said to have carried on extensive research and tests in this line. He was, as history has it, partly successful with model ornithopters but did not succeed with a man-carrying size. Ornithopter method of flight was given up for the conventional propeller and rigid wing type. After this type had proved successful, little heed was given to man-carrying ornithopters but experiments were still carried on in model form. Some had little success but others failed in making their scale model birds fly.

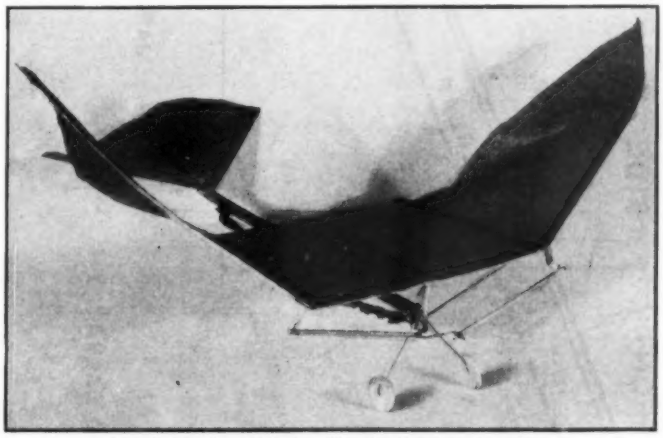
Those who were at the 1933 National Championship Meet (Outdoors) will remember seeing a wing flapper which could only execute one loop (by mere force of power) and then would try to burrow in the ground. Several weeks later a similar model was seen at the New York City Model Airplane Derby which performed a little better. This model could make two loops and flutter down. There are several boys in the U.S. who claim to have had success with such a model as a wing flapper but have not openly proved so.

It was in the latter part of 1930 that I first began to study and experiment with model ornithopters. Like the others who had failed, I was about ready to give up. However, carrying on my experiments intermittently for three years I finally succeeded in obtaining level flight. Those who were at the 1932 Eastern States Indoor Meet held in New York City will remember a wing flapper which when launched off the balcony would make a level flight and then glide down gracefully. Diligently keeping up my work in this line until a year later, I then had a wing flapper which was capable of making a climbing circling flight and then gliding to earth in a birdlike manner. I had actually made a wing flapper that gained lift and forward speed from the same wing. I redoubled my efforts until a year later a model wing flapper was produced which could not only climb and glide well but also soar on an ordinary hot day. This model has made a soaring flight of 1 min., 29 sec.

Now would you like to build the little model wing flapper that even attracted the close attention of your editor, Mr. C. H. Grant? I suppose you would, so here it is. Read the instructions thoroughly and be sure you understand the plans completely before you begin construction.. One thing more—don't try to insert anything new in the wing flapper unless you build it completely from the plans first.

Wire Fittings

Great care has to be taken in making the wire fittings, as the success of the model depends on them. The "yoke brace" is made from .034 piano wire. The two eyelets that are bent in it should be able to tightly fit 1/8" diam. bushings. The two wing braces are also made of .034 piano wire. Be sure to make one right and the other left. Great care should be taken in bending the crankshaft. Make sure that every bend in the crankshaft is as sharp as possible and that your crankshaft is as accurate as the one in the drawing. You may have to make several of them before you make one that is like the one in the drawing.



The finished model that flies by flapping its wings

Attachment of Mechanism

Great care has to be taken in assembling the mechanism of the wing flapper. First make the wing yoke from 1/8" hard balsa and mark off the place of the "yoke brace." Using plenty of cement, cement the "yoke brace" to the wing yoke and let it dry while making the connecting rods. The connecting rods are made of 1/8" diam. dowels 1 7/8" long or can be made of ordinary matches 1 7/8" long. Little holes are burned in the ends of these by means of red-hot pins heated over a candle flame. These holes are to be big enough to easily fit the crankshaft. Slip the connecting rods on the crankshaft. Now on the crankshaft, slip on in the order named, one 1/8" bushing, one 1/4" washer, two 1/8" washers, and one 1/8" bushing. Now fit the crankshaft on the "yoke brace" and bend the hook to receive the rubber. With the crankshaft on the "yoke brace," cement the "yoke brace" to the 1/4" square motor stick. Bind with thread and cement again. Put this aside to dry while you hunt for a good smooth piece of bamboo that hasn't any knots in it and has plenty of flexibility.

Wing and Tail

Start making the wing by slicing off the above-mentioned bamboo, two pieces 1/8" square. Gradually taper one piece at a time until they are 1/32" square at the tips. Bind well with thread and cement. Let dry for a few minutes. Make the wing ribs from 1/8" flat hard balsa. There are two of them and they are tapered from 1/8" by 1/4" to 1/8" by 1/8". Assemble the wing spars to the wing yoke by means of bearings made from thin cardboard, preferably cut from a penny post card. Bind well with thread and cement.

After the wing spars are attached, cement the wing ribs in the manner and position as shown on the drawing. Allow this to dry while cutting the bamboo for the tail. Out of the same piece of bamboo that the wing spars were cut from, cut three pieces of bamboo tapered from 1/8" square to 1/32" square to conform with drawings. Lay these on the side and proceed to make a pattern or template for the wing covering. After the template is made, cement the three pieces of bamboo for the tail on the end of the motor stick as shown on the drawings.

Using the pattern, cut a whole piece of paper for the wing covering with the grain running as shown on the drawing. A paper is left for the trailing edge in order to gain the proper sag and slack. Use cement in attaching the paper to the wing frame. Next cover the tail. Use red Japanese tissue in both cases. The wing is connected to the mechanism by attaching the free ends of the connecting rods to the wing braces and bending up the wire to keep the connecting rods from slipping off.

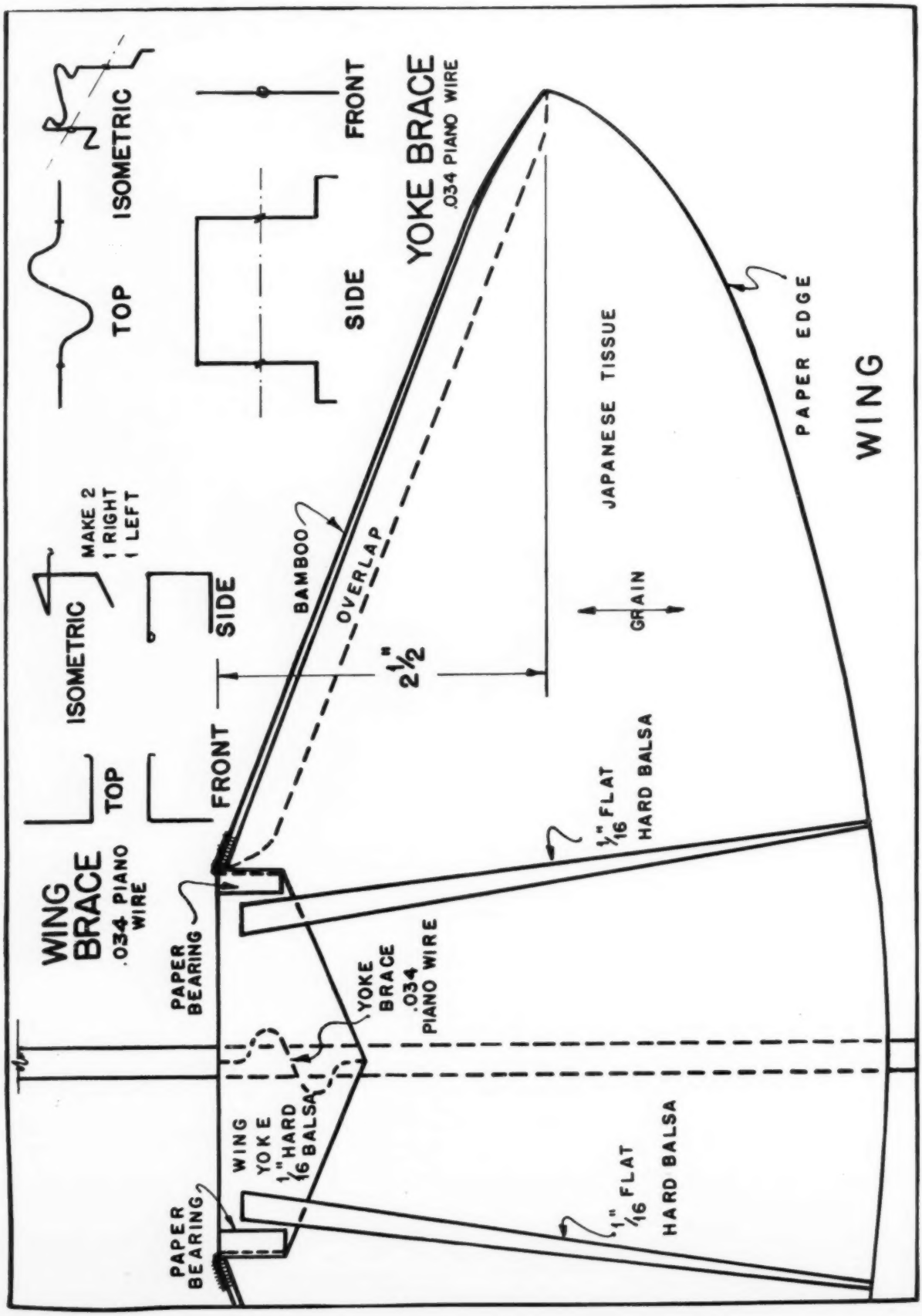
Flying Instructions

The wing flapper will fly on four strands of 1/8" by 1/30" brown rubber or six strands of 3/32" by 1/32" black rubber. It can be wound up either to the right or to the left. In such a model as the wing flapper, one does not have to worry about torque or carving propellers. The model does not have a rudder but turns by bending or tilting the tail to the right or to the left. Adjusting the model as to stalling or diving is made by shifting weight or sticking pins in the nose. In order to wind up the model with a winder, an S-hook is put on the end of the rubber in the conventional manner.

Notes and Hints on the Flapper

1.—Don't expect your first model of the

(Continued on page 34)


WING
BRACE
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BEARING
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BRACE
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PIANO WIRE
BAMBOO
OVERLAP
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YOKE BRACE
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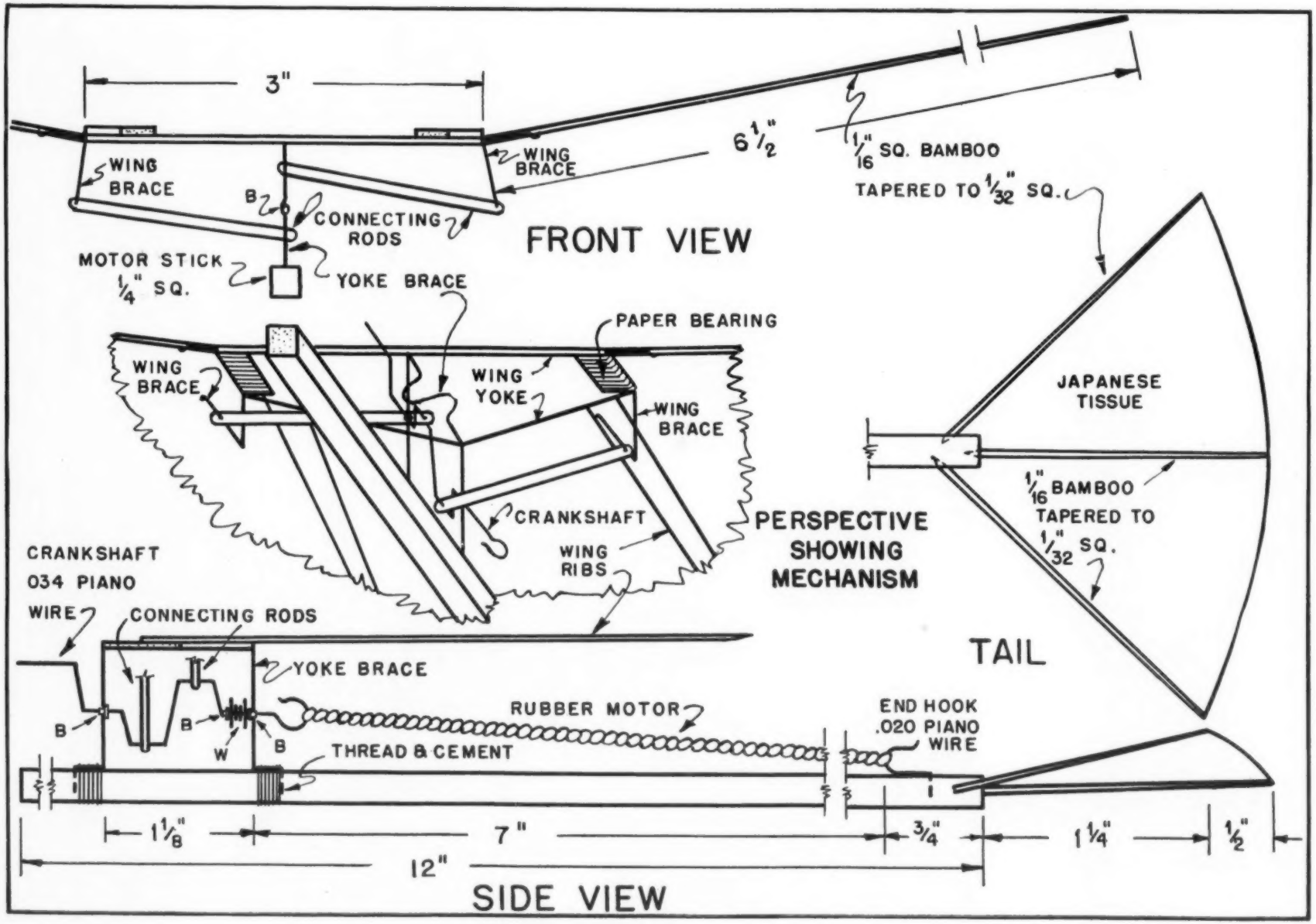
3"
WING BRACE
WING BRACE
6 1/2"
1/16 SQ. BAMBOO TAPERED TO 1/32" SQ.
B
CONNECTING RODS
FRONT VIEW
MOTOR STICK 1/4" SQ.
YOKE BRACE
PAPER BEARING
WING BRACE
WING YOKE
WING BRACE
CRANKSHAFT
WING RIBS
PERSPECTIVE SHOWING MECHANISM
JAPANESE TISSUE
1/16 BAMBOO TAPERED TO 1/32 SQ.
CRANKSHAFT 034 PIANO WIRE
CONNECTING RODS
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RUBBER MOTOR
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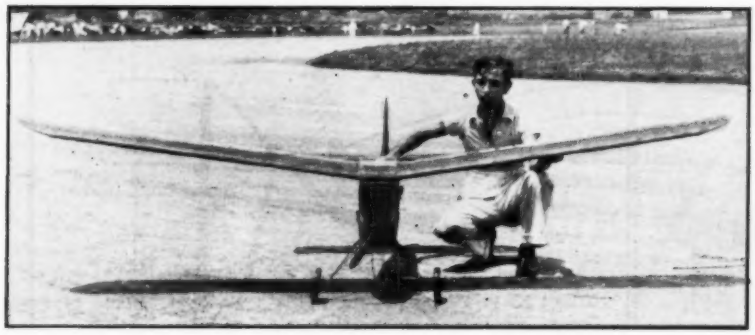
1 1/8"
7"
3/4"
1 1/4"
1/2"
12"
SIDE VIEW



Joe Kovel and the KG-2 world-record gas model on the runway at Lambert Field, St. Louis, Mo. Kovel placed fourth with a flight of 31 min. 5 sec., late in the afternoon after the thermals had died. Note the ship's perfect rigging

Leo Weiss with his model which won the Gas event with a flight of 64 min. 12 sec. It was just 28 seconds short of the record

Now It's "Gas" Models

What the Gas Models Did at the Annual National Contest, How They Were Handled and a Glimpse of Some of Their Unique Features

By C. L. BRISTOL

THE N.A.A. Meet at St. Louis, June 27-29, offered among its many attractions a colorful and spectacular demonstration of model aviation's newest development, the "gas-jobs." Carefully designed contest planes, beautifully finished flying scale models and rule-of-thumb creations, roared away from Lambert Field during the entire day. Some were pursued for miles by harried officials in automobiles. Others were picked up in bits, close at hand, by their erring and sorrowful designers. Occasionally a snarling "gas-job," choosing to circle the immediate lower reaches of the atmosphere, could be seen herding an agitated group of officials and spectators about the mighty airport at a surprising rate of travel.

Leo Weiss, age 16, of New York City, carried off the gas event with a time of 64 minutes, 12 seconds. A clever model plane designer and first-rate showman, this lad fell only 28 seconds short of the world's record held by Joe Kovel of Brooklyn, N.Y. Weiss' model is suggestive of Lockheed design, having the general lines of the Vega in combination with an Electra-type tail group. The fuselage is a hollowed balsa shell and all wing surfaces are balsa-covered. A completely cowled motor has controls projecting outside. This is a significant feature, as many of the contestants burned precious drops of fuel while replacing cowl or baffle plates after the motor was started.

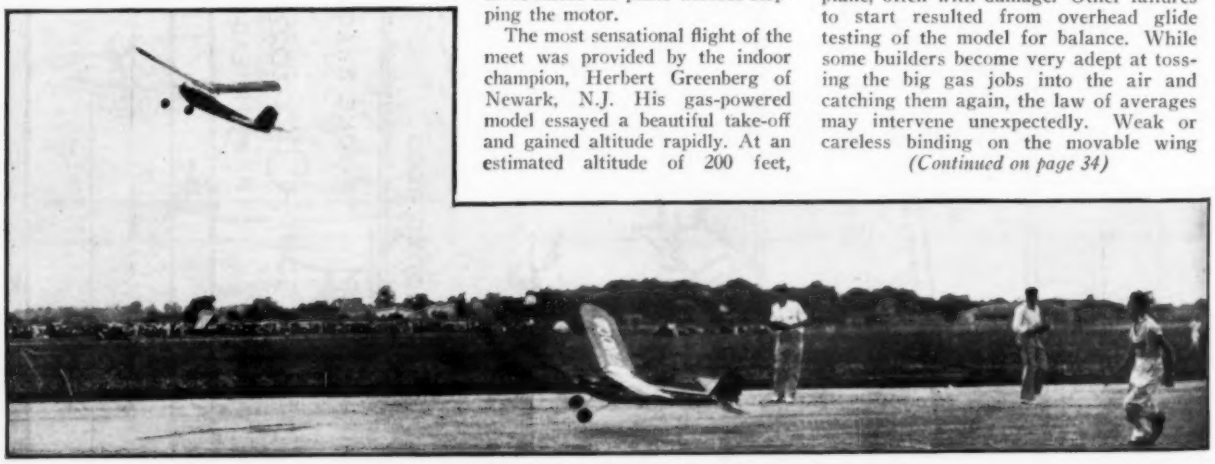
Hubert Lacey, 21, of Dayton and St. Louis, won the open-class event with a fine scale model of the Buhl "Bull Pup." Like Weiss, Lacey fell short of the existing record in his class by seconds. For those who prefer scale models, he demonstrated that intelligent application along these lines can bring out nice results in the gas-powered field. It is interesting to note that Lacey, in working out a successful wing, tail, and thrust line adjustments for his plane, arrived at a very similar combination to that employed by "Champion Joe" Kovel in his record-breaking KG-2. A feature of Lacey's model is the wiring system and outside button that enables him to switch from external or starting batteries to those inside the plane without stopping the motor.

The most sensational flight of the meet was provided by the indoor champion, Herbert Greenberg of Newark, N.J. His gas-powered model essayed a beautiful take-off and gained altitude rapidly. At an estimated altitude of 200 feet, however, it went into a series of whip-stalls and "spun in" to a most convincing crack-up. Mr. Greenberg would like to know which of the many pitfalls of gas-powered model building brought his flight to such an untimely end.

Of the 65 gas models entered at the "Nationals," 24 made official time. Approximately half of the remaining entrants took "delayed" flights, which is an elegant way of saying that they flew for less than ten seconds. The remainder failed to show at the field, or contracted the balky engine complex.

A common ailment of the unsuccessful entrants was insufficient dihedral and tail group, combined with a tendency to climb too sharply at the take-off. Models that are practically "stalled off" the ground do not retain sufficient flying speed to resist motor torque, which remains constant and results in quickly grounding the plane, often with damage. Other failures to start resulted from overhead glide testing of the model for balance. While some builders become very adept at tossing the big gas jobs into the air and catching them again, the law of averages may intervene unexpectedly. Weak or careless binding on the movable wing

(Continued on page 34)



A composite picture of how the record-holding KG-2 outdistanced its builder, Joe Kovel of Brooklyn on the take-off and how it looked a few seconds later as it climbed for altitude. It is *not* stalling

Maxwell Bassett of Philadelphia and the model with which he placed third with a flight of 36 min. 4 sec. It seems that Bassett's plane has at last gone "parasol." Bassett is the former gas model champion and is the "father" of gas model aviation in the U. S.

Hubert Lacey of Dayton and St. Louis, winner in the Open Class, with his scale Buhl "Bull Pup." Lacey fell short of the class record by only a few seconds with a flight of 17 min. 58 sec. The "Bull Pup" has proved to be an excellent design for gas models

The Stix Baer & Fuller entry receives its official microscopic allotment of fuel, one-fourth ounce for each pound of model weight. This is a moment full of expectation with possible tragedy to follow

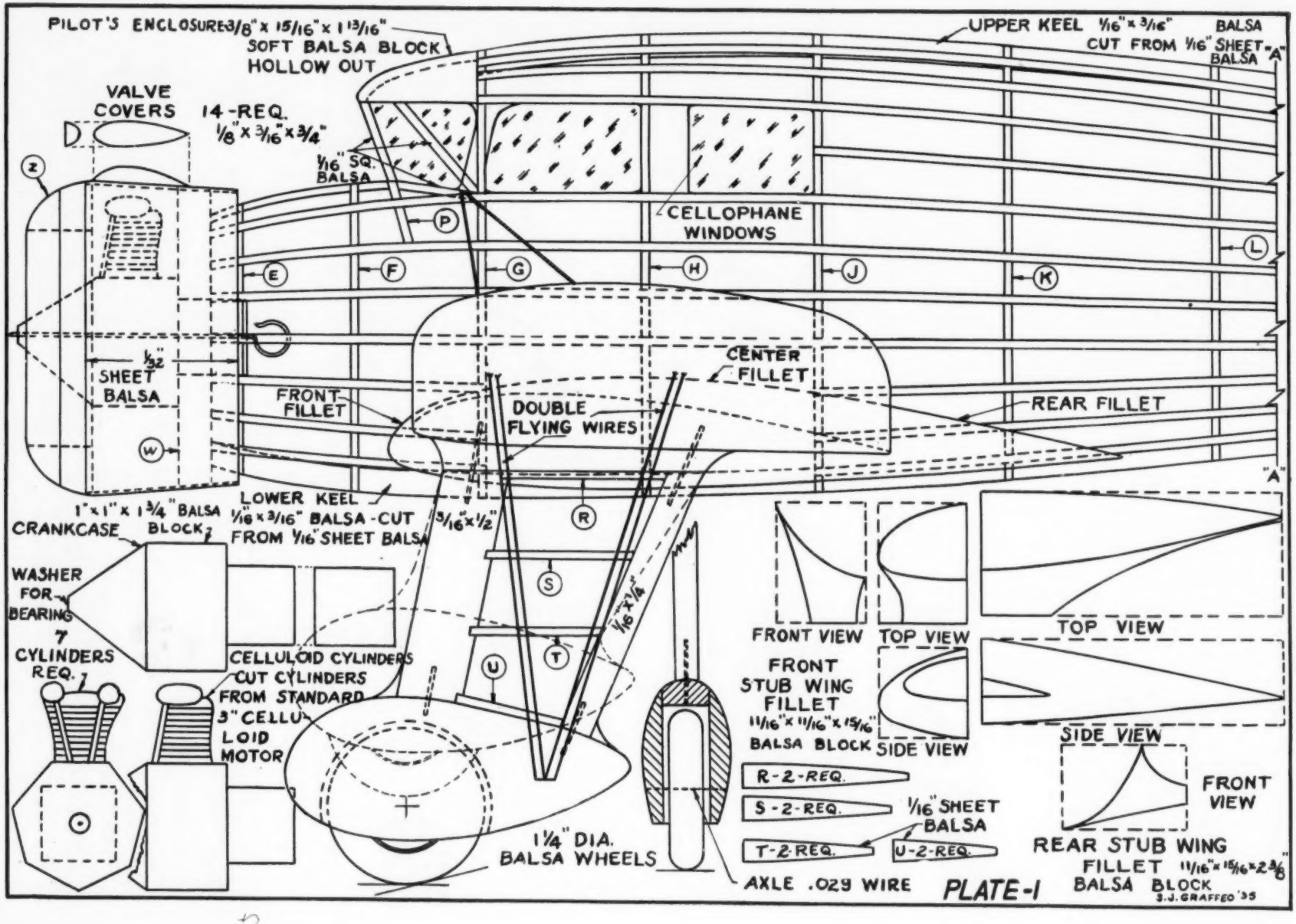
Risky business—Frank Ehling of Jersey City does a little overhead glide testing of his gas job to determine correct balance. Sometimes the model is safely retrieved. The model or its builder must be "good"

The Tlush gas job mounting a motor designed and built by Charles Tlush who stands at the right. The motorcycle policeman wonders whether or not it is a *real* motor or just for looks

Winford ("Winnie") Davis of Kansas City and his fine Corbin Super Ace scale gas model. It carries the cryptic name, "Mrs. Frequently." As a rule scale proportions in a gas job are obtained at the expense of crack-ups

Herbert Greenberg of Newark makes a last-minute adjustment on his ill-fated craft. The plane fell from a dizzy height, reducing the front section to toothpicks. It is strange that nearly all planes with motors mounted at the bottom of the fuselage are prone to crash

Jesse Bieberman, open-class contender of Philadelphia, in hot pursuit of his Brown powered ship. Looks as if his model is not at all snobbish for it absolutely refuses to "stick its nose up in the air"


PILOT'S ENCLOSURE 3/8" x 15/16" x 1 13/16" SOFT BALSA BLOCK HOLLOW OUT
UPPER KEEL 1/16" x 3/16" BALSA CUT FROM 1/16" SHEET BALSA
"A"
VALVE COVERS 14-REQ. 1/8" x 3/16" x 3/4"
1/16" SQ. BALSA
CELLOPHANE WINDOWS
Z
P
E
F
G
H
J
K
L
1/32" SHEET BALSA
W
CENTER FILLET
FRONT FILLET
DOUBLE FLYING WIRES
REAR FILLET
LOWER KEEL 1/16 x 3/16" BALSA - CUT FROM 1/16" SHEET BALSA
3/16" x 1/2"
R
1" x 1" x 1 3/4" BALSA BLOCK
CRANKCASE
WASHER FOR BEARING
7 CYLINDERS REQ.
CELLULOID CYLINDERS CUT CYLINDERS FROM STANDARD 3" CELLU- LOID MOTOR
S
T
U
1/16" x 1/4"
1 1/4" DIA. BALSA WHEELS
AXLE .029 WIRE
FRONT VIEW
TOP VIEW
FRONT STUB WING FILLET 11/16" x 11/16" x 15/16" BALSA BLOCK
SIDE VIEW
R-2-REQ.
S-2-REQ.
T-2-REQ.
1/16" SHEET BALSA
U-2-REQ.
TOP VIEW
SIDE VIEW
FRONT VIEW
REAR STUB WING FILLET 11/16" x 15/16" x 2 3/8" BALSA BLOCK
PLATE-1
J. J. GRAFFEO '35

Building the Kinner Envoy

How You Can Construct a Remarkable Flying Scale Model of the Latest Transport Used by the U.S. Army

The finished ship has the good looks, the detail and the fine flying qualities of the full-size plane

By STEPHEN J. GRAFFEO

THE Kinner Envoy is a sensational new four-place cabin transport. It is powered with a C-7 300 hp. Kinner 7-cylinder radial engine, which pulls it at a maximum speed of 165 m.p.h. This plane is considered the last word in modern airplane design and construction, meeting the approval of the U.S. Navy which has invested in three Kinner Envoys for transportation of its personnel.

The model herein described, retains all the beautiful lines of its prototype and is an excellent flier, which is not usual for this type of model airplane.

Fuselage

First cut Plates No. 1 and No. 3 and join at A-A. Trace and cut upper and lower keels (1/16"x3/16") from 1/16" sheet balsa.

The bulkheads are cut to shape from 1/16" sheet balsa, as detailed in the plans, and notched for 1/16" square stringers. Cement bulkheads F, G, H, J, K, L, M, N, and O to upper and lower keels as shown on the plans. Check carefully front to rear for alignment, especially bulkheads G and J, otherwise the stub wings will not line up properly.

After cement has set, glue center side stringers in place, and when dry, glue in the remainder of the bulkheads. Be sure to make bulkhead E from ¼" sheet balsa. Make rear hook from .029" music wire bent to shape shown and glued to bulkhead O. Cut former P from 1/16" sheet balsa to shape shown on Plate No. 5 then cement instrument panel to former P and cement in fuselage. Now cement all stringers (1/16" square balsa) in place.

Next make pilot's enclosure from soft balsa block ⅜"x15/16"x1 13/16", finish, and hollow out, then cement in proper place. Construct windshield from 1/16" square balsa strips glued to fuselage and pilot's enclosure as detailed on Plates No. 1 and No. 3.

Make front, center, and rear stub wing fillets from soft balsa as shown on Plates No. 1 and No. 3. Shape fillets so that they will match bulkheads G and J. Cement fillets to fuselage and allow to dry, then sand to a streamline shape.

Four pieces of .034" music wire are cut to required lengths and inserted into the center stub wings at the position detailed on the plan.

In covering fuselage, cover in sections;

This ship is no slouch at climbing. Here it is in flight

strips of tissue are cut as long as the distance between bulkheads. This is the only way in which it is possible to make a smooth covering job. Use banana oil or dope to cement tissue paper to fuselage. When completely covered, shrink tissue by spraying a light coat of water. When thoroughly dry, give two coats of clear dope.

Wings and Stub Wings

The wings are built in two separate panels, one right and one left. (Left wing panel shown on plan, Plate No. 5.) Make the right wing panel by tracing the left wing panel.

Cut 14 ribs from 1/32" sheet balsa and 6 ribs from 1/16" sheet balsa as detailed on Plate No. 5. Lay a sheet of waxpaper on the plan and pin front and rear spars in position. The ribs are now placed in their proper locations and glued. Slant rib A (1/16" sheet balsa) for correct dihedral angle. The leading and trailing edges are sanded to the shape shown and glued in place. Make wing tips as shown on drawings from 1/16" sheet balsa. This type of wing tip is recommended because it is easier to construct and gives a neater appearance. When the wing panels are completely dry, glue two pieces of 1/16" dia. aluminum tubing to front and rear spars as detailed on Plate No. 3 and No. 5.

To cover, use separate sheets of tissue. Cover tops of wing panel first, and then the bottom. Use banana oil or dope to cement paper to wings. Shrink and dope wings in the same manner as fuselage.

Use the same procedure as for the wings above in making the stub wings, and before covering them, cement .034" music wire to front and rear spars as detailed on Plate No. 2. Now glue stub wings to fillets and bulkheads G and J, and then cover.

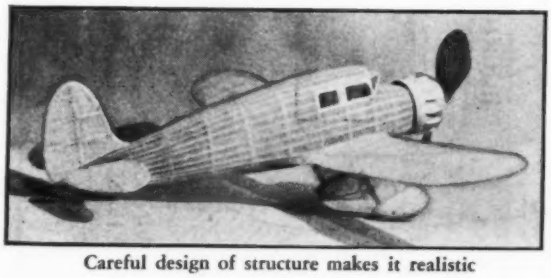
Motor Cowl and Dummy Motor

Make cowling front Z by laminating two ¼" sheets cross grain to avoid splitting when carving. Carve and sand to shape as shown on Plate No. 2. Next carve and sand rear cowling bulkhead W from ¼" sheet balsa. Before assembling the motor cowl, make the crankcase from a 1" x 1" x 1¾" balsa block, and cement to bulkhead W. Now cut out seven celluloid cylinders from a standard 3-inch celluloid dummy motor, and glue the cylinders to the crankcase as detailed on Plate No. 1. Then cover the rear part of the cowling with 1/32" sheet balsa. This completes the cowling and dummy motor, with the exception of the fourteen valve covers which are glued around the outside of the cowling as detailed on Plates No. 1, No. 2 and No. 3. The motor cowl with the crankcase and dummy motor is detachable to permit the use of a mechanical winder.

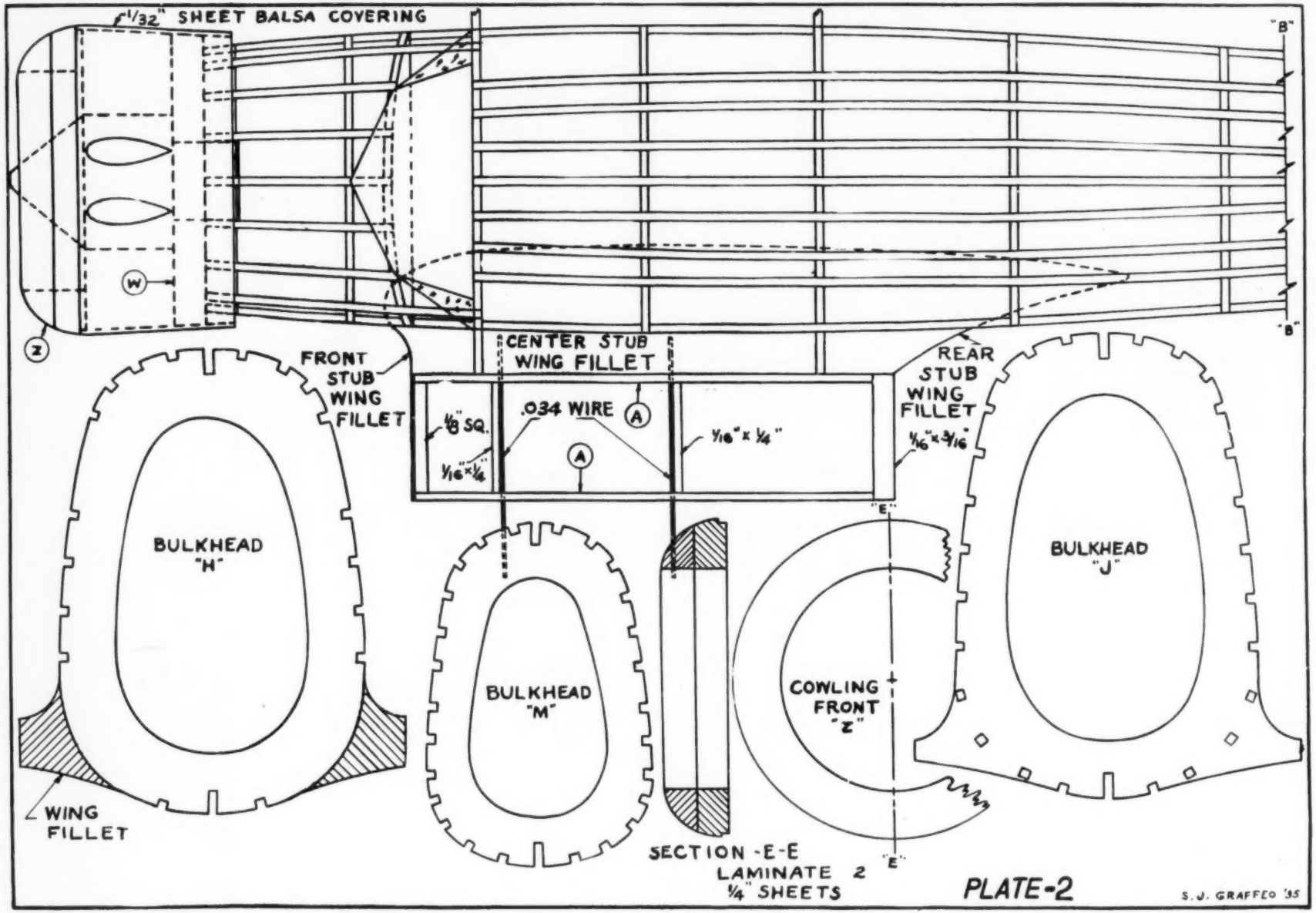
Landing Gear and Tail Wheel

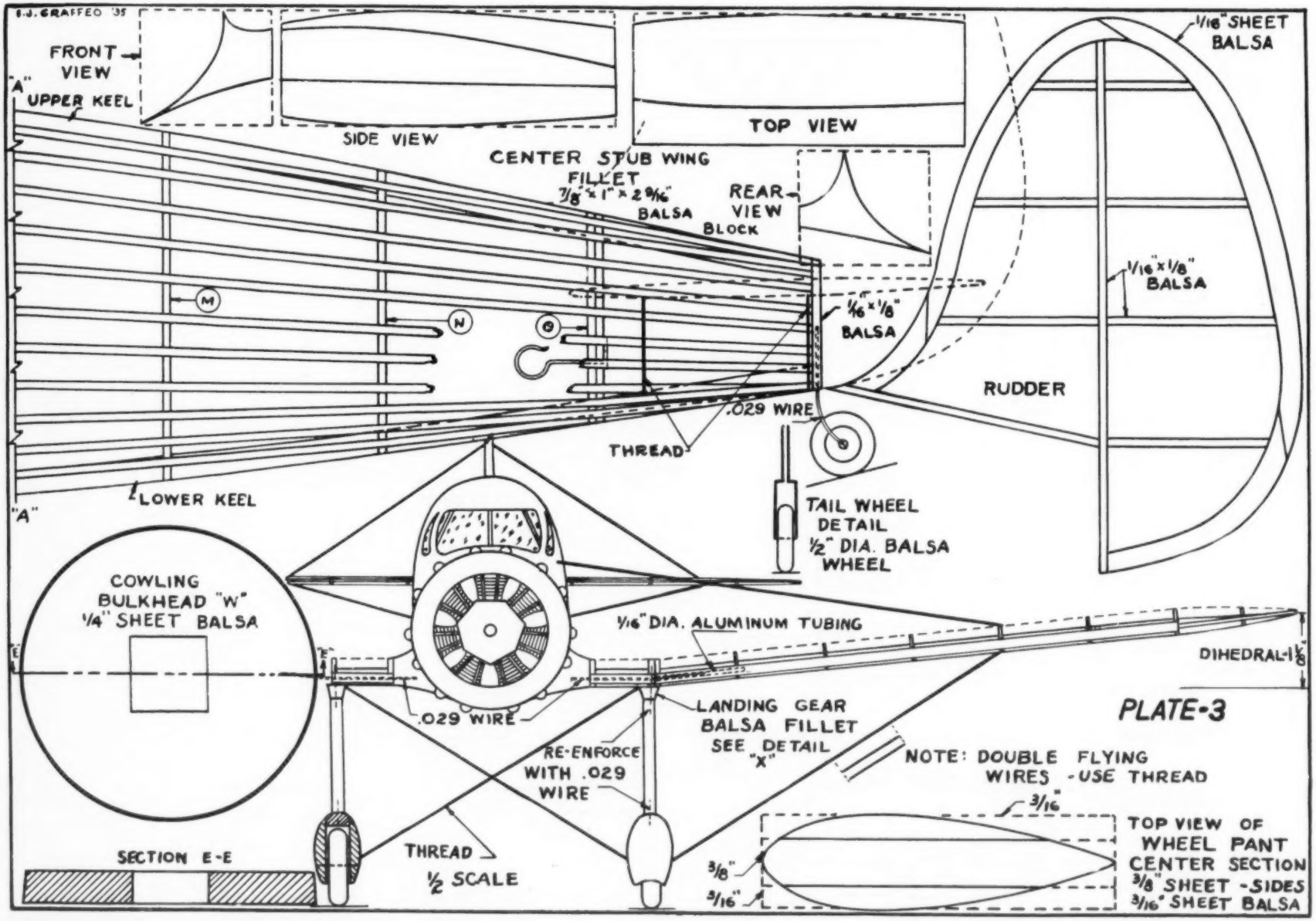
The streamline wheel pants are cut to shape and built up in three sections as detailed on Plates No. 1 and No. 3. Carefully carve and sand to a streamline shape so that they may be glued to the built-up landing gear struts. Now make the landing gear struts as shown on Plate No. 1. Be sure to streamline struts before cementing to landing gear fillet X (Plate No. 4), which is also carved and sanded to a streamline shape. When dry, cover the landing gear struts with tissue. Spray with water and dope. Now assemble the landing gear and cement it to the wing stubs, and allow to dry.

(Continued on page 38)



Careful design of structure makes it realistic


1/32" SHEET BALSA COVERING
"B"
"B"
W
Z
CENTER STUB WING FILLET
FRONT STUB WING FILLET
REAR STUB WING FILLET
1/8" SQ.
1/16"x1/4"
.034 WIRE
A
A
1/16" x 1/4"
1/16" x 3/16"
"E"
"E"
BULKHEAD "H"
BULKHEAD "M"
BULKHEAD "J"
COWLING FRONT "Z"
WING FILLET
SECTION -E-E
LAMINATE 2 1/4" SHEETS
PLATE-2
S.J. GRAFFEO '35


E.J. GRAFFEO '35
FRONT VIEW
"A"
UPPER KEEL
SIDE VIEW
TOP VIEW
CENTER STUB WING FILLET
7/8" x 1" x 2 9/16" BALSA BLOCK
REAR VIEW
1/16" SHEET BALSA
1/16" x 1/8" BALSA
M
N
O
1/16" x 1/8" BALSA
RUDDER
.029 WIRE
THREAD
LOWER KEEL
"A"
TAIL WHEEL DETAIL
1/2" DIA. BALSA WHEEL
COWLING BULKHEAD "W"
1/4" SHEET BALSA
1/16" DIA. ALUMINUM TUBING
DIHEDRAL-1 1/8"
.029 WIRE
LANDING GEAR BALSA FILLET SEE DETAIL "X"
PLATE-3
RE-ENFORCE WITH .029 WIRE
NOTE: DOUBLE FLYING WIRES - USE THREAD
3/16"
TOP VIEW OF WHEEL PANT CENTER SECTION
3/8" SHEET - SIDES
3/16" SHEET BALSA
3/8"
3/16"
SECTION E-E
THREAD
1/2 SCALE

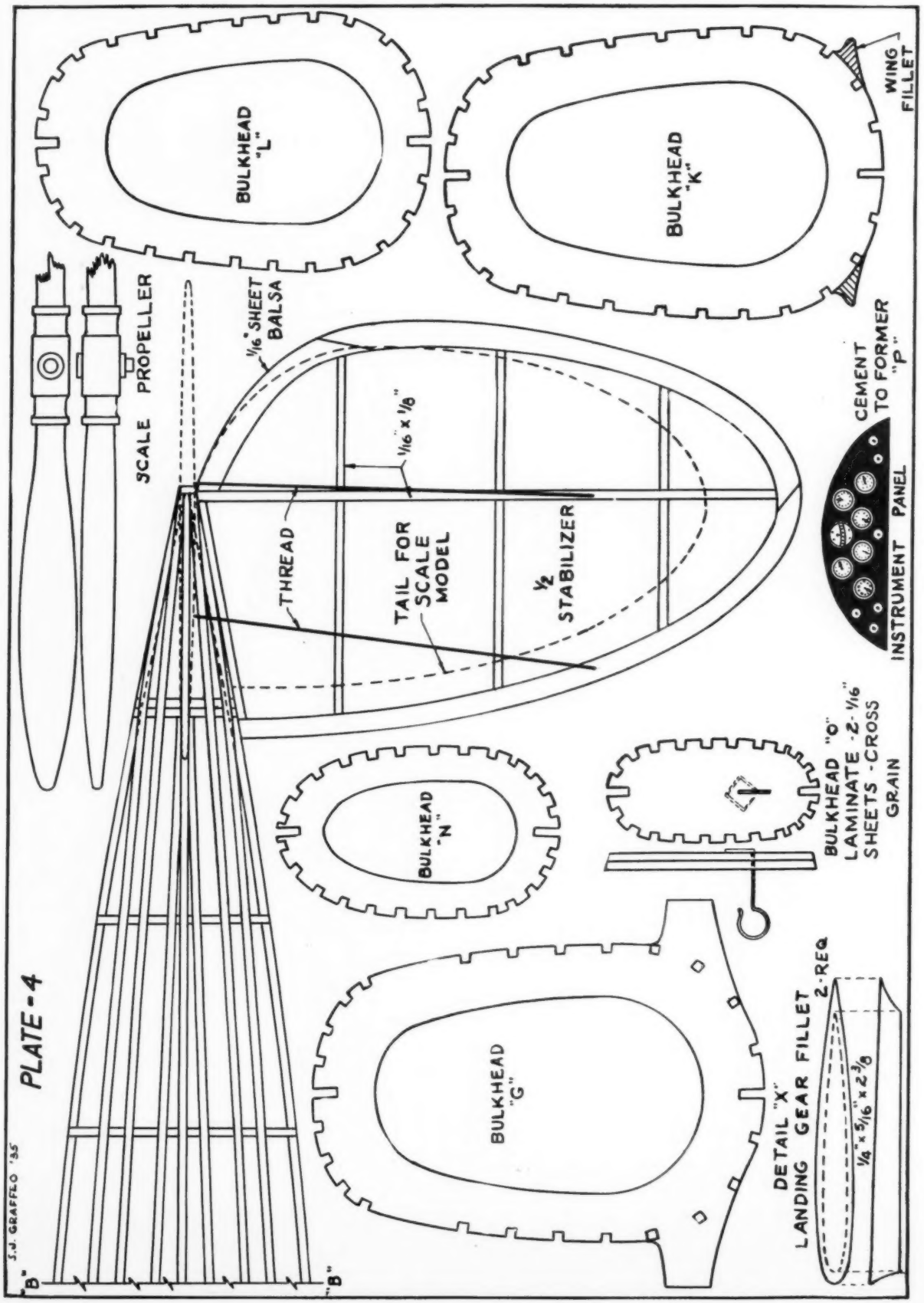
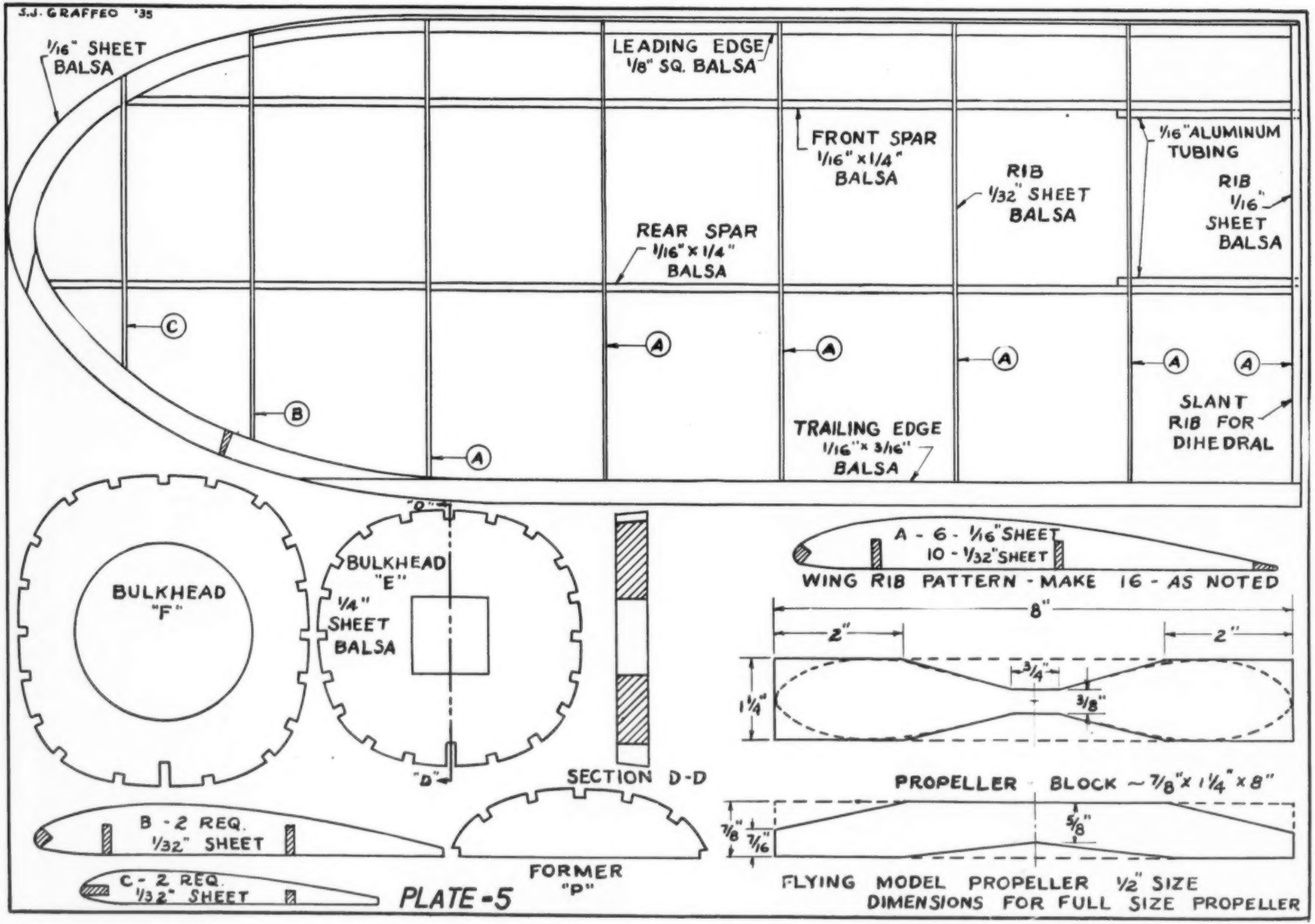
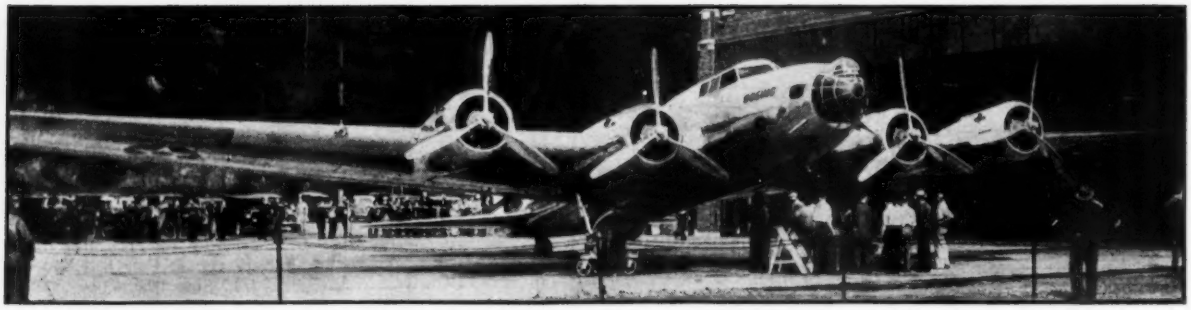


PLATE - 4
J.J. GRAFFEO '35
BULKHEAD "L"
BULKHEAD "K"
WING FILLET
SCALE PROPELLER
1/16" SHEET BALSA
1/16" x 1/8"
THREAD
TAIL FOR SCALE MODEL
1/2 STABILIZER
CEMENT TO FORMER "P"
INSTRUMENT PANEL
BULKHEAD "N"
BULKHEAD "O" LAMINATE - 2 - 1/16" SHEETS - CROSS GRAIN
BULKHEAD "G"
DETAIL "X" LANDING GEAR FILLET 2 - REQ
1/8" x 5/16" x 2 3/8
"B"
"B"


S.J. GRAFFEO '35
1/16" SHEET BALSA
LEADING EDGE 1/8" SQ. BALSA
FRONT SPAR 1/16" x 1/4" BALSA
RIB 1/32" SHEET BALSA
1/16" ALUMINUM TUBING
RIB 1/16" SHEET BALSA
REAR SPAR 1/16" x 1/4" BALSA
C
B
A
A
A
A
A
A
TRAILING EDGE 1/16" x 3/16" BALSA
SLANT RIB FOR DIHEDRAL
BULKHEAD "F"
BULKHEAD "E" 1/4" SHEET BALSA
"D"
"D"
SECTION D-D
A - 6 - 1/16" SHEET
10 - 1/32" SHEET
WING RIB PATTERN - MAKE 16 - AS NOTED
8"
2"
2"
3/4"
3/8"
1 1/4"
PROPELLER BLOCK ~ 7/8" x 1 1/4" x 8"
7/8"
7/16"
5/8"
B - 2 REQ. 1/32" SHEET
C - 2 REQ. 1/32" SHEET
FORMER "P"
PLATE-5
FLYING MODEL PROPELLER 1/2" SIZE
DIMENSIONS FOR FULL SIZE PROPELLER



The new Boeing Bomber. Its wingspread is 105 ft. and it carries 15,000 pounds of bombs at 250 m.p.h.

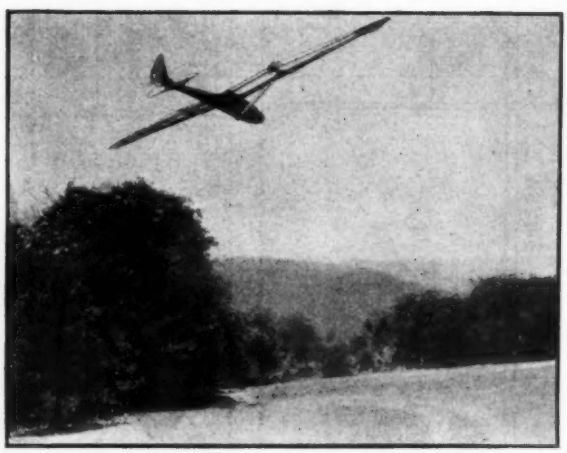
On the Frontiers of Aviation

Interesting Facts Concerning Airplanes of New Design With Which the United States Is Leading the World

By ROBERT C. MORRISON

THE total value of the contract recently awarded to the Consolidated Aircraft Corporation for 60 giant Navy Patrol flying boats was $8,507,037. It is the largest peace-time Navy contract that any aircraft company has ever received. The new planes are undoubtedly a radical departure from the Consolidated flying boats now in the Navy and which are now under construction at the Consolidated plant at Buffalo, New York. The sixty new ships will be built at Consolidated's factory now being completed at San-Diego, California. The old Buffalo factory will be vacated after the present orders of 32 flying boats and 30 pursuit planes are completed.

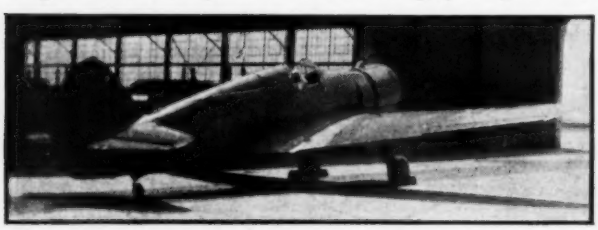
With a wingspread of 104 feet, length of 63 feet, and a height of 17 feet, the planes will carry a crew of five. Though performance data on the planes is secret, it is safe to say that the planes cruise at over 150 m.p.h. They will be of the twin-engined monoplane type, much resembling the new Sikorsky S-43. Twin Wasp Pratt & Whitney engines will be the power plants. It is believed that the "mystery" ships will have no wing floats nor "water wings." The hull will be wide enough to give the flying dreadnaughts sufficient stability. As a safeguard, the wide, tapered wing will probably bulge at the tips and in these bulges will be airtight compartments. If the plane should happen to tip while maneuvering in a rough sea, the wing tips will adequately act as floats. Cruising range is said to be greater than that of any other Consolidated plane built.



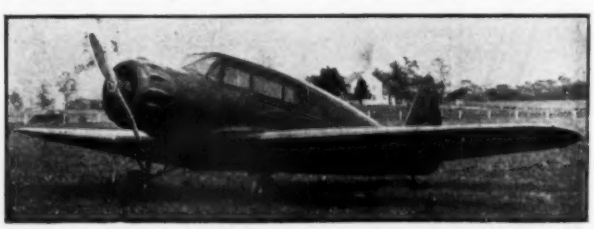
A Bowlus Sailplane in flight at Elmira, N.Y.

Two months ago in these columns was announced the fact that the Sikorsky Aircraft Corporation was endeavoring to get an order from the Navy for some of their S-42 patrol boats. Recently their efforts have been rewarded by receiving a contract amounting to over $400,000 for one of the giant flying boats. If this ship performs successfully when completed, several more will likely be ordered.

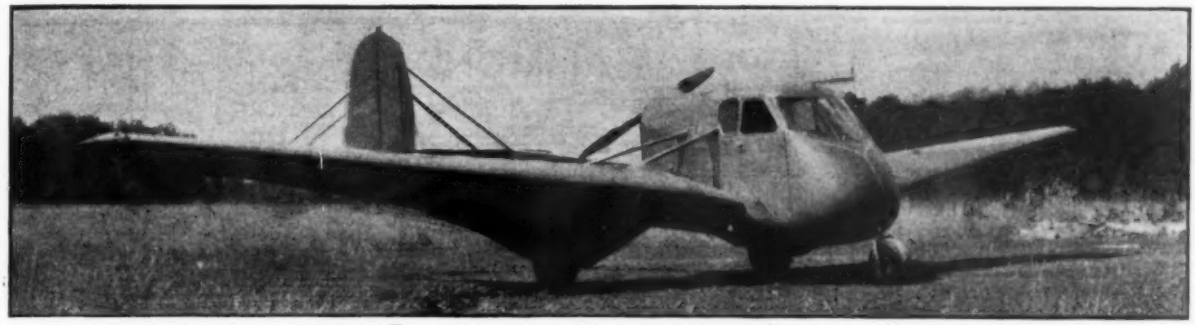
This magazine was one of the first publications to announce information on the proposed giant Sikorsky six-engined flying boat (see March issue). The new plane, construction of which is to start soon, will have a 400 foot wingspread! The hull will be about 200 feet long and will be powered by six radial engines of 1,000 hp. each. Standard stock engines of this horsepower are not in existence at this time, but it is believed that such engines will be available by the time the flying "ocean liner" is completed. The plane will weigh 112,000 to 115,000 pounds, three times the size of the Sikorsky S-42! The ships will be used on Pan American's trans-Atlantic and Pacific routes. They will have a cruising range of 5,000 miles and will fly at altitudes of about 12,000 to 20,000 feet. 30-40 people may be carried with fifteen private cabins containing from 2 to 5 sleeping berths each. The cabins will be larger than the drawing rooms on a railroad train. There will be such luxurious accommodations as a spacious smoking lounge with bar, an observation lounge and small library. There will be a dining room to seat 20 passengers with a full load of passengers dining in two sessions. A separate dining room will be provided for the crew, also separate shower baths and wash-rooms. The wing will be over seven feet in thickness and therefore there will be enough head-room to permit the passengers to walk up and down the interior and look out the glass-enclosed leading edge of the wing as the plane cruises along at 200 m.p.h! In other words, the new Sikorsky will be a miniature "S.S. Normandie" with wings. It will be able to make about five round-



Here is the new Curtiss "75" all-metal cantilever wing pursuit ship. It has a speed of 265 m.p.h.



The latest Fairchild six-place cabin plane. It is very fast. Note the cantilever wings and retractable landing gear.



The Hammond "flivver" plane. It will not stall or spin and will stop upon landing in 50 feet

trips across the Atlantic in the time it takes the Normandie to do it once—those antiquated steamships! This new creation of Igor I. Sikorsky will be completed and ready to fly within two years from this date.

Though this is startling news to the average person, to Mr. Sikorsky it is only a mere careful step forward with the thought that planes of 200 tons will be developed in the course of a very few years. With this news now made public, the question arises as to what other company will take it upon themselves to compete against the Sikorsky company. Will transcontinental landplanes of this size be built in the near future and who will build them? Thus a new era in aviation is taking form, and it will be the youth of today who will be the designers of these future giants of the air.

The small plane however, will always be available and following is some first-hand news on new planes of that type. The builders of the popular Arrow Sport have recently been receivers of one of the many contracts distributed by the Bureau of Air Commerce for light sport planes. The Arrow Company has already begun work on the plane, which will be a fast low-wing job. The list of Bureau of Air Commerce contractors comprise the following names; Arrow, Curtis-Wright, Waterman, Fairchild (Weike), Pitcairn, Hammond and Fahlin.

The new Fairchild low-wing cabin monoplane has been completed. It is being test flown at Hagerstown, Maryland.

Keith Rider has come out with a new swift racer to give the Wedell-Williams some competition. Without a doubt it will be a participant in many of the events at the 1935 National Air Races. The ship is much like the Keith Rider that Jim Granger was unfortunately killed in and probably is the same one rebuilt. It is powered by a large radial engine and has a retractable landing gear. The pilot sits well forward and is enclosed in a small portable cabin with turtle deck in the rear which fairs back into the fin. The stubby low wing is extremely tapered and joins the wing in a large fillet. Earl Ortman, famous racing pilot, recently flew the plane in record time from Vancover, B. C., to Agua Caliente, Mexico, (1,250 miles) in 5 hours and 27 minutes!

Hundreds of British airplanes in review at Mildenhall Airdome, July 6th, while a squadron flies overhead

A new Boeing bomber has made its appearance at Seattle, Washington! It is powered by four 700 hp. Pratt & Whitney engines and has a 105 foot wingspread. It is the largest modern landplane in the United States. The plane is seventy feet long and 15 feet high. Many machine-guns and bombs are to be carried. With landing gear retracted and carrying a full load, the huge bomber should fly at about 250 m.p.h. The giant plane is a mid-wing monoplane. The pilot and co-pilot sit in an enclosed cabin almost identical to that on the latest Boeing 247 transports. In the rear of the pilot cab in the center of the fuselage is a gun turret. Further aft and just in front of the tail surfaces are two more gun turrets, one on each side of the fuselage. The nose, which is round in cross-section such as the 247 will also contain a gun turret. Dotted here and there along the fuselage are small windows, not more than a foot square.

There are also unconfirmed rumors that Douglas has a new four-engined plane completed!

Since the announcement in these columns that three planes of the "Maxim Gorky" type are to be built, the Russians have decided to build sixteen of them!

Not so long ago Colonel Clarence Chamberlain test-hopped a new 700 pound flivver plane built by the Milford Furniture Company. The plane is a low-wing and a has a span of twenty-two feet. An Aeronca engine supplies the power. The plane is constructed entirely of wood veneer.

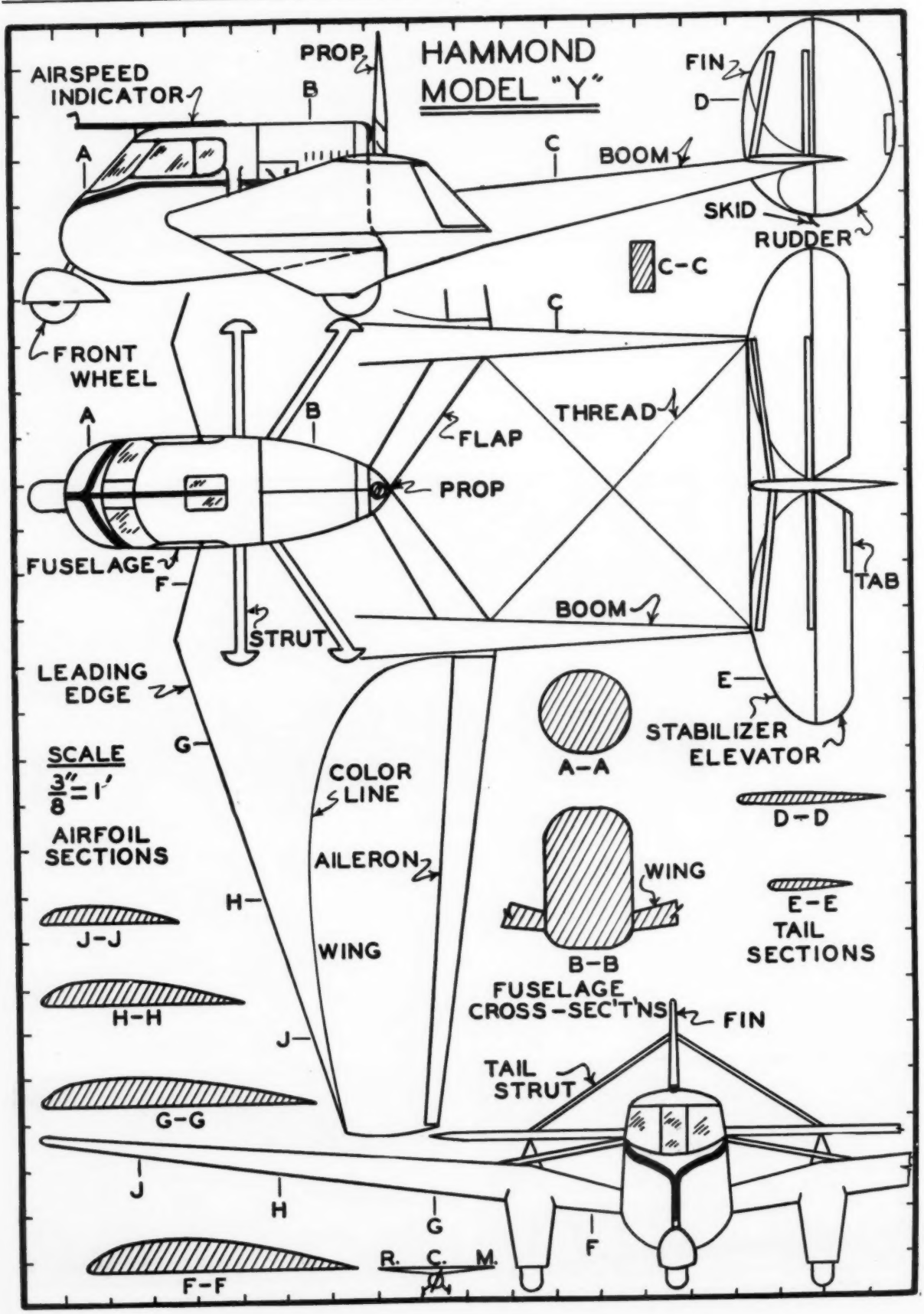
The first of the new Hammond Y. sport planes for the Bureau of Air Commerce has just come off the production line. It should be interesting to follow the development of these small ships of very radical design.

The De Havilland Company of England

(Continued on page 36)

This is Britain's wireless controlled airplane. It flies at 100 m.p.h. and is controlled from the ground

Japan's new light bomber "93" of 700 hp. It composes the main 1935 air force


HAMMOND
MODEL "Y"
AIRSPEED INDICATOR
PROP
B
A
C
BOOM
FIN
D
SKID
RUDDER
C-C
FRONT WHEEL
THREAD
FLAP
PROP
FUSELAGE
F
STRUT
TAB
BOOM
LEADING EDGE
E
STABILIZER ELEVATOR
A-A
G
SCALE
3/8" = 1'
COLOR LINE
D-D
AIRFOIL SECTIONS
AILERON
WING
E-E
TAIL SECTIONS
H
J-J
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FUSELAGE CROSS-SEC'T'NS
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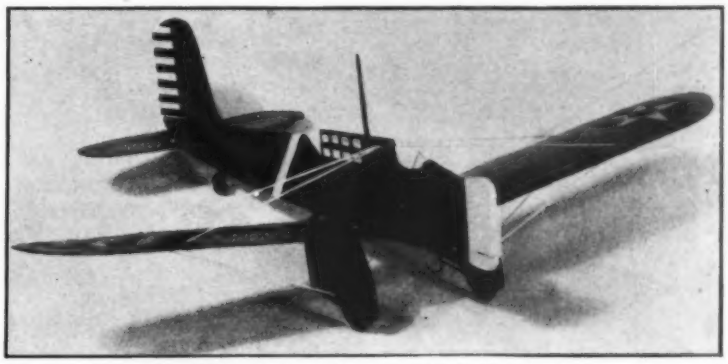
R. C. M.
F-F

Build This U. S. Army A-12 Attack Glider



The finished flying glider, just like its big brother

By JESSE DAVIDSON

HERE is another little glider-plane that will soon make a landing in your model airport. It is a model of the well-known Curtiss "Shrike" A-12 attack ship. This ship is equipped with five machine-guns and a 500-pound bomb suspended underneath the fuselage. Its top speed is over 200 miles per hour.

Painted with regulation Army colors and additional trimmings, this silhouette-o-plane fills an important gap in the collection of the model builders who are having fun building and gliding these little realistic-looking ships.

All the parts in the plan are indicated by letters and are listed below with their respective dimensions:

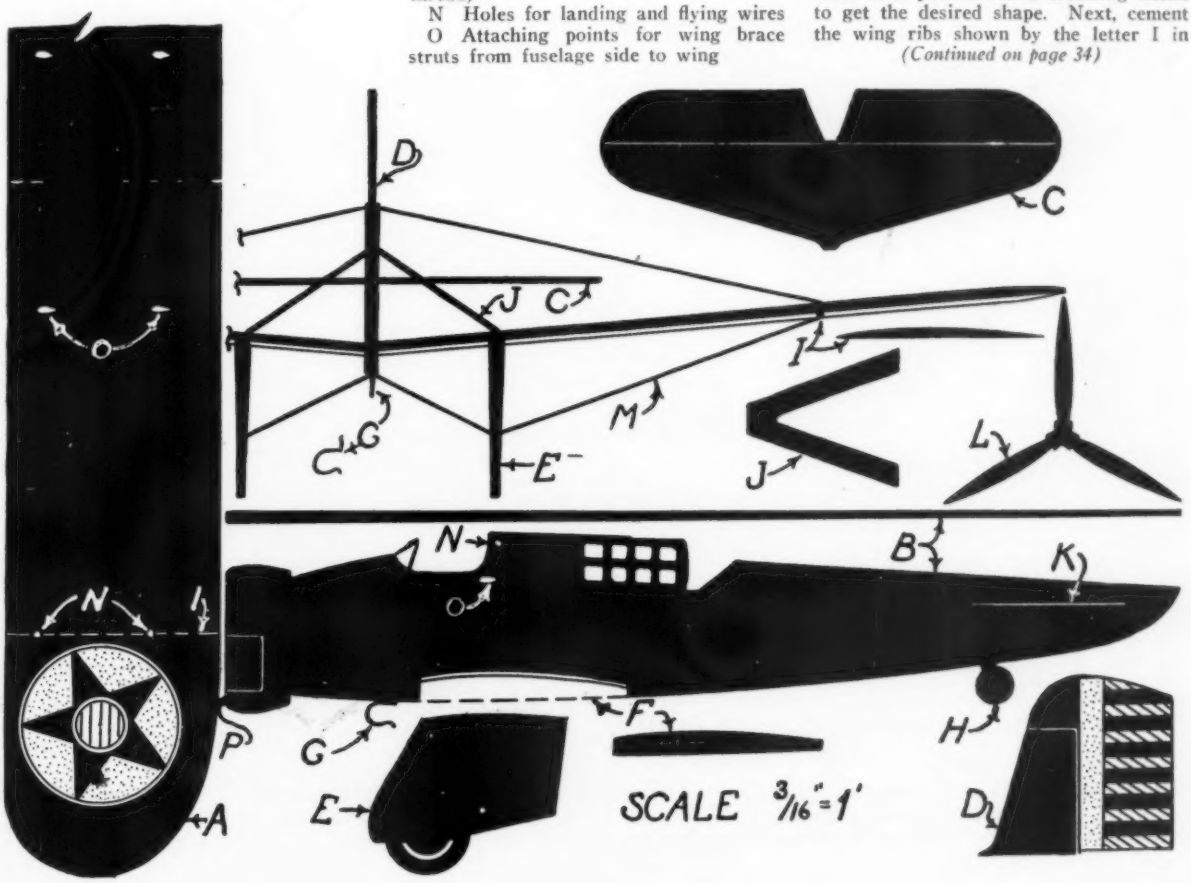
A Wing, 1/32"x1¼"x8¼"
B Fuselage, 3/32"x1"x5 11/16"
C Elevator, 1/32"x15/16"x2¾"
D Rudder, 1/32"x1⅛"x1 1/16"
E Wheel pants (2 pieces), 3/32"x15/16"x1⅛"
F Fillet strip, 1/16"x⅛"x1¼"
G Wire launching hook
H Tail wheel, 1/16"x¼"x¼"
I Wing rib (2 pieces), 1/32"x1/16"x1¼"
J Wing brace struts (2 pieces), 1/32"x13/16"x15/16"
K Slot for elevator
L Three-bladed prop 1/16" flat balsa
M Landing and flying wires (silk thread)
N Holes for landing and flying wires
O Attaching points for wing brace struts from fuselage side to wing
P Position for the nose weight

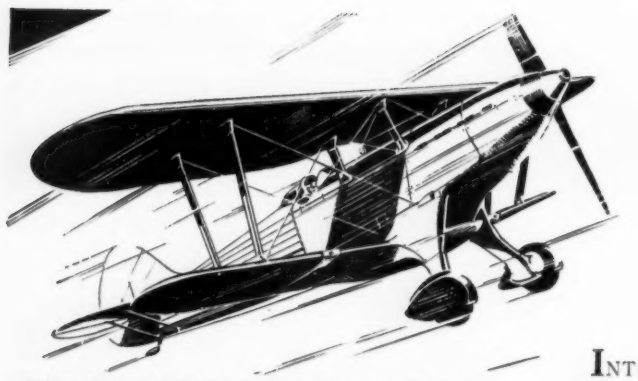
The patterns of the wing, side view of fuselage, rudder, elevator, wheel pants, brace struts, wing ribs, prop and fillet strip are the main parts of the model. These are shown in black. The patterns may be cut out from this page to have their outlines traced onto the wood or you may use tracing paper to transfer the outlines. The latter method is urged if you do not wish to mutilate the page.

Cut out all parts right on the line. The white squares on the fuselage represent the windows of the sliding hatch used on the real ship. These are to be painted in white.

The wing, of course, must be cambered. Hold that part above a steaming kettle to get the desired shape. Next, cement the wing ribs shown by the letter I in

(Continued on page 34)





Fairey Day and Night bomber (Norman Barker)

AIR WAYS

HERE AND THERE

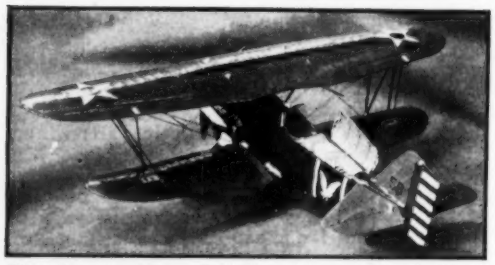
What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments

INTERCHANGING of ideas is the basis of knowledge. How many readers have stopped to consider this fact? After giving it a little consideration you will realize what a valuable asset this Air Ways column is. Many interesting and useful "brainstorms" have resulted from casually reading in a moment of leisure about what the "other fellow" has done.

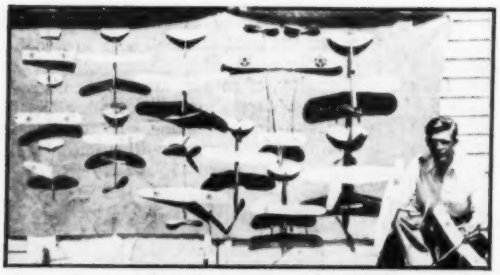
For instance, here we have Norman Barker of 139 Evans Avenue, Toronto, Ontario, Canada, who favors us with the excellent drawing of the Fairey Multi-Gun Day and Night Fighter, at the head of our page. Some other fellow upon looking at this drawing may get the idea that he can make his aviation instincts pay valuable dividends by turning them into artistic channels. We congratulate Mr. Barker upon his very excellent drawing.

The finest model picture received this month is picture No. 1, submitted by C. Chandler King of 5 Augusta Avenue, Baltimore, Maryland. It shows a detail scale Curtiss Hawk. This job is National contest material. Every detail has been very carefully carried out. You will even note, if you look closely, that there are miniature pliers, hammer and other tools in the tool box, the cover of which is open. Also there are ribbed tape strips on the wings over the ribs. Gusset plates trim the holes through which the aileron struts pass. Though this picture does not show the gas tank at the bottom of the plane, another picture which was submitted even shows the rivet heads against the metal side of the tank. Details inside the fuselage and the wing cannot be seen, but we can assure you it is of unusual quality. Any one who has built a model of this type knows well that the time and labor spent upon it is nearly as great as if he had built a large, full size ship.

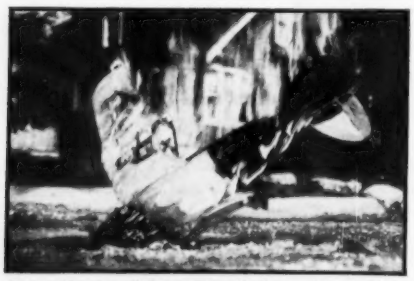
Some months ago MODEL AIRPLANE NEWS published a series of plans of all-balsa models which were simple to build and with which the novice and average model builder could obtain excellent flights. There are not many models of this type at present and often model builders, attempting to construct a plane which is complicated and difficult to fly, meet with little success and become discouraged easily. Thus, another recruit for aviation may be lost. This series of all-balsa models was hailed by the



Pict. No. 1. Best submission this month. A detail scale Curtiss Hawk by C. C. King

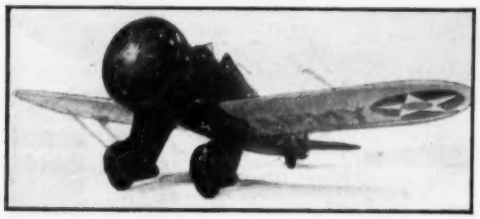


Pict. No. 2. Complete series of all-balsa models, plans for which appeared in MODEL AIRPLANE NEWS; by W. M. Myers

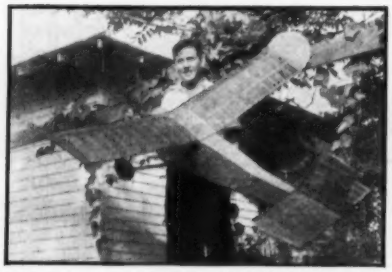


Pict. No. 7. "Extry-Extry" first picture of a gas model to crash and burst into flames. The bereaved builder is Roland Lungazo

Pict. No. 8. If you look carefully you will see George Sholes' Curtiss Robin in full flight



Pict. No. 6. A prize-winning Boeing P-26 built by Harry Trimble. The details are beautifully done



Pict. No. 5. H. W. Reeds with the gas job that he has built and flown successfully

Pict. No. 15. Sixty seconds duration at the high elevation of Albuquerque is good performance

Pict. No. 10 Just a small group of model fliers who attended one of the monthly contests of the Model Flying Club of Australia

readers in many cases. The unusual part about it is that many of them flew as well as models of the built-up paper variety. Mr. W. M. Myers, who is faculty adviser of the Largo Air Cadets of 206 First Avenue, SW, Largo, Florida, and who is also an instructor in mathematics, undertook to construct the whole series of these little ships.

They appealed to him from an experimental standpoint, being easy to build and yet demonstrating principles of flight. Picture No. 2 shows the complete series of planes. Mr. Myers is shown in the lower right corner of the picture holding two of the models. Mr. Myers says that in every case he has been able to get a performance at least equal to the one claimed for any particular model. In many cases the performance was considerably better.

We would appreciate hearing from readers if they have built any models of this series and how they like them.

At the Glider Contest held in Elmira, New York, in July, there was an added feature in the nature of a gasoline-powered model contest. Percy Pierce of Philadelphia, one of the oldest model fliers, directed the proceedings. There were not many fellows present; however, an active group from Brooklyn was on hand with ships. These young men were: "Funzie" Bellantonio, Leo Vartanian, Gerard Smith, and Thomas Condax. Thomas Condax came from Philadelphia. Andrew Borysko of 1485 East 96th Street, Brooklyn, New York, to whom we are indebted for the information concerning the contest and the pictures, was also on hand. He is shown launching an eleven and a half foot glider in picture No. 3. This glider was built by "Funzie" Bellantonio. A great deal of sport was had by all and experiments were made with this little ship at the contest. Borysko says:

"The terrain up in that locality is fine for losing gas jobs. 'Funzie' sent his model up with less gas than he was allowed, which was a quarter of an ounce per pound, and after 15 minutes, 27.5 seconds it landed on the side of Hill No. 44 a few miles away, across the Big Flats. It was followed by a Taylor Cub but when the steep hill was reached by car, the model could not be found. The first model to make an official flight was that belonging to Condax which stayed up for ten minutes and landed in the valley. It was not lost.

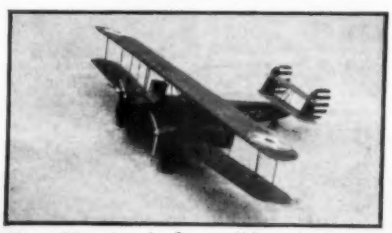
"This model had a high-wing loading but kept its speed down by maintaining a high angle of attack while in flight. It was well balanced on this flight but climbed

(Continued on page 45)

Pict. No. 4. Bellantonio, Leo Vartanian, Percy Pierce and Thomas Condax enjoy gas model contest at Elmira. Mr. Pierce was Director

Pict. No. 16. Macon, Ga., boys built these

Pict. No. 11. A full size airplane built by the Boy Scouts of Enfield, England (Herz Photo)



Pict. No. 9. A fine solid scale Curtiss XB-2 in careful detail by Walter Stine, Jr.

Pict. No. 3. An 11½ ft. glider built by "Funzie" Bellantonio, launched at Elmira by Andy Borysko

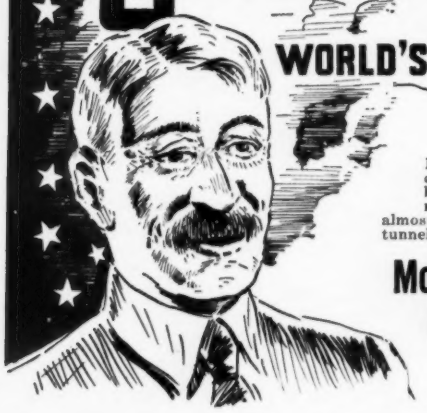
Pict. No. 14. Mr. Kasuk of Russia builds and flies solid wood gliders from airplanes. (Courtesy Andy Borysko)

Pict. No. 13. Mr. Yoshio Hirata with the flying Supermarine he constructed

Pict. No. 12. Prize-winning Macchi Castoldi racer built by a member of the Escadre de la Rose des Vents

Cleveland-Designed Models

WORLD'S STANDARD OF MODELPLANE COMPARISON



Not toy planes just called "Scale Models" but honest-to-goodness 100% scale jobs almost suitable for wind tunnels, that's why they're

Modelin' Bill's Favorites

YES, model builders, this is a beauty if ever there was one, and a great favorite, too! The large sketch here (½ size of actual model) is for your convenience in seeing many details—yet even all aren't shown. A Kit to build such an amazingly complete and authentic model is obtainable only from Cleveland—or C-D dealers. It backs up the C-D guarantee of super completeness, and exceptional quality. Send for yours **TODAY.**

CURTISS (Goshawk) F11C-2

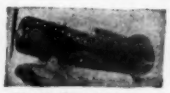
This ¾ scale Navy fighter is an unusual, beautifully detailed C-D model which makes an instantaneous hit with everyone that sees it, with its decorations of little "Felix the Cat" scampering away with the bomb on the side of the fuselage (for which insignia is supplied, printed out) and its numbering, color striping, bombs, gas tank with realistic gadgets holding it on, the beautifully-made motor, radio mast and wire, etc., etc., etc. It is colored, silver wings, the top of the upper which is all yellow, with attractive red striping outlined in white and a large black number "49" over the center section. The tail surfaces and the cowl are entirely green, except for the minor details which are black. The balance is a beautiful pearl gray (light) which very closely matches the aluminum.

Incorporated in this model, besides the C-D authentic rib and stringer spacing ing duplicated where it should be, etc. tofore unheard-of minute details inco in the design showing all the decorati lettering, the various metal panels which lage, rivets, pins, etc. Complete inform cockpit interior and controls will be fou those who want them. Also complete d how to make super-complete kits, which of every beginning or even the most expe will give very realistic flights of perha dred feet too. Span 23⅝, length 14⅜. order Kit SF-49, postfree.....

Each One of These 31 Authentic ¾" C-D Flying Models is as Super-Detailed as This Large F11C-2

The Great Lakes Sport Trainer
Span 20", length 15⅛". Beautiful flights. Easy to build. Orange and cream. Kit SF-1, $2.65.

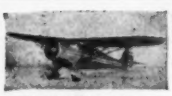
English A-W QUAD Fighter
Span 20⅜", length 16⅞". Unusual fine-flying type. Easily built. Red, white and blue. Kit SF-11, $2.50.



'31 Air Race Winner—Bayle's Gee-Bee
Span 17⅝", length 12". Speedy flights. Beautiful lines. Yellow and black. Kit SF-17, $1.95.

Hawker Highspeed Fury Fighter
Span 22⅜", length 19½". Redesigned. Long fast flights. All silver. Kit SF-20, $2.65.

The World-Renowned Lockheed Vega
Span 30¼", length 20⅝". Beautiful in looks—and flights. Brilliant red and cream. Kit SF-24, $3.25.



Popular Monocoupe Sportplane
Span 24", length 15¾". Has won many first prizes in contests. Cream and orange. Kit SF-28, $2.50.

Comper Swift Lightplane
Span 18", length 13[illegible]. Redesigned. Excel flights. Green with l fuselage design. Kit SF $1.25.

Famous Travel Air Mystery Ship
Span 21¼", length 14⅞". Swift flier. Rich in detail. Red, black scalloping, green trim. Kit SF-2, $2.95.

Von Richthofen's Fokke. Triplane
Span 17⅝", length 14⅛". Famous war model. Authentic coloring. Red, silver and white. Kit SF-14, $2.50.

The Swift Howard Racer "Pete"
Span 15", length 13⅛". Excellent flights. Easy to build. All white, black details. Kit SF-16, $1.35.

U.S. Army Hawk P6E Fighter
Span 23⅜", length 16⅝". Most authentic Hawk on the market. Yellow, olive drab, Selfridge Field markings. Kit SF-21, $3.25.

Long Flying Heath Parasol Sport
Span 23⅛", length 12⅝". Excellent for beginners. Steady flier. Orange and black. Kit SF-26, $98c.

U.S. Navy Boeing F4B3 (or 4)
Span 22½", length 15⅜". Exciting to build—thrilling to fly. Silver, yellow, and red. Kit SF-29, $2.85.

Sensational Lincoln Sport
Span 15", length 1[illegible]. Beginner's model. Ex cating flights. Co black trim. Kit SF-30.

U. S. Army Boeing P12-E
Span 22½", length 16⅝". Excellent army model. Yellow olive drab with red trimmings. Kit SF-8, $2.85.

Beautiful Fokker D-7 Fighter
Span 21½", length 17". Rich in details. Orange, Green, white, black details. Kit SF-15, $2.95.

Schneider Winner—Supermarine S6-B
Span 22⅝", length 21⅝" overall. Many unusual features. Will R.O.W. Silver and blue. Kit SF-19 $2.50.

U.S. Army Boeing P-26
Span 20⅜", length 17⅛". Very popular. Superdetailed. Yellow and olive drab. Kit SF-23, $2.50.

'32 Air Race Winner—Gee-Bee Supersportster
Span 18⅝", length 13⅜". Fast flights. A beauty in looks. White, red scalloping. Kit SF-27, $2.50.

Big Boeing 9B Mailplane
Span 33¼", length 24⅝". Easy for beginners. Good duration flights. Blue and silver. Kit SF-32, $2.50.

Popular Waco C Cabinplane
Span 24¼", length 18⅜". Beautiful model. Flyer. Silver and red. SF-37, $3.25.

PLEASE 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. On "Dwarfs"—add 10c extra per Kit for packing, if less than 6 are ordered. Please mention your dealer's name and address. Canada, Mexico, British Isles customers—add 10%; all other countries, 20%.

'33 Air Race Winner—Wedell's W-Williams
Span 19½", length 16⅛". Very beautiful in appearance and flights. Red, black and bronze. Kit SF-47, $2.95.

"I didn't Kno-o-o-w that!"

Our sympathy goes out to the boy or man who buys a Kit because the picture in the ad looked so very realistic—only to find later that the Kit WON'T build such a model. Don't just buy pretty pictures! If you've never before dealt with the company from whom you intend buying, ask other experienced model-builders about it. Yes, ask them about us, too! They'll undoubtedly tell you, as we've always said, that all C-D photos and sketches show models just as they WILL look when built from our super-complete kits **without** extra materials (except for liquids in Dwarf kits and these are HONESTLY advertised as "Dry" kits, for our policy forbids saying or even leaving open for speculation that kits are complete when they're not! How many others do? On your guard! Nuf sed!

...Super complete Kit, postfree, $3.75.
...(Dwarf—no liquids") Kit—85c plus 10c packing.

Actual photo of model design 49 (F11C-2)

C-D DWARFS

Inexpensive Now to Build Formations Commercial Fleets, etc.—Get Started Today!

These models are probably the finest little models you will ever see in your lifetime. They are precisely like those wonderful and famous ¾" scale C-D's described below with but few minor exceptions—very few, in fact. We don't believe there are a total of six of these minor changes or simplifications in the entire line of the 29 small Dwarfs, except in the D-35 and D-45 there is a considerable amount of change necessary because of the extremely large size of the models and of course putting in movable controls would make a little additional change for the movable "works" necessary in the internal structure.

Listed here, in addition to the names and prices of the Dwarfs you will note only the span is given. For length, simply take ⅔ the length of the ¾" scale model and the coloring we suggest is the same as is supplied with ¾" scale models.

If you wish to order coloring right with the model, only ½ oz. of each of the two or three main colors, usually listed first, and paper cement and balsa cement will be needed. On the larger models (over 15" generally speaking) and for those who do not have much experience, perhaps a 1-oz. bottle of all liquids should be ordered, except for small numbers up to 35c. A 15c packing charge when dopes are ordered *must* be included beyond the 10c packing charge you must send for each Dwarf kit ordered up to the amount of five. When six or more "Dwarfs" are ordered no packing charge is necessary, thereby saving you 60c or more.

DWARFS are "dry" kits. No Liquids are included.

The Complete Line of Dwarf Models

SINCE ½" AND ¾" SCALE C-D KITS BUILD UP PRECISELY THE SAME BEAUTIFUL MODELS SIMPLY REFER TO ILLUSTRATIONS BELOW UNDER CORRESPONDING NUMBERS.

When ordering please remember these are "Dry" kits (no liquids included.)

No.	Name	Span	Price
D- 1	Gr. L. Sport. Trainer	13 3/8	$ .65
D- 2	Tr. Air. Mystery Ship	14 1/2	.50
D- 8	Army Boeing P12-E	15	.65
D-11	A-W Quad Fighter	14	.45
D-14	Fokker Triplane	11 3/4	.45
D-15	Fokker D-7 Fighter	14 1/8	.60
D-17	Bayle's '31 Gee-Bee	11 3/8	.50
D-18	Howard "Pete" Racer	10	.30
D-19	Supermarine S.6B	15	.65
D-20	Hawker Fury Fighter	15	.45
D-21	Hawk P6-E Fighter	15 3/4	.75
D-23	Boeing P-26 Fighter	14 1/8	.65
D-24	Lockheed Vega	20 1/2	.85
D-26	Heath Parasol Sport	15 1/2	.35
D-27	Doolittle's Gee-Bee	12 1/8	.50
D-28	Monocoupe Sportplane	16	.45
D-29	Boeing F4B-3 Fight	15	.65
D-32	Boeing 88 Mailplane	22 1/4	.85
D-33	Comper Swift Lightpl	12	.30
D-35	Boeing 247 Transport	36 7/8	2.50
D-36	Lincoln Sportplane	10	.25
D-37	Waco C Cabinplane	16 1/2	.75
D-40	Aeronca C-3 Sport	18	.60
D-41	Vought Corsair Fight	18	.85
D-42	Howard "Ike" Racer	10 1/8	.25
D-43	Douglas O-38 Obs	20	.85
D-45	Martin Bomber	35 3/8	2.50
D-46	Laird Solution Racer	10 5/8	.50
D-47	33 Wedell's W. Wms	13	.50
D-48	34 Turner's W. Wms	13	.50
D-49	Curtiss F11C-2	15 3/4	.85

The Powerful Boeing 247 Transport (below)

Span 55⅛", length 38⅛". A wizard for flights with its two-motor pull. The thoroughly engineered drawing of four large panels (17"x44") and supplementary sheet each contain accurate modeling information. Over 16 oz. of liquids, dope, cement, etc. Entirely gray in color. Kit SF-35 ..... $8.50

Highspeed U.S. Army Martin Bomber

Span 53¼", length 33⅛". Nothing ever before like it. Novel and strong method of duplicating an almost impossible landing gear (but not retractable—however it may be done). Turned balsa invisible hub wheels. Colored standard U.S. Army yellow, olive drab details black. A real kit. Kit SF-45 ..... $8.50

Aeronca C-3 Sportplane
Span 27", length 15¼". Flies flights and very easy for beginners. Red and silver. Kit SF-40. $2.65.

Douglas O-38 Observation
Span 20¼", length 22¾". Very beautiful, and unusually well detailed. Yellow, olive drab, black details. Kit SF-43. $3.75.

2-place Vought Corsair V-65
Span 20½", length 19¼". Super detailed. Beautiful colors. Blue, yellow, red, black, and silver. Kit SF-41. $3.75.

'30 Air Race Winner—Laird Solution
Span 15⅞", length 13¾". A fast flier. Pretty lines. Gold and black. Kit SF-46 $2.50.

4-Wheeled Howard Racer "Ike"
Span 15⅝", length 12¾". Flies and climbs beautifully. Also data for Pete. White, black details. Kit SF-42. 98c.

Race Winner W-Williams
Span length 16". Flies Turner's fast flying. White, gold. Kit SF-48.

Dealers! Clubs!
See our message on back cover of this issue.

SEND 5c NOW

for complete C-D list of world's best Kits and full line of quality parts and supplies as illustrated here. Later, a Christmas list will also be sent you, too!

CLEVELAND MODEL & SUPPLY CO., Inc.

1866NK West 57th St., Cleveland, Ohio, U. S. A.

Model Builders' Hall of Fame

Intimate Glimpses of the Life of a Famous Model Airplane Builder

By PHILIP ZECCHETELLA

CARL GOLDBERG

LIKE many great men, Carl was born in the Bronx, New York, which was a good start considering that Al Smith only came from the East Side, which suffers in comparison... it happened twenty-two years ago and he is having a birthday on October 27th. His grammar schooling was varied but he graduated at Kreischerville, Staten Island, (we're not sure about the spelling of that place; in fact, there are many things about Kreischerville we don't even know about, let alone be sure of), finished high school at White Plains, New York, and is now a Junior at the University of Wisconsin.

His first interest in model planes was aroused by an article in the January, 1928, issue of the American Boy Magazine with plans for a flying model. He immediately scraped together some material and started on his first model. The wings were covered with waxpaper and the wood stock was picture molding. It took him six hours, using a knife, heavy duty pliers and some rough sandpaper... no mention was made of a monkey wrench which was probably required to put the wing in place. When completed it had the terrific duration of twelve seconds and at that we are beginning to realize it was pretty remarkable waxpaper and picture molding... we've seen a picture frame fly off the wall and waxpaper give a good account of itself in a wind, but we never counted on them to get together and cooperate for twelve seconds. We heard of another chap who was well aroused by pretty near the same article, only he took apart the family wicker chair (the old one) and covered the model with superfine gingham cloth and Le Pages' glue and that became the rage. We suspect the Le Page people must have been paying terrific dividends in those early days of our model aero-nuts... but getting back to Carl, at that time twelve seconds was plenty encouraging so he joined the newly-organized A.M.L.A., known as the Aeroplane Model League of America.

We'd refer to Carl as "C.G." but he's so air-minded it would probably be interpreted for "Center of Gravity"... it would be horrible if anyone thought that the Center of Gravity was born in 1912... and besides, our esteemed editor has the same initials and we're sure HE wasn't born in 1912... and since we have proof of his designing successful models about that time, he would have to have been an unusual prodigy. By this time you have probably become accustomed to the delightful knack we have of getting away from our subject which, we believe, was left in the midst of waxpaper, picture molding and A.M.L.A. membership.

Carl's first contest was the A.M.L.A. National Meet in June, 1928, which was held at Detroit and which was also the first National Meet to be sponsored. The first prize in the events was a $200 cash award and a trip to Europe. The entry, his only model, was a twin pusher which flew for twenty-six seconds, winning him horrible mention, as he puts it. At that meet Carl saw his first indoor model when Aram

(Continued on page 40)

A Midget Motor Ignition Coil

By WILLIS NYE

THIS coil, if built to the specifications herein given, should perform its duty in a midget gasoline model airplane engine. There are many things that affect the operation of an electrical device of this type. By following the instructions, a coil of satisfactory results should be able to be built.

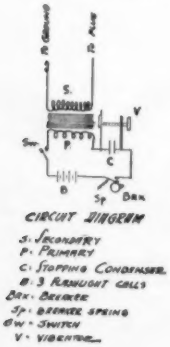
The coil ends are made of 1/16" round disk fiber. They are drilled in the middle for the iron core to be inserted therein. The end discs were held to the core by means of shellac or cement. As an added feature for lightness, though not necessary, they may be drilled for lightness as shown.

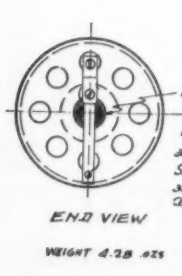
The core is made up of 22 gauge iron wires 5/16" in diameter in bundle form. They are bound together by silk thread at each end and shellacked to hold together. The smaller the wire gauge, the better is possible to get this small. You will need about 5 feet of this wire for a bundle this size. The core should not be solid, otherwise low magnetic permeation will interfere with the efficiency.

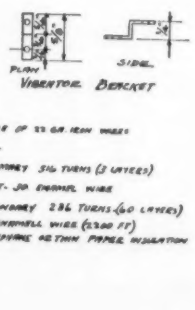
The primary is comprised of 516 turns of 30 enamel wire wound in three layers and insulated between with thin paper or sheet cellophane. The secondary is wound with 236 turns per layer, with 60 layers being required or about 2,200 feet of 36 enamel wire. Enamel wire is okeh provided the enamel isn't chipped so the insulation is broken down. The layers are separated by sheet cellophane. The whole winding is wound and slipped over the primary coil, which in turn is wound around the iron core.

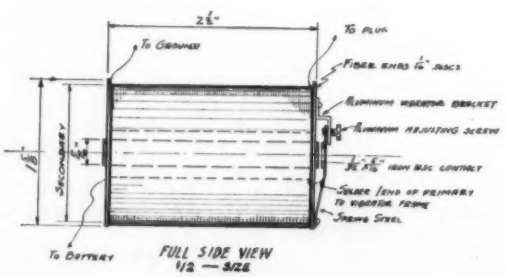
The vibrator is made of an aluminum bracket with an adjusting screw of aluminum with a thread adjustment. The alu-

(Continued on page 38)









Powering Your Model Planes

Article No. 44

Chapter No. 4

Why the Power Required for Flight Varies With Different Models and What to Do About It

By CHARLES HAMPSON GRANT

MANY model builders have a fairly accurate conception of why rubber bands generate power, through practical experience. However, one of the most important points concerning rubber motor power for model airplanes is the *application of power*. How to obtain the best results from correct application of power is often a problem that defies solution by the model builder, as it is quite involved. All that is necessary in order to know what will give good or bad results is to be familiar with the factors involved, and how they operate. Suppose we see what can be done to clear away some of this fog of misconception.

In a model plane, the rubber band transmits its torque to the propeller, the turning of which causes a thrust to be generated parallel to its axis. This thrust drives the model plane through the air. The proper amount of power to use in order to obtain the kind of flight you desire, depends upon the size and design of the propeller. Propellers of large diameter or high pitch require more powerful motors than ones of small diameter and low pitch. The area of the propeller blades also affects the delivery of power, as do other factors such as the size of the propeller relative to the area of the wings and weight of the model. Suppose a few examples are cited here in order that you form a clear conception of how these factors affect the use of power and its transformation into forward velocity.

The factor that makes it necessary to use power or energy to drive a plane through the air is its resistance to forward motion. The air particles strike against the structure of the plane when it moves through them; each particle, due to its weight or mass tends to retard the motion of the plane. Thus a constant force must be applied to the plane in order to overcome the particles' resistance. The larger and heavier a plane is and the faster it moves through the air (against the air particles), the greater is the resistance opposing the plane's forward motion. Thus more driving power is required than for smaller, lighter and slower ships. For any given design of plane, the forward driving power or thrust is directly proportional to the size of the airplane and to its weight; the size of the plane being established in respect to *area*, not by its lineal dimensions. One with twice the wing area as another of similar design would incur twice the resistance to forward motion if it flew at the same speed. A plane of twice the weight but of the same size as another would meet twice the resistance because it would have to fly faster to generate twice the lift on its wings. If we consider two planes of identical size and weight, and one flies twice as fast as the other, it will meet greater resistance due first to the greater number of air particles it bumps into per second and secondly, to the greater velocity with which it strikes these air particles. Thus it meets two times two, or four times the resistance. From this we see that the resistance is proportional to the square of the velocity, or V^2. It is directly proportional to the wing area A, on planes of similar design, and to the weight W.

When a plane is being driven through the air against a resistance, the driving force or thrust must be equal to the resistance in order to create a balanced system of forces. The propeller on an airplane creates this thrust. It drives the plane forward at a speed that generates enough resistance acting backward to exactly balance the thrust at this speed, acting forward.

It is apparent that the resistance increases with an increase of forward speed while it is also obvious to many model builders that the thrust becomes *less* as the forward speed increases, with the same amount of power being applied. This is a very important fact. Taking an example to illustrate this point, suppose we consider two airplanes both being driven by the same amount of power, but one traveling twice as fast as the other.

From the study of Physics we learn that power P equals the force overcome, times the velocity with which the power moves against the force, or P = FV.

It can be seen readily that if P = 1, and V = 1, in the case of one plane, that F = 1. Then in the other where the speed is twice as great, P = 1 and V = 2 or F = ½. The force in the case of these airplanes is the thrust delivered by the propeller. The power generated by the rubber motor and applied to the propeller, causing it to turn, is the same in both cases. However, in one case more of the power is absorbed by the greater speed, *leaving less to be transformed into force, or propeller thrust.*

Now we come to a very enlightening and interesting fact. From previous explanations it is known that resistance *increases* with increase of velocity. As already given, the resistance $R = KV^2$, where (K) is a numerical constant used to produce an answer in desired units, or to show proportion. In our example of the two planes with the same power but one traveling at twice the speed, the faster ship develops only *one-half* the thrust of the slower one. However, from the above formula for resistance R it is clear that the resistance to forward motion at twice the speed is *four* times as much. Thus we have a case of a plane traveling at twice the speed of another similar one and meeting four times the resistance, yet the propeller is developing only one-half the thrust of the *slower* plane. As the thrust must always be at least equal to the resistance at flying speed, it is obvious that the faster plane requires the application of more power in order to have the propeller develop sufficient thrust. Actually it will have to give *eight* times the thrust of a plane of one-half the speed. It can be expressed by formula as follows: P = FV, and R = KV^2, and as R = F, then P = $KV^2(V) = KV^3$. So we see a surprising fact; namely, that the power required to drive the plane increases as the *cube* of the velocity. Coupled with the fact that the lift on a wing increases only as the *square* of the velocity, or $L = KV^2$, (for wings of equal size and design) it is obvious that the faster an airplane flies, the more power must be used in proportion to the lift obtained.

This information forces us to a very important conclusion in model design, and that is, that *the slower an airplane*

(Continued on page 44)

REQUIRED NUMBER OF STRANDS 1/8" x 1/30" RUBBER.								
PROPELLER	WEIGHT OF PLANE IN OUNCES							
DIAMETER	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
6 INCHES	1.65	2.9	4.1	5.4	6.6	7.8	9.1	10.3
7 "	1.83	3.2	4.6	6.0	7.3	8.7	10.1	11.4
8 "	2.00	3.5	5.0	6.5	8.0	9.5	11.0	12.5
9 "	2.16	3.8	5.4	7.0	8.7	10.3	11.9	13.5
10 "	2.32	4.1	5.8	7.5	9.3	11.0	12.8	14.5
11 "	2.47	4.4	6.2	8.0	9.9	11.8	13.6	15.5
12 "	2.62	4.6	6.5	8.5	10.5	12.5	14.4	16.4
14 "	2.85	5.1	7.2	9.4	11.6	13.8	16.0	18.2
16	3.17	5.6	7.9	10.3	12.7	15.1	17.5	19.8
MULTIPLY TABLE VALUES BY (5) FOR 1/32" x 1/30" STRANDS REQUIRED								
" " " " (2.4) " 1/16" x 1/30" " "								
" " " " (1.5) " 3/32" x 1/30" " "								
" " " " (0.65)" 3/16" x 1/30" " "								

JUNIOR N.A.A. NEWS

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

Wakefield Cup Returns to America. Won for United States by Gordon Light

THE Wakefield Cup for International competition has been won again for the United States after being in England since 1932. Gordon S. Light, 20, Lebanon, Pennsylvania, has been declared the winner of the 1935 contest by the Society of Model Aeronautic Engineers, the body controlling model aeronautics in Great Britain.

Details of the contest are lacking at this writing. The following radio message from Mr. B. K. Johnson, S.M.A.E. Secretary, contains the welcome news: "AMERICA WINS WAKEFIELD CUP GORDON LIGHT WRITING."

The Wakefield Competition is held annually in the country that has the Cup in its possession. It was held this year at Fairey's Aerodrome, Hayes, Middlesex, England, on Monday, August 5. Only rubber powered cabin fuselage models of 200 square inches wing area are permitted to compete. The average time of three flights determines the winner.

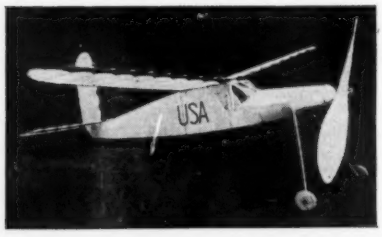
Each country is allowed to enter a team of six contestants and those who are not able to attend in person are provided proxy flyers by the contest management. The United States team was made up of only five members this year, the sixth member failing to ship his model in time for the contest. Gordon Light, Frank Zaic, Donald Mertens, Vernon Boehle and Ralph Kummer were the representatives of this country.

As prizes for winning, the Cup will be held in custody of the National Aeronautic Association for one year and Gordon Light will receive a silver medal and cash award amounting to somewhat more than ten dollars.

The Wakefield Cup was won for the United States in 1930 and 1931 by Joseph Ehrhardt of St. Louis, Missouri. The 1932 contest was held in Atlantic City, New Jersey, and was won by Gordon Light. However, due to the contest being held at a later date than prescribed by the international rules, the Cup was not awarded and was returned to England. It is, therefore, most fitting that Light should be the winner this year.

The Wakefield Competition is open only to entrants appointed by the model plane governing body that enjoys the official recognition of the Federation Aeronautique Internationale. In the United States this body is the Junior National Aeronautic Association. Another rule is that the contest must be held on an air port that is approved by the F.A.I.

The place and date for holding the 1936 Wakefield Competition has not been set. Announcement of this will be made in these columns as soon as possible. It is a practical certainty that Gordon Light will be defending his 1935 victory.



Gordon Light's Winning Wakefield Model

Gordon S. Light, 1935 Winner of International Wakefield Cup

N.A.A. Reception in Washington for National Champions

HIGH honor was paid to ten National Champions in Washington, D.C., July 19 and 20 when the National Aeronautic Association was host to that number of winners of their respective events in the National Championship Model Plane Meet held in St. Louis this summer.

The ten champions who received this recognition are Vernon Boehle, Carl Goldberg, Kenneth Ernst, John S. Stokes, Jr., Leo Weiss, Bronik Soroka, Richard Korda, Louis Casale, Bruno Marchi and Torrey L. Capo. George Gruen, Chief Pilot of Parks Air College, was also a member of the party, having flown the Parks Lockheed Vega from East St. Louis to Washington with four of the champions.

Arriving at the Washington Hoover Airport at 2 o'clock, the ten ranking champions were met by a reception committee of representatives from the various governmental aviation departments organized by the N.A.A. The trip to Washington was made by American, United, Eastern, and Pennsylvania Airlines, and by the Parks Air College plane.

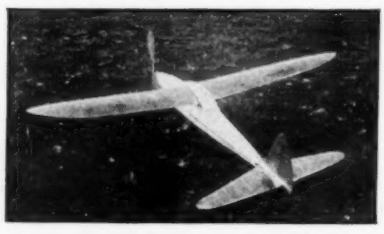
Immediately after landing they were taken to the Senate where they met Senator William G. McAdoo, President of the National Aeronautic Association. From the Capitol, they were taken to the Department of Commerce to meet officials of the Bureau of Air Commerce and were greeted by Director Eugene Vidal, Colonel Carroll Cone and Dr. Roy E. Whitehead. Next they were given a personally conducted tour through and talk on the Aircraft Exhibit at the Smithsonian Institution by Dr. Paul E. Garber who is in charge of this interesting exhibit. That evening they were entertained at the N.A.A. headquarters on Dupont Circle with a buffet supper. Government and N.A.A. officials were given the opportunity to inspect the champions' models and movies were shown after supper.

The second day's program included a visit to the White House, receptions by War and Navy aviation officials and inspection trips to Bolling Field and the Anacostia Naval Air Station. The party enjoyed an excellent lunch in the Officers' Club at Bolling Field. Later in the afternoon they were shown many of the city's points of interest, after which they spoke over the radio and expressed their appreciation of Washington hospitality.

The final event on the program was an official N.A.A. dinner at the Mayflower Hotel, presided over by Mr. Charles F. Horner, N.A.A. Executive Assistant. The boys all expressed their appreciation for all that the N.A.A. had done for them and agreed that the reception was one of the most enjoyable occasions of their lives.

Helping the N.A.A. make the reception such a success, there were besides the airlines and government departments several sponsors who aided in getting the winners to Washington. Casale was assisted by the Syracuse Exchange Club; Boehle and Ernst by the Indianapolis Times; Capo and Marchi by Jordan Marsh Company; and Weiss by the Bamberger Aero Club.

The party was conducted through Washington in a police escorted motorcade under the direction of Clifford T. Kettler representing the Washington Board of Trade. Mrs. Inez Macdonald of the N.A.A. staff was in direct charge of keeping the party to its arranged schedule and there was nothing but praise for her efficiency. The boys were especially appreciative of these two capable escorts.



Frank Zaic's Beautiful Wakefield Entry

Donald Mertens, Erie, Pennsylvania, with his Interesting Wakefield Model. Note the Four-bladed Propeller.

New Model Plane Council N.A.A. Chapter

AT St. Louis during the National Championship Meet in June a plan was worked out for the formation of a new N.A.A. chapter composed of leaders in the model airplane field. There is no age limit and both model flyers and non-flyers are included in the chapter's membership. However, only non-flyers who are definitely and actively interested in model aviation were included.

The purpose of the organization is to advance model aeronautics as a science and a sport and to aid constructive activities employing model aircraft as one means toward general aeronautic education. This program is to be carried out by the organizing council of about thirty-five who will form the charter group.

It has been felt for some time that model activities should be more closely knit into the N.A.A. structure and this chapter gives this result. The members will be regular N.A.A. members with voting rights for N.A.A. elections and conventions. Thus model aeronautics becomes a direct part of the larger N.A.A. itself and more securely associated with the parent organization. The leaders in the model field, some of whom had never affiliated with the N.A.A., all become united in one advisory body, having a firm official standing.

Around this council chapter is to be built up a Model Builders Institute similar to the Institute of Aeronautical Sciences. All Junior N.A.A. members will be affiliated with this Model Builders Institute as soon as their model plane performance justifies it. The requirements for this particular type of membership will be established shortly and those who are qualified will be given an opportunity to join the advanced group. In this way, all of the most proficient serious builders and flyers will be bound into one large self-governing group.

Special distinction will be given to outstanding contributions in the advancement of model aviation by election to Fellowship in the Institute. Anyone who has done some particularly noteworthy work or made some especially valuable development in the science will be considered for this very limited honor each year. A committee will be appointed by the N.A.A. to recommend such selection for Fellowship. This will be the highest honor attainable in the field of model aeronautical science.

One of the results of the formation of this new chapter and its affiliated Institute is the elevation, officially, of the science of model aviation to its proper station of importance. It will focus deserved attention on the valuable work that is being accomplished by the model builders and flyers. It will mean that the members of the Institute will be regarded as the recognized leaders in their selected field.

Among the charter group are: Colonel Harry Blee, William R. Enyart, H. M. Jellison, Captain Willis C. Brown, Ernest A. Walen, Carl Goldberg, Gordon S. Light, Charles Tlush, H. W. Alden, Guy Scott, Mrs. W. W. Milar, Miss Frances Alexander, C. E. Carmichael, H. T. Sommers, John S. Stokes, Jr., Percy Pierce, Nathan Polk, Frank Zaic, John Young, Charles H. Grant, Bruno Marchi, Ralph Kummer, Dick Courtial, Jesse Bieberman, Bill Brown, H. Weir Cook, Robert K. Allen, and Bert Pond.

It is considered that with such an excellent group as that listed in direct charge of the N.A.A. model work, much real good will be accomplished and that model aviation will remain on its definite upward trend.

News from N.A.A. Juniors Here and There

THE Philadelphia Model Aeroplane Association completed its annual program with its indoor championship meet and the customary high order of indoor competition was maintained. As usual with Philadelphia indoor flying, some new records were established.

William Latour, 21, made a new open class record with his R.O.W. Stick Model, Class B, when it flew for the excellent time of 13 minutes 15 seconds. Mayhew Webster, 18, did 16 minutes 33 seconds with his Class B Stick Model. R.O.G. John Haw, 19, made a new record with his R.O.G. Cabin Fuselage Model by flying it for the good time of 14 minutes 35.4 seconds. Haw's model was in Class C. His record was later beaten by Torrey Capo at St. Louis.

The Philadelphia flyers are starting their new season and many more records are anticipated in their indoor contests. They also promise definitely to produce some outdoor records whenever the weather is favorable on one of their outdoor contest days.

BOSTON'S Junior N.A.A. Chapter, the Jordan Marsh Junior Aviation League, has done some extensive and praiseworthy work this past year. Captain Willis C. Brown, the club's director, was persuaded by the store to remain in Boston and carry on the fine work that he has been doing there. He had recently planned to move to Virginia but it is Boston's gain that he changed his plans.

The final year's standing in points for the first six Boston members, is: Phillips 14916,

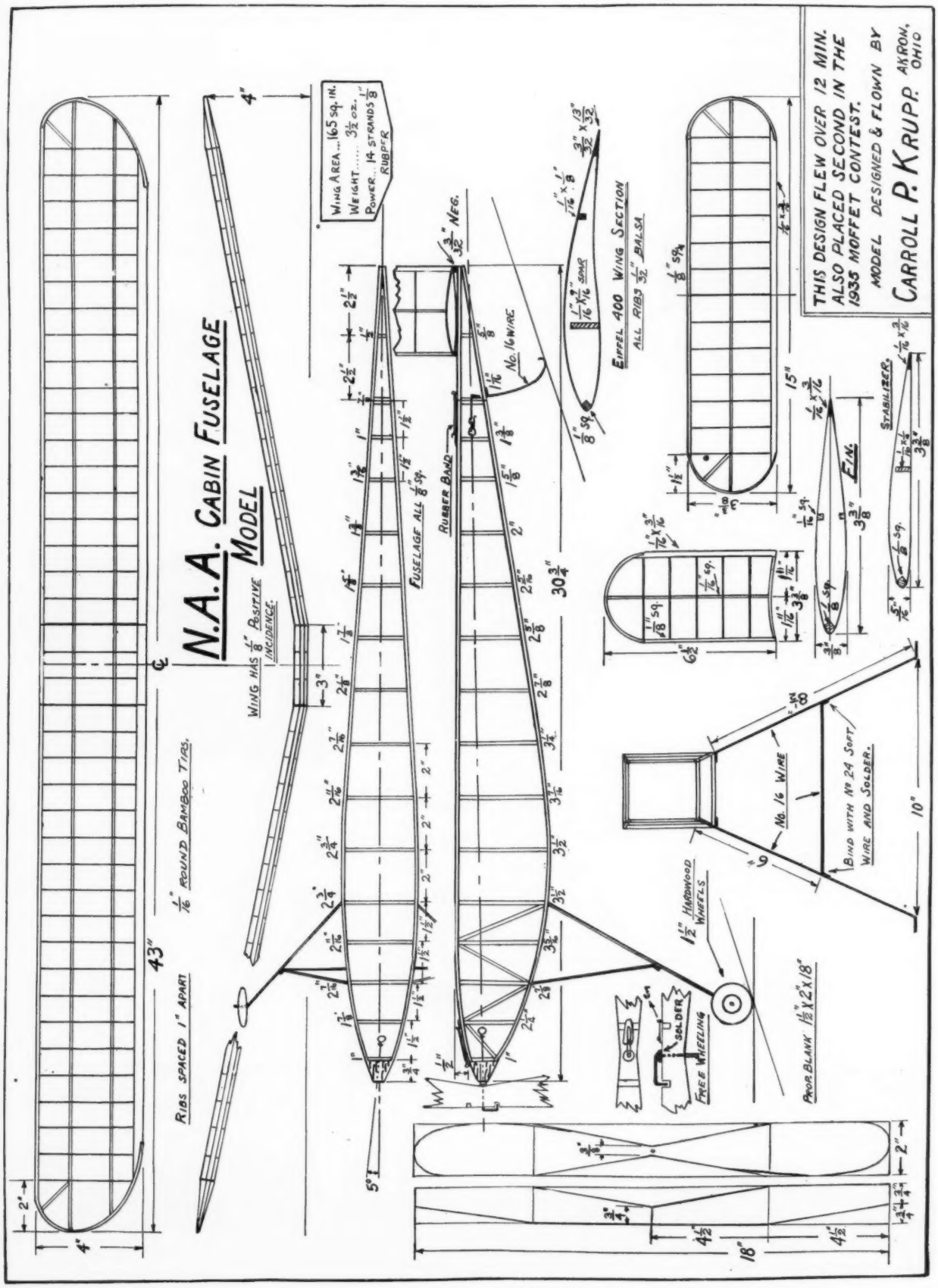
Mrs. Inez Macdonald and Clifford Kettler, N.A.A. Washington Escorts

Capo 12024, Marchi 11690, Tyler 6686, Shea 6501, and Fleming 5343. This point system is based on performance during the year in all of the J.A.L. scheduled contests. Regular attendance and constant effort are the most important factors.

John P. Glass, the Boston club's able designer and counsellor, has left that city to accept a position in the New York metropolitan district. Mr. Glass has given a world of advice to the Boston model flyers during the past several years. His influence will be missed.

The J.A.L. outdoor contest of July 6 was a great success and resulted as follows: Glider, tow launched, class B; Robert Shea, 3 minutes 09 seconds. Glider, hand launched, class B; Torrey Capo, 55 seconds. Stick Model, hand launched, class C; Torrey Capo, 2 minutes 47 seconds. Cabin Fuselage Model, R.O.G., class C; Frank Barrett, 1 minute 27 seconds.

REDLANDS, California, recently had an outdoor model plane meet under the direction of Edward Swan, Jr. The awards were silver cups and trophies. The meet was held under N.A.A. sanction and, while not productive of any new records, it was


N.A.A. CABIN FUSELAGE MODEL
WING HAS 1/8" POSITIVE INCIDENCE.
1/16" ROUND BAMBOO TIES.
RIBS SPACED 1" APART
43"
WING AREA...165 SQ. IN.
WEIGHT..... 3½ OZ.
POWER... 14 STRANDS 1/8" RUBBER
RUBBER BAND
FUSELAGE ALL 1/8" SQ.
No. 16 WIRE
EIFFEL 400 WING SECTION
ALL RIBS 1/32" BALSA
1/16" X 1/8" SPAR
1/8" SQ.
FIN.
STABILIZER.
THIS DESIGN FLEW OVER 12 MIN. ALSO PLACED SECOND IN THE 1935 MOFFET CONTEST.
MODEL DESIGNED & FLOWN BY
CARROLL P. KRUPP AKRON, OHIO
No. 16 WIRE
BIND WITH No 24 SOFT WIRE AND SOLDER.
1½" HARDWOOD WHEELS
SOLDER
FREE WHEELING
PROP BLANK 1½" X 2" X 18"

greatly enjoyed by the contestants and spectators.

The results: Stick Model, class B, (1) Don Donahue, Glendale, 2 minutes; (2) Melvin DeFrese, Redlands, 52 seconds. Stick Model, class C, (1) Don Donahue, 1 minute 47.4 seconds; (2) Vernon Perkinson, Los Angeles, 42.2 seconds. Cabin Fuselage Model, class C, (1) Don Donahue, 2 minutes 00.5 seconds, (2) Garner Summers, San Bernardino, 1 minute 55 seconds. Scale Model Contest (1) Ralph Guernsey, Bakersfield, Boeing P26A; (2) E. Swan, Redlands, Stinson Reliant.

Recipients of N.A.A. Washington Reception. Left to Right, Korda, Soroka, Casale, Weiss, Capo, Stokes, Marchi, Ernst, Goldberg and Boehle

A similar meet is scheduled for September 8 in San Bernardino. It will be interesting to see whether Don Donahue will be there and also to see whether he will take as many first places as he did at Red lands.

THE Seventh Annual Connecticut State Model Airplane Meet, held in Hartford at Rentschler Field and sanctioned by the N.A.A. produced one new record. This was made by Michael L. Vetrano, South Manchester, an open age class contestant. His hand launched Stick Model, class D, flew for 2 minutes 55 seconds.

These Connecticut State meets are always well attended and the quality of competition is always of such high order that it requires real ability to win. The officials at the Hartford meet were H. Lewis MacClain, W. H. Thompson, Paul S. Schmidt, and Frank W. Schade.

INDIANAPOLIS Junior N.A.A. Chapter is very active this summer. Four of its members were awarded trips to Cleveland to compete in the Scripps Howard Junior Air Races. These four are Jim Cahill, Vernon Boehle, John Foster, and Robert Cahill. The selection was made on the showing of the members in their two outdoor elimination trials.

The American Legion Annual Meet is attracting a good number of the Indianapolis Junior N.A.A. members. This meet is always held in Indianapolis under the supervision of the Legion Headquarters. Usually, one of the local boys proves to be high point scorer.

The results of the second elimination contest are: Stick Model, hand launched, Jim Cahill, 6:10; Bob Cahill, 4:50; Vernon Boehle, 4:10; John Freeman, 2:17. Cabin Fuselage, R.O.G., John Foster, 3:49; John Freeman, 3:06; Vernon Boehle, 3:04; Bob Cahill, 2:43.

In the first elimination contest, John Foster won the cabin fuselage event with a flight of 7 minutes 53 seconds for a new class C record.

OFFICIAL MODEL AIRPLANE RECORDS

Approved by Contest Board of the N.A.A.
Through July 30, 1935
OTHERS PENDING

INDOORS

STICK MODEL AIRPLANES, Hand-launched

CLASS B

Junior: Roy Carlson	Springfield, Mass.	16m 45.6s
Senior: Ralph Kummer	St. Louis, Mo.	17m 49.8s
Open: William Latour	Philadelphia, Pa.	15m 17.8s

CLASS C

Junior: John S. Stokes, Jr.	Huntingdon Valley, Pa.	20m 53s
Senior: Herbert Greenberg	Newark, N. J.	22m 11s
Open: Carl Goldberg	Chicago, Illinois	23m 29.3s

STICK MODEL AIRPLANES, R.O.G.

CLASS A

Junior: Joseph Pruss	Philadelphia, Pa.	10m 25s
Senior: Merrell Malley	Atlantic City, N. J.	10m 56.4s
Open: William Latour	Philadelphia, Pa.	9m 50s

CLASS B

Junior: Bruce Mackler	Atlantic City, N. J.	10m 22s
Senior: Mayhew Webster	Philadelphia, Pa.	16m 33s
Open: William Latour	Philadelphia, Pa.	14m 02.8s

STICK MODEL AIRPLANES, R.O.W.

CLASS A

Junior: William Wert	Philadelphia, Pa.	3m 46s
Senior: Paul Karnow	Philadelphia, Pa.	5m 01.4s

CLASS B

Junior: James Mooney	Philadelphia, Pa.	8m 37.6s
Senior: Mayhew Webster	Philadelphia, Pa.	11m 55s
Open: William Latour	Philadelphia, Pa.	13m 15s

GLIDERS, Hand-launched

CLASS A

Junior: Kenneth Nelson	Boston, Mass.	26.6s
Senior: David B. Hecht	New York City	34.4s

CLASS B

Junior: Louis Young	Boston, Mass.	27s
Senior: David B. Hecht	New York City	31.6s

CLASS C

Junior: Stanley Congdon	Glen Ridge, N. J.	17s

AUTOGIROS

Junior: Raymond Steinbacher	Ridgefield, N. J.	57.2s
Senior: Alton H. DuFlon, Jr.	Ridgefield, N. J.	2m 01.2s

FUSELAGE MODELS, R.O.G.

CLASS B

Junior: Robert Jacobson	Philadelphia, Pa.	10m 44s
Senior: Herbert Greenberg	Newark, N. J.	12m 23.5s
Open: William Latour	Philadelphia, Pa.	6m 48s

CLASS C

Junior: John S. Stokes, Jr.	Huntingdon Valley, Pa.	15m 05.6s
Senior: Torrey Capo	Quincy, Mass.	15m 33s
Open: William Latour	Philadelphia, Pa.	12m 31.8s

FUSELAGE MODELS, R.O.W.

CLASS B

Junior: John Stokes	Huntingdon Valley, Pa.	3m 23s
Senior: Bruno Marchi	Boston, Mass.	3m 11s
Open: William Latour	Philadelphia, Pa.	5m 42s

OUTDOORS

STICK MODEL AIRPLANES, Hand-launched

CLASS C

Junior: Jack Haggerty	Reading, Pa.	18m 58s
Senior: Vernon Boehle	Indianapolis, Ind.	15m 00s
Open: Bernard Collins	Providence, R. I.	3m 23s

CLASS D

Junior: Fred Skafec	Akron, Ohio	8m 21.6s
Senior: Ralph Kummer	St. Louis, Mo.	20m 54s
Open: Michael L. Vetrano	South Manchester, Conn.	2m 55s

GLIDERS, Tow-launched

CLASS C

Senior: Bob File	Columbus, Ohio	23m 13s

CLASS D

Junior: Stanley Congdon	Glen Ridge, N. J.	45.2s
Senior: Fred Korn	New York City	1m 16.2s

AUTOGIROS

Senior: Ralph Kummer	St. Louis, Mo.	2m 06s

FUSELAGE MODELS, R.O.G.

CLASS C

Junior: John Foster	Indianapolis, Ind.	7m 53s
Senior: Robert Cahill	Indianapolis, Ind.	33m 00s
Open: Bernard Collins	Providence, R. I.	2m 56s

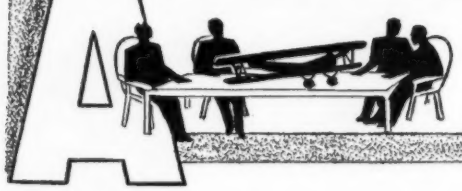
CLASS D

Junior: Alan Starr	Atlantic City, N. J.	5m 41s
Senior: William Ying	Staten Island, N. Y.	41m 19s
Open: Michael Lichstein	Philadelphia, Pa.	1m 28s

CLASS E (Gasoline Engine)

Senior: Joseph Kovel	Brooklyn, N. Y.	64m 40s
Open: Alphonse Bellantonio	Brooklyn, N. Y.	18m 50s

Aviation Advisory Board



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

THE greatest problem which faces a young man today is making a living. From the time he is born until he actually dies, he is preparing himself and improving his qualities to fulfill this end. We have received many questions from young men asking what they should do to help them get into aviation or in general, be successful in business.

John Sokol of 2020 Kenneth Avenue, Arnold, Pa., is particularly anxious to know what he should do. He says that he is a young man with no vices, but a limited education, having graduated from grammar school but not having taken up any high school work. In order that young men will have a little clearer conception of how to prepare themselves, possibly it would be well to analyze the problem they have to meet.

People have been prone to think that knowledge can only be obtained in school. The function of school is to provide the individual with the intellectual tools which he is to use later on. In school the individual memorizes certain fundamental facts. Occasionally, in exceptional schools he is taught to think. Possibly this lack of teaching students to analyze and think, on the part of the schools, is their greatest fault. The longer one goes to school, the more mental implements he has with which he can work. The whole situation might be likened to a carpenter. The hardware store is the school; it supplies the carpenter with tools. After the carpenter buys these tools, he has to learn to use them. In other words, when young men are graduated from scholastic institutions they have their equipment, after which it is necessary to gain experience in the career they wish to take up in order to learn how to use these tools successfully.

However one does not have to go to school to "buy" his intellectual tools, he can study by himself, if he has the understanding and knowledge to guide his course of study intelligently. Mr. Sokol, we might say, has a limited set of tools with which to work. It is possible for him to "buy" more by going to night school or merely by getting a job and working industriously, studying on the side to supplement his work. The main requisite in order to accomplish such a feat is to have ambition and determination. Most people fail because they are knocked down at the first blow. In other words, "they can't take it."

If the desire of Mr. Sokol's to get into aviation is strong enough he will not leave a leaf unturned in order to accomplish this end. We recommend that he take up the study of mathematics and science, as these things are very useful in any form of mechanical or engineering work. They also teach him the laws by means of which the universe and the world in particular operate. It will give him an understanding of life. If it is possible for him to go to night school we certainly recommend this. Probably the best form of education is one which enables the student to study while working. In this way his practical experience from his work helps him to grasp the theories presented in his studies. In fact, each phase of learning helps the other.

Now we have some questions of a more technical nature from Joseph Otter of 21751 Wilmore Avenue, Euclid, Ohio. He wants to know:

Question: What type of airfoil should be used and what should the angle of climb be on a stunt model?

Answer: No particular type of airfoil is necessary. An ordinary single surface slightly cambered wing is excellent, or some thin double surface wing. We should not advise a thick camber airfoil.

Question: Would a high-wing monoplane be the most efficient type of plane for this kind of flying?

Answer: No, the best type of plane is that type which has its wing approximately at the line of thrust; in other words, a mid-wing. The high-wing is too stable and its stability will resist any tendency to fly from the normal path. For a good stunt model we advise plenty of power and clipped wings. A narrow wing span helps the model to roll and turn quickly.

Question: Where could I obtain accurate scale plans of a military type airplane?

Answer: This question is quite opportune, inasmuch as the answer to this puzzles many boys. It is very difficult to get this type of plan for details of military planes are usually kept secret for obvious reasons. Consequently the manufacturer, who is the usual source for accurate drawings, cannot be appealed to with the hope of success. Plans of this nature must be passed down, one might say, through underground channels by those who have access to such planes or who are able to take the actual measurements of the ship itself. The danger of this is that important information may drift into the hands of the agents of some foreign government or other persons who wish to use it against the interest of this country.

From time to time MODEL AIRPLANE NEWS publishes detailed plans of military type planes. We suggest that the young men follow the magazine closely and take from its pages information of this nature which they may wish. Plans which are presented in the magazine are usually of ships of which the details are fairly well known and not kept secret. We suggest that the young men write to the manufacturers themselves if they wish accurate scale plans

(Continued on page 48)

Here is the Canadian Fairchild "Super 71." The design is very unique and is such that it may be changed readily to a landplane or seaplane. There are thousands of lakes in Canada, so seaplanes are used extensively. The body is composed of a series of aluminum alloy rings covered with metal. The wings are wood and fabric. It has a speed of 175 m.p.h. at 7,000 ft. with 600 hp.

Build a Wing Flapper that Flies

(Continued from page 7)

wing flapper to fly perfectly. You may have to build two or three of them before you get a real nice flying model.

2.—If your model does not fly on the designated power, do not try to add more, try to lighten your model instead. (Mine flew on two strands of 5/32" brown rubber.)

3.—Paper on the wing should be changed about every 500 or 600 flights, as the paper becomes too loose.

4.—Best flights are obtained by having a slight negative angle of incidence and the proper weight in the nose.

5.—It is not advisable to build a larger size than the one shown in the plans.

6.—Don't by any means think that by scaling this wing flapper smaller or larger it will go better because it will not. (I have already tried it.)

7.—It will take time to get used to flying the wing flapper. It can be easily launched with one hand.

Well, there you are! Now let's see you build and fly some scale model pigeons.

Now It's Gas Models

(Continued from page 10)

type of model causes other disasters, as the motor vibration may be underrated. Planes of the fixed wing type depend on shifting of the batteries for balance, and these batteries must likewise be securely fastened in their final position.

Badly designed landing gears drew their toll, as the gear must withstand not only normal landing shocks but also those of "pancaking" and the familiar one-wheel "hot" landings. It is significant that the landing gear of the KG-2 has been designed with infinite care.

Trouble-shooting becomes an exacting job where miniature gas engines are concerned. Weak batteries, a plugged vent in the gas tank cap, or a microscopic leak in the feed-line joints can cause the contestant many feverish minutes of delay. Motor vibration may change the adjustment of the mixing valve where no lock or other provision for keeping it tight is employed, causing the motor to "conk" and terminate the flight abruptly. A worn or loose timing device may succumb to motor vibration with similar results. Tapered or out-of-round pistons with their resultant loss of compression usually become a problem for the chosen manufacturer.

The construction of gas-powered model planes is not only the logical forward step for successful builders of rubber-powered types, but it has attracted large numbers of men engaged in other fields who dislike the rubber string idea. The builder who contemplates a "gas-job" will do well to study the aerodynamics involved thoroughly, and consider carefully the many-sided structural phases of design. He will be dealing with five to seven pounds of extremely active and temperamental machinery, representing an investment of several times as many dollars. He will treat himself to participation in the finest and most scientific of sports, and will say along with the rest, "It gets in the blood!"

Build the U.S. Army A-12 Attack Glider

(Continued from page 21)

their respective positions as shown by the dotted lines on the outer edges of the wing plan. Place a weight over the wing to hold it in that position until the wing dries thoroughly. After that, crack the wing slightly to obtain the dihedral angle, which measurement is taken direct from the plan.

The fuselage is simple. With a razor blade cut out the slot for the elevator, place the elevator in it and apply cement. Cement the rudder upright. It is best to paint the red, white, and blue stripes on the rudder first before cementing it to the fuselage. Attach the tail wheel H. Cut out the fillet piece, cement the wing in position and replace the fillet piece again. Check for the dihedral angle here. With a long thin needle, make holes for the landing and flying wires in the wings and the sides of the fuselage and bottom of the wheel pants. The positions for the holes are shown by white dots. Attach the wheel pants E in position as shown and check for tread measurements. Next cement the wing brace struts J in place.

For the nose weight, use a piece of heavy silver wrapping or lead foil. This piece is cemented in front of the cowling shown by P. After a gliding test, indoors and out, you will be able to determine the maximum weight to leave on permanently. Paint the model first and add the weight later. This piece can be touched up then. The wire launching hook G is cemented underneath the fuselage. This is shaped from a small piece of music wire. It comes into use only when the model is to be launched by slingshot. The propeller is used for show purposes only and should not be mounted to the cowling when the model is launched by slingshot.

The "Shrike" is painted in regulation Army colors, which follow:

The wings (top and underside), elevators, and vertical fin are chrome yellow. The fuselage, wheel pants, wing brace, struts, and tail wheel are olive drab. Tires are black. The cowl is white separated from the fuselage color by a thin black line. The windows of the sliding hatch are white (or silver if you prefer). The radio mast, which is made of a piece of 1/16" flat, 1/16" wide tapering toward the top and ¾" high, is mounted just in back of the pilot's cockpit. (See photograph.) The mast is painted olive drab also. Underneath the wings, as the ship flies overhead, U.S., in bold black block lettering is painted on the left-hand side. The word ARMY is on the right-hand side. At the outer ends of the wings are the regulation stars which are the same size as that shown on the top of the wing in the drawing. The number 7 is painted in black on the vertical fin on both sides. Any number besides 7 up to 50 may be used if you prefer.

On both sides of the fuselage at an angle is a red band lined with a thin stripe of white on each side, as shown in the photograph. The prop is aluminum with red, white, and blue tips.

WHAT THE IDEAL NAME MEANS TO MODEL BUILDERS

FAMOUS SUPER-DETAIL MODEL SHIPS!

Build the NEW Super-Detail Model Italian Liner, REX

29"—scale 1/32" to the foot. Patented Hull Design Shaped hull and over 100 metal fittings. 24 cast metal lifeboats; 24 cast stairways; 2 cast anchors; 4 metal propellers; 6 cast bits; 48 metal davits. The Rex comes in beautiful high luster original colors of black, orange, white, red and green; and the kit also contains turned wood parts, printed wood, cement, wood filler, sand-paper, etc. **postpaid** **$6.00**

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Full size plan—scale 1/32"—sheet 34" x 44"—full instructions—7 photos—25 detail views. Everything included complete, **only 25c postpaid.** Regular value $1.00.

NORMANDIE

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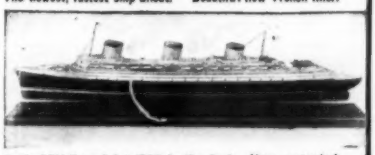

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NORMANDIE PLAN

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The IDEAL knife for building models—Tru-Cut Nife. Send for this new, keen, patented, razor-edged knife. Securely fastened to a long holder it can follow intricate curves; cuts balsa like butter! Excellent for every cutting purpose. **15c postpaid. Extra blades 3 for 10c.**

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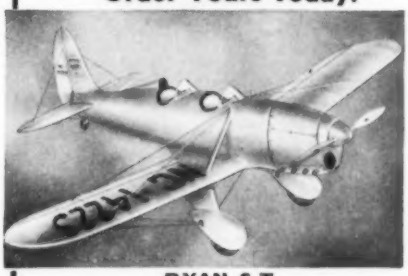

RYAN S T

Wingspan 22½", length 16½", weight 2½ oz., scale ¾". New fast Ryan has dual control systems which operates in either cockpit; adjustable wing flaps; plans for making an actual working engine—4 cylinders with movable pistons, carburetor and spark plugs.
Complete kit **$1.50**

BOEING P-26A

Wingspan 21¼", length 18", weight 2½ oz. Exact ¾" scale. This flying model is an exact replica of the famous fighter—one that is identical in all but size with its noteworthy big brother. Beautifully colored in olive drab and yellow. All Super-Detail parts included. Kit complete, postpaid **$1.75**

CURTISS GOSHAWK

Wingspan 23⅜", length 16¾", weight 3⅜ oz., exact ¾" scale. Coated with new IDEAL high lustre finish, with silver, yellow, red and black coloring. Kit complete, postpaid **$2.00**

STINSON RELIANT

Wingspan 32 5/16", length 21¼", weight 3½ oz., exact ¾" scale. Adjustable speed arresters built into the wings, movable cabin doors, complete interior with four seats and control column, and all the other Super-Detail features. Colored in bright contrasting yellow and black. Kit complete, postpaid **$2.50**

MARTIN BOMBER

Wingspan 35", length 22½", weight 4⅝ oz. Exact scale. Retractable landing gear, rotating gun turret, movable machine guns, special streamline cowlings, two types of 3 bladed propellers—one for flying and one for exhibition with removable motor sticks for flying; rudder and elevator balanced surfaces; new type freese ailerons. Kit complete, postpaid **$3.50**

On the Frontiers of Aviation

(Continued from page 19)

have produced a new cabin job known as the Hornet Moth. It is a biplane and is much the same in design as the popular Puss Moths. The new ship will take the place of the open-biplane Moth that has seen so much service for the past many years and which will no longer be manufactured by the De Havilland Company.

The new Brown sport B3 described in preceding articles of this series is about ready to be turned over to its purchaser, a Los Angeles sportsman pilot. The plane sells for $8,000.

According to N. A. A. "Skylights," Lee Miles will have a new Brown racer at the National Air Races this year.

The weather man was not very hospitable to the contestants that participated in the Annual Soaring Contest at Elmira. Fortunately the only day that I attended the meet the weather was excellent, and I had a good chance to watch the many ships perform. Many new gliders made their appearance. Mrs. Du Pont took up the new Bowlus-du Pont utility glider for an hour's flight. It performed wonderfully and seemed to soar much better than the popular Cadet and Franklin gliders which were very numerous at the meet. The ship was a little larger than the Franklins and greatly resembled the old Bowlus sailplanes. The fuselage was painted red and the large tapered wing was black. On the next to the last day of the meet Mrs. duPont took the same ship up to a record height of 3,600 feet and set an official world endurance record for women of 5 hours and 31 minutes. Other du Pont ships on hand were a black and silver Franklin utility and the famous Bowlus-du Pont "Albatross" sailplane.

Jack O'Meara's "Chanute" was the only other sailplane to compete against the "Albatross." Both of these ships are built up of wood veneer and are examples of the great height of perfection that has been obtained in the design and construction of sailplanes.

Students of Lawrence University had a new gull-wing utility of excellent design. It had very good flying qualities.

The Franklin Glider Corp., of Ypsilanti, Mich., displayed a new utility glider with a unique control for operating ailerons and elevators. It was a bar that projected out the right hand side of pilot seat, waist high, with a rubber handle. This handle operated in the same directions as a control stick. The advantage of such a control is the elimination of obstacles in the front of the pilot. All controls are of tubing except the rudder. A new novel cockpit cover was incorporrated into the design also.

The ship of most interest was the four-place Gross glider. It was a very successful flier and resembled a huge heavy transport when it was in the air. With one person in the ship it flew almost as well as the high-performance Franklins. The four passengers sat in rows of two under the 50 foot wing. The nose resembled a Buck Rogers rocket ship with its many small windows to let light in on the dashboard. The large cabin was fully enclosed. The paint job was red and silver.

In Italy aeronautical engineers have designed a new plane known as the Piaggio 16 and greatly resembles a flying fish. It is a landplane but has strong, airtight wings for landing in water in case of emergency. It is intended for South Atlantic service. A high speed of 250 m.p.h and a cruising range of 7,000 miles is dreamed of with three engines!

Slightly different are some of the Douglas DC-2c for K.L.M. They are powered by Pratt & Whitney Hornets instead of Wrights. Newly designed engine cowls have been installed and windshields slightly revamped.

The latest product of the Curtis Aeroplane and Motor Company is another new pursuit! It is a single-place low-wing monoplane with retractable landing gear. Construction is all-metal. The cockpit, which is well forward, is glass enclosed. Bomb compartments are located inside the tapered wing! Power is supplied by a twin row Wright Whirlwind. An estimated speed of 280 m.p.h. is expected to be obtained. In recent tests the ship, known as the Curtis "75," did 262 m.p.h.

The reorganized Bellanca Company has a great many proposed planes in mind, most of them being new military creations. Mr. Temple N. Joyce who helped produce Berliner-Joyce planes is now president of the company with Mr. Bellanca acting as chairman of the board.

The Royal Air Force Display in England brought forth many startling military planes this year. Because of lack of space in this article, description of the various planes will be included in next month's issue.

Several airlines are now purchasing fast new Stinson tri-engined low-wing transports. Central Airlines has placed an order for five of them.

How to Build a Solid Wood Scale Model of the Hammond Model Y

The Hammond Model Y is a two-place side-by-side pusher monoplane powered by a Menasco B-4 engine of 95 hp. Fuselage is of all-metal construction and provides room for 40 pounds of baggage and two parachutes. Visibility is extra-ordinarily good. Wind noises have been diminished around the fuselage because of the shape of the nose. The ship has almost foolproof flying qualities. Landing speed is about 35 m.p.h. and high speed is over 110 m.p.h. Mileage is about 20 miles to the gallon.

Get dimensions from full size plans for purchasing stock. It is best to use balsa wood for making the model. Three wheels, a razor blade, coarse and fine sandpaper, a jig saw, sharp chisel, ambroid, paint bushes, dope, thread and a cople of straight pins are all that is necessary to construct the model.

If you wish to square off the plans, connect up the corresponding dots on the border with straight and neat pencil lines. Each square will equal one square foot.

Construct fuselage first. Draw side elevation and cut with jig-saw. Smooth down surfaces with coarse sandpaper. Draw top elevation and cut again. Round off edges with razor blade as shown by the two cross-sections. Sandpaper the entire fuselage with coarse and then fine sandpaper.

Make wing halves next. Cut out the

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CONTENTS: Each of these new G.H.Q. Giant 5 ft. Model Planes contains full-size Plans, all ribs, formers and curved parts clearly printed on best grade Balsa. Large bottles Cement and Dope, different colors Japanese Tissue, Special Endurance Rubber, finished Ready-Cut 3" Wheels, Wire, Balsa strips cut to size, Washers, and . . . Movable Controls, shock-proof Landing Gear, Scale Details, Lettering, Numbering and Insignias, Flight Log, etc.

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Dear Sir:

The last time I ordered a kit, I was very much pleased with it. It takes off like a real plane and lands like one. They are the most complete kits I have ever seen. Anybody who buys one of these don't have to think they are buying a cat in the bag, because they fly like birds and you don't hardly need any work to construct them.

Yours truly,

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Lemont, Illinois.

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Dear Sir:—

Enclosed please find a money order for $1.35 for which please send me your 5 ft. Monocoupe. I have built your five foot Stinson Reliant and it turned out all right. I got flights of 900 feet from it. I want to build this monocoupe and see what kind of flights I get from it. Please send the Monocoupe as soon as possible, because I am anxious to get started on it.

Sincerely yours,
ROBERT TRUAX,
R. D. 1, Wellsville, Ohio.

36" FLYING SCALE MODELS 50c

plus 20c packing, postage, insurance

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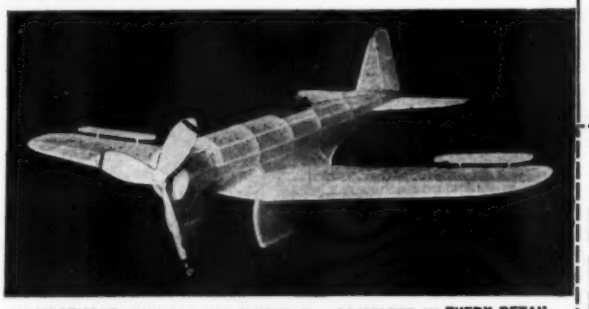

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Army Falcon
Sopwith Camel
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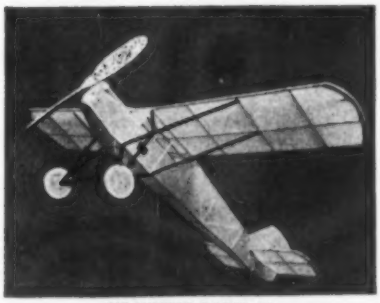
SE5
Aeromarine
Army Hawk Monocoupe
Fairchild "22"
Aeronca
Fokker D-8
Nieuport
Douglas Mailplane
Stinson "R"
Curtiss JN4
Bellanca



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- ☐ Dewoitine D 33
- ☐ U.S. Army Martin Bomber
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24" FLYING KITS

- ☐ Curtiss JN4
- ☐ Bellanca
- ☐ Nieuport
- ☐ Douglas Mailplane
- ☐ Stinson "R"
- ☐ Puss Moth
- ☐ Fokker D-7
- ☐ Fokker D-8
- ☐ Polish Fighter
- ☐ Monocoupe
- ☐ Falcon
- ☐ Aeromarine
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- ☐ Aeronca
- ☐ Fairchild
- ☐ Army Hawk
- ☐ Curtiss Robin

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- ☐ Monocoupe
- ☐ Stinson Reliant
- ☐ Heath Parasol

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outline with jig-saw and then shape out the taper with sharp, small chisel. Still using the chisel, finish off the wing as shown by airfoil sections. Sandpaper the wing halves to smoothness and then make the tail surfaces.

These may be cut from sheet balsa with a razor blade and smoothed down with sandpaper.

The booms are rectangular in cross-section and are round at the leading edge. These may easily be cut into shape with a chisel and razor blade. Take much care in cutting notch in front end for wing sections. Sandpaper thoroughly. Chisel out a hollow space for housing a wheel in each boom.

Cut out the streamlined pant for covering front wheel with your razor blade and sandpaper it.

Make one propeller and all wing and tail struts.

Go over all parts of the model once more with fine sandpaper and then brush off all dust, making the parts ready for painting. Colors are optional. Allow the first coat to dry thoroughly before applying a second. Many coats will have to be applied before a smooth finish is obtained. Lay parts aside to dry.

Next begin the assembly of the model. Lay the fuselage on a level surface with blocks underneath to keep it upright. Join the two wing halves to the sides of the fuselage, applying plenty of ambroid. Lay blocks under wing tips to give the wing the correct dihedral, then join the four wing struts in place.

Join the two booms to the wing and when connections have dried, ambroid the stabilizer-elevator piece to the other end of the booms. Join the rudder securely in place and connect all tail struts. Insert a small piece of wire under the fin to act as an emergency tail skid (see plans).

Put on entire landing gear next. Wheels may be connected to pant and booms by using a straight pin as axle. Join the prop in place with a straight pin and then put on airspeed indicator made from scrap wood with your razor blade. Connect thread to tail booms as shown on plans with ambroid. Touch up all connections with ambroid and dope and the model will be completed.

A Midget Motor Ignition Coil

(Continued from page 26)

minum should not be over 16 gauge, and lighter if possible. The bracket is bent as shown. The spring is of high spring steel about 1/64" thickness and bent up as shown. The vibrator parts are held by brass pins or escutcheon pins into the fiber discs. A soft iron disc about ¼" diameter should be soldered to the spring steel. This is the contact vibrator point.

The hookup is as shown. The breaker is naturally a part of the engine. 3 flashlight cells are required. They produce 1.1 volts each and good for about 2 hours continuous operation with good results. The small fountain pen type of cell size was used in a series arrangement. The vibrator adjustment is very delicate and the threading job should be good. A heavier piece of aluminum bracket may be used if good threading is difficult in the lighter gauge. The screw should fit tight and not vibrate loose. The vibrator is screwed down with a gap about 1/100 inch at times, all depending on the electrical system requirements and the effective voltage from the batteries.

The spark gap on the plug should be close even though the gap soots up. It should not be over 3/64" distance since the greater distance the spark will not jump. Use as small a gap as possible without short circuit by carbon or soot. The voltage required to jump the gap varies with the pressure inside the cylinder, which on those small engines is about 70 lbs. per square inch or less. Take this into consideration and adjust the gap and the vibrator by experience that gives the best results.

The stopping condenser must be a good make of high dielectric insulation brakedown voltage. A good grade of radio stopping condenser (.00025 mfds) was used with fair results. The condenser must be good or else the contacts will arc or stick and burn.

The weight without the batteries runs a trifle over four ounces. This is not excessive. The outside of the coil is wrapped with cambric and shellacked to prevent moisture ingress. If possible, use as large a wire gauge as possible, since the writer believes better results can be obtained than the experimental coil furnished using the high gauge wire. The lower the gauge, the greater the current to the spark and the fatter the spark, all necessary to good ignition. The writer suggests a 26 primary and a 30 or 32 secondary, which increases the weight but little. Also certain makes of radio audio transformer secondaries provide a good coil winding for secondary work with a suitable primary winding. The right amount can be determined by experimentation. A coil of the type described can be built for less than three dollars.

Building the Kinner Envoy

(Continued from page 13)

Make tail wheel assembly as detailed on plan **(Plate No. 3).**

Tail Surfaces

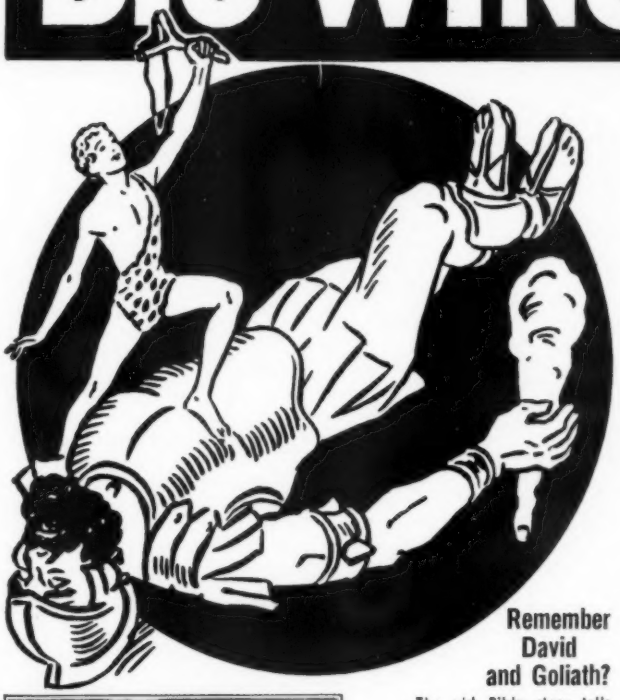
Pin a **1/16" x ⅛"** balsa spar to the drawing; cut out the leading and trailing edges from 1/16" sheet balsa for the stabilizer. Cement 1/16" x ⅛" ribs as shown on Plate No. 4. Make the rudder in the same manner. When dry, taper the ribs from the spar toward the leading and trailing edges. Cover the tail surfaces in the same manner as the wing panels. Spray lightly with water and dope.

NOTE: After the tail surfaces and wing panels are sprayed with water, lay them on a flat board, and place weights along their outline to keep them flat against the board to prevent warping.

Propeller and Motor

Make the propeller from a **⅞"x1¼"x8"** block of medium balsa, cut to shape shown, then carve and sand prop in the usual manner. Dope the finished prop two or three times, sanding between each coat to

BIG WINGSPANS?



Yes—But COMET Places COMPLETENESS Ahead of Mere SIZE!

Comet gives you big wingspan, of course—but it gives you far more than that—it gives you kits so complete in every detail, that it is a pleasure to build any Comet model! Plenty of everything—that's the rule at Comet headquarters—plenty of liquids, plenty of Balsa—and a world of extras, to make the finished plane a thing of joy to the model builder! And of course—Comet Kits—and Comet Kits alone—have that remarkable new construction method—"AUTO-LINE-UP"!

Remember David and Goliath?

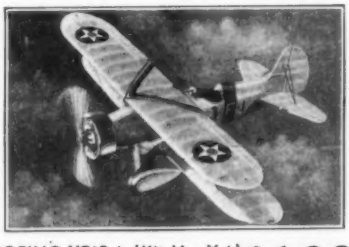
The old Bible story tells that little David slew the giant Goliath with his trusty sling-shot. Goliath had size—but that's *all* he had—David was more compact, but he had the equipment needed to whittle the big man down to his size. Just another case of "completeness" being better than "size" alone.

COMET

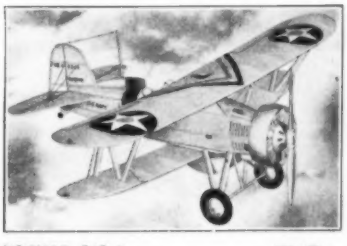
Buy from Your Local Comet Dealer

You'll find that your local Comet dealer usually carries a complete stock of Comet kits and supplies—and you'll find that he is a good man to do business with! If you have no dealer in your neighborhood, and would like to become acquainted with the complete Comet line, send a 3c stamp for Comet's new catalog—which illustrates many of the newest and most popular ships—a big variety at 10c, 25c, 50c, $1.00, $1.50, $1.95 and $2.50.

FAIRCHILD "24"
Wingspan 15" Kit No. 215..... **25c**



BOEING XF6B-1 (Kit No. X-6)
20½" wingspan..... **$1.00**



BOEING F4B-4
Wingspan 15" Kit No. 512..... **50c**

CURTISS HAWK P6-E
Wingspan 15½" Kit No. 513... **50c**

WHAT IS "AUTO-LINE-UP?"

"AUTO-LINE-UP" (automatically lines up) is a revolutionary, sensational new method of model airplane construction. With it, models seem to build themselves, step by step, on Comet's full-sized, perfectly designed plans. Models come out straight and true, and you save hours of building time, and get better flying results, too! Remember—no kit is really modern unless it has "AUTO-LINE-UP"—and the only place you'll find "AUTO-LINE-UP" is in Comet Kits!

COMET *Flying Model* KITS ARE COMPLETE —*no trick charges* —*no missing liquids* —*no skimping!*

Order convenient C.O.D. Way; mark, mail coupon—pay for planes, C.O.D. fee, postage on delivery! We pay postage on cash orders. REMIT cash by Money Order—If Check, add 15c extra. CANADIAN: No C.O.D., stamps nor coin. International Money Order only, plus 20c extra.

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insure proper balance of the prop.

The scale propeller is clearly shown on plan (Plate No. 4).

The prop. shaft is bent from .029" music wire. It is inserted through the crankcase, washers and propeller, and then bent over and sunk into the front face of the propeller hub, where it is cemented.

Power the model with six strands of ⅛" flat brown rubber.

Assembly

Cement the tail surfaces on to fuselage, being sure to get the correct stabilizer setting. Next assemble the wings to the stub wings. For all bracing, flying and landing wires, use strong black silk thread. All other details are shown clearly on the drawings.

Flying

Glide the model over tall grass before it is flown. If the plane is tail-heavy, add some weight to the nose until you get an even glide. You can now wind the propeller for a test flight. Any adjustments regarding the flight of the model after it is carefully balanced may be made by adjusting the stabilizer setting. If the model is correctly built, you will be able to obtain flights of one hundred to three hundred feet.

Bill of Materials

3—1/16"x3"x18" sheet balsa—Bulkheads, keels, ribs, wing, stabilizer and rudder tips.
2—1/32"x2"x18" sheet balsa—Ribs and motor cowl.
26—1/16" square x 18" balsa strips—Stringers and windshield.
2—⅛" square x 18" balsa strips—Leading edges.
2—1/16"x1/16"x18" balsa strips—Trailing edges.
4—1/16"x¼"x18" balsa strips—Wing spars and trailing edges of landing gear struts.
1—¼"x3"x18" sheet balsa—Cowling bulkheads and landing gear fillets.
1—3/16"x2"x9" sheet balsa—Wheel pant sides and leading edges of landing gear struts.
1—⅛"x3/16"x18" balsa strip—Valve covers.
3—1/16"x¼"x18" balsa strips—Tail surfaces.
1—⅜"x15/16"x1 13/16" soft balsa block—Pilot's enclosure.
2—⅛"x1"x2 9/16" balsa blocks—Center stub wing fillets.
2—11/16"x11/16"x15/16" balsa blocks—Front stub wing fillets.
2—11/16"x15/16"x2¾" balsa blocks—Rear stub wing fillets.
1—⅜"x2"x5¾" sheet balsa—Wheel pants center section.
12" .029" music wire.
8" .034" music wire.
4—⅛" brass washers.
1 oz. cement.
2 oz. clear dope.
1—1"x1"x1¾" balsa block—Crankcase.
2 sheets of tissue paper.
1 sheet of cellophane.
6" 1/16" dia. aluminum tubing.
1—3" standard celluloid motor—Cylinders.
1—½" dia. balsa tail wheel.
1 pair 1¼" wheels—balsa or celluloid.
6 ft. of ⅛" flat brown rubber.

Model Builders Hall of Fame

(Continued from page 26)

Abgarian's tractor won the Stout Indoor Event with the amazing time of five minutes and fifty-three seconds. Right then and there Carl decided he was building indoor models, and here was born the effort that won this year's Springfield Trophy with a world record flight of twenty-three minutes and twenty-nine point four seconds.

His early models weighed as little as four ounces and they would fly fifty or sixty feet if he threw them hard enough. At that rate, a good athlete had marvelous possibilities of becoming a model plane champion as well. In October, 1928, he entered an indoor tractor at a meet held in Ossining, New York, home of Sing Sing . . . the tractor was flown outdoors against twin pushers, commercials, Cecil Peoli racers and the like. It was a sort of pot-pourri affair and the plane that came down last won. Carl's little plane, in the midst of all those crates possessing a tonnage that compared favorably with the S.S. Arizona, probably had no alternative and thereby came down after all the others weren't around any more, which was eighty-one seconds later. Considering the proximity of Sing Sing Prison, the first prize was rather a risky venture on the part of the contest officials, but Carl got home safely with the 2½-dollar gold piece that was awarded.

At the age of five it was Carl's intended ambition to become a janitor or a shoemaker . . . a choice that concerned itself with the lesser of two evils . . . the year was 1917, the start of the World War, and Carl's ultimatum in all probability started another one in the Goldberg Barracks. At the age of ten, when both aforementioned wars were over, Carl was set on becoming a chemist. If for no other reason, the wisdom of this latter choice at least lay in the fact that it was something you could spell when writing about, a convenience that very few children afforded their parents at that early age. However, in 1927, Lindbergh flew to Paris and that settled matters once and for all, he wanted to be an aviator, and to date possesses a modified version of that ambition.

He has now been building indoor planes for the past seven years, has entered at least thirty major contests, including all of the Nationals, has followed these meets to Detroit, Dayton, Atlantic City, New York, Philadelphia, Indianapolis, Akron, and St. Louis. As a rule, he paid his expenses with money saved during the year, which is quite unusual. Is there anyone else who has been saving money these days? He has won twenty-six prizes and does not think that is many, not that we're good at figures, but we prefer to believe that twenty-six prizes out of thirty is a pretty good average . . . the prize he worked hardest for was the second place he received at the 1930 National Meet, in Detroit . . . the easiest was at this year's national meet, in which he used the same plane he had at last year's meet and for the simple reason that he was too busy to build a new advanced one he had planned on.

The greatest disappointment as a model builder came in taking third place at the Atlantic City Nationals in 1932. The indoor meet was held in a ballroom with a fifty-foot ceiling. (The 1934 Meet was held in the 180-ft.-high Goodyear-Zeppelin Air Dock at Akron.) This low ceiling handicapped his plane which was designed for a high climb. Some of you probably read of his experience at the 1930 National Meet in Detroit which in the opinion of many caused him to lose a national championship. He finished second to Ray Thompson who incidentally, while Carl's model was being officially timed, was so nervous that he could stand on only one foot at a time. The flight came only twenty-four seconds short of Ray's record time.

Getting back to the incident, Eddie Beshar asked for a loan of Goldberg's best propeller in order to make a copy of it. In his room Eddie worked carefully with

SELLEY-TEX DOOMS old fashioned ALL BALSA STICK CONSTRUCTION

PAT. APPLIED FOR

This REVOLUTIONARY SIMPLIFIED BUILDING IDEA is sweeping the country!

SELLEY'S exclusive FLYING MODEL KITS set the pace for others to follow!

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WACO D Military

4.00 25c Postage

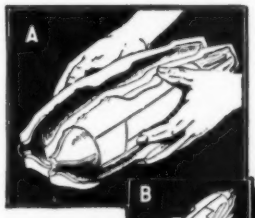
WACO D MILITARY. A wealth of military detail characterizes this formidable prototype of the latest Army innovation, and what a flyer!

The SELLEY-TEX moulded parts included in this kit are shown at the right. These together with special parts and materials as listed complete this outstanding value.

SELLEY-TEX! AMERICA'S *only* MODEL KITS with MOULDED PARTS

Each of the SELLEY-TEX Construction Sets featured in this ad and the Fairchild 22 not illustrated contain the necessary individually designed moulded scale parts similar to those shown above.

ALL 24" WING SPAN



All other SELLEY-TEX moulded parts as listed are equally easy to build.

Simple as ABC

A—Fit together and cement the two moulded parts of the fuselage.

B—Cut away the border of excess fabric.

C—The result is a perfectly shaped fuselage in the form of a hollow shell, very strong and indestructible.

SELLEY-TEX OFFERS TEN ADVANTAGES over all Balsa-Stick Kits!

1—**MOULDED CONSTRUCTION.** First real advancement in practical building.
2—**EASIER-TO-BUILD.** The moulded parts make it simple as ABC.
3—**EXCLUSIVE FABRIC.** Specially close woven and processed by secret formula.
4—**MORE PRACTICAL.** Selley is discontinuing Balsa Stick type entirely.
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8—**POSITIVE MEANS OF BALANCING.** Simple ring device correctly balances plane.
9—**FINISHED ADJUSTABLE PITCH ALUMINUM PROPELLER.** Maximum of thrust and minimum of rubber.
10—**FULL MONEY BACK GUARANTEE.**

LISTED PARTS AND ACCESSORIES—Every kit packed in a beautiful, sturdy box with finished scale flying, adjustable pitch metal prop, finished propeller shaft and rear hook, scaled wheels, with brass bushings, ribs printed out accurately on white sheet balsa, many special turned wood parts, finest grade of balsa wood, sticks, tail wheel and fork fittings, control horns and wire, pure para rubber, special bamboo paper, authentic markings, colored insignia, best quality cement, colored dopes, full-size easy-to-understand plan, complete with all picture details. All the tools necessary to build model: **CLAMPS—RAZOR BLADE, BRUSH, SANDPAPER.**

ALL 24-INCH WING SPAN
West of Denver or Foreign 10c extra.

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GOSHAWK. A powerfully attractive flying scale replica of the speedy Navy fighter and accurate to the minutest detail. The SELLEY-TEX moulded parts together with special parts and materials as listed complete this superlative value.

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in the world

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13/16" 5c
1¼" 8c
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WITH RING MOUNT
1¾" long B 25c
1⅝" long A 30c

SWIVEL GUN TYPE C
2" Double Action..15c

PURSUIT GUN TYPE D
⅝" long 5c
1" long 5c
1½" long 5c

TYPE F
1¼" long 10c

TYPE E
1⅝" long 10c

Dummy Ratchet Gun-G
⅞" long 5c

DUMMY MOTORS
Something New
9 Cylinder
1" dia. 30c
1½" dia. 50c

5c Postage

Aluminum Disc Rubber Tired Wheels

½" dia.	5c ea.
⅝" dia.	6c ea.
¾" dia.	7c ea.
⅞" dia.	8c ea.
1" dia.	9c ea.
1⅛" dia.	10c ea.
1¼" dia.	11c ea.

Bal. Tire Alum. Disc Wheels

1⅛" dia.	25c pr.
1¾" dia.	28c pr.
2" dia.	30c pr.

Treaded Rubber Tire Aluminum Disc

1 3/16" dia.	30c pr.
1½" dia.	40c pr.
2" dia.	50c pr.
3" dia.	60c pr.
5⅝" dia.	$1.50 pr.
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7" dia.	$2.50 pr.

Axel Fork and Swivel Joint

⅛ up to ⅝" wheel	10c
⅝ up to ⅞" wheel	15c

WHEELS

SEND 5c FOR CATALOG

Aluminum Disc Rubber Tired Air Wheels

1" dia.	15c pr.
1¼" dia.	18c pr.
1½" dia.	20c pr.

Celluloid Wheels / Balsa Wheels

¾" dia.	06 pr. / 04 pr.
1" dia.	08c pr. / 05 pr.
1¼" dia.	10c pr. / 07 pr.
1½" dia.	18c pr. / 10 pr.
3" dia.	35c pr. / 35 pr.

Bal. Tired Cel. Disc Wheels

1½" dia.	30c pr.
1⅝" dia.	33c pr.
2" dia.	35c pr.

AXLES Threaded and fitted with washers, bushings and nuts.

Length	⅛"	3/16"
2"-5"-6"	.12	.16 .20
7"-8"-9"	.14	.12 .23
10"-11"-12"	.18	.15 .25

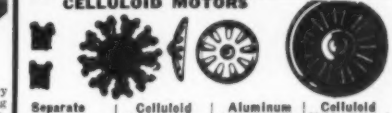
Postage 5c Pair—on Rubber Tired Wheels, 4c Pair

PROPELLERS

Hawk Type 2-bladed		Hawk Type 3-bladed		Die Cast 2-bladed		Standard 3-bladed	
3¼"	25c	4"	35c	1½"	8c	1½"	10c
4"	30c	4½"	45c	2"	10c	2½"	12c
4½"	35c	5"	50c	3½"	15c	4"	25c
5"	35c	5½"	60c	4"	20c	4½"	35c
5½"	40c	6½"	70c	4½"	25c	5"	45c
6½"	40c	7"	80c	5"	30c	6"	60c
7"	55c	8"	90c	5½"	35c	7"	70c
8"	65c	9"	$1.00	6"	40c	8"	80c
9"	75c	10"	1.10	6½"	45c	9"	90c
10"	85c	11"	1.25	6⅝"	50c	10"	$1.00

Props can be had up to 2¼ in. dia. Postage 6c each.

CELLULOID MOTORS



Separate Cylinders		Celluloid Dia.	Motors	Aluminum Cowl	Plates	Celluloid Motor & Cowl	Combination
5/16"	3c	1½"	25c	7/8"	8c	1⅛" dia.	25c
⅜"	4c	2"	30c	1¼"	10c	1½" dia.	30c
½"	5c	3"	35c	1¾"	12c	3" dia.	35c

Postage 5c

SPUN ALUMINUM COWLS

Dia.	Drag Ring	Open Face	Closed Face
1"	15	15	15
1½"	18	18	18
2"	20	20	20
3"	28	28	28

Postage 6c each

AUTHENTIC AIRPLANES 2¼"x4¼"

24 ARMY	25c Set
18 NAVY	25c Set
16 WARTIME	25c Set
84 SQUADRON INSIGNIA	25c

Postage 5c set

Dummy Turnbuckles

¼"	10c each
⅜"	10c each
½"	10c each

IMPORTANT—Minimum order, 50c. Add postage on all items but if over 15c on less than $1.50 order add only 15c. Orders over $1.50 add 10%; west of Denver 15%.

SELLEY MFG. CO. INC., DEPT 310 1373 GATES AVENUE, BROOKLYN, N. Y.

the propeller, examining its features and then laying it on a pillow while working on his own. At three in the morning Eddie fell asleep, during which time his head landed on the propeller, crushing off three inches of one blade. He awoke at ten in the morning and tried for one hour but without success to repair the damaged propeller in which Carl had placed his hopes for a new record... it was the day of the indoor meet at the Grosse Ille Airport hangar and Carl was waiting for Eddie to appear with his prop. Eddie came, but Carl was informed that his propeller was damaged beyond repair.

Carl says he used no tricks nor was any unusual ability or "knack" required to fly his model for a record flight. The only requisite is a good tractor of similar design and he sees no reason why any other advanced model builder cannot duplicate, if not improve, his performance. Here are all necessary details on Carl's record-holding tractor: wing span, 40"; wing area, 148 square inches; motor stick, 15"; tail boom, 12"; propeller, 16"; 20" loop of 3/32x1/30" rubber. The mean chord, by the way of simple arithmetic, is 3.7 inches. The rubber was given 2,000 turns for the twenty-two minute flight and was capable of taking 2,500 turns. The ship climbed to 150 feet in 11 minutes and was practically deadstick when down to thirty feet. The effective R.P.M. was calculated at 92, while the plane weighed eighty-five thousands of an ounce, less rubber. Last year he made an experimental job of the same design weighing only forty-six thousandths of an ounce. Those figures would make any self-respecting flea go on a diet. Actual value in terms of material for his model is thirty cents, in terms of labor at $1 per hour for 30 hours, $30. The personal value is $100 although he would not sell it for that amount . . . and there we are. It required thirty cents of his money, thirty hours of his time and thirty contests to come through to win a National Championship.

Personal opinions on thissa and thatta: ... finds the Junior N.A.A. very satisfactory as it now stands... would perhaps like to see the limit on area taken off entirely, to be replaced with the rule that no indoor model weigh more than half an ounce. This, he believes, would correspond more to the "free for all" races of full-size planes, at the same time insuring that all models be of the indoor variety. He admits such a suggestion would undoubtedly meet with much criticism but that there are times when it would be advantageous and fair to all models in the contest.

He likes to fly but has only been up twice. His idea of his own plane is any Aeronautical Engineer's dream; a top speed of not less than 300 miles per hour, landing speed of not more than 35 miles per hour, six-place and a cruising range of not less than 1,000 miles... and of his own design. Well, it will certainly have to be, for we haven't even as much as a hint of such a supership as yet. His favorite aviator is Colonel Lindbergh and among the women he likes Amelia Earhart's propwash best; does not approve of speed contests with the present system of timing the models; has built two speed models, one attaining a speed of forty miles per hour. He once witnessed a friend's speed model render a girl spectator unconscious ... the model was traveling at more than 50 miles per hour. We don't know whether to congratulate the model or offer condolences, so the ayes have it.

In conclusion, one trait is adamant... he is recognized as one of the cleanest enthusiasts in the cleanest sport we know of. All of his efforts have been devoted constructively to model aviation. In the Library of Congress in Washington is inscribed the following motto: "Science Is Organized Knowledge." Carl's recent record is undoubtedly a great contribution to the effort we are making for Organized Knowledge in Model Aircraft. We asked him one more question for the records and his originality was pronounced . . . he NEVER jumped off a barn roof with an umbrella and while you wonder what made that concoction of balsa and microfilm remain aloft for twenty-three minutes, we're going to look for some waxpaper and picture molding... you see, we have an idea!

Wings Beneath the Sea

(Continued from page 5)

100 miles per hour, a duration of two hours and a service ceiling of 8,400 feet.

A short time ago, the Navy acquired a

new ship and has been making changes and improvements on it, shrouded with the greatest secrecy. It is the Loening XSL-2. It is extremely difficult to find out anything concerning this plane. However, we do know that it differs from all other submarine planes in that it is an amphibian. This gives it the advantage of being able to land at shore bases and on carrier decks as well as to operate from a submarine.

It is a monoplane with a flying boat hull. The engine is a 110-horsepower Warner *Scarab*, a radial air-cooled type, and is mounted on struts above the fuselage. A tractor propeller is employed. V-struts with the apex at the engine nacelle support the wings. These wings are constructed to fold when the ship is stowed.

The possibilities of submarine aircraft carriers can scarcely be overestimated, and it may be bringing about a revolution in naval air strategy. The submarine itself has certain serious drawbacks when used for scouting purposes. Because of its low construction and consequent limit of visibility and comparatively slow speed, a sub is hampered in ascertaining the whereabouts of an enemy. If it can send up a plane, however, the commander can be acquainted with conditions over a wide area, approximately two hundred miles, which is the average cruising range.

The sub plane makes it possible for aircraft to be operated in areas far in advance of the rest of the fleet. The surface aircraft carrier is rather vulnerable to attack and must stay with the rest of the fleet for protection, which greatly limits its usefulness. The submarine, on the other hand, is an extremely difficult ship for an enemy to attack and it can run in where surface vessels dare not go. It is even possible for a submarine to go completely under an enemy fleet, which is lying about enemy shores, and to come to the surface within the protected area and release its planes.

While most of the planes developed so far have been too small to carry any great amount of armament, the future will probably see such airplanes as bristling with machine-guns and bombs as those that operate from carriers and shore bases. One of the greatest uses for the submarine plane will probably be in the new and terrible form of fighting known bacteriological warfare, or the spreading of virulent disease germs. While this type of warfare is particularly deplorable, for plagues started in an enemy country will attack non-combatant and combatant alike, it will doubtless play a major part in future conflicts. It does not require an airplane of large weight-carrying capacity, and the types that have been already developed would be adequate. A submarine could sneak into an enemy harbor, launch its plane, which could then fly over a city's water supply and contaminate it, and drop the germ-carrying bombs at other vital points.

Airplanes that travel beneath the sea to the scene of battle will undoubtedly become an accepted part of naval warfare. While our own Navy is keeping quiet on what it is doing at present, a future war may see whole squadrons of airplanes, bearing the red-white-and-blue-starred cocarde, emerging from the depths.

Powering Your Model Planes

(Continued from page 27)

flies, the less is the power required to fly it per unit of weight. This means that for long duration it is advantageous to have your model's flying speed as low as possible. The same law applies to velocity of the tip of a propeller; that is, the power required to drive it, (P) is proportional to the cube of the tip velocity or $P = KV^3$. The explanation follows the same reasoning as given respecting the velocity of the airplane itself. Another important conclusion can be derived from this fact; namely, *that the slower a propeller can turn and yet have the model fly properly, the less will be the power required to fly the plane.* This is true of course only when the comparison is made with propellers of equal or similar diameters and pitches. Larger diameters could give greater tip speed even if the propellers turned more slowly, and larger pitches require more power.

In previous pages it was shown that the torque Q was proportional to $\sqrt{N^3}$ or $Q = K\sqrt{N^3}$ (Q) is proportional to (P) so $Q = KV^3$. Then $\sqrt{N^3} = KV^3$, or $N = \sqrt[3]{V^6}$, or $N = V\sqrt[3]{V^2}$ where (N) is the number of strands used in the motor. By this formula you can compare the number of strands required on similar models with various speeds. For most designers, however, it is sufficient to comprehend the laws given in italics in the immediately preceding paragraphs.

In order to make a propeller turn slowly as advised here, the pitch can be increased with advantage. Though the power must be increased in proportion to the pitch, the drop in the power required to obtain the same thrust due to the slower propeller turning speed, will help to increase the duration. In other words the propeller pitch can be fifty per cent greater, yet in spite of the greater amount of rubber required to obtain the same thrust, the unwinding duration will be greater than with a lower pitch.

The mathematic theory involved in the calculation of power required for various propellers is very complicated and not of special value in the design of models, so it will not be dealt with in detail here. Only significant facts will be considered, and then from a practical standpoint.

Approximate methods of estimating the amount of rubber required to propel a model will prove fairly accurate. At least they will prove helpful as a guide in your designing. Therefore, the accompanying tables are given which show the number of strands of 1/8"x1/30" rubber necessary to fly planes of various weights with propellers of the diameter indicated. Change in pitch has not been considered. The data is approximately correct for propellers with a *pitch of 1½ times the diameter*, and it has been calculated by means of the following formula:

$N = 0.25\ (\sqrt[3]{D^2})\ (0.5+3W)$, where (N) represents the number of strands of 1/8"x 1/30" rubber required, (D) the propeller diameter and (W) the weight of the airplane in ounces.

The table values indicate the number of strands to use on single motor planes. However, for models with twin motors and twin propellers the values change. *In order to determine the number of strands to use in each motor of a twin motor model, multiply the value shown in the table for any condition by (0.62).*

It should be noted also that the figures in the table have been determined on the basis of a pitch which is $= \left(\frac{\Pi D}{2}\right)$. This means that the propeller has an average pitch of about 1½ times the diameter. All models are not equipped with propellers of this degree of pitch and their builders may wish to determine accurately the correct number of strands to use with higher or lower pitch propellers. In such cases the correct number of strands may be determined by simply substituting the proper values for the quantities in the formula, $0.8\left(\frac{d^2+w^2}{w^2}\right)$ and multiply the table value for the proper propeller diameter and weight of model, by the figure derived by the solution of the formula. In the formula (d) = the depth of the block from which the propeller is cut and (w) represents the width of block. For instance if the propeller pitch is 1½ times the diameter as in the cases represented by the table values, the results of the formula solution should be *one.* Solving it; d = 1, and w = 2, then $0.8\left(\frac{1+4}{4}\right) = 0.8(5/4) = 1.$

The table indicates you should use eight strands on a model weighing 2.5 ounces and equipped with an eight inch propeller. This is in the case that the propeller has a pitch of twelve and a half inches, or the pitch $P = \left(\frac{\Pi D}{2}\right)$. In such a propeller the width (w) is twice the depth (d) of the block. If you should wish to raise the pitch of the propeller to fifteen inches, then it is equal to three-fifths of (ΠD).— —(ΠD = 3.1416x8 = 25). Then the depth of the propeller block should be 3/5 of the width. The number of strands to be used can be determined as follows by the formula:

$N = Z\left[0.8\left(\frac{d^2+w^2}{w^2}\right)\right]$ where (Z) equals the table value. Here (d) = 3 and (w) = 5.

Solving, $N = 8\left[0.8\left(\frac{9+25}{25}\right)\right] = 6.4\ (1.36) = 8.7.$

In other words a fifteen inch propeller of eight inches diameter would have to have the equivalent of 8.7 strands in order to give it the ability to perform in the same manner. In such a case nine strands should be used.

There are other factors of course that affect the action of the propeller and consequently the number of strands to be used. One is the velocity of the airplane which is determined by the weight of the model relative to its wing area, or $V^2 = K\left(\frac{W}{A}\right)$ or $V = K\sqrt{\frac{W}{A}}$. Another factor is the relative size of the propeller

blade area to the wing area which factor determines the amount of slip and, therefore, the efficiency of the propeller. The number of strands vary in this case approximately as $\sqrt{\frac{A}{a}}$. The larger the wing area relative to the propeller blade area, the greater the required torque will be.

For those who do not choose to go too deeply into the mathematics of this phase of model building, the tables will suffice. They give approximate values which can be readily understood and used by inexperienced builders. However, some may wish a more exact method and more accurate results, or possibly they enjoy analyzing the mathematical relationships involved. These students without question will obtain a clearer understanding of the subject. For their benefit a complete formula for the required number of strands follows which covers all the important varying factors. These include the speed and efficiency factors mentioned previously. The formula is

$$N = 3.84\left(\frac{40W}{A}\right)\sqrt[3]{\left[\left(\frac{A}{12.5(a)}\right)\left[D(W+0.5\left(\frac{(\sqrt{d^2+w^2})+d}{2}\right)0.8\right]\right]}$$

In the formula:

N = the number of strands, (W) the weight of the airplane in ounces, (A) the area of the wings in square inches, (D) the diameter of the propeller, (a) the area of the propeller blades in square inches which $= \left(\frac{(\sqrt{d^2+w^2})+d}{2}\right)0.8$, (d) equals the thickness of the block from which the propeller is cut and (w) equals the width of it. Propellers when cut from a block are always considered here to be cut by means of the diagonal layout, lines being drawn diagonally from one corner to the opposite one.

The values given in the table and by the formula are for the number of 1/8"x 1/30" rubber strands that will give moderate power during a flight when single surface wings are used. If the double surface or built-up type is employed, 20% less power may be used with about the same result. Probably models powered with 30% less rubber than specified will fly but will have very little if any climb. For high climb and superior performance, 25% more power should be employed than is normally the case.

In the following article of this series a method of estimating motor unwinding duration will be given, as well as a brief summary of the important facts of this chapter.

Air Ways—Here and There

(Continued from page 23)

slowly."

[Ed. Note. May we suggest that a transit be taken along so that accurate location of the models be obtained from triangulation. Possibly this is a little scientific but it appears that model building and flying becomes more that way every day.]

Picture No. 4 shows left to right, "Funzie" Bellantonio, Leo Vartanian, Percy Pierce and Thomas Condax, with a line-up of several of the gas jobs which participated.

Next we have information about another model builder working with gas model planes. He is H. W. Reeds of Lafayette, Louisiana, shown in picture No. 5 with his gas ship. Reeds tells us that this little ship has twenty flights to its credit, ranging from four to seven minutes on one-eighth of an ounce of gas. The ship was designed by Mr. Primeaux and has never had a rough landing. It is used to advertise Shell gasoline and is paying for itself in this manner.

We note with interest that the model resembles the Kovel model in many details. In fact, it might be the Kovel model with the wing tips turned up, the fuselage built up to the wing instead of using the "bird cage" center section and with a slightly changed shape on the nose. Otherwise, the construction and design look to be identical.

Mr. Harry W. Trimble of 1440 South Milledge Avenue, Athens, Georgia, sends us picture No. 6 of the Boeing P-26 Pursuit. This little ship is a beautiful detailed scale job. Actually the picture does not do it justice. The motor cowling, wires, in fact all details, have been carefully carried out. Trimble recently won first place with this ship in the annual Scale Model Contest of the Atlanta Model Airplane Club. The model is completely built up and covered, or filled in with balsa to create a solid effect.

Picture No. 7 is apt to startle one if they do not examine it closely. Apparently an airplane is being consumed by flames. However, actually this is only Roland Lungazo's idea of what to do with old discarded ships. Lungazo lives at 33 Sunset Avenue, Lynbrook, New York. In this case we are not referring to the plane shown in the picture, for it represents a more dramatic event. It was taken by a friend of Lungazo, H. R. McCary, Jr., of Lynbrook, who happened to be on the spot when his gas-powered Great Lakes Trainer model cracked up and caught the model in flames just before the framework collapsed. This is certainly an unfortunate incident for its designer and builder, but it is to our knowledge the first instance in which such a picture has been taken. For the skeptics we wish to say that this is actually true and the picture is not "faked."

Picture No. 8 apparently is not one of an airplane. However, if you look closely you will see in the upper right corner what looks like a bird. Actually it is a Curtiss Robin in full flight, built by George Sholes of 55 Holburn Avenue, Cranston, Rhode Island. This is some model! Its flying characteristics cannot be doubted. It is one of the best pictures of actual performance of a model that we have seen.

Walter R. Stine, Junior, of 307 East Stanton Road, Wildwood, New Jersey, likes to build solid scale ships and when he undertakes such a job he does it to perfection. Picture No. 9 shows a Curtiss XB-2 Army Bomber of excellent workmanship. Close examination will reveal careful detail in its construction. In the front there are miniature machine-guns as well as many cockpit details which cannot be seen. On the whole it is a worthy job.

MODEL NEWS FROM OTHER COUNTRIES

Australia

Model plane activities in Australia are growing with leaps and bounds. In the Model Flying Club of Australia there are members from every section of the country. Great interest is shown in all forms of this activity, as is indicated by picture No. 10, which shows a group of model fliers assembled at one of the contests which are held monthly. The moving spirit of this club is Mr. Ivor Freshman, who we wish to compliment and praise for his interest in young men and for the work he is doing for them.

England

The Boy Scouts in Enfield, England, having tired of building model planes, turned their hand to building a full size airplane. Picture No. 11 shows the ship recently completed. It has a thirty-five horsepower Herz motor and was built at the cost of sixty pounds (approximately $300). As yet we have had no report concerning the performance of this little ship. If any of our readers know something about it we would appreciate it if they would write us.

New Zealand Model Aeroplane Association

From W. G. Alexander, Honorable Secretary of the Association, comes a list of the records which were recently made at the 1935 Championships. Following is the list of record-holders and the times:
Fuselage Outdoor R.O.G.

R. Browning—Canterbury M.A.C.—11 min. 55 sec.
R. Crabtree—Napier M.A.C., 2 min 22.2 sec.

Spar Outdoor H.L.
R. Palmer—Auckland M.A.C.—5 min. 20.8 sec.
L. Shaw—Auckland M.A.C.—4 sec. 23.2 sec.

Fuselage Indoor R.O.G.
V. B. Gray—Auckland M.A.C.—3 min. 31.8 sec.
P. R. Palmer—Auckland M.A.C.—3 min. 29.8 sec.

Spar Indoor H.L.
L. R. Mayn—Auckland M.A.C.—4 min. 35.2 sec.
J. R. Lawry—A.G.S.A.S.—3 min. 59.6 sec.

Champion Clubs
1st. Auckland M.A.C.—23 points.
2nd Napier M.A.C.—6 points.

France

From the Escadre de la Rose des Vents of 2 Boulevard Des Filles-Du-Calvaire, Paris, France, Mr. Mahn sends us picture No. 12, which shows the Macchi Castoldi F-2 which won the first prize at the Bergeron Contest. This is certainly a beautiful example of workmanship. We wonder if this ship was built from Mr. Bristol's plans appearing in MODEL AIRPLANE NEWS. Mr. Mahn says that the club has been very active. Great success was had at Roven last May, which was one of the first contests of the summer. The club team of twenty-six contestants placed among the thirty first places and there were over eighty contestants. This was a most unusual performance. We wonder if it has ever been matched before.

In regard to the type of construction used by French model builders, Mr. Mahn says,

"We build our models in a stronger way and our planes can stand any weather, even storm and rain and also they last much longer. We fly them all every day and Sundays for about a year."

Japan

Mr. Hiroyasu Minowa of the Tokyo Model Airplane Club has been very generous in sending us a number of pictures of model activities in Japan. Lack of space keeps us from printing more than one or two of these at a time. One of them, picture No. 13, shows Yoshio Irata holding a very fine model of the Supermarine which he constructed. This is a flying model and performs well. Unlike American model builders, they do not use balsa wood as it is foreign to Japan. Construction of their models is usually made of bamboo, paulownia wood, tissue paper and aluminum. Most of the bamboo joints are bound with thread. In spite of this handicap, Japanese models are excellent fliers. If model builders are interested in learning more about model building in Japan, we suggest they write Mr. Minowa at No. 3 Wakamatsucho, Ushigome, Tokyo, Japan. Also, they might find it interesting to exchange models they have built for Japanese models.

Russia

As most people connected with aviation know, Russia is intensively active in the aviation field. In order to educate the younger generation in the principles of flight, they have organized a system of deriving knowledge by the use of model airplanes as a basis of study. Through the courtesy of Andrew Borysko we have received picture No. 14, showing Mr. Kasuk with several of his all-wood gliders which he makes in large quantities for experiments. These gliders are taken up in an airplane and dropped. Though they are rather heavy, this fact being necessary because of the high speed of the airplane from which they are thrown, they glide beautifully for miles. This should be an interesting pastime for model builders who have access to flying a large plane. There have been several instances where this stunt has been tried. However, it has usually ended disastrously because the model builder has failed to realize that the high speed and frail construction of the model does not seem to "get together" very well. As soon as the model is "poked" out into the slipstream it disintegrates unless the construction is exceedingly rigid and heavy. If you do not believe this, try it at the first opportunity.

CLUB NEWS

An event took place recently which may be an important factor in the education of many young men. The Curtiss-Wright Technical Institute of Aeronautics at Grand Central Air Terminal in Glendale, Calif., has been granted an approved mechanic's school certificate by the Department of Commerce. This school is the first one to be granted such Federal recognition west of Chicago. All graduates of the Institute, due to the government's stamp of approval,

will be eligible for the present mechanic's license without first serving one year as an apprentice as was previously required.

Albuquerque, New Mexico

It appears that the model airplane bug has bitten people in Albuquerque. There seems to be no place in the world inhabited by live-wire young men that is free from this infection. Mr. Lee Erlandson of No. 16, 203½ West Central Avenue, is Secretary and Treasurer of the Albuquerque Model Airplane Club. This club is very active, even young women of that district are interested in that sport, as picture No. 15 will indicate. It shows a young member of the club with one of her fuselage models. Note with interest the "sixty seconds or bust" quotation on the wing. Apparently to model builders who fly at sea level altitudes, this time is not unusual. However, Mr. Erlandson explains that a sixty second flight at the high altitude which Albuquerque enjoys is most unusual. Not only that, but this is the young lady's first model. We would say that it was quite an accomplishment.

The club is interested in comparing scientific notes with other clubs to determine more accurately the effect of high altitude on the design and flying of model airplanes. It is known that the air being less dense than at sea level, the propeller spins faster and the model has greater speed, thus the duration of the model is cut down considerably. May we suggest that for high altitude flying that the size of the wings and area of the propeller be increased considerably? Aspect ratio wings with a deep camber should help to reduce the handicap of thin air to a great extent.

Macon, Georgia

We have been pleased to hear from Mr. W. J. White who is Instructor of Model Aviation at the Macon Vocational School. He says that a very active model club has been formed in the school composed of twenty boys from fourteen to seventeen years of age. They have organized their own squadron modeled after the regulation Aviation Corps, elected their own officers whose duties are outlined and whose authority is recognized by the younger cadets. The building of the planes is not merely to be a source of pleasure for the boys, but primarily as a basis around which to build up the study of English, mathematics, history and geography.

In the past we have known that model aviation has been a great aid in teaching mathematics and all forms of science and to the wise school teacher has proved a great boon. Classes conducted by teachers who bring model aviation into their courses have all been successful. This is not an opinion but has been demonstrated clearly in every occasion brought to the attention of the editor. We suggest that schools try this method to aid them in their teaching. If you want to take a pill, it is well to sugar coat it.

Mr. White further says, "Many planes are made from kits and supplies purchased from dealers who advertise in MODEL AIRPLANE NEWS. The completed planes are taken out into the public parks to be tried out. Incidentally, these trips by the young Flying Squadron often include an expedition to the local airport to enable the boys to see the landing and taking off of a real plane and to examine at close range the parts of the plane they have previously studied in the Model Building Class."

Picture No. 16 shows a group of planes constructed by the club members. Though the details do not show up well, it is evident that some of the members have real ability as model builders.

CORRESPONDENTS

Here are some more boys who would welcome letters from other readers:

Paul Brumbea, Jr., 605 Powersdale Avenue, Youngstown, Ohio.

Roy Morichiro, Independence Oregon.

Albert L. Shaw, Holden Street, Deshon Estate, 5th Brisbane, Brisbane, Queensland, Australia.

Masatoshi Sakka, Terajima 1-Chome, Mukojima, Tokyo, Japan.

Aviation Advisory Board

(Continued from page 32)

of this class of airplane, provided they cannot find them in the regular aviation publications.

Here is rather an interesting question from Rodney Bond of York, Pa.

Question: I notice all automobiles have an even number of cylinders, but airplanes usually have an uneven number. Why is this?

Answer: In the automobile, the engine is not of the radial type but is such that a cam shaft may be made that will enable any order of firing of the cylinders that may be desired. Because of this any number of cylinders may be used. However, in a radial engine the cylinders must be fired in rotation, starting with the top cylinder, skipping one, then the next will fire, skip one and so on. As the motor turns over, every other cylinder fires. With this procedure if an even number were used the same cylinder would fire with every revolution. However, a four cycle engine demands two revolutions for the firing of every cylinder so, when an odd number is used and every other cylinder fires, as the motor turns, at the beginning of the second revolution, the cylinder which on the previous revolution did not fire is then exploding.

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A splendid extra-size model that will make you the King of model builders among your friends. Every detail of construction is accurate and we have kept it simple and easy to build.
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Seth Parker—typical 4-masted coasting schooner. 10c—25c and $1.00 models

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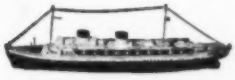

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"In expressing my sincerest feeling toward the world's finest model airplanes, I cannot say anything but CLEVELAND.

"My solid attachment to CLEVELAND models I must say, certainly was not decided by what other model builders or any advertising matter have conveyed, although these have been instrumental in my introduction to these excellent kits. It was not until after long "investigating" other makes that I pledged my troth only for and always with CLEVELAND.

"I have constructed model airplanes for well over eight years, including the "rest" periods which have served to avoid the staleness which sometimes tends to discourage the model fan. In all the time that I have fully enjoyed this greatly fascinating work, I have tried out practically all other brands of kits which eventually made me decide to stay with nothing but CLEVELAND-DESIGNED models.

"One of the most appreciable features which I have found in CLEVELAND MODELS is the rigorous "third degree" production methods to which these most authentic designs are subjected. Where others seem to be satisfied with first production designs, CLEVELAND always continues to perfect and re-design where such additional detail is rightly justified. Then comes the great amount of research from which CLEVELAND MODELS are made, and finally, the well-finished product which satisfies the most discriminating model engineer in not only authenticity and detail, but appearance and flying performance as well!

"To anyone contemplating model aircraft mechanics as the world's most instructive and fascinating hobby, to those particularly discriminating replica collectors that desire only the most authentic, and to those model-pilots that want a real model for thrilling flights and beauty in appearance, I certainly would recommend nothing but CLEVELAND-DESIGNED MODELS.

"I venture to say that when better models will be produced, only CLEVELAND will have them for you."

Signed—

JOSEPH NIETO.

If you prefer, we'll send this information to him direct—just send us his name, address and mention the type store he operates (hardware, sporting goods, confectionery, general, large or small department stores, etc.?). Then before long, you may have a complete line of C-D's on sale right there in your neighborhood—so show this message to your dealer NOW, or send his name to us. Do this TODAY!

CLUBS AND SCHOOLS

A brand new, most unique plan has just been worked out by Cleveland for the establishment of Cleveland Model Clubs throughout the world, and it's a wow! In addition to a discount allowed on purchases of $10.00 or more, we allow you trophies, pins, plaques, etc., which your members may compete for. If you have a club started or as soon as you can round up five or more members to organize a chapter of the Cleveland Model Club, send for this information. If you wish large wall display posters giving tips on how to build C-D's, and banners, placards, etc. these are also available. Get started on this today. Send immediately for full information on the Cleveland Model Club.

A REAL DEALERS SETUP!!

The big Fall and Winter season is just starting. Act immediately to get every possible profit on model and supply purchases in your neighborhood. The C-D Line answers every need, every demand—from beginners to expert builders—and it's backed up with a heavy barrage of advertising that's making new C-D customers every day. Prices range from 25c to $8.50—every model flies—every one of the 81 is authentically designed. And we've got a display and merchandising setup that will take you "to town." Banners! Posters! Placards! All richly colorful, in red, white and blue as are the brand new boxes—specially treated against picking up finger prints and that "distressed" shopworn look. Don't wait—write immediately for full particulars. You'll NEVER regret it.

7 Reasons for Dealing with CLEVELAND

(1) Best known, and most complete line of authentic FLYING models (in Kit form) the world has ever seen.

(2) Known and flown in over 40 countries throughout the world. We have been known as model engineers since 1919.

(3) The C-D Line offers a number of extremely fine models simple enough for beginners—yet all designed to suit even the most critical modelbuilder.

(4) Two scales: ½" at 25c to 85c with two models at $2.50; ¾" at 98c to $3.75 with two numbers at $8.50. From the cheapest that's good to the best that's made.

(5) A complete Line of Quality Supplies and Parts.

(6) Our large stock of Kits and supplies makes possible prompt deliveries—even during rush periods.

(7) The "Cleveland Diamond" or "C-D diamond" is your assurance of our complete guarantee. We stand back of our products 100%.

Be sure to see our ad on the two center pages of this issue.

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