AIR TRAILS

56335-4 VOLUME 3/NUMBER 1 SPRING/1979 PDC $3.25

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by

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● Payload events, first sponsored by Pan American World Airways in 1948, have become an outstanding free flight competition at numerous local and regional meets—and a highlight of the Nationals.

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PAA Load Events, responsible for many new designs and flying techniques, offer trophies and cash prizes to the winners. Here's where sheer inventiveness is the mark of a champion.

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VOLUME 3/NUMBER 1
SPRING/1979

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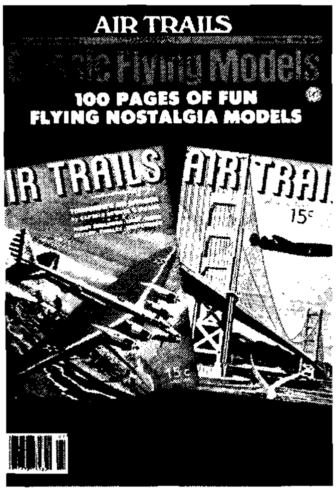
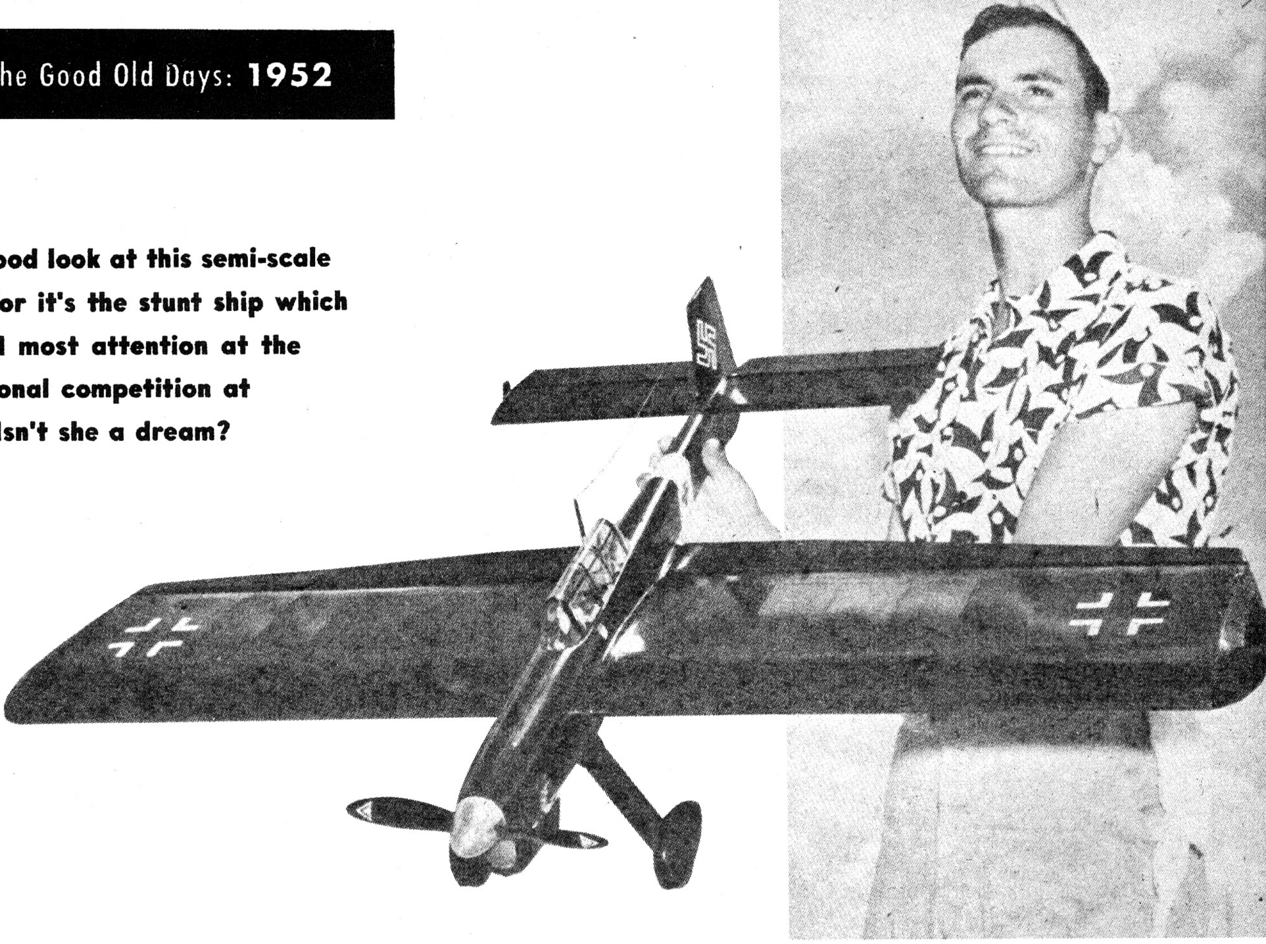


It should be noted that all advertisements in AIR TRAILS CLASSIC FLYING MODELS are vintage ads and not current advertisements for goods or services.

Take a good look at this semi-scale beauty, for it's the stunt ship which attracted most attention at the last National competition at Dallas. Isn't she a dream?



Still's Slick Stunt "STUKA"

Don Still and his beautiful black semi-scale Stuka stunt ship. Don and his entry turned in one of the top stunting performances at the big National meet in Dallas. Model was awarded highest appearance points of the competition. Don's busy at the Happy Hobby Haven in Beaumont, Texas, when he isn't off to some contest flying his models.

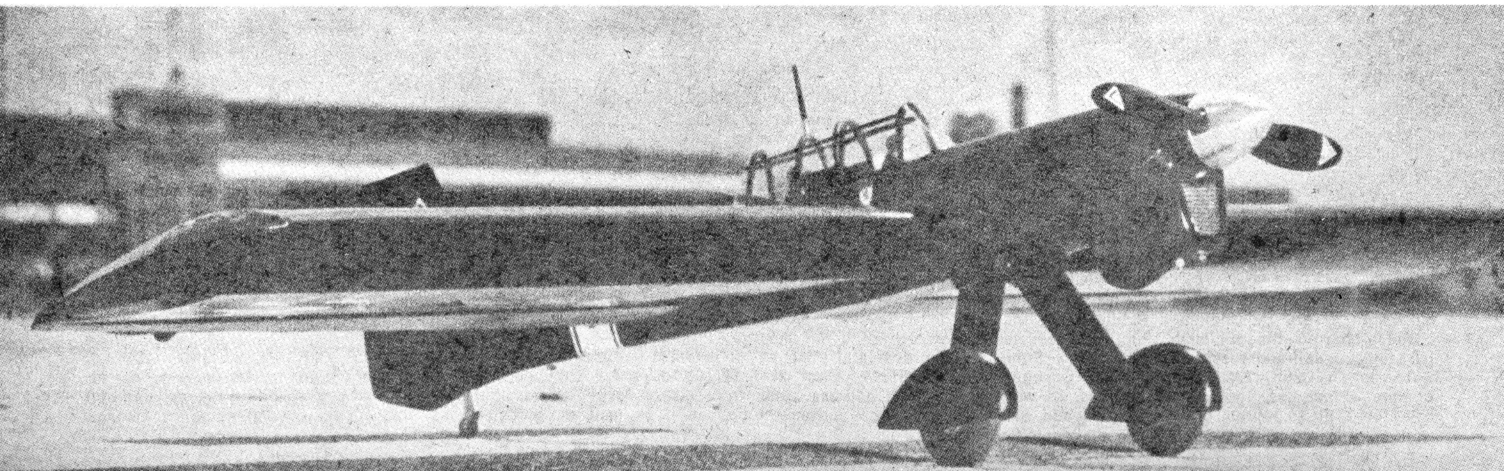
■ It's spring and time for college final exams. A graduating senior goes to his desk, takes pencil and paper in hand, and hurriedly begins . . . to sketch plans for the approaching model contest season. This was how the *Stuka* stunt ship came into being.

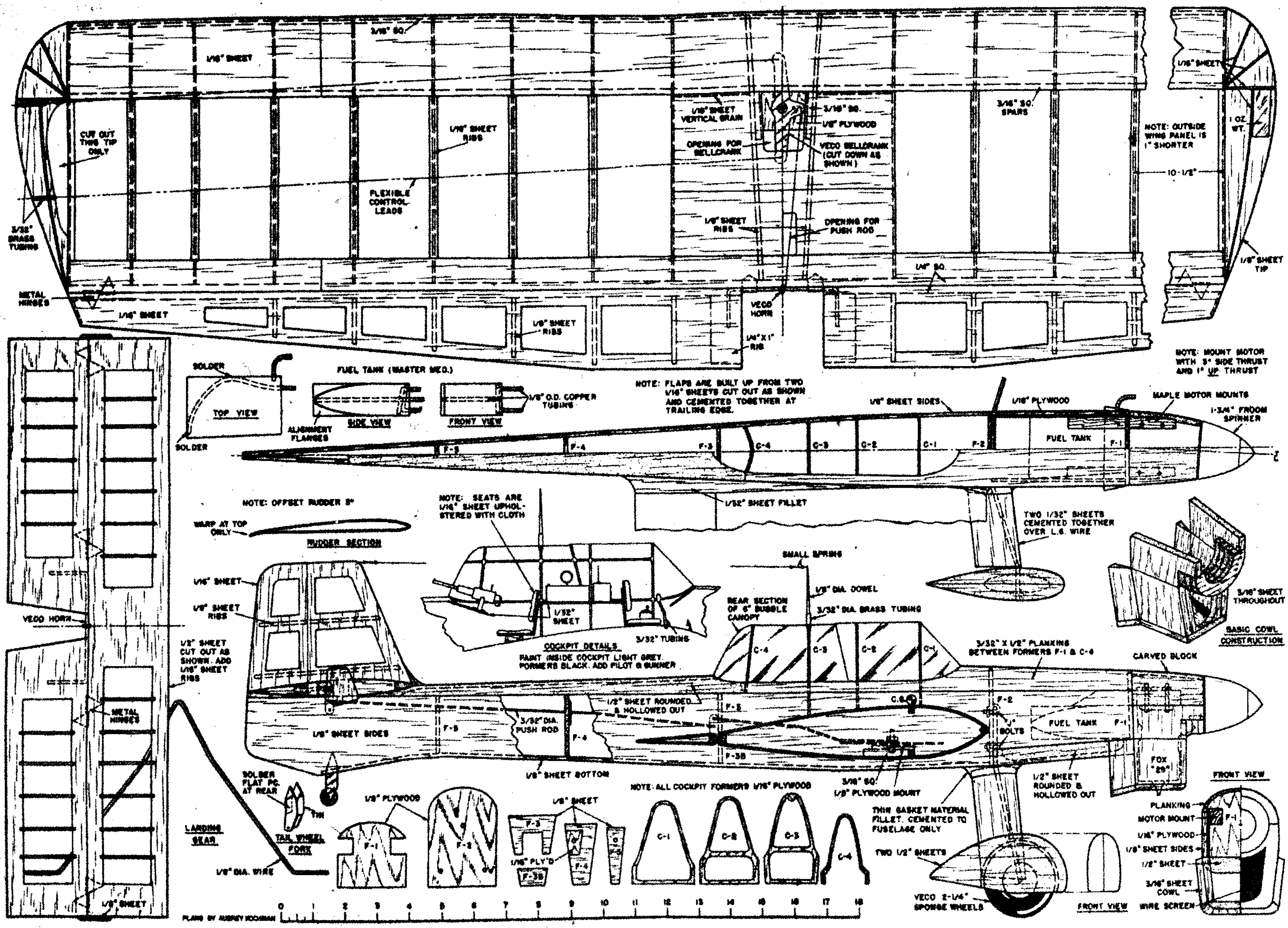
After having accumulated the highest score in precision acrobatics at the '49 Nationals in Olathe, Kansas then the following year at the Dallas Nationals being replaced for the first position by the last flight of the day, this stunter had some observations to make. Stunting had been making changes and it wasn't in the maneuvers—appearance was becoming the thing.

The ship used at the '49 Nationals was a large-area, short-coupled Atwood .60 job. With only a few minor changes, the same ship was used at the '50 Nationals. But this model lacked the now-essential property—realistic proportions.

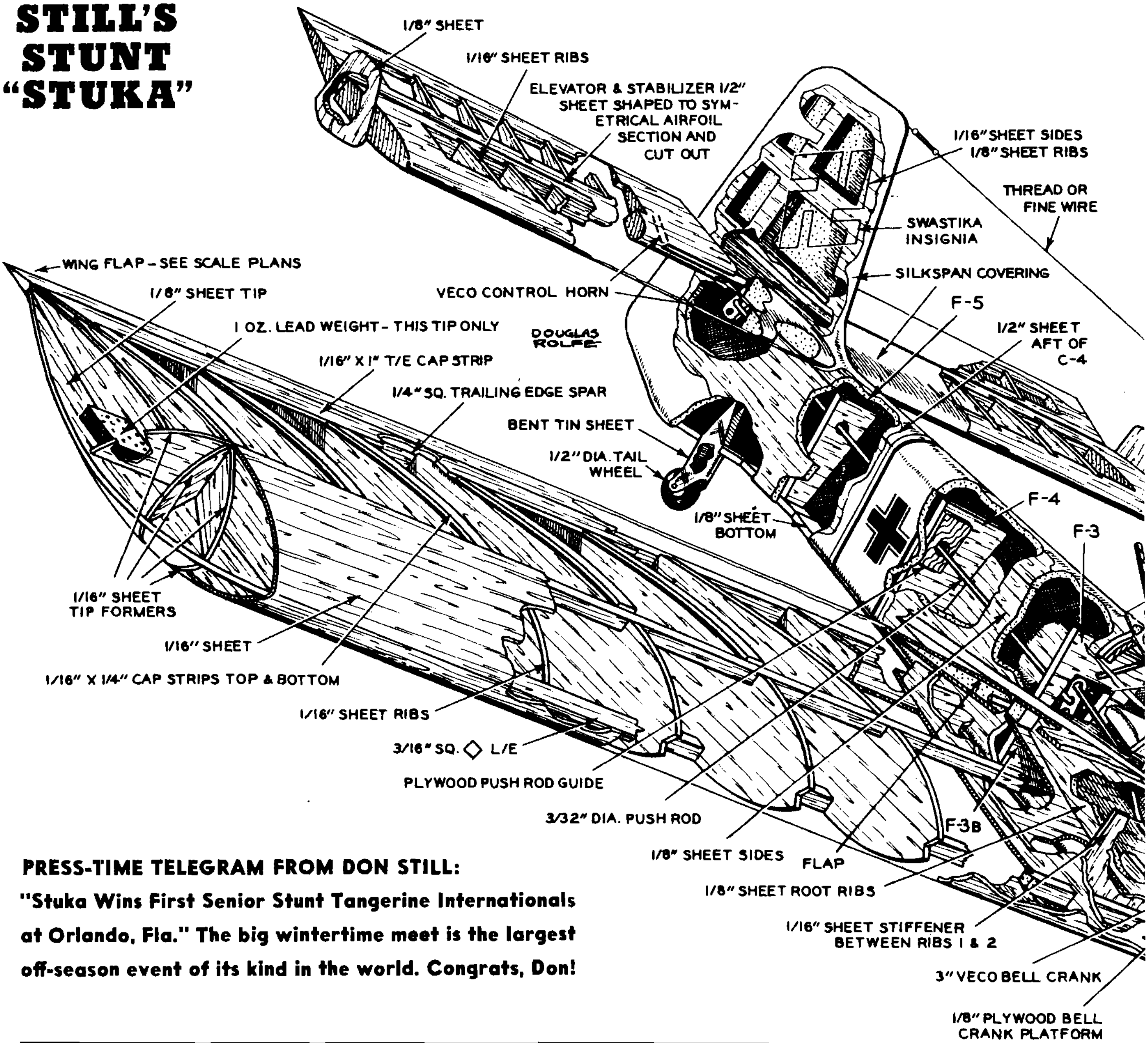
Seeing the need for this different type of stunt ship, I decided on a semi-scale warplane. Searching for a plane with good dimensions, sleek lines, easy cowling, and with

All black and more than a yard wide! Among our "repeatedly requested" jobs this one by Don Still ranks high. For motors .19 to .35.



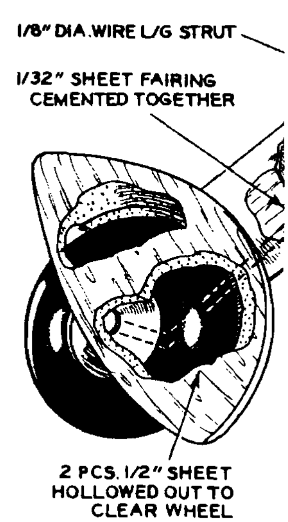

3/16" SQ.
1/16" SHEET
1/16" SHEET VERTICAL GRAIN
3/16" SQ.
1/8" PLYWOOD
OPENING FOR BELLCRANK
VECO BELLCRANK (CUT DOWN AS SHOWN)
3/16" SQ. SPARS
NOTE: OUTSIDE WING PANEL IS 1" SHORTER
1 OZ. WT.
10-1/2"
CUT OUT THIS TIP ONLY
1/16" SHEET RIBS
FLEXIBLE CONTROL LEADS
1/8" SHEET RIBS
OPENING FOR PUSH ROD
3/32" BRASS TUBING
1/8" SHEET TIP
1/4" SQ.
METAL HINGES
1/16" SHEET
1/8" SHEET RIBS
VECO HORN
1/4" X 1" RIB
NOTE: MOUNT MOTOR WITH 3° SIDE THRUST AND 1° UP THRUST
SOLDER
FUEL TANK (MASTER MED.)
TOP VIEW
SIDE VIEW
FRONT VIEW
1/8" O.D. COPPER TUBING
ALIGNMENT FLANGES
NOTE: FLAPS ARE BUILT UP FROM TWO 1/16" SHEETS CUT OUT AS SHOWN AND CEMENTED TOGETHER AT TRAILING EDGE.
1/8" SHEET SIDES
1/16" PLYWOOD
MAPLE MOTOR MOUNTS
1-3/4" FROOM SPINNER
F-5
F-4
F-3
C-4
C-3
C-2
C-1
F-2
FUEL TANK
F-1
1/32" SHEET FILLET
NOTE: OFFSET RUDDER 3°
WARP AT TOP ONLY
RUDDER SECTION
NOTE: SEATS ARE 1/16" SHEET UPHOLSTERED WITH CLOTH
TWO 1/32" SHEETS CEMENTED TOGETHER OVER L.G. WIRE
3/16" SHEET THROUGHOUT
BASIC COWL CONSTRUCTION
1/16" SHEET
1/8" SHEET RIBS
VECO HORN
1/2" SHEET CUT OUT AS SHOWN. ADD 1/16" SHEET RIBS
METAL HINGES
1/32" SHEET
3/32" TUBING
COCKPIT DETAILS
PAINT INSIDE COCKPIT LIGHT GREY. FORMERS BLACK. ADD PILOT & GUNNER
SMALL SPRING
1/8" DIA. DOWEL
REAR SECTION OF 6" BUBBLE CANOPY
3/32" DIA. BRASS TUBING
3/32" X 1/2" PLANKING BETWEEN FORMERS F-1 & C-4
CARVED BLOCK
1/2" SHEET ROUNDED & HOLLOWED OUT
3/32" DIA. PUSH ROD
1/8" SHEET SIDES
C.G.
F-3B
BOLTS
FOX "29"
1/8" SHEET BOTTOM
3/16" SQ.
1/8" PLYWOOD MOUNT
1/2" SHEET ROUNDED & HOLLOWED OUT
SOLDER FLAT PC. AT REAR
TIN
TAIL WHEEL FORK
LANDING GEAR
1/8" DIA. WIRE
1/8" PLYWOOD
1/8" SHEET
1/16" PLY'D
NOTE: ALL COCKPIT FORMERS 1/16" PLYWOOD
THIN GASKET MATERIAL FILLET. CEMENTED TO FUSELAGE ONLY
TWO 1/2" SHEETS
VECO 2-1/4" SPONGE WHEELS
FRONT VIEW
PLANKING
MOTOR MOUNT
1/16" PLYWOOD
1/8" SHEET SIDES
1/2" SHEET
3/16" SHEET COWL
WIRE SCREEN
1/8" SHEET
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
PLANS BY AUBREY KOCHMAN

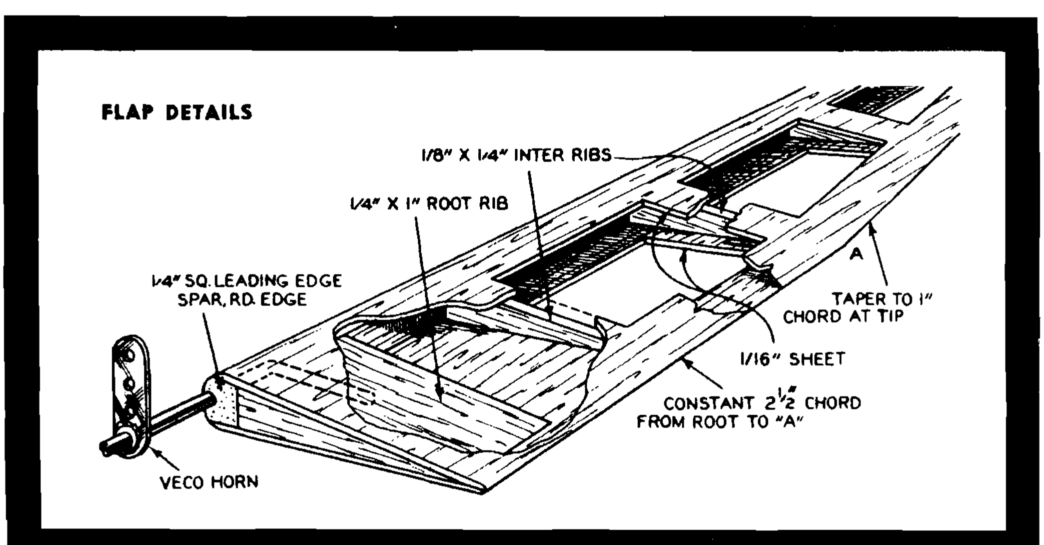
STILL'S STUNT "STUKA"



PRESS-TIME TELEGRAM FROM DON STILL:

"Stuka Wins First Senior Stunt Tangerine Internationals at Orlando, Fla." The big wintertime meet is the largest off-season event of its kind in the world. Congrats, Don!





semi-box fuselage, I chanced on the German Junkers Ju. 87B Stuka which filled the bill.

Some noticeable changes were made, namely the inverted gull wing became a straight wing with a wider chord. Otherwise the cowl, landing gear, tail surfaces, and fuselage remained approximate scale.

This ship was awarded the highest appearance points at the '51 Nats and took second place in the Senior division.

The *Stuka* was designed for medium-sized maneuvers and cannot be made to do tight, un-uniform flip-flops (a fault with most flap ships). Weight should be kept around two pounds, my ship weighing 30 ounces.

Because this ship is designed for the more experienced model builder, conventional construction advice will be omitted. Attention will be placed on unusual details. Construction was begun on the wing. It is of the popular "D" tube type. However, it was found construction time is cut considerably, with no strength sacrifice, by using two 3/16" square main spars instead of the 1/16" sheet spar. Wing alignment is also easier.

Instead of the leading and trailing edge sheeting joining at the wing's center, a full-length 36"x2½"x1/16" sheet is used with a shorted 2½"x 1/16" sheet planking the remainder of the wing's length. Top and bottom full-length sheets are alternated, as are leading and trailing edge sheets. This arrangement distributes your weak joints evenly and toward the tips of the wing.

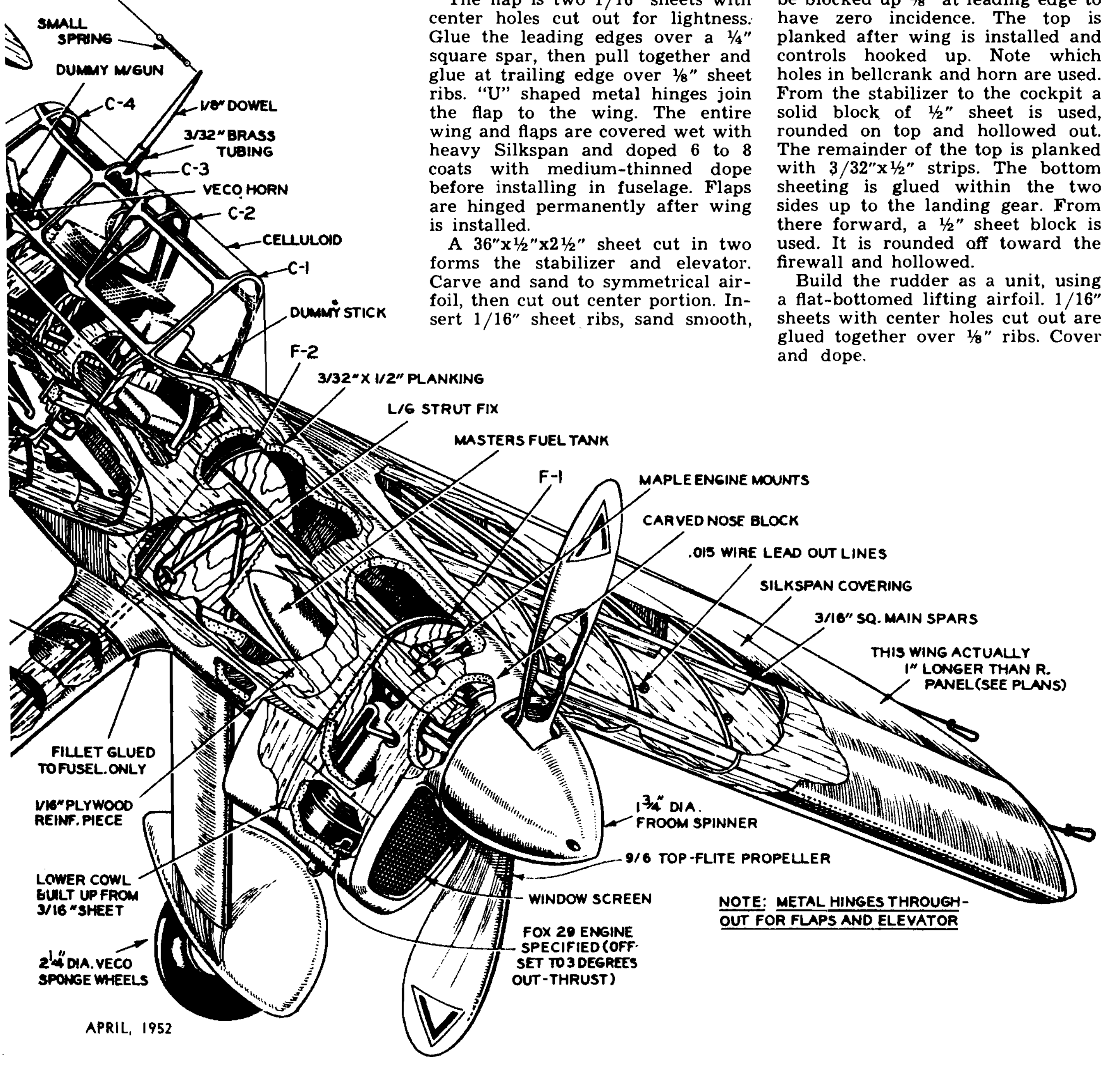
The flap is two 1/16" sheets with center holes cut out for lightness. Glue the leading edges over a ¼" square spar, then pull together and glue at trailing edge over ⅛" sheet ribs. "U" shaped metal hinges join the flap to the wing. The entire wing and flaps are covered wet with heavy Silkspan and doped 6 to 8 coats with medium-thinned dope before installing in fuselage. Flaps are hinged permanently after wing is installed.

A 36"x½"x2½" sheet cut in two forms the stabilizer and elevator. Carve and sand to symmetrical airfoil, then cut out center portion. Insert 1/16" sheet ribs, sand smooth, cover with Silkspan and dope, add horn and join with metal hinges.

Fuselage construction is started around tank. Reinforcements of 1/16" plywood are added to the ⅛" sheet sides. Particular attention must be drawn to motor mounts. They are installed at a slight angle to correspond with the angular setting of the wing and stabilizer, thus putting the stabilizer out of the wing turbulence. The two sides are glued over firewall and landing gear bulkheads, with tank in place. Holes are drilled for installing landing gear before bulkhead is glued in. Landing gear is added later, before top and bottom planking. Now glue fuselage tail together and add bulkheads, giving the fuselage a "V" shape toward the tail.

When the stabilizer is next glued on top of the fuselage sides, it must be blocked up ⅛" at leading edge to have zero incidence. The top is planked after wing is installed and controls hooked up. Note which holes in bellcrank and horn are used. From the stabilizer to the cockpit a solid block of ½" sheet is used, rounded on top and hollowed out. The remainder of the top is planked with 3/32"x½" strips. The bottom sheeting is glued within the two sides up to the landing gear. From there forward, a ½" sheet block is used. It is rounded off toward the firewall and hollowed.

Build the rudder as a unit, using a flat-bottomed lifting airfoil. 1/16" sheets with center holes cut out are glued together over ⅛" ribs. Cover and dope.



Model Builders are INVENTORS, Too!

The ingenuity of the aeromodeler is evident from great number of patents which have been issued to him by U. S. Patent Office

By RAY RUSHER

■ Out of the many United States patents that were issued during the the past few years, well over 100 have had to do with model airplanes, race cars and engines, and with a variety of accessories for the model builder. Possibly one of those gadgets you have worked out for your modelplane is an invention. If so, a patent can be issued to you. Inventors need not be "of age"; if you have really invented something, you are entitled to a patent.

If the Patent Office considers any device you have worked out as being an invention, it will grant you a patent, the life of which is seventeen years and conveys the exclusive right to make, use and sell the invention claimed in the patent. Full information about the procedure can be had by addressing the Commissioner of Patents, Washington 25, D.C.

The main prerequisite to securing a patent is the preparation and filing of a patent application. An application consists of drawings and a description of the invention together with "claims" you make for it.

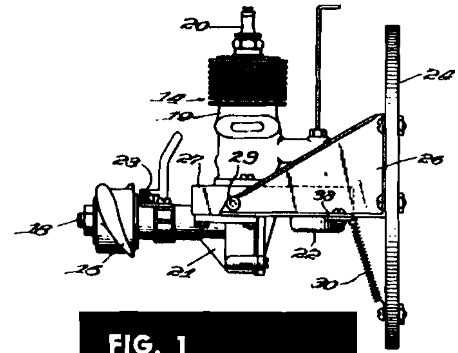


FIG. 1

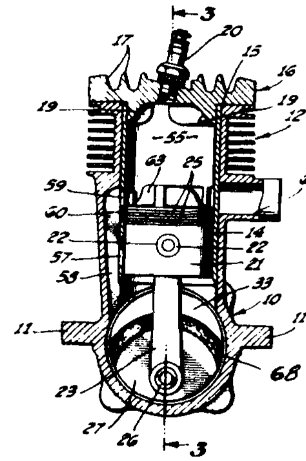


FIG. 2

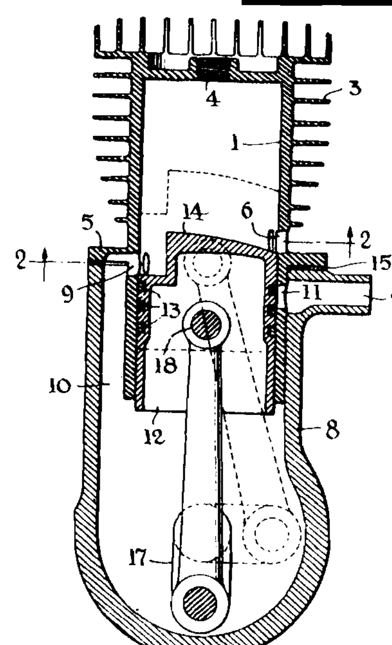


FIG. 3

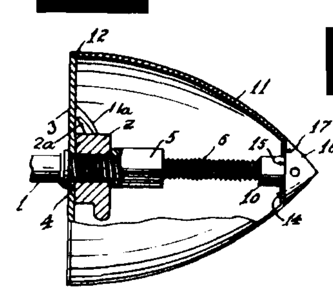


FIG. 4

Fig. 1. One of Carl Goldberg's engine accessories consisted of an engine mounting to prevent broken props. Engine bearers 27 are pivoted at 29 to mounting brackets 26 and are held against stops 33 by springs 30. Most all patent drawings look wild 'n' weird.

Fig. 2. Daman L. McCoy made seveeal improvements on the conventional 2-cycle engine to increase efficiency. Among other features, the shapes of transfer ports 58, baffle 63 on the piston and cylinder head 16 were improved, and the spark plug was set at an angle.

Fig. 3. Charles Brebeck patented stepped piston to reduce mixing fresh gas with exhaust gas. Fresh gas coming in through ports 9 hits step and is deflected upwardly into cylinder while exhaust gas is expelled through parts 6 in opposite side. He runs "OK" motor works.

Fig. 4. Randall E. Froom holds patents on prop spinners. This one solves the problem of mounting spinner back plate 3, the prop hub 2 and spinner 11 on crankshoft 1. Rod 6 screws inta nut 5 for the back plate and prop. Head 16 on rod holds the spinner in position.

Fig. 5. T. R. (Ray) Arden holds many inventions in the model field. This is the Atom engine with adjustable fuel supply. Arden also received patents for an adjustable compression ratio in the old Atom powerplant. A lever was used to raise or lower the cylinder head.

Fig. 6. This is it! Patent #2,292,416 dated Aug. 11, 1942—"controlled captive type toy airplane." Jim Walker filed for this in December, 1940. Note that he also covered the engine control. Authorities consider this the greatest patent in modelplane field.

Fig. 7. We all know that the majority of modelplane engines now use a glow plug rather than spark ignition. Well, here's the beginning of that trend: Kenneth Howie filed an application for glow plug ignition in 1937 and received his patent the following year.

Fig. 8. Here is the unique "control for model airplanes" as patented by Victor Stanzel and known back then in '39 as "G-line" flying. One line utilized. Mr. Stanzel also holds other patents on model plane items as do many of the other inventor-modelers mentioned.

Fig. 9. Kenneth A. Willard's invention for the control of the model elevator was a rubber band 24 for "down" and a control wire 26 for "up" which passes through eyelet 28 to handle from which second line is permanently anchored at wing tip at 27. Tail pivots.

Fig. 10. Most users of spark plug ignition are familiar with the ignition timer patented by Walter C. Austin and Webster Hill. Operates by air compressed by a spring so travel of piston is slowed depending on rapidity with which air is let out of cylinder by the valve.

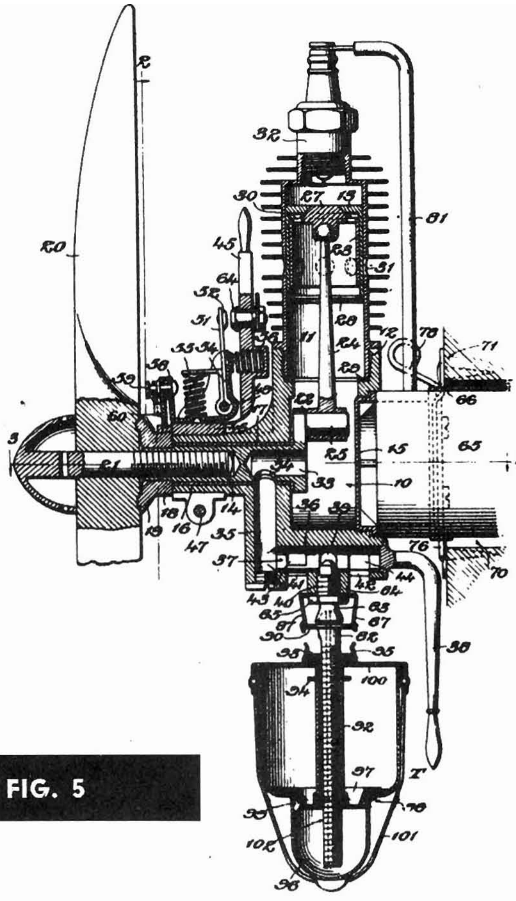


FIG. 5

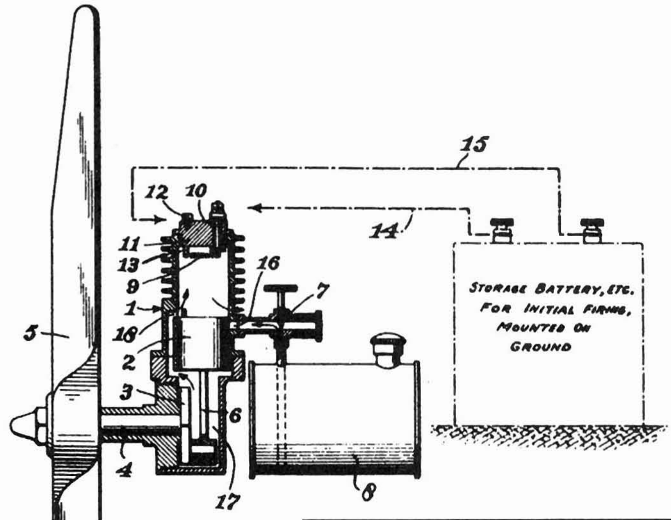


FIG. 7

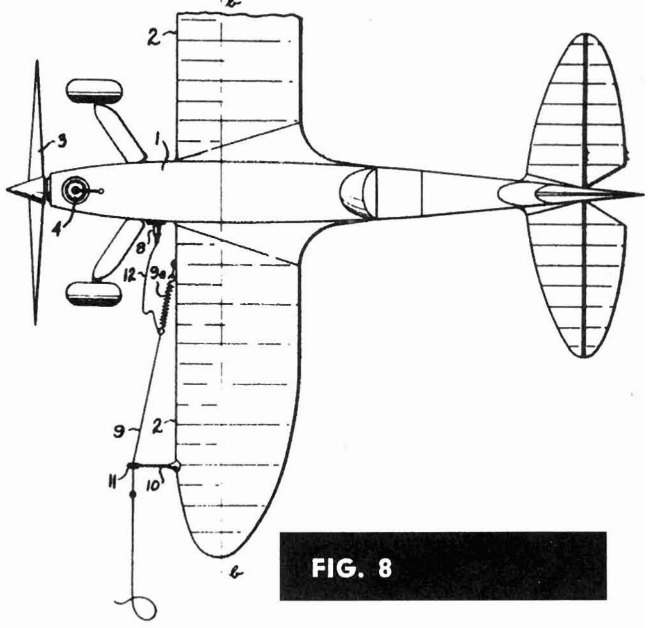


FIG. 8

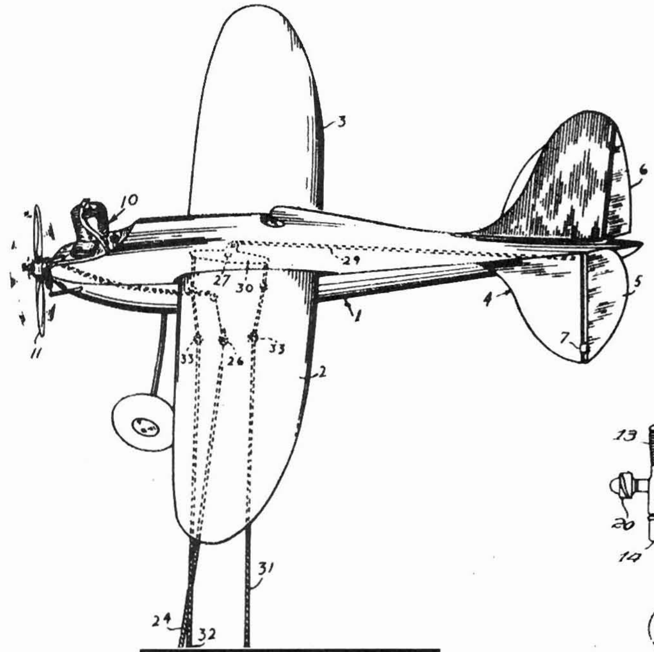


FIG. 6

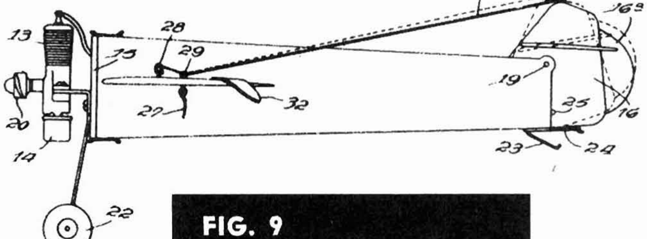


FIG. 9

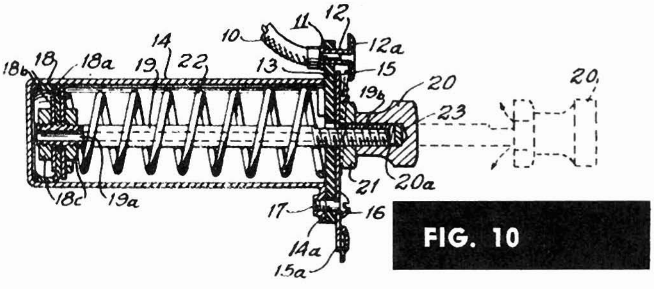
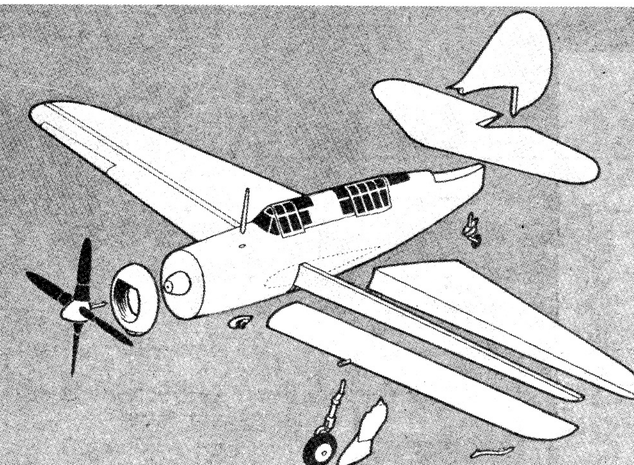
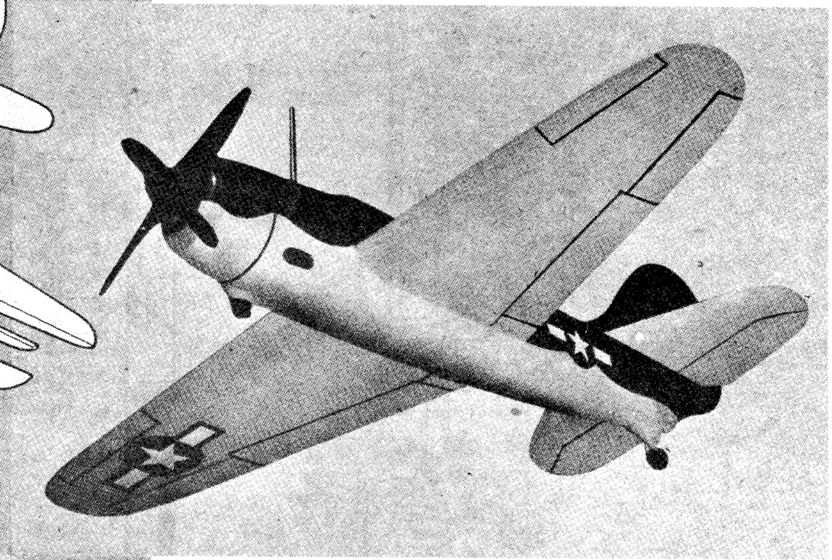


FIG. 10

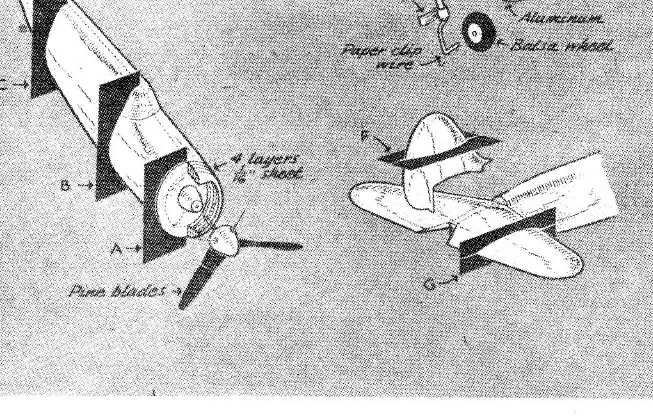




CURTISS HELLDIVER SBC-2

THIS SCOUT-BOMBER WAS THE NAVY'S SUNDAY PUNCH IN THE BATTLE OF THE PACIFIC

by H. A. THOMAS



THE Helldiver was widely publicized prior to its delivery to the Navy, and, as a result, it had a hard, up-hill fight to achieve the performance expected of it. Before the end of the war, however, it had earned its place among the first-line Navy fighting planes. As replacement for the Douglas SBD, the Helldiver is a powerful, carrier-based scout bomber.

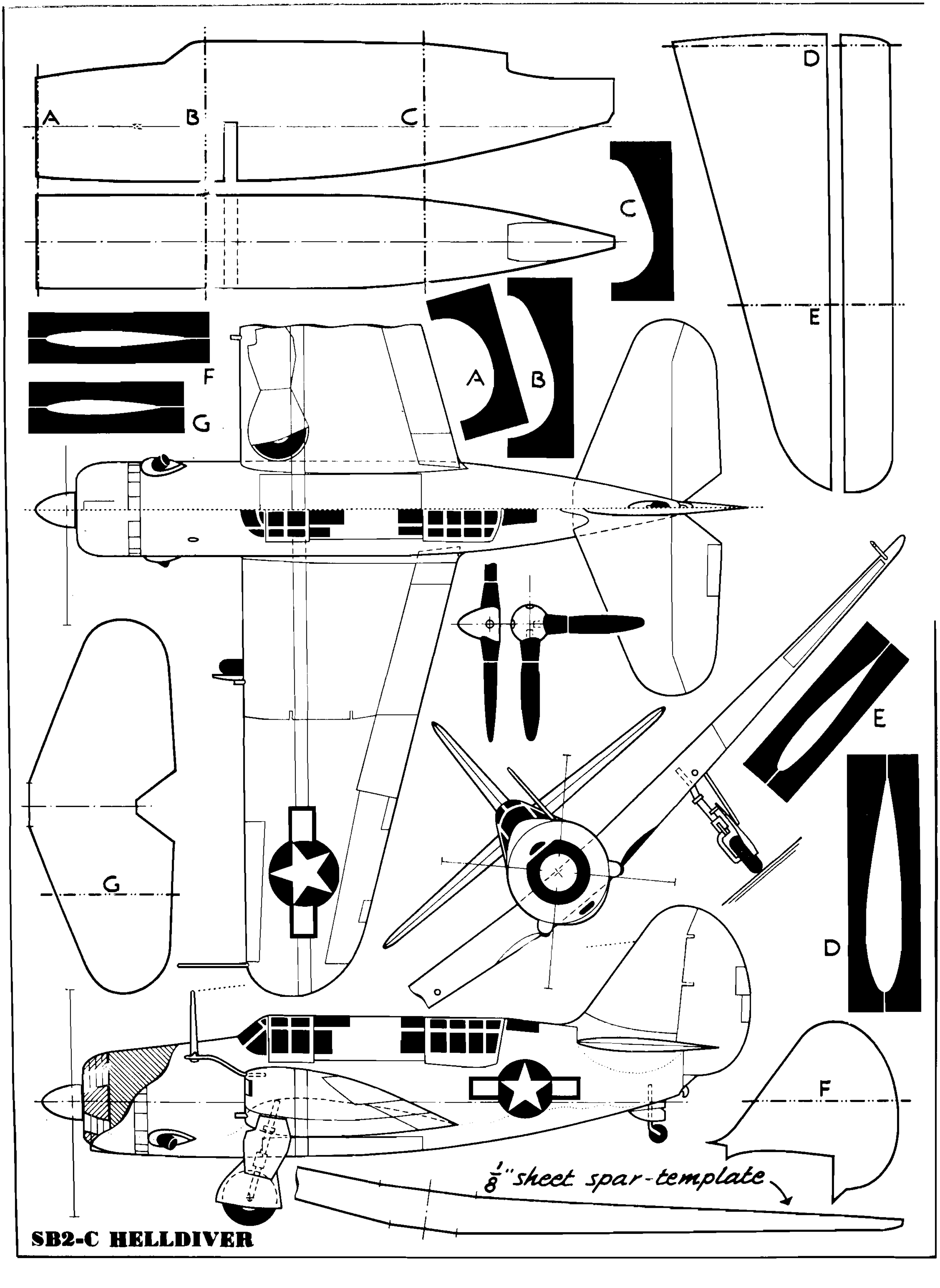
Powered by Wright Cyclone engines, newest SB2C's have four-blade propellers and perforated wing flaps. Radar equipment, droppable wing tanks, rockets, bombs and machine guns are fitted in various combinations. Wings fold upward at a point just outward from the landing gear position. The Helldiver's odd, though graceful, lines provide quick and positive identification. In spite of its size and weight, the SB2C is a fast airplane.

Build the Helldiver model in flight attitude with landing gear in retracted position for pedestal mounting, if you prefer, or follow the plans which indicate the landing gear in extended position. Select firm balsa for all parts; wood too soft or too hard in texture makes the job needlessly difficult. Saw the fuselage block to side, then to top outline. Carve and sand it to contours indicated by the templates. Cement the spar-template into the fuselage slot and assemble the four wing pieces to it.

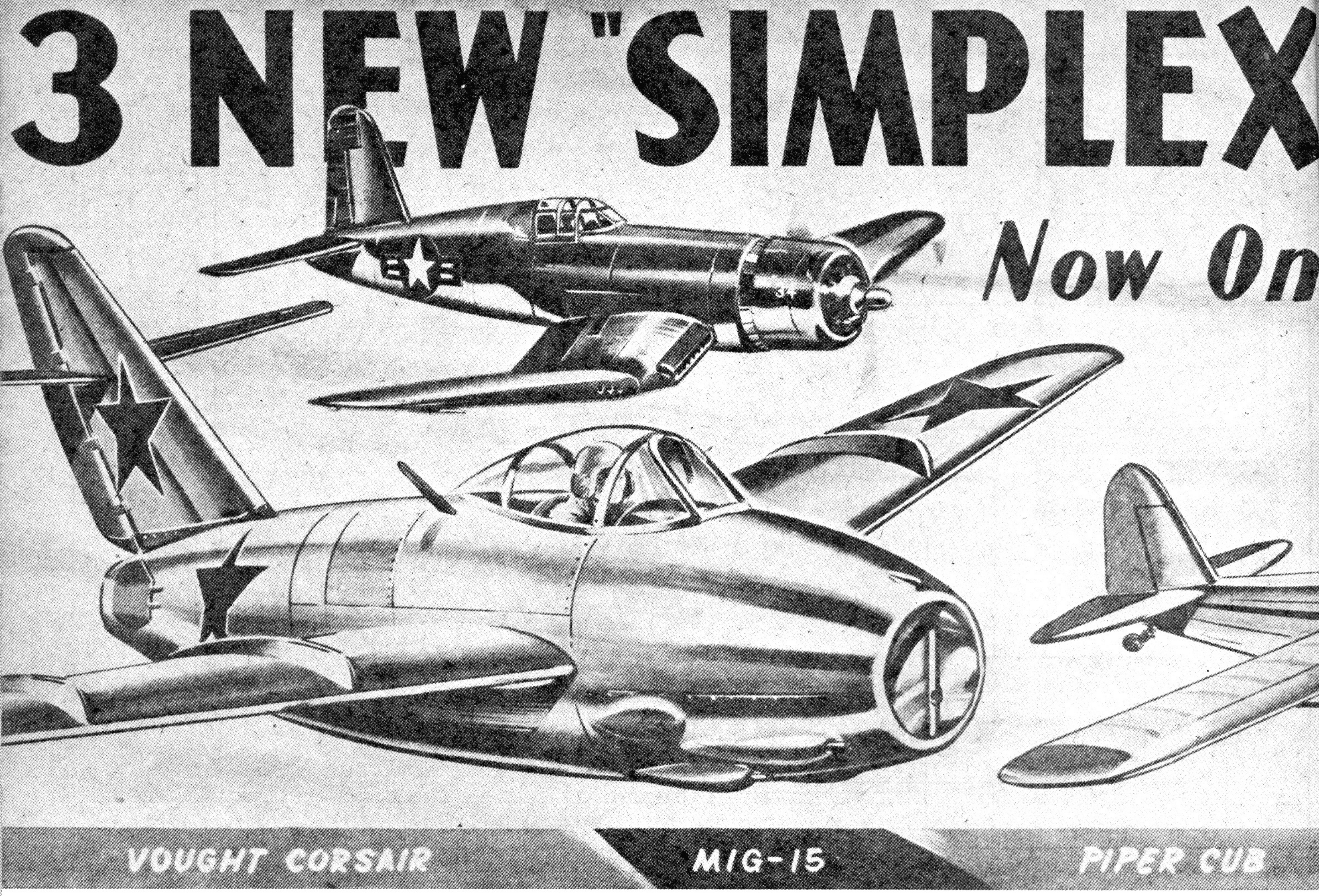
The tail group is shaped and sanded accurately before being fitted to the fuselage. Fillets of talc-dope putty are shaped as indicated on the plans. The engine cowl front portion is made separately of 1/16" sheet layers with grain crossed. This provides the realistic recessed front to the cowl. The dummy crankcase is also a separate piece.

Paper clip wire is easily bent to shape for landing gear struts. Build these up by wrapping with paper strips to simulate the recoil mechanisms. Wheels and propellers may be purchased from your model dealer or they may be carved by hand, using balsa for the wheels and white pine for the propeller blades.

Dope the entire model and fill the grain by applying two or more coats of dope-thinner-talc wood filler. Sand all surfaces smoothly before applying final colored dope. All upper areas are dark blue and lower surfaces are light gray. Recessed parts as well as windows and small details should be painted flat black. Application of decal insignia to wings and fuselage completes the Helldiver model.

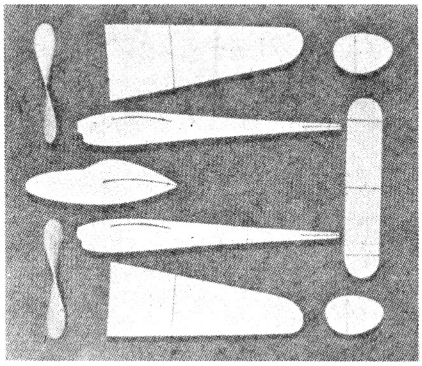


A
B
C
D
E
F
G
1/8" sheet spar-template
SB2-C HELLDIVER



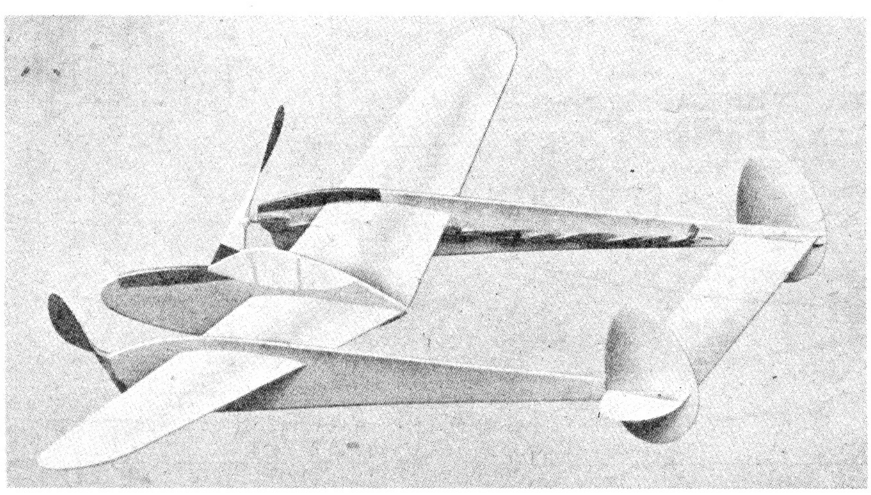
Flying Profiler:

P-38 LIGHTNING



■ Ordinarily, the young modeler would experience difficulty with a model of this type because of the propeller problem. But the neat plastic propellers, now available for a few cents each, eliminate this carving chore and make it possible to complete the ship in very short time.

Built to scale outlines, the Lightning offers surprising realism and is capable of reasonably good performance. Center nacelle and outer engine booms are cut from firm 3/32" thick sheet balsa; other parts are of light 1/32" sheet balsa stock. Shafts and rear hooks are bent from steel straight pins, and the thrust bushings are dural.



Use a sanding block after cutting parts to outline. Smooth all saw marks and bevel trailing edges of wings and tail; the nacelle and engine booms have rounded edges. Wing halves are fitted at center to provide one inch dihedral measured under each wingtip. Pins can help position parts during assembly.

The plastic propellers are of five-inch diameter; their tips were clipped and rounded to clear the center nacelle. Single loops of 1/8" flat T-56 rubber is adequate power. Heavy doping is not recommended because of the weight and warping tendency. Some detail can be indicated and decals added for realism.

For flying, the fins and wingtips can be warped for adjusting, and additional nose weight of modeling clay will be needed for correct balance. Hand gliding, while making these adjustments, should precede powered flights.

—H. A. THOMAS

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Giant 76" Span $7.50
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PreFab
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59¢ "QUICKYS"
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WHEN ORDERING BY MAIL: (If your dealer is out of stock) Do not accept substitutes for C-D's but order direct. Orders under $2 not accepted. (No C.O.D.'s.) Include 35c pack.-post. to all orders up to $3.50, over $3.50 add 10%. (This includes A.P.O. and U.S. Possess.) Foreign customers add 10% for special handling, etc., in addition to pack.-post. charges. Special Delivery in U.S.A. only, 35c extra. Ohio residents: add 3% Sales Tax. Send 5c for illustrated airplane circular.
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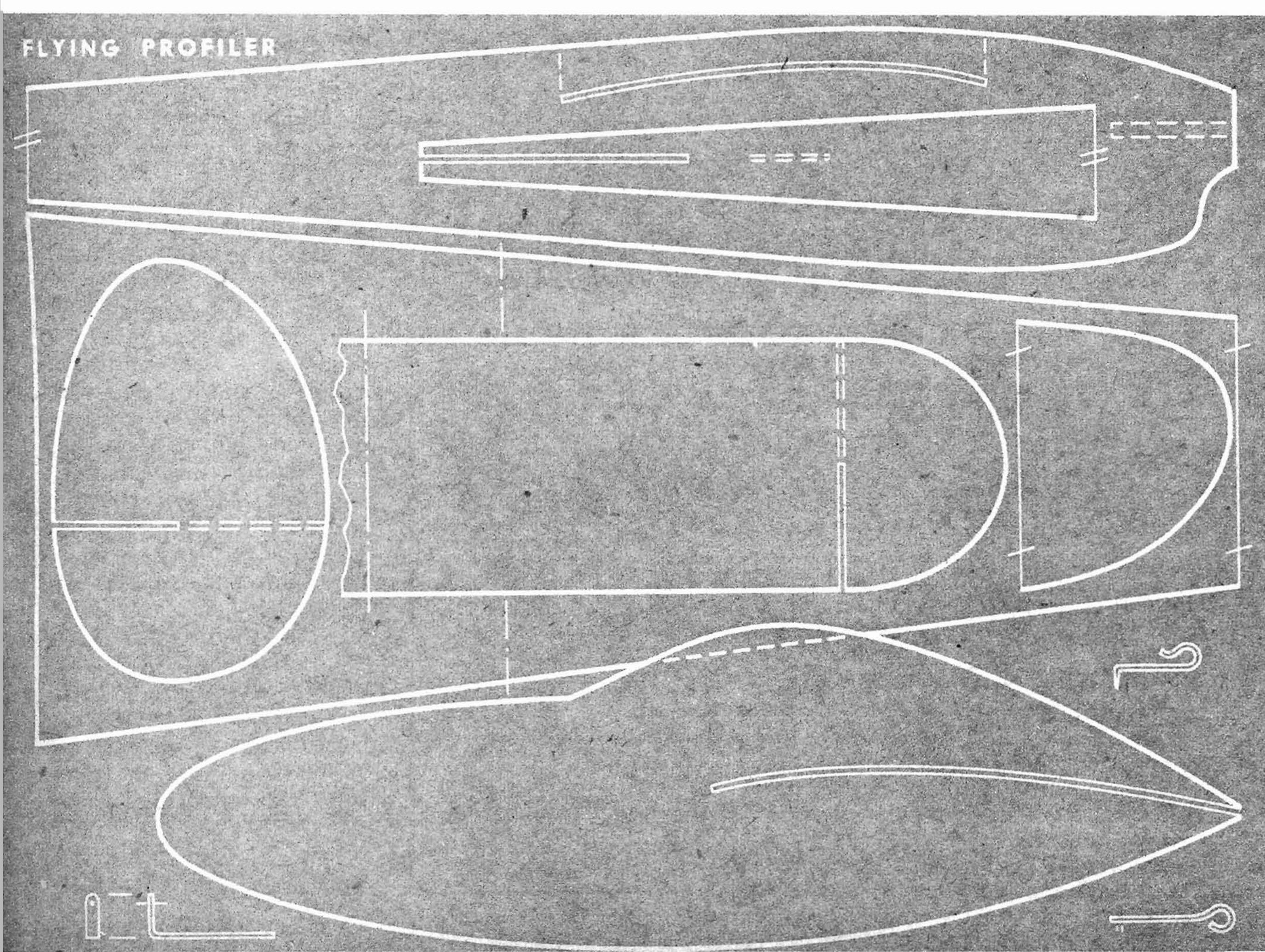
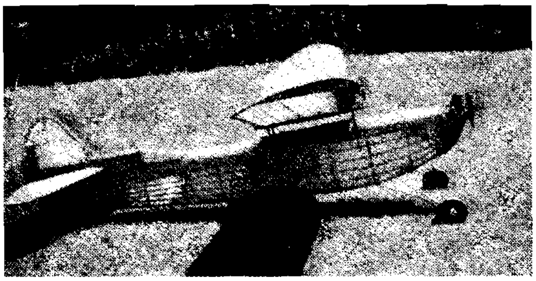


FLYING PROFILER



The student of design will note in these two pictures the requisites of a perfect model.

TEXACO TROPHY WINNER

Five pages of detailed plans and information for duplicating the most renowned gas model of the 1937-8 contest year—the 25th Air Trails championship model presentation.

By Fiske Hanley

In collaboration with Gordon S. Light

THE TEXACO TROPHY is the outstanding award for gas models. All Texaco winners have been outstanding models. Hanley's 1937 winner continues this famous line of models. It incorporates the features which Hanley deemed necessary for a contest winner—fast climb, slow glide, and stable flight. The model lived up to all these requirements despite the fact that it was designed, built and test-flown two weeks before the National Meet.

It's a long way from Fort Worth to Detroit and this accounts for the attention Hanley paid to making his model demountable for ease in carrying. The wing is two-piece, the landing gear is detachable, tail removable, and the motor mount is readily detached.

CONSTRUCTION

It is difficult to include every construction detail in this limited space. Therefore the routine type of construction will be passed over lightly and the special emphasis given to the features which make this model distinctive. All the drawings have been drawn to the scale indicated and measurements can be made directly from the sketches.

FUSELAGE

The basic fuselage structure is built from 3/8x3/8" balsa in conventional fashion. The two side panels are built directly over a full-size layout of the fuselage and then joined by the top and bottom cross-braces. Formers and stringers are added to the top and bottom of this basic structure.

The formers are cut from two-ply 1/8" balsa. A typical former—top and bottom—is shown in the pattern of full-size parts. The other formers will have to be changed slightly to fit their particular location. 1/8" spruce stringers are used both top and bottom.

Two front fuselage formers are cut from 1/4" three-ply hardwood. One of these formers is attached rigidly to the front of the fuselage. The other former is used to make up the motor mount. Cut two motor bearers (pattern shown full-size) from 1/4" plywood. These bearers are nailed and cemented to the former. Spruce pieces—1/4x3/4x4"—are cemented to the inside of these plywood motor bearers.

The motor mount is attached to the fuselage by rubber-and-hooks on each side of the fuselage. The inside surface of the motor mount is lined with 1/4" square balsa which fits inside

Fiske Hanley holding the Texaco Trophy.

ABOUT FISKE HANLEY

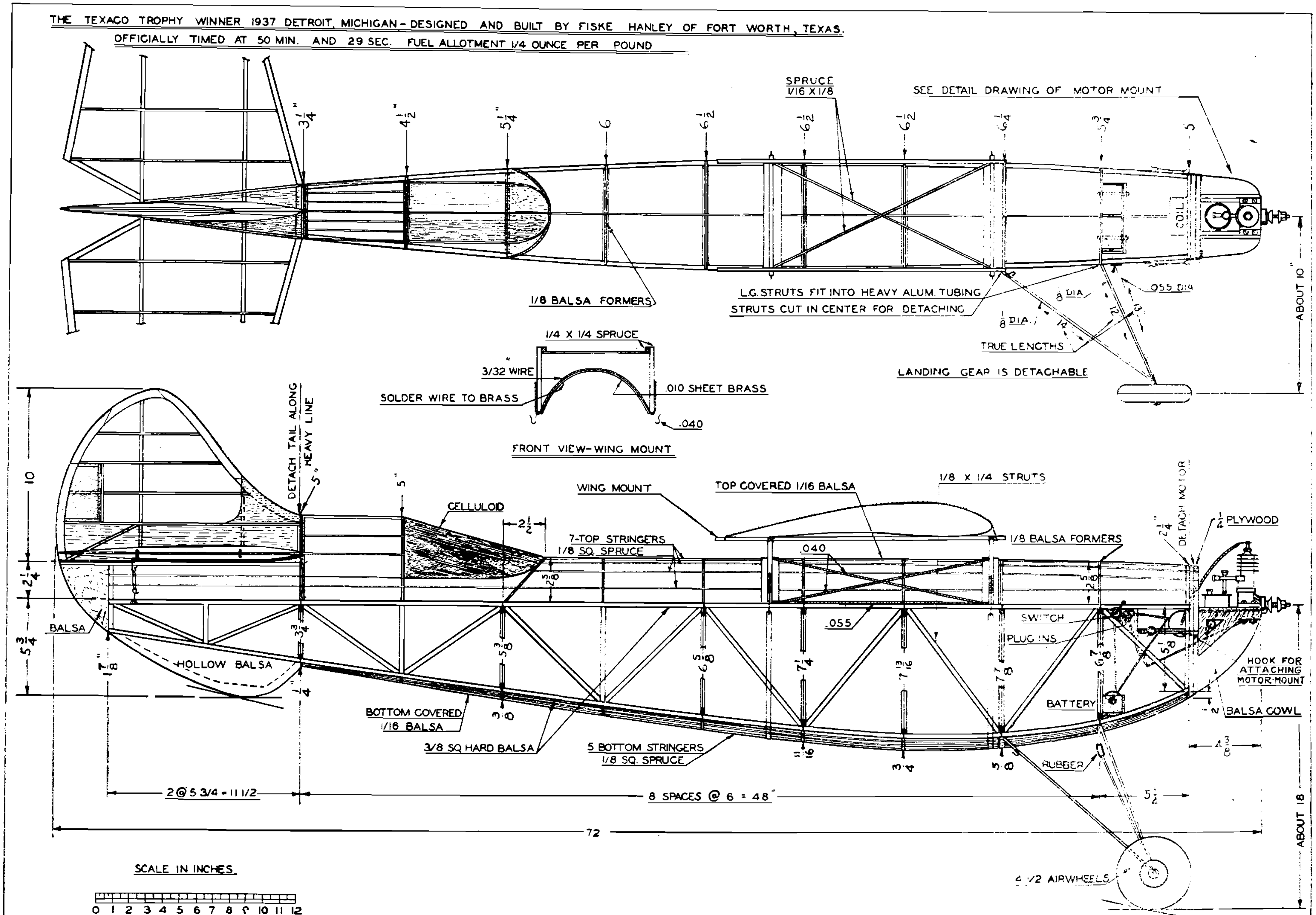
Good flying terrain and equally good flying weather are fast making gas modeling a favorite outdoor sport in Texas, recent though this interest is in that state. Fiske Hanley was one of the first to take up gas modeling in Texas—that was a little more than a year ago. He had ample modeling background for his gas model activities. He started building the "solid" variety when he was just old enough to start school. During the last four years he's been doing good work with flying models.

Last July in Detroit, Hanley earned a championship rating by winning the Texaco Trophy for gas-powered models. He matched a model of his own design and construction against the best in the country. His winning flight of 50 minutes and 29 seconds was well out in front. (His model landed in the Detroit River on the Canadian side.) The long trip from Fort Worth to Detroit hadn't dimmed the flying brilliance of his design.

About a year ago, Hanley's first gas model won the all-Texas meet. The prize was a Brown motor. It was with this motor that he later won the Texaco Trophy. Hanley is a member of the Fort Worth Gas Model Club and has placed well up in the regular monthly contests. The club has the enviable record of having a member take first in every contest the club has entered. As Hanley puts it, "We don't use big words for our model aerodynamics, but we sure do get results."

At present Hanley is finishing up his high school courses and plans on taking aeronautical engineering at the North Texas Agricultural College.

Hanley and his fellow-Texans have come a long way in the gas model hobby. Other modelers will do well to follow their work closely.



THE TEXACO TROPHY WINNER 1937 DETROIT, MICHIGAN - DESIGNED AND BUILT BY FISKE HANLEY OF FORT WORTH, TEXAS.
OFFICIALLY TIMED AT 50 MIN. AND 29 SEC. FUEL ALLOTMENT 1/4 OUNCE PER POUND
SPRUCE 1/16 X 1/8
SEE DETAIL DRAWING OF MOTOR MOUNT
COIL
1/8 BALSA FORMERS
L.G. STRUTS FIT INTO HEAVY ALUM. TUBING
STRUTS CUT IN CENTER FOR DETACHING
.055 DIA
TRUE LENGTHS
LANDING GEAR IS DETACHABLE
ABOUT 10"
1/4 X 1/4 SPRUCE
3/32" WIRE
SOLDER WIRE TO BRASS
.010 SHEET BRASS
.040
FRONT VIEW-WING MOUNT
DETACH TAIL ALONG HEAVY LINE
CELLULOID
WING MOUNT
TOP COVERED 1/16 BALSA
1/8 X 1/4 STRUTS
DETACH MOTOR
1/4 PLYWOOD
7-TOP STRINGERS
1/8 SQ. SPRUCE
1/8 BALSA FORMERS
.040
.055
SWITCH
PLUG INS
HOOK FOR ATTACHING MOTOR MOUNT
BALSA
HOLLOW BALSA
BATTERY
BALSA COWL
BOTTOM COVERED 1/16 BALSA
3/8 SQ HARD BALSA
5 BOTTOM STRINGERS 1/8 SQ. SPRUCE
RUBBER
2@5 3/4 = 11 1/2
8 SPACES @ 6 = 48"
72
ABOUT 18
SCALE IN INCHES
0 1 2 3 4 5 6 7 8 9 10 11 12
4 1/2 AIRWHEELS

the opening cut in the front fuselage former and helps hold the motor mount in position.

Batteries are replaced inside the front of the fuselage by taking off the motor mount. Clips are cemented to the motor mount to facilitate taking off the motor.

LANDING GEAR

The landing gear is demountable. The 1/8" diameter wire struts fit into extra-thick aluminum tubing which is cemented and wrapped to the bottom of the 3/8x3/8" longerons. A "V" strut of .055 wire joins the two halves of the landing gear. It is attached with rubber bands to a similar strut fastened to the bottom of the fuselage. Rubber bands are used to connect the two sets of 1/8" diameter struts to keep them in place in the aluminum-tube sockets.

RUDDER

The bottom part of the rudder is cut from balsa and cemented to the bottom of the fuselage. Hollow out the inside of the balsa to reduce unnecessary weight at the rear of the model. A balsa block is added to the rear tip of the fuselage to round out the shape. The rudder is streamlined into the cockpit.

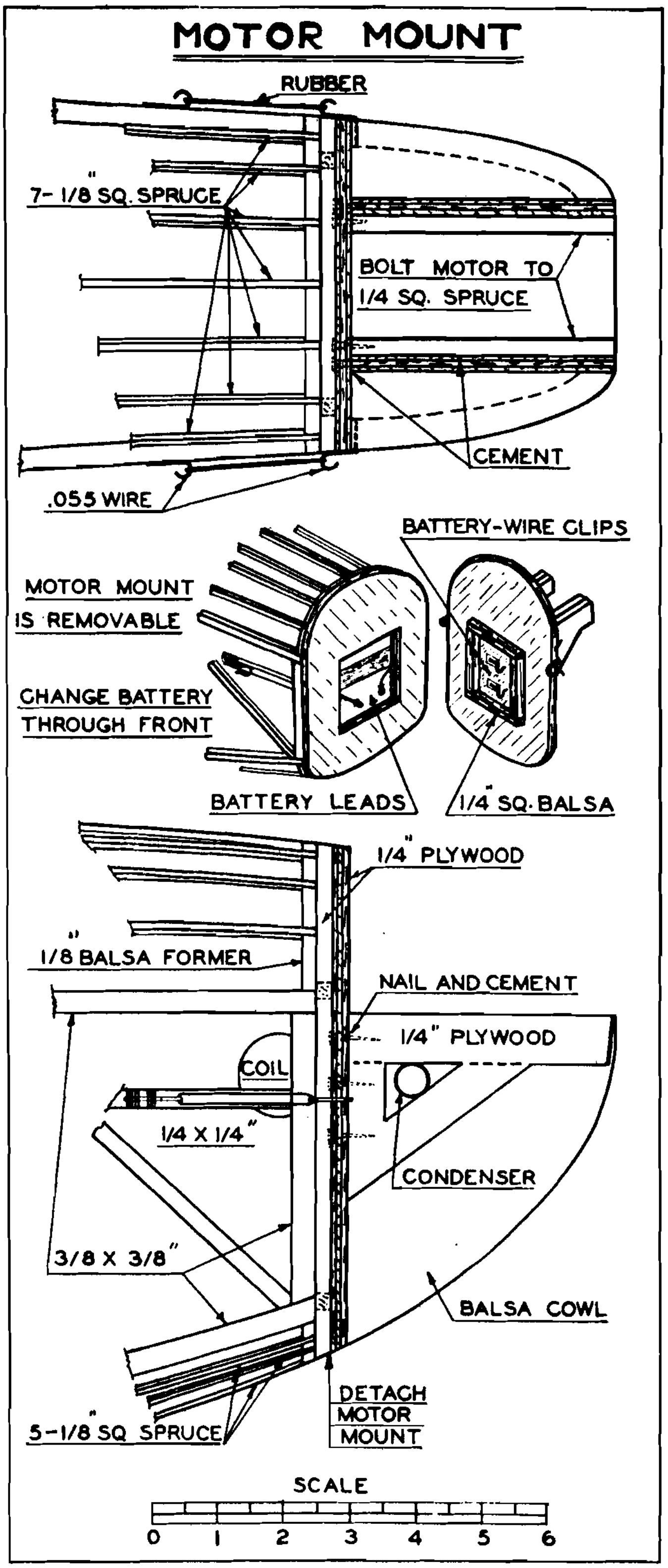
You'll notice from the drawing that the rudder-elevator unit is demountable from the fuselage. It is held in place on the fuselage by rubber-and-hooks at the leading edge and the rear spar of the elevator. A movable tab is built into the rudder. It is intended for making minor changes in rudder setting. Soft wire can be used for hinges. Ribs are symmetrical. The longest rib has a maximum thickness of 1¼" and the others vary accordingly.

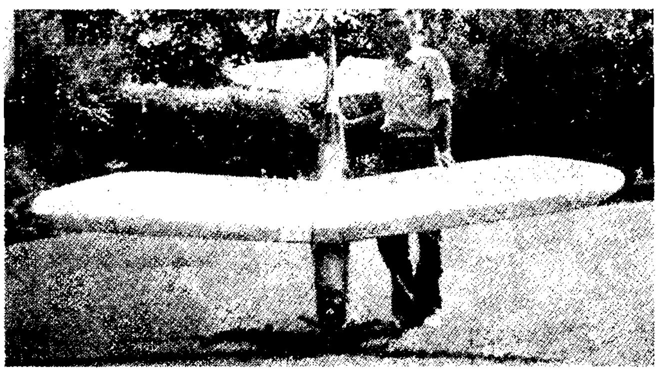
ELEVATOR

The elevator is rigidly built into the rudder. A streamline or symmetrical airfoil shape is used. The thickness of the center rib is about 1". The shorter ribs are tapered to form a smooth surface. The tips and the center are covered with 1/32" sheet balsa. The elevator should be mounted at zero incidence—referred to the top fuselage longerons. The tail assembly must be kept light-weight or the plane will be tail-heavy.

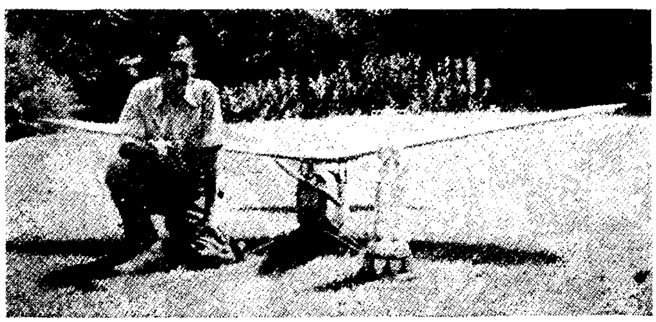
WING

The wing is built in two pieces—detachable at the center section. The rubber which holds it onto the wing mount also holds the two halves of the wing together. The spars are spruce up to the 4th rib from the center. At the center section these spars are covered with 1/32" plywood and silk. The other



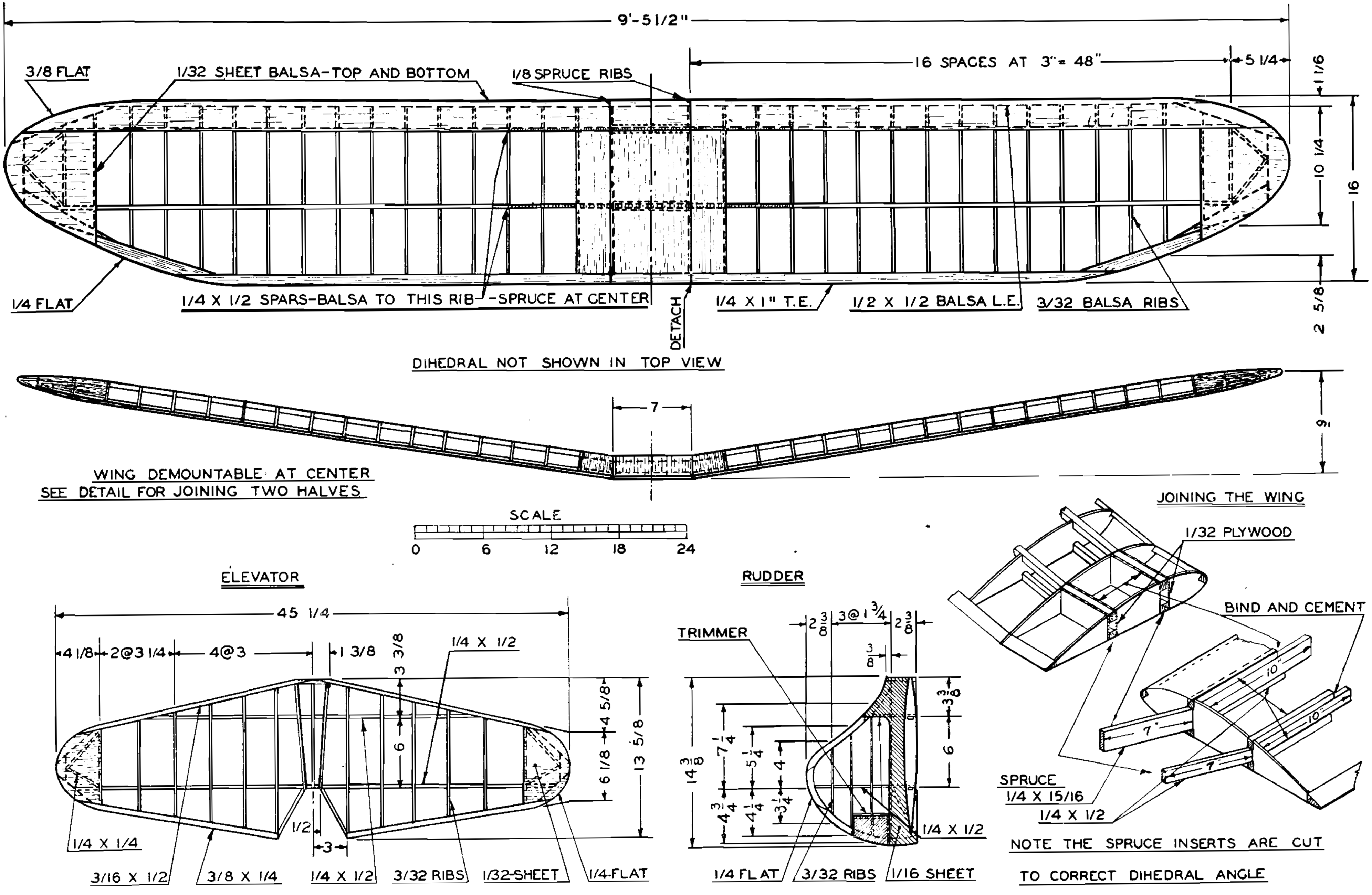


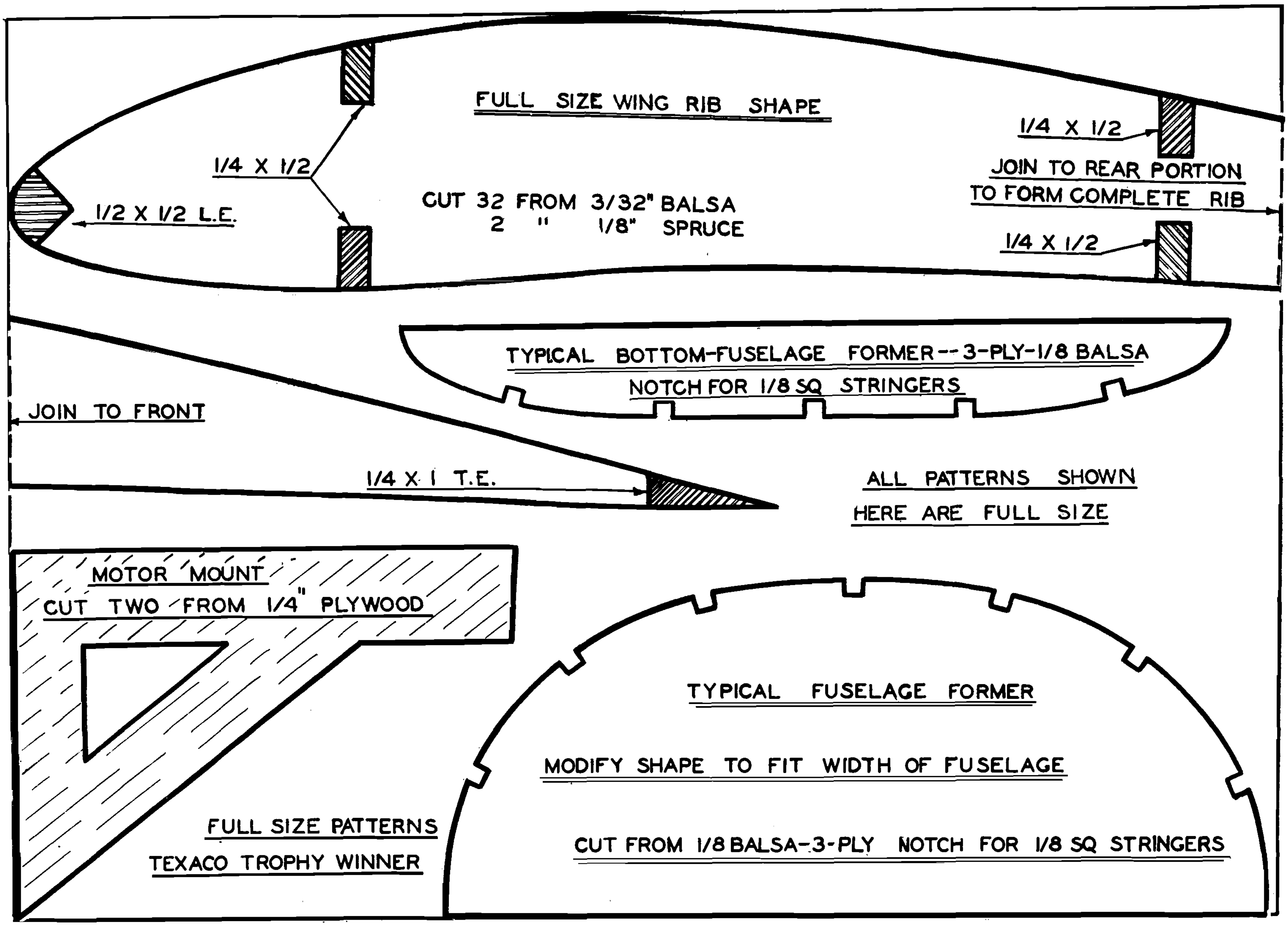
The model is a large one; its construction features many interesting fine points.



Fiske Hanley, the Texaco winner, and the Texaco Trophy.

WING DETAIL TEXACO TROPHY WINNER




FULL SIZE WING RIB SHAPE
1/4 X 1/2
1/2 X 1/2 L.E.
CUT 32 FROM 3/32" BALSA
2 " 1/8" SPRUCE
1/4 X 1/2
JOIN TO REAR PORTION
TO FORM COMPLETE RIB
1/4 X 1/2
TYPICAL BOTTOM-FUSELAGE FORMER -- 3-PLY-1/8 BALSA
NOTCH FOR 1/8 SQ STRINGERS
JOIN TO FRONT
1/4 X 1 T.E.
ALL PATTERNS SHOWN
HERE ARE FULL SIZE
MOTOR MOUNT
CUT TWO FROM 1/4" PLYWOOD
TYPICAL FUSELAGE FORMER
MODIFY SHAPE TO FIT WIDTH OF FUSELAGE
FULL SIZE PATTERNS
TEXACO TROPHY WINNER
CUT FROM 1/8 BALSA-3-PLY NOTCH FOR 1/8 SQ STRINGERS

TEXACO TROPHY

side has a spruce insert between the spars which fits into the center section. This method of making a two-piece wing is popular in Texas.

The leading edge of the wing is covered with 1/32" sheet balsa back to the first spar—top and bottom. Therefore, the front parts of the ribs will have to be notched to receive the sheet balsa. In the full-size pattern, the exact rib pattern is shown. The notch for the sheet balsa is not included.

WING MOUNT

The mount is rounded to fit the top of the fuselage. Spruce is used, adequately braced with piano wire diagonals. The mount should be rigid enough to hold the wing without any possible twisting in flight. It is attached to the fuselage by rubber bands.

COVERING

The model is covered with bamboo paper except over the sheet balsa covering, which is silk-covered. In covering sheet balsa with silk, take care to work out all the wrinkles. Dope all parts of the model with at least two coats of medium thick dope.

FLYING

The approximate fore and aft position of the wing is shown in the drawing. Naturally, this will vary with the particular model. Move the location of the wing mount until the model trims at about one-third back from the leading edge. 1/8" incidence is put into the wing. That is, the front top-edge of the mount should be 1/8" higher than the rear as measured from the top fuselage longerons. The elevator and the rudder are both set at zero angles.

The model seems to have considerable torque effect. Hanley used ample right-thrust in the motor. After take-off, the model climbs about 25 feet, then turns to the left and appears to be diving at the ground, but is in reality flying level. When it gains enough speed down-wind it starts climbing to the left. As long as the motor runs it makes left circles. The glide is in right circles. 250- to 300-foot diameter circles have been found most convenient for both power flight and glide.

ADDITIONAL ITEMS

The total weight of the model ready to fly is 6 pounds. Minor changes and repairs have boosted the weight to 6½ pounds without any effect on the flights.

An important feature of this type motor mount is that it is shock-absorbing as well as demountable for servicing and carrying.

MATERIAL

(Balsa unless otherwise noted)

Fuselage

8 3/8x3/8x66" longerons, bracing
8 1/4x1/8x12" diagonals
1 1/4x5x11" hardwood 3-ply, motor mount and fuselage formers
14 1/8x1/8x48" spruce stringers
1 1/4x3/4x8" spruce motor mount
5 1/16x2 5/8x24" top-fuselage formers
4 1/16x3/4x24" bottom-fuselage formers
1 1/8" I.D.x12" heavy aluminum tubing
5 ½ ft. 1/8"-diameter wire
2 ½ ft. .055-diameter wire
2 7/8x1½x12" bottom of rudder
2 2½x4x5" motor cowling
1 ½x1 7/8x3" rear tip of fuselage
18 1/16x2x24" top and bottom covering
1 10x12" sheet celluloid cockpit covering
2 4½"-diameter airwheels
1 ignition switch
2 auxiliary battery plug-ins
2 battery-wire clips

Wing

8 1/4x1/2x40" spars
4 1/4x1/2x27" spruce spars
2 1/4x2½x17" spruce inserts
2 1/32x2x14" hardwood 3-ply center section
2 ½x½x45" leading edge
1 ½x½x7" leading edge center-section
2 1/4x1x38" trailing edge
1 1/4x1x7" trailing edge center-section
2 3/8x1x10" tip
2 1/4x1 3/8x16" tip
2 1/4x1 3/4x7" tip
16 3/32x2 1/4x24" ribs
1 1/8x2 1/4x24" spruce center ribs
12 3/32x3x36" wing covering
4 1/4x1/4x18" spruce wing mount
2 1/8x1/4x16" spruce wing mount
2 ½ ft. 3/32" diameter wire wing mount
2 .010x1x10" sheet brass wing mount
5 ft. .040 wire wing mount

Elevator

2 3/16x1/2x21" leading edge
2 1/4x3/8x18" trailing edge
1 1/4x1/2x43" spar
1 1/4x1/2x33" spar
2 1/4x1x16" tips
7 3/32x1x24" ribs
5 1/32x2x12" tips
1 1/4x1/4x14" tips.

Rudder

2 3/32x1x18" ribs
2 1/32x2x18" covering
1 1/4x1x24" outline
1 1/4x1/2x14" spars

Additional Items

1 qt. cement
1 qt. dope
10 sheets bamboo paper (24x36")
4 brads, soft wire, thread
2 yds. silk covering for sheet balsa

The Stoner-Stapilus design features a combination of rectangular and triangular fuselage cross-sections.

THE STOUT TROPHY WINNER

By Roy E. Stoner and Peter Stapilus

In collaboration with Gordon S. Light

Complete plans for reproducing the model that won the Stout outdoor event with a flight of 12:52.2—the 25th Air Trails championship model.

CAREFUL refinement of every part has resulted in a reliable and dependable contest model. The 12:52.2 flight last July in Detroit proved the value of design changes which Stoner and Stapilus have been making in this model ever since its origin back in 1935. Originally, the model had a straight wing, symmetrical stabilizer, and a motor stick. The changes they've made are obvious from the drawings and photos. But even further changes have been made since the model's winning flight last year. Photo of the most recent Stoner-Stapilus model is included with the views of the winning model itself. The plans and instructions describe the model flown by Stoner last July in Detroit.

FUSELAGE

The fuselage drawing is drawn to scale—the 1" divisions are indicated around the outside margin. Dimensions not indicated can be scaled off the drawing.

The three views of the fuselage point out that the cross-sectional shape changes from a rectangle to a triangle. The two bottom longerons fair into a single longeron about halfway back. 1/8" square hard balsa is used throughout the fuselage. The entire fuselage on the winning model was covered with 1/16" sheet balsa inlaid between the longerons and struts—flush with the outside edges. As a substitute, 1/32" sheet can be used to cover the outside of the fuselage. Apply it on the outside of the longerons and struts—bending it to the shape of the fuselage.

ABOUT STONER AND STAPILUS

Roy Stoner with a recent version of the 1937 Stout winner.

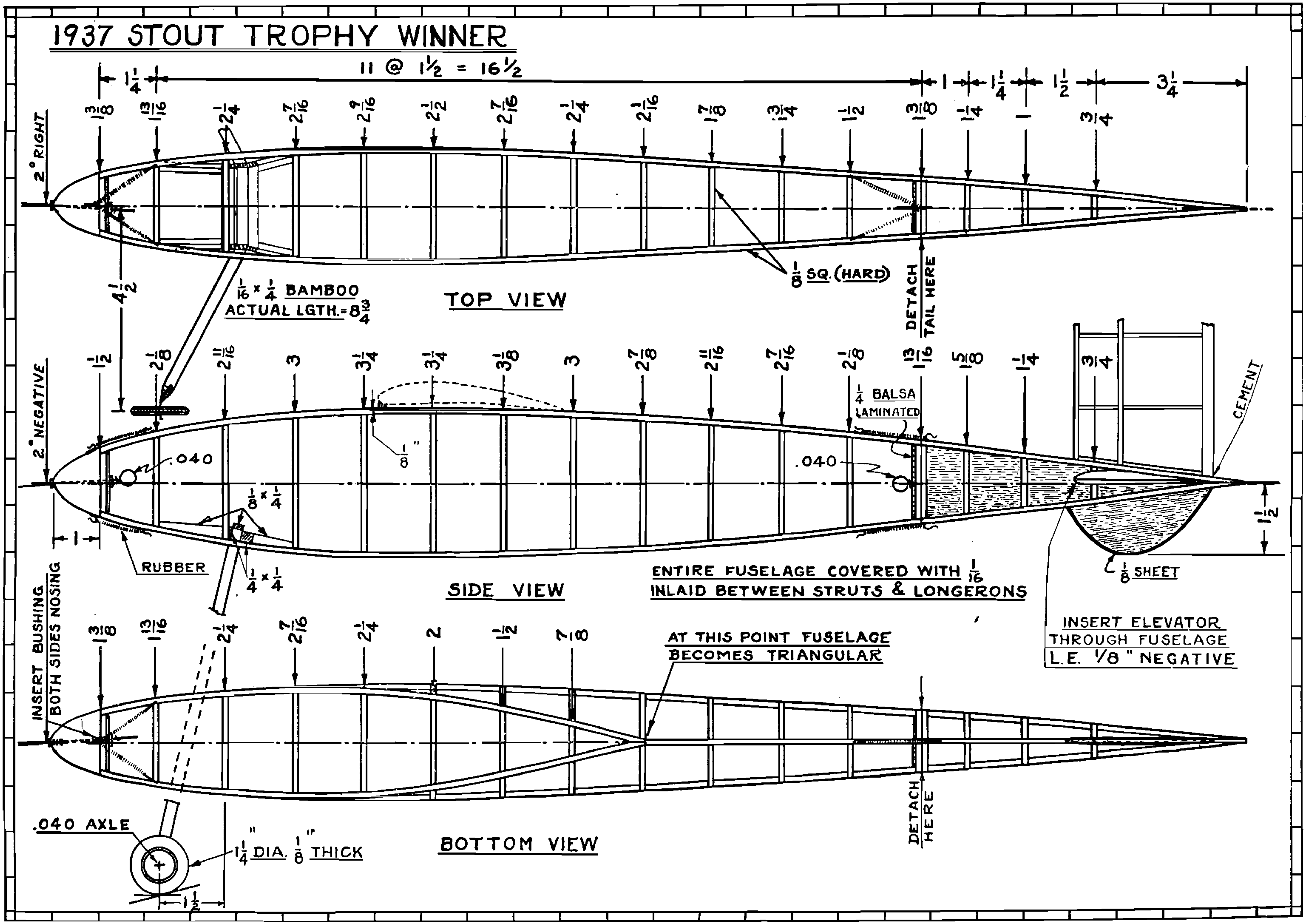
The Stout Outdoor Trophy Winner is the result of three years of design refinement with one particular type. The work was started in the early part of 1934 by Roy Stoner and Peter Stapilus, modeling partners of Rockford, Ill. In 1935 a model of their design set a new city record of 13:45, flying more than 7 miles. They spent the next several months cleaning up their design and by 1936 they were ready to go places.

Stoner and Stapilus both entered the Madison (Wis.) State Centennial Contest. Stoner took two firsts—fuselage and glider—and won the junior high-point trophy. Stapilus took second in the senior glider event. From Madison they traveled to Detroit for the 1936 Nationals. Roy took seventh in the Stout Outdoor event.

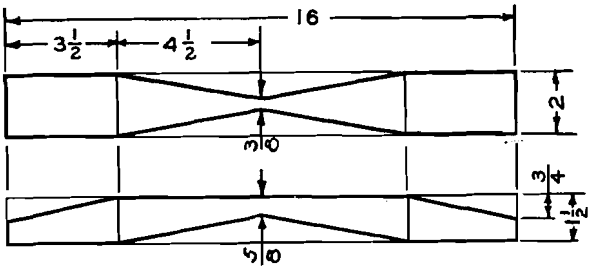
The 1937 National Meet in Detroit proved to be Stoner's big year. The Stout Trophy was his after a record-breaking flight of 12:52.2. His modeling partner, Stapilus, had bad luck. In a test flight his model struck a fence and snapped a propeller blade. By the time the repairs were completed, helpful thermals were not available for long flights.

The success of these two Rockford boys proves the policy of developing a particular design until it has reached its maximum in performance. Winning the Stout Trophy doesn't mean the end of development with this model. Improvements have been made since last July and the Stoner-Stapilus design bids well to turn in an even better showing in Detroit this summer.

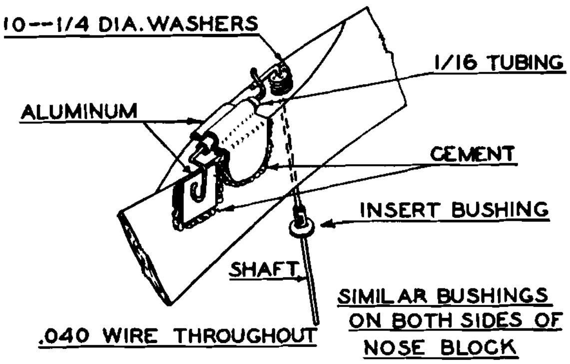
Peter Stapilus with a single pusher of his own design.


1937 STOUT TROPHY WINNER
11 @ 1½ = 16½
2° RIGHT
1/16 x 1/4 BAMBOO
ACTUAL LGTH. = 8 3/4
1/8 SQ. (HARD)
TOP VIEW
DETACH TAIL HERE
2° NEGATIVE
.040
1/8"
1/4 BALSA LAMINATED
CEMENT
1/8 x 1/4
1/4 x 1/4
RUBBER
SIDE VIEW
ENTIRE FUSELAGE COVERED WITH 1/16
INLAID BETWEEN STRUTS & LONGERONS
1/8 SHEET
INSERT ELEVATOR
THROUGH FUSELAGE
L.E. 1/8" NEGATIVE
INSERT BUSHING
BOTH SIDES NOSING
AT THIS POINT FUSELAGE
BECOMES TRIANGULAR
DETACH HERE
.040 AXLE
1 1/4" DIA. 1/8" THICK
BOTTOM VIEW

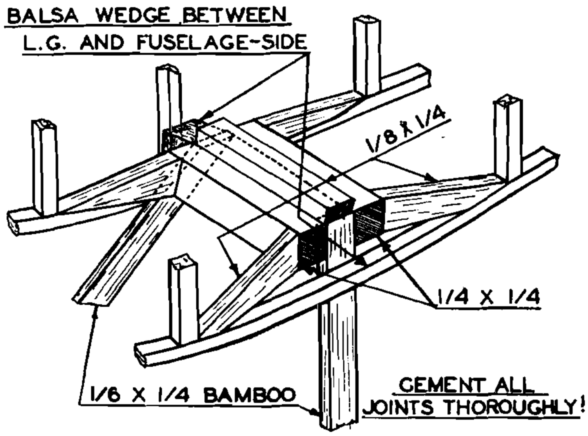
PROPELLER LAYOUT



MEDIUM GRADE-STRAIGHT GRAINED



LANDING GEAR DETAIL



The rear section of the fuselage is detached at a point 7″ from the rear end. The tail section fits into the forward part in pluglike fashion. ¼″ laminated balsa is cemented inside the tail section to serve as an anchor for the rear hook and a plug to fit the opening in the front part of the fuselage.

The bottom portion of the rudder is made from ⅛″ sheet balsa cut to streamline shape. It is an integral part of the fuselage and serves as a tail skid.

Cut the nose block from balsa 1¼x1⅜x1½″. When drilling the hole for the propeller shaft, note the 2 degrees right- and 2 degrees left-thrust. Bushings are inserted into both sides of the nose block.

Bamboo landing struts are rigidly fastened to the fuselage. Careful precautions have been taken to prevent the struts (1/16x¼″) from breaking loose under rough landings. The method of anchoring the struts is shown in the sketch (not drawn to scale). ⅛x¼″ balsa is cemented across the top of the struts to prevent pushing through the fuselage. In addition balsa wedges are inserted between the struts and the sides of the fuselage. These wedges can be cemented directly to the sheet balsa fuselage-side.

The landing gear struts are 8¾″ long. Landing gear tread is 9″ and the wheels are moved 1½″ forward of the strut-fuselage junction. The corners of the bamboo struts should be rounded off until the strut is oval cross-section.

Nosing and tail section are secured to the main section of the fuselage with rubber bands and hooks. Fine-wire hooks are cemented to the fuselage (top and bottom, front and rear). Similar hooks are cemented to the nosing and tail section. On their most recent model, Stoner and Stapilus have discarded this method in favor of extra-tight plugs—front and rear—which remain fixed to the fuselage even after the tension of the rubber motor disappears.

WING AND TAIL SURFACES

The drawing of the wing and tail surfaces is to scale as indicated by the 1″ divisions marked around the border. Any additional dimensions can be readily scaled.

Only the center wing-rib has been shown full size. The slight taper (4″ to 3½″) makes it possible to use practically the same rib throughout with slight modifications in length and thickness to suit the particular position. For a truly accurate taper-wing, each rib can be plotted from the table of ordinates given below the rib pattern.

All ribs—wing, stabilizer, and rudder—are cut from 1/16″ balsa. 1/16″ diameter bamboo tips are used on the three surfaces. The bamboo is pointed and inserted into the balsa leading and trailing edges. The top surface of the wing is covered with 1/16″ balsa inlaid between the ribs and leading and trailing edges.

FULL SIZE RIB PATTERNS

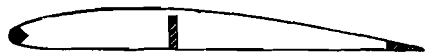
EIFFEL 431

WING-RIB-CENTER

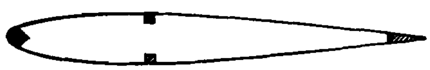
CUT FROM 1/16 BALSA

%	UPPER	LOWER	%	UPPER	LOWER
0	3.00	3.00	40	12.20	2.80
2 1/2	5.78	.56	50	11.50	2.50
5	7.10	.14	60	10.00	1.80
10	8.90	.30	70	8.00	1.20
15	10.45	.82	80	5.70	.80
20	11.40	1.50	90	3.00	.40
30	12.30	2.50	100	.00	.00

ORDINATES OF EIFFEL 431 AIRFOIL SECTION



ELEVATOR RIB-9 RQD.-1/16 BALSA

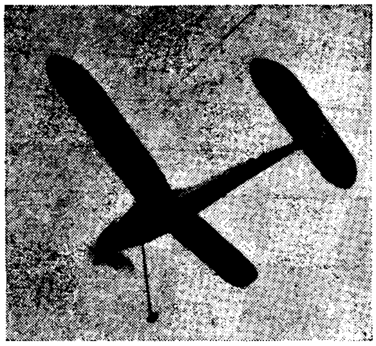


RUDDER RIB-5 RQD.-1/16 BALSA

The bottom surface of the wing is covered with sheet balsa up to the first rib. It is inlaid flush with the edge of the ribs and spars.

Both sides of the top of the rudder are covered with thin aluminum foil to help keep the model in sight on long flights. The sun flashing on the bright rudder and the highly polished propeller proves a definite help in adding seconds to the length of flight before passing out of sight.

The rudder is cemented directly to the top of the fuselage, the last rudder rib being beveled to the slope of the rear of the fuselage. The elevator is inserted through the rear of the fuselage. The 1/16" sheet balsa covering on the fuselage is cut to fit the elevator. The incidence is 2 degrees negative—that is, the leading edge is dropped about 1/8" below the trailing edge. The wing has 1/8" positive incidence, obtained by cementing a piece of balsa under the leading edge. The thickness of this insert will vary with the fore and aft position of the wing since the top surface of the fuselage is a curved shape. The wing is attached to the fuselage with rubber bands extending over top of the wing and around the bottom of the fuselage.



The new version of the 1937 Stout model features an inverted triangular cross-section throughout the rear of the fuselage. Elevator is above fuselage.

A loop in the front of the shaft to fit your winder (not shown in the sketch) will facilitate winding the motor from the front. The original Stout Winner was wound through the rear of the fuselage.

PROPELLER

Select medium-grade, straight-grained balsa block. Mark off the block as shown in the sketch. Cut away the excess balsa and then shape the blades. The blades of the propeller are sanded smooth with fine sandpaper and then doped with two coats of dope with intermediate sanding. Finish with one coat of polish and rub to a high gloss.

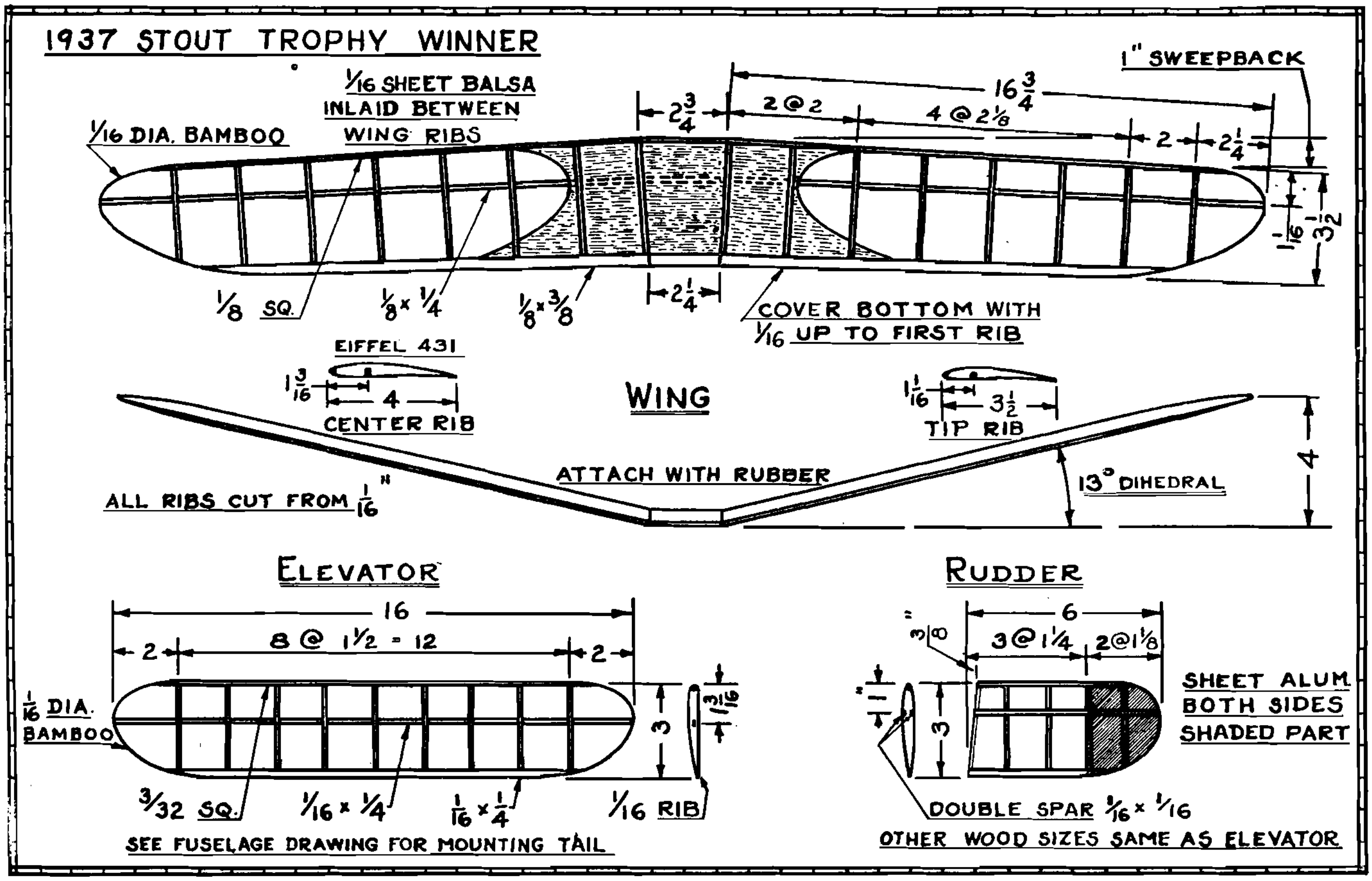
The free-wheeler is added to the hub of the propeller as illustrated. About 10 1/4"-diameter washers are inserted between the shaft and the propeller to prevent the shaft from fouling the propeller when it is free-wheeling.

FLYING

The motor is 16 strands of 3/16" brown rubber about 28" long. The winding capacity is about 700 turns. The motor is lubricated with a mixture of soap and glycerin—both available from the nearby drugstore.

In the evening air—calm with no risers—the model climbs about 80-90 feet until the initial burst of power is gone. After this it continues to climb steeply to a high altitude. The average dead-calm evening flight is well over 2 minutes. During the power flight the model flies in tight circles against the torque (right circles with a right-hand propeller). In the glide the circle is also right—about 75-100 feet in diameter.

Ready to fly, the model weighed 4.75 ounces. The wing area is 125 square inches. This brings the model well within the minimum weight requirements of 3 ounces per 100 square inches of wing area.



STOUT TROPHY WINNER

MATERIAL REQUIRED

(Balsa unless otherwise noted).

Fuselage

8 1/8x1/8x26" longerons and struts
1 1¼x1⅜x1½ nosing
6 1/6x1½x24" sheet balsa covering, wheels, tail plug
1 1/8x1¼x3¼" bottom rudder
2 1/16x¼x8¾" bamboo landing gear struts
1 foot .040 piano wire, shaft, rear hook, and axles
6 inches fine piano wire, nose and tail-section attachment hooks
2 bushings, nosing
1 1/8x¼x8" landing gear brace
1 ¼x¼x4" landing gear brace

Wing

2 1/8x1/8x16" leading edges
2 1/8x¼x16¾" spars
2 1/8x⅜x16¾" trailing edges
2 1/16 diameter x8" bamboo tips
2 1/16x9/16x24" ribs
3 1/16x2x12" sheet balsa covering

Elevator and Rudder

1 3/32x3/32x14" leading edge
1 3/32x3/32x7" leading edge
1 1/16x¼x16" spar
2 1/16x1/16x6" spars
1 1/16x¼x13" trailing edge
1 1/16x¼x5" trailing edge
3 1/16x⅜x12" ribs
2 2½x3" aluminum foil top-rudder covering
3 1/16 diameter x6" bamboo tips

Additional Items

1 1½x2x16" propeller block
10 ¼"-diameter washers
1 small piece sheet aluminum
3 ounces cement
3 ounces dope
3 sheets tissue
38 feet of 3/16" flat brown rubber
soap and glycerin (rubber lubricant)

HISTORY OF THE TROPHY

The Stout Trophy was put into competition in 1930 by William E. Stout, famous airplane and automobile designer. Since then it has become one of the country's outstanding model awards. Following is the list of modelers who have held this trophy:

Joseph H. Ehrhardt, St. Louis, 1930, duration unknown.

Emanuel Feinberg, Detroit, 1931, 28:30.

James F. Parham, Indianapolis, 1932, duration unknown.

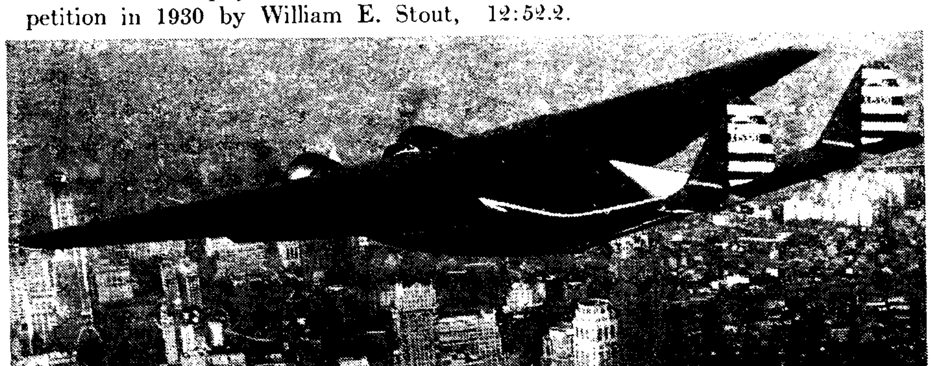
Maxwell B. Bassett, Philadelphia, 1933, 22:22.5.

James B. Cahill, Indianapolis, 1934, 4:28.

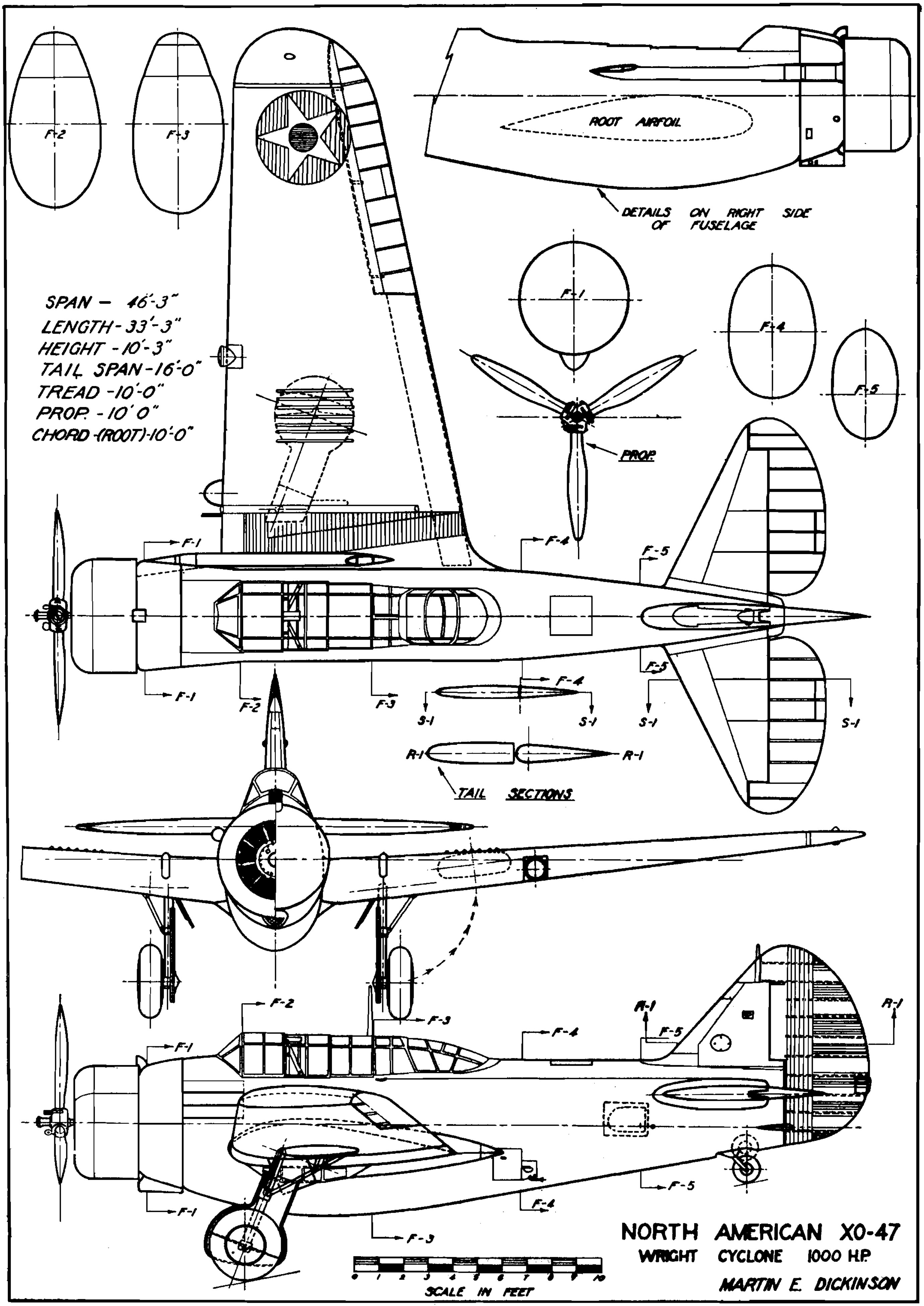
Kenneth E. Ernst, Indianapolis, 1935, 20:05.

Erwin Leshner, Philadelphia, 1936, 36:01.

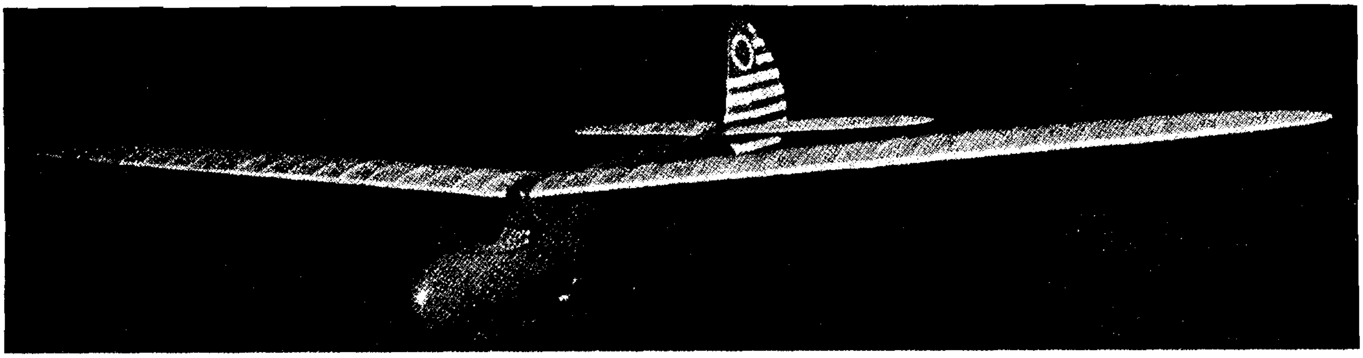
Roy E. Stoner, Rockford, Ill., 1937, 12:52.2.



A Burnelli over New York City.


F-2
F-3
ROOT AIRFOIL
DETAILS ON RIGHT SIDE OF FUSELAGE
SPAN — 46'-3"
LENGTH - 33'-3"
HEIGHT - 10'-3"
TAIL SPAN - 16'-0"
TREAD - 10'-0"
PROP. - 10' 0"
CHORD - (ROOT) - 10'-0"
F-1
F-4
F-5
PROP.
S-1
R-1
TAIL SECTIONS
NORTH AMERICAN X0-47
WRIGHT CYCLONE 1000 H.P.
MARTIN E. DICKINSON
SCALE IN FEET
0 1 2 3 4 5 6 7 8 9 10

The Bowlus "Baby Albatross"



Plans and instructions for making a fine flying model of a modern sailplane.

By
Paul Plecan

Drawings by William Winter

THE name Bowlus has been identified for years with the finest soaring craft in America. Already distinguished because of the Albatross and other ships too numerous to mention, Bowlus is now producing the Baby Albatross. The new design is highly original, striking a pleasant note in this day of standardization.

The model, with the exception of alterations in the size and area of the tail surfaces and the addition of dihedral, is an accurate reproduction of its prototype.

CONSTRUCTION OF POD

Material sizes are not listed throughout this article—you will find them in the bill of materials at the end.

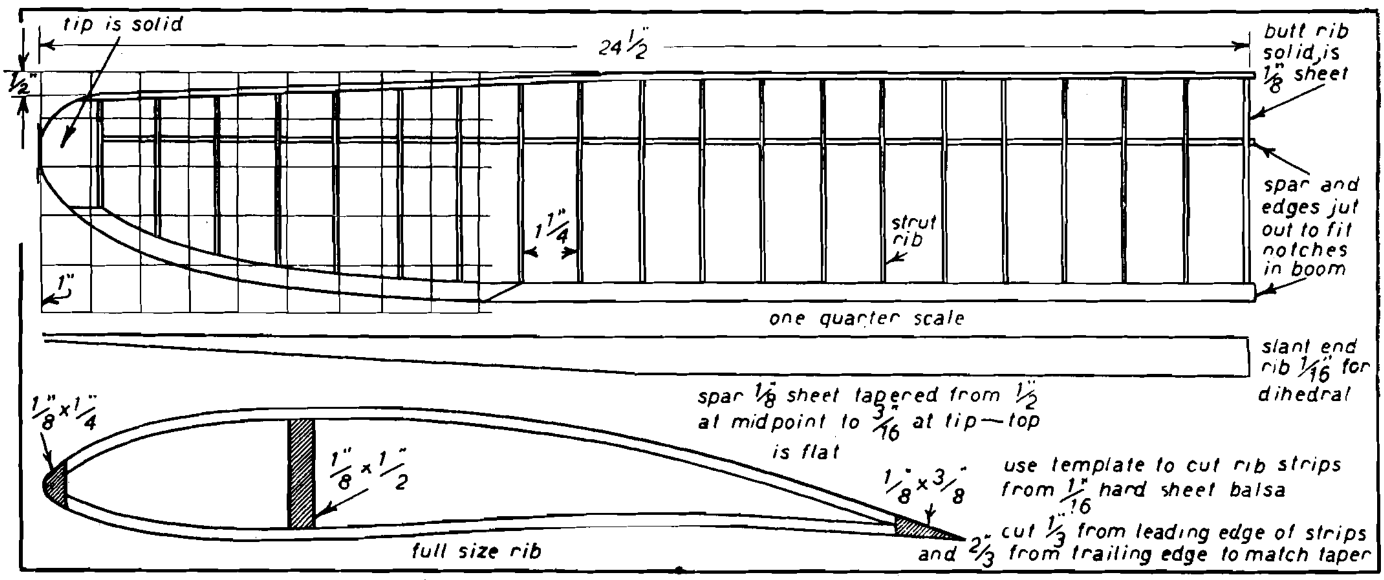
The fuselage or "pod" is carved from a solid block of soft balsa. After shaping the block to the required outside dimensions of the pod, draw the profile on the largest side. Cut away the excess wood and repeat the process to obtain the proper top-view shape. Shape the pod to the proper cross-sections, indications of which are drawn integral with the side view. Sand the finished pod to a temporarily rough but even finish. Cut the pod in half longitudinally and hollow each half until an electric light, held close, can be seen through the wood. A curved blade of some description would facilitate the work. The hollowed halves are cemented together and held, until dry, with rubber bands wrapped around the whole. Cut out the pod for the landing wheel and cockpit openings. Sand the surface of the pod with progressively finer grades of sandpaper. Blow off the dust after the final sanding.

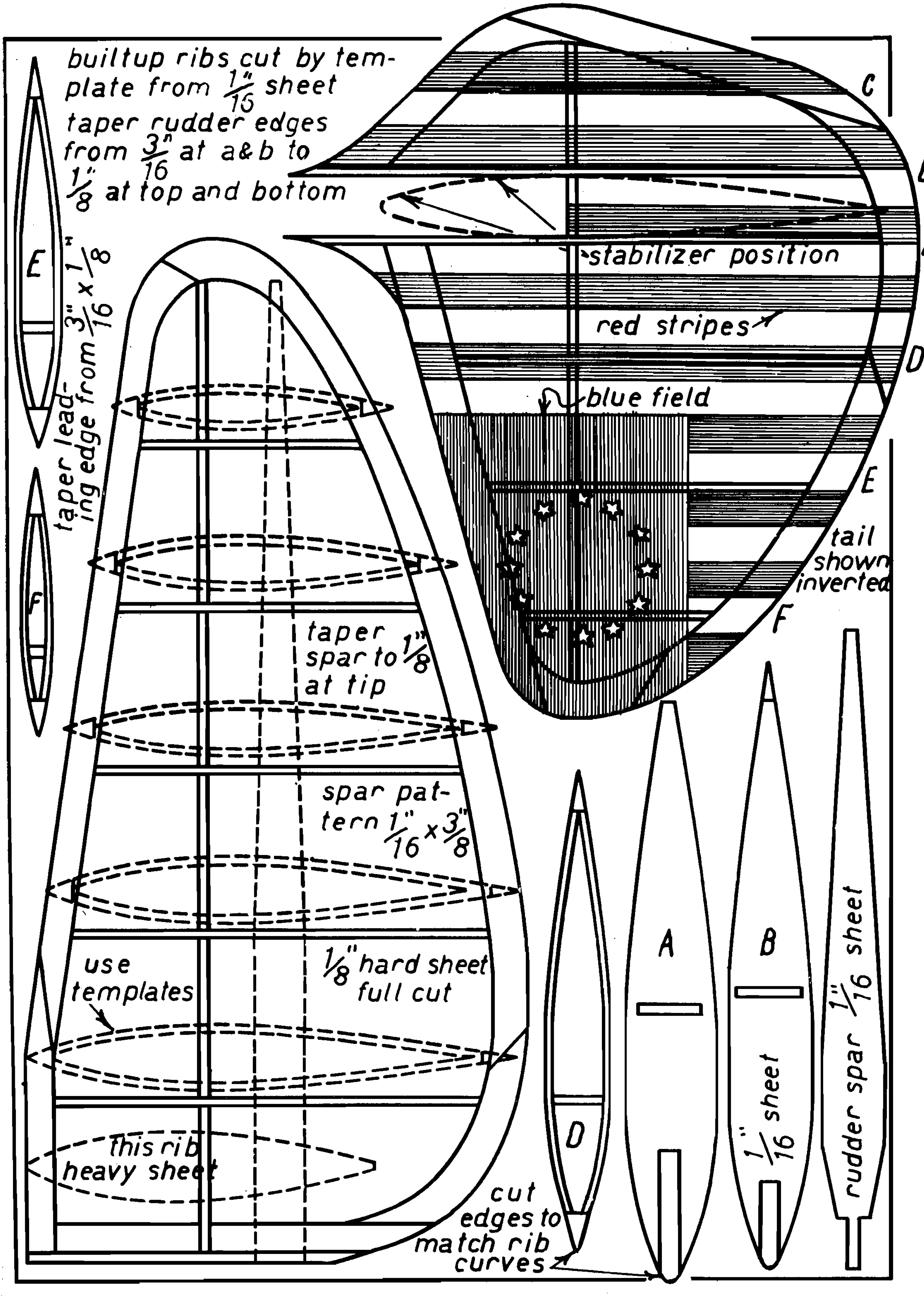
THE BOOM

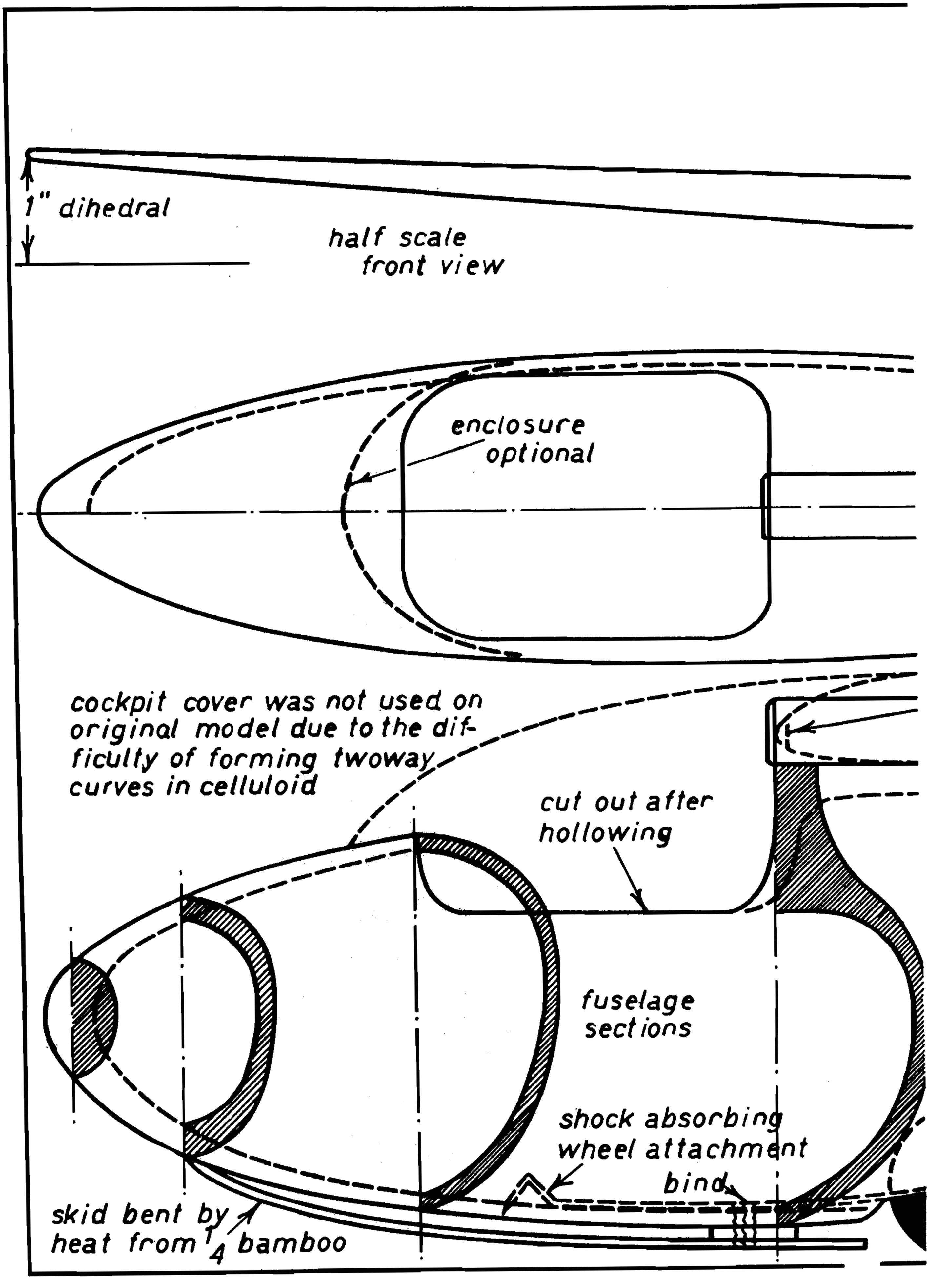
The boom is prepared from a square strip of firm balsa, the ends of which, even while the boom is being rounded, are left square to serve as a base to which the wings and tail can be cemented. Shave the corners of the boom until a true octagonal cross-section is affected. By drawing the boom through sandpaper held roundly in the hand, a circular cross-section can be worked accurately. The boom is left solid, sanded to a satin finish, and attached to the pod. Form the skid from bamboo and cement in place.

FINISHING THE POD ASSEMBLY

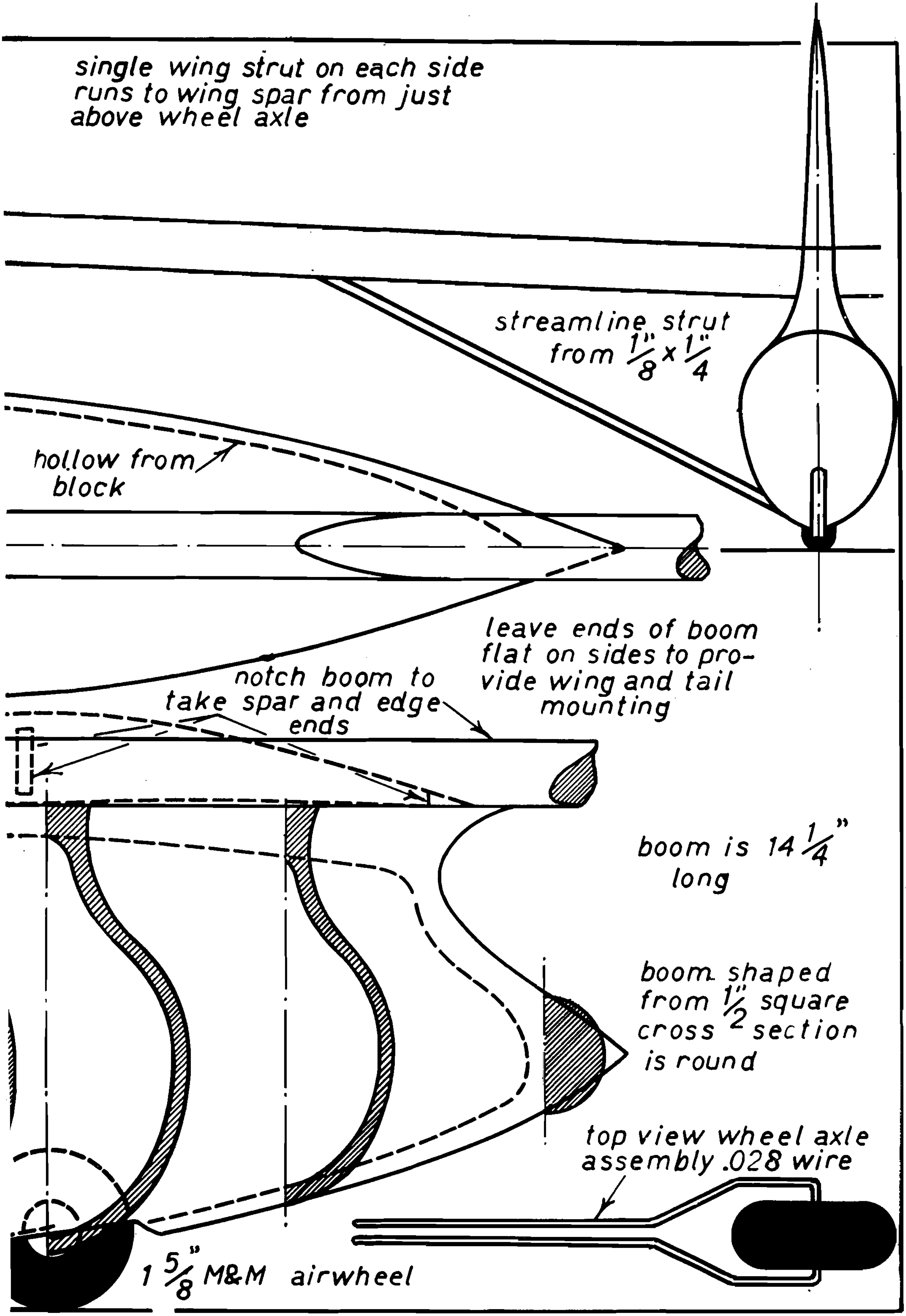
Give the pod and boom a coat of wood filler and, when dry, a sanding with the finest paper. If a prepared model filler is used, give the surface three coats.



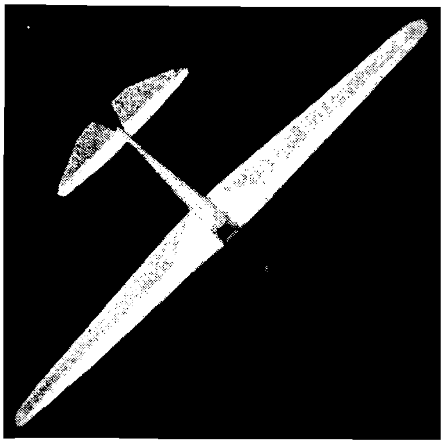

builtup ribs cut by template from 1/16" sheet
taper rudder edges from 3/16" at a&b to 1/8" at top and bottom
E
3/16" x 1/8"
taper leading edge from 3/16" x 1/8"
F
C
B
A
stabilizer position
red stripes
D
blue field
E
tail shown inverted
F
taper spar to 1/8" at tip
spar pattern 1/16" x 3/8"
use templates
1/8" hard sheet full cut
this rib heavy sheet
D
cut edges to match rib curves
A
B
1/16" sheet
rudder spar 1/16" sheet



1" dihedral
half scale
front view
enclosure
optional
cockpit cover was not used on original model due to the difficulty of forming twoway curves in celluloid
cut out after
hollowing
fuselage
sections
shock absorbing
wheel attachment
bind
skid bent by
heat from 1/4 bamboo


single wing strut on each side
runs to wing spar from just
above wheel axle
streamline strut
from 1/8" x 1/4"
hollow from
block
leave ends of boom
flat on sides to pro-
vide wing and tail
mounting
notch boom to
take spar and edge
ends
boom is 14 1/4"
long
boom shaped
from 1/2" square
cross section
is round
top view wheel axle
assembly .028 wire
1 5/8" M&M airwheel

sanding lightly between each. Allow at least 15 minutes between coats. Finish with three coats of the top color desired. Sand between each with wet or dry sandpaper. After the final coat, rub the finish with especially prepared model rubbing compound. Polish the surface



The Ross-Stephens sailplane model featured last year's annual gliding and soaring number. Plans appeared in the December issue.

with a flannel cloth to bring out the luster.

LANDING WHEEL

Mount a $\frac{5}{8}''$ M & M airwheel on a .028 wire axle. The assembly can be easily worked into position and cemented through the cockpit and wheel opening in the pod.

TAIL SURFACES

The stabilizer rib strips are all cut to the same shape and size from sheet balsa by means of a rib template. The shorter ribs are attained by cutting one-third from the leading edge portion and two-thirds from the trailing edge portion of each rib until the lengths match the plan. Place the two stabilizer halves—one left-hand, the other right—on the bench. Cut the edges from sheet balsa and assemble the entire unit in the form by placing small blocks beneath the pieces to be elevated. After the ribs have been fitted and cemented, shave the edges to the required cross-sections—conforming with the contour of the rib section. The rudder is constructed in like manner with the exception of the various details noticeable on the plans. Since the edges are thickest at the point where the rudder has the greatest breadth, it will be necessary to use the thickest sheet balsa required, for the entire outline. The edges can be cut from the sheet balsa, cemented together on the bench, and then sanded to a gradual taper toward the top and bottom.

WINGS

Prepare a wing rib template and cut all the wing rib strips required, both top and bottom. It will be noticed that the sheet balsa spar tapers from its mid-point to the tip, being flat on the top throughout its entire length. As was done with the tail surfaces, make the shorter ribs by cutting one-third of the surplus length from the front ends and two-thirds from the rear. Slide the lower rib strips beneath the spar, pin the spar and edges in place, (elevating the leading edge with small blocks), and cut the ribs to the exact fit. The butt rib is of $\frac{1}{8}''$ sheet and is solid. It is slanted $\frac{1}{16}''$ for dihedral. The tip is a solid piece of sheet.

COVERING

Run the grain of the paper spanwise on the wings and tail. Attach the paper, first to the tip and butt ribs, stretching tightly until adhered. Dope down the leading and trailing edges. The paper may then be lightly sprayed, the units being pinned to the bench until dry to prevent warping. Dope the finished surfaces with thinned clear dope. Cement the wing panels, the stabilizer and rudder to the squared boom ends. Brace the wings with a single streamlined strut on each side as called for in the plans.

FLYING

Use a 100-foot heavy thread or light cord for a tow line. Place a loop around the skid and move forward to tow the ship into the air. The resistance of the air will slide the tow line off the skid after sufficient altitude has been obtained for gliding. Balance the job with small pieces of lead. Gliding trim can be obtained by gliding the model from the hand over tall grass.

COLOR SCHEME

The real ship is painted as follows: white wings, gold trim; natural veneer finish on pod; metallic boom; red, white, and blue tail. For simplicity, a blue or black fuselage and yellow or red wings are suggested. The same tail design serves as a decorative value.

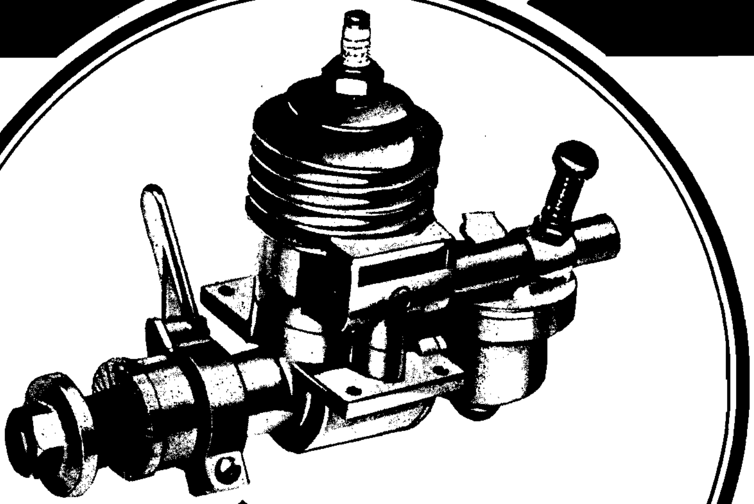
BILL OF MATERIALS

1 $2\frac{1}{2}$x$3\frac{1}{4}$x12" soft block
1 $\frac{1}{2}$ sq. x$14\frac{1}{2}''$ medium strip
1 $\frac{1}{8}$x$\frac{1}{4}$x36" hard strip
1 $\frac{1}{8}$x$\frac{3}{8}$x36" hard strip
1 $\frac{3}{16}$x2x12" hard sheet
1 $\frac{1}{16}$x2x36" soft sheet
1 $\frac{1}{8}$x2x36" hard sheet balsa
1 $\frac{1}{16}$x2x24" hard balsa
1 $\frac{1}{16}$x$\frac{1}{4}$x10" bamboo
1 sheet Jap tissue
1 oz. cement
1 oz. clear dope
1 piece .028 wire
wood filler, colored dopes as required

The Taylorcraft gas model, plans of which appeared in the April issue, won the Eastern States scale event at Seversky Field. Ship built by Paul Plecan, flown by Roger Hammer.

it's here!

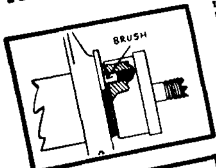
The Greatest of All Achievements in the History of Miniature Gas Engines



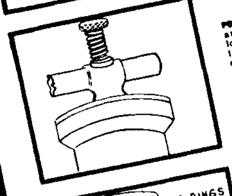
SPECIFICATIONS
b-30

Bore, 13/16"	R.P.M., 700 to 15,000
Stroke, 9/16"	Weight, 5½ oz.
Displacement, .298	May be inverted.
Horsepower, 1/7—1/6	Class B—N.A.A. Rules

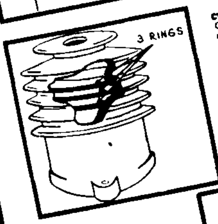
No Other Motor At Any Price Has All These Features



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



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



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

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

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

HEAD OF THE B CLASS

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

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

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

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

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

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

BEST THAT MONEY CAN BUY

$6.95 complete with coil and condenser

BEYOND COMPARE

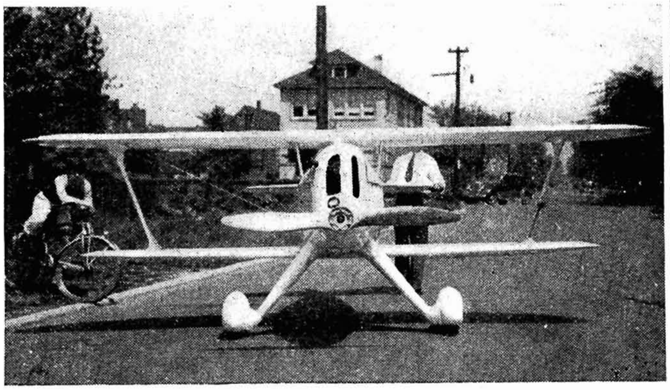
ATTENTION DEALERS:
The SyncrO b-30 is ready now. Your instructions will receive prompt attention
DON'T DELAY · STOCK b-30 TODAY

SYNCRO DEVICES INC.
743 BEAUBIEN ST. DETROIT, MICHIGAN

KNIGHT TWISTER

Replica plans of a great little ship

By William Winter



The drawings of the model are prepared to the 1/2"=1' scale, the ship being so tiny.

CREATOR of the greatest furor in recent years among light plane enthusiasts, the Payne Knight Twister, with its tiny 15-foot wings, is the most interesting of kit-form ships (ship can be had complete or as kit). Size seems to be no handicap, for the Twister zips along at 160 m.p.h., climbs 1,122 feet per minute. Ceiling is 20,000 feet.

The ship is one-place, its fuselage of steel tubing. Complete data follows:

Upper Span	15'	Tankage	17 gal.
Lower Span	13'	Duration	4 hrs.
Length	13' 6"	Engine	70 or 75 h.p.
Empty Weight	460 lbs.	Landing Speed	45 m.p.h.
Loaded	750 lbs.		

BUILDING THE MODEL

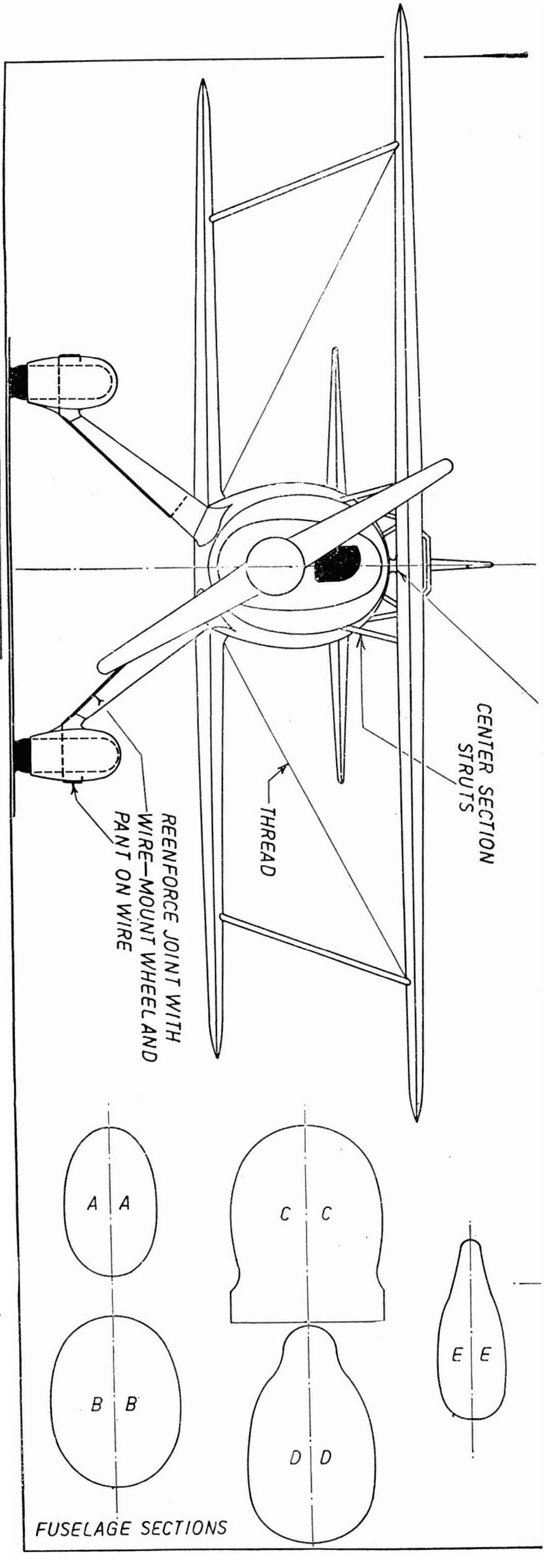
Refer to the bill of materials for dimensions.

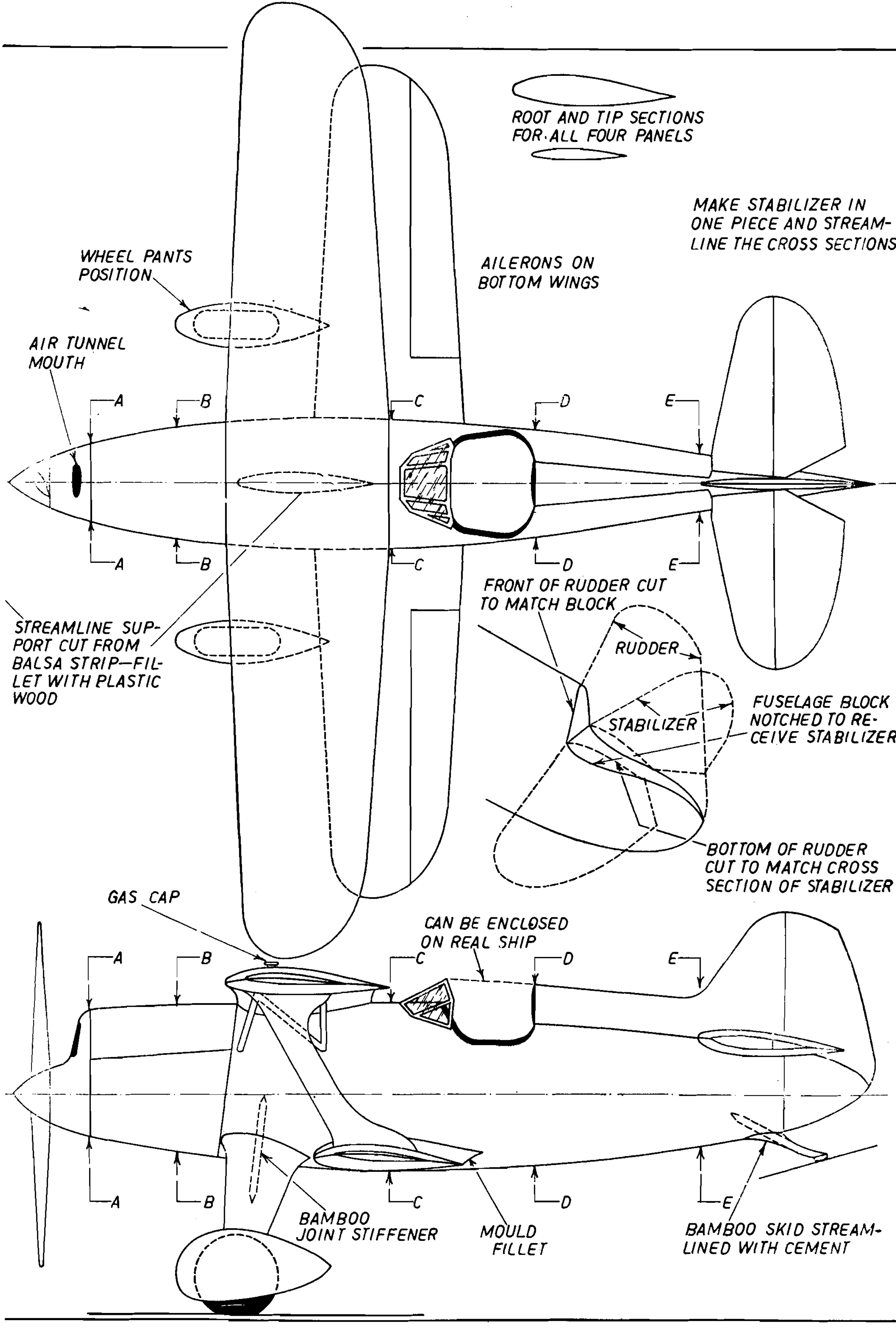
Cut the fuselage, first to profile then to top outline, from a soft balsa block. Shape to the required cross sections and sand. Cut the tail surfaces from sheet balsa, streamline the cross sections, and sand. Likewise, prepare the wings. All flying surfaces are sanded to a taper in thickness. Construct the landing gear from scraps and assemble the entire model with thickened cement. To complete, give the entire surface a filler coat of clear dope, sand lightly, and finish in white.

Mount propeller on a pin, free to turn.

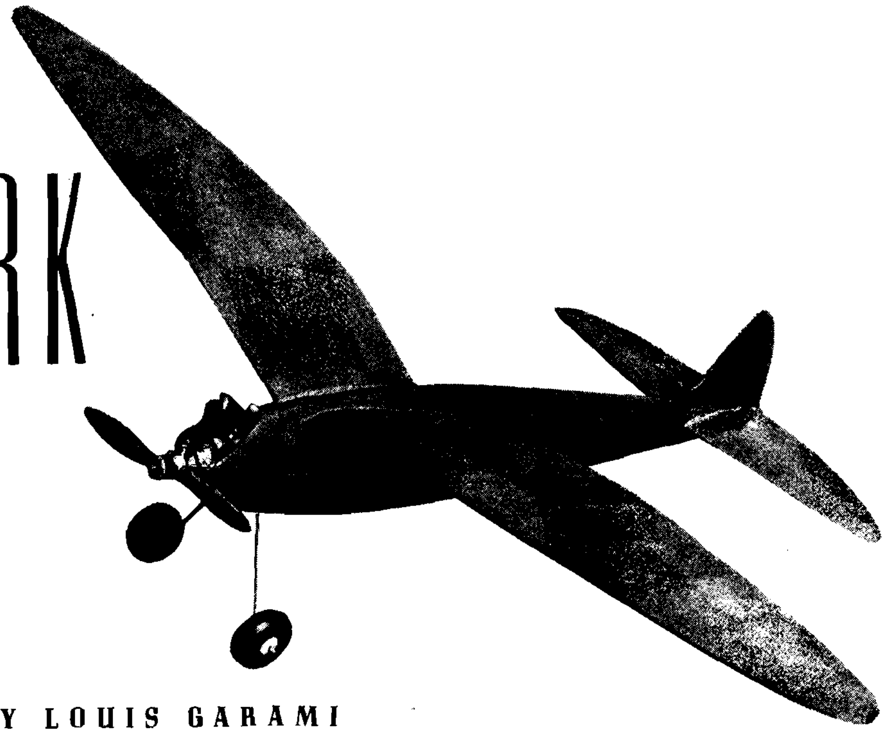
BILL OF MATERIALS

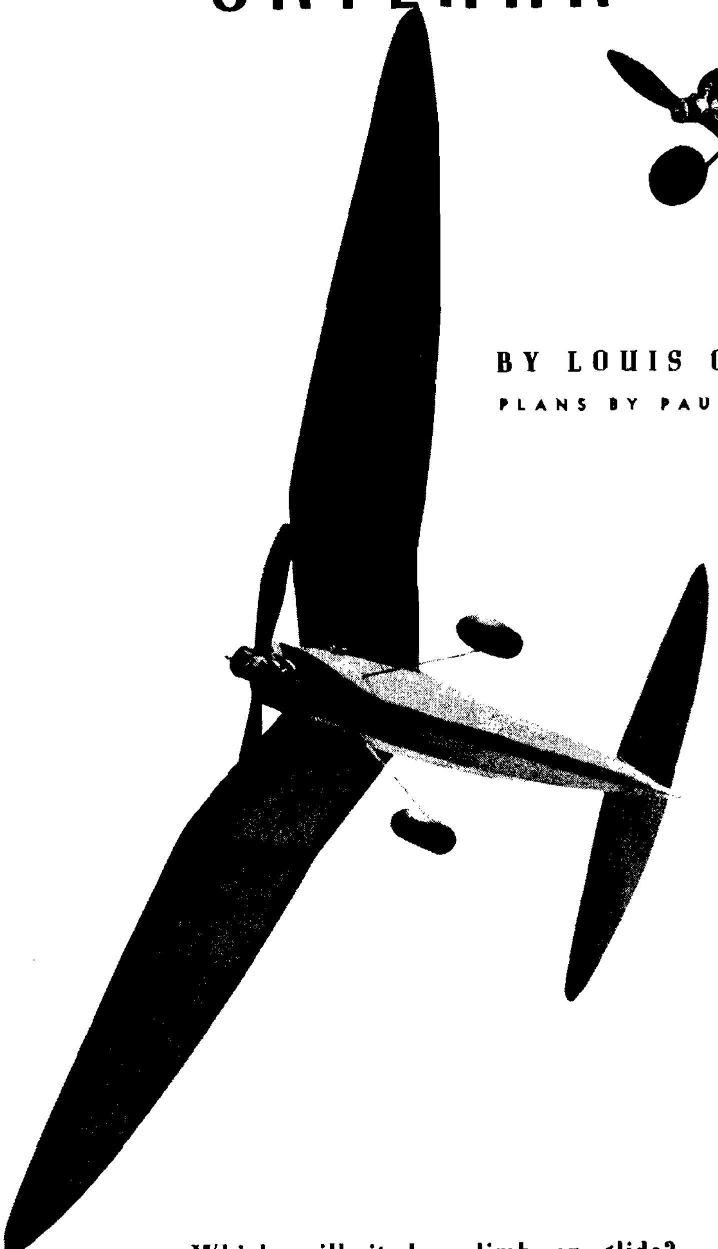
1 block 1 5/8x1 1/8x6 1/2"
1 sheet 3/16x2x24"
1 pair of 5/8-3/4" wheels
1 vial cement
1 vial clear dope
1 vial white dope




ROOT AND TIP SECTIONS
FOR ALL FOUR PANELS
MAKE STABILIZER IN
ONE PIECE AND STREAM-
LINE THE CROSS SECTIONS
WHEEL PANTS
POSITION
AILERONS ON
BOTTOM WINGS
AIR TUNNEL
MOUTH
A
B
C
D
E
FRONT OF RUDDER CUT
TO MATCH BLOCK
STREAMLINE SUP-
PORT CUT FROM
BALSA STRIP—FIL-
LET WITH PLASTIC
WOOD
RUDDER
STABILIZER
FUSELAGE BLOCK
NOTCHED TO RE-
CEIVE STABILIZER
BOTTOM OF RUDDER
CUT TO MATCH CROSS
SECTION OF STABILIZER
GAS CAP
CAN BE ENCLOSED
ON REAL SHIP
BAMBOO
JOINT STIFFENER
MOULD
FILLET
BAMBOO SKID STREAM-
LINED WITH CEMENT

SKYLARK





BY LOUIS GARAMI

PLANS BY PAUL PLECAN

Which will it be, climb or glide? This ship has both, a hot climb in Class B and super glide in Class A

SINCE the new rules are based on engine displacement the size of the ship itself becomes of secondary importance. The wing area of the model built for a certain engine is governed solely by the opinion of the builder as to which combination is more apt to succeed in a contest, a fair climb and a swell glide, or a swell climb and a fair glide.

As the borderline of A and B Classes is approached, a situation arises which to my mind is both interesting and beneficial for the builder. He can build a two-in-one model which will have one of the above-mentioned combinations for each class. And it is not the same one, either! A ship with 320 square inches of wing area powered by a Bantam or an Ohlsson 19 no doubt will have the best glide a Class A ship can produce. On the other hand, powered by an Ohlsson 23 (Class B), it will bore a hole in the sky when fully opened.

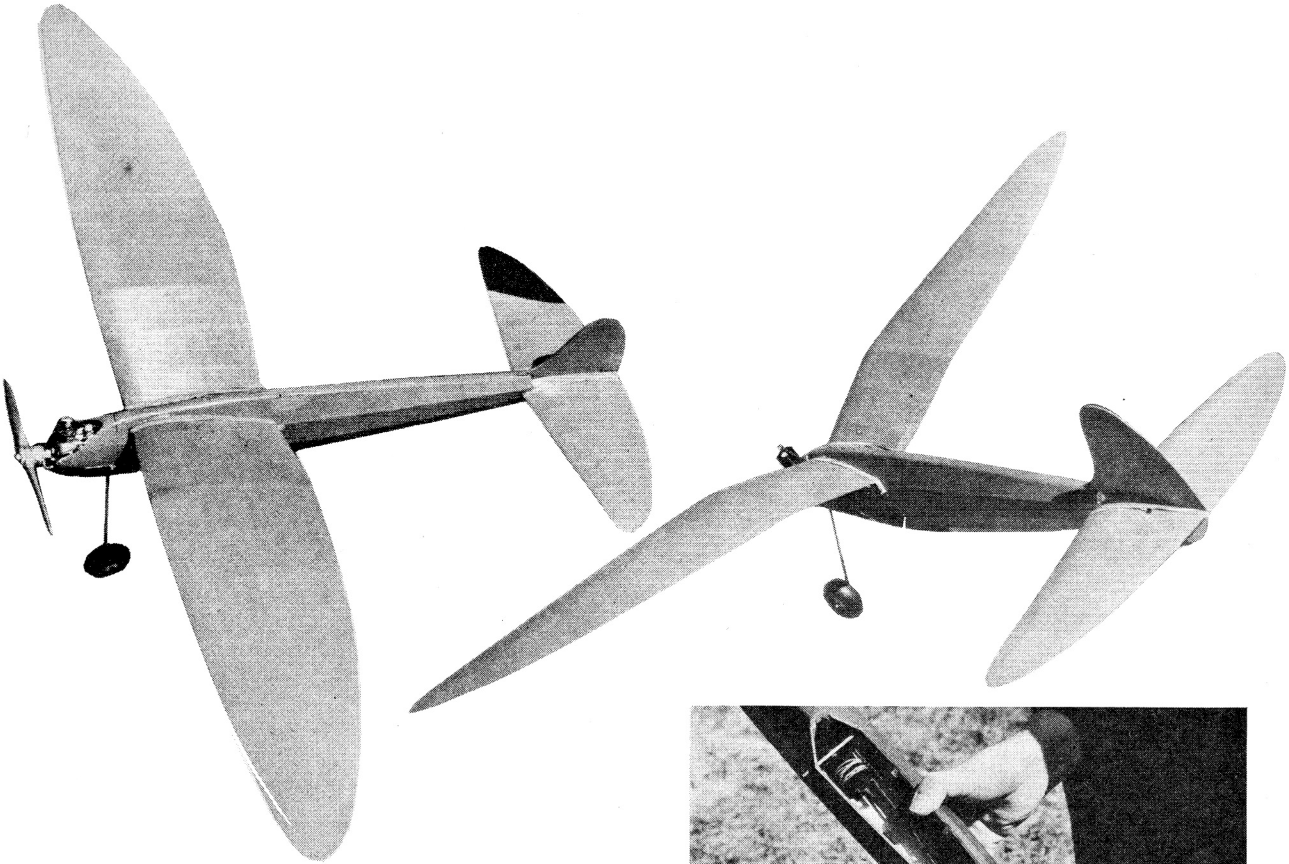
The Skylark was built with these thoughts in mind. Mechanically it is simple and strong. The ignition unit is compact and removable. The total weight as a Class B ship is 18 ounces. That is using very light wheels. The two-ounce difference between the Bantam and Ohlsson engines can be made up by changing the wheels for heavier ones.

CONSTRUCTION

The construction of the fuselage is clearly shown in five steps. Use the chart to determine the length of cross braces and uprights. The length of the side braces is not given because they are left longer when cemented in place and trimmed at the peak after they are dry. The cap strips and stringers follow in order. The cap strips are sandpapered half-round. Next the underslung rudder is cemented in place, strengthened by a wedge-shaped brace which fits between the two longerons.

Cut out F1 plywood former. The square holes are cut out with a small coping saw and the motor bearers cemented in. Bend and attach the landing-gear wire with three small aluminum fittings. Cement hardwood blocks behind the bulkhead at the point the woodscrews holding the fittings run through, since the bulkhead itself is not thick enough for a firm hold.

The bulkhead is centered to the body with two locating dowels



on top and bottom respectively. Make the cowling out of ten pieces of balsa which are cemented one by one right on the bulkhead and motor bearers.

Sandpaper the corners round and cement wire hooks onto each side of cowl and body which will be rubber-banded together.

The battery box is four inches long and it accommodates two pen cells in series. The timer mount which is made out of $^1/_{16}$" plywood also serves as the end of the battery box. This part has to be cemented several times to withstand the pressure of the spring connection in the front of the box and the pull of the string on the Austin timer. The negative contact is made with a small brass or copper plate laid inside the box. This extends outside the box and is cemented there.

Solder all joints of the ignition unit. Use wires as short as possible. Ninety percent of engine failures on the field are loose joints, shorts and such.

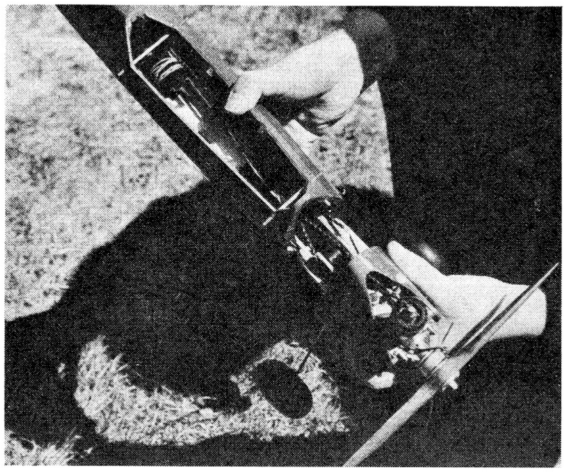
Now for the wing. Build this in two halves. These half wings are built on a board and the gull effect is produced afterward with the aid of the templates provided on the plan.

Assemble the trailing edge, ribs and leading edge on a flat board. Add top spar and tips next. Remove from the board and put in bottom spar. Now all joints are cut at W4 rib and reglued at the proper dihedral.

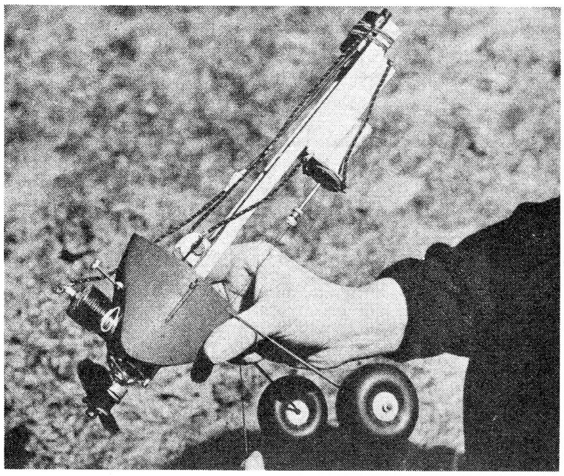
Cover the leading edge with $^1/_{16}$" sheet balsa. Cap-strip the top of the ribs with the same thickness and sandpaper them away gradually at the trailing edge. Cement the two half wings together. When covering the wing, dope a couple of extra strips of paper on top and bottom over the center joint to forestall any folding wing stunt at 600 feet altitude.

Cut out the planked portion of the body using the template given in the plan and trace your center rib outline on each side. With these portions cut away it should fit the top of the wing, and when the wing is placed in position on the body it should fit the body outline also. $^1/_8$" thick dowels are used to hold the rubber bands over the wing.

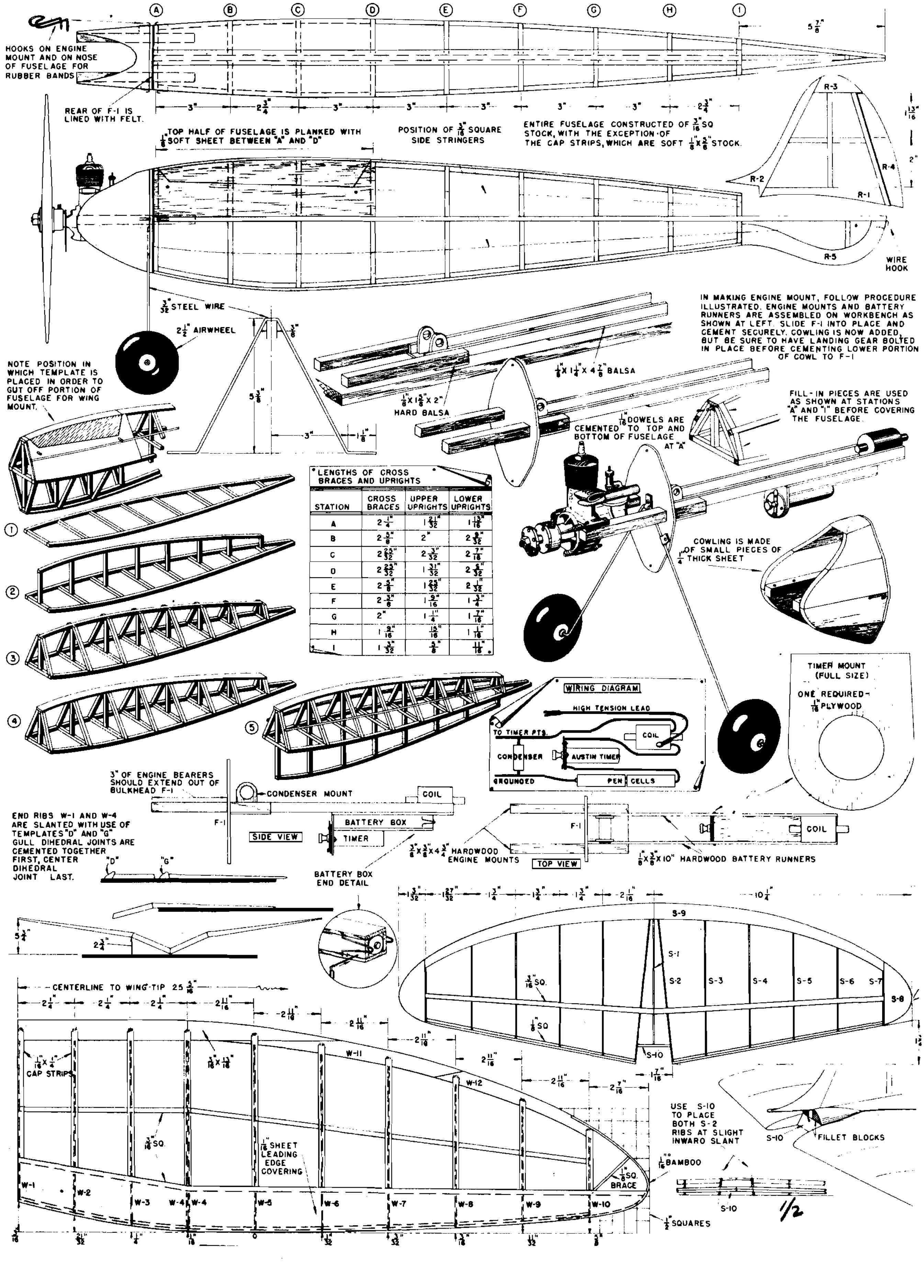
The elevator is made in one piece. The lower part of the rudder is made to fit the center rib of the elevator.



The entire nose and battery tray can be quickly detached by removing two rubber bands. Mounting is firm, nevertheless. Ohlsson 19 shown.

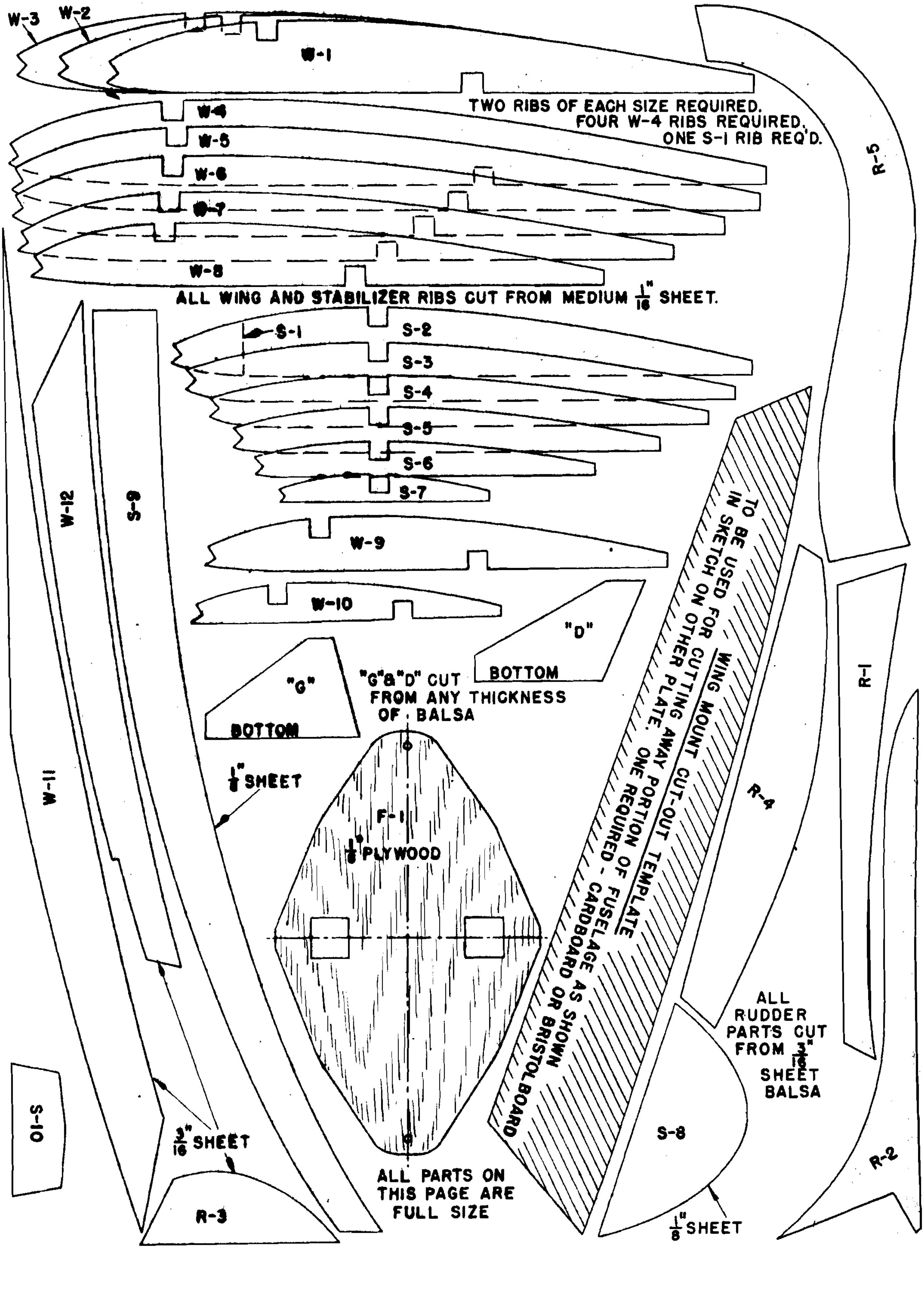


Timer is attached parallel to battery tray. Arm is pulled by cord running outside ship. Coil can be moved along tray for proper balance.

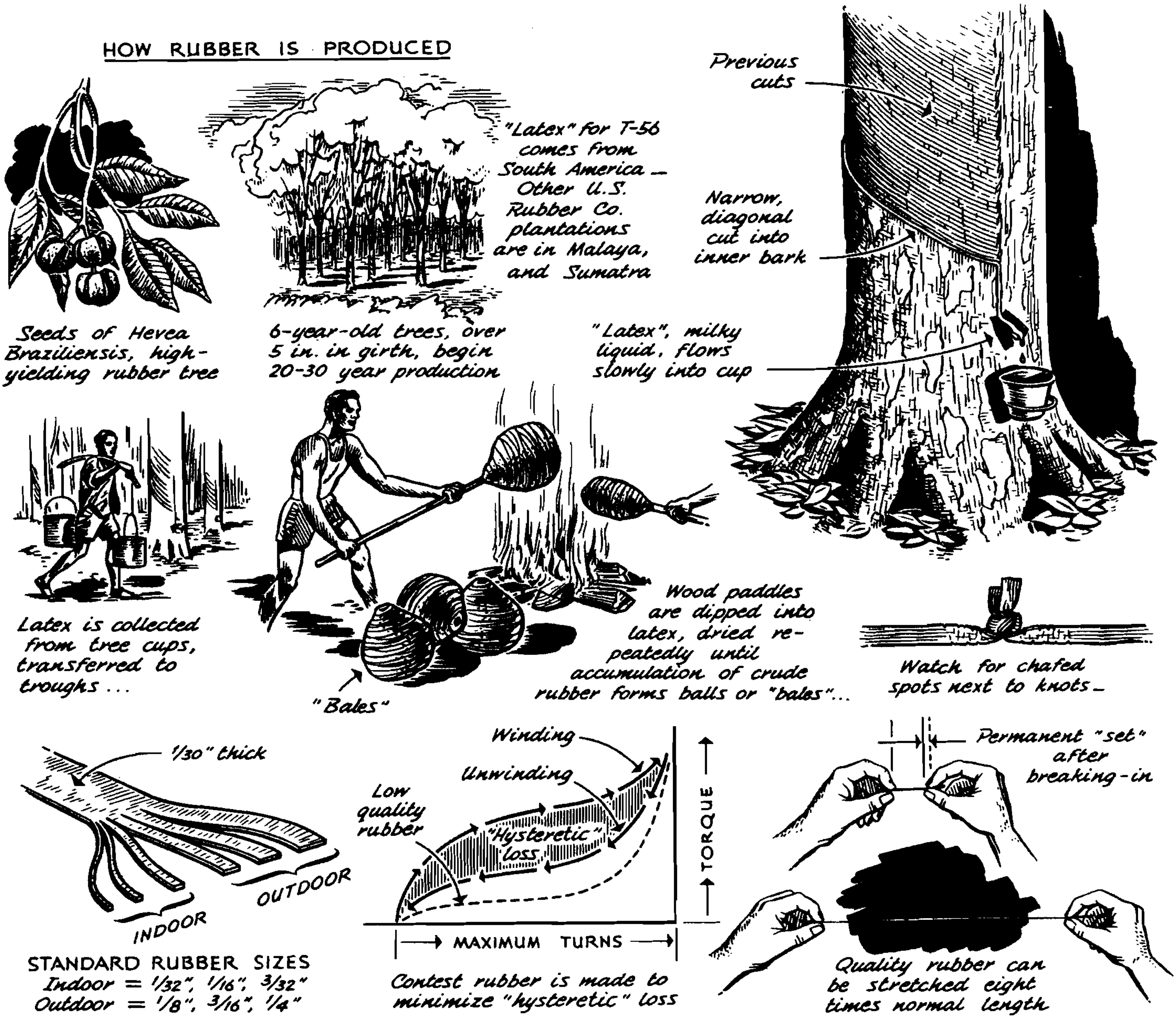


LENGTHS OF CROSS BRACES AND UPRIGHTS

STATION	CROSS BRACES	UPPER UPRIGHTS	LOWER UPRIGHTS
A	2 1/4"	1 21/32"	1 13/16"
B	2 5/8"	2"	2 9/32"
C	2 25/32"	2 3/32"	2 7/16"
D	2 25/32"	1 31/32"	2 5/32"
E	2 5/8"	1 25/32"	2 1/32"
F	2 3/8"	1 9/16"	1 3/4"
G	2"	1 1/4"	1 7/16"
H	1 9/16"	15/16"	1 1/16"
I	1 3/32"	5/8"	11/16"


W-3
W-2
W-1
TWO RIBS OF EACH SIZE REQUIRED.
FOUR W-4 RIBS REQUIRED.
ONE S-1 RIB REQ'D.
W-4
W-5
W-6
W-7
W-8
ALL WING AND STABILIZER RIBS CUT FROM MEDIUM 1/16" SHEET.
S-1
S-2
S-3
S-4
S-5
S-6
S-7
W-9
W-10
W-12
S-9
W-11
S-10
R-5
WING MOUNT CUT-OUT TEMPLATE
TO BE USED FOR CUTTING AWAY PORTION OF FUSELAGE AS SHOWN
IN SKETCH ON OTHER PLATE. ONE REQUIRED - CARDBOARD OR BRISTOLBOARD
"D"
BOTTOM
"G"
BOTTOM
"G"&"D" CUT FROM ANY THICKNESS OF BALSA
1/8" SHEET
F-1
1/8" PLYWOOD
R-1
R-4
ALL RUDDER PARTS CUT FROM 3/16" SHEET BALSA
3/16" SHEET
R-3
ALL PARTS ON THIS PAGE ARE FULL SIZE
S-8
1/8" SHEET
R-2

Elementary Modeling: Rubber



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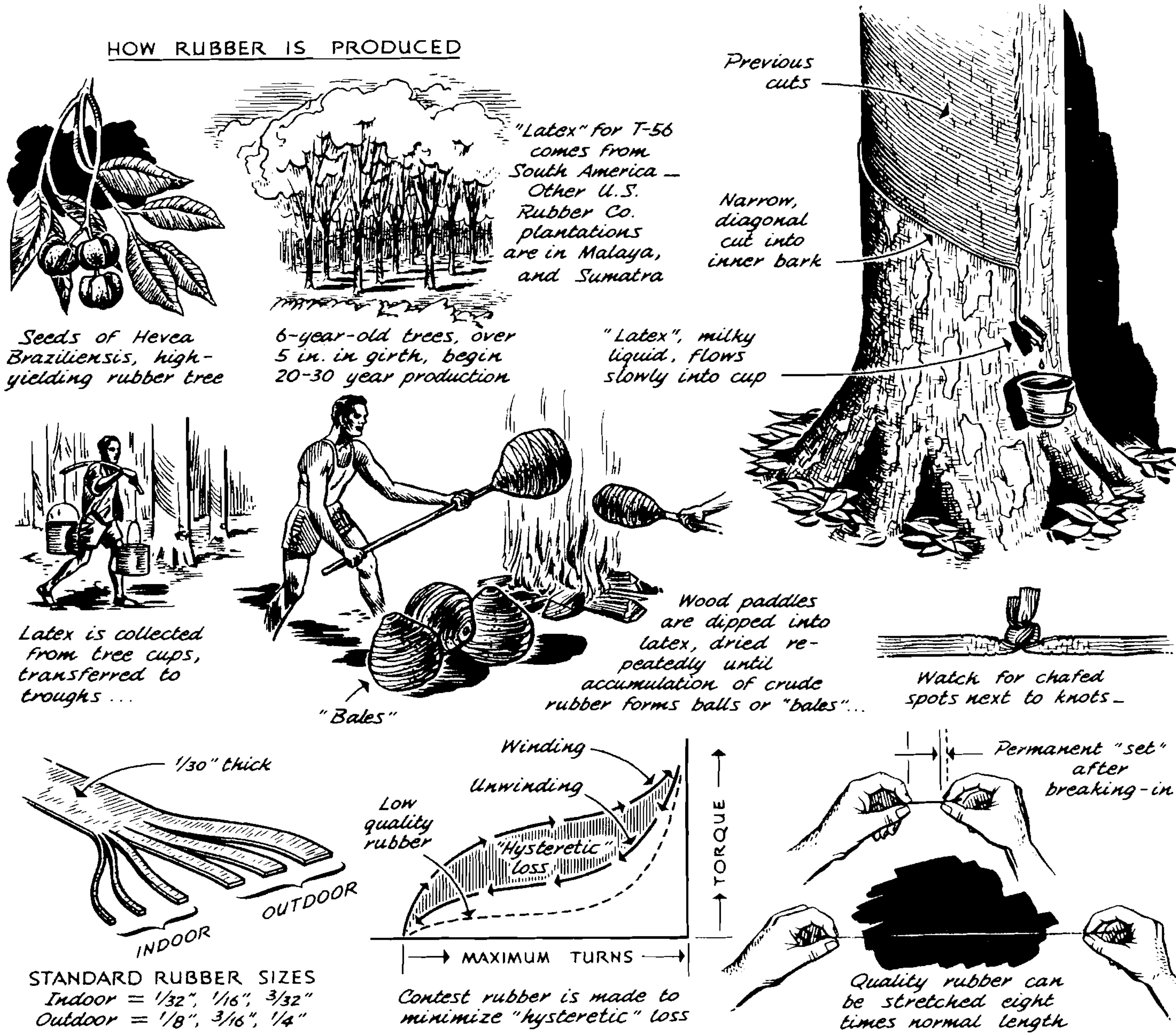
Elementary Modeling: Rubber



Elastic strands for models are of highest quality fine para rubber. U. S. Rubber Company's "T-56" is made from milky "latex," drained from inner bark of *Hevea Braziliensis* trees in South America. Trees average 25 years' production, though some 252-year-old trees continue to produce. Latex is accumulated into ham-shaped balls or "bales" by drying over heat, then sent to U. S. for manufacture. Smoke in drying process protects coagulated latex from molding.

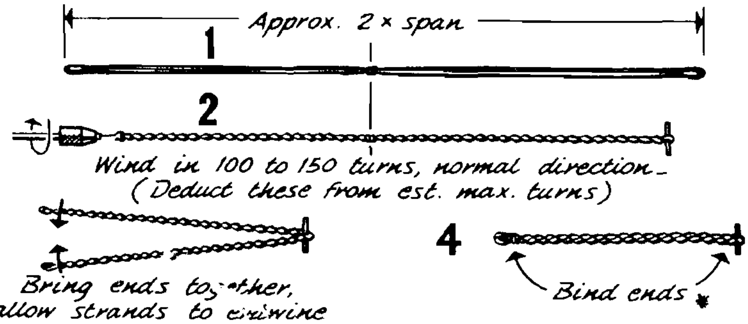
In the mill, natural rubber is cleaned, dried, run through compounding mill where sulphur, accelerators, anti-oxidants are added. Result, after testing, is the T-56 compound. Huge calendering machines form rubber into large sheets of uniform thickness. Finished sheet, approximately 1/30 inch thick, is wound on drums, subject to cycle of controlled temperatures to vulcanize. Final operation is stripping to uniform thread widths, winding on spools.

Main consideration in contest rubber are: resistance to chafing, high elongation, low hysteresis loss (the retention of as much of the initially wound-in energy in torque as possible) and a flat torque curve (power output remaining as uniform as possible during unwinding).

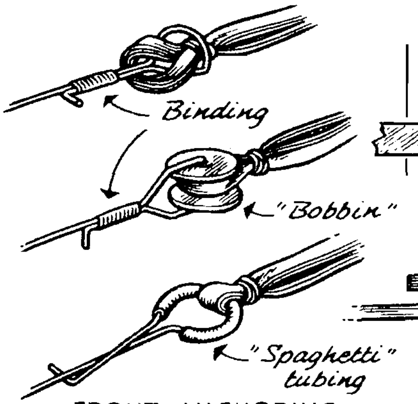
Heat, sunshine and abrasive foreign matter are enemies of rubber motors. Storage, when not in use, in cool, dark place is important. Life of rubber can be extended by washing, drying at intervals, by making up motors properly, correct knotting, lubricating, winding.

Experiments with sample strips is good idea for beginner. Test-pull strand between fingertips, note that maximum stretch is 7 to 8 times normal length.

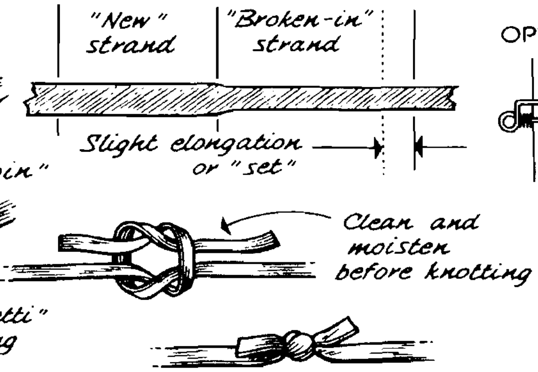
ITS PREPARATION AND USE FOR MODELS



"ROPING" OR "PREWINDING" PREVENTS SLACKENING

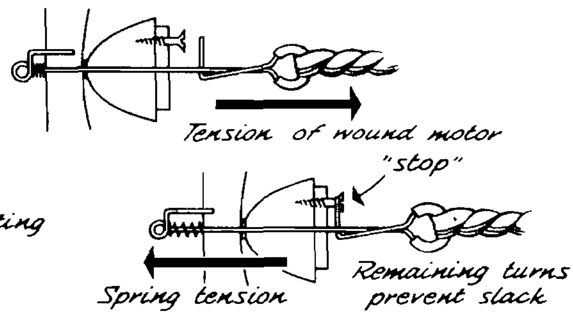


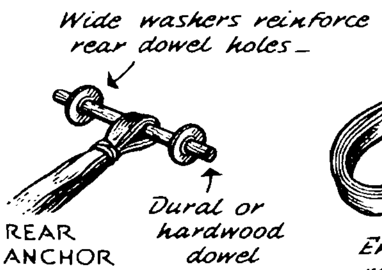
FRONT ANCHORING



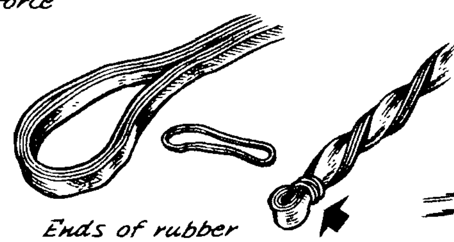
"Square" knot is best rubber splice

OPERATION OF "RUBBER TENSIONER"

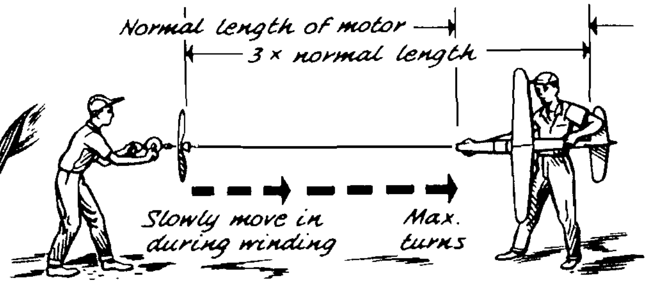




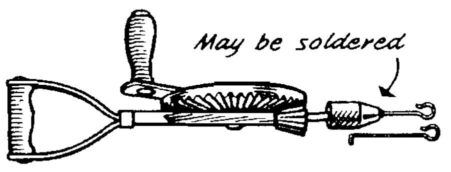
REAR ANCHOR



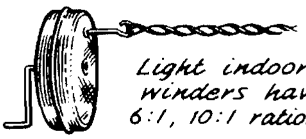
Ends of rubber motor should be bound with small band



"STRETCH WINDING" PROCEDURE

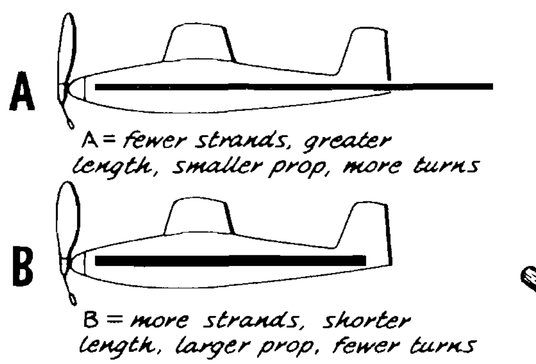


Heavy-duty outdoor rubber winder has large handles, securely-mounted hook

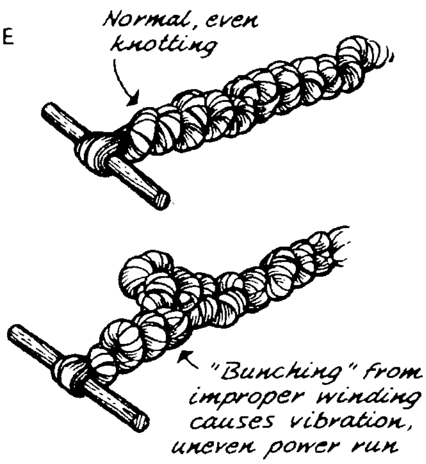


Light indoor winders have 6:1, 10:1 ratios

MOTOR ARRANGEMENT IS A COMPROMISE



(Rubber weight of A = B, motors shortened by tensioner or roping)



After several tests, up to 15 percent permanent "set" or elongation may be noted. The various knots, pull to breaking point which will likely occur at chafed point near knot.

"Square" knots tied before lubricating motor are preferred. Do not clip loose ends too closely. Broken strands can be washed, knotted, then relooped to equalize strand lengths.

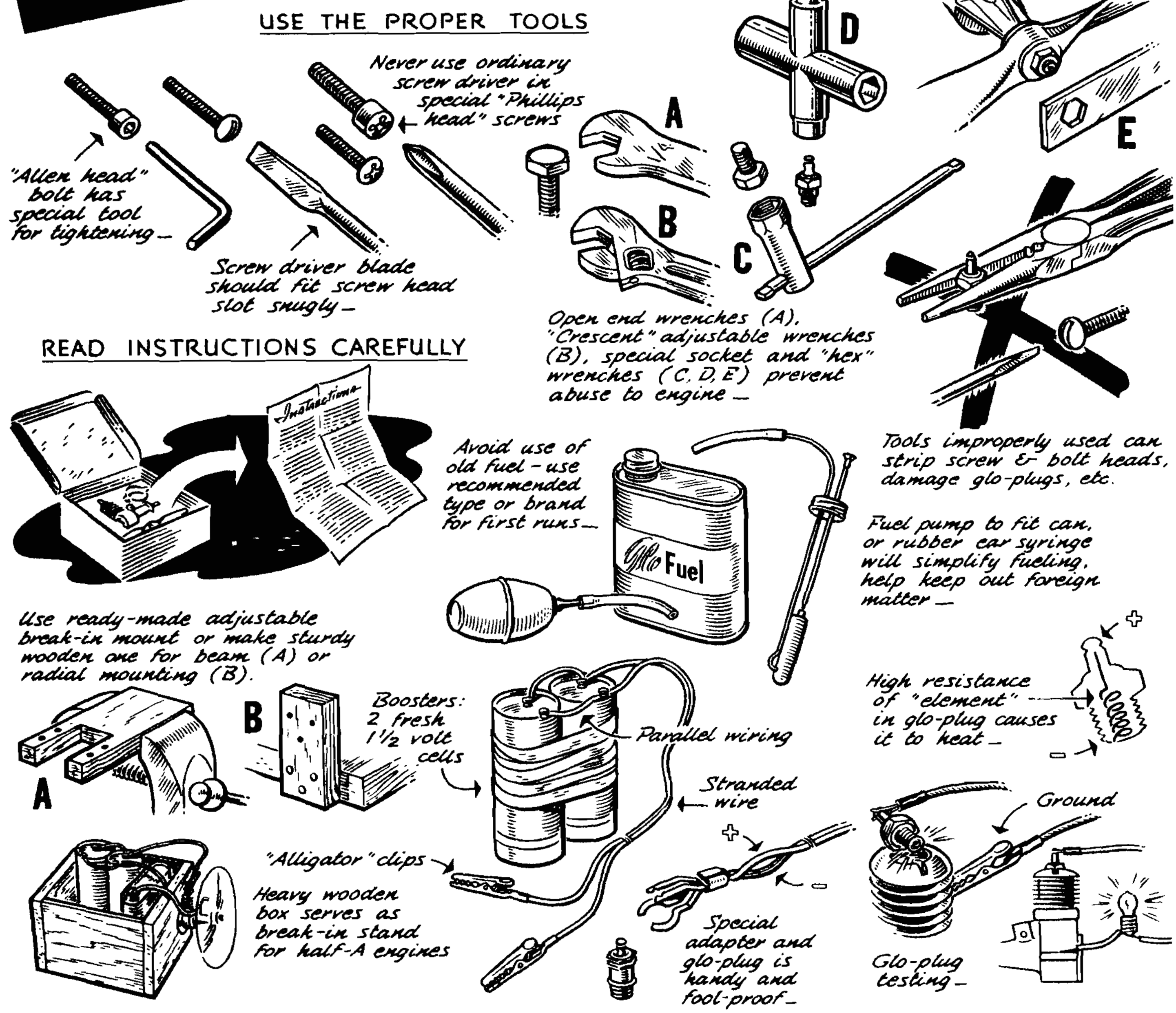
Larger multi-strand motors need "spaghetti" insulation over the hooks. Larger radii of bobbins and rear dowels reduce cutting tendency. Rubber "lube" prevents strands sticking when tightly wound. Effect of lube is to increase maximum winds by 25 percent; maximum torque is somewhat reduced. Lubricant is worthless unless worked thoroughly into strands. General lubricant formula: 4 parts liquid soap, 1 part glycerine, 8 parts water, boiled until the mixture arrives at a syrupy consistency.

Consecutive windings result in rubber "fatigue," largely overcome by rest between flights.

Short, sample rubber motor can be rigged for test. Wind to destruction (after break-in), record turns. Compute maximum turns on per inch basis, allowing 5 to 10 percent safety factor in practice.

Amount of rubber for given model varies from one-third total weight for sport models to over half total weight for contest ships. Most motors are longer than distance between anchoring points, are "tensioned" mechanically or "pre-wound" to prevent slack strands bunching in nose or tail, upsetting balance. Slow winding-in last turns prevents knots bunching unevenly. Launching should be done as quickly as possible after motor is wound, as delay causes power loss.

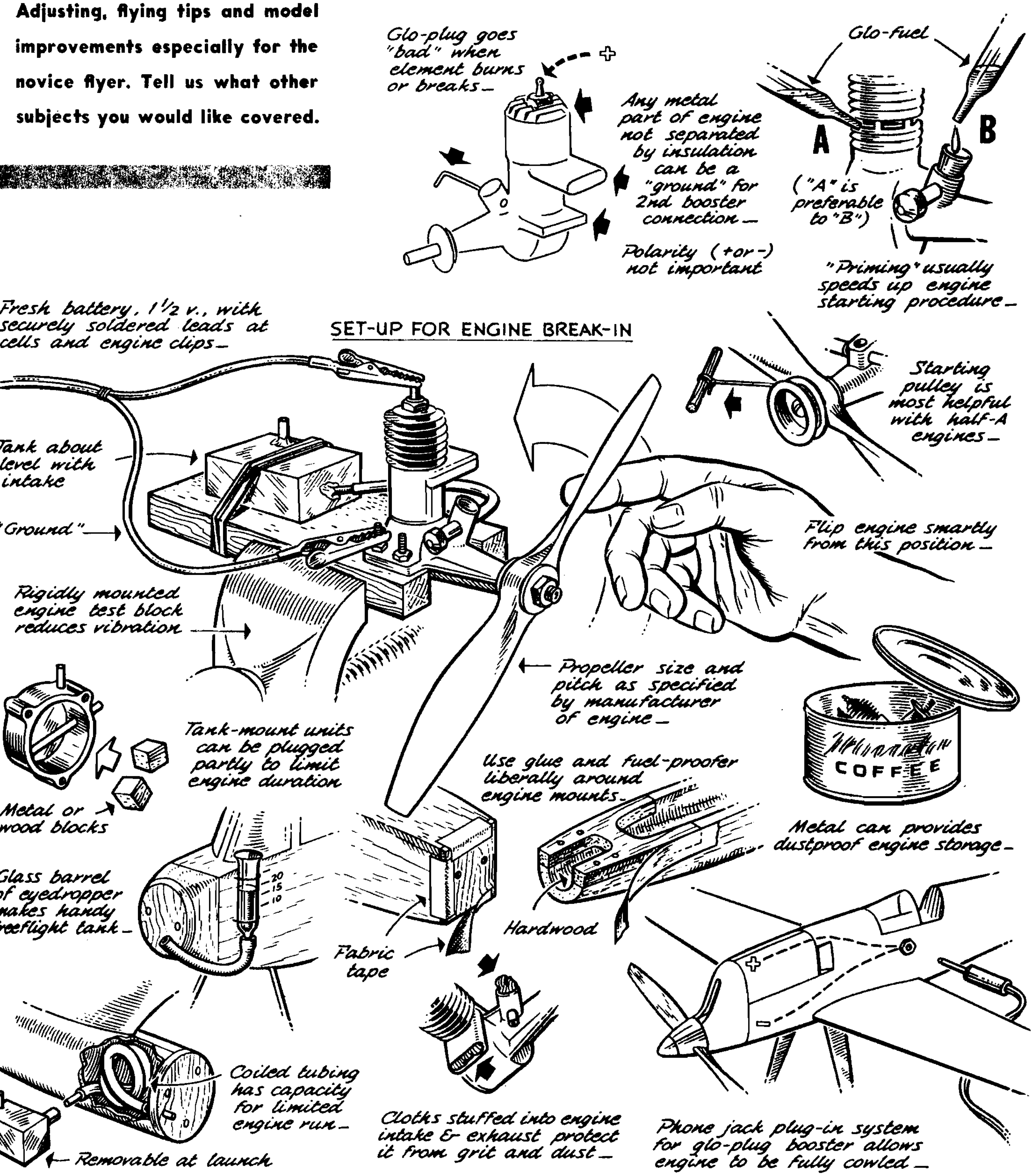
Elementary Modeling: *Model Engines*



The new modeler should remember that his engine is a piece of precision apparatus fitted to amazingly close tolerances. He should thoroughly familiarize himself with the manufacturer's instructions as to its operation, never weighing his own judgment against that of engine's builders. He is smart if he invests in the few tools necessary to service engine properly rather than subjecting it to possible abuse by using improper or makeshift tools. Parts bolted or screwed together should be tightened evenly and snugly, preferably after running engine. *Never disassemble engine unless it is absolutely necessary.*

Length of engine's life and performance both hinge on type and amount of lubricant supplied to moving parts. Model engines of two-stroke cycle type carry lubricant mixed with fuel, oil being forced by compression to all points needing lubrication. Castor oil, a fine lubricant, is usually employed in ready-mixed glow-fuels, additional castor oil often being used during break-in period. However, if engine shows no tendency to "freeze" (tolerances reducing through heat expansion until engine slows or stops), no additional oil is needed if needle-valve is left to rich setting. Rich settings mean slow running, smoke, a relatively cooler engine; lean

Adjusting, flying tips and model improvements especially for the novice flyer. Tell us what other subjects you would like covered.



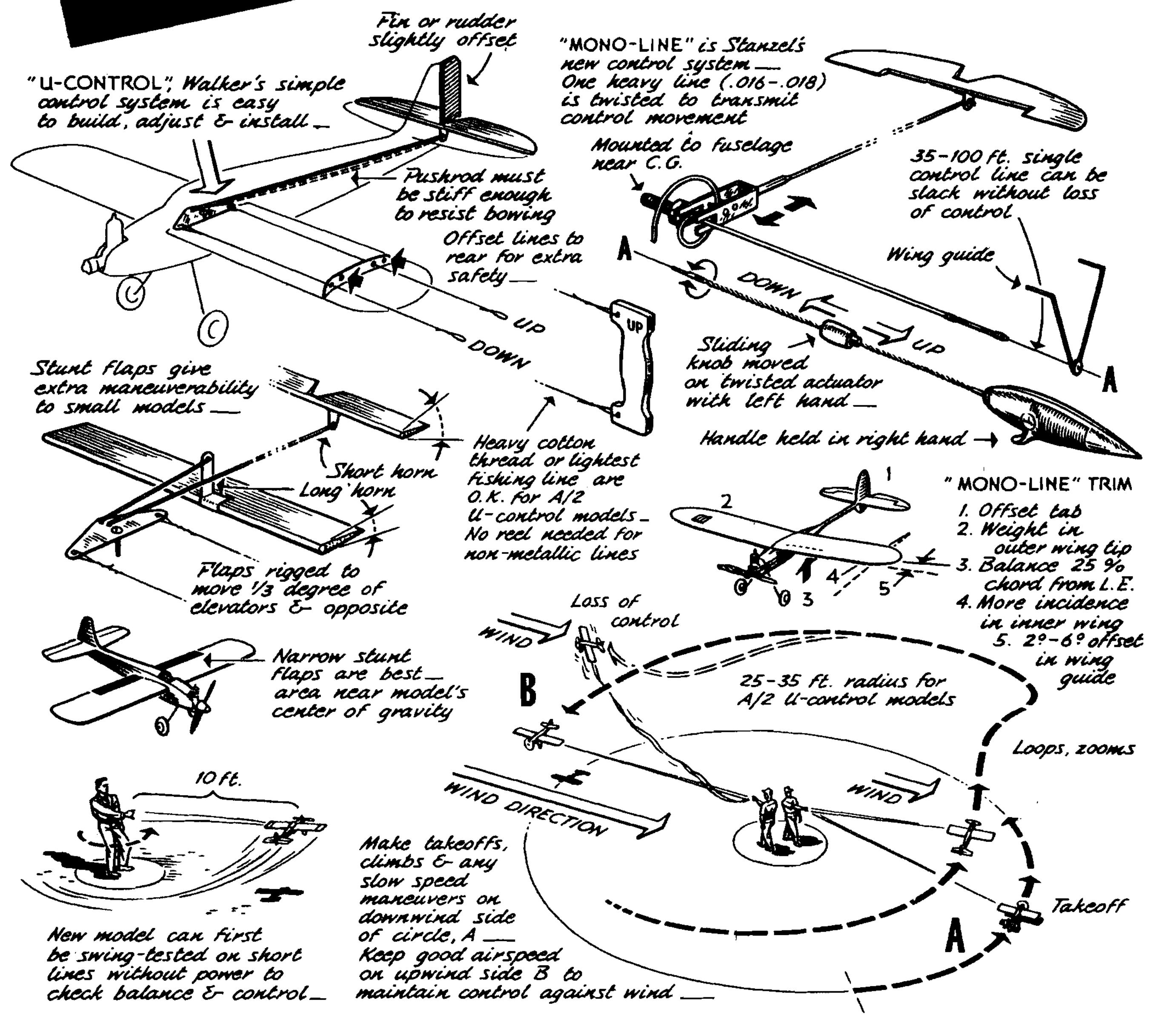
settings give greatest speeds and most heat.

Glow-plugs are heated by batteries for starting, then continue to glow and provide ignition by heat of combustion. Check condition of plug by light bulb wired into starting battery circuit, or remove plug, connect batteries and check glow. Sometimes reflected glow can be observed through exhaust port without removing plug, thus assuring glow-plug is O.K. After starting, wait until engine is adjusted for smooth running before disconnecting booster.

If engine runs smoothly without overheating, little break-in is necessary. If it overheats, make numerous short runs or add more castor to fuel, or drop small quantities in intake while engine is running; continue until engine loosens. Cover intake and exhaust ports to keep out foreign matter between runs. If engine lands in dirt, remove plug, flush thoroughly in gasoline, then lubricate.

If glow-plug checks O.K. and fuel reaches intake, engine should start after priming. If too lean, it may make short, fast bursts; if too rich, will run sluggishly and smoke. Go easy on priming in exhaust or intake—only a drop or so at a time. Flip prop smartly, having it positioned on shaft for easiest cranking.

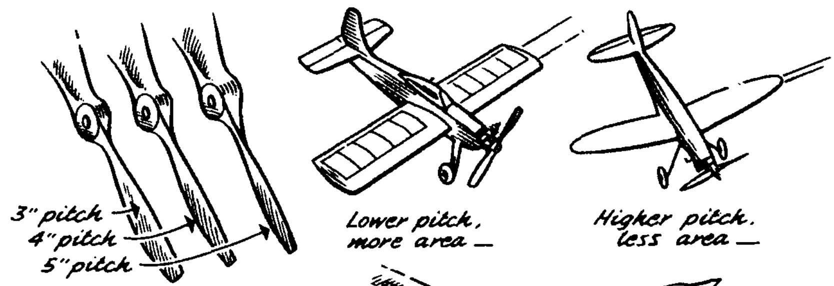
Elementary Modeling: half-A Control-line

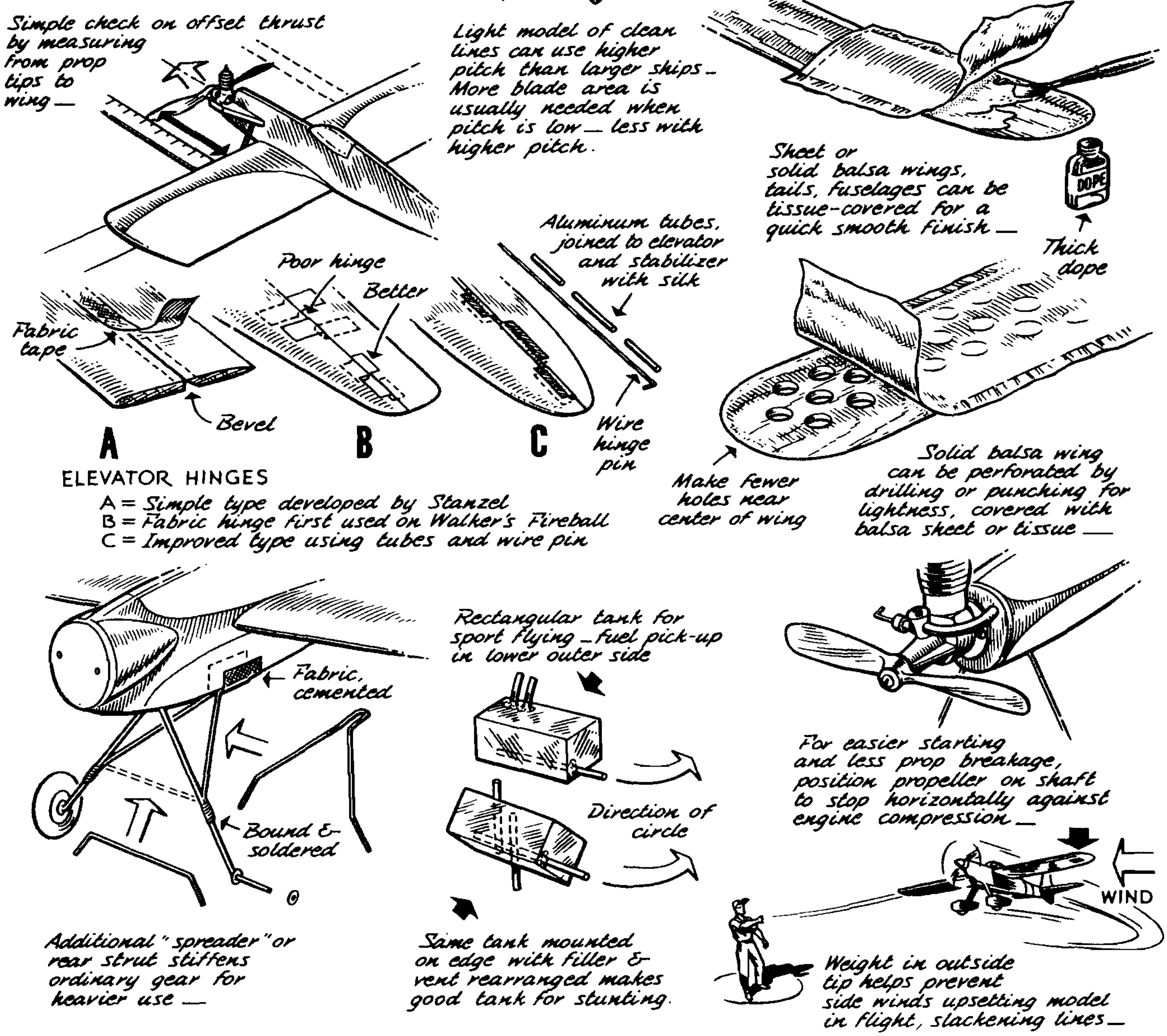


Though the intriguing Half-A control-line models are leaders in popularity, particularly among beginners in modeling, they are not without their shortcomings. With engine displacement reduced to a small fraction of the size we have been accustomed to in the past (a Half-A engine is only *one-twelfth* the displacement of a Class D .60 engine!) there is a corresponding reduction in power. The smaller, lighter ships that result are more at the mercy of the winds than the larger ones and have little of the very "solid" feel we associate with larger, more powerful control jobs. An inexperienced modeler with a new Half-A control ship is wise to wait for calm weather. Follow the wind diagram carefully for proper operation.

Jim Walker's "U-Control" and the new Stanzel "Mono-Line" are the control systems in use nowadays. U-Control, with its inherent simplicity, is foolproof; it utilizes two tether lines to handle, movements of which are transmitted to a pivoted bellcrank, thence to hinged elevator. The lines must be kept taut, however, and such methods as outward offset engine thrust line, outward offset rudder tab, weight in outer wing tip, more incidence in inner wing panel, and rearward location of control line wing guides are resorted to in various combinations to maintain line tension. These many "tools"

Adjusting, flying tips and model improvements especially for the novice flyer. Tell us what other subjects you would like covered.





can be used to extreme, causing a crabbing flight attitude which is neither efficient nor desirable. An untested model should incorporate perhaps two of these wrinkles for a safe test flight; reduce them as much as the flight attitude indicates you can get by with.

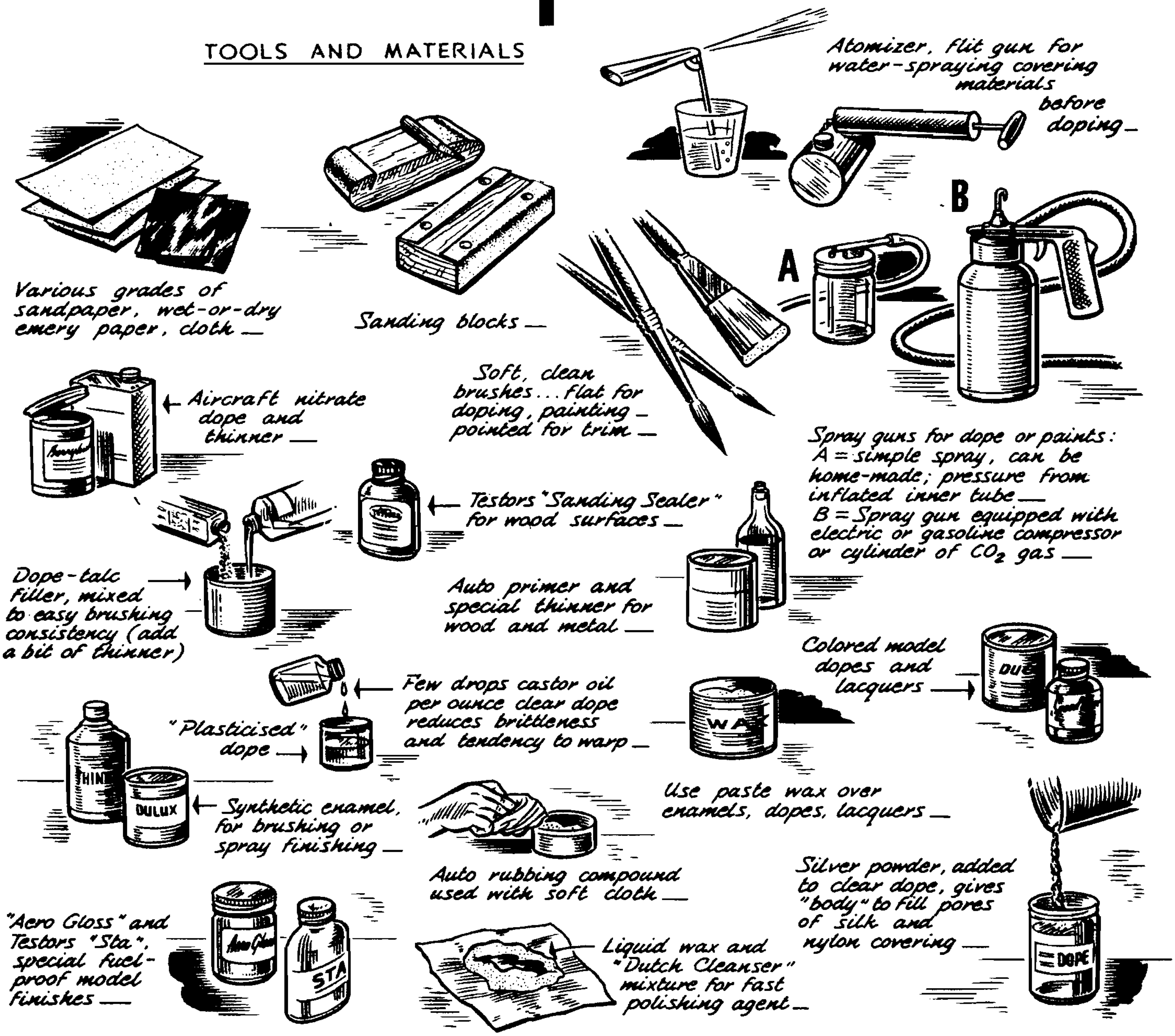
Half-A models can be flown on very lightest casting line or heavy commercial cotton thread. Only the lightest wire lines need be used. Heavy threads can be wrapped around the handle, while metal lines require use of a reel to prevent kinking or curling.

Mono-Line flying presents two outstanding advantages: longer lines can be used—up to 100 ft. radius—and full control is maintained even if the line shoud become slack. When short lines are used, .016" dia. steel wire is specified, and when length is increased to 100 ft., the diameter is increased to .018". Smaller or larger sizes of wire affect control; don't use stranded or braided "cables."

It is best to balance U-Control models fairly nose-heavy, somewhere near the wing leading edge. Mono-Line ships should balance about 25% of chord from leading edge. Selection of woods, type and extent of paint job, wheels, propellers, etc. affect balance greatly. Improper balance of a finished model can often be corrected with lead weights.

AIR-MODEL MANUAL ... *finishing your model*

TOOLS AND MATERIALS



■ Model finishing begins with preparation of the surface—smoothing, filling—for the final protective and/or coloring coats to follow. Wood filling, after initial smoothing, serves to fill depressions, grain pores, and seals the wood against absorbing other materials to be applied.

Application of finish materials is by brush or preferably by spray. Once having sprayed a finish, few modelers revert back to brushing. Good finishing can be done by brush, however. Invest in good brushes; keep them clean and soft. Thin your paint for brushing, using long, even strokes. Avoid finishing in damp, humid weather, which makes dope "blush."

Remember that nitrocellulose materials (dopes, lacquers) *cannot* be applied over enamels, varnishes, shellacs, though enamels *can* be applied over nitrocellulose.

Advent of glow-fuels has made model finishing complex. But specially developed model finishes such as "Aero Gloss" and Testor's "Sta" can withstand dissolving effects of glow-fuel though often require use of special thinners and primers. Some finishes are merely hot fuel *resistant*. "Fuel proofer," clear substance to protect colored dopes from hot fuels, is

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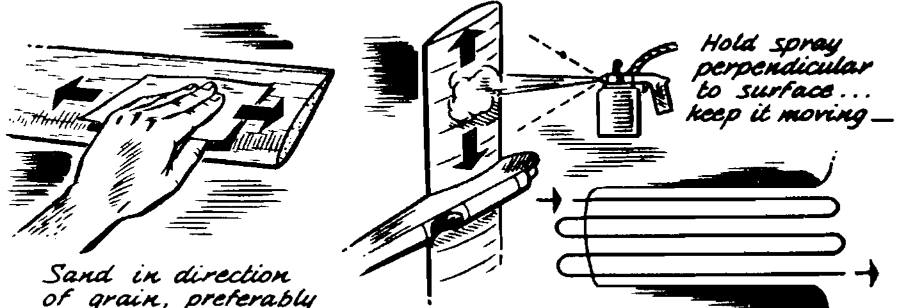
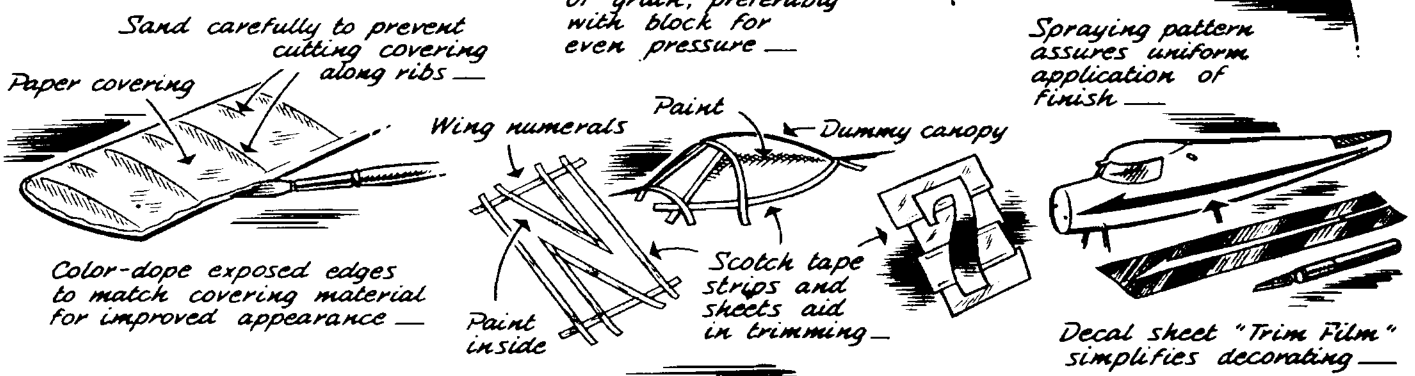
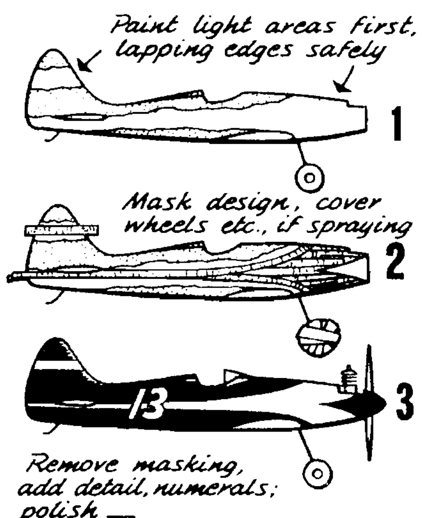


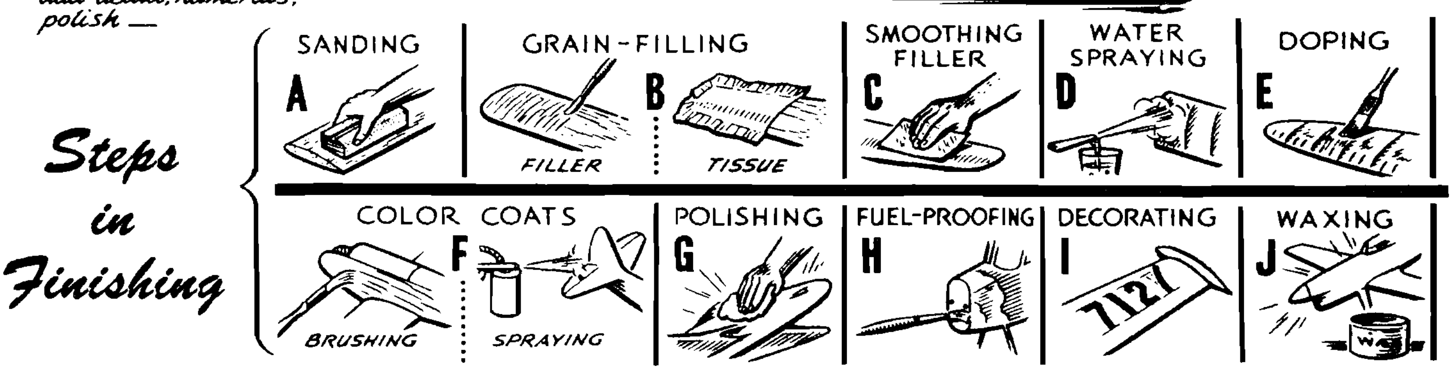


PAINTING SEQUENCE



WOODEN CONTROL-LINE, PRE-FAB, A/2, SPORT, ETC.	STUNT MODEL (BUILT-UP WINGS)	FREEFLIGHT (BUILT-UP)
Minimum = A, F, H Optional = B, C, F, G, H, I	Minimum = A, D, E, H Optional = F, G, I, J	
NON-FLYING SCALE	**FLYING-SCALE**	**SPEED, TEAM R.**
Minimum = A, F, I Optional = B, C, G, J	Minimum = A, D, E, H, I Optional = B, C, F, G	Minimum = A, B, C, H Optional = F, G, I, J

Steps in Finishing

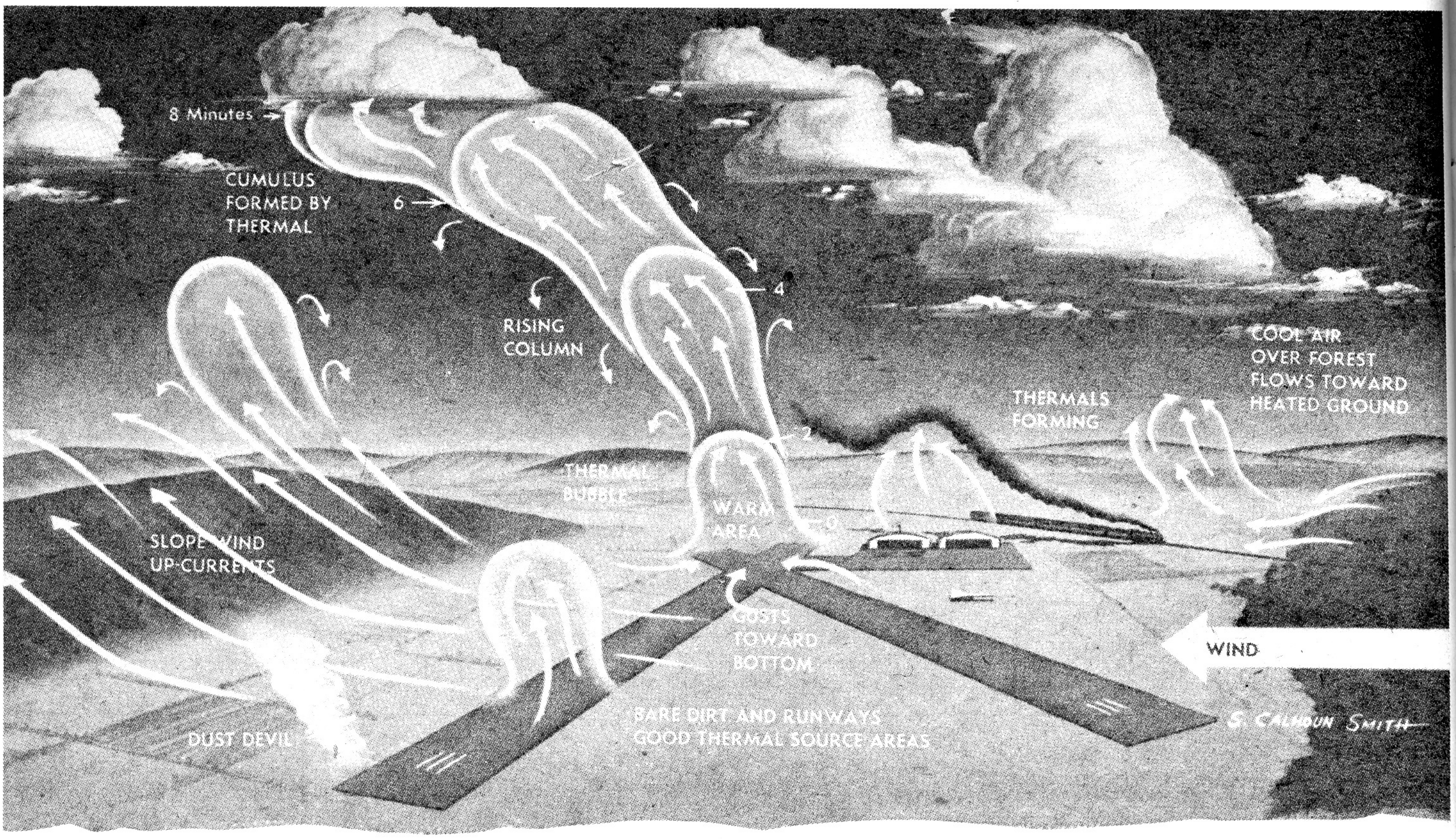


practical, needs only be applied around nose of model but makes repairing difficult where recementing and doping are needed. Ideal for free flight where weight is important factor.

Superior finishes, after thorough smoothing and filling of surfaces, are had by application of numerous thinned coats, first ones with light sanding between, later ones with polishing between coats. Polishing agent must be cleaned away before next coat is applied. Final buffing and waxing assure sheen.

Speed jobs, team racers, flying scale models and similar types can be finished successfully in synthetic enamels (auto finishes) where extra weight can be tolerated. This can be brushed or sprayed over any type filler; should be "aged" several weeks for best results in polishing to satin finish. Auto cleaner containing rubbing compound works fine here. Synthetic enamels, particularly after "aging", resist hot fuels; further protection can be had by heavy waxing.

Any finish, particularly a slow drying one, needs dust-free atmosphere for good results, though small imperfections from dust particles can be polished out if finish is thick enough—hence suggestion of several thinned coats which also dry faster than thicker ones.



LOCATING THERMALS

■ Thermals are rising columns of air which are slightly warmer than the surrounding air. They may be likened to hot-air balloons being released from the earth. When air over a particular portion of the ground becomes warmer than the surrounding air (because of heating action of sun on that section of terrain), that mass of air breaks loose from the earth and starts rising like a bubble. As it rises it accelerates and moves faster, the acceleration upward depending on how much hotter it is than the surrounding air.

The formation of thermals may be likened to water being warmed in a pot; as the water near the bottom is heated, it tends to rise. A lump of air cools 5.5 degrees F. for every 1000 feet it goes up. The maximum vertical velocity of a thermal and its height depend on the temperature of the surrounding air, for whenever the thermal has cooled to the temperature of the air around it, it ceases to rise.

Watch how other models are performing. Thermals tend to be emitted from a particular spot periodically, so if any other model catches a thermal you would be wise to send your ship up the same place 5 or 15 minutes afterward. You can watch a series of models and get an idea of the period of the thermals. If you can send your model up right after you see another model catch an updraft, you can often get yours up in the same thermal.

Watch the cumulus clouds. When there are cumulus clouds marking the tops of the thermals you can actually "see" the up-current. The problem is to estimate where the lower part of the up-current is in relation to the cloud.

Thermals do not last very long, so you want to get your model under a cloud when it is growing, not dissipating. If the cumulus cloud has a firm, solid appearance, with a flat, dark base, you can be sure it is growing and that there are strong up-currents in and under it. When it looks frayed around the edges it is usually breaking up.

If the clouds that are forming are all small and wispy, there is no way of telling from the appearance the stage of the thermal. A good method of estimating the strength of an up-current which connects with a cloud is to watch the cloud's horizontal velocity relative to other clouds. If it tops a good thermal it will be moving more slowly with the wind than its mates.

Observe birds, dust, insects or paper going up in the thermal. Sometimes thermals are like little whirlwinds on the ground and will pick up solid material. When they do you can be sure the up-current is very strong up high. Your model can probably climb in any updraft that lifts a bird.

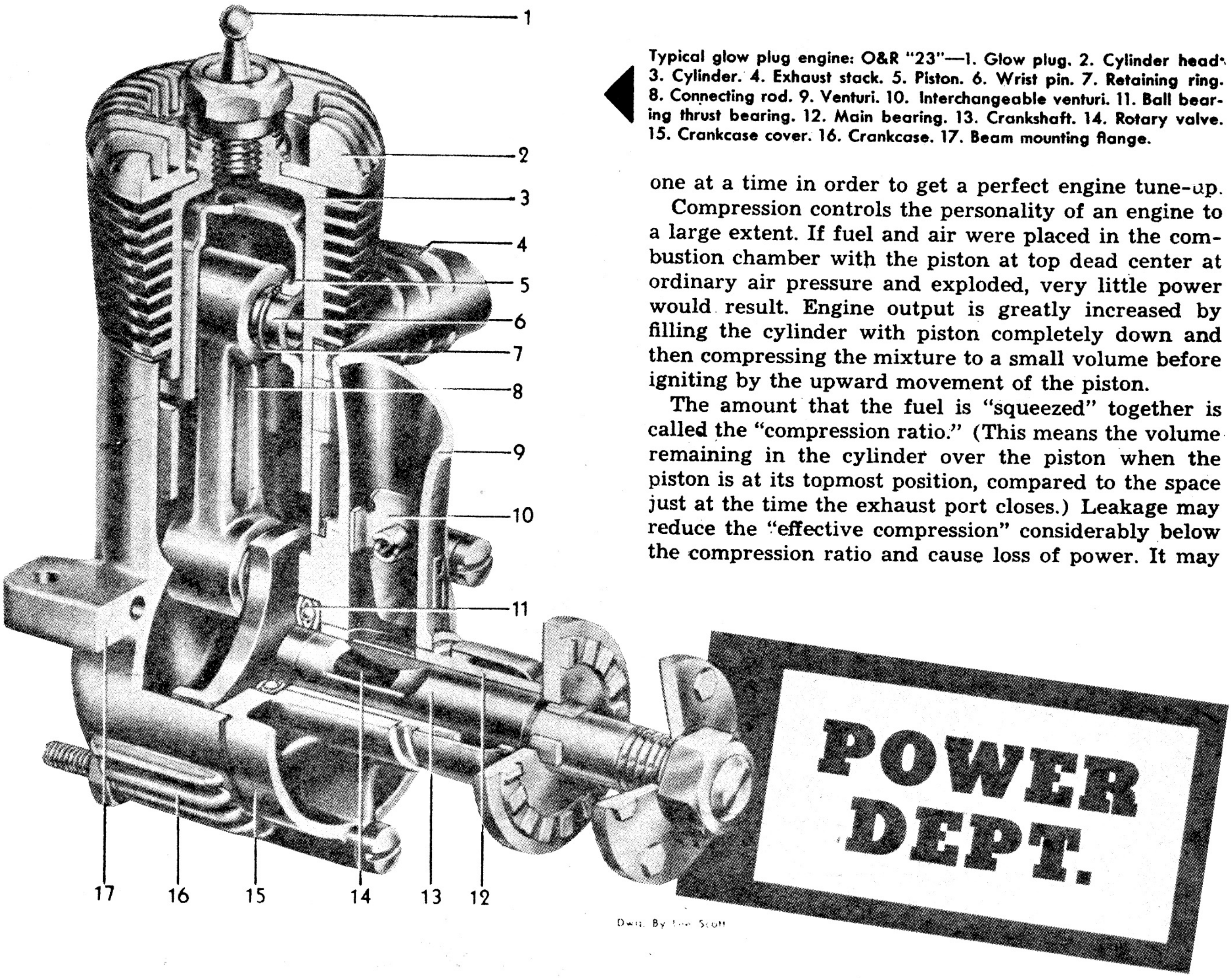
Suppose you find yourself launching a model on a cloudless day in a part of the country where all the ground is flat and there are no smoke plumes or birds or other models. You then cannot guess where the next thermal will be very accurately, but you can tell if thermals are present by noting whether or not the wind is steady. Whenever the wind is gusty there are some up-currents nearby.

Let's imagine you have a powerful thermal all lined up and waiting for your model—you still have to make proper use of it. If the day seems to offer good thermal possibilities you should always get your model up as high as possible while the motor is going. When it starts gliding it should circle tightly. A stable model in a tight turn has the best possible chance of catching a thermal and staying in it. Good thermals are gusty, so your model must be able to recover from any unusual position it assumes. It must be able to make use of both large and small thermals; hence its circle must be very tight.

A model will not stay in one thermal more than about ten minutes if there is much wind. The best model sinks vertically downward through the mass of air in which it is circling at approximtely 3 feet per second, no matter what the air is doing. If there is wind a thermal does not extend straight up; instead it leans downwind. Thus as the model is carried aloft in the thermal it tends to drop out of it on the downwind side. Then it finds itself in the gentle down-current, and descends. It may hit another thermal lower down. and start up again. Most days the thermals go up until they squash against a layer of very stable air called a "temperature inversion." When they hit this layer the thermals push out sideways. This is another reason why your model may lose the thermal—it gets pushed out sideways near the top.

On a typical day the thermals become strong enough to be useful about 11 A.M., die out around 6 P.M., and are strongest between 1:30 and 3 in the afternoon. If you think the day is going to be a very good one you should try to get your flights in as early as possible, because there is usually less wind then and your model will take longer to go out of sight. Another point —thermals do not go as high earlier in the day, which means the timer can keep your model in sight longer.

By PAUL B. MacCREADY, Jr.



Typical glow plug engine: O&R "23"—1. Glow plug. 2. Cylinder head. 3. Cylinder. 4. Exhaust stack. 5. Piston. 6. Wrist pin. 7. Retaining ring. 8. Connecting rod. 9. Venturi. 10. Interchangeable venturi. 11. Ball bearing thrust bearing. 12. Main bearing. 13. Crankshaft. 14. Rotary valve. 15. Crankcase cover. 16. Crankcase. 17. Beam mounting flange.

Dwg. By Lee Scott

■ Model airplane engines are nearly all the single-cylinder two-cycle type as illustrated. Power is developed by compressing an air-fuel mixture in the cylinder during the upward stroke of the piston and igniting it at the top of the stroke. Rapid burning causes a sudden increase in temperature and pressure which acts on the piston with a force as great as *500 pounds*. This is transmitted to the connecting rod and then the crankshaft.

At the bottom of the stroke, intake and exhaust ports open, allowing fresh air and fuel to flow from the base through the by-pass and into the cylinder, pushing the burned fuel mixture out the exhaust port. While this explosion is occurring in the cylinder above the piston, the base of the engine is pumping fuel for the next power stroke.

The upward travel of the piston causes a partial vacuum in the base and draws air and fuel through the intake or rotary valve. When the piston is at top center the valve closes and the mixture is compressed in the base during the downward stroke. The resulting pressure blows the mixture up through the by-pass when the ports open.

This operating cycle sounds very simple, but when an engine is built and put into operation several complications set in. High pressure is difficult to seal against leakage at the piston, and intense heat plays havoc with close fits when the parts begin to expand. These individual problems must be understood and overcome one at a time in order to get a perfect engine tune-up.

Compression controls the personality of an engine to a large extent. If fuel and air were placed in the combustion chamber with the piston at top dead center at ordinary air pressure and exploded, very little power would result. Engine output is greatly increased by filling the cylinder with piston completely down and then compressing the mixture to a small volume before igniting by the upward movement of the piston.

The amount that the fuel is "squeezed" together is called the "compression ratio." (This means the volume remaining in the cylinder over the piston when the piston is at its topmost position, compared to the space just at the time the exhaust port closes.) Leakage may reduce the "effective compression" considerably below the compression ratio and cause loss of power. It may seem logical to make a close-fitting piston and cylinder to stop all leakage, but expansion of metal parts due to heat renders this impossible.

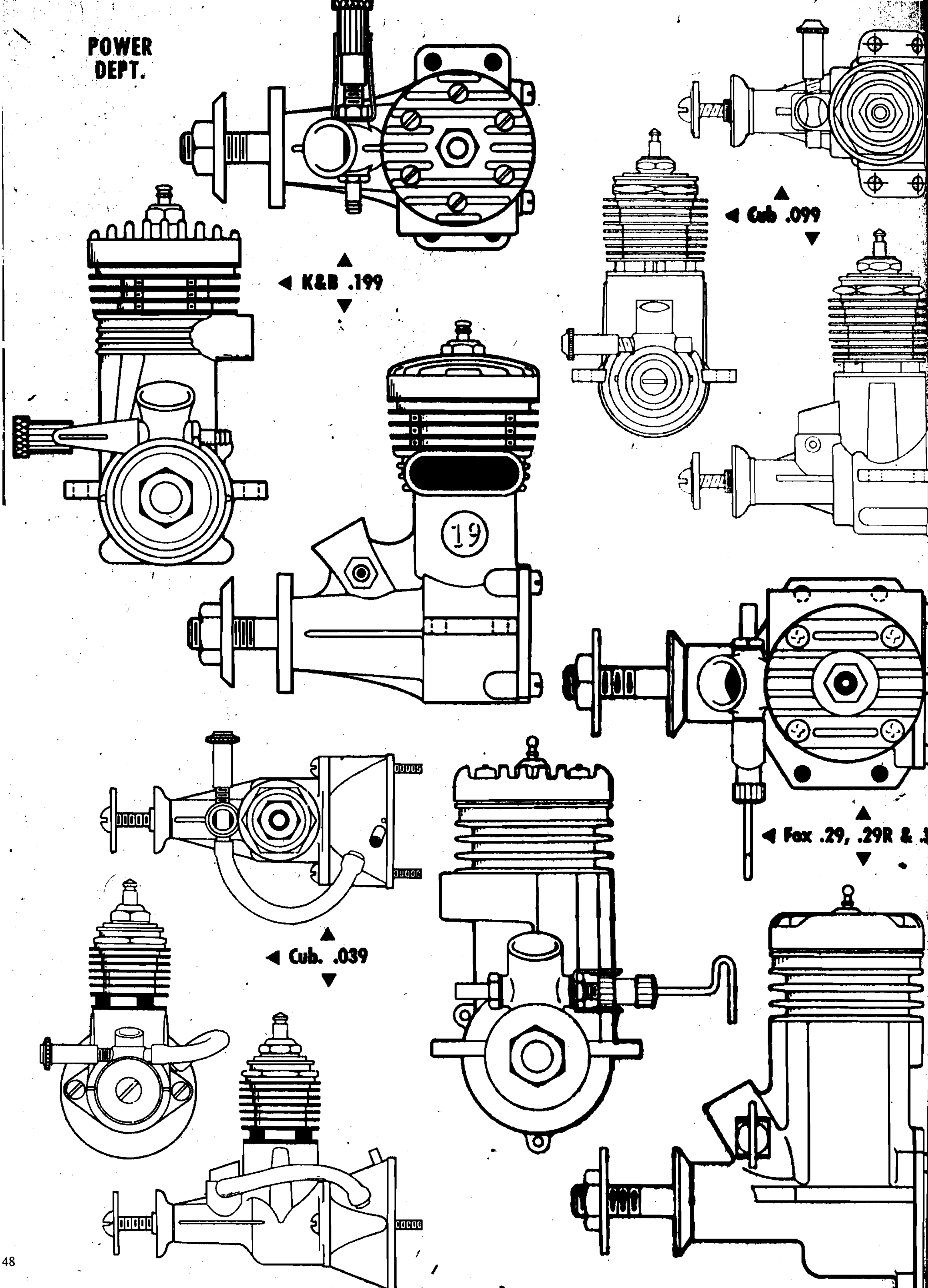
Burning inside the cylinder starts when the piston is near the top center and is completed before the piston moves down very far. The resulting heat is picked up by the piston, cylinder and cylinder head. Fins on the cylinder and head keep these parts at a reasonable temperature.

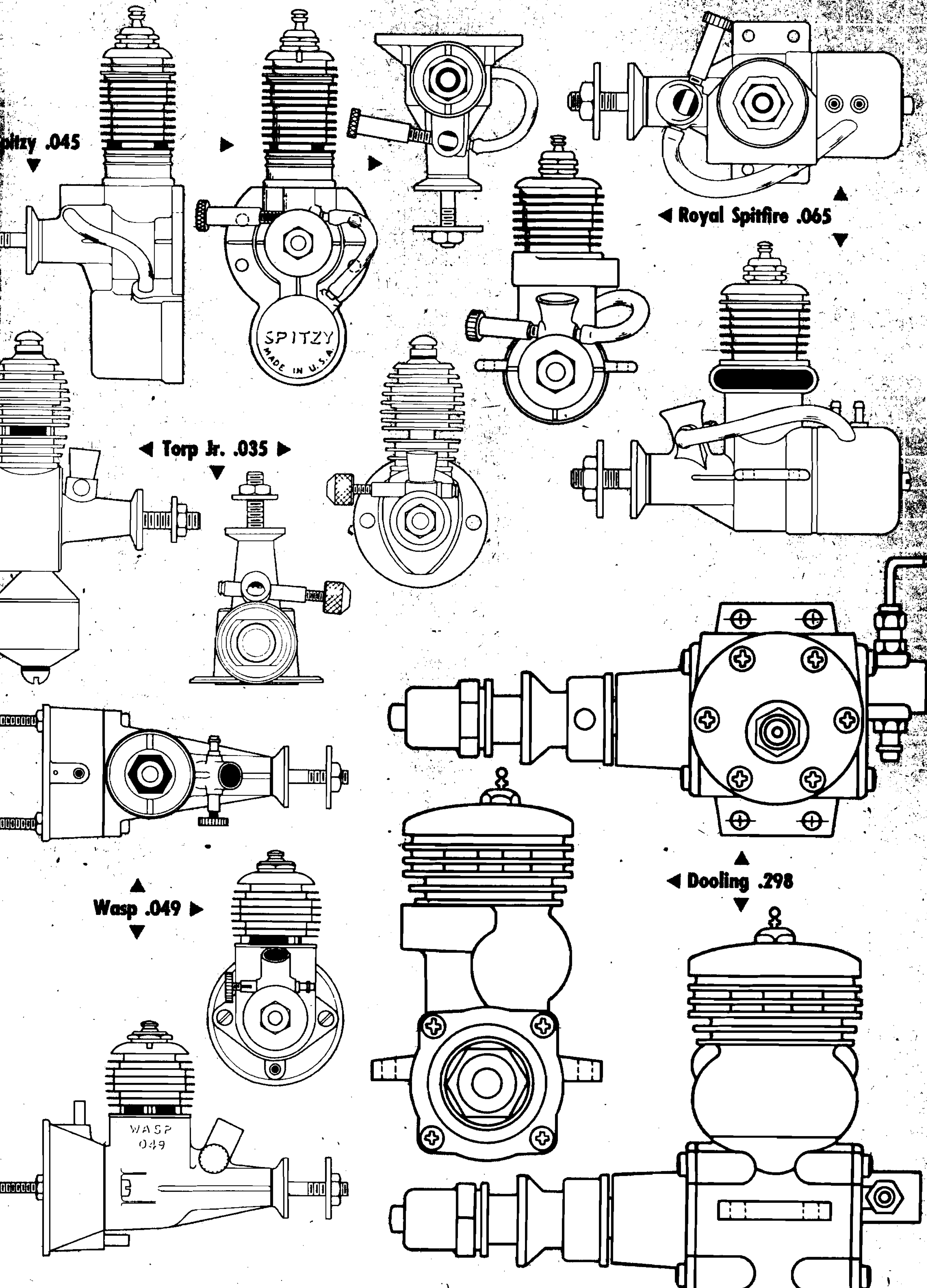
However, considerably higher temperatures exist in the piston because it is cooled only by contact with the hot cylinder.

High temperatures at the top surface of the piston cause the greatest expansion at that point, and its skirt expands somewhat less. Piston clearance is reduced because the piston expands much more than the cylinder. Most small-bore engines take care of this change in clearance by allowing .0005" clearance cold and depend on heavy oil to make a compression seal.

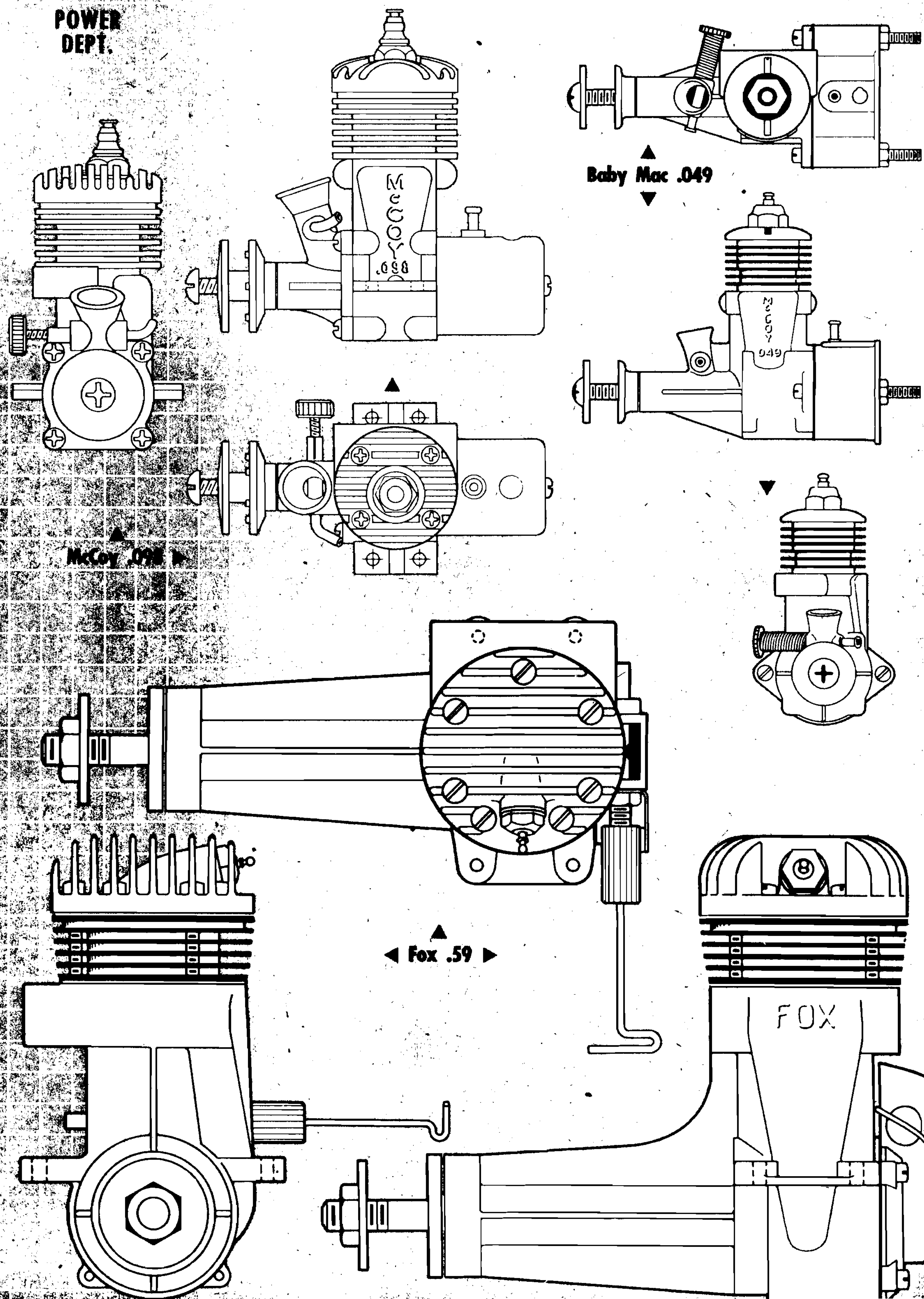
Cast-iron or steel pistons must be used in this arrangement because of their low rate of expansion. Cast iron or steel has proven satisfactory, especially in the comparatively lower speed engines, but for top-speed engines a lighter piston is necessary to avoid excess vibration, so aluminum is usually used. But aluminum pistons expand about two and one-half times as much as cast iron or steel and the oil film no longer seals. Cast-iron piston rings are used to make a seal with .002" to .0035" piston clearance for expansion.

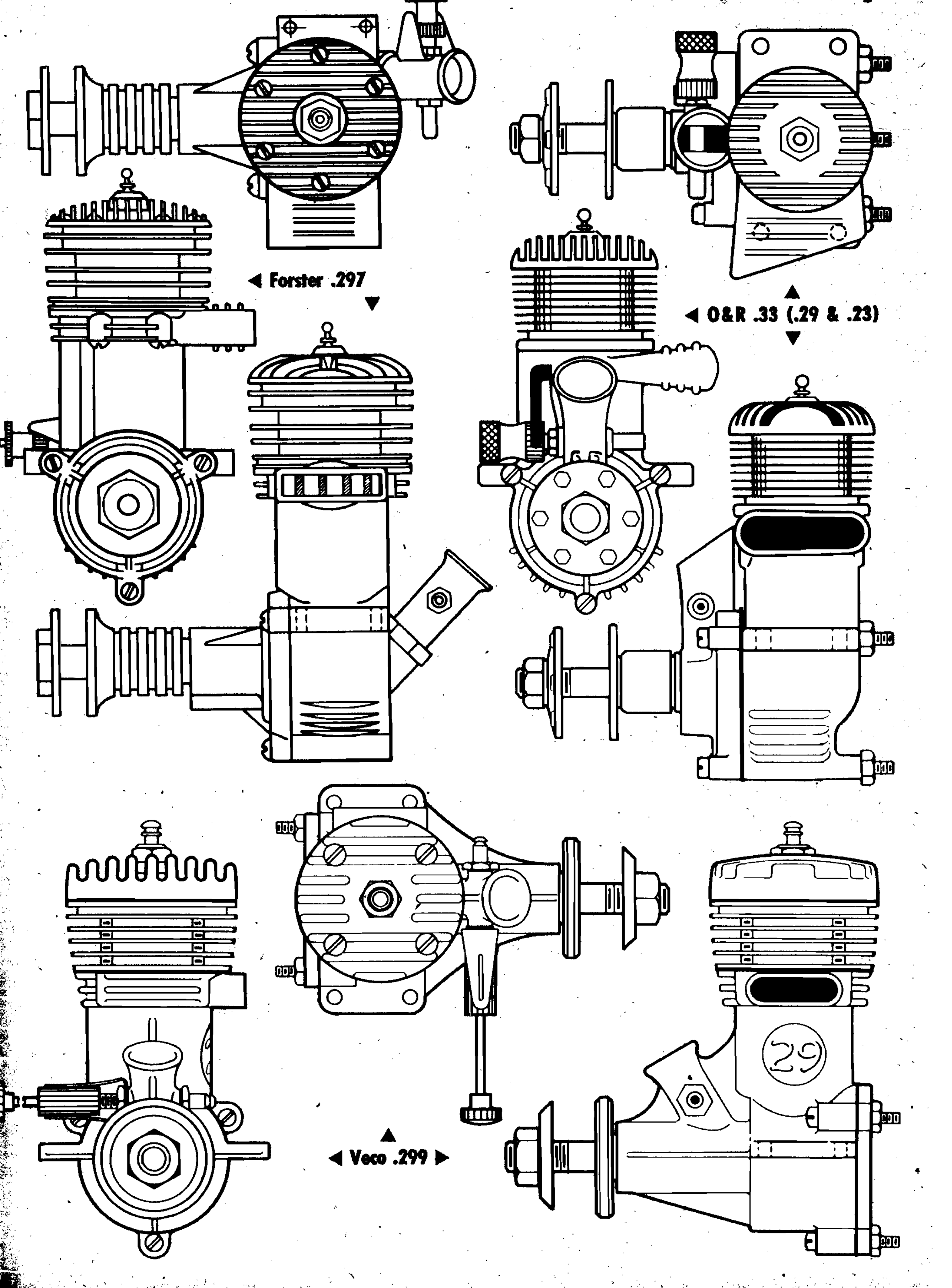
POWER DEPT.

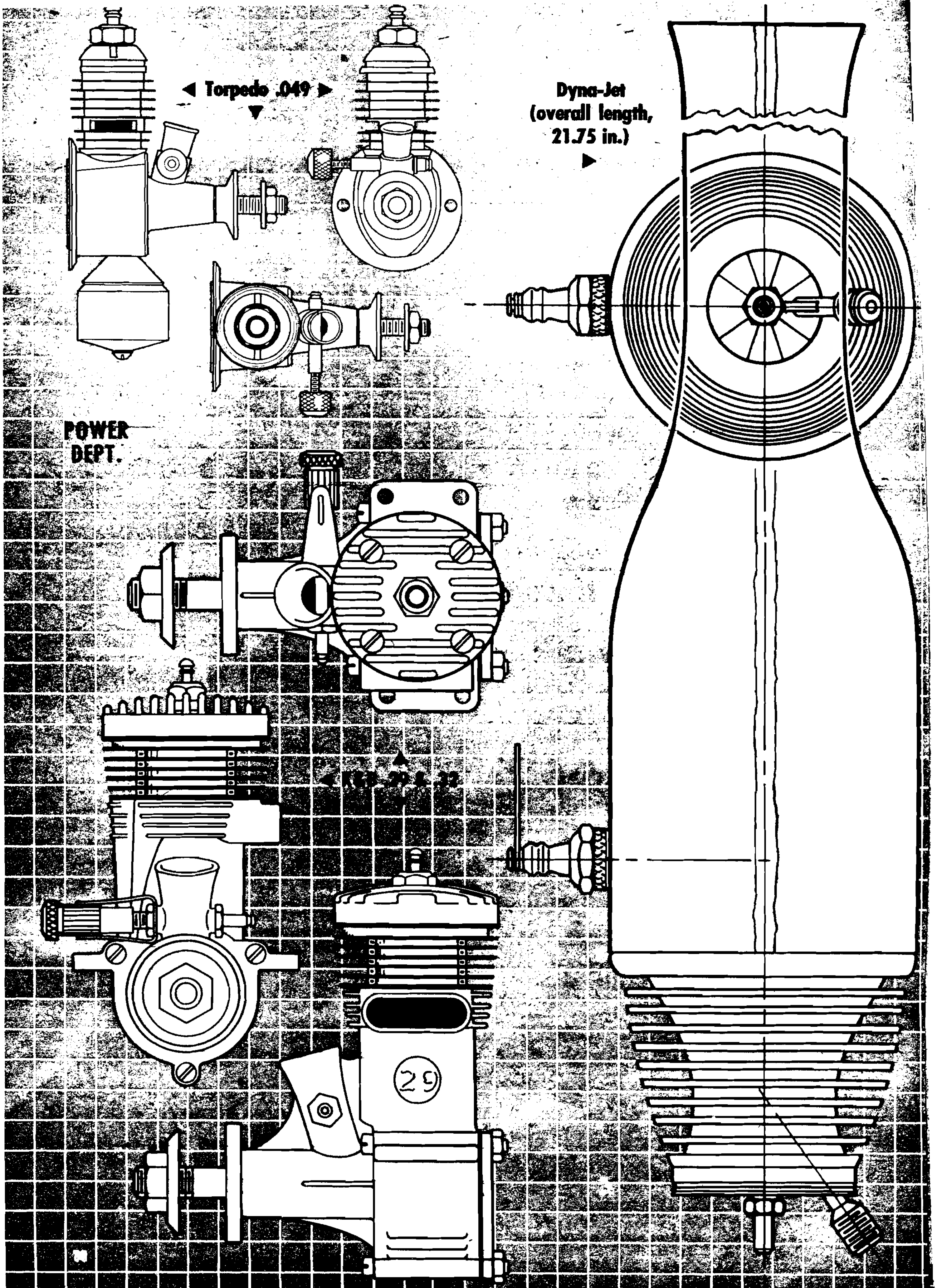



pitzy .045
SPITZY
MADE IN U.S.A.
Royal Spitfire .065
Torp Jr. .035
Wasp .049
WASP
049
Dooling .298

POWER DEPT.




Forster .297
O&R .33 (.29 & .23)
Veco .299


◄ Torpedo .049 ►
Dyna-Jet
(overall length,
21.75 in.)
POWER
DEPT.
◄ K&B 29 & 32
29

There's nothing like long-lasting, power-packed T-56 for rubber-powered planes. Made of fine Brazilian para rubber, "T-56" is scientifically compounded to take maximum winding . . . return a high percentage of power . . . give consistent propulsion, *flight after flight.* Insist on T-56 and be "power sure."

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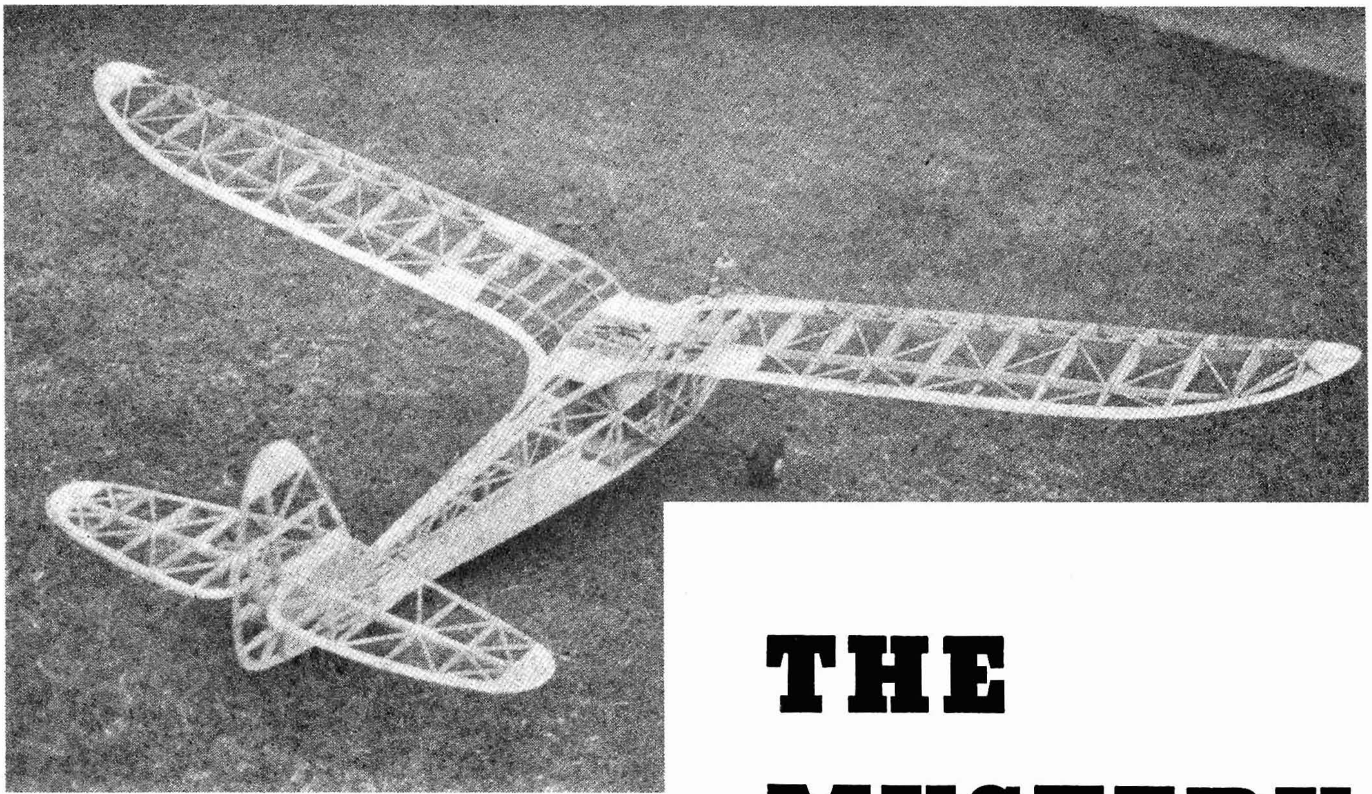
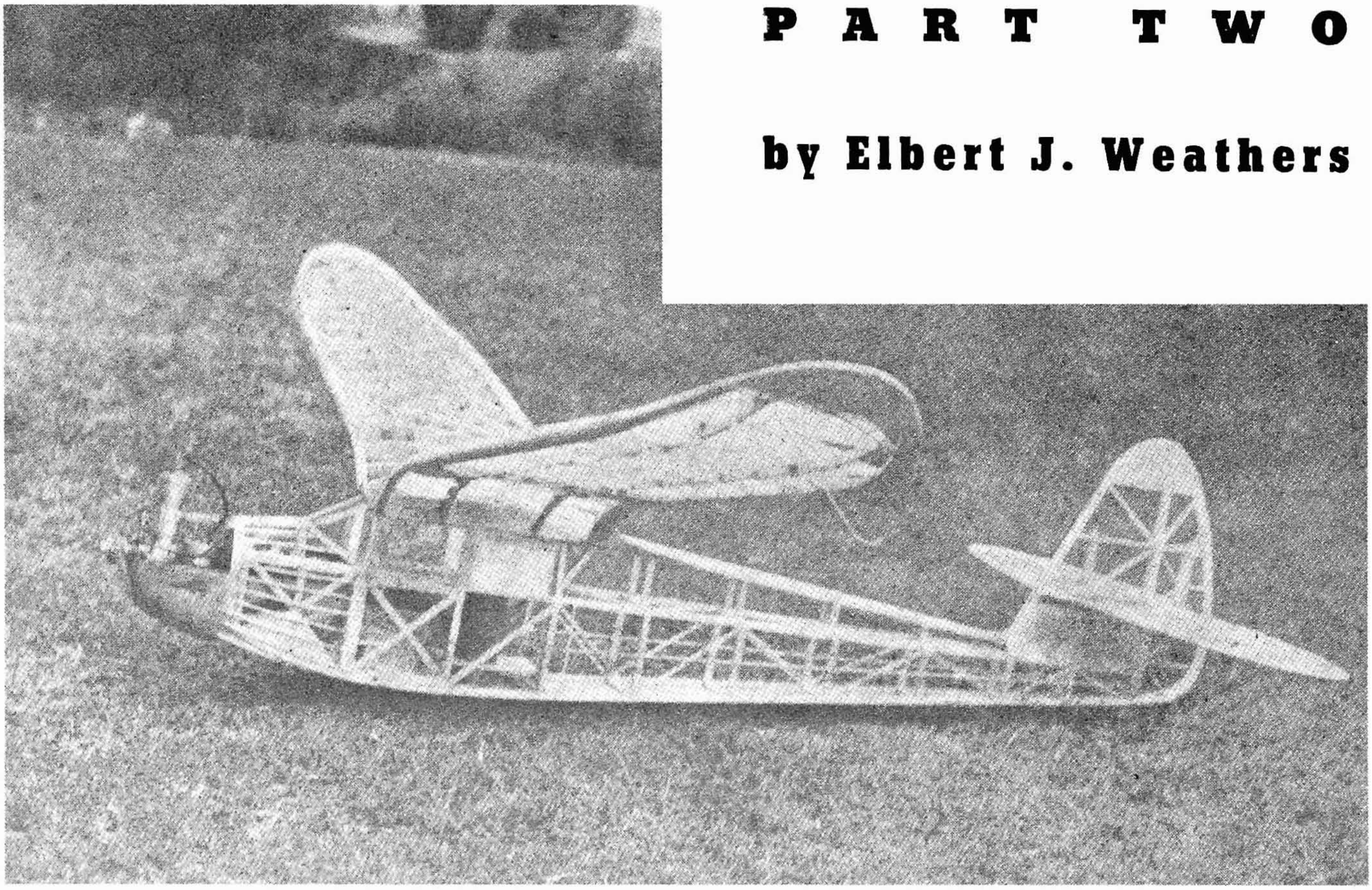


The skeleton views of the Mystery Man show the beautiful construction. This ship is a tough customer in competition, having won $99.75 in prizes and cash. Going to press, we hear that it just took second in the Pacific Coast Championship. Timed flight was 14:33, total flight 20:00 on a 20-second motor run. There were 350 entrants representing the cream of the Coast Modelers.

THE MYSTERY MAN

PART TWO

by Elbert J. Weathers



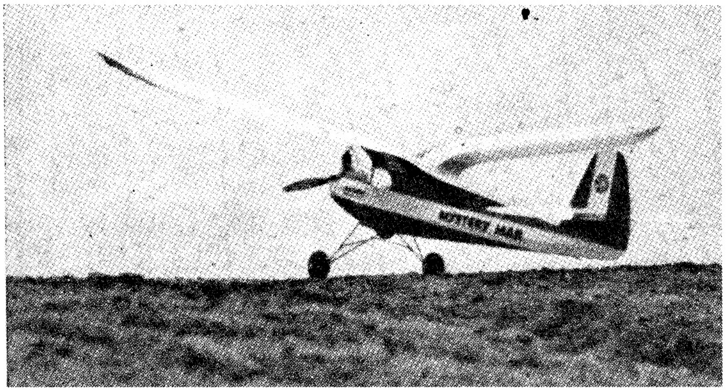
PART one, last month, presented the fuselage, tail surfaces, and take-off dolly, and beginning here, the remaining details to complete the model will be explained.

Probably the most complicated and important item is the center-section construction. It is a throwback to the flying scale model construction where a considerable part of the assembly had to be checked by measuring up from the work board.

GULLED CENTER SECTION AND WING

First make the special spars as shown in detail. Place these in position on your full-size sketch and cement ribs CW-1 in place. The slots cut out to get the ribs over

The Mystery Man is convenient for transportation. Below—On the line.



the wire reinforcings should be replaced before covering. Next cement the remaining pairs of ribs on, making sure that each pair is the same distance from the work board. It is vitally important that both sides be alike.

The wing construction is of accepted practice, except for the upcurved tips, which require special leading and trailing edges and sawed-out spars of $\frac{1}{8}$" sheet basswood. The tip leading edges are carved out of blocks, and the tip trailing edges are cut out of $\frac{1}{4}$" sheet balsa and boiled to let them bend easily.

It is advisable to leave the first rib of each frame lightly cemented so that it may be moved slightly if necessary while matching the wings to the center section.

Assemble the wings on the center section with pins and braces, including the tubes and dowels as they will be finally. Check this line-up to perfection and cement the tubes and dowels in their respective positions, then add the $\frac{1}{8}$" sheet fillers. When dry, drill $\frac{1}{16}$" lock-pin holes through the tubes and dowels, inside and against the second ribs, then cement $\frac{1}{16}$" aluminum pin guide tubes over the holes, to the tops of the ribs, and finish with $\frac{1}{16}$" sheet cover support plates. This is shown in detail on the wing root perspective drawing.

Take the fuselage assembly from under the table and cement on the nose block, front formers and stringers, then carefully mount and cement the center section.

TIMER INSTALLATION

The $\frac{1}{16}$" CW-1 rib must be cut out partly and the $\frac{1}{8}$" sheet fillers cemented in between the spars and trailing edge.

An Autoknips photo-timer accepted for model use was adapted for the original model.

The two phosphor bronze contact brackets are mounted on a $\frac{1}{8}$" sheet platform, which is cemented in the proper place for the timer "creeper" to engage the longer contact bracket. Solder the timer wires to the brackets. The timer is cemented in place with two $\frac{1}{16}$" sheet braces and lots of cement.

Next, add the $\frac{1}{16}$" fillets, A, B, C, D, and E as shown in detail.

Remove the timer winder and cover the flat center section with $\frac{1}{16}$" sheet. The top of the gulls are covered by cementing fitted $\frac{1}{8}$" sheets between the ribs. The bottom of the gulls are covered with $\frac{1}{16}$" sheet in the same manner. Sand all wood covering to a smooth finish and prepare the frames for covering.

Pin and cement the fiber and dural skids to the bottom, and attach the celluloid windows.

COVERING

With the following list to refer to, the model is covered partly with special Chinese-made bamboo paper, and partly with Flightex:

Fuselage: bottom from nose block to rear—Flightex; remainder—paper.

Wing panels: bamboo paper, all except tips; cover remainder from W-2 with Flightex.

Gulled center section: all Flightex.

Tail surfaces: all paper, except tips. Cover from last rib out with Flightex.

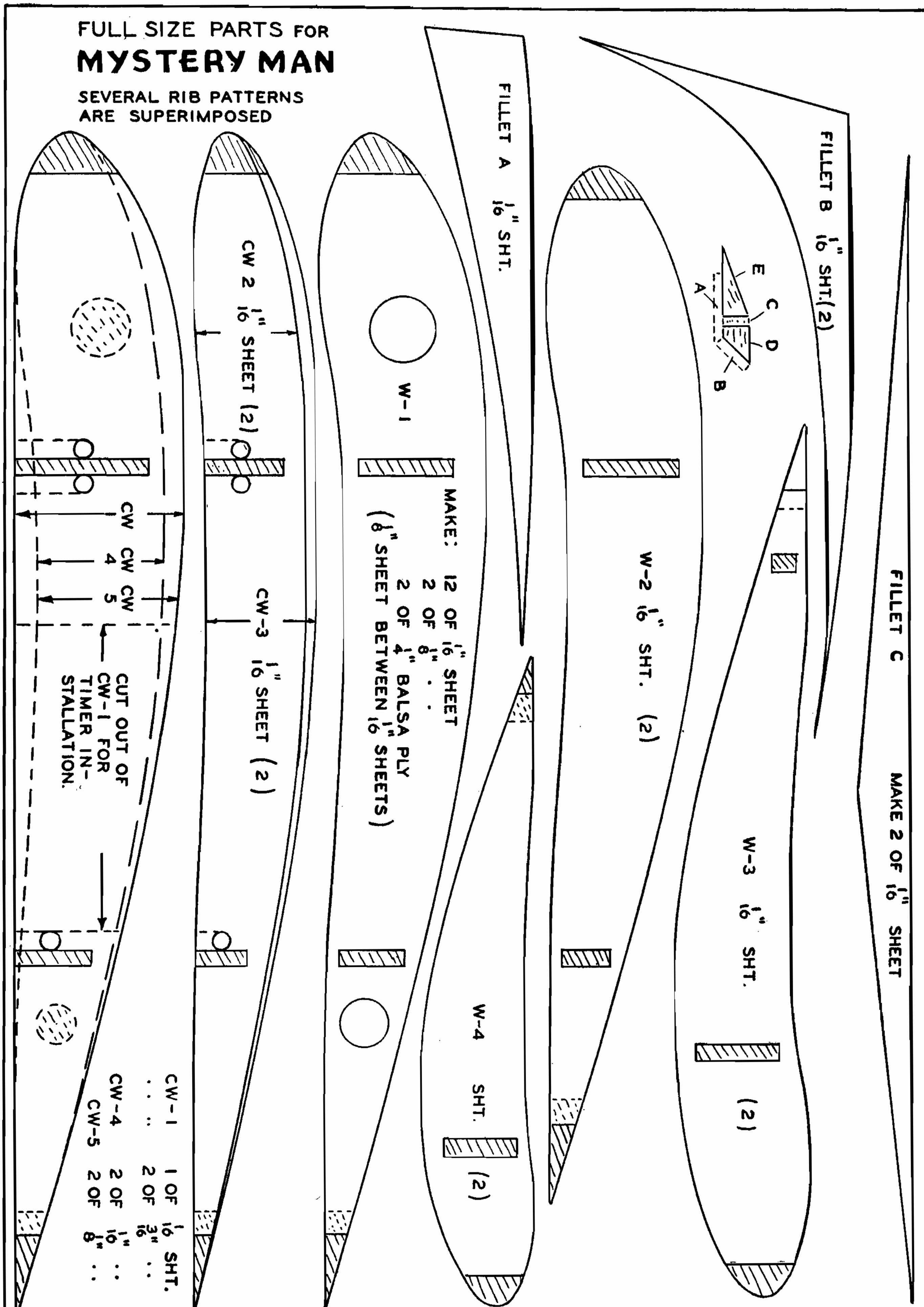
FINISH

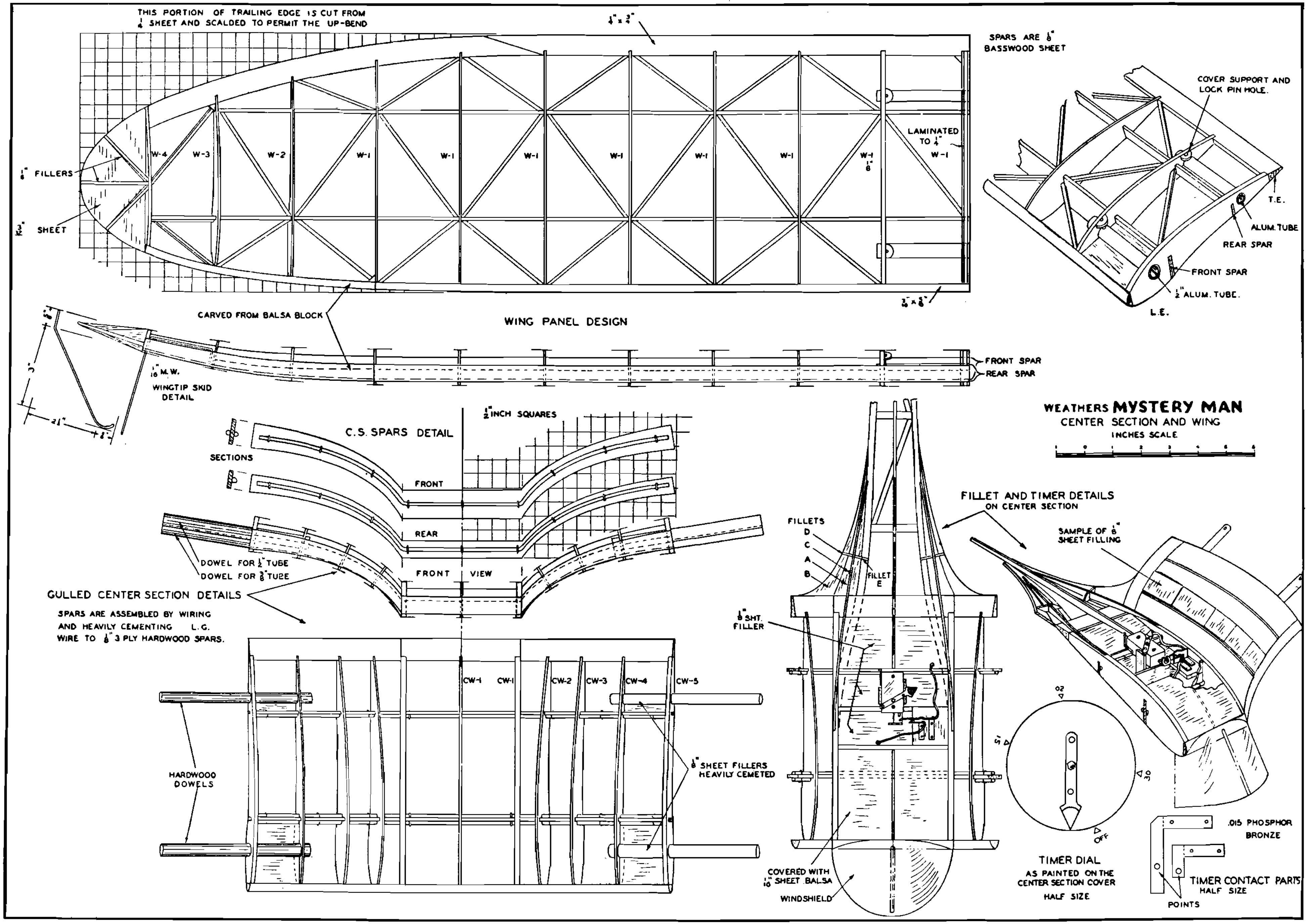
Give the model three coats of nitrate dope after first shrinking the cover with water. Follow with two to three coats of color lacquer of your choice. The original is red, white and blue. Rub the finish down between coats. Paper masking applied with masking tape will give a clean-cut paint job. Color separation lines of the original are included on the drawings and will save time in figuring out an effective color scheme.

Install the motor and prop, and the model is ready to test.

FLYING

When ready to fly, the model should balance with the nose down very slightly, balancing being done on fingers about one third of way back on wing chord. Use a propeller of known ability in flying it, one having about an 8-inch pitch and 14-inch diameter. (Such a propeller will have a thickness at hub of about $\frac{1}{2}$ to $\frac{9}{16}$ inch.) Be sure that take-off gear functions


FULL SIZE PARTS FOR
MYSTERY MAN
SEVERAL RIB PATTERNS
ARE SUPERIMPOSED
FILLET A 1/16" SHT.
FILLET B 1/16" SHT.(2)
E
C
D
A
B
FILLET C
MAKE 2 OF 1/16" SHEET
CW 2 1/16" SHEET (2)
W-1
MAKE: 12 OF 1/16" SHEET
2 OF 1/8" " "
2 OF 1/4" BALSA PLY
(1/8" SHEET BETWEEN 1/16" SHEETS)
CW
CW 4
CW 5
CUT OUT OF CW-1 FOR TIMER INSTALLATION.
CW-3 1/16" SHEET (2)
W-2 1/16" SHT. (2)
W-3 1/16" SHT. (2)
W-4 SHT. (2)
CW-1 1 OF 1/16 SHT.
" " 2 OF 3/16" " "
CW-4 2 OF 1/16" " "
CW-5 2 OF 1/8" " "


THIS PORTION OF TRAILING EDGE IS CUT FROM
1/4" SHEET AND SCALDED TO PERMIT THE UP-BEND
1/4" x 3/4"
SPARS ARE 1/8"
BASSWOOD SHEET
COVER SUPPORT AND
LOCK PIN HOLE.
T.E.
ALUM. TUBE
REAR SPAR
FRONT SPAR
1/2" ALUM. TUBE.
L.E.
1/8" FILLERS
3/32" SHEET
W-4
W-3
W-2
W-1
LAMINATED
TO 1/4"
3/16" x 3/8"
CARVED FROM BALSA BLOCK
WING PANEL DESIGN
FRONT SPAR
REAR SPAR
1/16" M.W.
WINGTIP SKID
DETAIL
1/2" INCH SQUARES
C.S. SPARS DETAIL
SECTIONS
FRONT
REAR
FRONT VIEW
DOWEL FOR 1/2" TUBE
DOWEL FOR 3/8" TUBE
GULLED CENTER SECTION DETAILS
SPARS ARE ASSEMBLED BY WIRING
AND HEAVILY CEMENTING L.G.
WIRE TO 1/8" 3 PLY HARDWOOD SPARS.
CW-1
CW-2
CW-3
CW-4
CW-5
HARDWOOD
DOWELS
1/8" SHEET FILLERS
HEAVILY CEMETED
WEATHERS MYSTERY MAN
CENTER SECTION AND WING
INCHES SCALE
FILLET AND TIMER DETAILS
ON CENTER SECTION
FILLETS
D
C
A
B
FILLET
E
1/8" SHT.
FILLER
SAMPLE OF 1/8"
SHEET FILLING
COVERED WITH
1/16" SHEET BALSA
WINDSHIELD
OFF
15
30
TIMER DIAL
AS PAINTED ON THE
CENTER SECTION COVER
HALF SIZE
.015 PHOSPHOR
BRONZE
TIMER CONTACT PARTS
HALF SIZE
POINTS

without any tight spots on rods so the model can leave gear without a hitch.

To test-hop, set the tab in fin in neutral position and adjust timer for about twenty seconds. Open up engine to a little over half throttle and give model a push, and if it is being flown at any time in any breeze at all, be sure that it is allowed to leave hands directly into wind. Otherwise it may be whipped into ground before sufficient altitude is obtained, by wind sweeping under one wing. The model should travel about twenty feet on the dolly and suddenly rise off when flying speed is attained. The model can be adjusted for circling on the glide if necessary by tab adjustment in fin. The original model was flown on a fifty-second motor run on one of its early test flights before its full ability was realized, and in this time it became faintly visible directly overhead, and against a clear sky! Therefore no more than thirty-second engine run is recommended, and if the Mystery Man ever flies away before you realize what has happened, you will at least have a related part of it to remember it by.

In conclusion, the contest record of this ship to date might be of interest. Up to the time of this writing the Mystery Man has made exactly twenty-nine flights since its first test hop in the latter part of October, '38, the small number being due to the fact it was used only for contest flying. The total merchandise value earned so far amounts to $43.75, with cash awards totaling $56. It might be added that by being careful with the ship and not flying it oftener than necessary, the paint job and covering are practically unmarred.

In the recent big yearly Pacific Coast Championship Meet held at Bakersfield, Cal., the Mystery Man, out of a field of 350 contestants, placed second with a flight of 14:33 official time, and just short of twenty minutes total time, using a twenty-second engine run. As a result, the ship earned for the writer $50 cash, plus merchandise awards.

Incidentally, metallic cement is recommended for installation of the following parts:

Gulled Wing Center Section

Piano wire along spars.

Timer.

Timer switch.

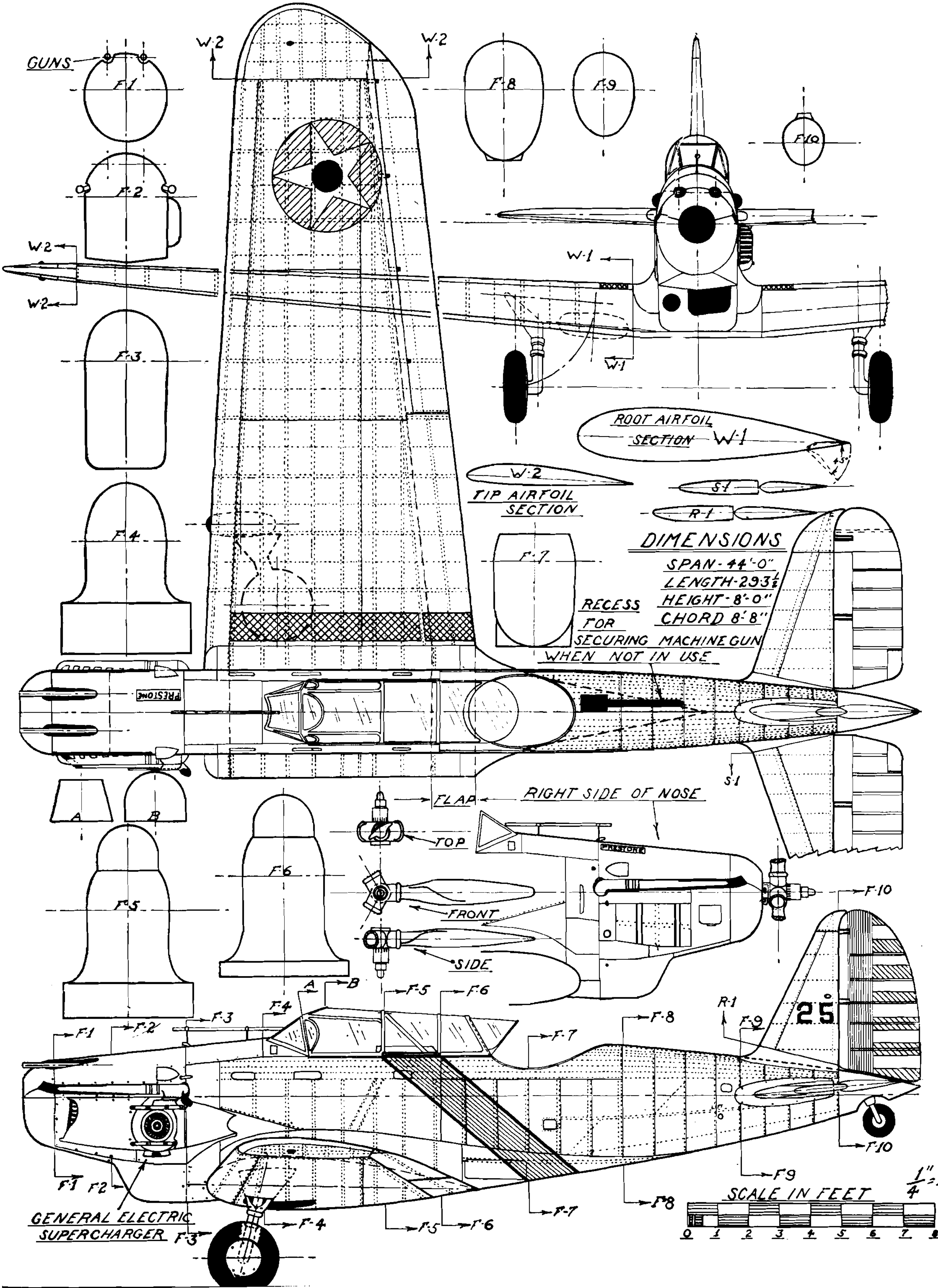
Wing Panels

Aluminum tubing for wing-panel pins in stubs.

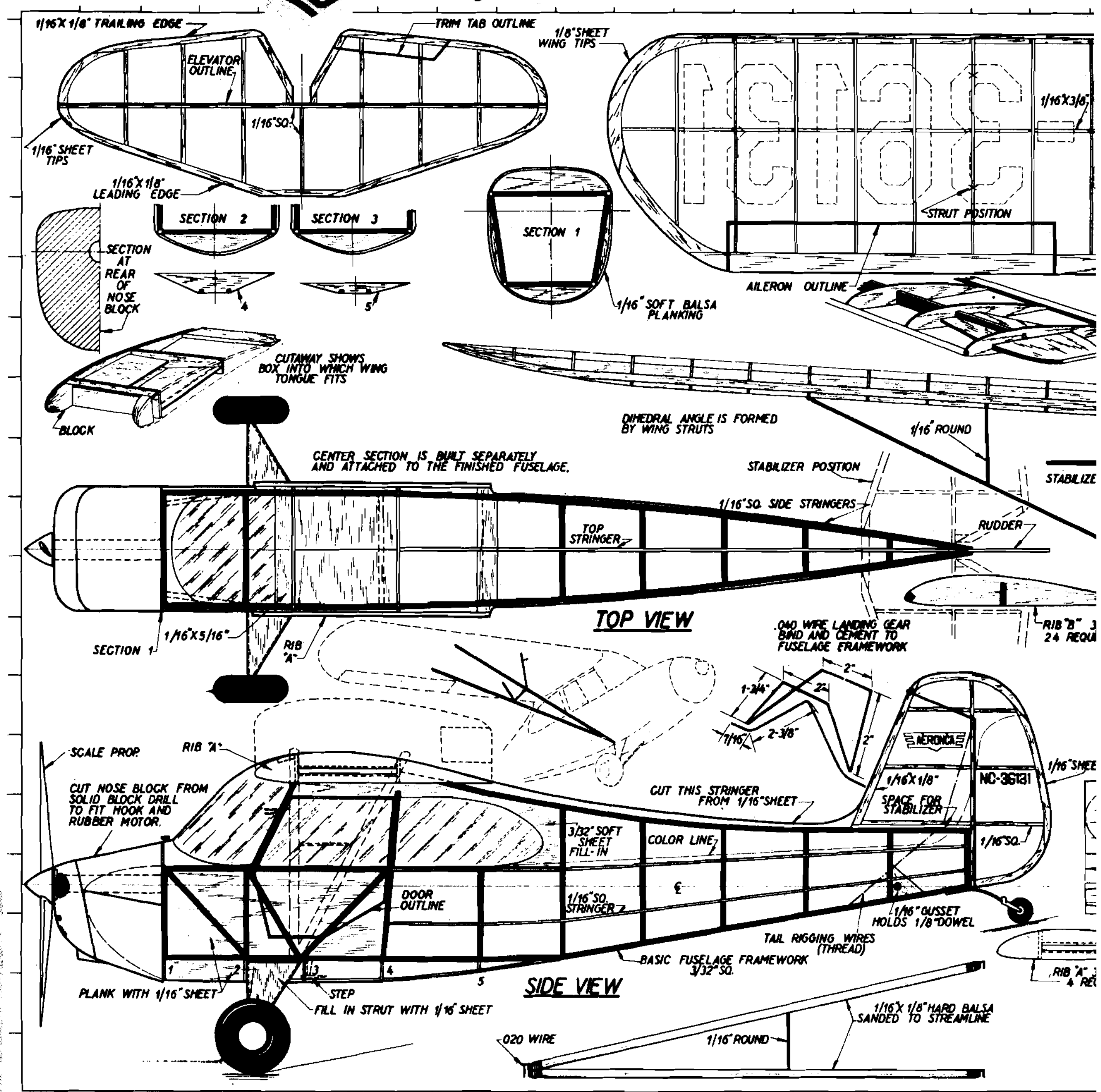
Small tubing on both sides of large tubing for lock-pin fittings.

Wing skids.

CONSOLIDATED PB 2A · · u. s. army bi-place pursuit



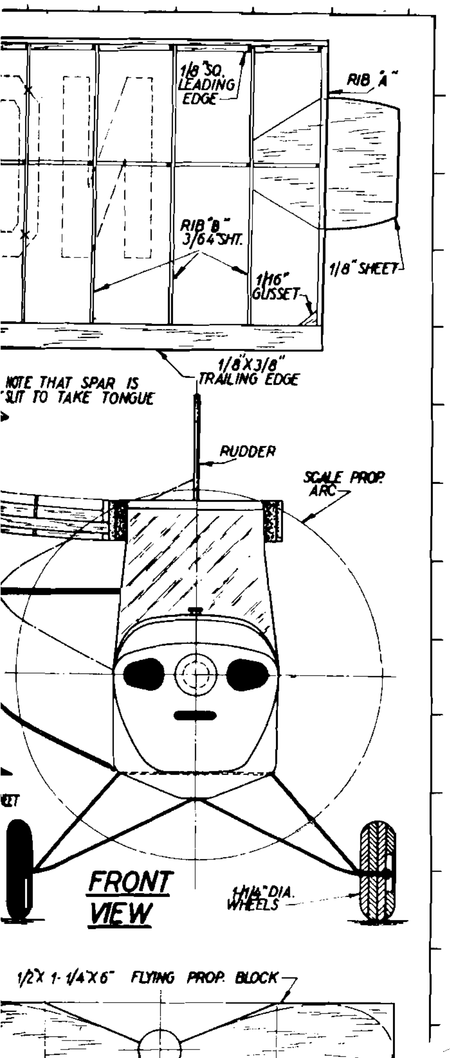
AERONCA



1/16"X 1/8" TRAILING EDGE
TRIM TAB OUTLINE
1/8" SHEET WING TIPS
ELEVATOR OUTLINE
1/16" SQ.
1/16" SHEET TIPS
1/16"X 1/8" LEADING EDGE
1/16"X3/8"
STRUT POSITION
SECTION 2
SECTION 3
SECTION 1
SECTION AT REAR OF NOSE BLOCK
1/16" SOFT BALSA PLANKING
AILERON OUTLINE
CUTAWAY SHOWS BOX INTO WHICH WING TONGUE FITS
BLOCK
DIHEDRAL ANGLE IS FORMED BY WING STRUTS
1/16" ROUND
CENTER SECTION IS BUILT SEPARATELY AND ATTACHED TO THE FINISHED FUSELAGE.
STABILIZER POSITION
STABILIZE
1/16" SQ. SIDE STRINGERS
TOP STRINGER
RUDDER
TOP VIEW
SECTION 1
1/16"X 5/16"
RIB "A"
.040 WIRE LANDING GEAR BIND AND CEMENT TO FUSELAGE FRAMEWORK
RIB "B"
24 REQU
2"
1-3/4"
2"
7/16"
2-3/8"
2"
AERONCA
NC-36131
SCALE PROP.
RIB "A"
CUT NOSE BLOCK FROM SOLID BLOCK DRILL TO FIT HOOK AND RUBBER MOTOR.
CUT THIS STRINGER FROM 1/16" SHEET
1/16"X 1/8"
SPACE FOR STABILIZER
1/16" SHEE
3/32" SOFT SHEET FILL-IN
COLOR LINE
1/16" SQ.
DOOR OUTLINE
1/16" SQ. STRINGER
1/16" GUSSET HOLDS 1/8" DOWEL
TAIL RIGGING WIRES (THREAD)
BASIC FUSELAGE FRAMEWORK 3/32" SQ.
1
2
3
4
5
SIDE VIEW
PLANK WITH 1/16" SHEET
STEP
FILL IN STRUT WITH 1/16" SHEET
RIB "A"
4 RE
1/16"X 1/8" HARD BALSA SANDED TO STREAMLINE
.020 WIRE
1/16" ROUND

CHAMPION by JAMES NOONAN

ANOTHER IN OUR SERIES OF POSTWAR PRIVATE AIRCRAFT. THIS FLYING SCALE VERSION OF THE CHAMPION IS CAPABLE OF GOOD, SUSTAINED FLIGHT



OUR model is drawn to a span of 30 inches and is exact in every detail, as factory plans were used in its make-up. If you wish, the model can be scaled up to a suitable size for gas model work, built as is for an exact 30" display or flying scale model, or the prop, landing gear, and stabilizer may be enlarged to make a duration flying scale model.

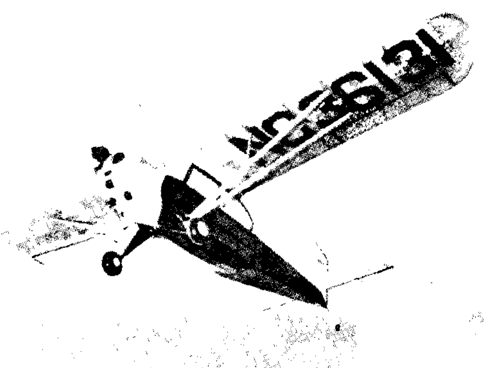
Light balsa, of generous sizes, was used throughout in the construction and weight was concentrated well forward to give, as it turned out, perfect balance for flight in the model shown in the photos. Another feature is the demountable wings which are flicked off in case of hard landings, thus preventing damage. The demountable wings also make it easier to store the model. This idea was picked up while the author was in Europe, where it is universally used on every type of model.

Lay out a drawing to the desired size (wood sizes are given for a 30" model), using proportional dividers, if possible. Build two fuselage sides, one on top of the other. Note that the sheet balsa forming the cabin windows is a part of the fuselage sides. Insert the gusset for the rear rubber retaining dowel. Cut the sides apart by inserting a razor blade between them and join them as shown on the top view. In section one, the lower crosspiece is shorter; see plan. Cut and attach the bulkheads, then begin the planking as shown by the shaded areas on the side view. Add stringers on bottom and sides. Carefully build the center section and check to see that the wing tongues fit in the boxes. Cement the center section to the fuselage and add the top stringer (cut from sheet balsa). Carve the nose block to rough shape and drill to allow clearance for the rubber motor. Use front view for the cross section of the forward part and sectional view for the rear part. Heavy lines show detail on the large plane. Sand and dope until smooth. Sand the entire fuselage. Add landing gear wire, binding and cementing it to the longerons. Fill in with sheet balsa to form the struts, and add the tail wheel. Hubless wheels may be built up as shown, or air wheels may be used.

Tail surfaces on the real ship are flat and thin. On the model, sheet balsa and $\frac{1}{16}$" sq. strips form the rudder and stabilizer. Be careful, for this type tends to warp easily.

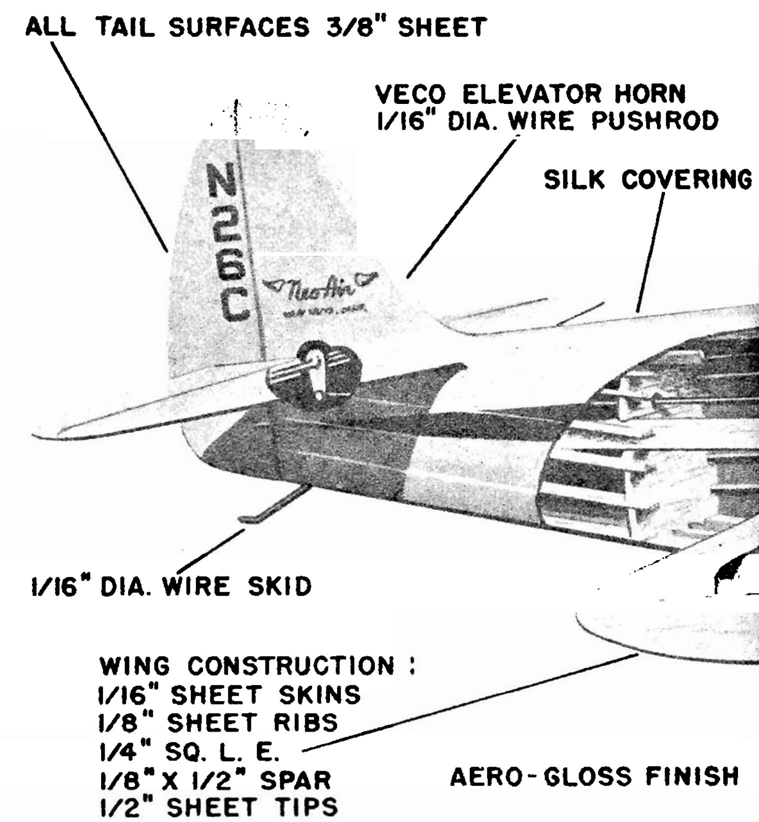
Make a metal template of the wing rib and cut the required number of ribs. Select stiff leading edge and spar material, using soft balsa for tips and trailing edge. Carefully insert the tongues and cement well, again testing for fit and alignment with the center section. Build the wing struts of stiff balsa and fit to the wing-fuselage assembly. The prop drawing is self-explanatory; only take time when carving, sanding, finishing, and balancing.

Again check all framework, sand carefully, and cover with Jap tissue or Silkspan. Then water spray and dope lightly.



● The author, assembling the wing and fuselage. Note the tongue section for ease of assembly.

AMERICA'S TOP MIDGET RACER: Shoestring



Right from the design drawings, this U-control flying scale's accuracy is something to rave about. Let's go, men!

By S. CALHOUN SMITH

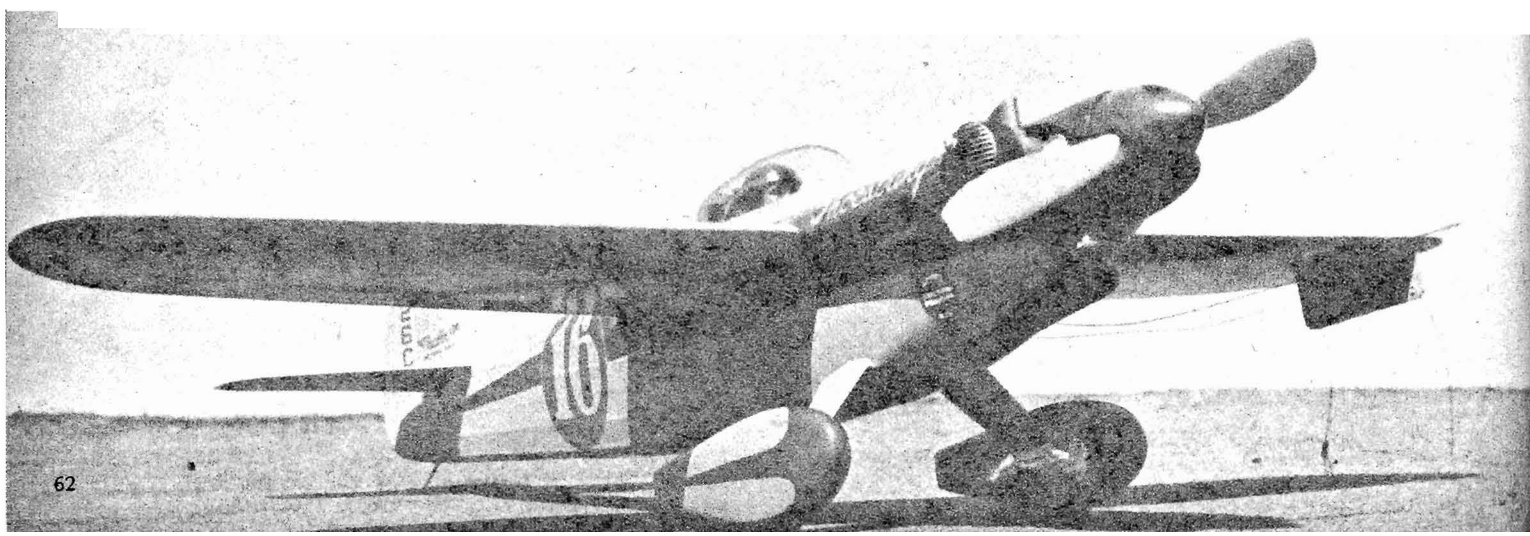
■ Since the inauguration of the Midget racing class in 1947 under Goodyear sponsorship, the basement-built pylon polishers have shown remarkable progress in design and performance. Race speeds have jumped from 165 mph (1947) to 200 mph, and the airplanes themselves have demonstrated the high degree of craftsmanship and ingenuity of the individual builders in gaining so much performance from the 85 hp Continental engine.

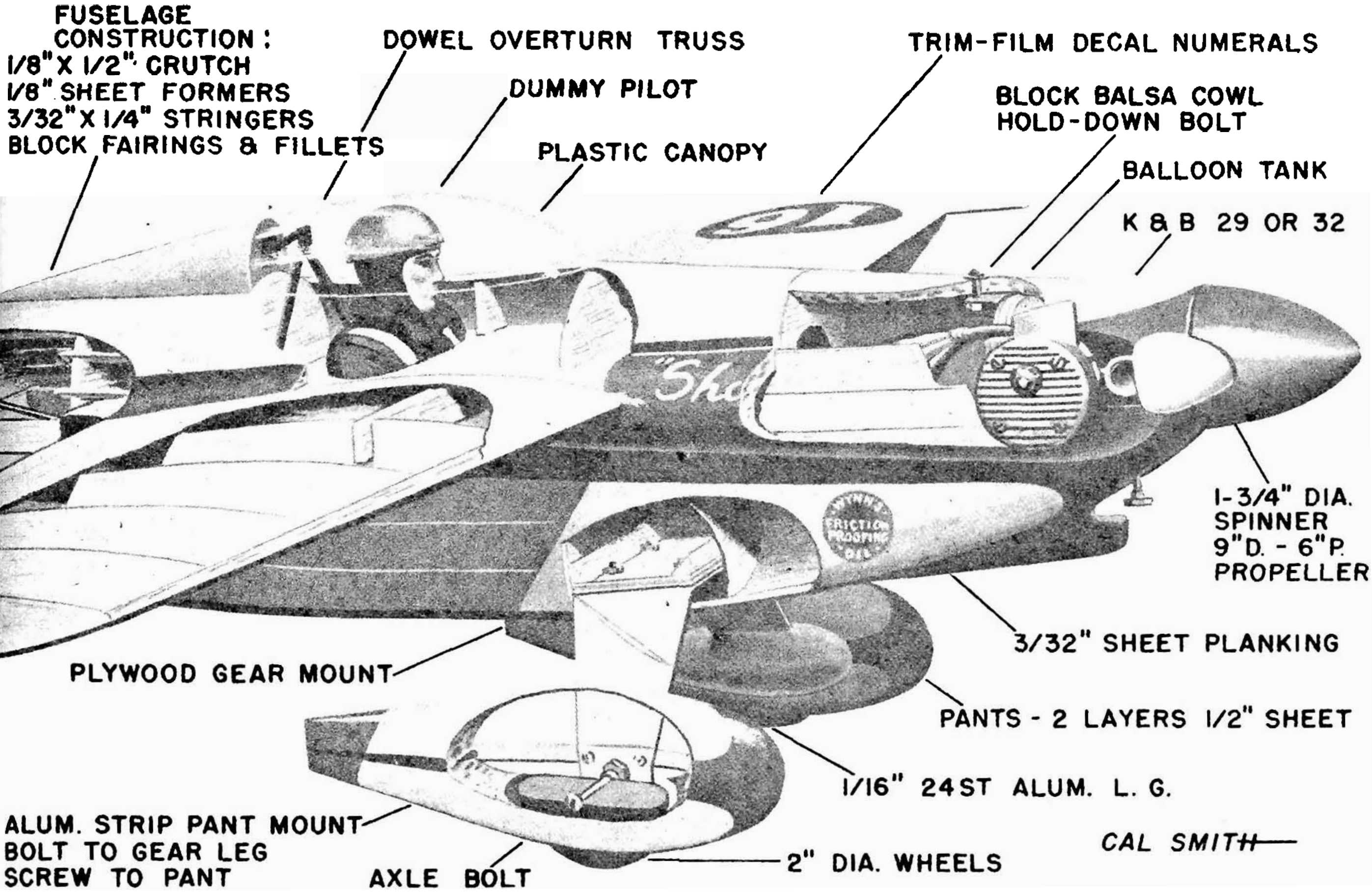
Now sponsored by Continental Motors, the midget races held in Detroit in September 1951 saw *Shoestring* a second-time winner of the big prize.

Pilot John Paul Jones, from Van Nuys, Calif., turned in the highest qualifying speed of 197.2 mph, and flew the race to win at an average speed of 199.778 mph. Which meant that some of the laps flown were well over 200 mph. Equal credit must be given to both pilot and airplane designer. Jones flew the course like clockwork, emphasizing the value of precision flying as a race-winning factor. Rodney Kreimendahl, designer of *Shoestring,* turned out a beautiful design with much attention given to the other race-winning factor—cleanness.

The ship is a high mid-wing with engine fairing following through into the wing fillet—the most desirable arrangement. All flying surfaces are filleted well into the fuselage. The flat-plate Cessna-type landing gear has a generous fairing, and the wheel pants are relatively large, making for good streamlining of the chubby wheels. The bottom of the oil tank is shaped to lie flush with the lower cowling line, and external fins are welded directly to the tank to aid in oil cooling.

If it wasn't for that K&B engine and control line guide, you'd swear this is the full-scale Shoestring. Ain't she a mighty purty job?





A reworked Macauley metal racing prop is used and engine exhaust stacks are pointed rearward for the small advantage gained by jet action of exhaust gases. The overall impression of the airplane can only be described as "solid." Proportions, moment arms, and aspect ratios are all sensible, straightforward and honest. Span is 19 ft., length is 17 ft. 9 in.

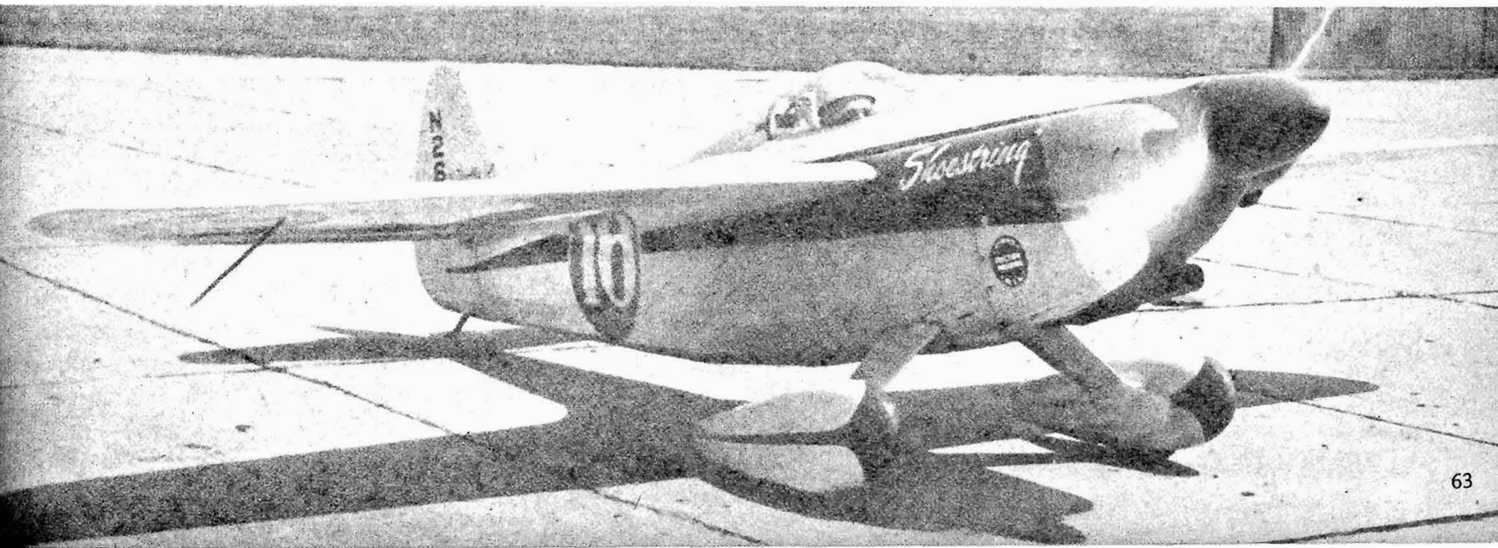
The little speedster has welded steel tube fuselage, stringered and fabric covered, with all-wood plywood covered wing and tail surfaces. Engine fairings, cowl, struts and pants are aluminum. The most outstanding feature of the airplane is the finish. The color scheme is a bright chartreuse and fire-engine red, rubbed down and waxed to the highest gloss seen at the races. You can barely stand to look at the ship in the sunlight!

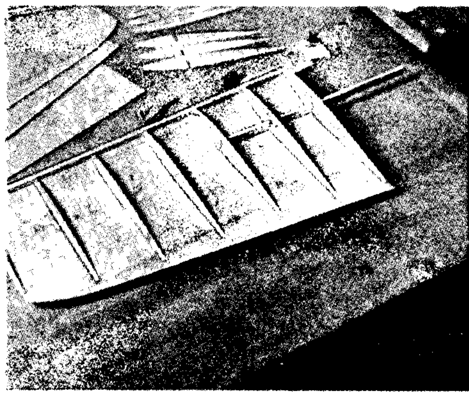
Modeling *Shoestring* is a natural for flying scale. The plans presented are scaled directly from accurate three-view drawings supplied by the designer. The odd scale of 1¾" = 1' was chosen so the ship would have a reasonable size and wing loading. Every effort was made to keep the construction light so good flight performance would result.

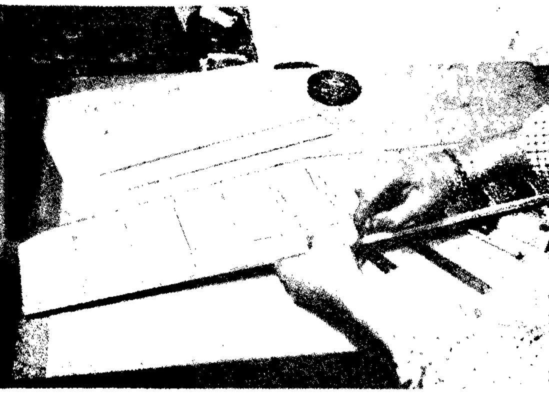
Span of the model is 33" and length 31". Wing area is 200 sq. in. and weight 28 oz., giving a wing loading of 14 oz./100 sq. in. With the K&B .32 engine the ship really moves and the symmetrical airfoil permits some stunting, although the ship is not light enough to compete as a pure stunt model. The symmetrical wing is the main departure from scale on the model.

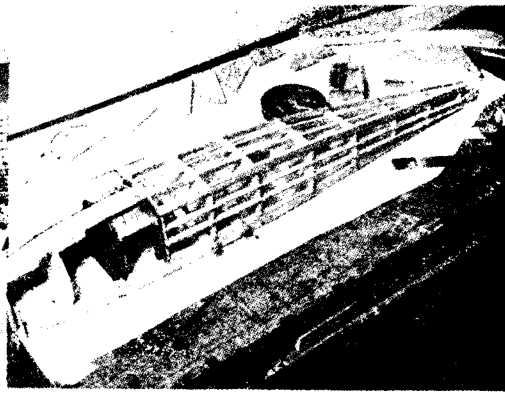
Construction details on full-size plans available.

Shoestring spans a mere 19 feet, yet flies at more than 200 mph! Sleek Continental racer took top honors at two National Air Races.





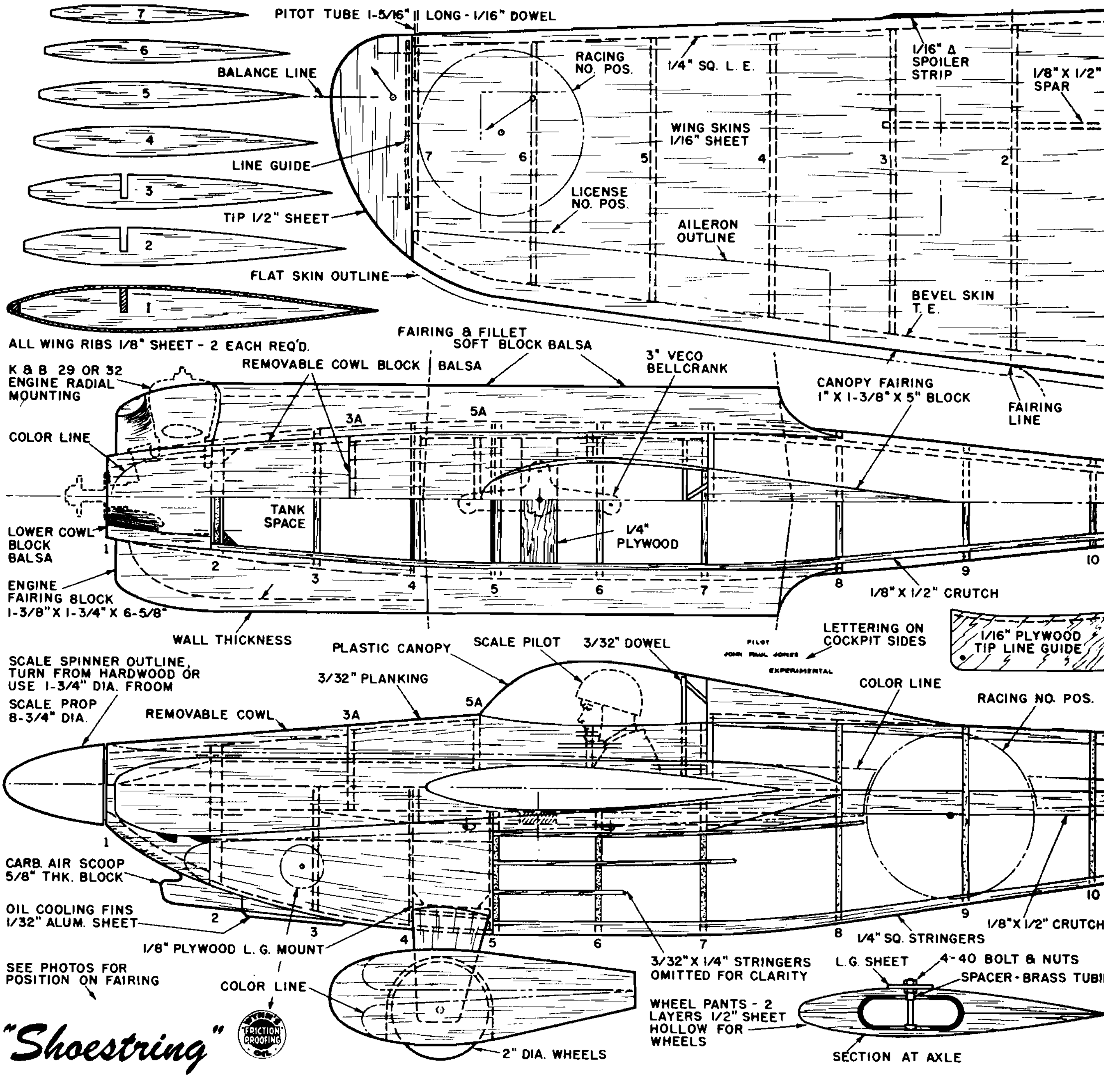


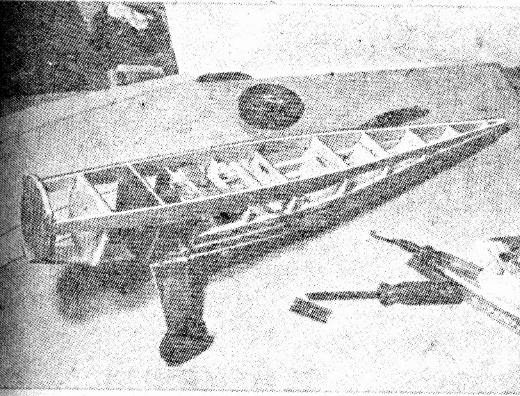


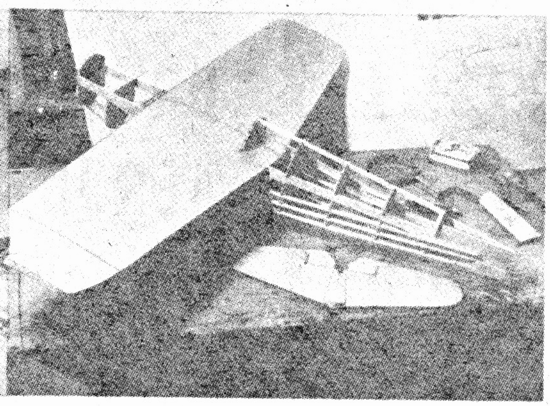
Construction begins when you lay out wing skins; cut out ribs, cement to skin; add L.E.; repeat for other wing.

Next step is to bevel the leading and trailing edges; put wing skins in place, pin to ribs and leading edge; tape the trailing edge into position.

Build fuselage crutch upside down over the plan top view; add the formers, bottom halves and the stringers. Then let dry.



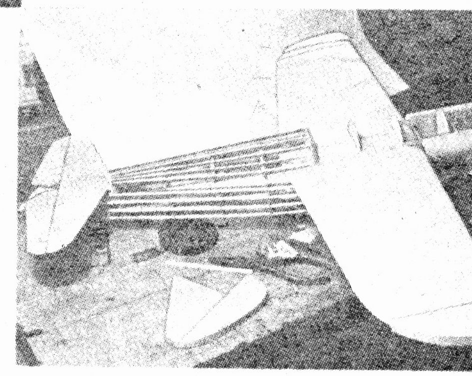




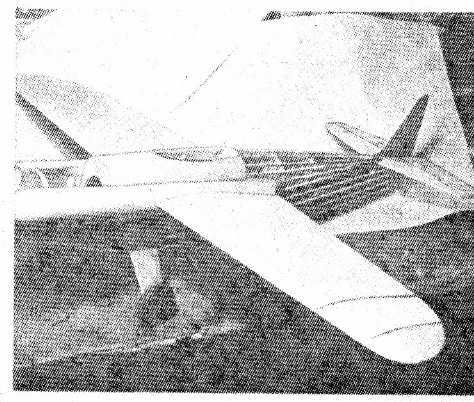
This flying scaler is no project for the novice; but Joe "Average" Modeler can turn out a super copy in this manner

Take fuselage off board; make the landing gear and install; add the bellcrank, control line lead-outs as well as pushrod.

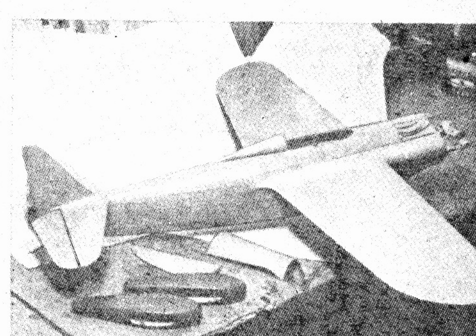
Glue the wing in permanent position, add the top formers; build up the stabilizer platform and also skid block; make the horizontal tail.



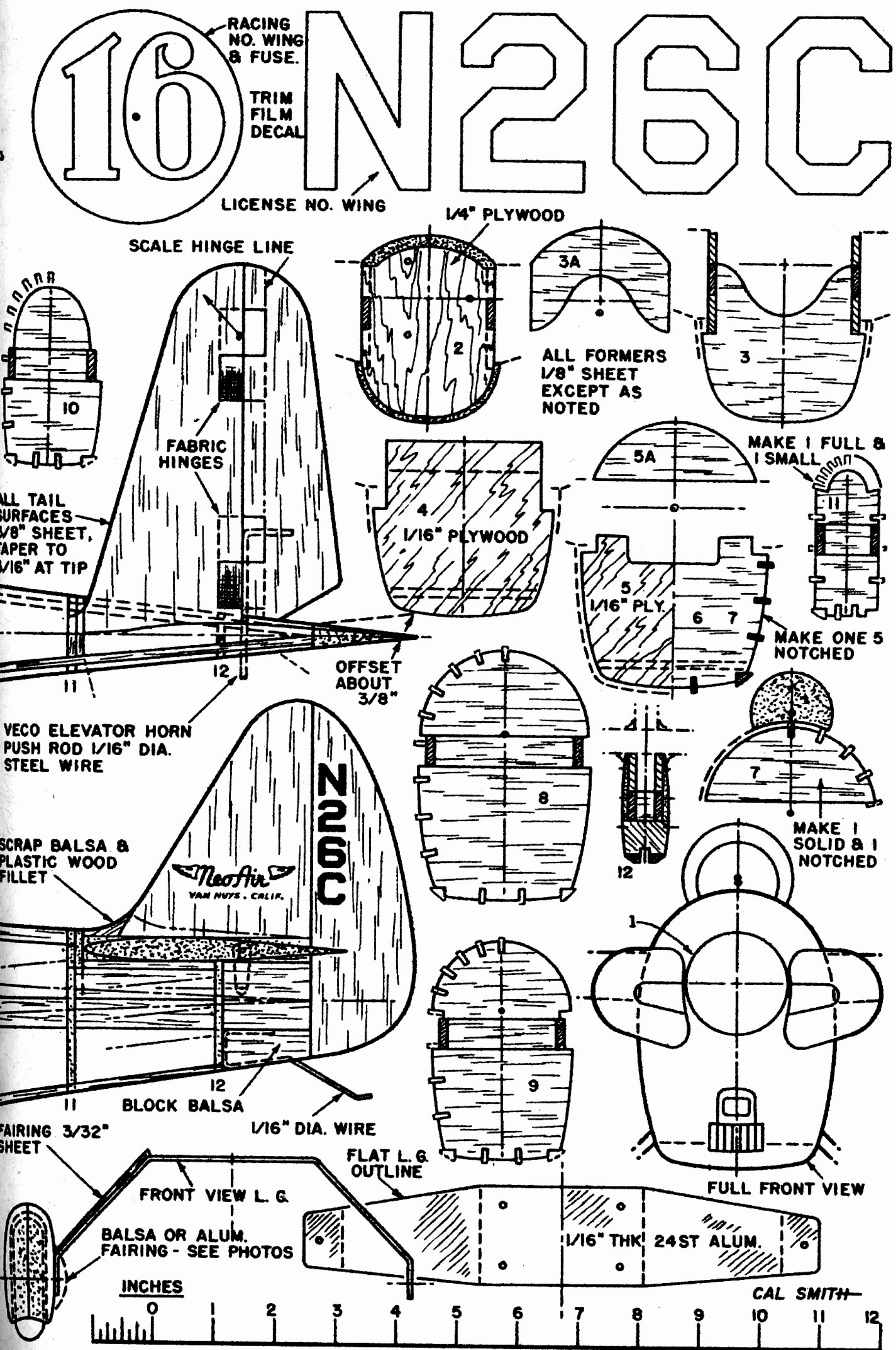
Install the stabilizer; connect pushrod; add top stringers, and the top formers in front; rough carve, add engine fairings, tip blocks.



Add fin; build up tail fillets; plank the nose section; proceed to carve fillets for the wing, then complete wing tip carving.



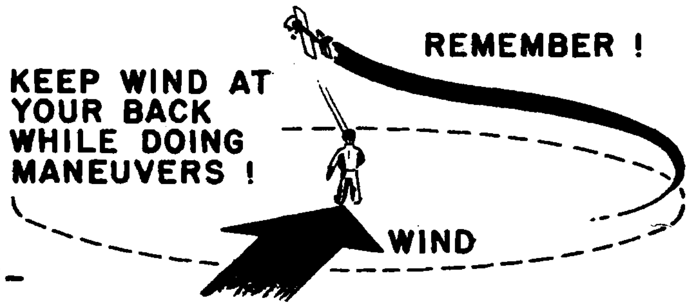
Carve fin, pants and nose cowl; cover and prepare for doping; prime and fill all the surfaces; spray if it is at all possible.



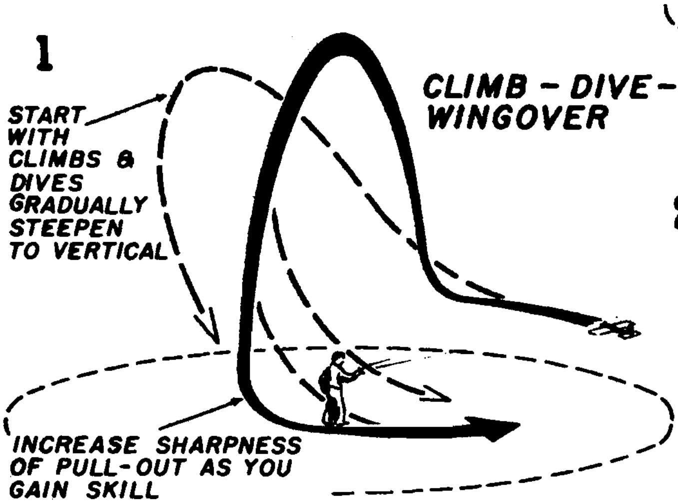
AIR-MODEL MANUAL | PRECISION AEROBATICS

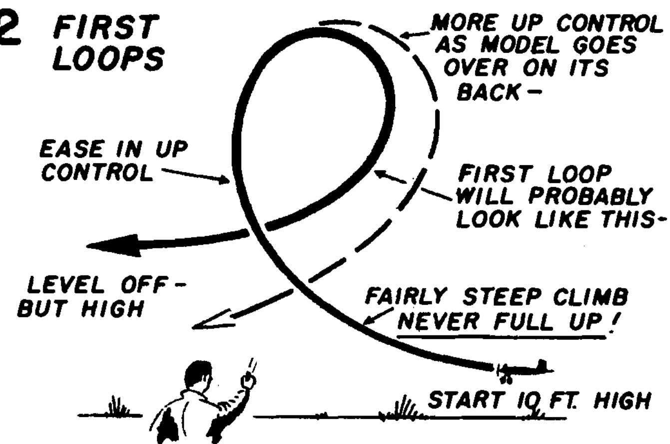
PREFLIGHT CHECK

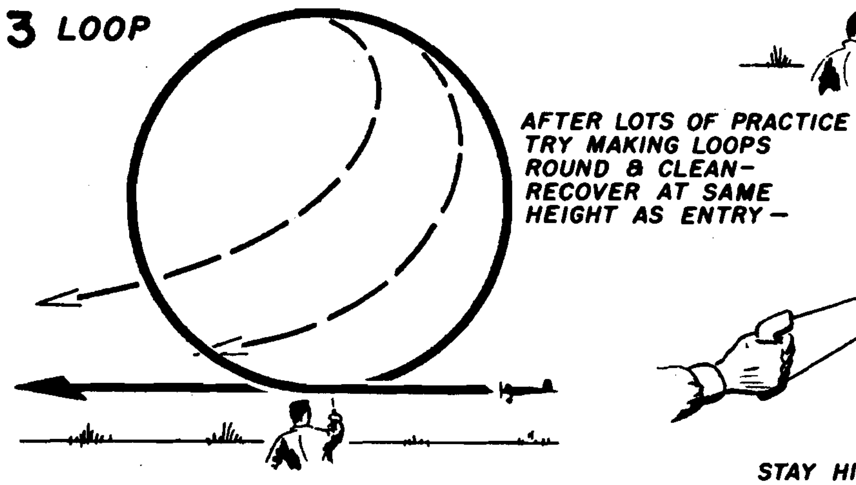
HAVE SHIP, ENGINE, PROP, TANK, WIRES, IN TOP FLYING CONDITION. TUNE ENGINE THEN HOLD MODEL UPSIDE DOWN TO CHECK PROPER RUNNING FOR INVERTED FLIGHT.

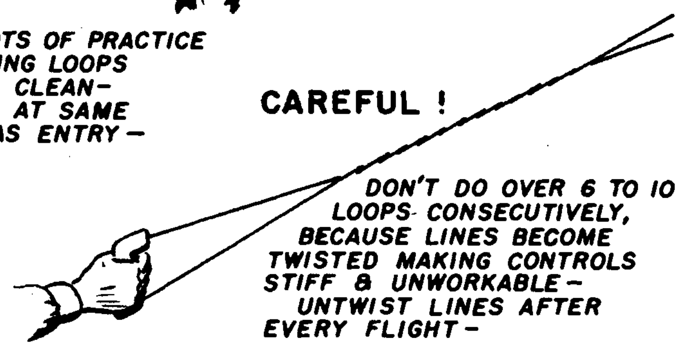


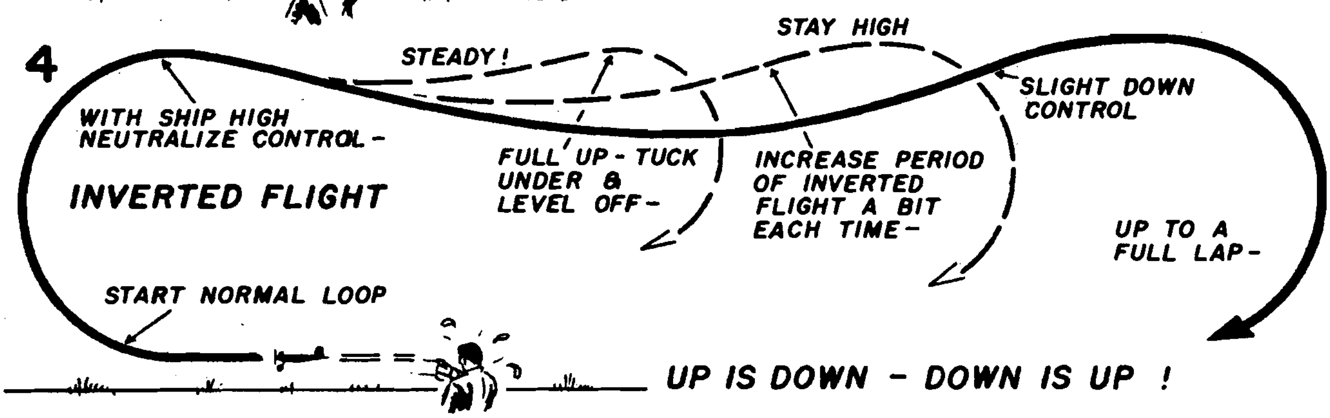
ASSUME THAT ALL CONTEST DAYS WILL BE WINDY – SO PRACTICE FLY ON WINDY DAYS TOO!





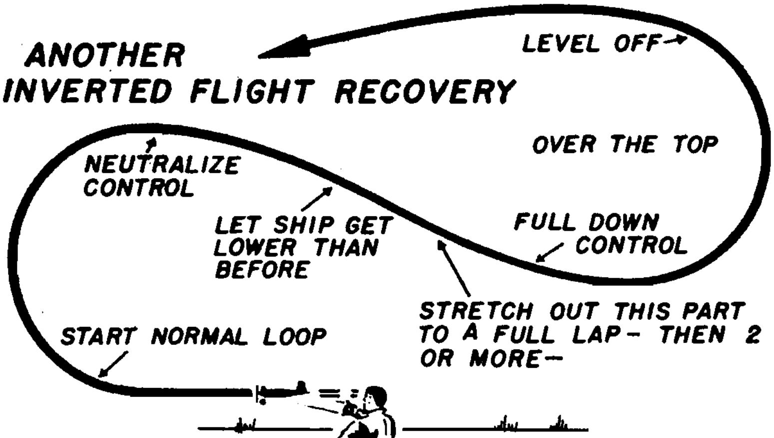






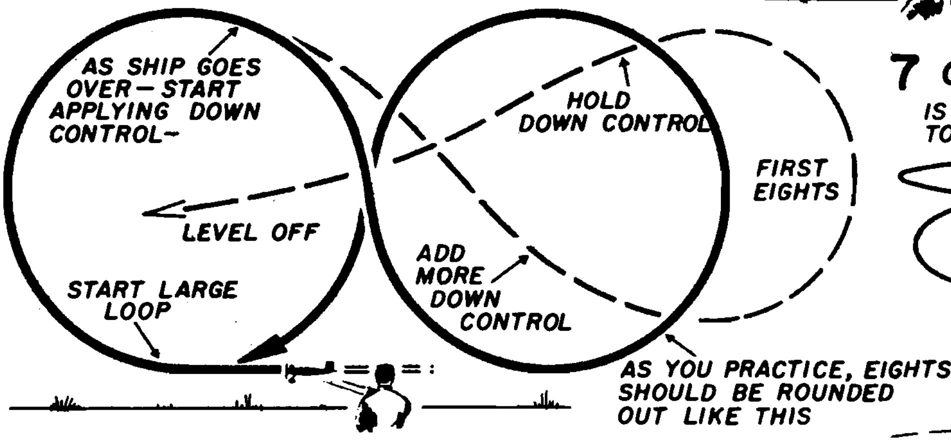
This informative material offers adjusting, flying tips and model improvements especially for the novice flyer. Tell us what other subjects you would like covered.

5 ANOTHER INVERTED FLIGHT RECOVERY



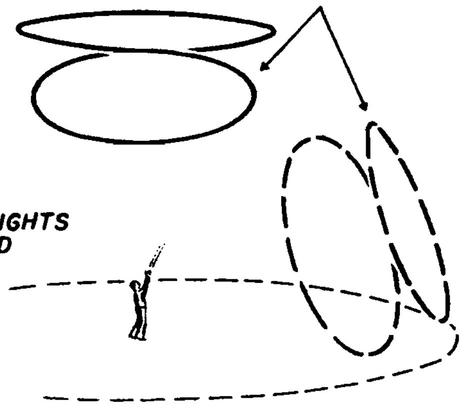
6 HORIZONTAL EIGHT

THE "S" SHOWN IN 5 IS GOOD TRAINING FOR EIGHTS THAT COME NEXT –

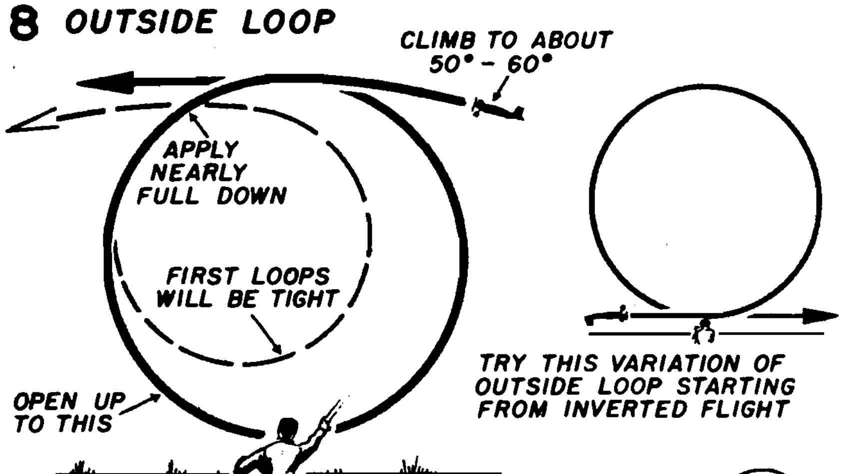


7 OVERHEAD EIGHT

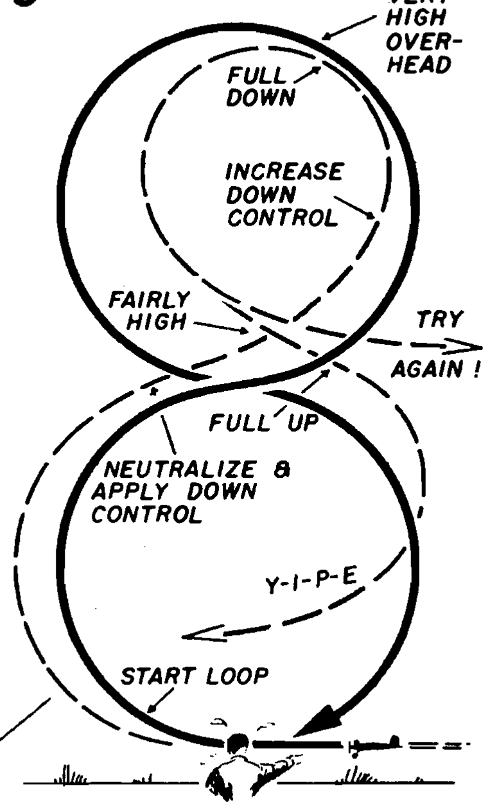
IS HORIZONTAL EIGHT MOVED UP TO DIRECTLY OVERHEAD



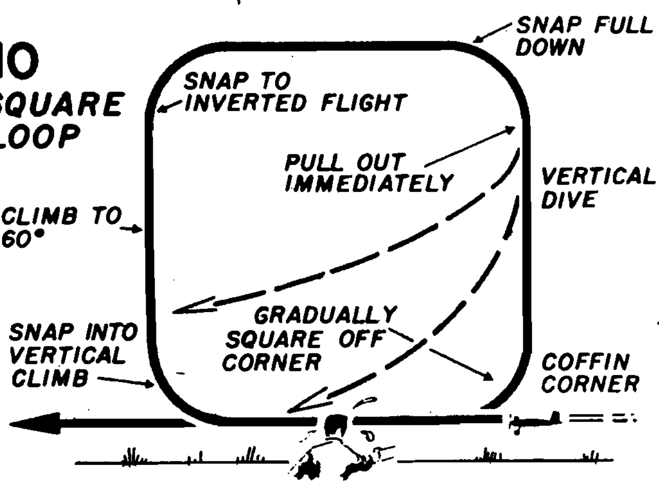
8 OUTSIDE LOOP

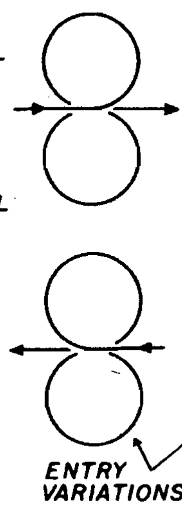


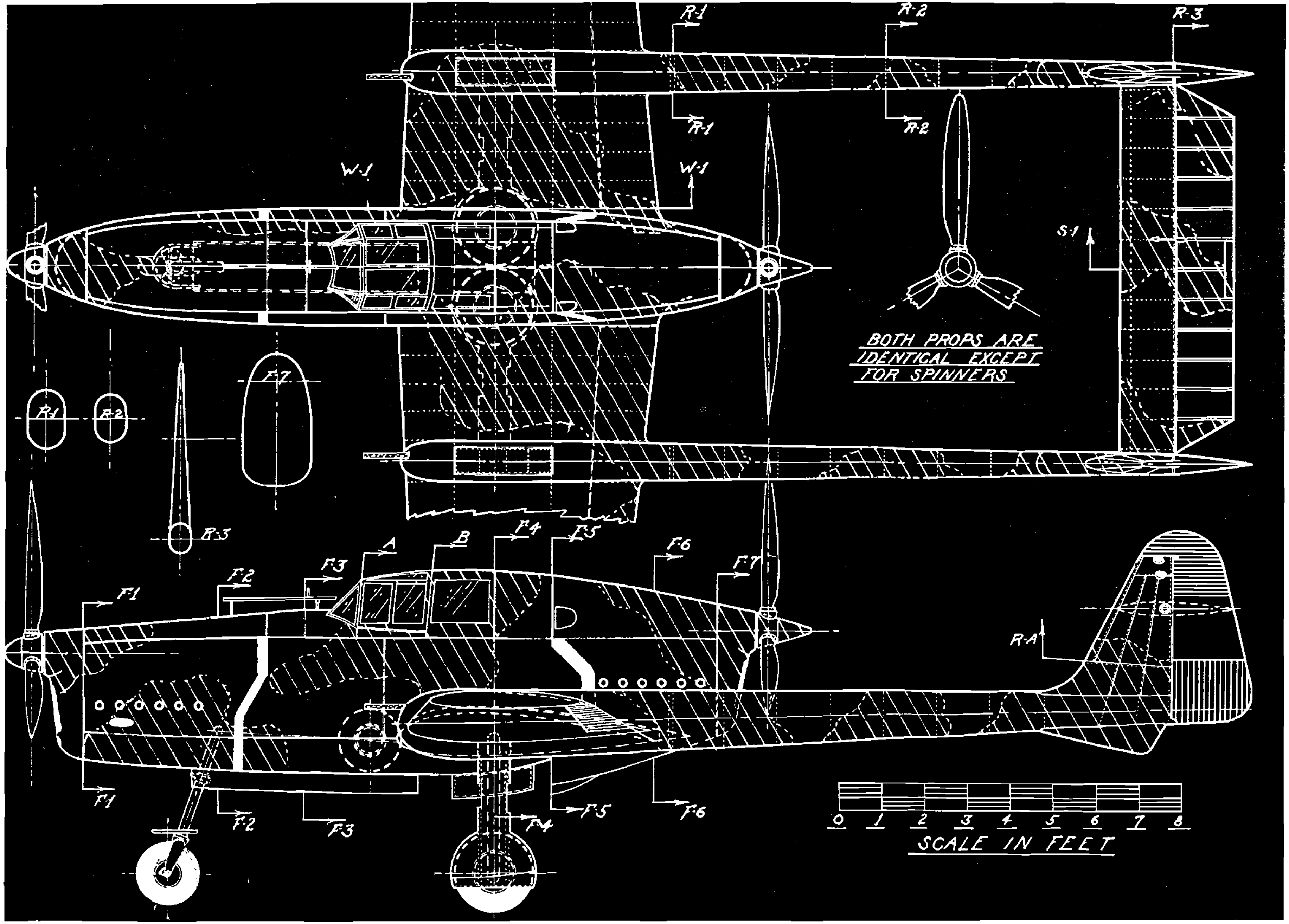
9 VERTICAL EIGHT



10 SQUARE LOOP

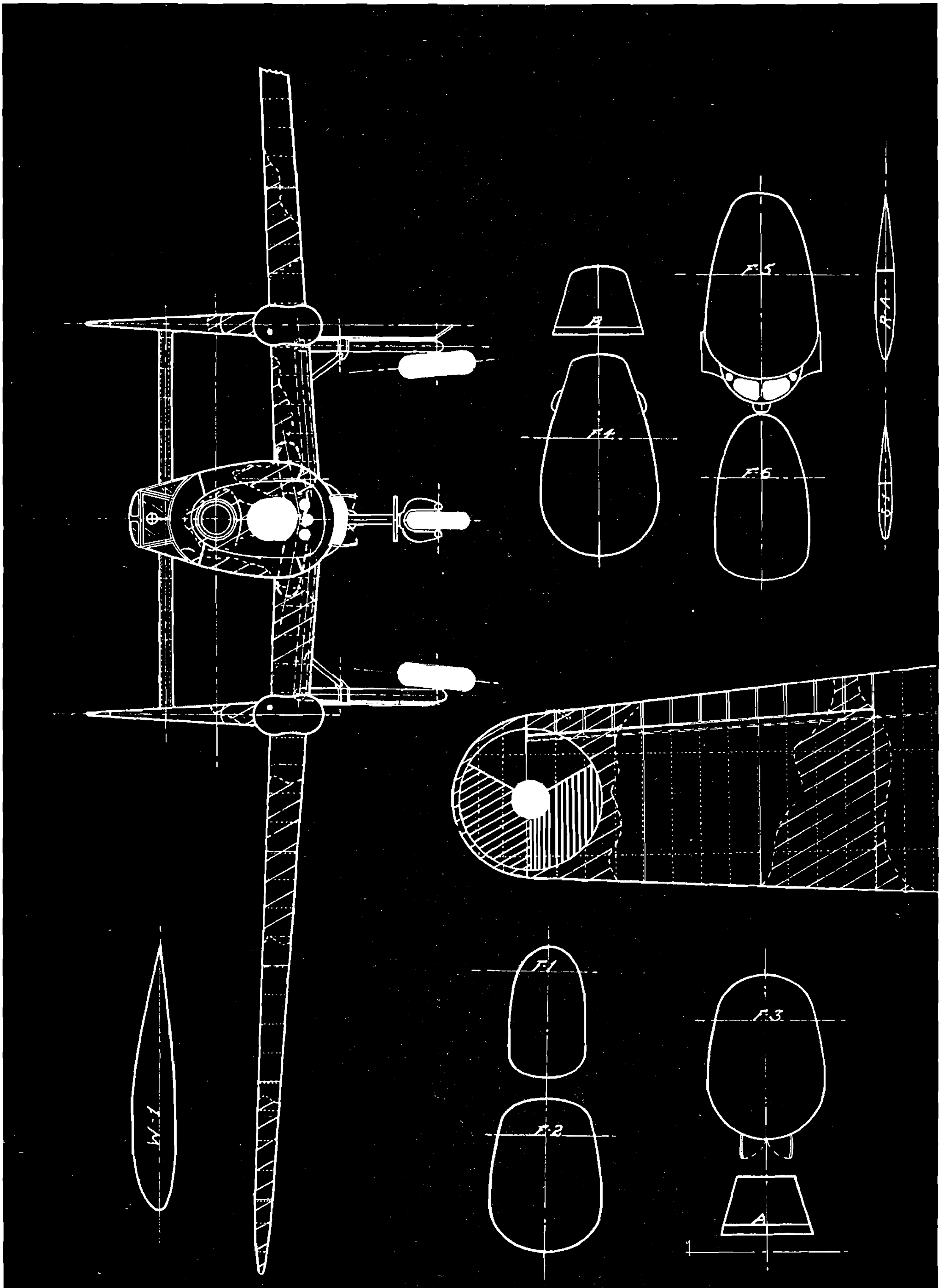


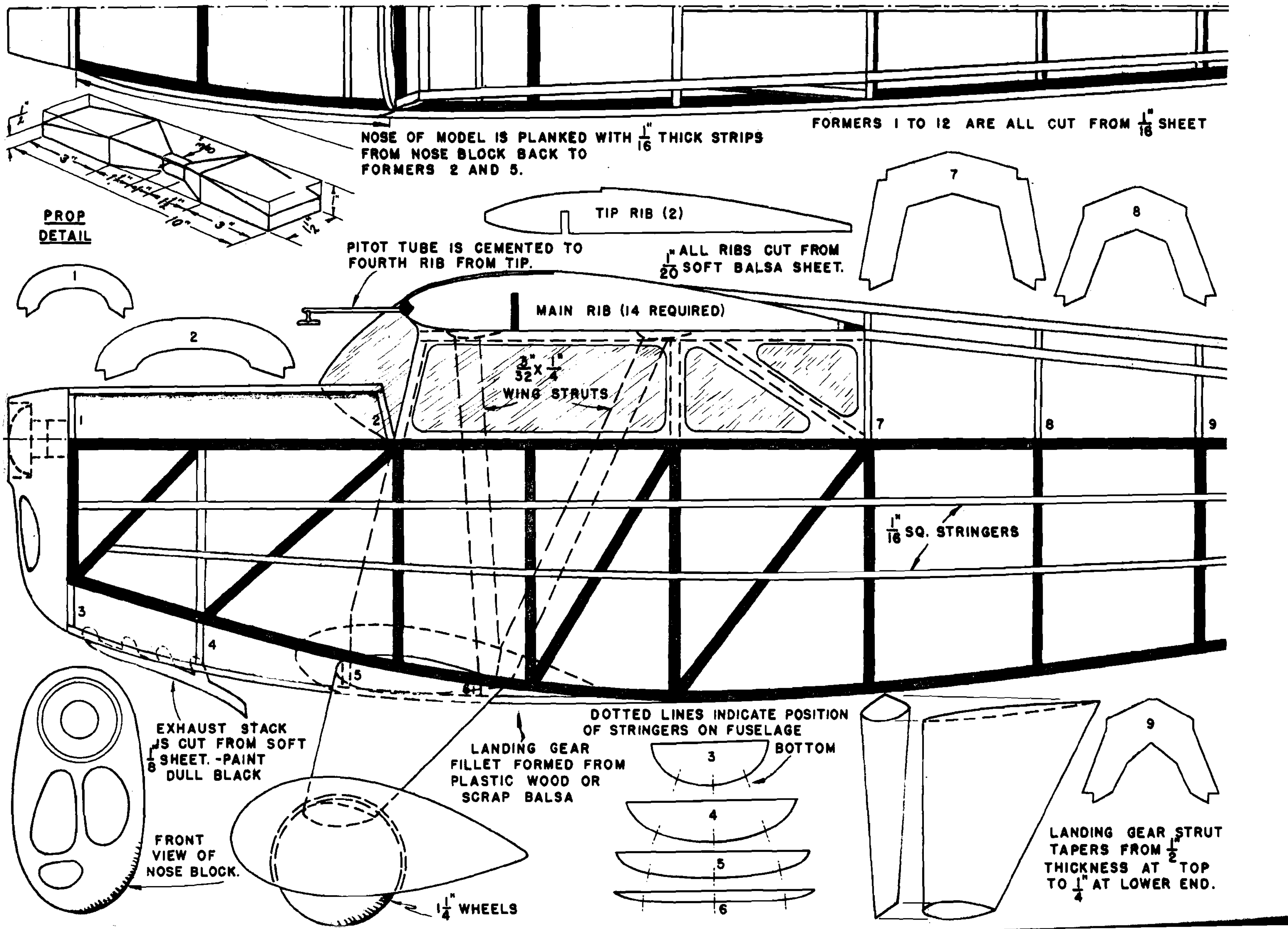




scale drawing by Martin E. Dickinson

Fokker's Latest, the D-23 FIGHTER





NOSE OF MODEL IS PLANKED WITH 1/16" THICK STRIPS FROM NOSE BLOCK BACK TO FORMERS 2 AND 5.
FORMERS 1 TO 12 ARE ALL CUT FROM 1/16" SHEET
PROP DETAIL
TIP RIB (2)
PITOT TUBE IS CEMENTED TO FOURTH RIB FROM TIP.
1/20" ALL RIBS CUT FROM SOFT BALSA SHEET.
MAIN RIB (14 REQUIRED)
3/32" X 1/4" WING STRUTS
1/16" SQ. STRINGERS
DOTTED LINES INDICATE POSITION OF STRINGERS ON FUSELAGE
EXHAUST STACK IS CUT FROM SOFT 1/8 SHEET. -PAINT DULL BLACK
LANDING GEAR FILLET FORMED FROM PLASTIC WOOD OR SCRAP BALSA
BOTTOM
FRONT VIEW OF NOSE BLOCK.
1 1/4" WHEELS
LANDING GEAR STRUT TAPERS FROM 1/2" THICKNESS AT TOP TO 1/4" AT LOWER END.

REARWIN SPEEDSTER

A NATIONALS FLYING SCALE WINNER

Most of the details of construction are explained in the drawings, but a few of the more important points will bear a little verbal explanation. It will be noted that the basic framework has been shaded in for clarity, and that the two top main longerons are perfectly straight in the side view, as the thrust line runs directly along the top portion of these longerons. This means that after the two sides have been assembled, the fuselage can be built in an inverted position on the workbench to insure absolutely perfect alignment. Note also that there are no cross braces in the upper portion of the fuselage. Temporary braces are used until the bulkheads and stringers have been cemented

BY HENRY THOMAS
NATIONAL CHAMPION

Above—The author and the championship model. Right—With trophies at 1939 Nationals. He also won Air Trails flying course.

PLANS BY PAUL PLECAN

During the 1939 Nationals, Akron's pride and joy, Henry Thomas, became National Champ. Netting a first, second, fifth and eighth place in four events, he ran up the highest score of points among the 700-odd entries to win the Air Trails flying course award. The most important of Hank's placing was the first in the Open Class Flying Scale event. His Rearwin Speedster, built to a scale of $^{7}/_{8}$" = 1', stayed aloft for approximately 50 seconds on the first two official flights. On the third attempt, over one minute was made, thanks to adjustments on the first two tries.

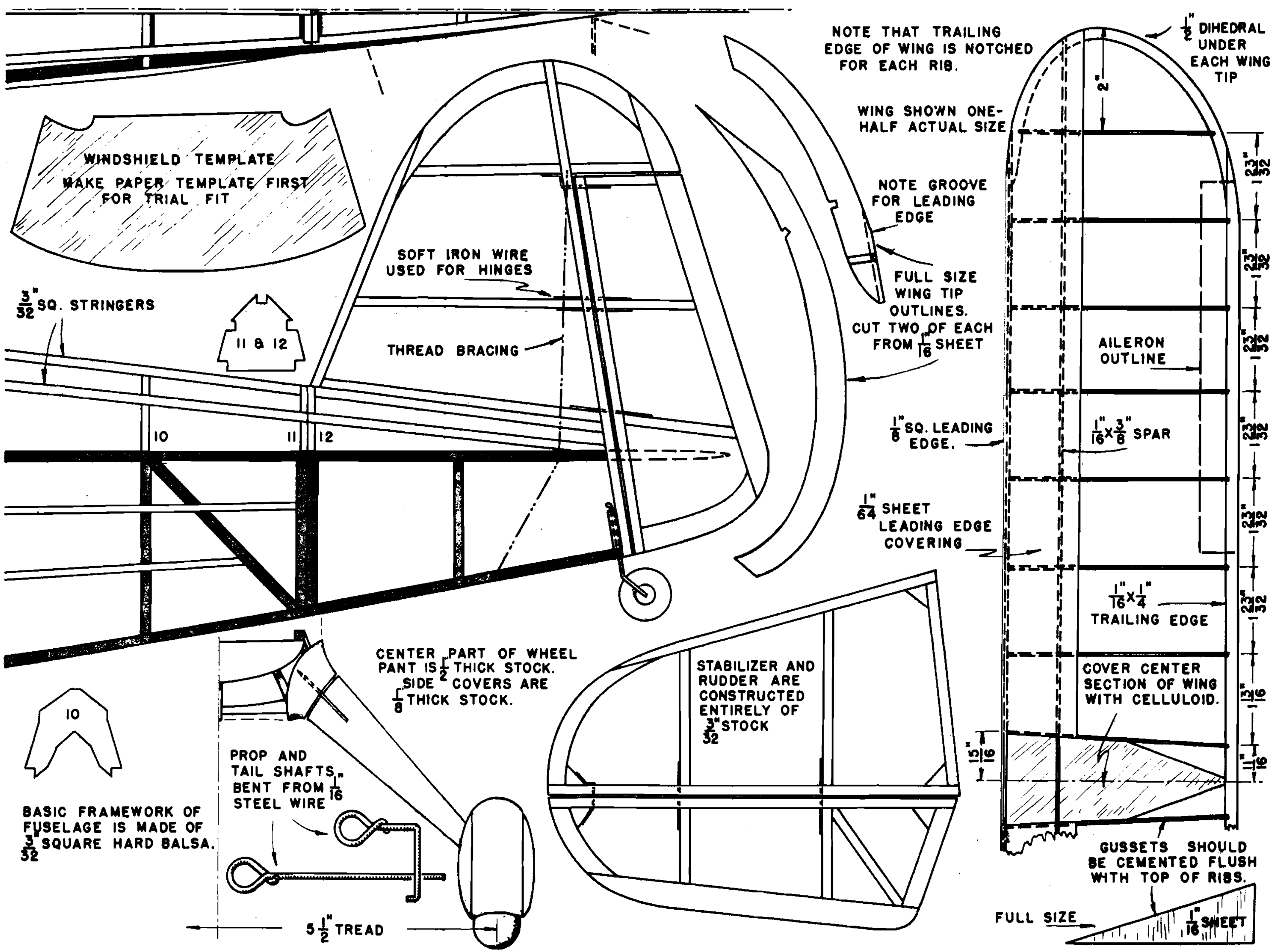
Due to the "beefy" construction, the Rearwin came up to weight rule without the addition of clay, a notable point to keep in mind, as every ounce of weight is used for strength or flying power. Many model builders like to bring along an old model for the flying scale event, loading it up with clay to bring it up to weight rule. This may be the reason why flying scale contests in the past have showed poor flight averages, since the models carried "payloads."

in place. Later on, they are sliced away, as there would be no room for the rubber motor if they were left in place.

Use the hardest $^{3}/_{32}$" squares that you can get for longerons to obtain maximum strength. The fuselage comes apart (just like a cabin model) between Formers 11 and 12. A cross brace is used under Formers 11 and 12, and the tail hook is secured to the rear of the cross brace under Former 12. The portion under Former 12 should be filled in with $^{3}/_{32}$" sheet, as this part of the fuselage must stand a lot of handling. The nose block can be made removable as in a cabin model, but the original was cemented in place and sanded to fair into the $^{1}/_{16}$" soft balsa planking which extends back to Formers 2 and 5. A hardwood plug, as illustrated, should be used if the nose block is cemented in place. By using air wheels and connecting the upper ends of the landing gear struts to the fuselage with wire, shocks due to landing or a dive can be taken care of most efficiently. The wire should be cemented to the leading and trailing edges of the landing gear struts, and should be covered with a small patch of silk, which will serve to conceal the wire and to strengthen it. If plastic wood (cement and balsa sawdust mixture) is used, there need be no fear of the wire loosening, as the wood and cement shrink, forming a viselike grip around the wire. Be sure to allow the plastic wood at least an overnight drying so that it may harden well before you attempt to sandpaper it to shape.

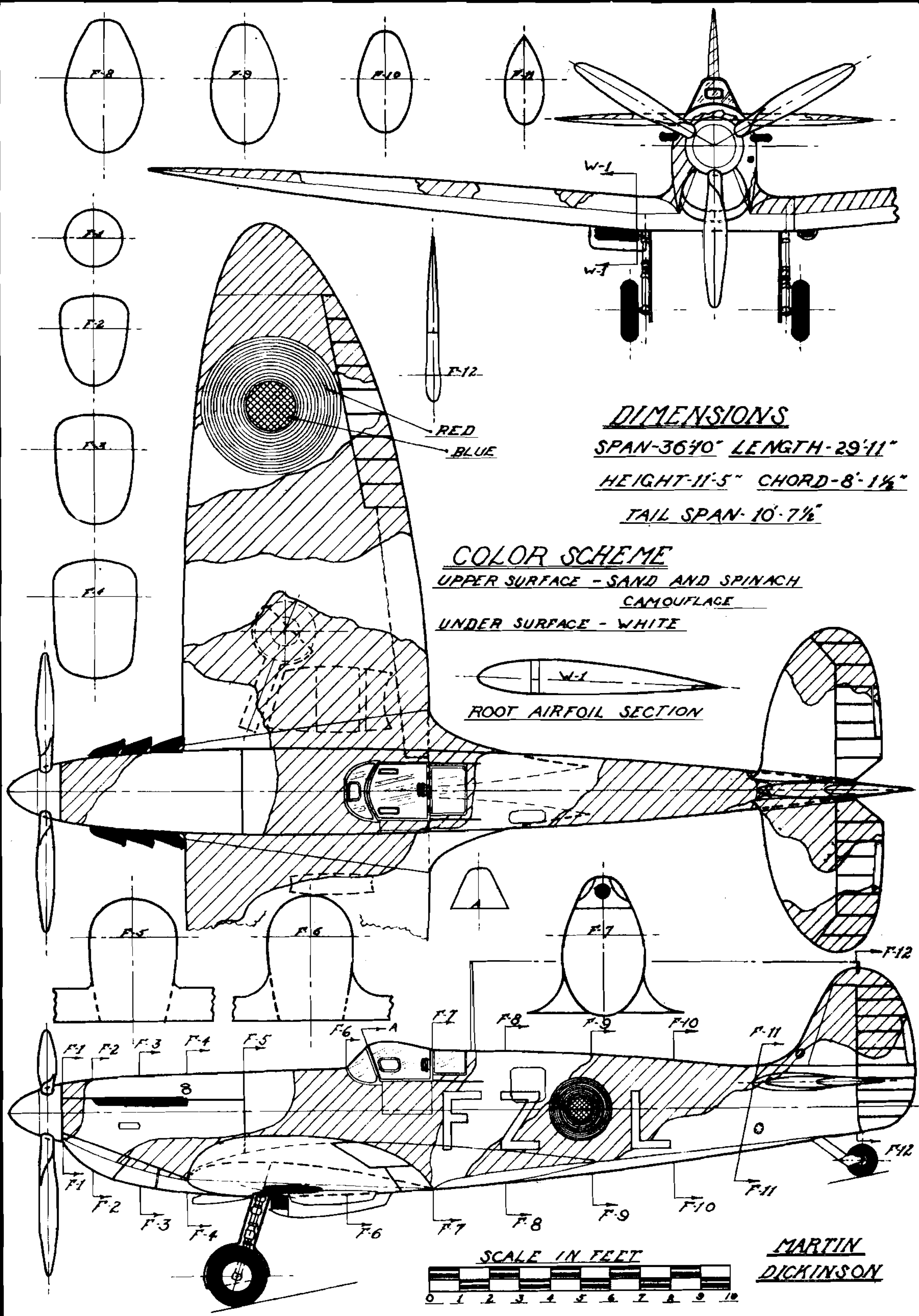
The entire wing may be made of medium-soft balsa, as the struts give the wing plenty of extra strength. The ribs can be lightened considerably by removing the eraser from a pencil and punching small holes in each rib. The tail surfaces are $^{3}/_{32}$" deep throughout, and all the necessary strips and curved parts may be cut out of medium sheet balsa, $^{3}/_{32}$" thick. Do not forget to add the wire hinges between the control surfaces before covering, as these should be cemented in place from the inside.

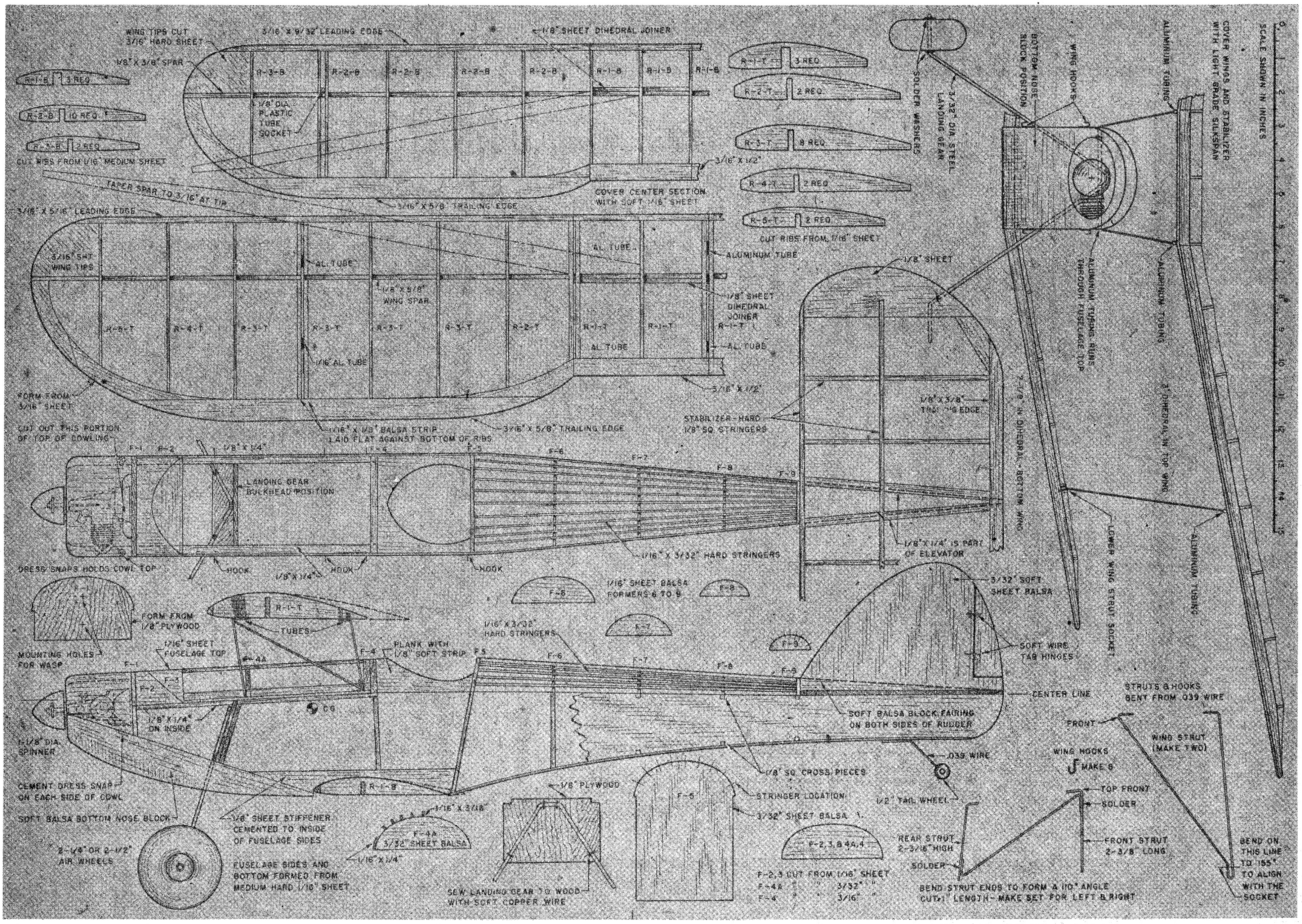
For best visibility, the model should be covered with dark-blue or red tissue paper. A silver trim will help for visibility and will catch the judge's eye when he is considering the model for points on finish. Use a soft brush that is about $^{3}/_{8}$" wide for color doping, as the dope can be applied more quickly with a wide brush, lessening the amount of brush streaks that are readily discernible to the eye. Silver dope has a bad habit of settling quickly, so keep a small length of wire handy to stir it up regularly. Keep the dope properly thinned out so that it flows off the brush well. Above all, keep neatness

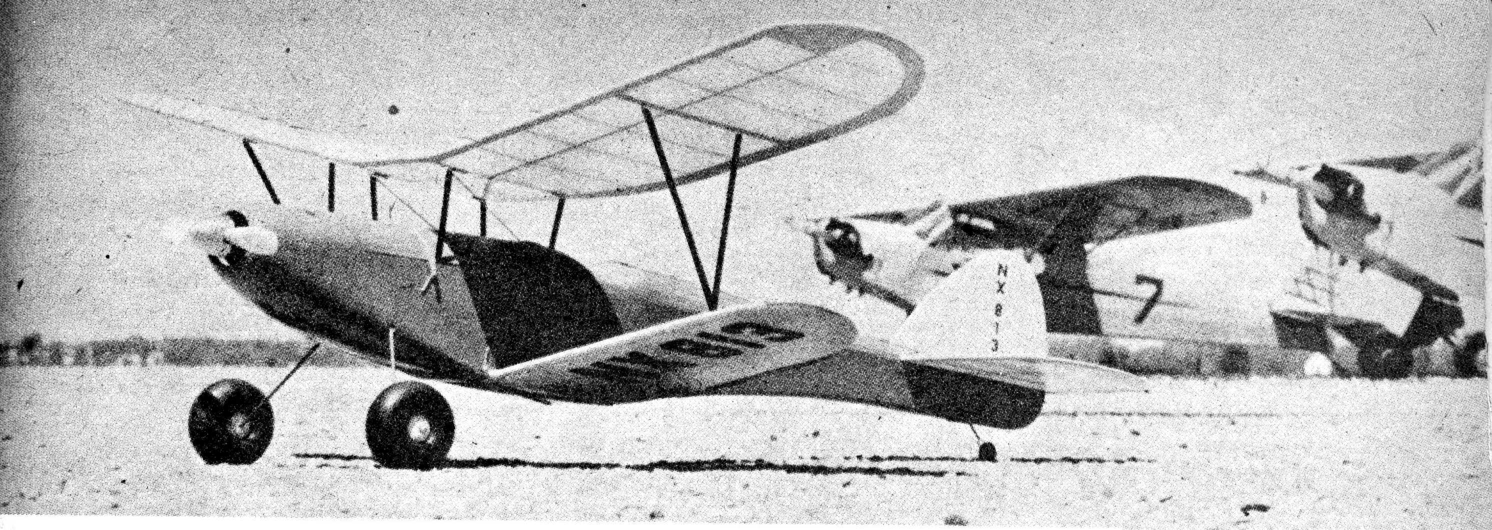

WINDSHIELD TEMPLATE
MAKE PAPER TEMPLATE FIRST FOR TRIAL FIT
3/32" SQ. STRINGERS
11 & 12
10
11
12
SOFT IRON WIRE USED FOR HINGES
THREAD BRACING
NOTE THAT TRAILING EDGE OF WING IS NOTCHED FOR EACH RIB.
WING SHOWN ONE-HALF ACTUAL SIZE
1/2" DIHEDRAL UNDER EACH WING TIP
2"
NOTE GROOVE FOR LEADING EDGE
FULL SIZE WING TIP OUTLINES. CUT TWO OF EACH FROM 1/16" SHEET
AILERON OUTLINE
1/8" SQ. LEADING EDGE.
1/16" X 3/8" SPAR
1/64" SHEET LEADING EDGE COVERING
1/16" X 1/4" TRAILING EDGE
2 3/32"
2 3/32"
2 3/32"
2 3/32"
2 3/32"
2 3/32"
2 3/32"
1 3/16"
1 1/16"
1 5/16"
COVER CENTER SECTION OF WING WITH CELLULOID.
GUSSETS SHOULD BE CEMENTED FLUSH WITH TOP OF RIBS.
FULL SIZE
1/16" SHEET
CENTER PART OF WHEEL PANT IS 1/2" THICK STOCK. SIDE COVERS ARE 1/8" THICK STOCK.
STABILIZER AND RUDDER ARE CONSTRUCTED ENTIRELY OF 3/32" STOCK
10
PROP AND TAIL SHAFTS BENT FROM 1/16" STEEL WIRE
BASIC FRAMEWORK OF FUSELAGE IS MADE OF 3/32" SQUARE HARD BALSA.
5 1/2" TREAD

British Interceptor—the Spitfire

Drawn By Martin Dickinson

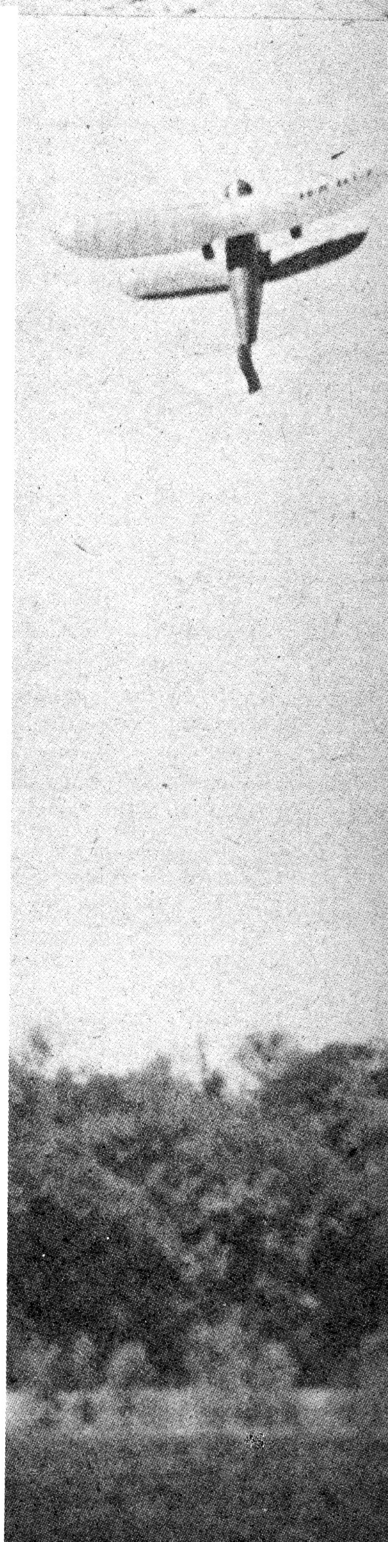



WING TIPS CUT 3/16" HARD SHEET
3/16" X 9/32" LEADING EDGE
1/8" SHEET DIHEDRAL JOINER
1/8" X 3/8" SPAR
R-1-B 3 REQ.
R-2-B 10 REQ.
R-3-B 2 REQ.
CUT RIBS FROM 1/16" MEDIUM SHEET
1/8" DIA. PLASTIC TUBE SOCKET
3/16" X 1/2"
COVER CENTER SECTION WITH SOFT 1/16" SHEET
3/16" X 5/8" TRAILING EDGE
TAPER SPAR TO 3/16" AT TIP
R-1-T 3 REQ.
R-2-T 2 REQ.
R-3-T 8 REQ.
R-4-T 2 REQ.
R-5-T 2 REQ.
CUT RIBS FROM 1/16" SHEET
SOLDER WASHERS
3/32" DIA. STEEL LANDING GEAR
BOTTOM NOSE BLOCK POSITION
WING HOOKS
ALUMINUM TUBING
COVER WINGS AND STABILIZER WITH LIGHT GRADE SILKSPAN
SCALE SHOWN IN INCHES
3/16" X 5/16" LEADING EDGE
3/16" SHT WING TIPS
AL. TUBE
ALUMINUM TUBE
1/8" X 5/8" WING SPAR
1/8" SHEET DIHEDRAL JOINER
1/16" AL. TUBE
FORM FROM 3/16" SHEET
3/16" X 1/2"
1/16" X 1/8" BALSA STRIP LAID FLAT AGAINST BOTTOM OF RIBS
3/16" X 5/8" TRAILING EDGE
1/8" SHEET
ALUMINUM TUBING RUNS THROUGH FUSELAGE TOP
ALUMINUM TUBING
1/8" X 3/8" TRAILING EDGE
STABILIZER-HARD 1/8" SQ. STRINGERS
2-1/8" IN DIHEDRAL-BOTTOM WING
2" DIHEDRAL IN TOP WING
CUT OUT THIS PORTION OF TOP OF COWLING
1/8" X 1/4"
LANDING GEAR BULKHEAD POSITION
1/16" X 3/32" HARD STRINGERS
1/8" X 1/4" IS PART OF ELEVATOR
LOWER WING STRUT SOCKET
DRESS SNAPS HOLDS COWL TOP
HOOK
1/8" X 1/4"
FORM FROM 1/8" PLYWOOD
MOUNTING HOLES FOR WASP
1/16" SHEET BALSA FORMERS 6 TO 9
3/32" SOFT SHEET BALSA
1/16" X 3/32" HARD STRINGERS
SOFT WIRE TAB HINGES
TUBES
1/16" SHEET FUSELAGE TOP
PLANK WITH 1/8" SOFT STRIP
CG
1/8" X 1/4" ON INSIDE
1-1/8" DIA. SPINNER
CENTER LINE
SOFT BALSA BLOCK FAIRING ON BOTH SIDES OF RUDDER
STRUTS & HOOKS BENT FROM .039 WIRE
FRONT
WING STRUT (MAKE TWO)
.039 WIRE
WING HOOKS MAKE 8
1/8" SQ. CROSS PIECES
CEMENT DRESS SNAP ON EACH SIDE OF COWL
SOFT BALSA BOTTOM NOSE BLOCK
1/8" SHEET STIFFENER CEMENTED TO INSIDE OF FUSELAGE SIDES
1/16" X 3/16"
F-4A 3/32" SHEET BALSA
1/16" X 1/4"
1/8" PLYWOOD
STRINGER LOCATION
3/32" SHEET BALSA
1/2" TAIL WHEEL
TOP FRONT
SOLDER
2-1/4" OR 2-1/2" AIR WHEELS
FUSELAGE SIDES AND BOTTOM FORMED FROM MEDIUM HARD 1/16" SHEET
SEW LANDING GEAR TO WOOD WITH SOFT COPPER WIRE
F-2, 3 & 4A, 4
F-2,3 CUT FROM 1/16" SHEET
F-4A " " 3/32" "
F-4 " " 3/16" "
REAR STRUT 2-3/16" HIGH
FRONT STRUT 2-3/8" LONG
BEND STRUT ENDS TO FORM A 110° ANGLE CUT 1" LENGTH - MAKE SET FOR LEFT & RIGHT
BEND ON THIS LINE TO 155° TO ALIGN WITH THE SOCKET



BOB MILLER'S

K.C. Cutie



How can you resist this F/F beauty? Rediscover fun of line-less flying!

About the Author: *Robert W. Miller of Richmond Heights, Mo., calls this job "Little Joe" (note the dice painted on the fuselage), but the editorial staff says the bipe's such a beauty it must be a "she"— hence "K.C. Cutie." Bob is 33, a motion picture projectionist, married, wife's name is Eleanor ("best helper a guy ever had and a darn good photographer"), has son Robert, 2½. Flies with St. Louis County Master Modelers; served 5 years with AF. Holds pilot's license; started modeling in '28 with Boy Scouts. Builds one rubber job per year to keep hand in; likes unconventional free flight—low wing, twin tractor, pusher, canard. Has twin engine R/C semi-scale job. Recently had R/C job land on passing freight.*

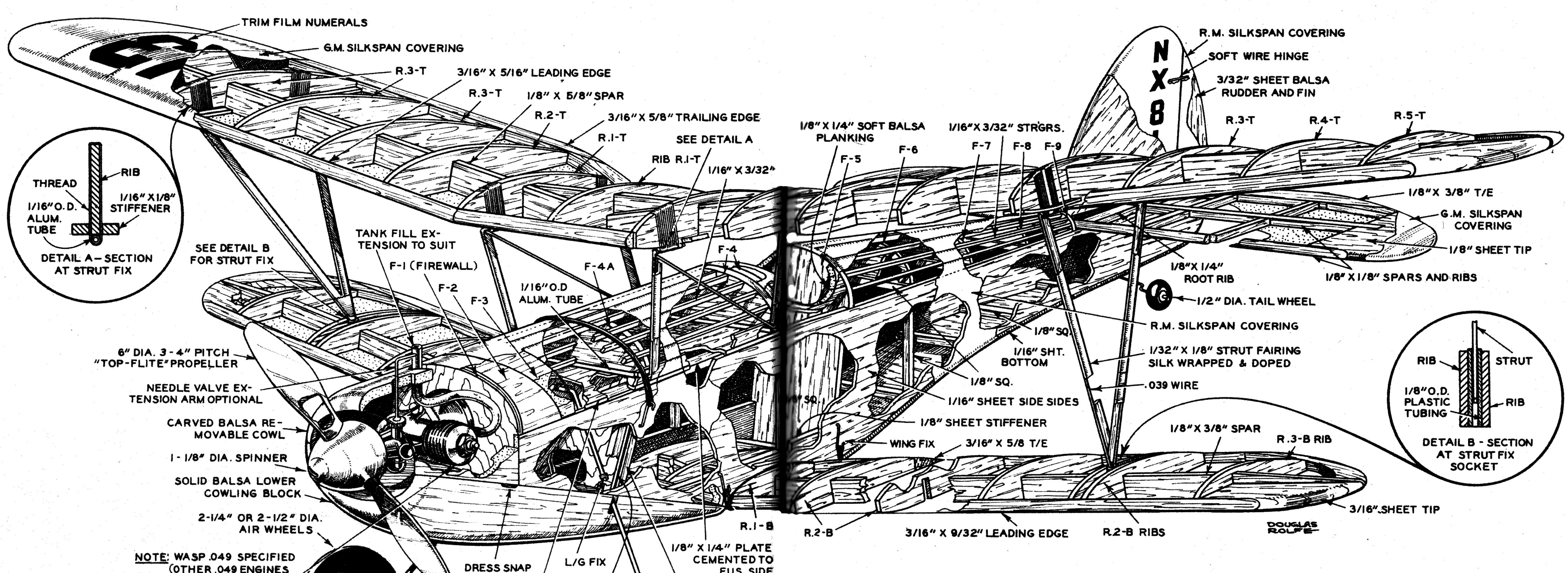
■ Like many other model builders, I have always had a fond love for biplanes. Yet most of us put them aside for the conventional monoplane because of their complexity and the extra wing required. *Cutie* is the result of some questions asked of me by a young builder, and in this model I have tried to combine realism and good sport performance.

The total wing area is about 350 square inches and the finished weight, including a paint job, is 14 ounces. The climb is good and on a 20 second motor run the model can cover considerable distance if a breeze is blowing. Incidentally, *Cutie* flies equally well in a wind and will roll out on the top of a stall if improperly launched.

The fuselage sides are cut from medium hard 1/16" sheet balsa; be careful to maintain the correct nose angle and lower wing cut-out. Cement bulkheads F-1 and F-5 in position on one side, and when dry cement on the other side. Draw the fuselage ends together and cement. Add the remaining formers to the back and attach the 1/16"x3/32" hard balsa stringers. The cockpit between F-4 and F-5 is filled in with soft ⅛"x¼" balsa; sand smooth and then cut out. Attach the landing gear to the ⅛" plywood bulkhead and cement in place.

Carve to shape and add the soft balsa bottom nose block which runs from the lower wing cut-out to the tip of the nose. Cover the bottom with medium 1/16" sheet balsa running the grain across the fuselage.

The balsa block behind F-1 is made in two pieces which are slanted 45 degrees



to allow the fuselage top to slide off without binding. Cement F-2 to the back of F-1; F-3 is part of the fuselage top. The top is made from 1/16" hard sheet balsa which is cut to fit between F-3 and F-4.

When a good fit is had, cement F-3 and F-4 to the 1/16" sheet balsa bottom. Add F-4a and then the 1/16" O.D. aluminum tubes and finally the 1/16"x3/32" stringers.

Build the elevator in the usual manner and cement it on the fuselage. Next add the rudder and fill in blocks on each side of it.

Wings offer no problem as they are conventional in construction. The wing strut fittings on the bottom of the top wing are cut from 1/16" O.D. aluminum tubing and are bound in place with thread and well coated with cement. Add a piece of 1/16"x⅛" balsa on each side of these ribs after the tubing is in place. The lower wing strut socket is a piece of plastic soda straw, large enough to allow the strut freedom to slip out in a rough landing — which *can* happen.

Bend the wing struts to shape, assemble the model and check the rig of the top wing for incidence angle at this time.

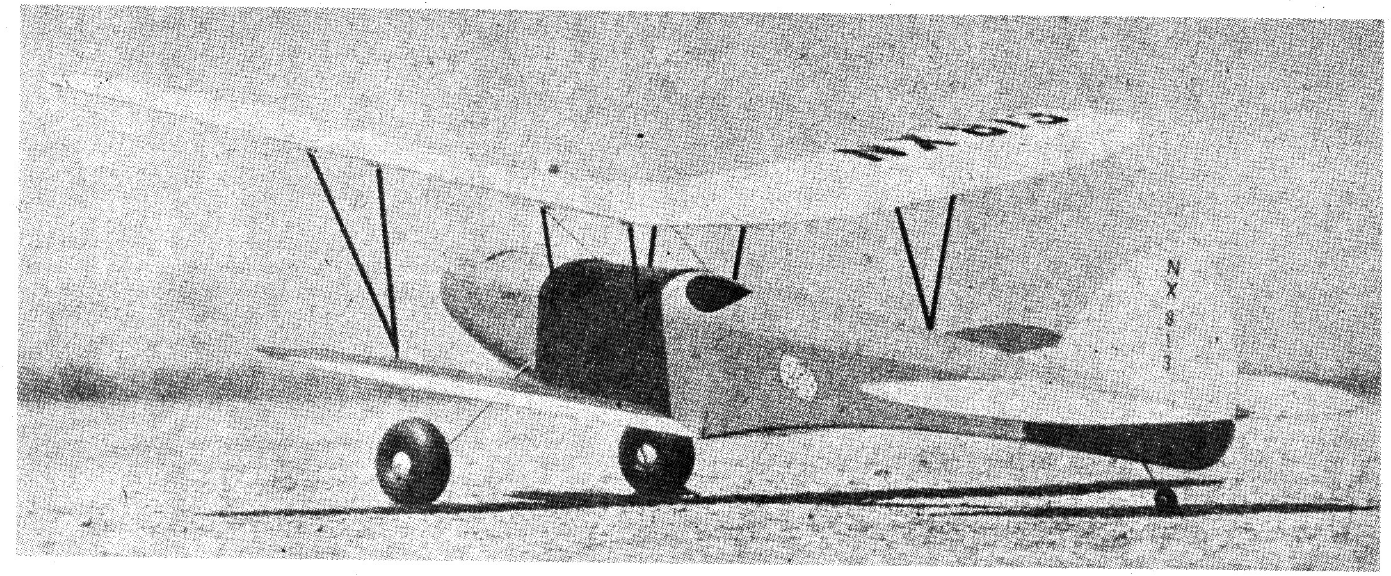
If correct, add the 1/32"x⅛" fairings to the struts by wrapping doped silk around them and the wire.

Air wheels were used on our model. Since one ounce of lead had to be added to the nose, sponge wheels can be used to help trim the model and reduce the amount of lead required for balance.

Any fuel tank can be chosen, but our model employs the coiled length of tubing method and external starting tank. A 12" length of 3/32" bore tubing will give a 20 to 30 second run depending on the prop used.

Cover the wings and elevator with GM Silkspan for greater strength. Rubber model Silkspan is doped on the fuselage sides and rudder to add strength to the wood and also to cover the grain.

Apply two coats of clear dope and one of color. The weight of one coat of colored dope is negligible, is far better looking than colored tissue and does not fade. The color



scheme of *Cutie* is: yellow wings and tail, bright green fuselage, yellow dice and black struts. The dice are cut from yellow Trim Film with the dots and edges inked in with black India ink. The model is now fuel proofed all over unless a fuel proof finish was used from the beginning of the job.

The finished model should balance 1¼" behind the top wing spar as shown on plan.

If it does not balance at this point, add weight to the nose or tail as required. Try gliding the model until a fairly fast glide results with no tendency to mush or stall. The ship is very sensitive to rudder setting, so be careful.

On first power flight, try 6" dia., 3 or 4 inch pitch prop and give it about ⅛" right rudder.

To reduce thrust, the prop can be put on backwards and the model will just fly, but the torque will be about the same. This will indicate the degree of power turn without the danger of high-speed flight.

When model is finally trimmed, turn the prop around and watch *Cutie* climb.

Martin P4M-1 MERCATOR

By FRANK LASHEK and CAL SMITH

This Navy patrol bomber scales down into a fairly simple twin-engine control liner

■ A little-publicized phase of Naval operations is long-range patrol work. The smaller fighters and anti-submarine attackers may have more roar and zoom, but prominent in the background is the big solid patrol plane. It's not the fastest aircraft in the Navy but it can fly for hours on end through all kinds of weather to seek out and photograph an approaching enemy, sow mines and be a watchdog over the nation's sea approaches

Martin's P4M-1 fulfills all these functions admirably. Naval aviators who fly it claim it to be more trouble-free than most. It has no bad habits, and although patrol flying can be grueling the P4M makes the job less so

The Mercator is a big airplane spanning 114 ft. and is 84 ft. long. Though pretty conventional in appearance, there are a few surprises under that blue paint. She's not a twin-engine aircraft. Those big nacelles house both prop and jet engines. Two 3250 hp Wasp Majors turn the props and two Allison J33 turbojets deliver 4000 lbs. thrust each. Able to cruise at a comfortable 200 mph for 3000 miles, the prop and jet combination boosts speed to over 350 mph when additional speed is needed. The jets are also used for take-off when heavily loaded.

The Mercator normally carries a crew of nine men. There is ample armament. The nose and tail turrets carry 20-mm guns. The top turret has 50 cal. guns. The large bomb bay is fitted for carrying mines primarily. Search radar and long-range electronic equipment enable the big ship to fulfill its reconnaissance missions.

The twin-engine model fan will find the Mercator a real natural for building and flying. There are lots of straight lines to make the job easier and the size is not unwieldly

Scaled at 7/16 in. = 1 ft. from factory three-views, the model has a span of 49 7/8 in. and a length of 37⅝" The original model was patterned after the prototype XP4M-1; however, the plans incorporate a few changes made in production aircraft which won't bother the flying qualities. Changes from prototype are: Fin and rudder are enlarged, tail turret is extended, wing has flat center section with dihedral outboard of nacelles. The original had straight dihedral.

It would be fine if every model could be scaled down exactly with everything a miniature duplicate of the big aircraft. Such is not always the case, however. Props, wheels and other little items don't always match sizes avail-

To facilitate good flying with reasonably sized props, nacelles have been moved outboard 5/16 in. to permit prop clearance. Gear was extended.

Although fuselage looks quite streamlined, because of straight top it is constructed with little difficulty. Top half is built first on crutch, planked.

able commercially. So some allowances must be made with some deviation from scale in the interest of better and easier building. The Mercator has a few deviations from scale, which we hope won't make anybody mad: Nacelles are moved outboard 5/16" to permit prop clearance at fuselage. The landing gear is extended 1" to allow more prop clearance above ground. The size of nose wheel is increased from 1⅜" dia. to 2" dia. for better ground handling.

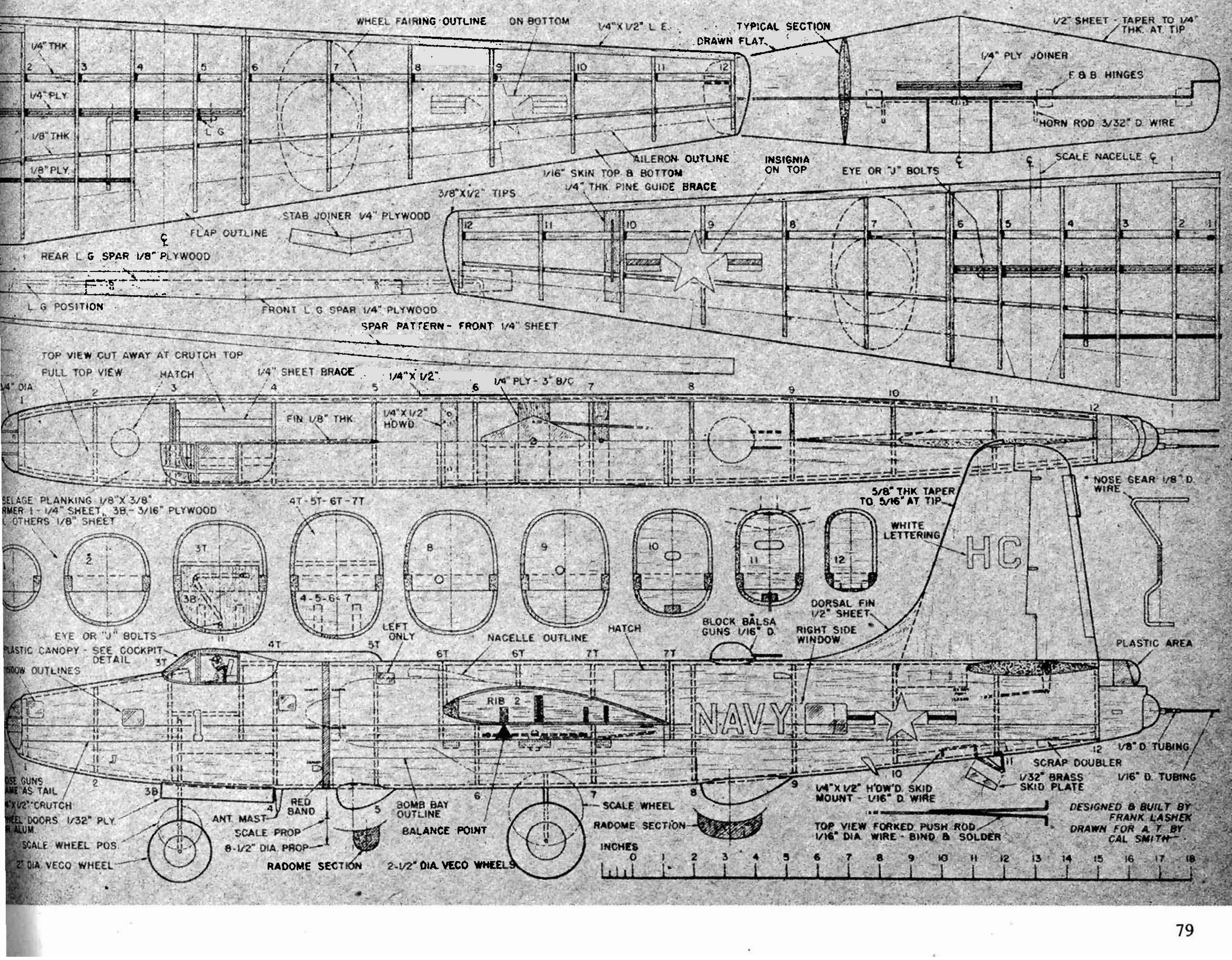
The original model weighed in at 4 lbs. even, with ignition O&R .23's turning 9/6 Top Flite props. The ignition system weighs ⅞ oz., so flying with glow engines would save some weight. K&B .19's are shown on plans; props should be 9/6 Top Flites cut down to 8½" dia.

Construction is conventional throughout. Fuselage is crutch and former with strip planking. Wing is built up with sheet planking. Tails are solid sheet and nacelles are hardwood, balsa block combination. The original model had wing removable from fuselage for ease of transportation, but this feature need not be built in if you prefer a one-piece model.

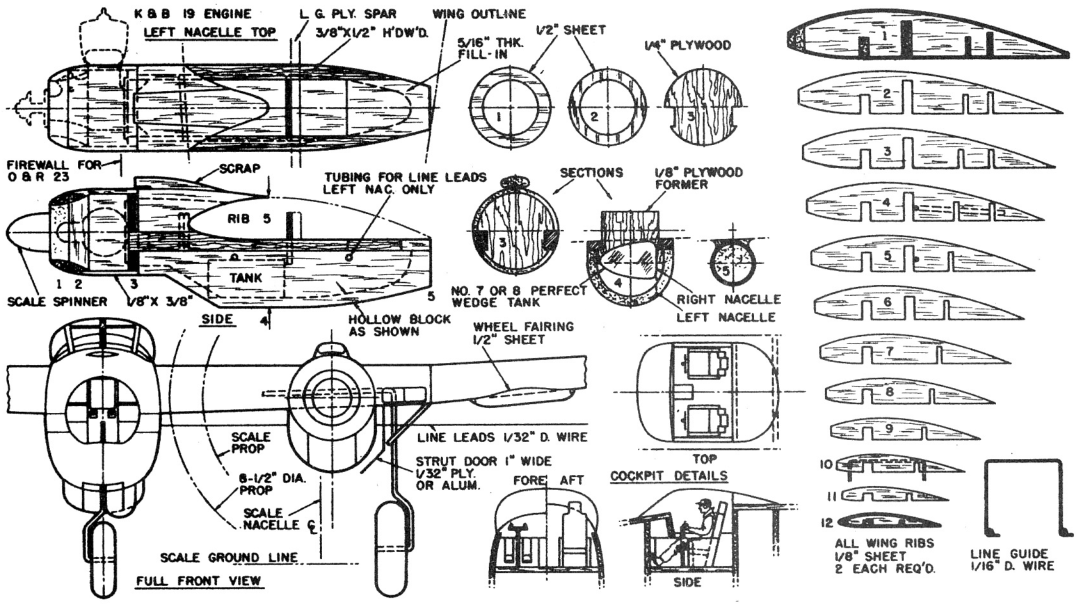
Construction can be started with fuselage. The crutch is laid down over the top view and the top section of the formers are cemented in place. The lower portion of each former can serve as a crosspiece between crutch or ⅛" x ½" or ¼" x ½" strips can be used instead. Note that formers 4T-5T-6T-7T are duplicates of each other with minor variations over wing center section. Plank top portion of fuselage with ⅛" x ⅜" strips. Make provision for removable section between formers 6T and 7T if wing is to be removable.

When planking is complete, the structure can be taken up from workboard. Make horizontal tail surfaces now. These consist of ½" sheet tapering in thickness to ¼" at tips. Carve symmetrical airfoil section. Note separate control horns on each elevator. Stabilizer and elevators are joined with F&B hinges. Stabilizer halves are joined with ¼" plywood joiner. Stab should be fitted in place on fuselage, carve planking to match lower curve of stab. Cement ¼" plywood bellcrank mount to bottom of crutch between formers 6 and 7. Make up forked pushrod and join to bellcrank and elevator horns. Check for good free elevator action before proceeding with fuselage construction. Remedy any trouble now, before fuselage is closed up for good.

Proceed next with bottom portion of fuselage. Install cockpit floor before adding former 3. Add ¼" x ½" hardwood strips across crutch for wing hold-down nuts if desired. Bend nose gear to shape and install on plywood former 3 before putting former in place. Add lower formers along entire fuselage. Don't forget wire skid and ¼" x ½" hardwood mount. Complete planking of lower fuselage. Tail turret is carved from block balsa, nose turret can be carved from block or simulated with clear plastic toy ball or rattle if proper size is obtainable. Cockpit canopy is not available commercially so one of proper shape will have to be made. Dorsal fin, fin and rudder are carved from sheet and cemented in place on fuselage top. Note front part of fin extends down behind former 10. Rudder is offset to right about ½".



MARTIN MERCATOR P4M-1



Wing construction can be tackled next. Cut out the ribs from 1/8" sheet. Make balsa spars to pattern shown. Build wing over plan one half at a time. Note dihedral break at rib 6, so build center section flat first, then lift up and build outer panel flat over plan. Plywood landing gear spars serve as wing panel joiners and these can be installed when wing panels are joined. Bend main landing gears to shape and install on plywood before slipping into place in wings. Wings are planked with 1/16" sheet, use 6" wide sheet if obtainable. Wheel fairings are cemented in after planking is done.

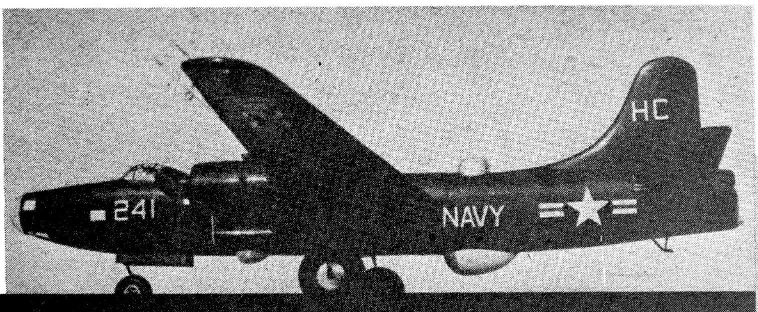
Engine nacelles are next. Structure is built up around two 3/8" x 1/2" hardwood strips glued to the bottom wing surfaces. These strips are carved to match bottom wing curve. A 1/4" plywood firewall is glued across the front of the hardwood strips. Plywood formers are glued across bearers at wing leading edge and 1/4" plywood landing gear spar. Vibration is quite a problem with wing mounted engines, so don't spare the glue (Weldwood) and gussets when joining these parts. Top and bottom of cowlings are block balsa carved to shape and cemented in place. The K&B .19 can be radially mounted using K&B radial mount disc. Front portion of cowling is two layers of 1/2" sheet with 1/8" x 3/8" planking. Two lengths of 1/8" aluminum tubing are placed across left nacelle for line lead passage.

This completes the wood working. Cockpit details are furnished for those interested in dressing up the model inside. There was no accurate information available for the cockpit, but the detail is drawn to proper scale size. Seats can be built up from sheet and throttle console made of block. Instrument faces would be slightly less than 1/8" in dia.

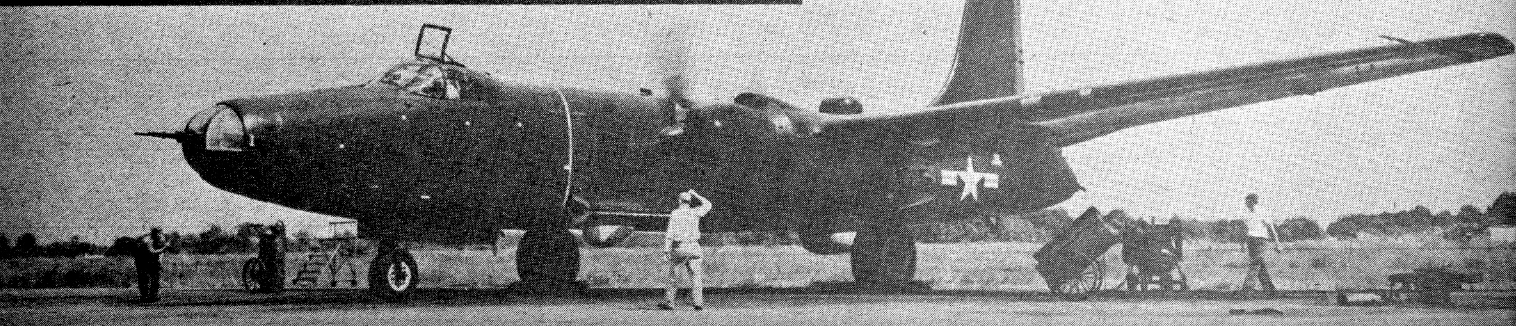
The contest-winning finish on the original model is no accident, because its main ingredient is elbow grease. Finishing procedure is this: Bare wood is sanded smooth and given two coats of clear dope, then lightly sanded. Lightweight tissue is then clear doped over entire model. Give tissue two more coats of clear dope, sand lightly. Duco auto primer is next applied, either sprayed or brushed. Build up about four or five coats, whatever it takes to fill pores and grain marks. Sand with finishing paper dry, then wet finishing with 400 grit. Then spray final color, wet sand between about three coats. Rub down final coat with rubbing compound, follow with Simoniz Kleener. Wax after decals and final details are in place.

Add final details such as wheel doors, radomes, turret and windows. Insignia and lettering can be decals. Windows are simulated with aluminum dope. Guns can be aluminum or brass tubing. Be sure model balances at point shown. Add ballast as needed. Model flies well on 70 ft. wires, and will fly on one engine after becoming airborne.

Some scale fans favor ignition and gas-oil operation to eliminate fuel-proofing problems. The original Mercator used O&R .23's with relay in circuit to cut both engines together; this eliminates single engine problems. Use fiber or plastic bellcrank with line leads insulated to carry juice to relay. Battery for relay power is carried at handle with on-off switch. Use insulated flying wires. Ignition batteries are carried in fuselage between former 5 and 6, four pencells are used. Coil and condensers are in each nacelle behind firewall.



Midnight Blue dope is applied over auto primer to develop prize-winning finish. Full size construction plans are available. Data on these may be obtained from Hobby Helpers or "AT."



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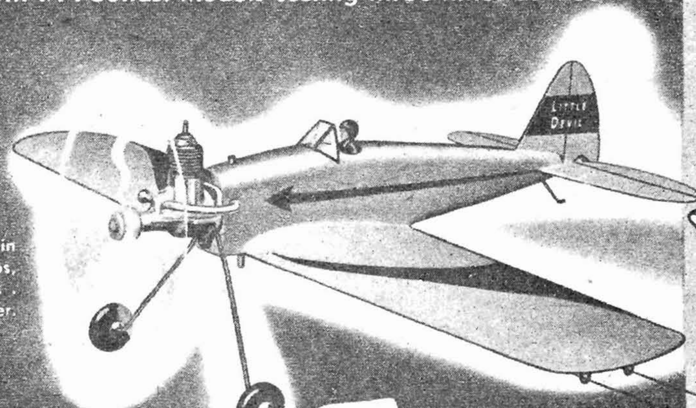
Scientific's "Little Devil" is as beautiful in appearance as in performance. For loops, banks, steep climbs, dives, "eights" . . . you'll find this model a top-notch performer.

SPAN . . . . 18 in.
LENGTH . . . . 12 in.
AREA . . . . 62 sq. in.
WEIGHT . . . . 4 oz.
ENG. DISP. . . . . .02 to .09

featuring Jim Walker U-CONTROL
U. S. PATENT 2,292,416



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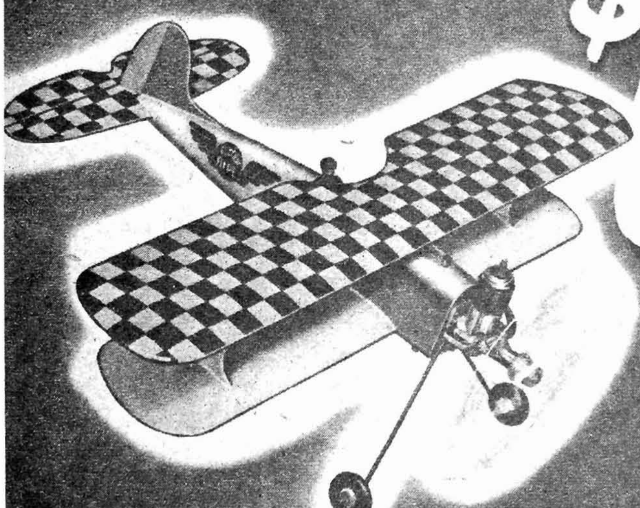


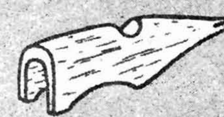
"LITTLE BIPE"

Here's the hottest bi-plane on the market! Easy to build and fly, the "Little Bipe" will give you loads of pleasure.

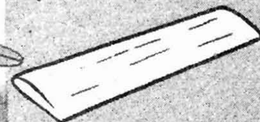
SPAN . . . . 16 in. AREA . . . . 80 sq. in.
LENGTH . . . . 11½ in. WEIGHT . . . . 4½ oz.
ENG. DISP. . . . . . .02 to .09

COMPLETELY PREFABRICATED

ALL PARTS FINISHED
NO TOOLS REQUIRED

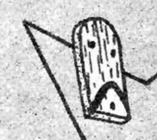


"TRU-CARVED" one piece fuselage

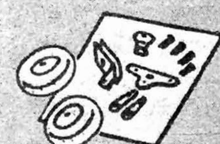


"TRU-FOIL" Ready Cut wing

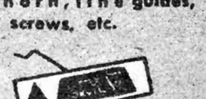
"TRU-CUT" Tail Surfaces



"TRU-FORMED" wire landing gear and TRU-CUT Plywood firewall



Hardware: wheels, bell-crank, control horn, line guides, screws, etc.



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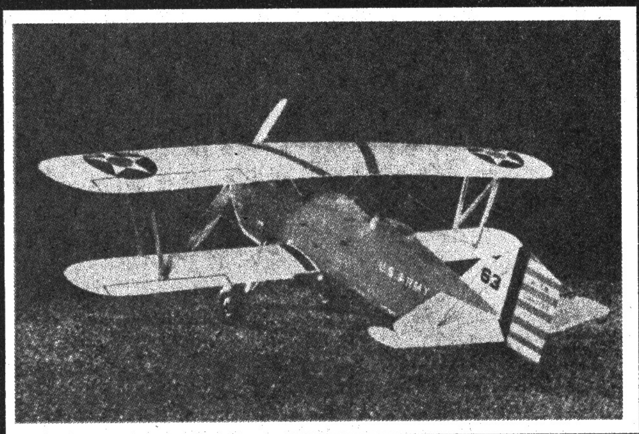
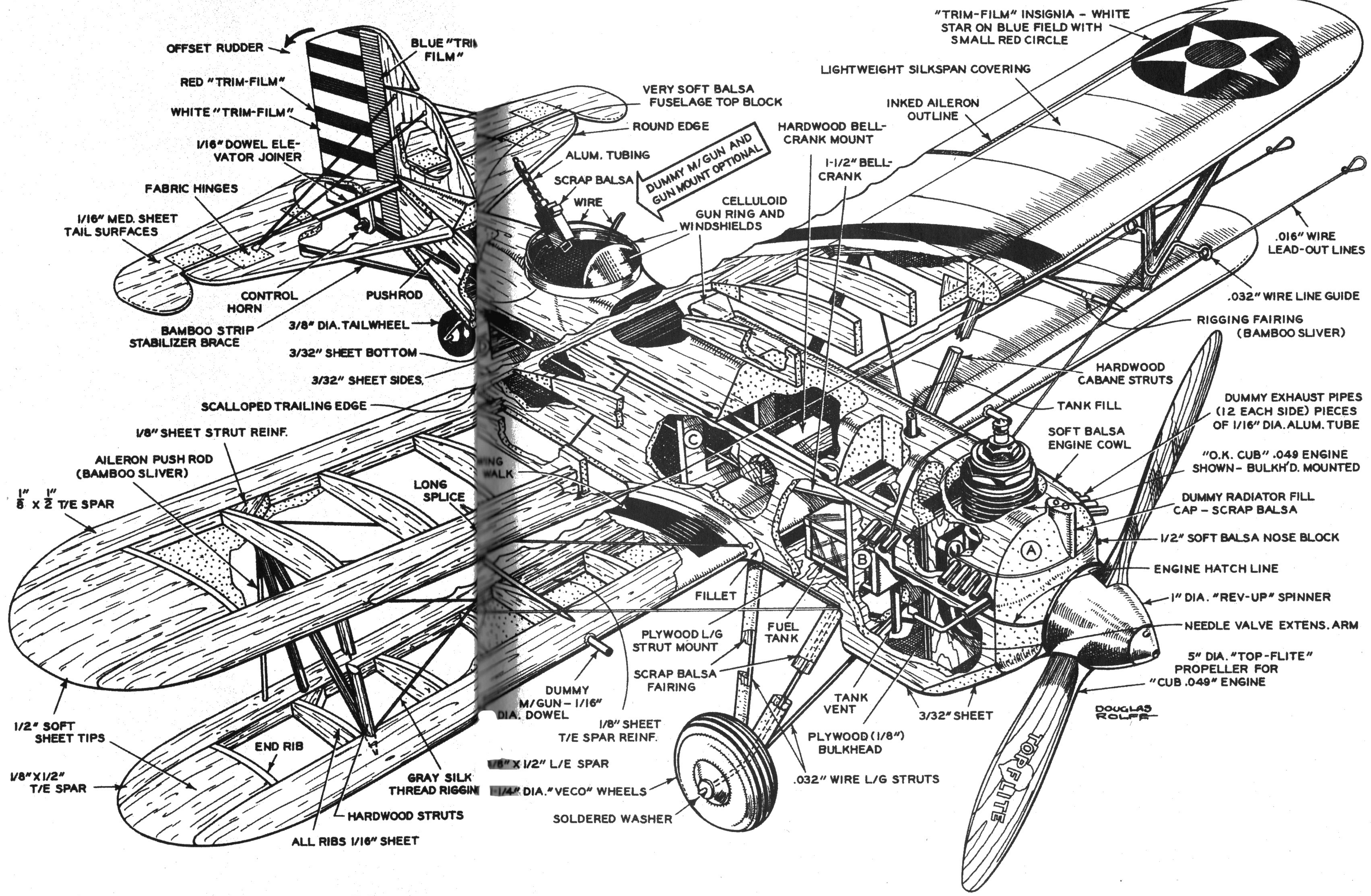


Scale-man Musciano comes up with a swell half-inch-to-the-foot Falcon for Half-A line fans; double full-size plans for .29 to .51 power

Curtiss Falcon A-3B Attack

By WALTER A. MUSCIANO



■This first cousin to the original Navy Helldiver was procured during 1925-26 as the O-1 and in various modifications up to the O-1F. Seventy-four observation Falcons were built. With slight modifications the A-3 attack version was developed from the "O" series, and 76 Curtiss A-3 Falcons were bought. After an experimental A-3A, the A-3B was evolved and 78 of these ground attack planes were purchased by the Army Air Corps in 1928—a very large order for that time, thus verifying the Army's satisfaction with these planes.

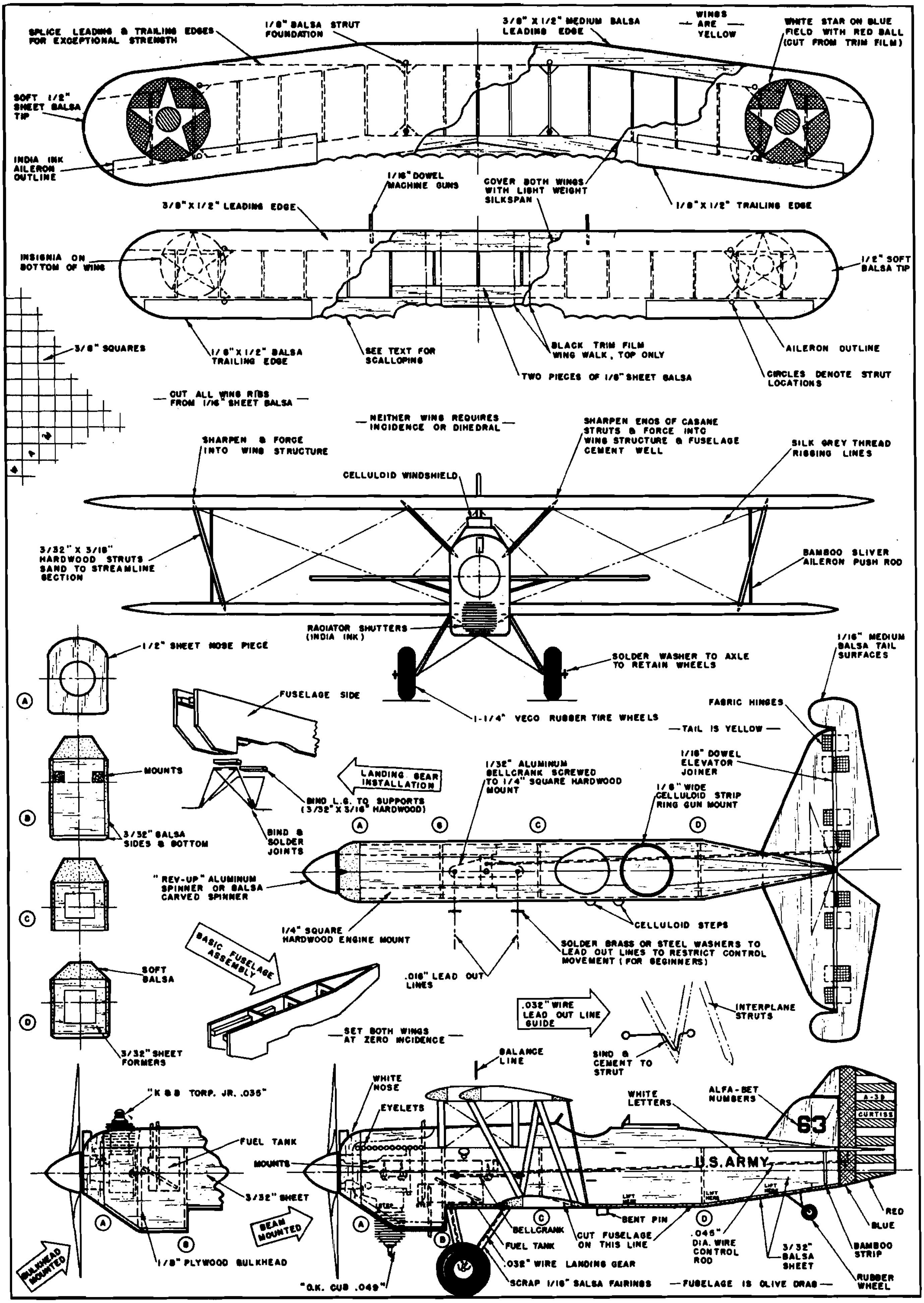
Powered by a Curtiss V-1150-5, 12-cylinder, liquid-cooled engine of 435 hp, the five-gun A-3B attained a top speed of 139 mph with a gross weight of 4458 lbs. Because of added armament and structural modifications, the A-3B was 650 lbs. heavier than the "O" series and 15 miles per hour slower. Rate of climb was 1725 ft. per minute, and service ceiling 23,400 feet. Endurance at full throttle at 15,000 ft. was 3½ hrs. Landing speed was 63 mph. (We thank Mr. G. A. Page of the Curtiss Wright Corp., Airplane Division, for valuable information on the full-scale plane.)

The Falcon is a rugged, easy-to-build Half-A job with excellent performance qualities. Any engine from .035 to .074 cubic inch displacement can be installed in this 74 sq. in. wing area model. These include Cub .039, .049, and .074, K&B .035 and .049, Spitfire, Spitzy, Royal Spitfire .065, and the Wasp. It will be noted that a Cub and a K&B .035 have been illustrated installed in both beam and bulkhead mounting. Either upright or inverted engine mounting can be utilized. The prototype model weighs 5 oz. ready to fly.

Cut fuselage sides and bulkheads from medium sheet balsa. Score with a razor blade and crack for the abrupt taper shown in top view. Join sides at rear; cement bulkheads in place. Add hardwood engine mounts or plywood bulkhead mount. Cement bellcrank mount in place. Attach lead-out lines; screw bellcrank in place; leave it loose enough for bellcrank movement.

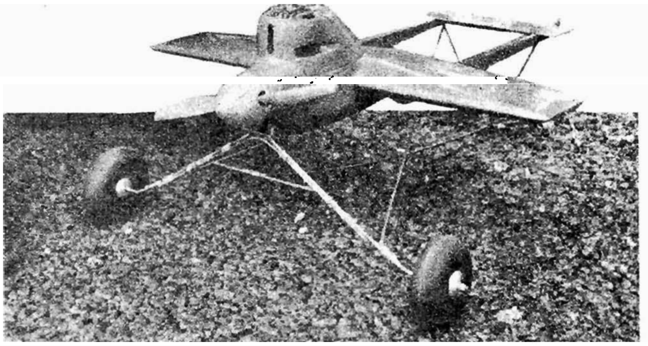
All tail surfaces are cut from sheet balsa; sand smooth. Join two elevator halves by means of dowel. When dry add horn, then hinge elevators to stabilizer.

That gets you off to a good start. Complete building details on AT's full-size plan.

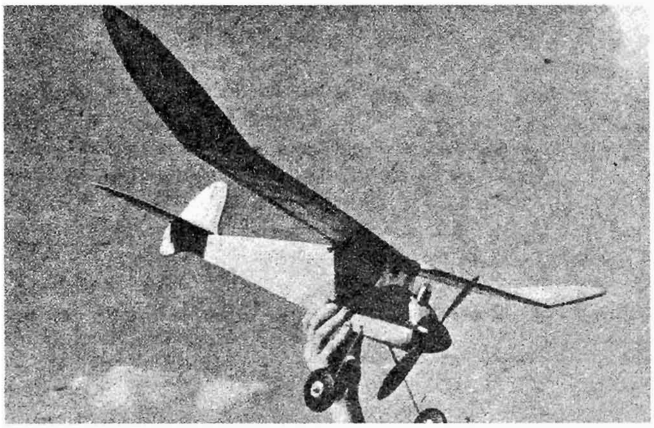


SPLICE LEADING & TRAILING EDGES FOR EXCEPTIONAL STRENGTH
1/8" BALSA STRUT FOUNDATION
3/8" X 1/2" MEDIUM BALSA LEADING EDGE
WINGS ARE YELLOW
WHITE STAR ON BLUE FIELD WITH RED BALL (CUT FROM TRIM FILM)
SOFT 1/2" SHEET BALSA TIP
INDIA INK AILERON OUTLINE
1/16" DOWEL MACHINE GUNS
COVER BOTH WINGS WITH LIGHT WEIGHT SILKSPAN
3/8" X 1/2" LEADING EDGE
1/8" X 1/2" TRAILING EDGE
INSIGNIA ON BOTTOM OF WING
1/2" SOFT BALSA TIP
3/8" SQUARES
1/8" X 1/2" BALSA TRAILING EDGE
SEE TEXT FOR SCALLOPING
BLACK TRIM FILM WING WALK, TOP ONLY
AILERON OUTLINE
TWO PIECES OF 1/8" SHEET BALSA
CIRCLES DENOTE STRUT LOCATIONS
CUT ALL WING RIBS FROM 1/16" SHEET BALSA
NEITHER WING REQUIRES INCIDENCE OR DIHEDRAL
SHARPEN & FORCE INTO WING STRUCTURE
SHARPEN ENDS OF CABANE STRUTS & FORCE INTO WING STRUCTURE & FUSELAGE CEMENT WELL
SILK GREY THREAD RIGGING LINES
CELLULOID WINDSHIELD
3/32" X 3/16" HARDWOOD STRUTS SAND TO STREAMLINE SECTION
BAMBOO SLIVER AILERON PUSH ROD
RADIATOR SHUTTERS (INDIA INK)
1/2" SHEET NOSE PIECE
SOLDER WASHER TO AXLE TO RETAIN WHEELS
1/16" MEDIUM BALSA TAIL SURFACES
FUSELAGE SIDE
1-1/4" VECO RUBBER TIRE WHEELS
FABRIC HINGES
TAIL IS YELLOW
MOUNTS
LANDING GEAR INSTALLATION
1/32" ALUMINUM BELLCRANK SCREWED TO 1/4" SQUARE HARDWOOD MOUNT
1/16" DOWEL ELEVATOR JOINER
1/8" WIDE CELLULOID STRIP RING GUN MOUNT
BIND L.G. TO SUPPORTS (3/32" X 3/16" HARDWOOD)
3/32" BALSA SIDES & BOTTOM
BIND & SOLDER JOINTS
"REV-UP" ALUMINUM SPINNER OR BALSA CARVED SPINNER
CELLULOID STEPS
1/4" SQUARE HARDWOOD ENGINE MOUNT
BASIC FUSELAGE ASSEMBLY
SOLDER BRASS OR STEEL WASHERS TO LEAD OUT LINES TO RESTRICT CONTROL MOVEMENT (FOR BEGINNERS)
SOFT BALSA
.016" LEAD OUT LINES
.032" WIRE LEAD OUT LINE GUIDE
INTERPLANE STRUTS
SET BOTH WINGS AT ZERO INCIDENCE
3/32" SHEET FORMERS
BALANCE LINE
BIND & CEMENT TO STRUT
"K & B TORP. JR. .035"
WHITE NOSE
EYELETS
WHITE LETTERS
ALFA-BET NUMBERS
A-3B
CURTISS
63
FUEL TANK
MOUNTS
U.S. ARMY
3/32" SHEET
RED
BENT PIN
BLUE
BELLCRANK
CUT FUSELAGE ON THIS LINE
.045" DIA. WIRE CONTROL ROD
BAMBOO STRIP
BEAM MOUNTED
FUEL TANK
3/32" BALSA SHEET
BULKHEAD MOUNTED
1/8" PLYWOOD BULKHEAD
.032" WIRE LANDING GEAR
RUBBER WHEEL
"O.K. CUB .049"
SCRAP 1/16" BALSA FAIRINGS
FUSELAGE IS OLIVE DRAB

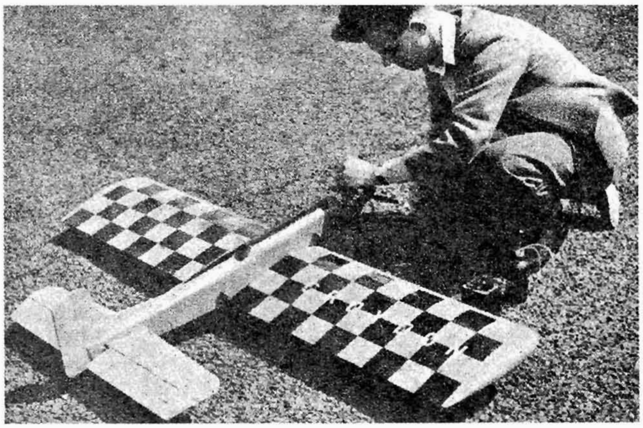
Real Gone Guys... Those Englishmen!



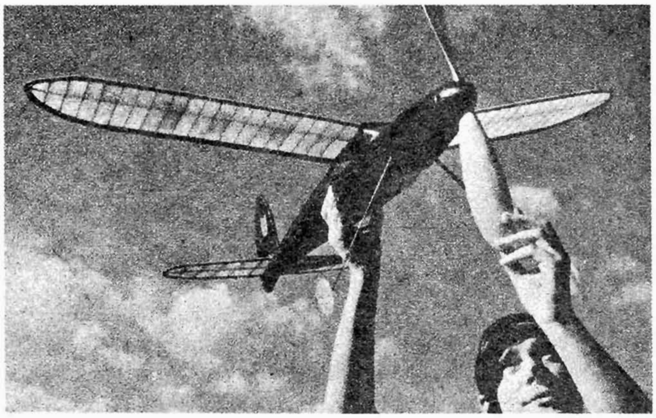
Unusual twin-boom speed job, powered by McCoy .60 engine designed and built by a Mr. Donovan (why won't Britishers give first names?), St. George's Heights MC. Pushrod runs atop port boom.



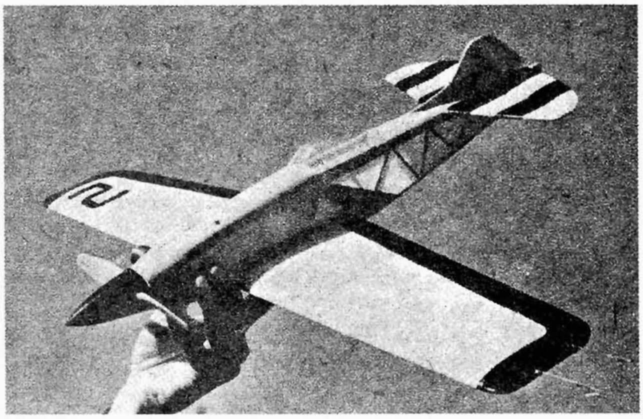
Mighty purty cabin free flighter built by R. A. Adams of London (who took these photos). Power supplied by Mills 1.3 cc diesel engine. Wing l.e. notched back above cabin. Clean construction.



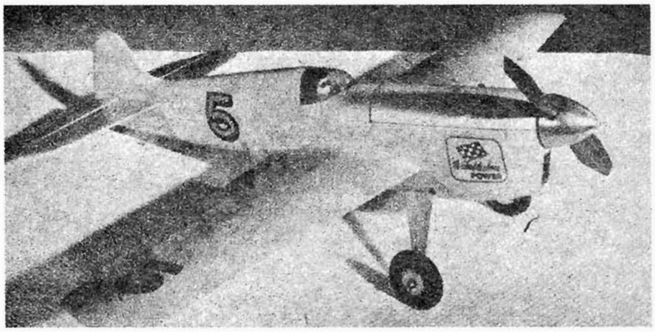
They build some nice stunt jobs, too. Here Mr. ? ? Arnold of Croydon Club starts up the Atwood which provides beaucoup oomph for orange and black stunter. Bracing wire between stab and rudder.



The "Aristocrat" is a Wakefield built to the old formula. Spans 36 in. with realistic cabin. Fourteen yards of black rubber provides the power. Multi-stringer fuselage, undercamber ribs typically British.



Another design by photog Adams which does all stunts in the book; the manner in which it flies inverted leaves him clammy. Yellow and black, boasts Mills diesel. Interesting type of fuselage construction.

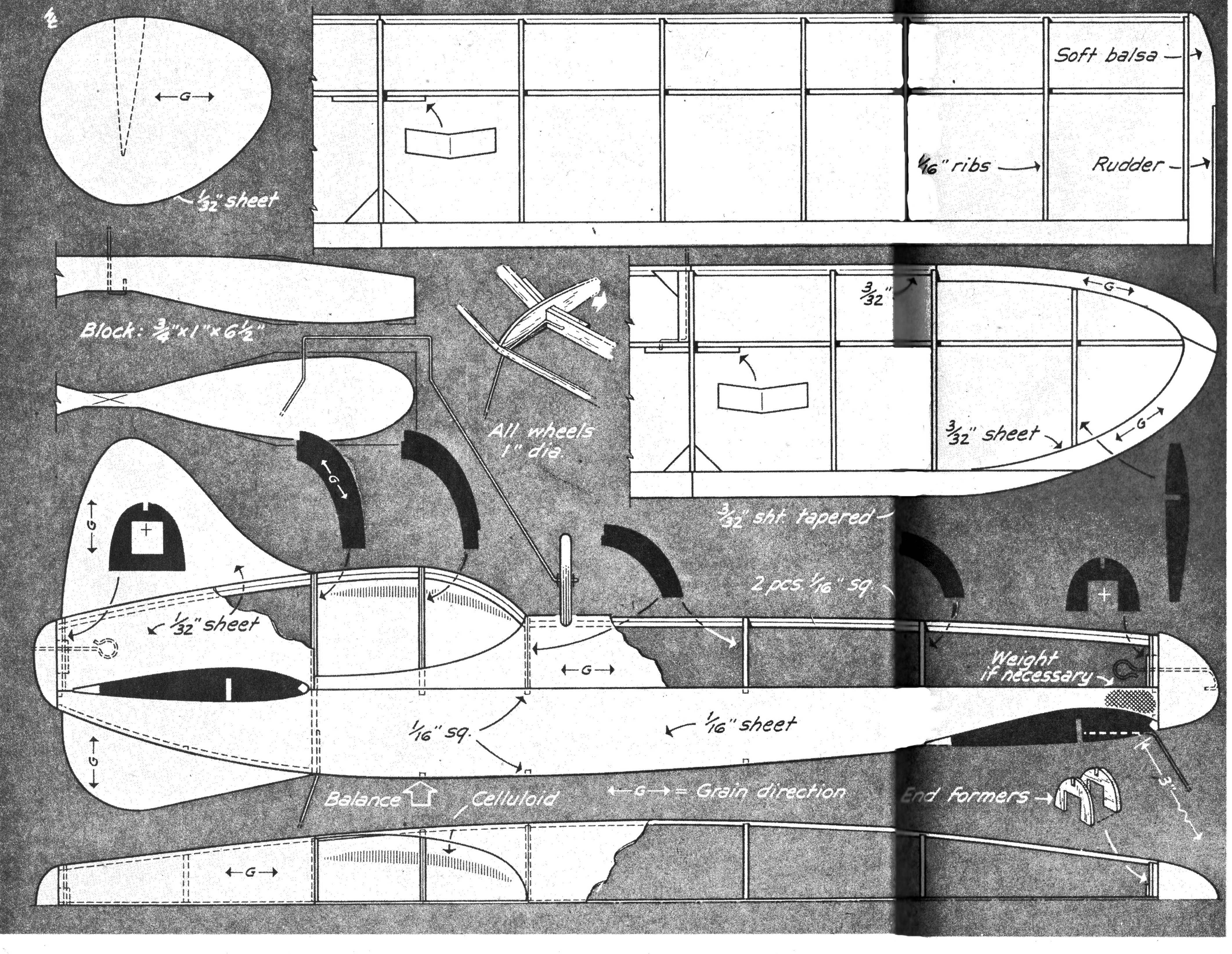


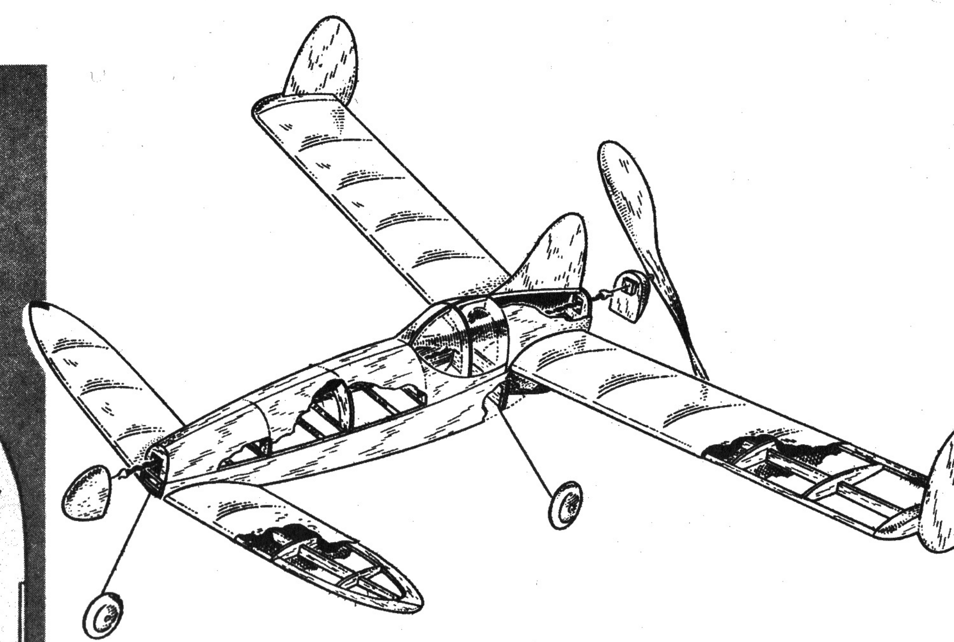
Team racer (looks like AT's Ole Slippery) designed and built by Phil Landray of Wimbledon Power Club. McCoy .29 pulls it around at a steady, economical 75 mph. Already racked up several victories.

Fine example of British kits: Aeronca Sedan of 65.5" span. Designed to take 2.5 cc motors for free flight or radio control. This one has an Elfin 2.40 cc engine. Boasts scale flight characteristics.

Canny Canard

By H. A. Thomas





GOOD STALL RECOVERY IS ONLY ONE OF THE MANY INTERESTING CHARACTERISTICS OF THE TAIL-FIRST MODEL

AMONG the unusual types of aircraft are the tail-first, "Canard" craft, named after an early exponent of the type. The same general kind of aircraft is termed "tandem wing" when the two aerofoils are of somewhat the same size. While earliest successful gliders and powered planes were tail-first types, the conventional tractor replaced them and has been used to the exclusion of Canards to the present time. Current experiments in England with tandem-wing planes, however, are so promising that a tentative design for a heavy, multi-engine bomber has been laid out as a tandem-wing craft.

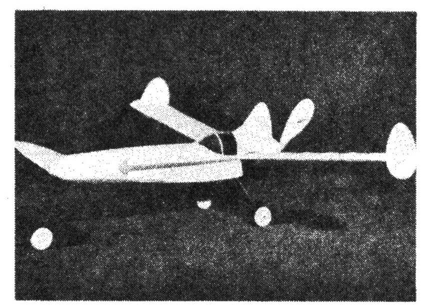
Present day orthodox planes are reaching such high wing loadings that many inherent faults are becoming obvious. For instance, center of gravity location is critical; slight fore and aft changes in loads often cause serious flight hazards. This is one of the chief advantages of tail-first types. In these, the center of gravity location is not critical; in fact, considerable latitude exists in its position without upsetting longitudinal stability.

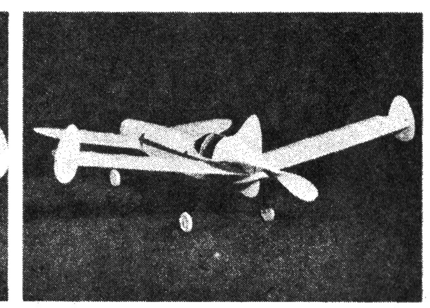
With more incidence in the front wing, the Canard quickly recovers from stalling positions since the front wing begins to stall out first and drops ahead of the rear wing to automatically recover flying speed.

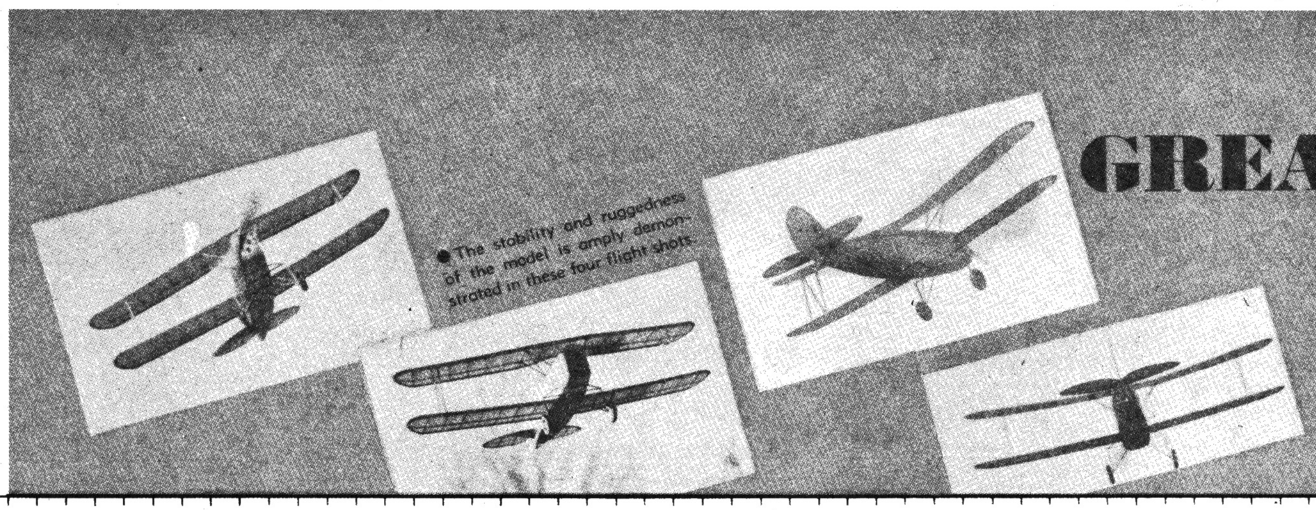
Frequently, model builders, in their experiments with tail-first planes, make the mistake of adding rudders to the noses of their models. When we consider that the center of gravity is located somewhere ahead of the rear wing, it is obvious that a rudder anywhere ahead of this point has a detrimental effect on directional stability. Should the model turn to either side, the front rudder tends to aggravate the turn. Some types of tail-first models manage to fly nicely with no rudder area at all (remember the old twin pushers?).

Our model is more of a Canard than a tandem-wing type. Both wings use the same section and have identical chord but the rear wing has more area and the front wing has more incidence.

Cut 18 ribs of 1/16-inch sheet balsa and the two tip ribs for the front wing. Taper the trailing edges and connect the spar halves before assembling the wings. Both wings have the same degree of dihedral. Sand the completed wing frames, tapering the tip edges of the front wing. With dope as the adhesive, cover the wings, spray with water, and apply one coat of dope. Add the 1/32-inch sheet balsa rudders to the rear wing tips.



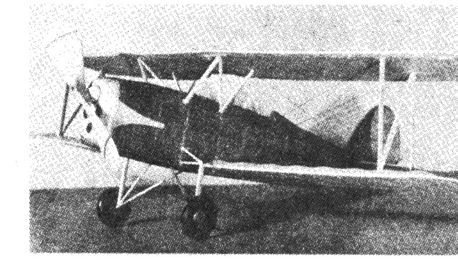




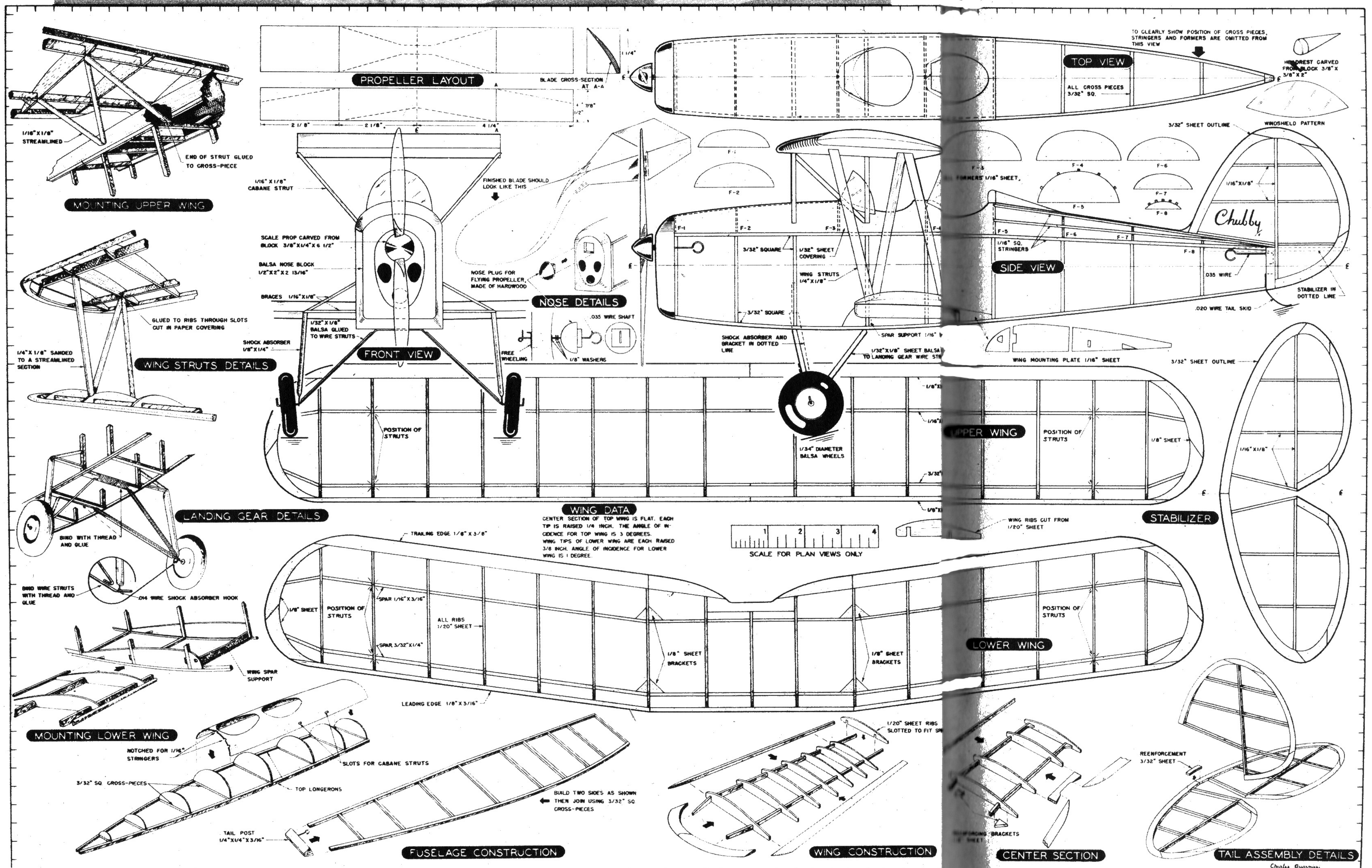
The stability and ruggedness of the model is amply demonstrated in these four flight shots

GREAT LAKES TRAINER

by CHARLES GUARNIERI



FOR REAL FLYING ABILITY, THIS SCALE VERSION OF THE FAMOUS OLD TRAINER CAN'T BE BEAT



WITH this model we have attempted to give you a true scale flying replica that will delight the builder and afford many hours of pleasant flying. The plans presented are three-eighths actual size and may easily be enlarged by using a grid work of half inch squares and by using the given scale for actual measurements.

The fuselage frame is made of 3/32" square longerons and connecting pieces. Build both sides together, one on top of the other. Lay out the required pieces in their proper places on the side view plan and hold in place with pins until the glue dries. Then, when the sides are ready, join them together with 3/32" strips cut to the sizes shown in the top view of the fuselage. The two crosspieces which will later hold the landing gear wire are cut from 3/32" x 3/16" balsa. The cowl and turtleback formers are cut from 1/16" sheet and are glued in place. Next cover the cowl section with 1/32" sheet balsa. Add the 1/16" square stringers and glue the balsa head rest in place.

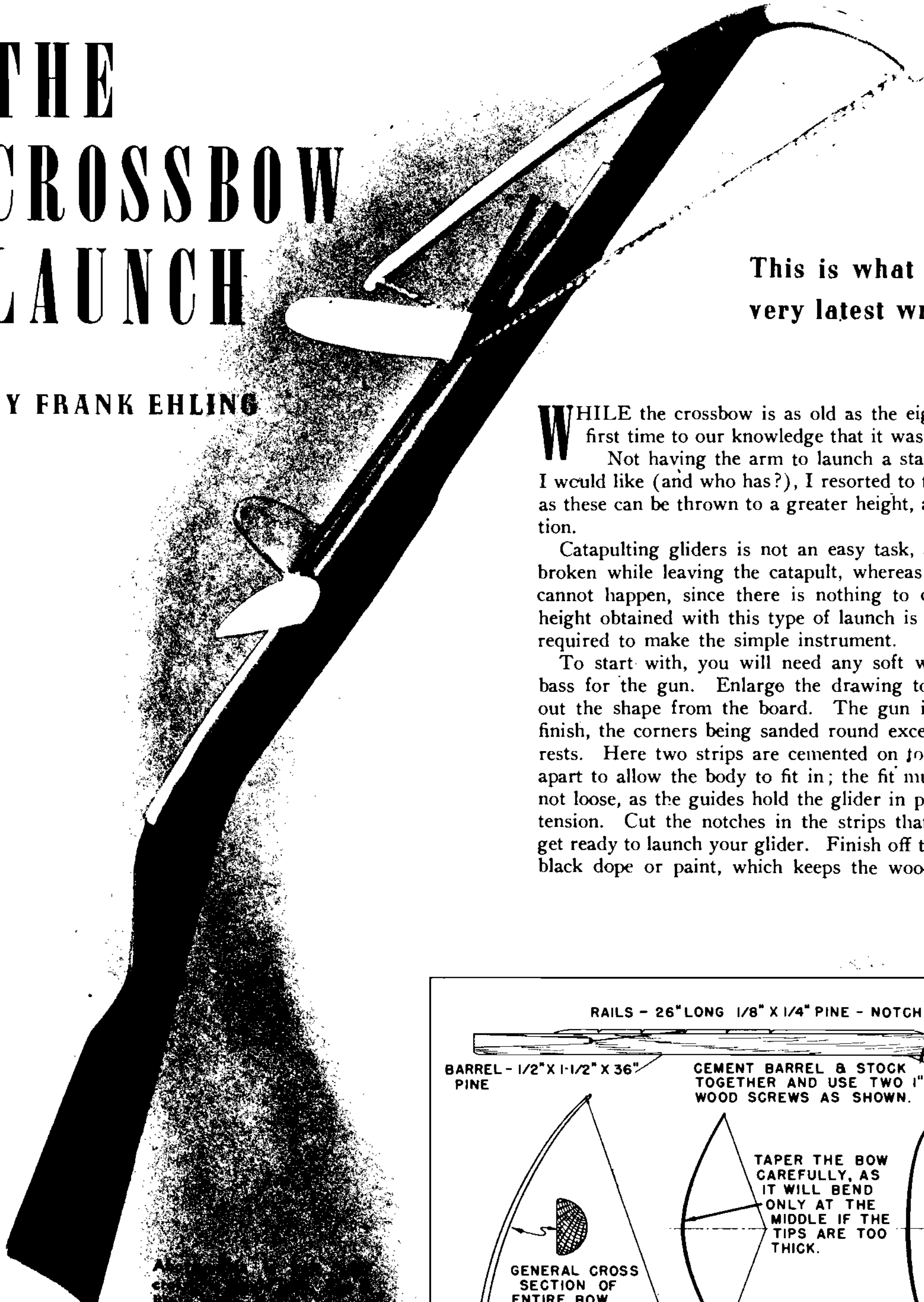
Make the lower wing mounting panels and glue these in place. Bend the wire landing gear, then attach to the fuselage frame using thread and several coats of glue. The wires are bound together with thread where they join at the axle end. Several coats of glue will secure the joint. Now glue the sheet balsa fairing to the wire struts. The balsa wheels should have either metal bushings running through them or metal washers glued on either side acting as bearings for the axles. Bend the ends of the wire axles to retain the wheels. Now carve the nose block from a piece of 1/2" balsa. Trace the front pattern on the block and carve out the air vents to a depth of 1/16". Cut out opening for the hardwood nose plug. Glue block to front of fuselage. Next attach tail block carrying rear hook and tail skid.

Obtain a block of suitable size and mark off the diagonals for the propeller. Then carve out each blade and round off the sharp edges to get the proper blade shape. Sand smoothly the finished product and cover each blade with tissue paper. Drill hole for prop shaft which is bent out of .035 wire and attach free wheeling. Glue a 3/16" washer on the back of the propeller to act as a bearing surface. Now insert prop shaft through nose plug and propeller, separating the two with washers. Bend end of wire shaft to engage free-wheeling device and the propeller is ready now for doping. Apply three coats of dope and sand after all except the last coat.

The wings are very easy to make, as the drawings will reveal. First cut all the necessary parts—ribs, spars, leading edges, trailing edges, and tips. Start with the top wing by laying the two spars on the plan. Next insert the ribs and then glue in the leading edge and the trailing edge. Pins will aid in keeping the parts together until the glue dries. Finally glue tips in place. When the glued joints are fully dry, separate the tip sections from center section and rejoin, raising the tips to the proper dihedral angle. The lower wing is built in a similar manner with the exception that the two halves are made separately. When the wings are completed, round off the leading edges and tips and sand the trailing edges to the desired taper.

Cut the stabilizer and rudder outline from 3/32" sheet balsa. Glue the parts together on the plan, and then glue the 1/16" x 1/8" ribs and spars in place. When the job is completed and the glue joints have dried, remove the sections from the plan and round off the edges with sandpaper.

THE CROSSBOW LAUNCH



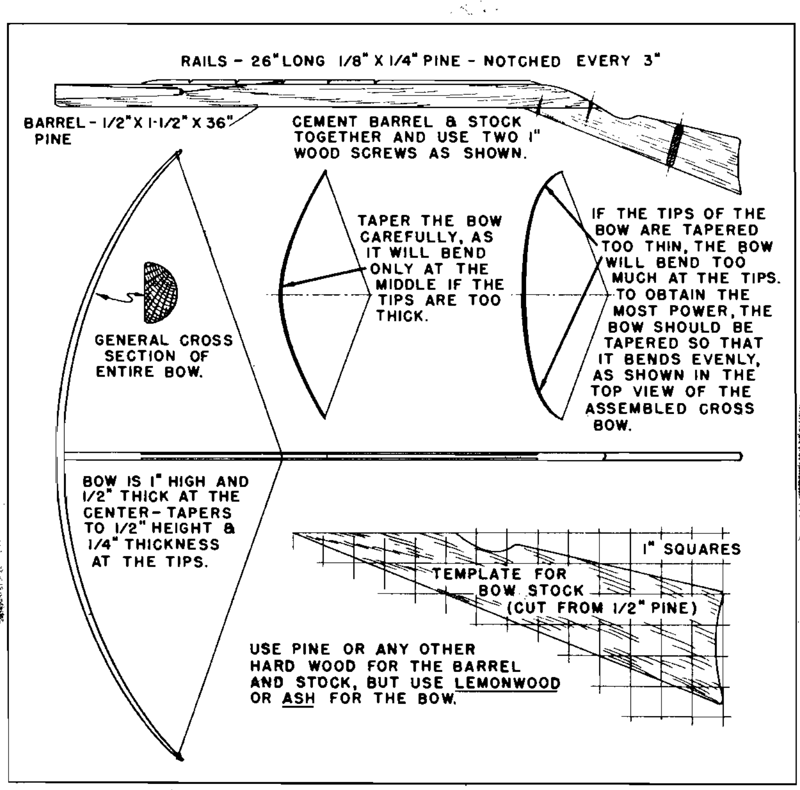
This is what we call fun. The very latest wrinkle in catapults.

BY FRANK EHLING

WHILE the crossbow is as old as the eighteenth century, this is the first time to our knowledge that it was ever used to launch gliders. Not having the arm to launch a standard-size glider as high as I would like (and who has?), I resorted to the building of small gliders, as these can be thrown to a greater height, and that spells greater duration.

Catapulting gliders is not an easy task, as the glider is liable to be broken while leaving the catapult, whereas in using the crossbow this cannot happen, since there is nothing to cut off the stabilizer. The height obtained with this type of launch is worth the little time that is required to make the simple instrument.

To start with, you will need any soft wood such as white pine or bass for the gun. Enlarge the drawing to the required size and cut out the shape from the board. The gun is then sanded to a smooth finish, the corners being sanded round except on top, where the glider rests. Here two strips are cemented on top where shown, far enough apart to allow the body to fit in; the fit must not be too tight and yet not loose, as the guides hold the glider in place while the bow is under tension. Cut the notches in the strips that hold the string while you get ready to launch your glider. Finish off the gun with a good grade of black dope or paint, which keeps the wood in shape.



The Crossbow Launch

The bow is an important part, for this is where the power of the launch is derived from. Since this is constantly under strain while flying, it must be made of a good grade of ash or other wood of the same bending quality. Cut the bow to shape as shown on the plan and then proceed to carve the cross section. When this is nearly done it can be finished off with sandpaper till as smooth as possible. Next it is given several coats of clear dope, sanding in between each coat, till the bow is as smooth as glass. The extra strength gained from dope will pay you for the time that it takes to do the job well. Notches can now be cut in at the ends to accommodate the string; these should be coated several times to save the string when the bow is stretched to the limit.

The bow can now be cemented in place at the end of the gun. Tie a string at one end of the bow and run it to the end of the gun and back to the end of the bow on the other side. Tie it so there is no slack in the string. This string can serve as a guide in lining up the bow as well as holding it in place while the cement is drying. As this cement joint must be strong, use plenty of cement but do not put one coat over another till the previous one is thoroughly dry. About five coats should give a good job.

A few words while the bow is drying. Many types of gliders were tried on this crossbow, the only requirements needed being that the stabilizer is on top of the body, as this allows the body to lie down in the groove, and a notch placed in the body to accommodate the bow string. This notch should be cut in at the bottom of the body one third from the leading edge of the wing; this point is an important one, as many locations were tried to get the most out of the launch.

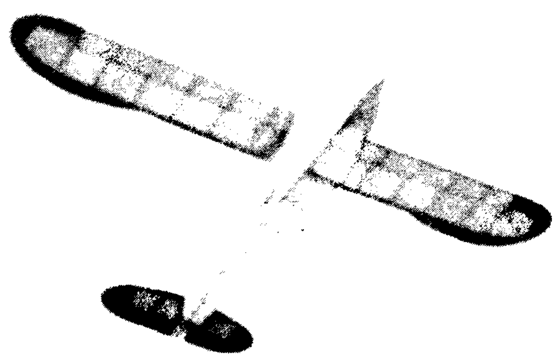
By this time the bow should be dry. String up the bow so there is a bend in it of about four inches. Place the string in the notches on the top rails and slide the glider in the groove ahead of the string, pulling it back till the glider is ahead of the string and the string is in the groove. All that is needed to release the glider into the air is to raise the thumb of the left hand.

A few words on test flying. Use the same care that you would when hand-launching your glider—that is, gradually increase the power of the launch till you have the ship taking all that you can give it. When using the crossbow, that is done by bringing the string back more each time till you have the glider really getting up where you can see just what the ship can do when it is on its own.

The easiest way to get the ship to turn is to warp the trailing edge of the stabilizer down on the left side, looking from the front of the glider. This will give the ship a nice turn and will not allow the glider to loop, but let it climb till all the power is lost, and at the end of the climb the nose will drop but the tail will rise, since by warping the stabilizer down it acts the same as a lifting tail; this allows the tail to be smaller in size as well as improves the glide.

By the way, you can use the crossbow to do some balloon busting. All you need to make it interesting is to get a few fellows and see how well you can bring down the gas bubbles. A pin in the nose with one in each wing tip will give you a good chance to bust the balloon.

THE QUICKIE is designed for swift construction and snappy performance. Although we do not recommend trying to build it at a single sitting, two evenings should be sufficient to get it into the air. Structural pieces are held to a minimum; curved sections of wing and tail are cut from sheet balsa in the easiest manner possible. Minutes have been sacrificed here and there to provide a few frills to make the job more attractive.



QUICKIE

BY JOHN SPRAGUE

Simple construction and a minimum of time required for building make Quickie popular with the beginners.

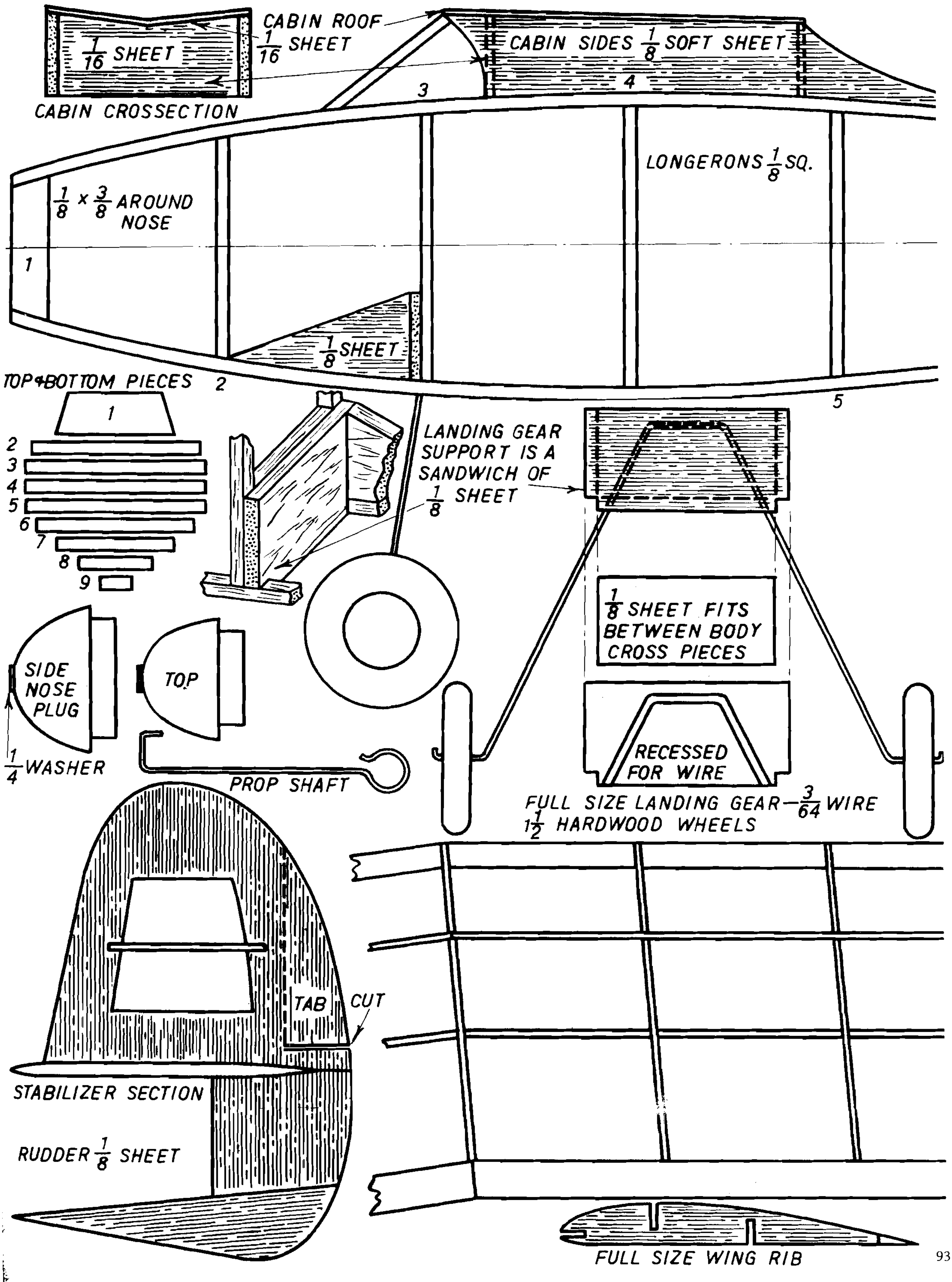
CONSTRUCTION

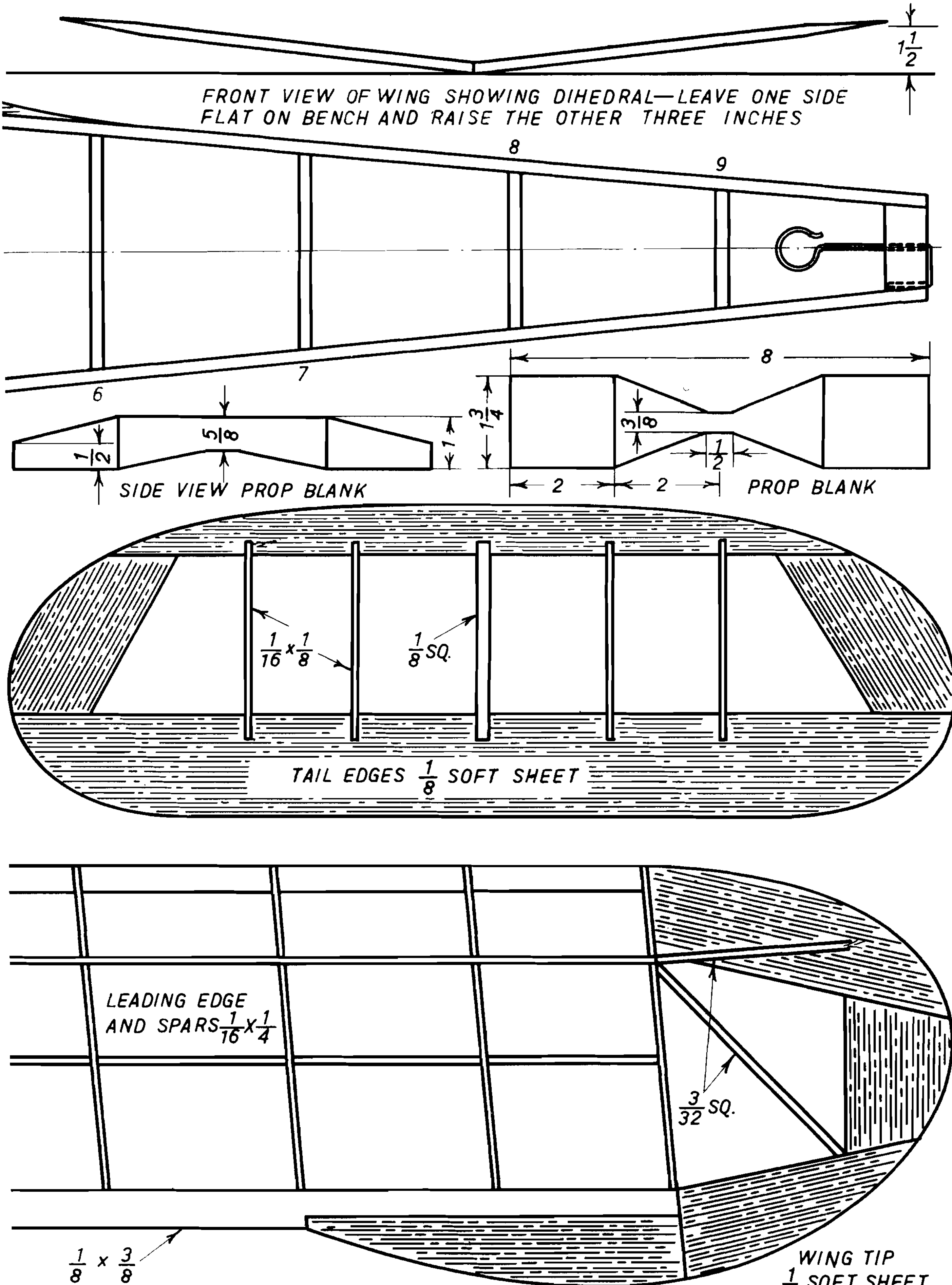
Fuselage. The side view is symmetrical, both 1/8" square longerons following the same bend. The nose cross pieces are wider to take knocks. The top and bottom cross pieces are shown in a group. No top view is necessary. Lay wax paper over the drawings and pin the longerons in place directly on the plans. Cross pieces are cut to size and cemented in place. When dry, remove the side frames from the form and assemble them to each other at Stations 3, 4, and 5. Wrap a rubber band around the nose to pull it into position while its remaining cross pieces are glued in position. Pull the rear of the longerons together, install the rudder post complete with rubber hook, and the remaining top and bottom cross pieces. Cut two cabin sides from 1/8" soft balsa sheet and glue one atop each upper longeron in the proper position. A 1/16" sheet bulkhead holds these cabin sides in alignment and supports the 1/16" sheet V-shaped cabin roof. Details of the landing gear are given on the plan. Finish the landing gear and install it before covering the fuselage. Use hardwood wheels.

Tail. The stabilizer is made from four pieces of 1/8" soft sheet as shown by the plan. The rudder requires three pieces. Notches are cut for the cross pieces and the tail is constructed by pinning the various parts directly over the plans until the cement has dried. Round the leading edges and taper the trailing edges.

Wings. Thirteen ribs are cut to the pattern given from 1/16" sheet balsa. Pin one of the 1/16 x 1/4" spars over the plans as the rear spar and cement the ribs on it in the proper locations. Preshape the 1/8 x 3/8" trailing edge and pin it to the bench. Then slide the 1/16 x 1/4" leading edge into the leading-edge notches cut in the rib noses. Lastly, glue the top spar in place. Cut the wing-tip pieces from soft 1/8" sheet and cement them in place. After the wing is removed from the form, round the front edge of the tip and shave the rear edge to a sharp-edged taper. Brace the tip with short pieces of 3/32" square to prevent warping when covered. Dihedral is accomplished by cracking the wing at the center and blocking up one tip three inches off the bench. Hold the other side flat on the bench. Cement the cracked center generously to hold position.

Covering. Using thick dope for adhesive, attach the paper to one fuselage side at a time. Trim the edges neatly before going on to the adjacent side. The stabilizer and rudder are each covered with two pieces of tissue (Silkspan was used on the original model), one piece for each side of the surface being covered. The wings are covered with


CABIN ROOF
1/16 SHEET
1/16 SHEET
CABIN CROSSECTION
CABIN SIDES 1/8 SOFT SHEET
3
4
LONGERONS 1/8 SQ.
1/8 x 3/8 AROUND NOSE
1
1/8 SHEET
2
5
TOP+BOTTOM PIECES
1
2
3
4
5
6
7
8
9
LANDING GEAR SUPPORT IS A SANDWICH OF 1/8 SHEET
1/8 SHEET FITS BETWEEN BODY CROSS PIECES
RECESSED FOR WIRE
FULL SIZE LANDING GEAR—3/64 WIRE
1 1/2 HARDWOOD WHEELS
SIDE NOSE PLUG
TOP
1/4 WASHER
PROP SHAFT
TAB
CUT
STABILIZER SECTION
RUDDER 1/8 SHEET
FULL SIZE WING RIB


1 1/2
FRONT VIEW OF WING SHOWING DIHEDRAL—LEAVE ONE SIDE
FLAT ON BENCH AND RAISE THE OTHER THREE INCHES
8
9
7
6
8
5/8
1/2
1
1 3/4
3/8
1/2
SIDE VIEW PROP BLANK
2
2
PROP BLANK
1/16 x 1/8
1/8 SQ.
TAIL EDGES 1/8 SOFT SHEET
LEADING EDGE
AND SPARS 1/16 x 1/4
3/32 SQ.
1/8 x 3/8
WING TIP
1/8 SOFT SHEET

Quickie

three pieces of paper, one for the bottom, and one for each side on the top. Attach the paper to end ribs and wing edges only. Spray the finished covering with water and allow to dry taut. Then follow up with a coat of thin clear dope. When spraying the tail surfaces and wings, pin them to the bench until dry to prevent warping. The wet paper will not adhere to the bench. Spray one half of the wing at a time.

Propeller. The propeller blank is cut to the outlines on the plan from a medium-hard balsa block 1¾ x 1 x 8". Do not round the tips until carving is finished. Carving is done in the usual way. Carefully balance and sand the finished prop. Use at least eight strands of ⅛" flat rubber with no slack. The nose block is shown. Glue a washer to it for a bearing and another to the rear of the prop hub. Use a loose washer on the shaft.

FLYING

The tail surfaces are cemented permanently in position. The wing is loose for convenience, being held in place by rubber strands run over the wing and around two wire hooks fastened one on each side to the fuselage at Station 4. Test glide the model over tall grass if possible. If properly built, the model will be tail-heavy. Since the wing cannot be moved back and forth for adjustment, a slight amount of downthrust will remove any stall, but if the stall should be severe, add a little weight to the nose. Insert a sliver of wood behind the top of the block for downthrust. Remember occasionally to place a drop of oil on the propeller shaft between the bearing washers.

Photo Credit List

The following list shows the sources from which credited photos were obtained. Abbreviations. bot., bottom; T., top; U.L., upper left; U.R. upper right; L.C., left center; R.C., right center; L.L., lower left; L.R., lower right; Cen., center; T.C., top center; B.C., bottom center.

Page 6—Fletcher of "PIC."

Page 10—International.

Page 11—Top, British Official Photo; R., British-Combine; Bot., British-Combine.

Page 12—Top, British-Combine; Bot., Official photo U. S. army air corps.

Page 13—All by British-Combine.

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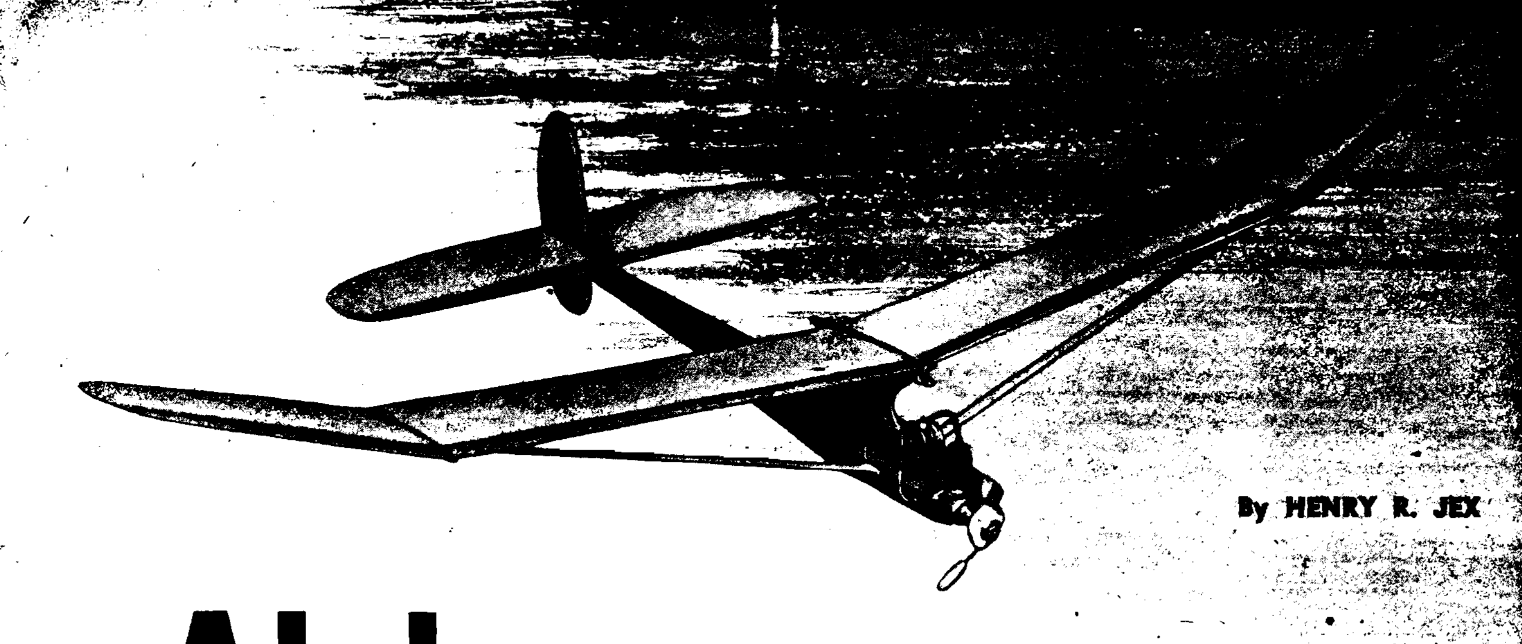
Page 22—TopR., British-Combine; Top.L., Wide World; Cent., John Collins; Bot., International.

Page 23—Second from top by Emery, rest by Brion.

Page 24—Top, Bond.

Page 40—Top, Al Daraghy; UpperL., Kulick; LowerL., Al Daraghy; Bot., Al Daraghy.

Page 47—Al Daragby.



By HENRY R. JEX

Aloha

Strictly a duration job, this Herkimer CO_2 powered contest winner can snare the trophies for you, too

ALOHA is a CO_2-powered contest model. It won the first contest it entered and nearly equalled the National record of 9 minutes for its category. Flights are always over 2 minutes, regardless of weather, over 3 minutes in warm weather!

This fine performance is due to several unusual design features. Primarily, its very small size (90 square inches) and light weight (3.5 ounces) permit the use of a long motor run of nearly 2 minutes. A Schmitz-Luck type airfoil is used in conjunction with sheet construction for efficiency and simplicity. Airfoil parameters are: camber—5% at 25% chord with a 3% thickness and a sharp leading edge. Thin 1/16" sheet is perfect for this shape, and it preserves a true, unbroken airfoil throughout the span and chord. Unique struts keep this thin section from twisting or bending, yet allow adjustment for C. G., warp, or removal. Minimum drag is caused by the pod-and-boom fuselage. Rugged T-construction simplifies building, while the screw in the cartridge holder enables fairing of this usually awkward area. Engine and cartridge are also readily accessible and are not "souped-up." A single-blade folding propeller makes effcient use of the gas energy, yet reduces glide drag immensely. Note that a reasonable diameter is used, along with higher-than-usual pitch and an efficient airfoil. The single folder is almost necessary for contest performance.

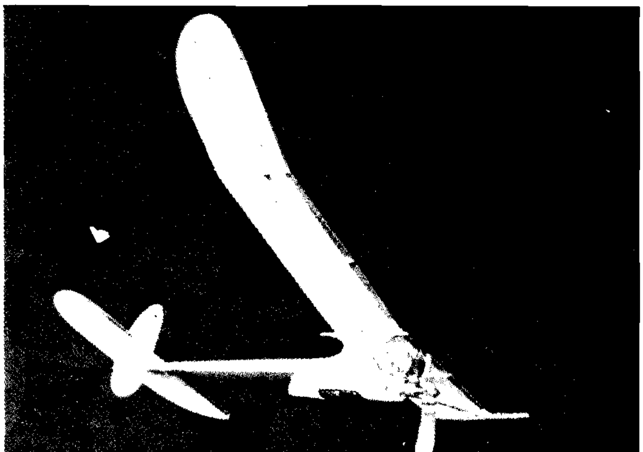
After all this harping on efficiency, some may lift their eyebrows at the extreme adjustments used. However, using the incidences and C. G. position shown, flights are always consistent, are not critical on adjustments, and, most important, variations in engine power don't affect adjustments. Aloha may be flown with the C. G. as far back as ½" from the trailing edge, but incidences must be carefully changed, so this is not recommended for the average flyer. Better still, follow settings exactly.

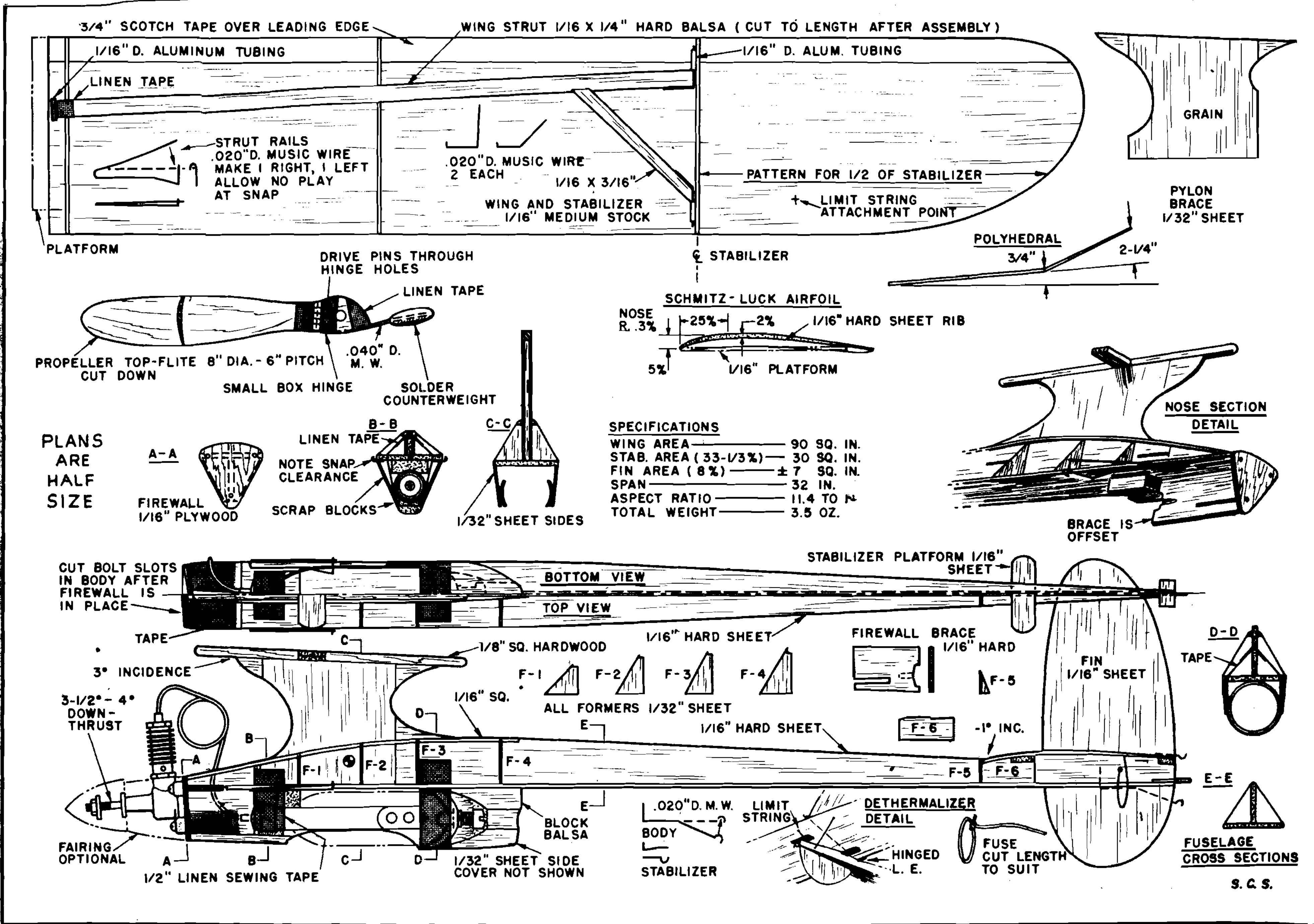
The fuselage is the more difficult, so knock it out first. Start with the 1/16" stiff balsa (quarter grain) boom. Cut the profile from 2" sheet, including the pylon. Add the 1/32" hard balsa pylon pieces (grain vertical) and the 1/32" formers as shown on the plan. Glue the 1/16" square fairing strip on last.

The pod and engine are next. Cut out and drill a 1/16" plywood firewall and attach it carefully to the nose of the boom, including the 3° to 4° down thrust and zero side thrust. Place a 1/16" sheet brace behind the lower part of the firewall, slightly offside to allow for the holder end. Cut out 1/16"-wide slots behind each bolt hole long enough for the 1/16" x 1" motor bolts to fit into. When the bolts are screwed in from the front, these should be a tight fit. Screw on the motor temporarily, put plenty of glue around the threads, and place ½"-wide linen sewing tape over and under the slots, effectively forming a "built-in" nut.

Place an empty cartridge in the holder; substitute a machine screw for the thumb screw (or cut off wings and slot head) and coil the tube as in the photographs. Put the holder

● If you like to work from full size plans you can secure working drawings of the Aloha on Plan #749 from AT's Full Size Plan Dept.




3/4" SCOTCH TAPE OVER LEADING EDGE
WING STRUT 1/16 X 1/4" HARD BALSA (CUT TO LENGTH AFTER ASSEMBLY)
1/16" D. ALUMINUM TUBING
1/16" D. ALUM. TUBING
LINEN TAPE
GRAIN
STRUT RAILS
.020"D. MUSIC WIRE
MAKE 1 RIGHT, 1 LEFT
ALLOW NO PLAY
AT SNAP
.020"D. MUSIC WIRE
2 EACH
1/16 X 3/16"
PATTERN FOR 1/2 OF STABILIZER
LIMIT STRING
ATTACHMENT POINT
PYLON
BRACE
1/32" SHEET
WING AND STABILIZER
1/16" MEDIUM STOCK
PLATFORM
℄ STABILIZER
POLYHEDRAL
3/4"
2-1/4"
DRIVE PINS THROUGH
HINGE HOLES
LINEN TAPE
SCHMITZ-LUCK AIRFOIL
NOSE
R. .3%
25%
2%
1/16" HARD SHEET RIB
5%
1/16" PLATFORM
PROPELLER TOP-FLITE 8" DIA. - 6" PITCH
CUT DOWN
.040" D.
M. W.
SMALL BOX HINGE
SOLDER
COUNTERWEIGHT
NOSE SECTION
DETAIL
PLANS
ARE
HALF
SIZE
A-A
FIREWALL
1/16" PLYWOOD
B-B
LINEN TAPE
NOTE SNAP
CLEARANCE
SCRAP BLOCKS
C-C
1/32" SHEET SIDES
SPECIFICATIONS
WING AREA — 90 SQ. IN.
STAB. AREA (33-1/3%) — 30 SQ. IN.
FIN AREA (8%) — ± 7 SQ. IN.
SPAN — 32 IN.
ASPECT RATIO — 11.4 TO 1
TOTAL WEIGHT — 3.5 OZ.
BRACE IS
OFFSET
CUT BOLT SLOTS
IN BODY AFTER
FIREWALL IS
IN PLACE
BOTTOM VIEW
TOP VIEW
STABILIZER PLATFORM 1/16"
SHEET
TAPE
1/16" HARD SHEET
FIREWALL BRACE
1/16" HARD
D-D
TAPE
C
1/8" SQ. HARDWOOD
3° INCIDENCE
F-1
F-2
F-3
F-4
F-5
ALL FORMERS 1/32" SHEET
FIN
1/16" SHEET
3-1/2° - 4°
DOWN-
THRUST
1/16" SQ.
D
E
B
A
1/16" HARD SHEET
F-6
-1° INC.
F-1
F-2
F-3
F-4
F-5
F-6
E-E
E
.020" D. M. W.
BODY
STABILIZER
LIMIT
STRING
DETHERMALIZER
DETAIL
HINGED
L. E.
FUSE
CUT LENGTH
TO SUIT
BLOCK
BALSA
FAIRING
OPTIONAL
A
B
C
D
1/32" SHEET SIDE
COVER NOT SHOWN
1/2" LINEN SEWING TAPE
FUSELAGE
CROSS SECTIONS
S. C. S.

Aloha

on the bottom of the boom in position shown; block up the small end, and attach it securely with ½" linen tape passed through slots cut in the tee. Glue well!

At this point, carefully bend the strut rails (one right and one left) from .020" music wire. Make sure the wire is a snug fit in the tubing used at the strut ends. Note that the open end is back, allowing it to unsnap in the event of a crash. Place this hook close to the fuselage, so that the rail snaps open and close. Glue this well, also. Fill in around the holder sides up to the firewall with 1/32" med. sheet, curved snugly over the parts involved. A hard block will be needed at the bottom front of the pod. Fair in the rear part with a soft balsa block, first scooped out to fit, then shaped outside. Add the wing and tail platforms and ⅛" square hardwood pylon top and sand the body smooth and clean. Cover the boon with light Silkspan, bottom first, then the sides, and fill in any crevices with Plastic Wood. Give the body one coat of clear dope and one coat of heavy bright red, orange, or yellow dope.

The wings and tail are the next to be constructed. They are relatively simple. Medium 1/16" x 3" sheet is used throughout, with the softer portion near the leading edge, if possible, because the curve is sharper at this part. Trace a paper pattern from the outer polyhedral break to the tip. This pattern is used not only for the wing tips but it is one half of the stabilizer planform. Cut out the wing, elevator, and fins from the sheet balsa, keeping the wing in one piece, Sand smooth with 7/0 sandpaper.

Ed Lidgard's method is used in forming the airfoil. First, cut out six hard ribs and make sure they fit the plan profile. Second, *wet* the top and *dope* the bottom of the wing back to 1½" from the leading edge. *Be careful* not to dope farther back, for in doing so you will spoil the airfoil. Now, while the wing is slowly curling up, place the ribs in their proper places, and pin them in place so that the airfoil is maintained. Don't worry if a slight twist develops at this stage; it is only necessary that the tips be carefully formed. Sand off the raised grain after the wing is dry but still flat on the bench.

The stabilizer is shaped in the same manner, but the airfoil is maintained by the tail platform. Cut apart the four wing panels and put the two left next to the two right panels. After sanding the ends of the outer dihedral breaks slightly to allow a clean joint, raise each tip 2¼" and glue well. After these have set, sand the center joint and with one side on the table, raise the other panel to 1½" at the outer break. Put a 2" long cross-grain brace between the center ribs so that the wing fits flat on the pylon mount.

The success of the sheet wing depends greatly on the struts used, so take great care in making this part. Use ¼" x 1/16" hard, tough balsa for the main strut, and 3/16" x 1/16" for the Y-piece. Glue up the Y over the plans, but leave the fuselage end a little long. Check the length by putting the wing and tail squarely on the body so that the C. G. falls as shown, and place the strut in its approximate position. Note that the Y must be cut so that the fuselage end of the strut falls in the center of the rail when wings are unwarped.

Put the L-shaped wires on the Y, cut short lengths of 1/16" O. D. aluminum or brass tube to fit over them, and attach tubes to the outer wing rib. The tubes should be a snug fit over the wire and should be raised slightly so the strut will fold flat on the wing. Replace the wing in its correct position on the pylon and trim the ends of the struts to just touch the rail. Groove this end, glue in a 1/16" O. D. aluminum tube, and reinforce with a piece of ¼" linen tape around the end. Note that wing may be slid forward or backward, the warp may be changed in either wing, or the whole may be removed by proper manipulation of the strut and rail. Hold the strut in correct position with short pins into fuselage on either side.

Apply ¾" colored or plain Scotch Tape to the wing leading edge to protect it, and run a thin line of dope along its edges. It is advisable to waterproof the wing so that it stays smooth. Dope or glider polish was too heavy for this model so a new idea was tried: spray or wipe on a heavy coat of the new water-repellent, "Aqua-Pruf," obtainable at any department store. Aqua Pruf adds practically no weight, doesn't raise the grain, and dries in five minutes. Surface must be satin smooth for best results. Try it on any thin sheet balsa!

Last but not least, comes the all-important propeller, for a good one will spell the difference between good and poor performance. Use a broken prop if you wish, but be certain the diameter is 8", the pitch is 6", and that the blade is of a wide type. A "Top-Flite" 8-6 was used on the original. Scoop out the undercamber until a thin, sharp airfoil results. Put a small box hinge on the flat part at the rear, positioning this as close to the hole as possible. These may be obtained from your hobby shop or from a cabinet maker's supply house. It's a good idea to strengthen each rolled part with a small drop of solder, but this is not absolutely necessary. Push ½" pin heads through the holes in the hinge and well into the prop. (Note: 2 Jasco heavy duty folding hinges may be used.) Glue securely.

The 1/16" music wire counterbalance support is now bent to shape, fitted to the short end, and glued on. Wrap ¼" linen tape around both sides of the hinge and the short end of the prop to strengthen these parts. Into a 3/16" x ½" deep hole in a block, stick the end of the balance support. Melt solder around it and file to balance after doping the prop. The support may be bent to get vertical balance. A 3/16" strip of paper wrapped around the CO_2 shaft will center the propeller. Cut apart the hinge now and check it for smooth action.

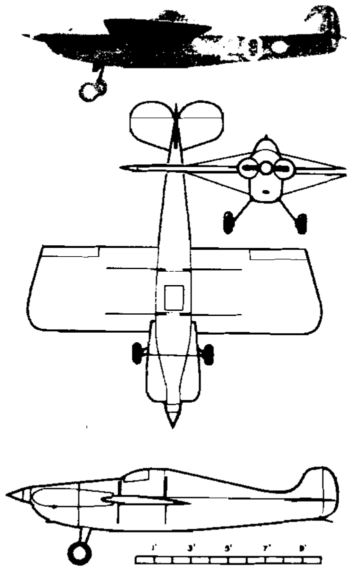
At this point it is essential that the completely assembled Aloha be checked thoroughly. Make sure the position of the C. G., the wing and tail incidences, and thrust adjustments are exactly as shown. Also check the model's weight. It should be around 3½ ounces including the empty cartridge. Correct carefully any warps or unbalance. Also, unscrew the cylinder until the motor runs nearly 1½ minutes. High power will not give the longest flights, but with this long motor run and the exposed cartridge the very utmost energy can be extracted from each charge. Also oil the motor frequently with 3-in-1 or similar oil.

After the Aloha has been checked and the motor slowed down, test-glide it over a grassy area with an empty cartridge. Try to get a 30-foot radius right glide. Use the rudder and wing warp to do this; i. e., right rudder, right wing washed in slightly. Keep the glide smooth and somewhat below a stall.

At last, a full cartridge may be inserted, the screw tightened up and backed off until the gas reaches the motor. Have the prop set so that the piston just touches the valve when the prop is on the left horizontally. Flip it over smartly, check to see if it is pulling forward, and release the model slightly to the left of the wind. Climb should be in shallow, wide right circles which gradually tighten as the power drops. At the end of the power run the model should be 100 feet up and just settling with a flat power glide. Increase power until this is the case, but keep in mind the fact that cool weather decreases the altitude.

After recovering the original Aloha from an out-of-sight flight of 12 minutes, it was decided to use a simple dethermalizer on hot days. A pop-up tail, Goldberg type is used and the release is a fuse. Merely hold down the trailing edge of the stabilizer with a ¼" loop on one end of a slow burning fuse, which trails behind. Tightly woven string should be soaked in a dilute solution of potassium or sodium nitrate, dried, and cut to a length previously determined to give a 5 to 8 minute flight. Try to get an even burning rate, like 1" per minute. Light the fuse just before flipping the propeller.

GOODYEAR RACERS



● Wittman "Buster," flown by William Brennand. Came in fourth in main event; speed, 167 mph. Similar to new plane flown by Wittman himself, described in January issue.

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