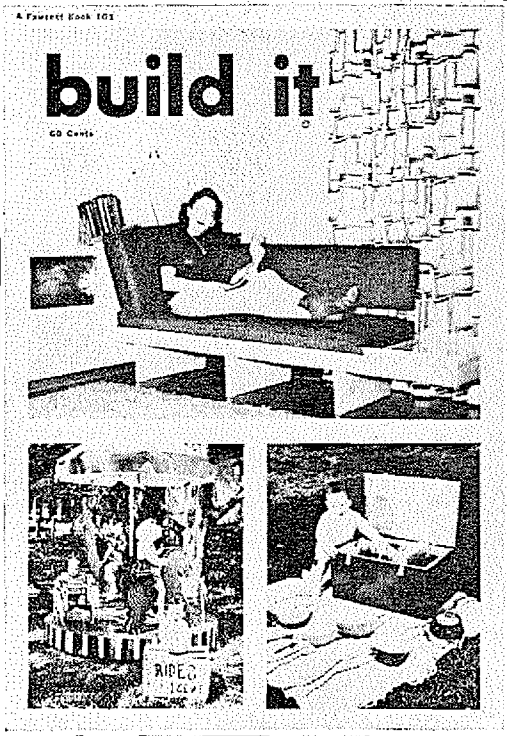
A FAWCETT
75c
BOOK
112

HANDBOOK FOR
Model Builders©

By the Editors of Mechanix Illustrated

TESTED PLANS FOR
MODEL PLANES
BOATS AND CARS

For Every Craftsman



Build It . . .

Modern furniture . . . children's toys . . . outdoor repairs . . . swimming pools . . . plus many more popular projects anyone can build are described in this 144-page laminated cover book. It's a must for your "how to" library. If your dealer cannot supply you order direct from FAWCETT BOOKS, Greenwich, Connecticut.

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Handbook For Model Builders

a fawcett book number 112

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Cover Kodachrome — Scene at the 4th International Plane Contest courtesy the Plymouth Motor Corporation.

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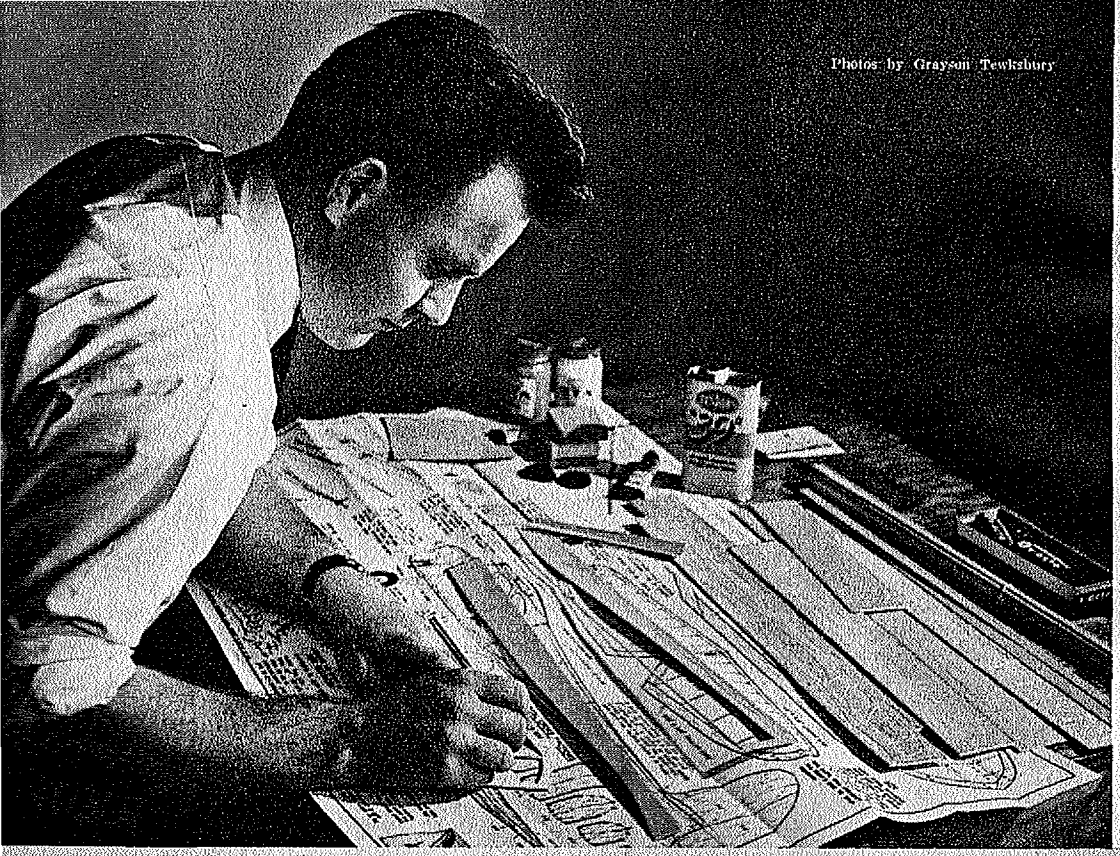


Getting Started in Model Building

So you want to build model airplanes? What do you do about it? What should you buy? Where? Cheer up, fella, it is easy. Here is the low down.

Types of Models: Most popular are the gas engine-powered ships. There are two types: 1—Control-line or U-control and, 2—free flight. The control line airplane is connected by two thin steel wires to a control-handle which you hold in your hand, the model flying in a large circle around you. Tilting the handle causes the plane to climb or dive. The free-flight job is started from the hand by a gentle shove and flies and climbs according to the way you balanced and adjusted it before take-off. Another type of model uses thin rubber strands for power. Finally, there are gliders, small all-wood affairs that are thrown hard like a baseball and the larger, lighter variety which is towed aloft by a string like a kite, after which the machine frees itself from the string or tow-line and soars in lazy circles.

Engines and Supplies: Almost 50 makes and sizes of little gas engines are on the market, at prices from several dollars up to $20 and even $30 or more. Numerous sizes of propellers to fit these various engines cost, on the average, from 15c to 35c, depending on the size and purpose. There are many sizes and shapes of fuel tanks, many kinds or sizes of wheels, balsa wood, covering, cements (glue) and dopes (special thin adhesive for applying airplane covering) and, in other words, any conceivable item you might need. Hundreds of model airplane kits of all types and sizes, costing from 10c to many dollars, offer a wide choice for you to select from.

If you live in the city, you can see these engines and supplies at some convenient

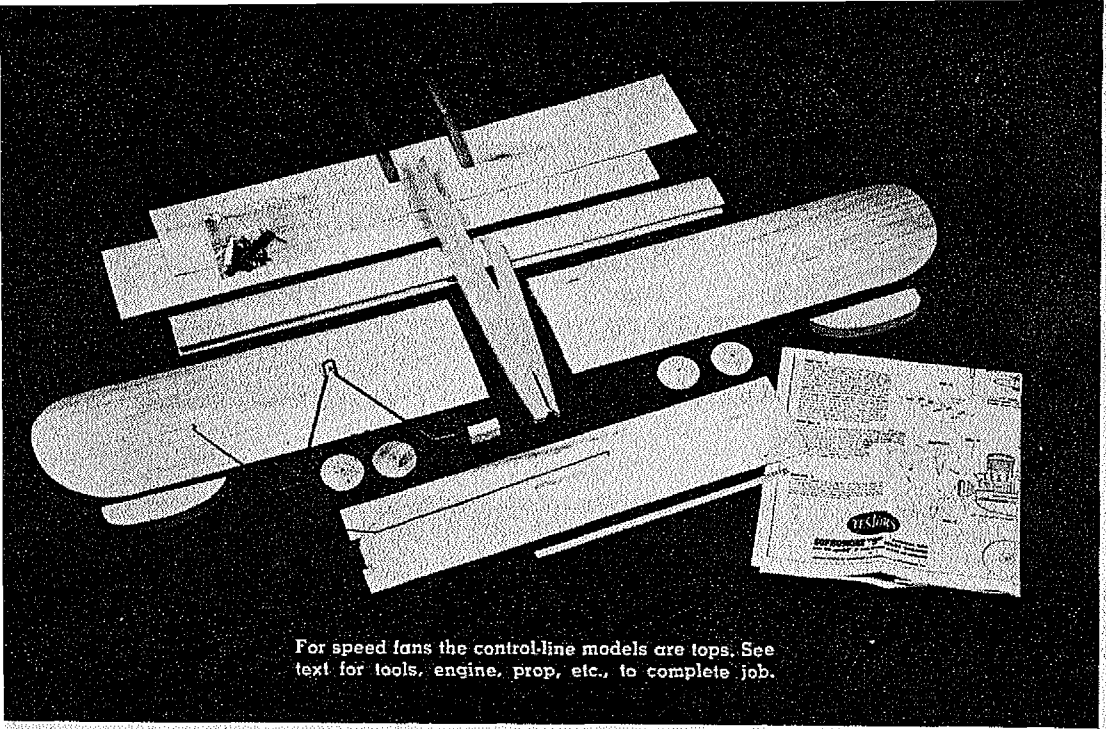
Today's easy-to-assemble kits are a blessing to the modeler. These two are for control-line models.

Straightforward facts for every beginner that will get you off to a flying start in a fascinating hobby.

hobby shop whose owner, incidentally, will be glad to give you sound advice on getting started. Whether you live in city or country you can buy at almost any newsstand a copy of any one of several model airplane magazines. These magazines publish lots of helpful articles and pictures and their advertising sections display everything that is on the market. So you can obtain what you want either from a hobby store or by mail order from some advertiser in a magazine. Some advertisers offer attractive catalogues at small cost, covering many kinds of engines, planes, and accessories.

The First Step: Much disappointment will be avoided, and success assured, if you can decide wisely what kind of a model, and possibly engine, you should obtain. If you happen to know where some fellows fly, ask some of them what a good airplane would be for a beginner. And what engine. If you can locate a dealer, ask him questions. Note the advertised planes that are labeled for beginners. So-called beginners' airplanes aren't sissy stuff, for they always are fun for even an expert to fly; but they are not needlessly complicated or expensive. They just save you money and trouble. There are several ways of actually getting started.

1. If you really want to do a good job of it, begin with an all-balsa hand launched glider or the very simplest rubber-powered stick model. If you don't wish to fly at all for the time being, begin with some precarved solid scale model. By making simple models you'll get acquainted with cutting and sanding, cementing things together accurately and strongly. Lots of younger fellows begin with something like a Strombecker solid model, then make Monogram SpeeDee-Bilt built-up scale airplanes.



For speed fans the control-line models are tops. See text for tools, engine, prop, etc., to complete job.

finally get into simple rubber powered kits.

2. If it should happen that you make your start with control-line designs, lots depends on how old you are and how much you can afford to spend. Small engines, such as the .049 Cub, Atwood Wasp, K & B .049, and Anderson Spitfire and Spitzy, in combination with a model labeled for that particular size engine, is a good beginning. Choose a trainer, if possible a profile type job that has thick sheet balsa for its fuselage. Then, if it breaks, it can be glued together time and time again.

If you are older and have the money, a bigger, more powerful trainer is better, say something with a .19 or .23 engine. Of course, pick an engine and plane that matches. If some older chap will get out in the center of the circle with you, take-off the model and get it going, then help you feel it out, you'll cut corners right and left to become a hot flier in jig time.

Size and power is your number one problem. Nothing under .045 displacement (all engines are labeled for your convenience) is very practical for control-line or U-control. These fly best for the beginner on lines that are about 25 feet long. These lines should be very thin, as per advertisements or your dealer's advice. Some manufacturers have wire as thin as .004 but, if you aren't very careful, they kink easily. Kinks weaken wire and eventually will let the model break loose and smash. For these little ships, when longer wires are used, as up to 35 feet, try to buy flexible or stranded wire. In general, don't use larger than .008 wire for these particular engines.

The only certain way we know of for you to make the right beginning and afterwards progress to more difficult models and flying —without ample outside advice—is the Testor-McCoy program. Now there are many, many excellent designs and engines and you don't have to buy Testor-McCoy sets if you don't wish. Attention is being drawn only to the fact that Testor manufactures a graded series of four U-control models, beginning with the trainer and ending with the super-stunt plane, each calling for a particular size of McCoy engine and propeller. Always follow the engine maker's directions in selecting a prop or consult the counter chart that dealers have (it is printed by Top Flite Models), even if you buy another make of prop.

3. Suppose you happen to begin with free flight models. This is simple; avoid anything that calls for more than an .049 engine. The .049 will fly anything up to three feet with plenty of pep (actually it will fly much larger models but more sluggishly). Bigger models are impractical unless you live in the open spaces. Again, select the easiest-to-build designs, preferably all-balsa ones at first. You should limit the engine run by limiting the fuel; either equip the plane with some kind of a fuel cut-off timing device (dealer has them), or use an eye-dropper glass, or long piece of tubing for a tank. Some engines have timer

The soaring grace of the free-flight plane makes a hit with many modelers. Above kit simplifies building.

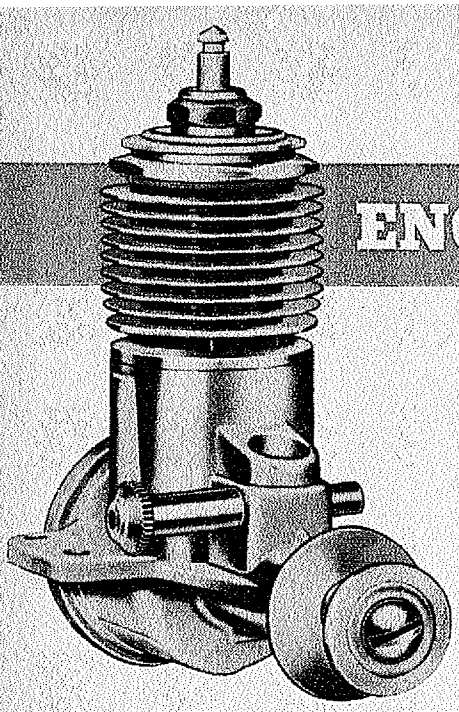
tanks included; if they run too long, try limiting the fuel itself by filling with an eye dropper. The main problem in free flight is adjusting the model so it will fly properly. Some plans have complete directions; all have some. A good bet is to write the magazine editors and ask them to refer you to a back issue that contains an article on adjustments. Usually, such back issues can be bought from the publisher.

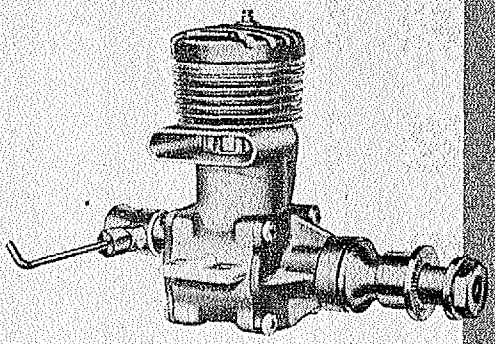
Why Buy a Kit? First, the kit is based on a sound design, engineered by an expert modeler, and will fly well when directions are followed. Secondly, kits have virtually all the difficult parts either printed, or stamped out ready to cement together. Pieces requiring shaping may be already shaped, blocks carved, slots cut, inserts made. Good kits have the wood selected for proper hardness for the part involved. Wire landing gears are bent to shape. And so on. Thirdly, you cannot possibly make a model from raw materials at the same low cost of the kit. You always end up behind the eight ball. Dealers and more experienced modelers can point out to you the country's finest designs that have been placed in kit form.

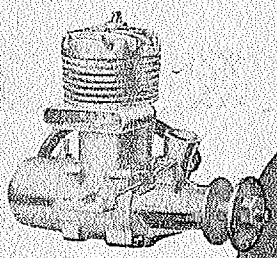
Which Engine? Pick an engine to suit the type of model you have in mind, to match its size, and to fit your pocketbook. (Also in this same issue you will find an engine survey. All engines shown therein are reliable and will [*Continued on page* 140]

Good tools and supplies are essentials for the model builder. Photo shows dope, cement, model engine fuel, sandpaper, booster battery, prop, clips and knives.

ENGINE SURVEY







On the following pages is a complete catalogue of engines for the model fan.

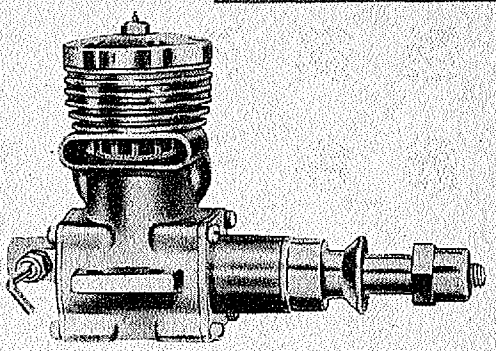
WHEN you bought a miniature gas engine some ten years ago, odds were even that you'd get a "hunk of iron" that would polish off your interest the first time you tried to run it. How different today. Every engine shown in the accompanying survey not only runs, but will start easily and last a long time.

Your choice of powerplant depends on the purpose it will be used for and on the thickness of your pocketbook. There is an engine for every conceivable purpose and for prices varying from less than four dollars to more than sixty dollars. Let's first consider the so called "baby" engines, those whose displacement is from .02 to .074 cu. in.

All these engines represent the easiest and cheapest way to begin model building and are ideal therefore for the younger hobbyists. The K & B Infant .02, smallest of American engines, is not a U-control engine, but is excellent for little free flight models, prop driven race cars, boats, etc. While the remainder of the baby engines will fly simple, small U-control kits—and this is generally true of sizes under .19—really practical U-control falls in the .23 to .29, or even .19 to .35 classifications, as evidenced by the bulk of sport flying around the nation. Engines of from .045 to .074 have proved terrific in economical free flight, either sport, scale or contest in class A/2. The many .09s fill the wide gap between the .074 and the .19s. For cheap flying of any variety with small kits in small areas, buy a baby engine. All are economical.

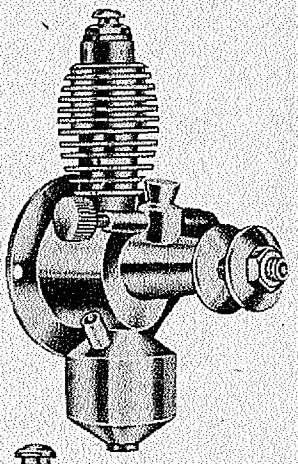
The .19 to .29, .32, and .32 grouping is overwhelmingly popular due to the suitability of these engines for many purposes. They are good for high performance free flight jobs in open areas, for the popular stunt models, and general usage such as scale. They are all round engines for the most part. Various [*Continued on page* 140]

DOOLING MODEL 29



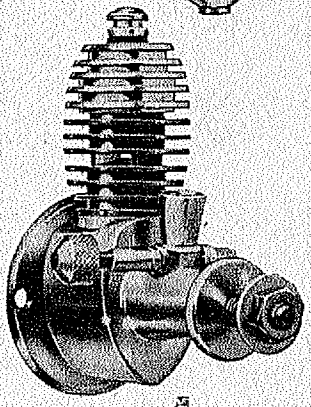
Manufacturer:	Dooling Brothers, 5452 West Adams Blvd., Los Angeles 16, Calif.
Purpose:	Designed for planes, but adaptable to cars and boats. Racing.
Special Features:	Ball-bearing crankshaft.
Piston:	Two rings.
Displacement:	.29 cu. in.
Bore & Stroke:	.800 x .594 in.
Ignition:	Glow plug.
Weight Bare:	6½ ozs.
Mounting:	Beam by four bolts. Distance between mounting bolts 1⅝ in.
Recommended Fuels:	4 parts Nitromethane (methyl nitrate), 4 parts methanol (methyl alcohol), 2 parts castor oil.
Recommended Props:	Pitch selected by table, diameter and area shaved to give 16,500 r.p.m. on bench.
Other Models:	Dooling Model 61.

K & B INFANT



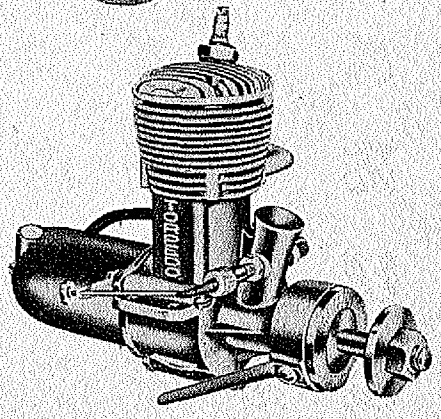
Manufacturer:	K & B Mfg. Co., 224 East Palmer St., Compton, Calif.
Purpose:	Free flight Class A/2 but has been adapted in field to U-control, *though midget size is limitation* for such flying. Widely used in air-cars, small boats, race cars.
Special Features:	Unique mounting plate which permits engine being tilted out of way while mounting screws are driven home.
Piston:	Lapped.
Displacement:	.020.
Bore & Stroke:	.281 x .331 in.
Ignition:	Glow plug.
Weight Bare:	1 oz.
Mounting:	Radial by 2 machine screws. Distance between mounting screws 29/32 in.
Recommended Fuels:	Any good glow fuel.
Recommended Props:	4½ in. diameter x 3 in. pitch, or 5 x 2 in.
Other Models:	K & B Torp, Jr.

K & B TORPEDO .049

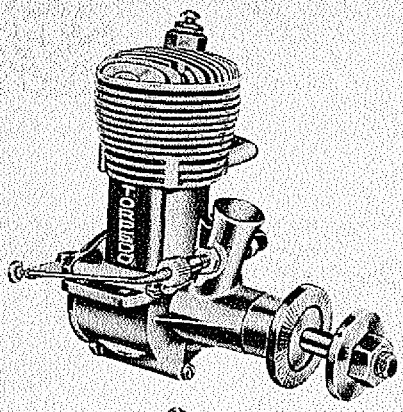


Manufacturer:	K & B Mfg. Co., 224 East Palmer St., Compton, Calif.
Purpose:	A/2 free flight, sport U-control, small boats, cars, air-cars.
Special Features:	Rotatable mounting plate.
Piston:	Lapped.
Displacement:	.049 cu. in.
Bore & Stroke:	.406 x .380 in.
Ignition:	Glow plug.
Weight Bare:	1⅛ oz.
Mounting:	Radial by 2 machine screws. Distance between mounting screws 29/32 in.
Recommended Fuels:	Supersonic Ultra Glo or 1,000, Testor's #39, O & R AA.
Recommended Props:	Diameter 6 x 3 in. pitch for free flight, 5 x 4 in. for U-control.

K & B TORPEDO

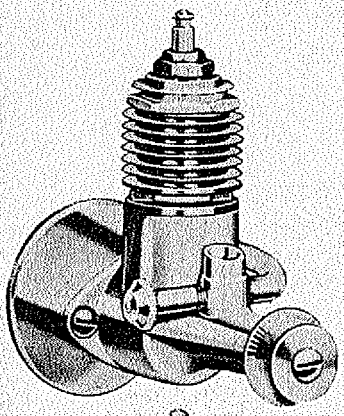


Manufacturer:	K & B Mfg. Co., 224 East Palmer St., Compton, Calif.
Purpose:	Class B free flight, U-control stunt and sport.
Special Features:	Optional beam or radial mounting; flexible needle valve.
Piston:	Lapped.
Displacement:	.299 cu. in.
Bore & Stroke:	.725 x .724 in.
Ignition:	Spark.
Weight Bare:	6.5 ozs.
Mounting:	Beam with 4 bolts or radial with 3.
Recommended Fuels:	One part SAE 70 oil to 3 parts white gasoline.
Recommended Props:	Free flight, diameter 10 x 6 in. pitch; stunt 9 x 6 in., speed 7 x 10½ in.



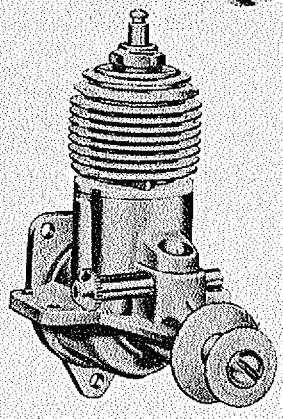
K & B GLO-TORP 29 & 32

Manufacturer:	K & B Mfg. Co., 224 East Palmer St., Compton, Calif.
Purpose:	As large Class B or small Class C engine, depending on displacement, for free flight, stunt, speed, sport control line.
Special Features:	Flexible needle valve standard.
Piston:	Lapped.
Displacement:	.299 or .32 cu. in.
Bore & Stroke:	.725 x .724 in. or .750 x .724 in.
Ignition:	Glow plug.
Weight Bare:	6.5 ozs.
Mounting:	Beam by 4 bolts or radial by 3. Distance between mounting bolts 1 21/32 in. diameter of radial mount 1.356 in.
Recommended Fuels:	Any good glow fuel.
Recommended Props:	Free flight, diameter 10 x 6 in. pitch; stunt, 9 x 6 in.; speed, 7 x 10½ in.



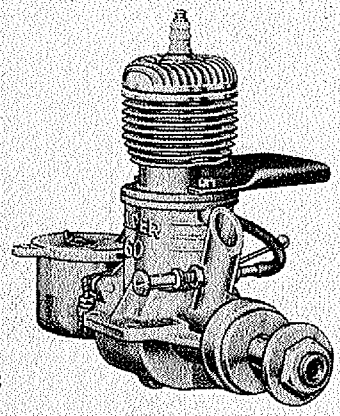
OK CUB .039

Manufacturer:	Herkimer Tool & Model Works, Inc., Herkimer, N. Y.
Purpose:	Small free flight and U-control for the beginner.
Special Features:	Timer-tank mount, 360 degree exhaust porting.
Piston:	Lapped.
Displacement:	.039 cu. in.
Bore & Stroke:	.390 x .334 in.
Ignition:	Glow plug.
Mounting:	Radial by 2 screws. Distance between mounting screws ⅞ in.
Recommended Fuels:	OK Glow Fuel.
Recommended Props:	Free flight and stunt, 6 x 3 in.; speed, 5¼ x 4 in.



OK CUBS .049 AND .074

Manufacturer:	Herkimer Tool & Model Works, Inc., Herkimer, N. Y.
Purpose:	Class A/2 free flight, U-control sport and small stunt.
Special Features:	360 degree exhaust porting.
Piston:	Lapped.
Displacement:	.049 and .074.
Bore & Stroke:	.390 x .415 in. and .478 x .415 in.
Ignition:	Glow plug.
Weight Bare:	1½ and 1⅝ ozs.
Mounting:	Beam by 4 bolts. Distance between mounting bolts 1⅛ in.
Recommended Fuels:	OK Glow Fuel.
Recommended Props:	.049: Free flight and stunt, 6 x 4 in.; speed, 5½ x 5 in. .074: Free flight, 7 x 4 in.; stunt, 6 x 5 in.; speed, 5¼ x 5 in.
Other Models:	OK Cub .099.

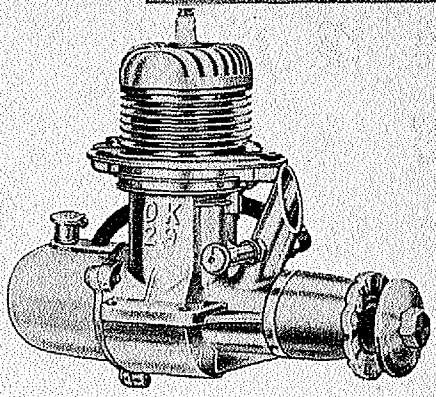


OK SUPER 60

Manufacturer:	Herkimer Tool & Model Works, Inc., Herkimer, N. Y.
Purpose:	Free flight, sport and stunt U-control.
Special Features:	Three position timer rear of crankcase on ignition version. Adaptable cars and boats.
Piston:	Lapped.
Displacement:	.604 cu. in.
Bore & Stroke:	.900 x 950 in.
Ignition:	Glow plug or spark ignition, at additional cost.
Mounting:	Beam by 4 bolts. Distance between mounting bolts 1 15/16 in.
Weight Bare:	12 ozs.
Recommended Fuels:	OK Glow Fuel. One part SAE 70 oil, 3 parts white gas on ignition.
Recommended Props:	Free flight, 14 x 6 in.; stunt, 11 x 8 in; speed, 10 x 10½ in.

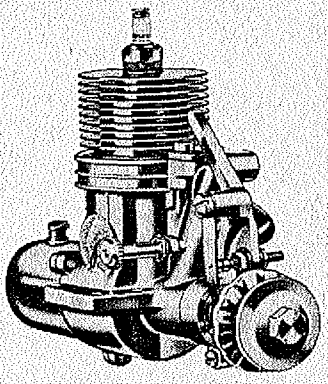
OK HOTHEAD 29

Manufacturer:	Herkimer Tool & Model Works, Inc., Herkimer, N. Y.
Purpose:	Free flight, sport and stunt U-control.
Special Features:	Replaceable prop bolt.
Piston:	Lapped.
Displacement:	.299 cu. in.
Bore & Stroke:	.760 x .660 in.
Ignition:	Glow plug. Adaptable to spark at extra cost.
Weight Bare:	7½ ozs.
Mounting:	Beam by 4 bolts.
Recommended Fuels:	OK Glow Fuel.
Recommended Props:	Free flight, 10 x 6 in.; stunt, 9 x 6 in.; speed, 7 x 9 in.



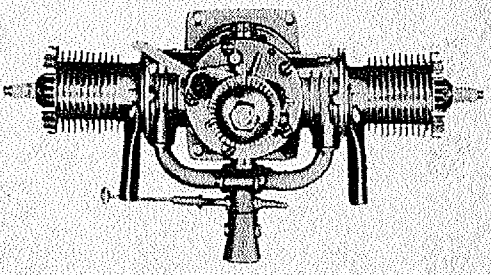
OK MOHAWK CHIEF 29

Manufacturer:	Herkimer Tool & Model Works, Inc., Herkimer, N. Y.
Purpose:	Free flight, sport and stunt U-control.
Piston:	Lapped.
Displacement:	.299 cu. in.
Bore & Stroke:	.760 x .660 in.
Ignition:	Glow plug, adaptable to spark at additional cost.
Weight Bare:	7 ozs.
Mounting:	Beam by 4 bolts.
Recommended Fuels:	OK Glow Fuel. 1 part SAE 70 oil, 3 parts white gasoline on ignition.
Recommended Props:	Free flight, 10 x 6 in.; stunt, 9 x 6 in.; speed, 7 x 9 in.



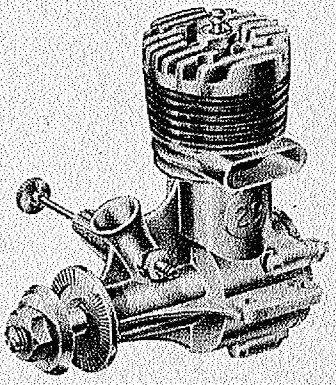
OK TWIN

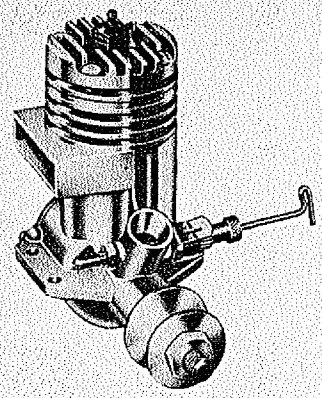
Manufacturer:	Herkimer Tool & Model Works, Inc., Herkimer, N. Y.
Purpose:	Weight carrying models, especially radio control.
Special Features:	Patented porting and crankshaft.
Piston:	Lapped.
Displacement:	1.208 cu. in.
Bore & Stroke:	.900 x .950 in.
Ignition:	Spark.
Weight Bare:	23 ozs. (with tank).
Mounting:	Radial by 4 bolts. Distance between mounting bolts 2⅛ in.
Recommended Fuels:	1 part SAE 70 oil, 3 parts white gasoline.
Recommended Props:	18 x 8 in., 16 x 10 in.



VECO 29 AND 31

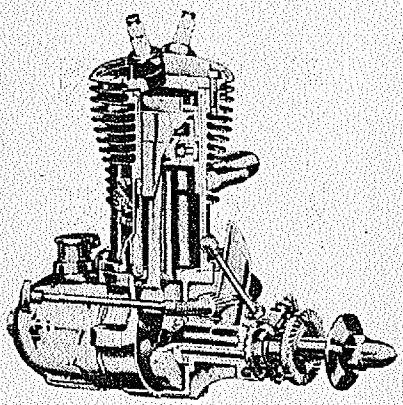
Manufacturer:	Henry Engineering Co., P.O. Box 229, Burbank, Calif.
Purpose:	Large Class B or small Class C free flight and control line stunt and speed.
Special Features:	Optional beam or radial mounting, low fuel consumption. Propeller included.
Piston:	Lapped.
Displacement:	.299 or .319 cu. in.
Bore & Stroke:	.725 x .724 in. or .750 x .724 in.
Ignition:	Glow plug.
Weight Bare:	7 oz. approximately.
Mounting:	Beam by 4 bolts or radial by 3. Distance between mounting bolts 1⅝ in. Diameter of radial mount 1⅜ in.
Recommended Fuels:	Standard name brand glow fuels provided castor oil content is at least 25% in methanol fuel.
Recommended Props:	Diameter 9 x 7 in. pitch.





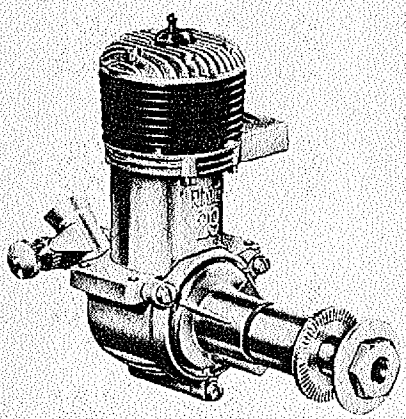
FOX 29 AND 35

Manufacturer:	Arnold & Fox Engineering Co., 7401 Varna Ave., N. Hollywood, Calif.
Purpose:	Large Class B and small Class C free flight, control line, sport and stunt U-control. Racing special for speed, or cars.
Piston:	Fully machined from Mehanite.
Displacement:	.299 or .35 cu. in.
Bore & Stroke:	.738 x .700 in. or .800 x .700 in.
Ignition:	Glow plug.
Weight Bare:	6 ozs.
Mounting:	Beam by 4 bolts. Distance between mounting bolts 1½ in.
Recommended Fuels:	Any good glow fuel.
Recommended Props:	11 x 5 in., 11 x 6 in., 10 x 5 in., 10 x 6 in., 9 x 6 in., 9 x 7 in. For speed: 7 x 9 in., 7 x 10 in., 7 x 11 in.



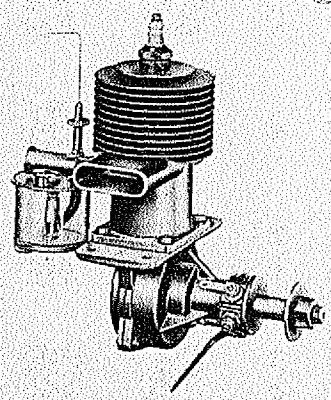
SUPER CYCLONE

Manufacturer:	Super Cyclone, Inc., P.O. Box 3157, Grand Central Station, Glendale 1, Calif.
Purpose:	Free flight, stunt, sport U-control.
Special Features:	Ball bearing thrust washer.
Piston:	Lapped.
Displacement:	.604 cu. in.
Bore & Stroke:	29/32 x 15/16 in.
Ignition:	Spark or glow.
Weight Bare:	9½ ozs.
Mounting:	Beam by 4 bolts. Distance between mounting bolts 1 27/32 in.
Recommended Fuels:	1 part SAE 70 oil, 3 parts white gas for ignition. Standard fuels on glow.
Recommended Props:	Free flight: Diameter 13 to 14 in., with 6 to 8 in. pitch. Stunt, 11 x 8 in.; speed 10 x 10½ in.



FORSTER G-29 AND G-31

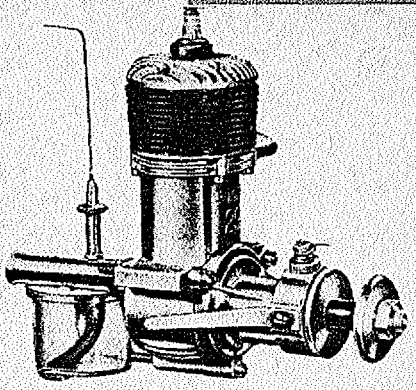
Manufacturer:	Forster Brothers, Lanark, Ill.
Purpose:	Large Class B or small Class C free flight, control-line stunt, speed, sport.
Special Features:	Ball-bearing crankshaft, extension propeller shaft, down draft carburetor.
Piston:	2 rings, aluminum piston.
Displacement:	.297 or .31 cu. in.
Ignition:	Glow plug.
Bore & Stroke:	.750 x .6718 in. or .760 x .6718 in.
Weight Bare:	6½ ozs.
Mounting:	Beam by 4 bolts. Distance between mounting bolts 1½ in.
Recommended Fuels:	Standard glow fuels.
Recommended Props:	Free flight: diameter 10 x 6 in. pitch; stunt 9 x 6 in.; speed, 7 x 9 in. narrow blade.



FORSTER 99

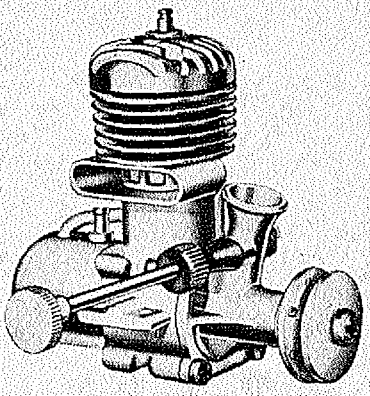
Manufacturer:	Forster Brothers, Lanark, Ill.
Purpose:	Large weight carrying (15 lbs. max.) gas models, especially radio models, and boats up to 36 in. long.
Special Features:	Ball bearing crankshaft, standard two-speed point system, oilite bronze bushed connecting rod.
Piston:	Two rings, aluminum piston.
Displacement:	.99 cu. in.
Ignition:	Spark.
Bore & Stroke:	1.0625 x 1.125 in.
Weight Bare:	14 ozs.
Mounting:	Beam by 4 bolts. Distance between mounting bolts 2 7/16 in.
Recommended Fuels:	1 part SAE 70 oil, 10 parts white gasoline.
Recommended Props:	15 in. diameter x 6 in. pitch. For boats 2½ in. diameter x 6 in. pitch, higher pitch for light weight hydroplanes. One-pound, 2½ in. flywheel recommended for water use.

FORSTER 29



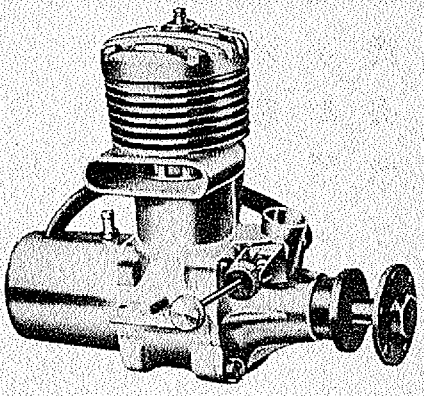
Manufacturer:	Forster Brothers, Lanark, Ill.
Purpose:	Class B free flight, U-control stunt and sport, radio control.
Special Features:	Two-speed points available at extra cost.
Piston:	Lapped, hardened steel.
Displacement:	.297 cu. in.
Ignition:	Spark but may be changed to glow.
Bore & Stroke:	.750 x .672 in.
Weight Bare:	6½ ozs.
Mounting:	Beam by 4 bolts or radial by 3. Distance between mounting bolts 1½ in. Diameter of radial mount 1 7/16 in.
Recommended Fuels:	Ignition: 1 part SAE 70 oil and 3 parts white gasoline. Glow plug: 2 parts castor oil, 3 parts methanol alcohol and 3 parts nitro-methane.
Recommended Props:	Free flight, 11 x 6 in. through 9 x 6 in.; 8 x 8 in. to 7 x 10 in.; narrow blade for speed, 9 x 6 in. for stunt.

McCOY 9



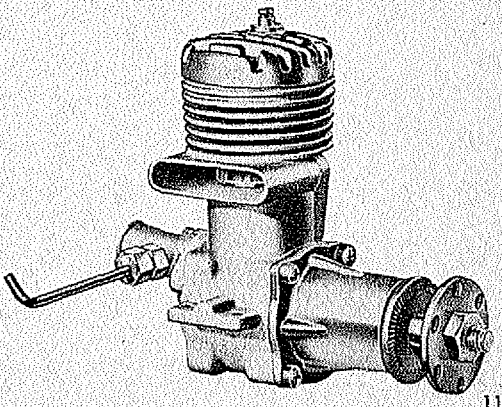
Manufacturer:	Duro-Matic Products Co., Hollywood 38, Calif.
Purpose:	Primarily U-control sport, also free flight.
Special Features:	Ball thrust bearing.
Piston:	Two rings.
Displacement:	.098 cu. in.
Ignition:	Glow plug.
Bore & Stroke:	.500 x .500 in.
Weight Bare:	3 ozs.
Mounting:	Beam by 4 bolts. Distance between mounting bolts 1⅛ in.
Recommended Fuels:	Testors 39.
Recommended Props:	Free flight, 7 x 6 in.; stunt, 7 x 6 in.; speed, 6 x 6 in.
Other Models:	McCoy 19.

McCOY 29

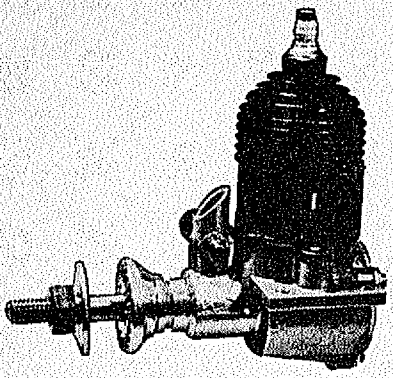


Manufacturer:	Duro-matic Products Co., Hollywood 38, Calif.
Purpose:	Primarily U-control sport, also free flight.
Special Features:	Ball thrust bearing.
Piston:	2 rings.
Displacement:	.29 cu. in.
Bore & Stroke:	.750 x .670 in.
Ignition:	Glow plug.
Weight Bare:	7.6 ozs.
Mounting:	Beam by 4 bolts.
Recommended Fuels:	Testor 39.
Recommended Props:	Free flight, 10 x 6 in.; stunt, 9 x 6 in.; speed, 7 x 10½ in.

McCOY REDHEAD 19

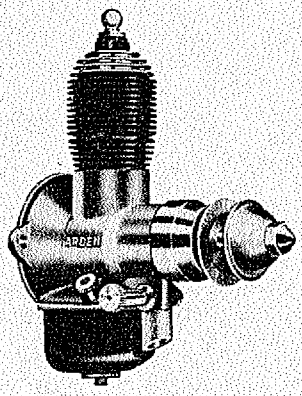


Manufacturer:	Duro-matic Products Co., Hollywood 38, Calif.
Purpose:	Primarily U-control speed, also stunt and free flight.
Special Features:	Double ball-bearing front plate.
Piston:	2 rings.
Displacement:	.19 cu. in.
Bore & Stroke:	.625 x .630 in.
Ignition:	Glow plug.
Weight Bare:	4 ozs.
Mounting:	Beam by 4 bolts. Distance between mounting bolts 1⅜ in.
Recommended Fuels:	Testor 39, popular brands methanol and castor oil fuels, or 3 parts methanol and 1 part castor oil plus 15% nitro-methane.
Recommended Props:	Free flight, 9 x 6 in.; sport, 9 x 6 in.; speed, 7 x 8 in.
Other Models:	McCoy Redhead 29, McCoy Redhead 60.



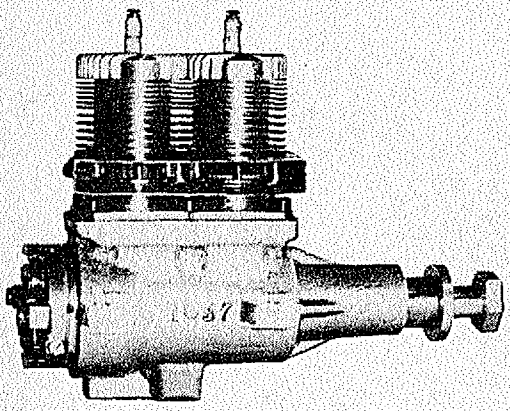
CAMPUS 29

Manufacturer:	Campus Industries, Inc., 1100 Adams Ave., Philadelphia 24, Pa.
Purpose:	U-control sport and stunt, free flight.
Special Features:	Dual by-pass, auxiliary air intake.
Piston:	Lapped.
Displacement:	.29 cu. in.
Ignition:	Glow plug.
Weight:	4½ ozs.
Mounting:	4 point beam.
Recommended Fuels:	Any good glow fuel.
Recommended Props:	Stunt and free flight, 9 x 6 in.; speed, 7 x 8 in.



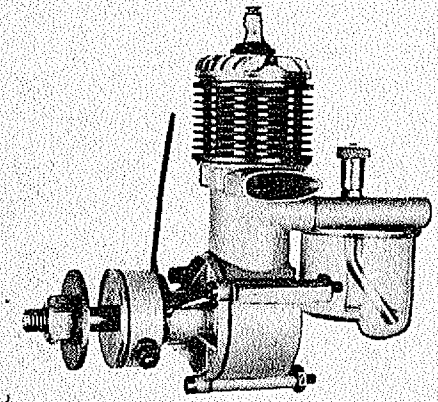
ARDEN 19

Manufacturer:	Micro-Bilt, Inc., Danbury, Conn.
Purpose:	Free flight Class A, U-control stunt, sport, speed.
Special Features:	Double ball bearings, 360 degree exhaust and intake porting, ball-and-socket connecting rod attachment.
Piston:	Lapped.
Displacement:	.199 cu. in.
Bore & Stroke:	.635 x .625 in.
Ignition:	Spark or glow plug. Arden glow plug.
Weight:	4.16 ozs.
Mounting:	Two-point radial. Diameter of radial mount 1⅝ in.
Recommended Fuels:	3 parts white gas and one part SAE 70 oil for ignition, Arden glow fuels for glow plug, or any good glow fuel.
Recommended Props:	Free flight and stunt, 9 x 6 in.; speed, 7 x 8 in.
Other Models:	Arden 09.



PAL

Manufacturer:	Pal Engineering, Ltd., 53 16th Ave., S.W., Cedar Rapids, Iowa.
Purpose:	For large-size airplanes suitable for 60 motors.
Special Features:	Tubular connecting rod, rear contact point assembly, nozzle type carburetion, ball thrust bearing. Crankshaft chrome-plated on bearing areas.
Piston:	Lapped.
Displacement:	.55 cu. in.
Bore & Stroke:	¾ x ⅝ in.
Ignition:	Spark or glow plug.
Mounting:	Beam.
Weight:	15 ozs.
Recommended Fuels:	Any good fuel. Lapped piston fuel for new engine.
Recommended Props:	About same as for .60 engines.

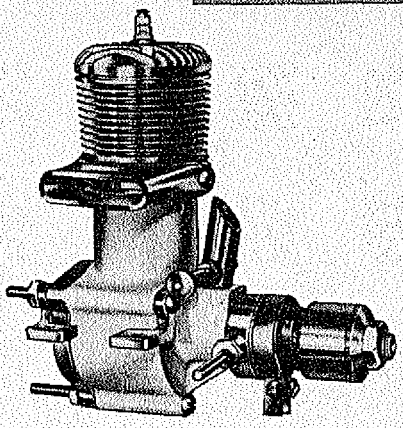


CAMERON

Manufacturer:	Cameron Precision Engineering Co., Walnut & Magnolia Sts., Chino, Calif.
Purpose:	Free flight Class B, sport U-control.
Special Features:	High stroke to bore ratio.
Piston:	Lapped.
Displacement:	.23 cu. in.
Bore & Stroke:	⅝ x ¾ in.
Ignition:	Spark, convertible to glow plug.
Mounting:	4 point beam or 3 point radial.
Weight:	6 ozs.
Recommended Fuels:	One part SAE 70 oil, 2 to 3 parts untreated white gasoline.
Recommended Props:	Free flight, 10 to 11 in. diameter by 6 in. pitch; control-line, 9 x 6 in.

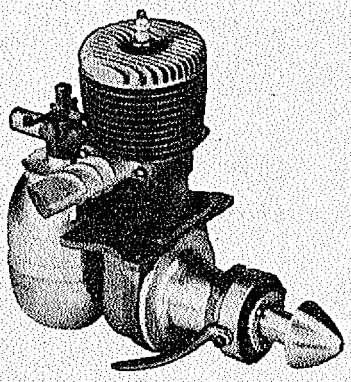
ORWICK

Manufacturer:	H. C. Orwick, 1523 West 70 St., Los Angeles 44, Calif.
Purpose:	Class S free flight, stunt, sport U-control.
Piston:	Lapped.
Displacement:	.64 cu. in.
Bore & Stroke:	15/16 x 15/16 in.
Ignition:	Spark.
Mounting:	Three-point radial. Diameter of radial mount 1¾ in.
Recommended Fuels:	One part SAE 70 oil, 3 parts untreated white gasoline, or Blazo by Standard Oil.
Recommended Props:	Free flight, 13 to 14 in. diameters with 6 to 8 in. pitch; scale and stunt, 11 to 12 in. diameters with 8 in. pitch.



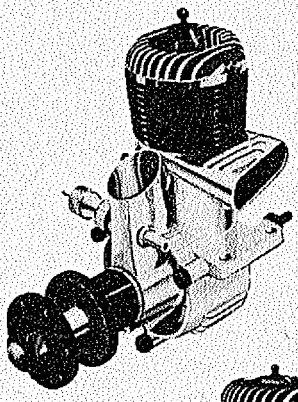
AVION MERCURY

Manufacturer:	Avion Machine & Tool Co., Woonsocket, R. I.
Purpose:	Large heavy models, such as radio jobs.
Special Features:	Actual carburetor for full control from idling to full throttle. Hoffman ball bearings.
Piston:	Two rings.
Displacement:	1.609 cu. in.
Bore & Stroke:	1¼ x 1 5/16 in.
Ignition:	Spark.
Weight:	20 ozs.
Mounting:	Beam at 4 points. Distance between mounting bolts 2⅝ in.
Recommended Fuels:	One part SAE 70 oil to 4 parts clear gasoline.
Recommended Props:	Mercury 45 prop (drawing available to engine owners).



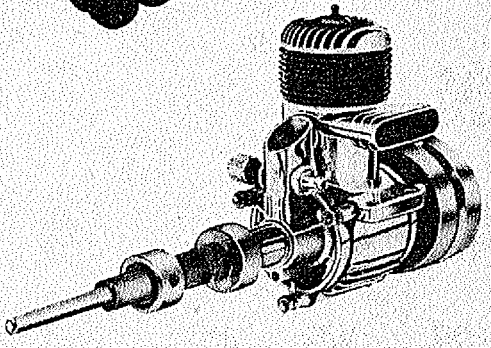
OHLSSON & RICE 23

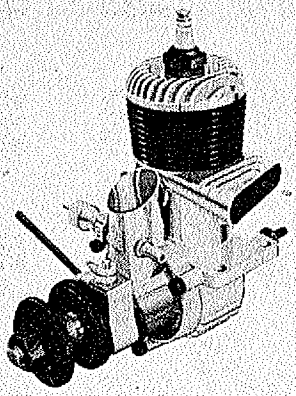
Manufacturer:	Ohlsson & Rice, Inc., Emery at Grande Vista, Los Angeles 6, Calif.
Purpose:	Free flight, sport and stunt U-control.
Special Features:	Roller bearing crankshaft, optional beam and radial mounting.
Piston:	Lapped.
Displacement:	.2299 cu. in.
Bore & Stroke:	.684 x .625 in.
Ignition:	Glow plug, but may be adapted to spark ignition by addition of points at extra cost.
Weight Bare:	5 ozs.
Mounting:	Beam by 4 bolts, radial by 3 crankcase bolts. Distance between beam bolts 1 9/16 in. Diameter of radial mount 1 13/32 in.
Recommended Fuels:	Ohlsson & Rice #2.
Recommended Props:	Ohlsson & Rice: 10 x 4 in., 9 x 6 in., 9 x 5 in. Also: Free flight, 10 x 6 in.; stunt, 9 x 6 in.; speed, 7 x 9 in.
Other Models:	Ohlsson & Rice 19.



OHLSSON & RICE MARINE

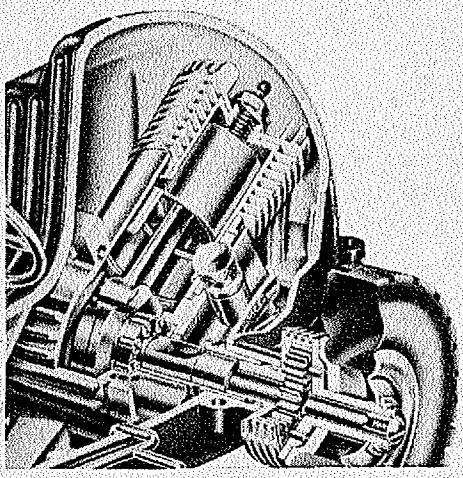
Manufacturer:	Ohlsson & Rice, Inc., Emery at Grande Vista, Los Angeles 6, Calif.
Type:	Single cyclinder, two-stroke cycle, rotary crankshaft valve.
Special Features:	Front and fly-wheel, dual counterweighted crankshaft, roller bearing crankshaft, ball thrust bearing, universal coupling.
Purpose:	Boats.
Piston:	Lapped.
Displacement:	.2999 cu. in.
Bore & Stroke:	.759 x .729 in.
Ignition:	Glow plug.
Mounting:	Beam by 4 bolts.
Recommended Fuels:	Ohlsson & Rice #2.





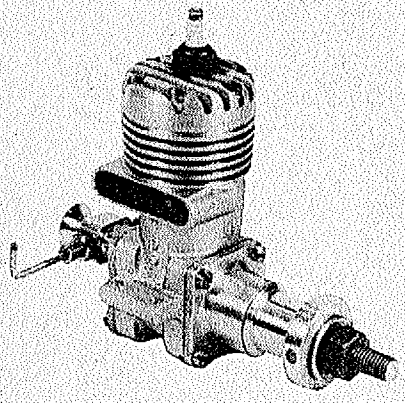
OHLSSON & RICE 29

Manufacturer:	Ohlsson & Rice, Inc., Emery at Grande Vista, Los Angeles 6, Calif.
Purpose:	Free flight, sport and stunt U-control.
Special Features:	Roller bearing crankshaft, optional beam or radial mounting.
Piston:	Lapped.
Displacement:	.2999 cu. in.
Bore & Stroke:	.759 x .663 in.
Ignition:	Glow plug, adaptable to spark by addition of points at extra cost.
Weight Bare:	5.25 ozs.
Mounting:	Beam by 4 bolts or radial by 3 crankcase bolts. Distance between beam bolts 1 9/16 in. diameter of radial mount 1 7/16 in.
Recommended Fuels:	Ohlsson & Rice #2.
Recommended Props:	Ohlsson & Rice: 9 x 8 in., 9 x 7 in., 9 x 6 in. Also: Free flight, 10 x 6 in.; stunt, 9 x 6 in.; speed, 7 x 10½ in.
Other Models:	Ohlsson & Rice 33, Ohlsson & Rice 60.



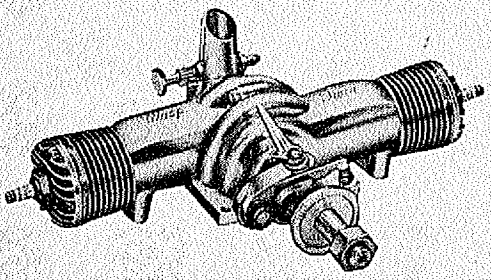
OHLSSON & RICE RACE CAR 29

Manufacturer:	Ohlsson & Rice, Inc., Emery at Grande Vista, Los Angeles 6, Calif.
Purpose:	Race cars.
Piston:	Lapped.
Displacement:	.299 cu. in.
Bore & Stroke:	.759 x .729 in.
Ignition:	Glow plug.
Recommended Fuels:	Ohlsson & Rice #2.



HORNET .199

Manufacturer:	Victory Tool & Die Co., 3849 Ventura Blvd., Fresno, Calif.
Purpose:	U-control speed and stunt, contest free flight, cars.
Special Features:	Full ball bearing suspended crankshaft, tapered for prop adapter or flywheel mounting.
Piston:	Cast aluminum, two rings.
Displacement:	.199 cu. in.
Bore & Stroke:	.656 x .590 in.
Ignition:	Glow plug.
Weight Bare:	4.5 ozs.
Mounting:	4 point beam.
Recommended Fuels:	70% methanol, 30% castor oil, 20% nitromethane (by volume).
Recommended Props:	6 in. diameter x 9 in. pitch.

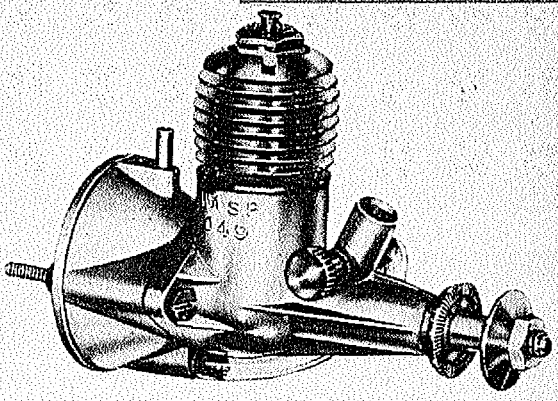


WASP TWIN

Manufacturer:	Micro Model Co., Metropolitan Airport, Van Nuys, Calif.
Purpose:	Large free flight and radio models, U-control equivalent to .60 engines.
Special Features:	Down-draft carburetion, two crankshaft main bearings.
Piston:	Hardened steel.
Displacement:	.60 cu. in. (total).
Bore & Stroke:	.740 x .702 in.
Ignition:	Spark.
Weight Bare:	12 ozs.
Mounting:	4 point beam. Distance between mounting bolts 2 in.
Recommended Fuels:	Gas-oil mixture.
Recommended Props:	10 x 8 in.

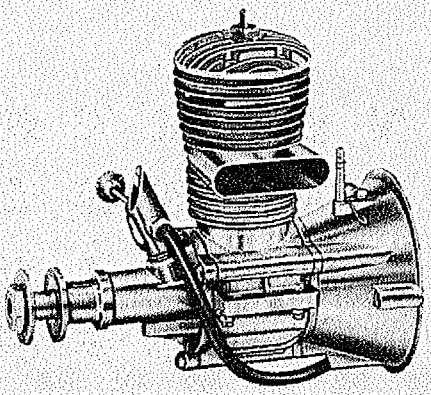
ATWOOD WASP

Manufacturer:	Atwood Mfg. Co., Pico, Calif.
Purpose:	Small free flight and sport U-control.
Special Features:	Timer tank.
Piston:	Lapped.
Displacement:	.049 cu. in.
Bore & Stroke:	.421 x .356 in.
Ignition:	Glow plug.
Weight:	1.33 ozs.
Mounting:	Two point radial. Diameter of radial mount 27/32 in.
Recommended Fuels:	Any good glow fuel.
Recommended Props:	6 x 3 in. and 6 x 4 in.



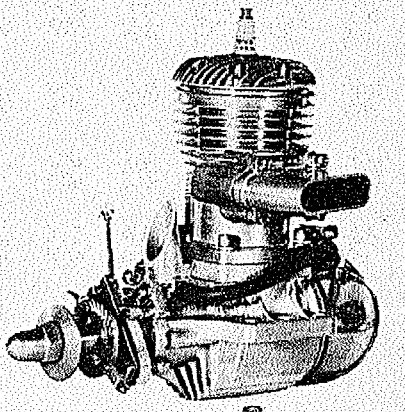
ATWOOD TRIUMPH .49 AND .51

Manufacturer:	Atwood Mfg. Co., Pico, Calif.
Purpose:	Large free flight, U-control sport, stunt, speed.
Special Features:	Timer tank.
Piston:	1 ring.
Displacement:	.49 or .51 cu. in.
Bore & Stroke:	.900 x .790 in.
Ignition:	Spark, or glow.
Weight:	8½ ozs.
Mounting:	Two point radial.
Recommended Fuels:	Any good glow fuel or, for spark, gas-oil mixture.
Recommended Props:	Stunt, 10 x 8 in.; free flight, 12 x 5 in.; speed, 8 x 10½ in.



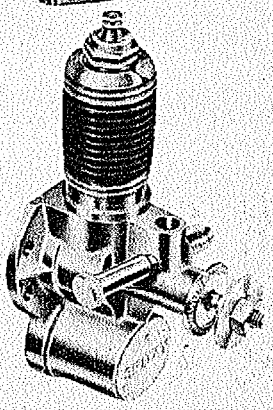
ANDERSON SPITFIRE

Manufacturer:	Mel Anderson Mfg. Co., 1819 Third Ave., Los Angeles 6, Calif.
Purpose:	Airplane—Free flight, stunt, sport U-control.
Special Features:	Ball-bearing crankshaft. .60 Spitfire may be modified to .65 by installing .65 crankshaft and standard head.
Piston:	Lapped.
Displacement:	.60 and .65 cu. in.
Bore & Stroke:	15/16 x 15/16 in.
Ignition:	Spark or glow plug.
Weight Bare:	12 ozs.
Mounting:	Beam by 6 bolts. Distance between mounting bolts 1⅞ in.
Recommended Fuels:	Ignition—One part SAE 70 oil to three parts white gasoline. Glow Plug—Standard brands, glow fuels.
Recommended Props:	For free flight, 13 in. diameter, 6 to 8 in. pitch. For stunt 11 x 8 in. For speed 10 x 10½ in.



ANDERSON SPITZY

Manufacturer:	Mel Anderson Mfg. Co., 1819 Third Ave., Los Angeles 6, Calif.
Purpose:	Free Flight Class A/2, sport U-control.
Special Features:	Tank relocated from rear, as on Baby Spitfire, to directly beneath crankcase, cast integral. Facilitates mounting. Needle valve slants slightly rearward to assist adjustments while running.
Piston:	Lapped.
Displacement:	.045 cu. in.
Bore & Stroke:	⅜ x 11/32 in.
Ignition:	Glow plug.
Weight Bare:	1 oz. less plug.
Mounting:	Radial by 4 machine screws. Distance between mounting screws 15/16 in.
Recommended Fuels:	Infant Thimble Glow, Ultra-Glow, Thimble Drome Fuel, O & R plus 30 or AA.
Recommended Props:	Baby Spitfire 6 in. diameter x 2 in. pitch. Up to 6 x 3 in. for stunt and free flight, 5¼ x 4 in. for speed.
Other Models:	Anderson Baby Spitfire.



radio control for everyone!

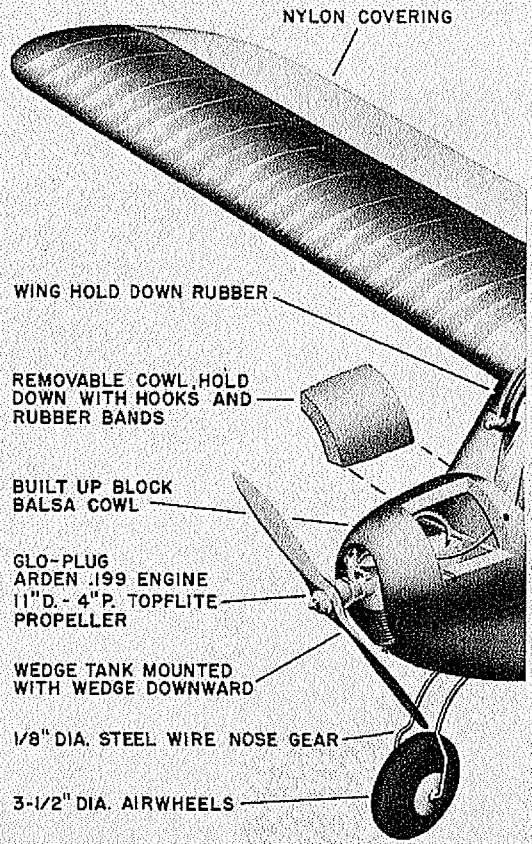
Here's an airplane designed especially for its equipment—Citizen's license-free radio control unit.

By Bill Winter

DESIGNED for use with the MacNabb Citizens Band radio control unit recently approved by the FCC, this model is a medium-sized, clean flying, rugged machine, capable of good performance in any reasonable wind, as well as calm.

The radio is slung with rubber bands from four hooks at the corners of the cabin; all radio batteries are mounted on the floor. However, other radios, such as the Good Brothers, may be mounted in the same manner and the batteries are held down to the top of floor with rubber bands attached to special hooks. Such mounting details are found in the manufacturers' directions and will not be fully detailed here.

The engine is a glow-plugged Arden .199, selected for easy starting, reliable operation, and high power output. A three-wheel landing gear prevents nose-overs and insures automatic straight running on the ground. The nose wheel structure will not fail. Wings and stabilizer are mounted with rubber bands to ease transportation



and to render the plane more damage resistant. These surfaces fly off in a crash. The use of sheet balsa in the fuselage makes it extremely strong.

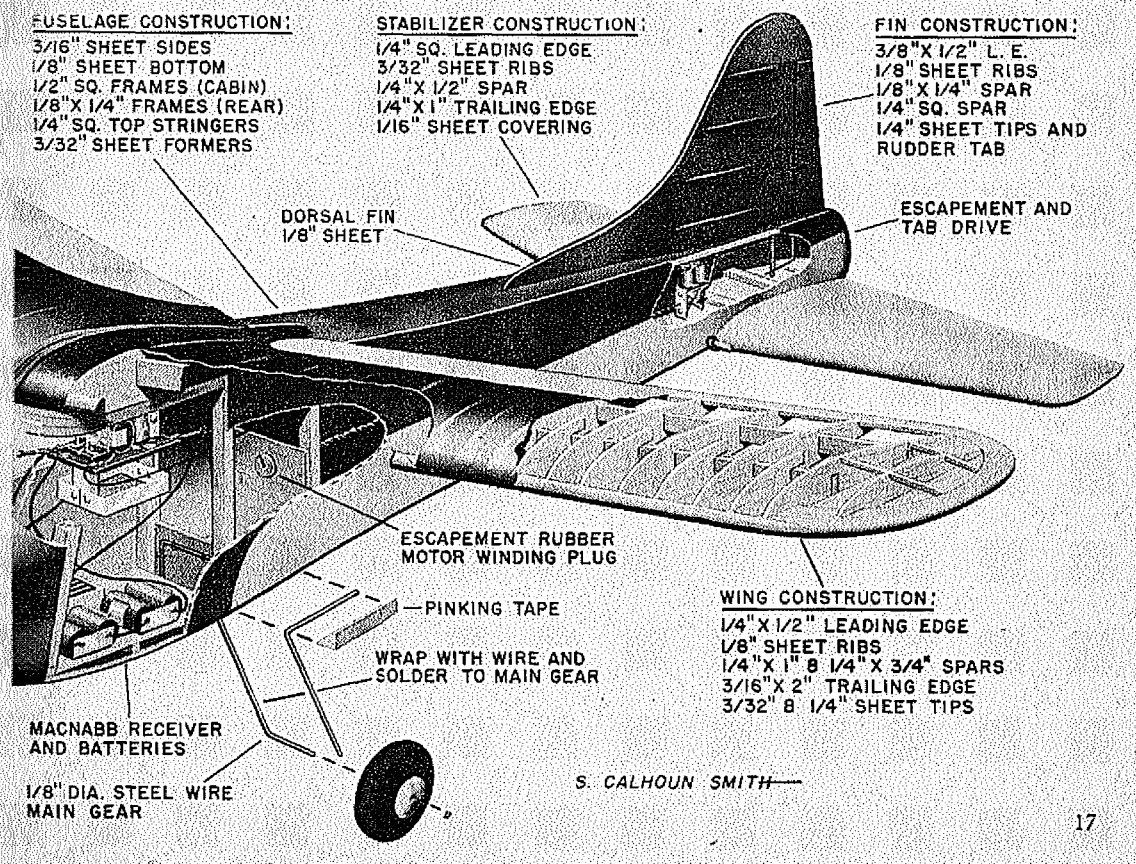
With several coats of paint and the heaviest batteries, the plane will gross nearly six pounds; with less paint and light batteries its weight is a little over five pounds. A Gottingen 549 high-lift airfoil is used to maintain a reasonably slow glide while the high wing loading, resulting from the amount of area used for the weight, makes for smooth steady flying.

Fuselage sides are cut from soft $\frac{3}{16}$ in. sheet balsa. First, cement the cabin uprights of ½ in. square (fore corners) to the side frames, then connect the sides at the cabin, beneath the wing. Finish this portion of the fuselage before connecting the sides toward the rear. The cabin roof is filled in with ¼ in. sheet with grain as noted on top view. Also note $\frac{1}{16}$ in. ply gussets at front and rear corners of cabin. Doors may be made now or later.

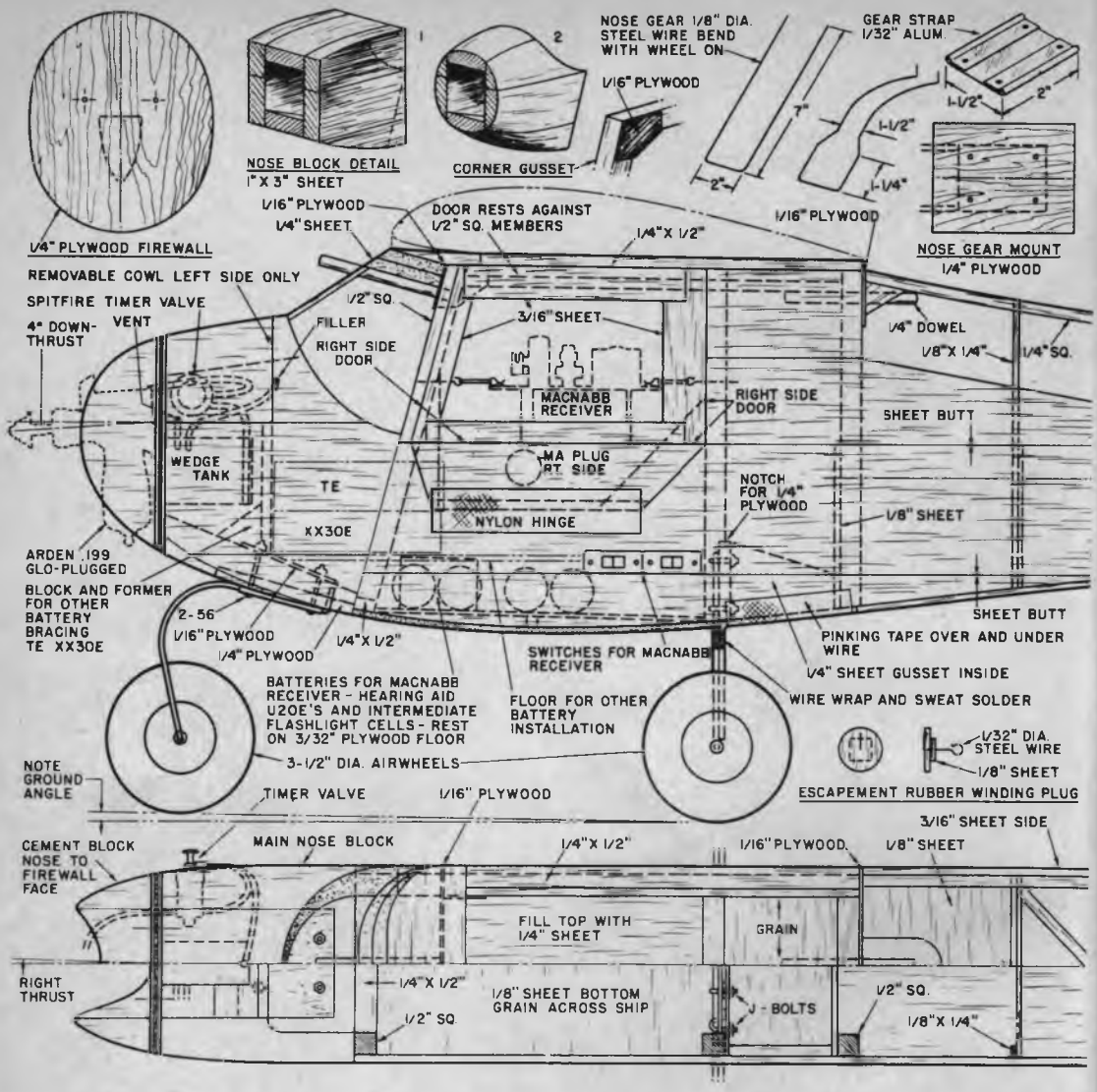
Shape the tail block and connect the sides to it; when dry begin to drop in the bulkheads ($\frac{3}{32}$ in. sheet). These bulkheads are not the full depth of the fuselage, are three inches wide, and have a ¾ in. circular hole through which the rubber band drive to the escapement runs forward to the cabin. The ⅛x¼ in. uprights cement to the front faces of the bulkheads with the narrow edge of the uprights against the fuselage sides. The top corners of the fuselage rear are formed by ¼ in. square. Top cross pieces and all diagonals are ⅛x¼ in.

Mount the escapement against the ⅛ in. ply bulkhead provided for the purpose, then sheet in and complete the rear tip of the fuselage as shown on the plan. The fuselage bottom is made from ⅛ in. sheet balsa with its grain running across ships. See drawings for assembly of the wing hold-down dowels (¼ in.), fuselage bottom and landing gear. The rear two wheels revolve on ⅛ in. music wire which is attached to a ¼ in. ply bulkhead in the fuselage by means of model J-bolts or metal straps held tight by 4/40 machine screws. The wire is assembled to the ply before the latter is inserted in the fuselage.

The entire nose is a boxlike structure made from block balsa, profiled, shaped. Butt join one-inch thick blocks, fairly soft, to make the sides of the nose. Trace the



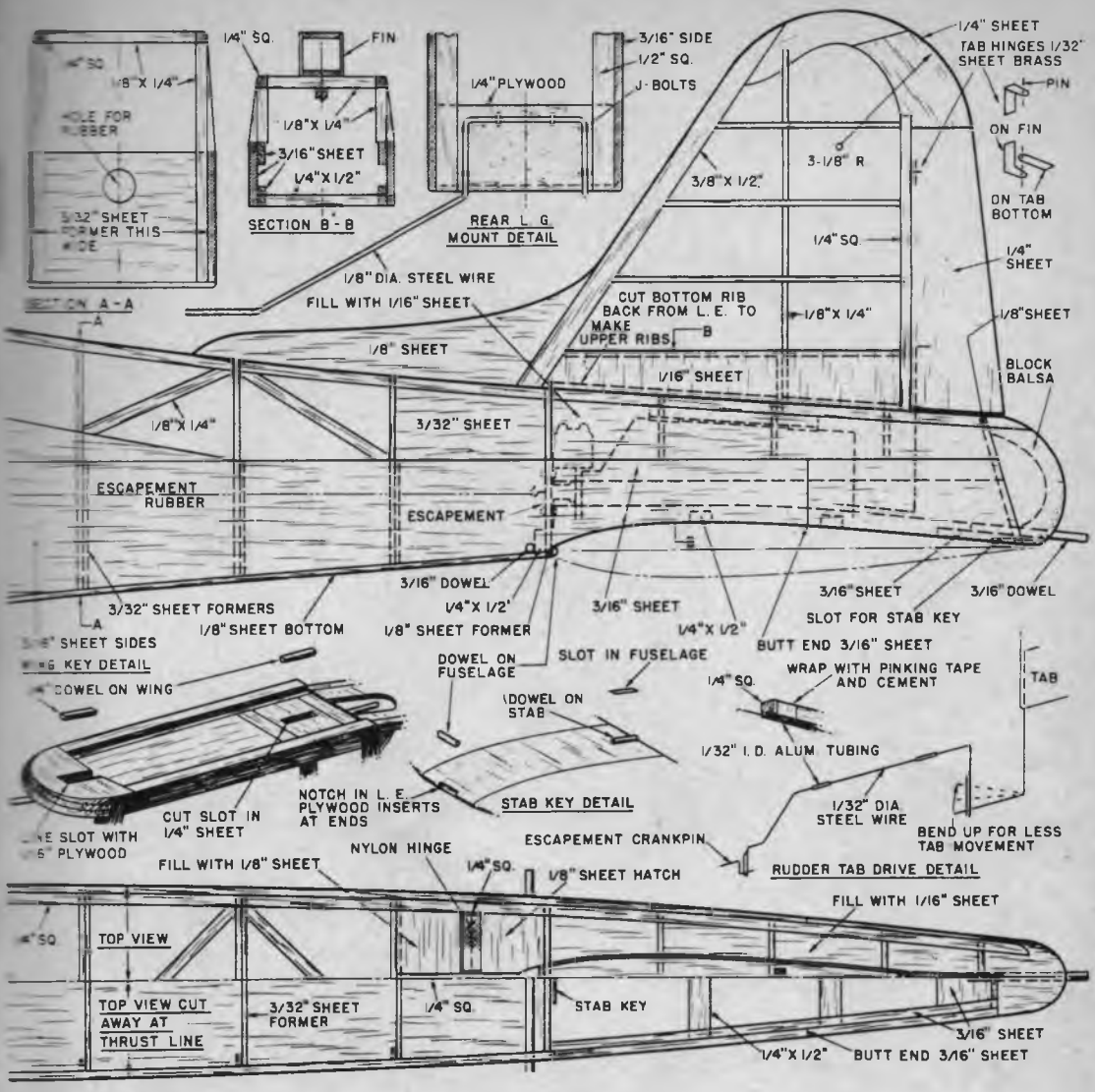
S. CALHOUN SMITH



Author Bill Winter preparing to start original plane model.

side view for their outline. Insert top and bottom blocks, spot gluing them temporarily in position. When the cement dries, carve the blocks to shape; the firewall pattern gives the cross section at the point where the engine mounts; the sides and bottom at the point of attachment to the fuselage proper are straight lines. The top, where the windshield rests, is almost a semi-circle. Remove the top block and carve out to ¼ in. wall thickness at the top. Remove the bottom block and cut into its under surface for the ¼ in. thick plywood insert that holds the nose wheel wire.

Note the four 2-56 machine screws that hold the wheel wire to the ply. These screws run through the bottom block, so that the ply is clamped in place when



cemented. The wire itself is bound in place by means of a heavy tin or brass strap fitting (see detail); a patch of pinking tape or other heavy strong material is glued over the strap fitting to the nose block bottom.

Make holes for the Spitfire Timer Valve and connect fuel lines as shown. The tank mounts directly behind the firewall. It can be attached to the firewall or mounted on cross members extending from the insides of the nose block. The tank was a 1x1½x2 in. wedge tank with the wedge pointing downward. Fuel lines and vents are changed to positions shown on the drawings.

The ¼ in. ply firewall is sawed to outline, drilled for the engine mounting screws, then cemented to the nose. The front of the nose may be smoothed by standing the entire fuselage nose down on a large sheet of medium and sliding the structure back and forth, frequently changing direction of the movement. After the firewall is in place, its narrow edge may be sanded to match the nose contour by means of a sanding block and coarse paper.

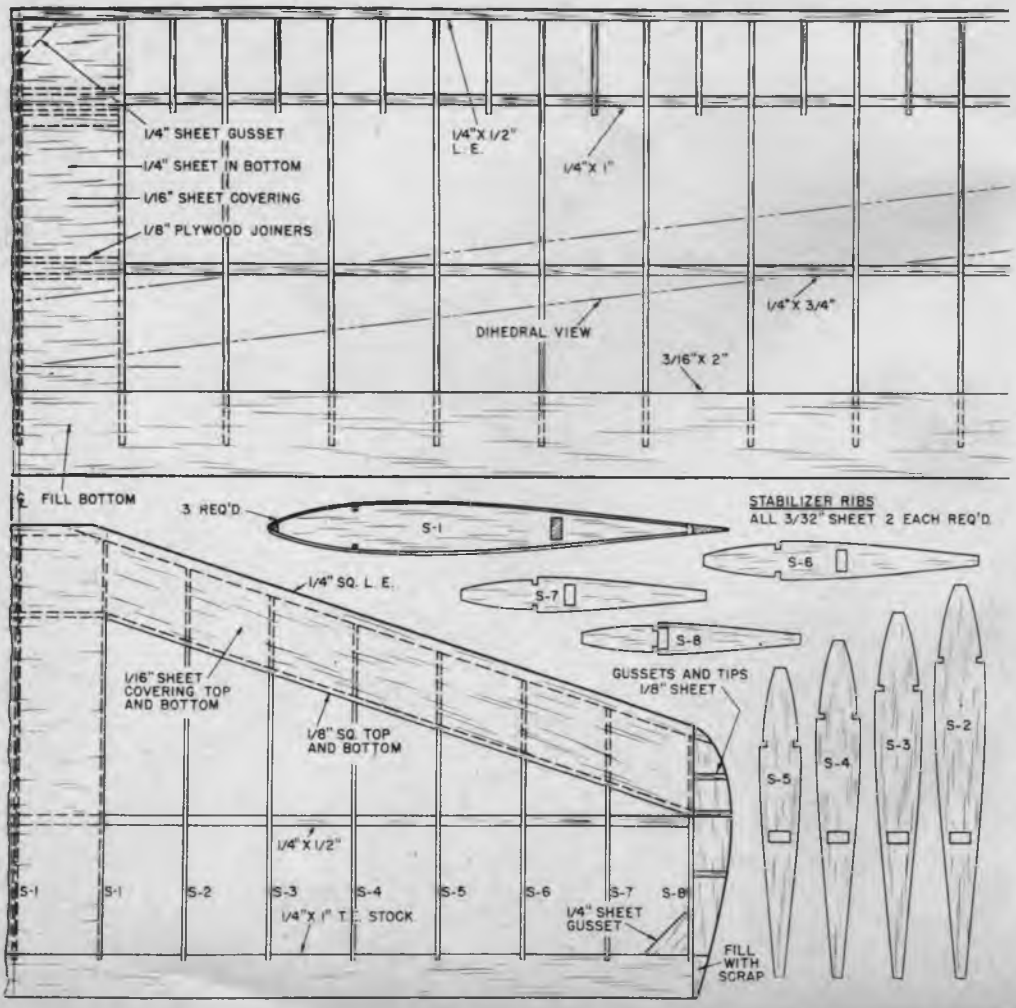
The removable engine compartment hatch is made by cutting down across grain at the front and rear, then cutting along the center line on top of cowl to separate the hatch from the nose. Smooth its ends, using wood filler if necessary. Solder the engine mounting nuts to small metal plates, then glue these to the back of the firewall when the engine is first tightened in posi-

tion. When dry, remove the engine until construction is completed.

Landing Gear: The bending of the wire should be done with a vise. Use the detail drawing for a pattern of the main gear. Leave enough length at the wheels to permit soldering a washer on either side for a retainer. The nose gear wire has one of its 90 degree bends made in the vise, then the wheel slides on, and the other 90 degree bend is made. Some strong round object like drill rod may be clamped in the vise, and this latter bend made around it. Being close to the wheel, this bend is very difficult with ordinary pliers. The large bend where the gear attaches to the nose is made by forming both sides of the gear simultaneously around a length of broom stick clamped in the vise.

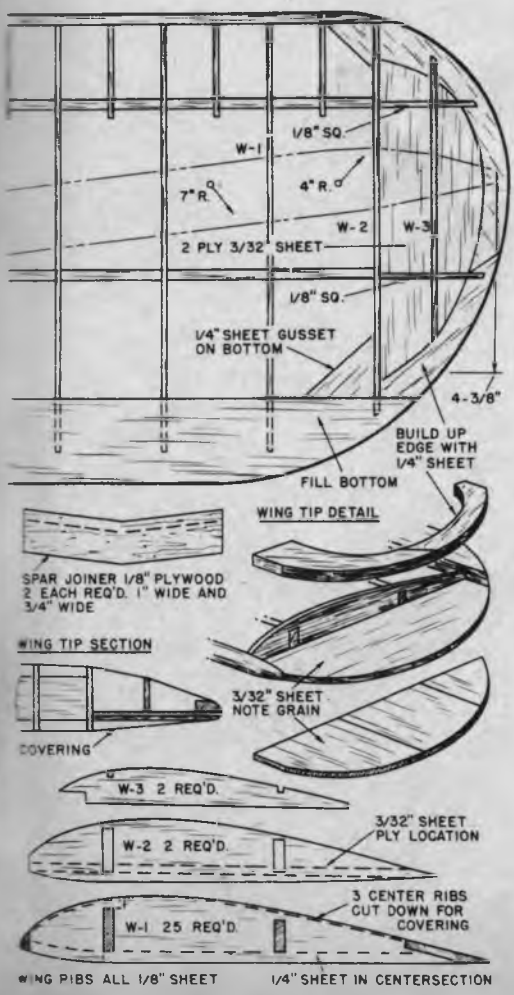
Tail Surfaces: Make the $\frac{3}{32}$ in. thick stabilizer ribs to patterns given. Mark the rib positions on the $\frac{1}{4}$x$\frac{1}{2}$ in. spar and slide each rib into position. However, cement only the biggest and the smallest rib. Attach the trailing edge, either standard triangle stock or $\frac{1}{4}$x$\frac{1}{2}$ in. hard balsa which can be shaped later, and the $\frac{1}{4}$ in. square leading edge. Work the loose ribs into an accurate fit, cementing them as you do so. Add the small $\frac{1}{8}$ in. square top and bottom spars and the leading edge sheeting. This $\frac{1}{16}$ in. sheet cements first to the $\frac{1}{8}$ in. spar then, when dry, bends down and cements to the leading edge and the rib tops or bottoms. Note that the center of the stab is sheeted over top and bottom. The tips are made from leftovers of $\frac{1}{8}$ in. sheet balsa.

The fin is made roughly the same way but is provided with the solid ($\frac{1}{4}$ in. sheet) hinged rudder. The finished vertical tail cements to the fuselage top to prevent shifting. This is done after covering. Fin ribs are cut to the shape of the bottom rib shown on the fuselage top view. Then cut back upper ribs at the front to fit into frame.

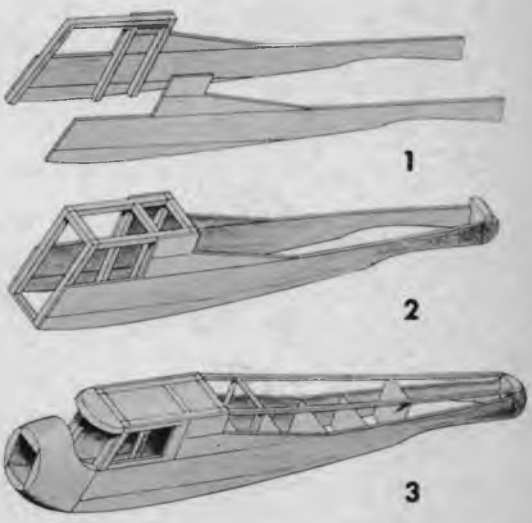


Wings: Cement the paper rib pattern W-1 to thin ply or metal for a template, using it to cut out 25 ribs from ⅛ in. sheet balsa. Cut W-2, W-3 from patterns given. Mark the rib positions on the spars (¼x1 in. and ¼x¾ in.) and slide the ribs to approximate position. Cement rib by rib, aligning each by sighting from above and in front. Check frequently with a triangle or square. Cement a large sheet gusset against one end rib and a spar to keep the work from shifting; remove the gusset when the wing is done. The trailing edge is hard quarter-grained $\frac{3}{16}$x2 in. sheet balsa. Note that it is beveled to a depth of ⅜ in. on its bottom surface. Check its fit to all the ribs then cement it firmly in place. The leading edge is ¼x½ in. [*Continued on page* 140]

Plane ready for take-off. Tricycle landing gear gives model stability and protection.



FUSELAGE CONSTRUCTION



FULL SIZE PLANS

are available and insure an accurate model. Send 50c for your set to: MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Conn. Specify Plan No. 425.

control-line

GLIDER PICK-UP

Action photo above taken at instant of snatch pick-up as tow plane swoops over glider station.

A sure point winner for the stunt contest flyer, this pick-up system is based on military techniques employed in cargo glider operation.

By S. Calhoun Smith

ONE of the most neglected point winning stunts frequently seen at control-line contests is the glider pick-up. All too often the stunt doesn't come off too well and if a successful pick-up is made, the glider usually whips along behind the tow plane in a most unrealistic manner.

The pick-up system presented here is so designed that the glider can be picked up and towed in a manner that resembles full scale operation as closely as anything could in control-line flying.

War-born developments in towing stable target gliders form the basis for this system. The technique has simply been scaled down for model use. Both the Navy and Army used similar systems for picking up training and cargo gliders and even single human beings in a special harness, without landing the tow plane. The system is used daily by All American Aviation, Inc., in their Air Mail Pick-up Service in the eastern states.

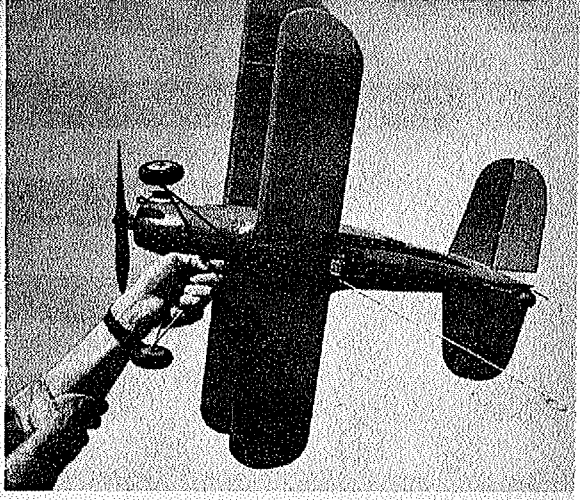
"Unolyn," the undrawn nylon rope used in these experiments, is nylon fibre which has not been stretched, as in normal practice, before making the strands into thread or rope. The rope is made of unstretched fibres with proper lubrication, to prevent trouble from the internal heat generated by the energy dissipation during stretching. The undrawn nylon rope is used as an ac-

Beef up tow plane structure at point of hook attachment to take full load of snatch and tow.

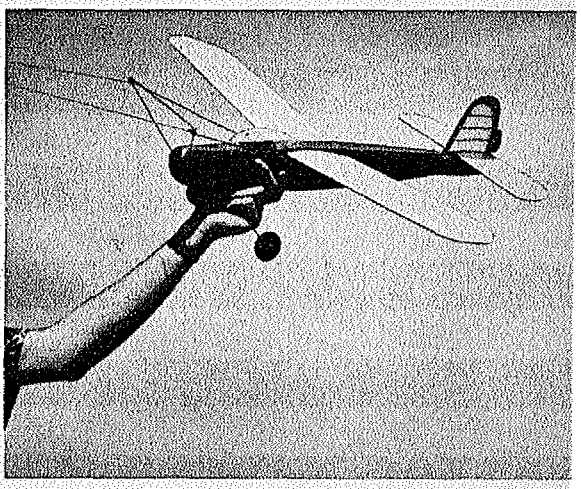
celerating device for "snatch pick-up." The force required to stretch the nylon rope is practically linear and constant and the rope will stretch about 200%. The fibres do not snap back as in the case of the rubber band after stretching, and they retain their elongation. A section of undrawn nylon rope can only be used once for the snatch pick-up. Suitable quantities of the undrawn nylon rope can be procured by writing to Mr. Arthur Schultz of the All American Aviation Corp., DuPont Airport, Wilmington, Del. The model builder should request a sample of lubricated ⅛-in. undrawn nylon rope for experimental work, and enclose a self-addressed stamped envelope and 25c in stamps or money order.

Full credit for the first model experiments should be given to Mr. Molton Taylor, aeronautical engineer and former Navy Commander connected with Naval research in guided missile design and operation. The author has been fortunate enough to duplicate Mr. Taylor's designs for purposes of publication.

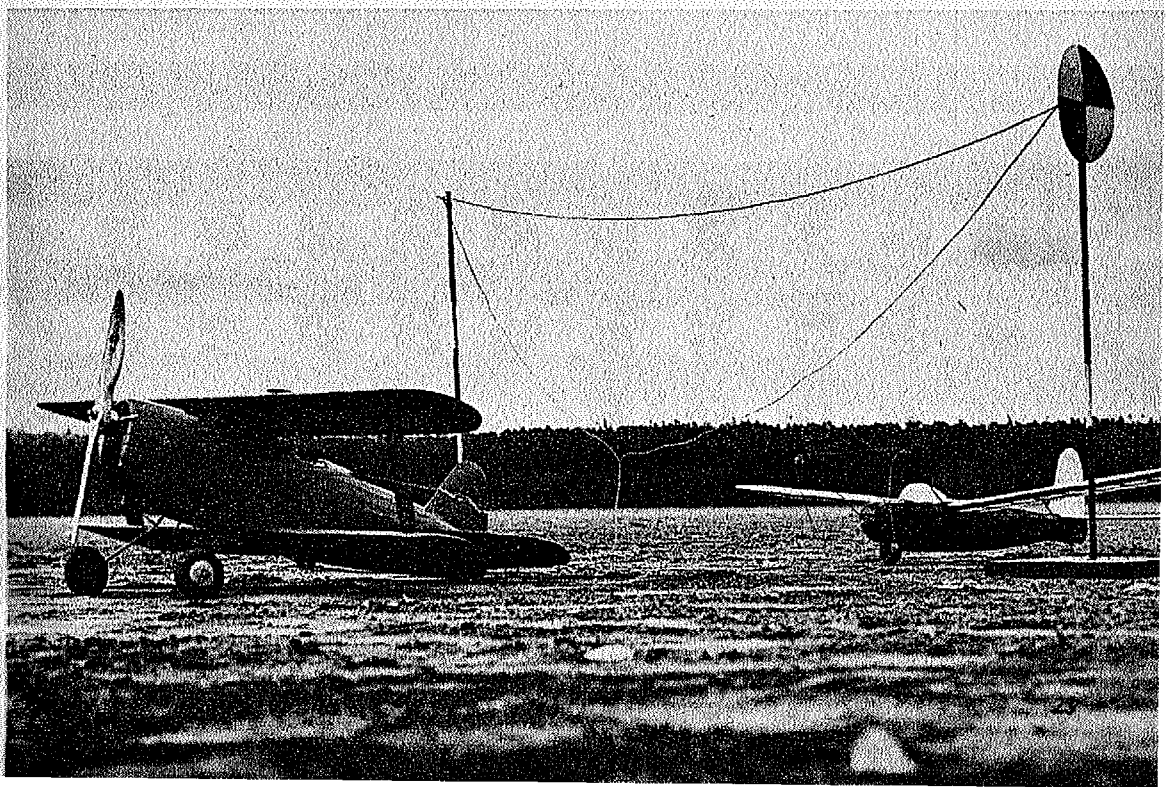
The size and dimensions given here for the glider are quite critical, and the builder

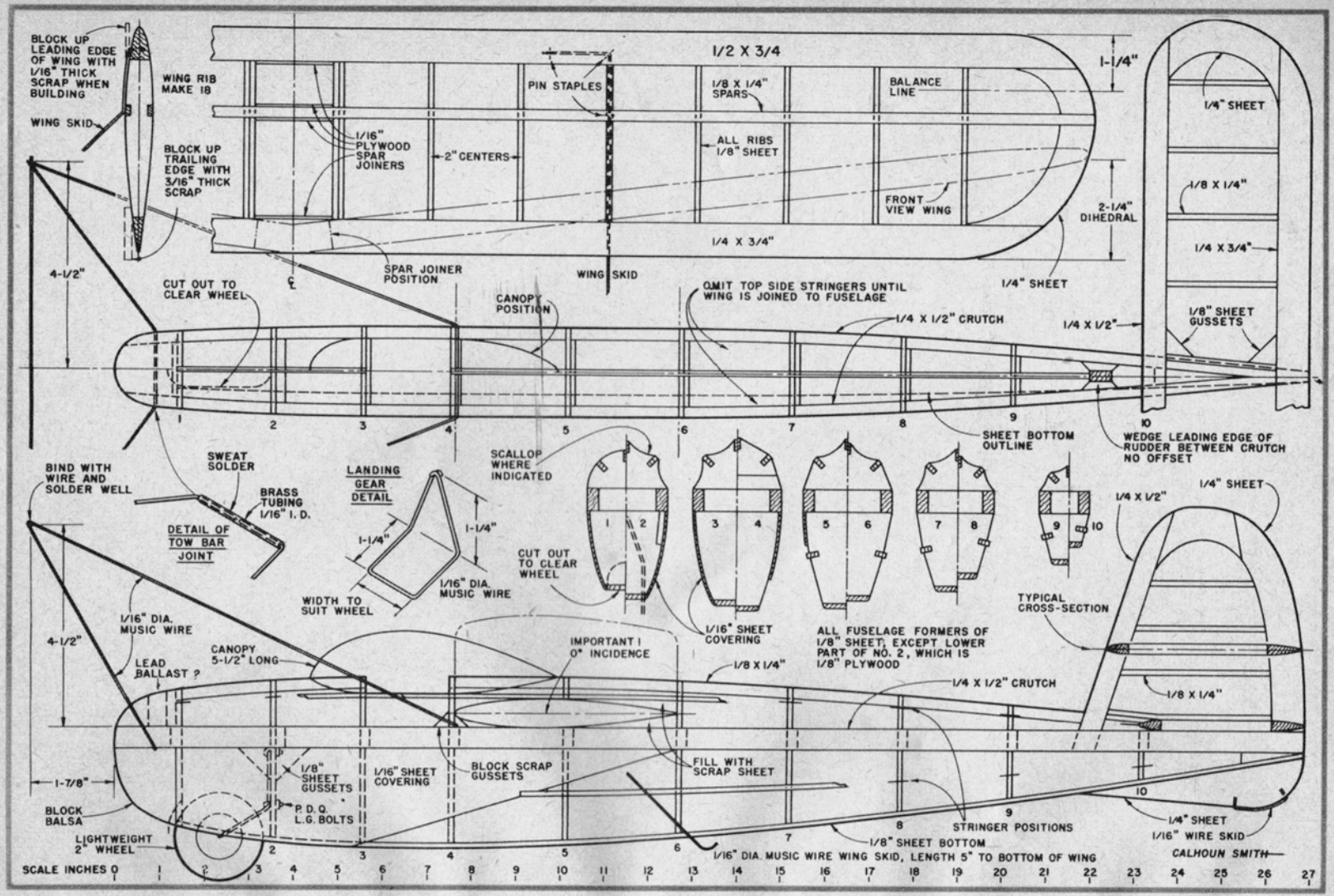


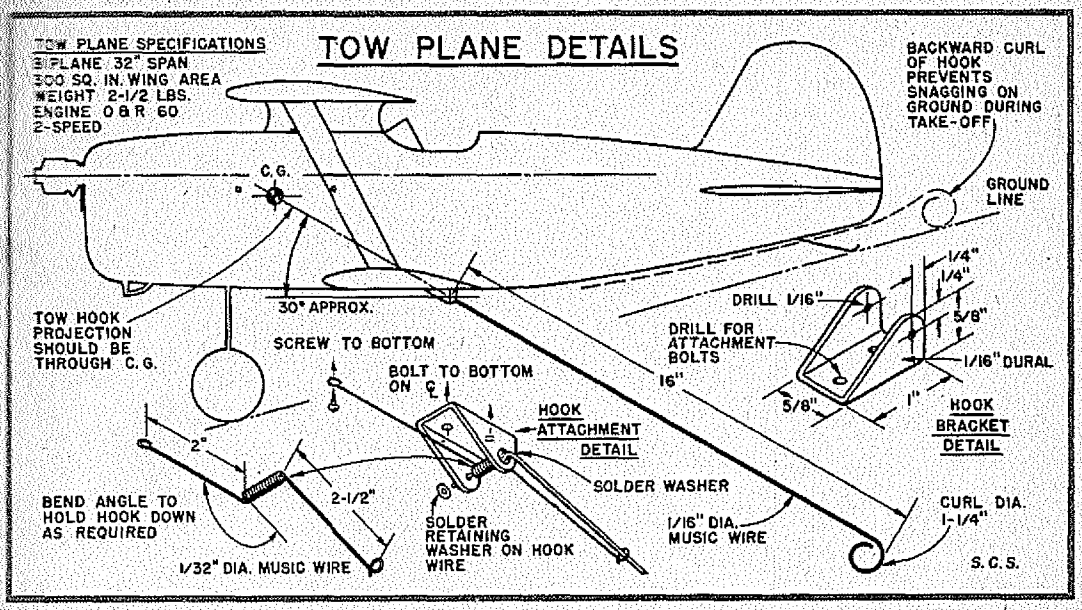
At right, 8-ounce glider is made in conventional crutch and former style, needs exact balance.



Below, first experimental flights should be made by towing glider off ground from standing start.




BLOCK UP LEADING EDGE OF WING WITH 1/16" THICK SCRAP WHEN BUILDING
WING SKID
WING RIB MAKE 18
BLOCK UP TRAILING EDGE WITH 3/16" THICK SCRAP
1/16" PLYWOOD SPAR JOINERS
2" CENTERS
PIN STAPLES
1/2 X 3/4
1/8 X 1/4" SPARS
BALANCE LINE
ALL RIBS 1/8" SHEET
FRONT VIEW WING
1/4 X 3/4"
1-1/4"
2-1/4" DIHEDRAL
1/4" SHEET
1/8 X 1/4"
1/4 X 3/4"
1/8" SHEET GUSSETS
SPAR JOINER POSITION
WING SKID
4-1/2"
CUT OUT TO CLEAR WHEEL
CANOPY POSITION
OMIT TOP SIDE STRINGERS UNTIL WING IS JOINED TO FUSELAGE
1/4 X 1/2" CRUTCH
1/4 X 1/2"
SHEET BOTTOM OUTLINE
WEDGE LEADING EDGE OF RUDDER BETWEEN CRUTCH NO OFFSET
BIND WITH WIRE AND SOLDER WELL
SWEAT SOLDER
BRASS TUBING 1/16" I. D.
DETAIL OF TOW BAR JOINT
LANDING GEAR DETAIL
1-1/4"
1-1/4"
WIDTH TO SUIT WHEEL
1/16" DIA. MUSIC WIRE
SCALLOP WHERE INDICATED
CUT OUT TO CLEAR WHEEL
1/16" SHEET COVERING
ALL FUSELAGE FORMERS OF 1/8" SHEET; EXCEPT LOWER PART OF NO. 2, WHICH IS 1/8" PLYWOOD
TYPICAL CROSS-SECTION
1/4" SHEET
1/4 X 1/2"
1/16" DIA. MUSIC WIRE
4-1/2"
CANOPY 5-1/2" LONG
LEAD BALLAST ?
IMPORTANT ! 0° INCIDENCE
1/8 X 1/4"
1/4 X 1/2" CRUTCH
1/8 X 1/4"
1-7/8"
1/8" SHEET GUSSETS
1/16" SHEET COVERING
BLOCK SCRAP GUSSETS
FILL WITH SCRAP SHEET
P.D.Q. L.G. BOLTS
BLOCK BALSA
LIGHTWEIGHT 2" WHEEL
STRINGER POSITIONS
1/8" SHEET BOTTOM
1/16" DIA. MUSIC WIRE WING SKID, LENGTH 5" TO BOTTOM OF WING
1/4" SHEET
1/16" WIRE SKID
CALHOUN SMITH
SCALE INCHES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27



should adhere to them as closely as possible in order to obtain a smooth flying airframe. This glider can be towed off the ground by any well powered control-liner. The pick-up system can certainly be applied to larger or smaller planes and power, but naturally, comparable changes in size and weight of the glider would have to be made.

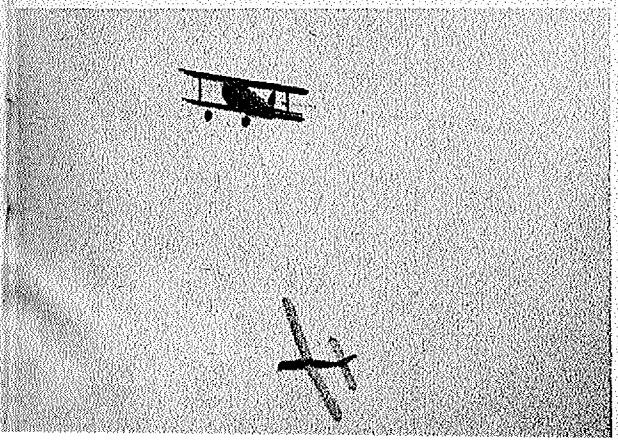
The author's first pick-ups were made using the glider shown here. The tow plane was a biplane with 300 sq. in. wing area using a Contestor engine for power. This proved to be a pretty fast combination to work with and although successful pick-ups were made, it was apparent that slower speed operation would make the stunt easier to perform.

An Ohlsson 60 with 2-speed control was then used, and this proved to be much better because the plane could be slowed down approaching the pick-up station and then the power could be poured on for flying off with the glider in tow. We recommend that the 2-speed control be used for this stunt and that a tow plane of the size used be considered a minimum. Slower speeds resulting from larger wing areas and lifting airfoils should make the stunt much easier, in any event don't go below 300 sq. in. wing area and .60 cu. in. engines if a glider of the size shown here is used.

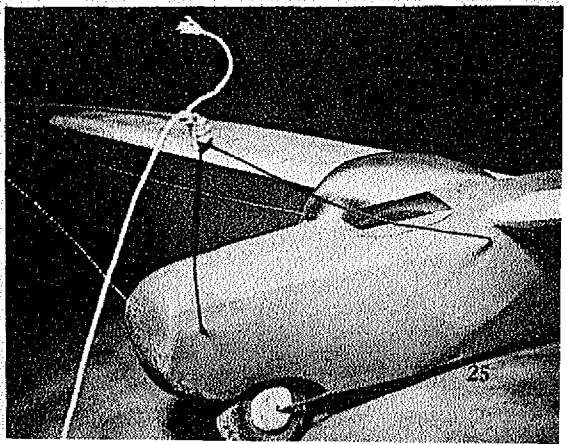
The tow plane hook and attachment is shown in detail on the plans. Be sure that the plane's structure is beefed-up a bit in the vicinity of the hook attachment, because this area takes the full load of the snatch and tow.

Glider construction is conventional crutch and former style. Stick to the plans exactly and note the following points carefully: Balance [*Continued on page* 141]

In air, glider assumes steeper bank than controlled tow plane. Correct by adjusting tow bar bridle.



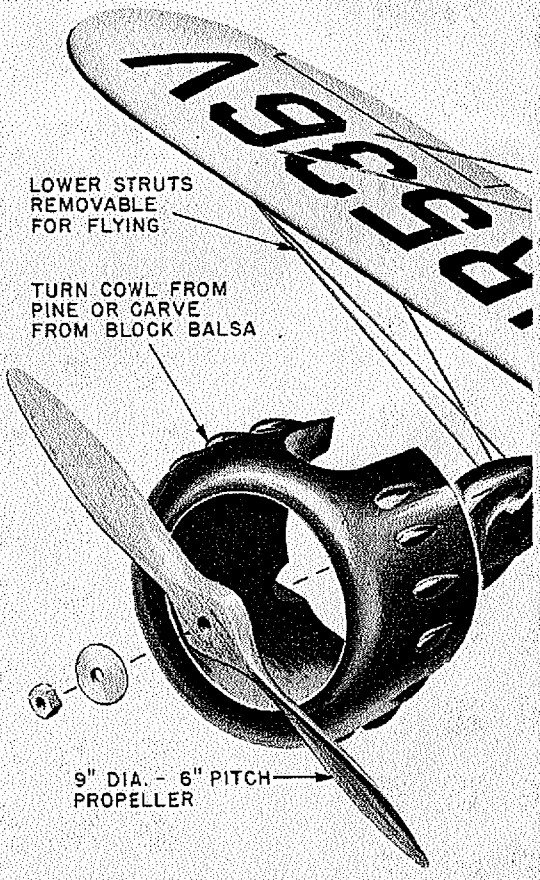
Tow line is made of "Unolyn," a special undrawn nylon fibre that will not snap under sudden pull.



control-line

WEDELL WILLIAMS RACER

A 26-inch exact scale model of the most famous National Air Race entry. Build it for any .19 to .49 cubic inch engine.



IF you are an old time airplane fan, then you'll surely recognize this racer as one of the most famous to ever enter the National Air Races. Of all the designs that gained continued national distinction in racing circles, this sleek low wing job rates with the leaders. But the long string of prizes this design earned is also shared by the pilots whose skill—and nerve—produced the victories. Colonel Roscoe Turner, James Haizlip, Lee Gehlbach, and of course, the late Jimmy Wedell, are only

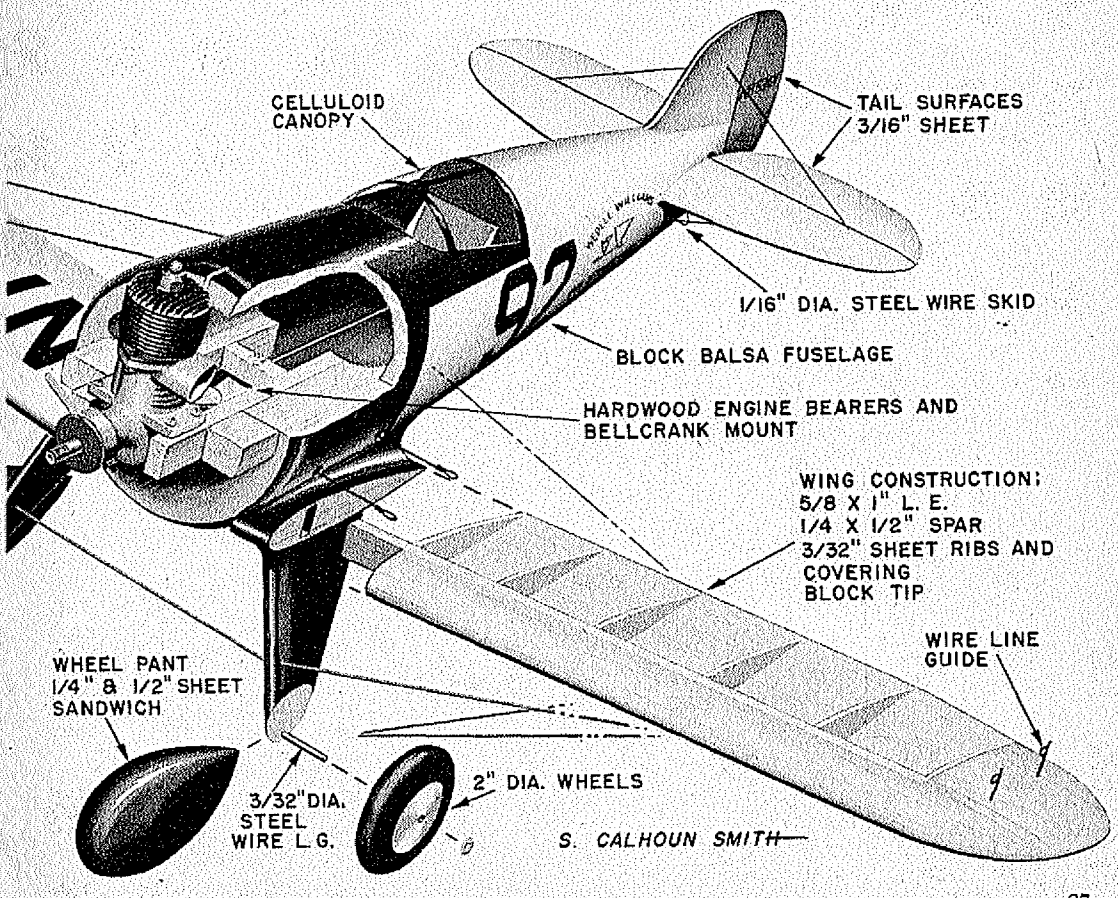
few of the "fly boys" who flew "Wedells" to fame.

Quite a few airplanes of this design were built and, all told, this type plane placed in the Thompson Trophy Race more than any other. The record shows two firsts, three seconds, two thirds, one fourth and a fifth place as recent as 1938, which is remarkable as the craft was designed in 1931!

The Bendix Transcontinental Race was won in 1932 by Haizlip with Wedell and Turner in second and third place, and the following year won by Turner. Again in 1932, Turner, Wedell and Haizlip placed second, third and fourth in the Thompson Trophy Race and Haizlip won the 1000 cubic inch free-for-all race that same year with Jimmy Wedell in second place! May Haizlip won the Shell Petroleum Corporation Speed Dash for women and she also placed second in the Aerol Trophy Race. Also in 1932, Wedell placed second in the Shell Petroleum Speed Dash for men with Roscoe Turner in third and James Haizlip in fourth place. The following year Wedell established a world landplane speed record of 305 m.p.h. while Turner established a new cross country record!

The struts are aluminum tubing glued permanently in place. For added speed wire can be substituted.

The color scheme of James Haizlip's craft was duplicated by the author, how-

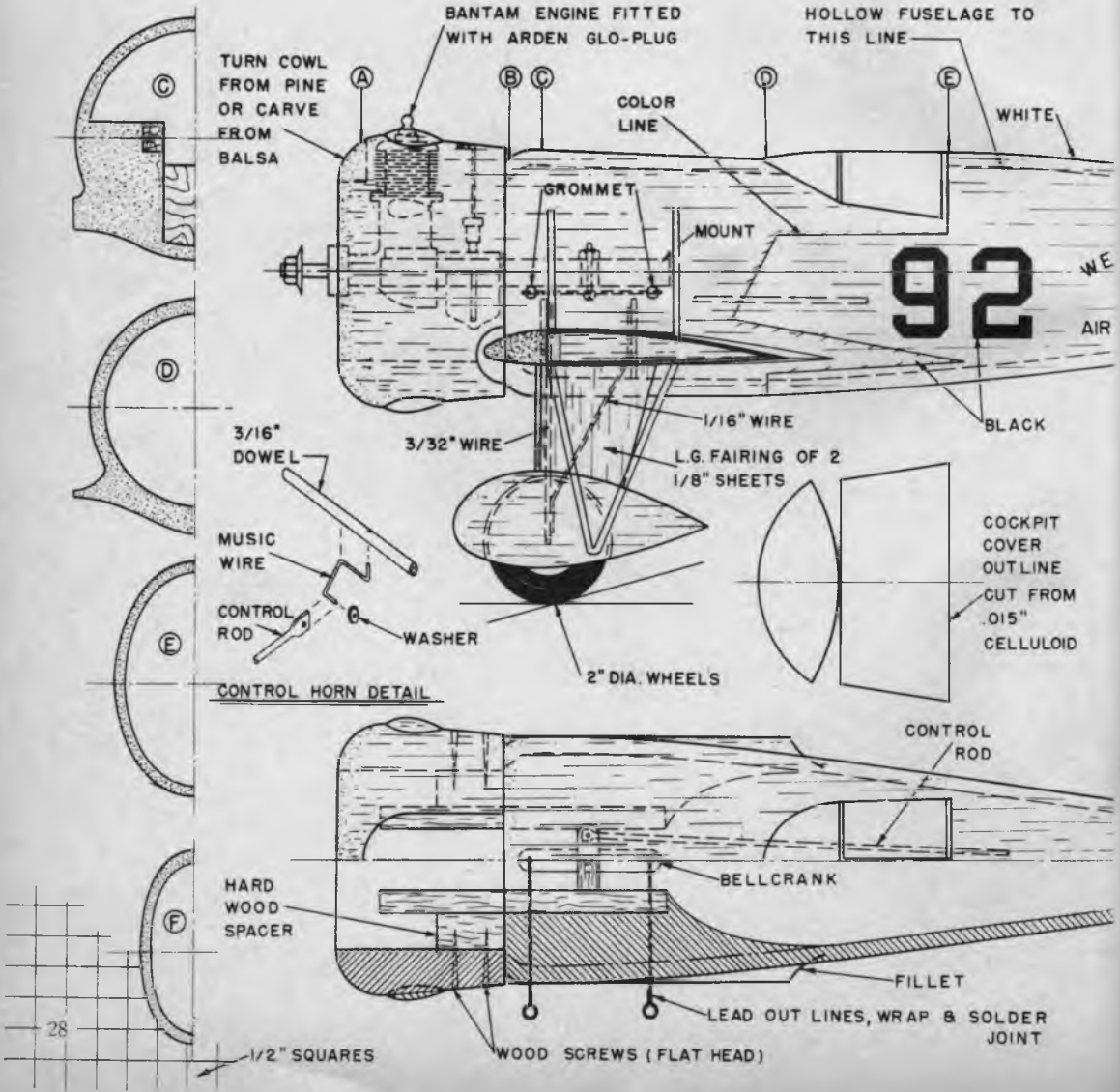


ever the plans also indicate the color schemes used by Turner and Wedell. The model has a span of 26 inches and is built to a scale of one inch to the foot. This size permits installation of engines from .19 to .49 cubic inch displacement.

After studying the drawings start construction by selecting two medium soft balsa blocks measuring 2¼x4x17 in. and cement them together along the horizontal centerline very lightly because they must be pried apart later. Trace and saw out the top and side views on the block and carve to shape, allowing for the wing fillet. When sanded smooth, the two halves can be separated and hollowed to a ⅛ in. wall thickness.

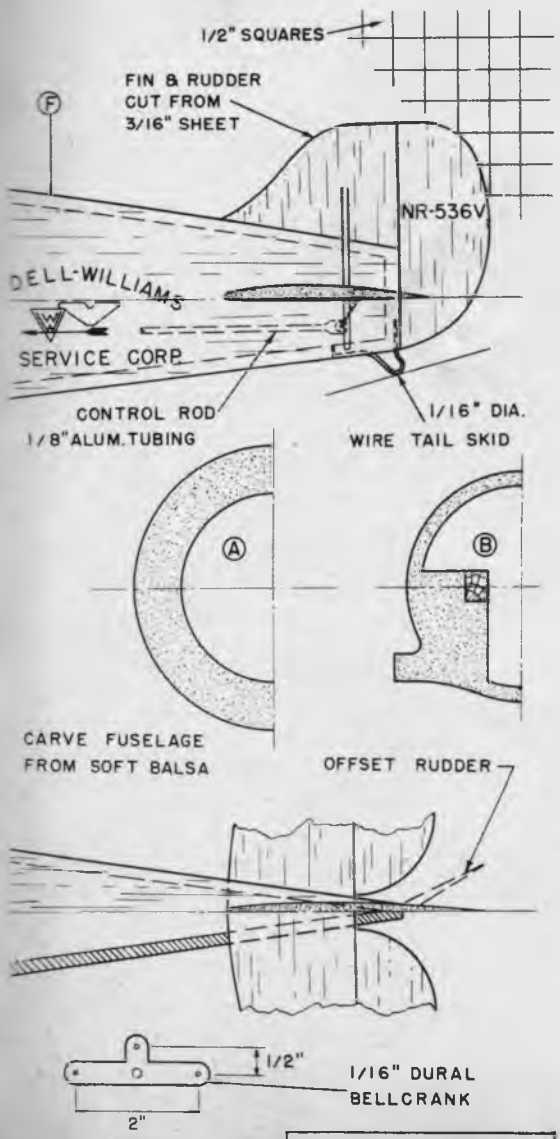
Note the ledge in the fuselage on which the engine mounts are attached. This provides additional support for the mounts. The distance between the mounts as well as the height of the mounts will be governed by the engine used so vary your mounts accordingly. A glow plug equipped Bantam engine was used on the original model, but an Ohlsson, McCoy, Herkimer or any other nationally known power plant up to .49 displacement can be used.

A glow plug installation is recommended, however regular spark type ignition units can be installed. A hatch will have to be cut for access to the battery. Now cut out and install the plywood landing gear foundations to the lower fuselage. The music wire landing gear struts are bolted to this foundation and the assembly inserted through slots in the bottom of the fuselage. These slots are filled in after the



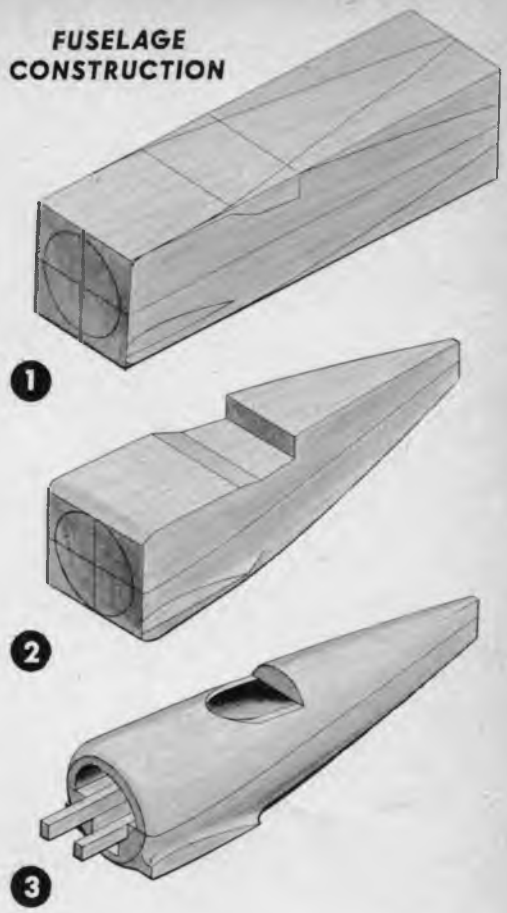
landing gear is in place. The tail surfaces are cut from $\frac{3}{16}$ in. sheet balsa and sanded to a symmetrical shape. Cement the stabilizer to the lower half and hinge the elevator to it after the control horn has been attached. Mount the bell crank firmly and connect the aluminum tubing control rod to the horn and bellcrank. Test the control system and then cement the upper half of the fuselage firmly to the lower half. The addition of a tail skid and fin completes the fuselage.

Wing construction is simple yet very rigid. No trailing edge is used and the heavy leading edge can be easily repaired should it become nicked. Cut the top and bottom covering from $\frac{3}{32}$ in. sheet and cement the spar to the lower half. While this is drying, cut out the ribs and cement them to the

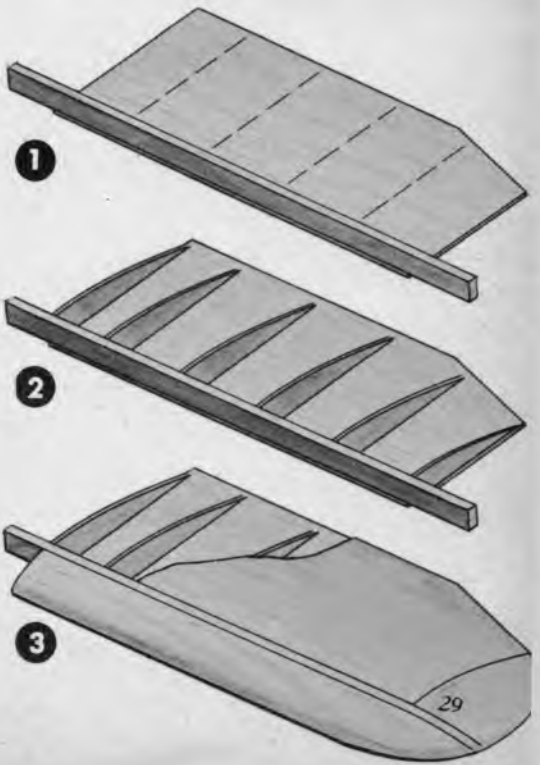


WALTER A. MUSCIANO

FUSELAGE CONSTRUCTION



WING CONSTRUCTION



The model is compact and very easy to fly. Huge cowl simplifies problem of mounting larger engines.

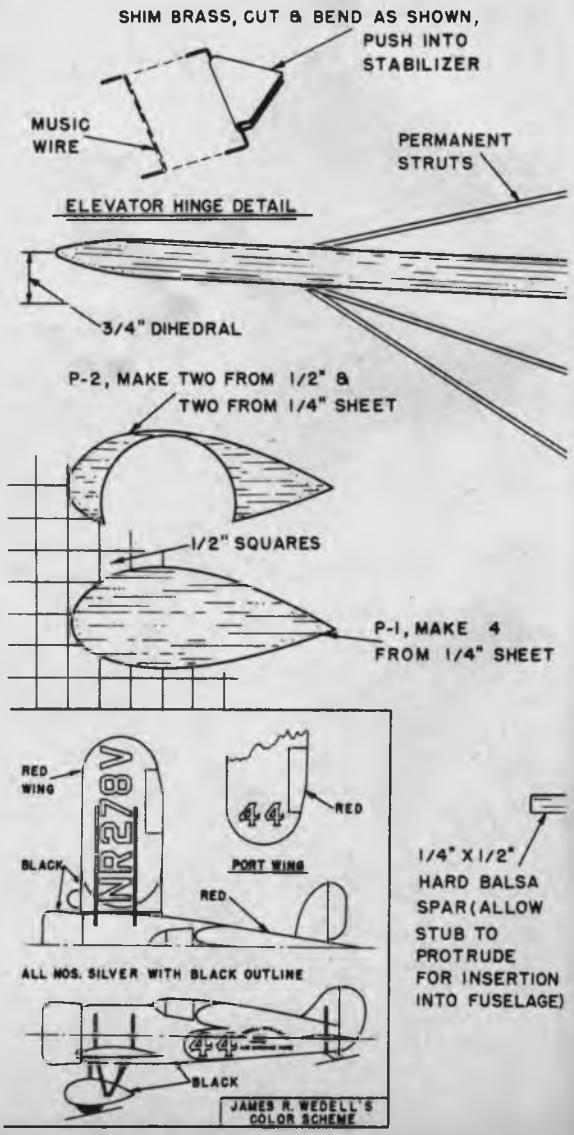
lower covering. Bevel the trailing edge of the lower covering before attaching the top sheet. Cement the soft balsa leading edge to the spar and then add the wing tip to the end rib. When dry, carve the leading edge to shape and sand the entire wing smooth.

Cement the wing to the fuselage by inserting the spar stubs into the recess. Be sure to obtain the indicated amount of dihedral. At this time the landing gear fairings can be made and installed. The fairing is made in two halves and both parts are assembled on the wire strut after the wheels have been secured. The fairings should be generously filleted with a good grade fillet compound. Note that the gear is allowed to flex without cracking the balsa fairing.

Carve the cowl from balsa or turn from pine on a lathe. The cowl blisters are carved individually and cemented in place. The cowl is held in place with wood screws, as shown. Add the rudder and then completely sand the model prior to painting.

The various color schemes are given on the plan. It is important that the model be prepared properly before the dope is applied in order to obtain a fine finish. Clear dope the model twice and sand off the nap. Apply a good grade of wood filler (Testors is one of the best) and sand when dry. Repeat this procedure several times until the model is smooth, then apply the color. The light colors should be applied before the dark.

When the paint is thoroughly dry, a fine lustre can be obtained by a brisk rubbing with a soft cloth and rubbing compound. The author used a petroleum base glow-plug fuel which would not dissolve the dope finish. If a methanol base fuel is used, alcohol resistant Aero-Gloss dope should be applied for the color. A coat of Testor's



fuel resistant clear dope will protect ordinary dope finish from the alcohol.

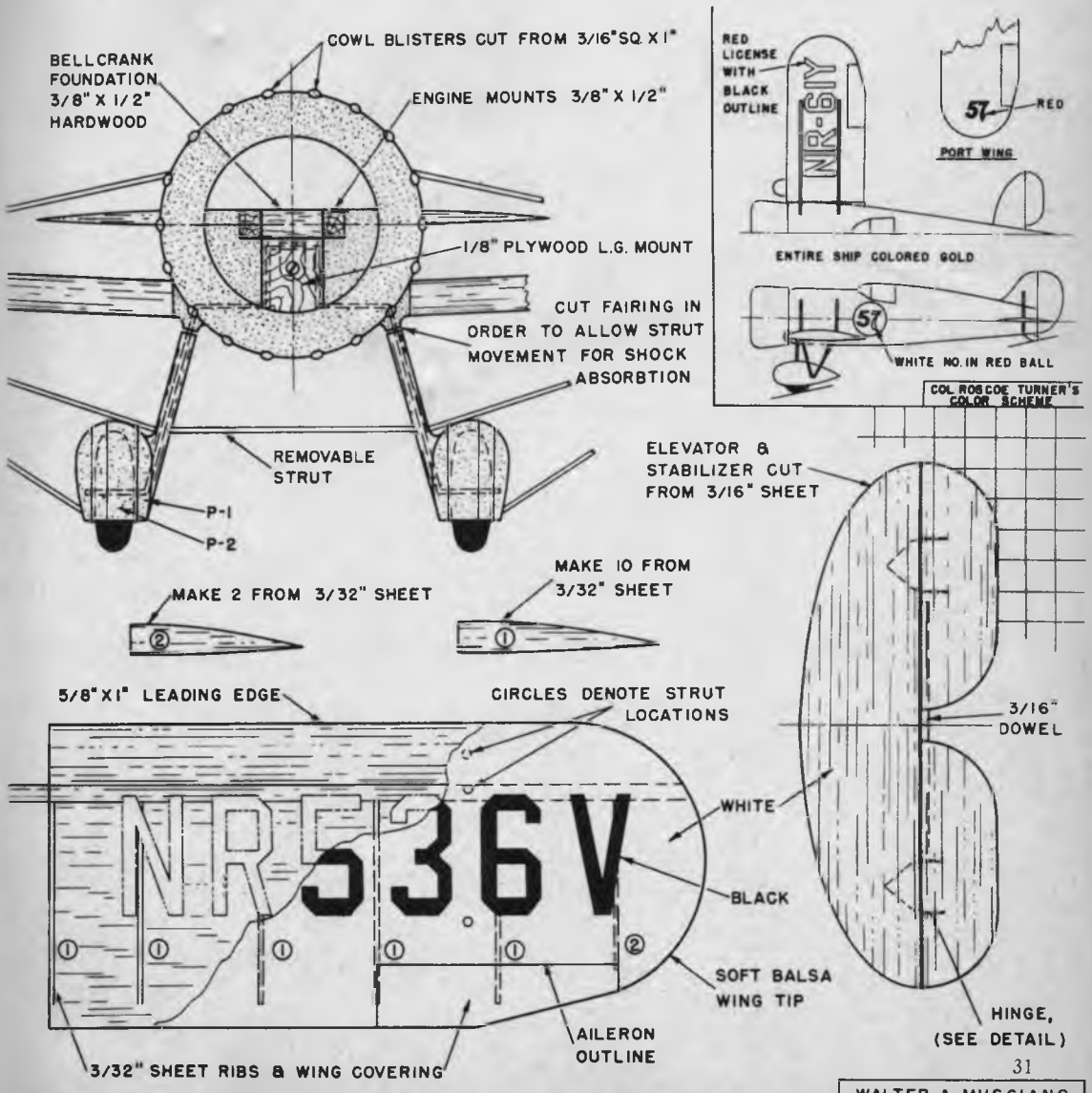
The struts are made from aluminum tubing squeezed to a streamline shape. The struts connecting the landing gear to the wing should now be attached as indicated so they can be removed when flying the model. The numbers and letters are decals obtainable from your model shop.

In view of the fact that the model is relatively small, the wheel pants may snag in the grass—so fly your model from a smooth area. Stainless steel lines forty feet long and from .012 in. and .016 in. in diameter (depending upon the power of the engine used) are recommended. Original model required a slight amount of lead ballast in the nose to make it balance correctly.

The plane should balance one inch behind the wing leading edge. When flying with the smaller engines, be sure to use full power at all times. Offset the rudder to pull the model away from the center of the circle •

FULL SIZE PLANS

of this model are available by sending fifty cents to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 412.



WALTER A. MUSCIANO

control-line

CURTISS P-6E

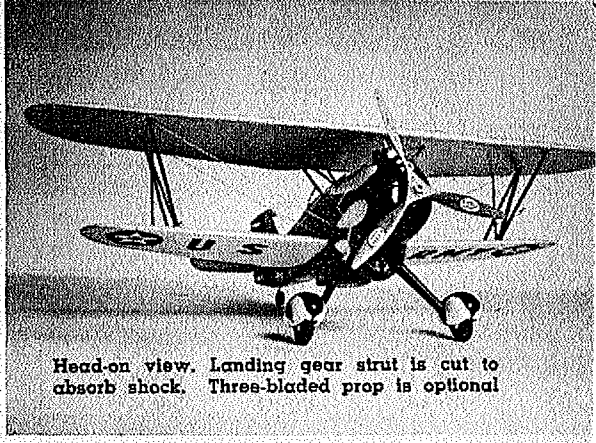
A 30-inch exact-scale gas model of the most famous of all "Hawks." Power with any .29-.49 cubic inch displacement engine. For sport of stunt flying.

CURTISS Hawk is a name long familiar in aviation because it represents a series of fighters (called "Pursuits" before World War II) that formed the aerial backbone of both Army and Navy for well over a decade. The series started in 1935 with the Curtiss Hawk P-1 being accepted by the Army and a similar version flying for the Navy. The next four models were very similar to the P-1 and the model of the P-6 series, called the P-6E, became the outstanding pursuit of its day. The 17th Pursuit Squadron at Selfridge Field, Michigan, helped publisize this prize plane and their color scheme will go down in history as one of the most vivid.

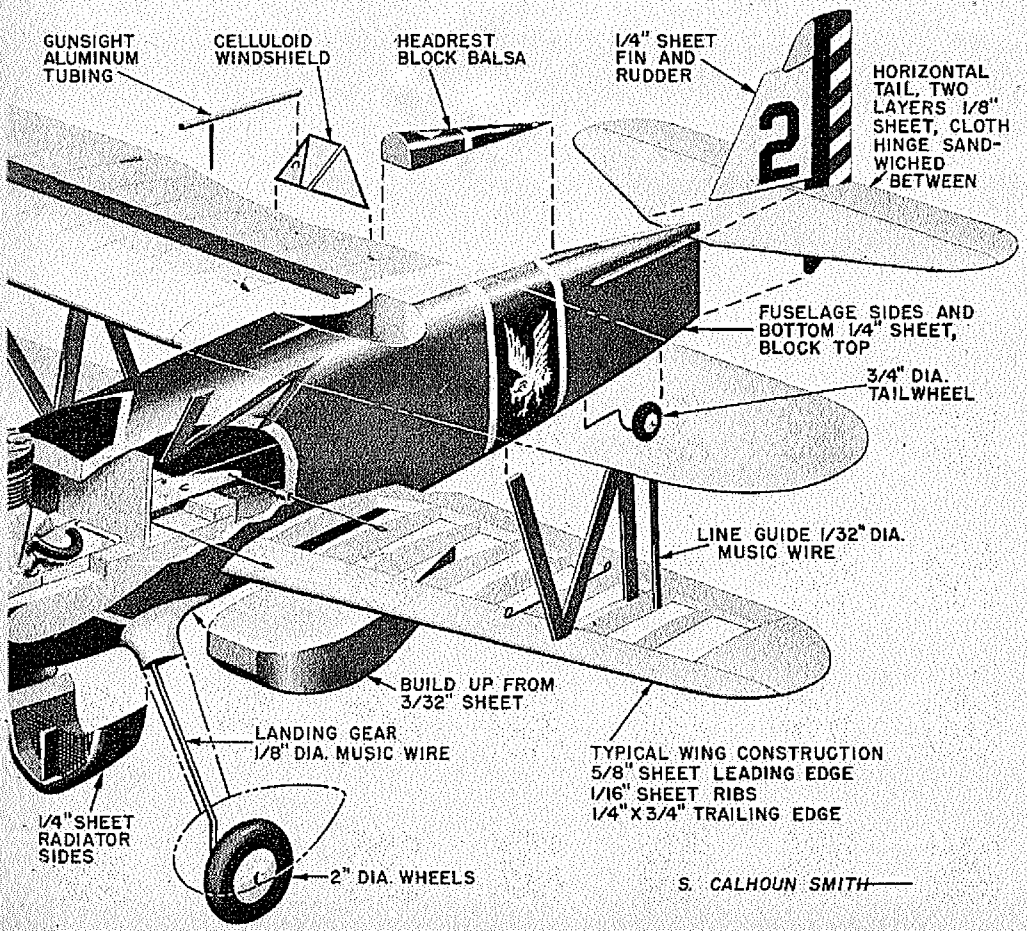
Our model, color scheme and all, is patterned after the planes used by the 17th Pursuit Squadron. The model makes an excellent beauty event entree as well as a fine sport job. Because of its

generous wing area the P-6E will also make a good stunt job if fitted with a symmetrical airfoil and stunt tank. Engines from .29 to .49 cu. in. displacement are recommended, using glow plug ignition. However, electric ignition will operate quite satisfactory but the addition of scale detail and a fine paint job add many ounces to the total weight, which can be offset by using a glow plug. A petroleum base glow fuel was used because high power was of secondary importance. If methanol base fuel is used be sure to use a finish that is impervious to the fuel.

After the plans have been carefully studied, work can be started on the fuselage. Cut the two fuselage sides from ¼ in. sheet balsa and cement one on each side of the hardwood engine mount. While this is drying, the bulkheads can be cut out and cemented in place. Construct the stabilizer from two sheets of ⅛ in. sheet balsa with a piece of crinoline to serve as a hinge. Add the control horn and cement the stabilizer in place on the fuselage. Install the bell-crank and connect the control rod. At this time the ⅛ in. wire landing gear can be bolted to the plywood support. Test the controls and cover the fuselage bottom with a soft balsa block and ¼ in. sheet as shown. The fuselage top and nose are also covered with soft balsa blocks. Carve and sand the fuselage to shape after the blocks are securely cemented together. During the carving process, check the fuselage cross-



Head-on view. Landing gear strut is cut to absorb shock. Three-bladed prop is optional



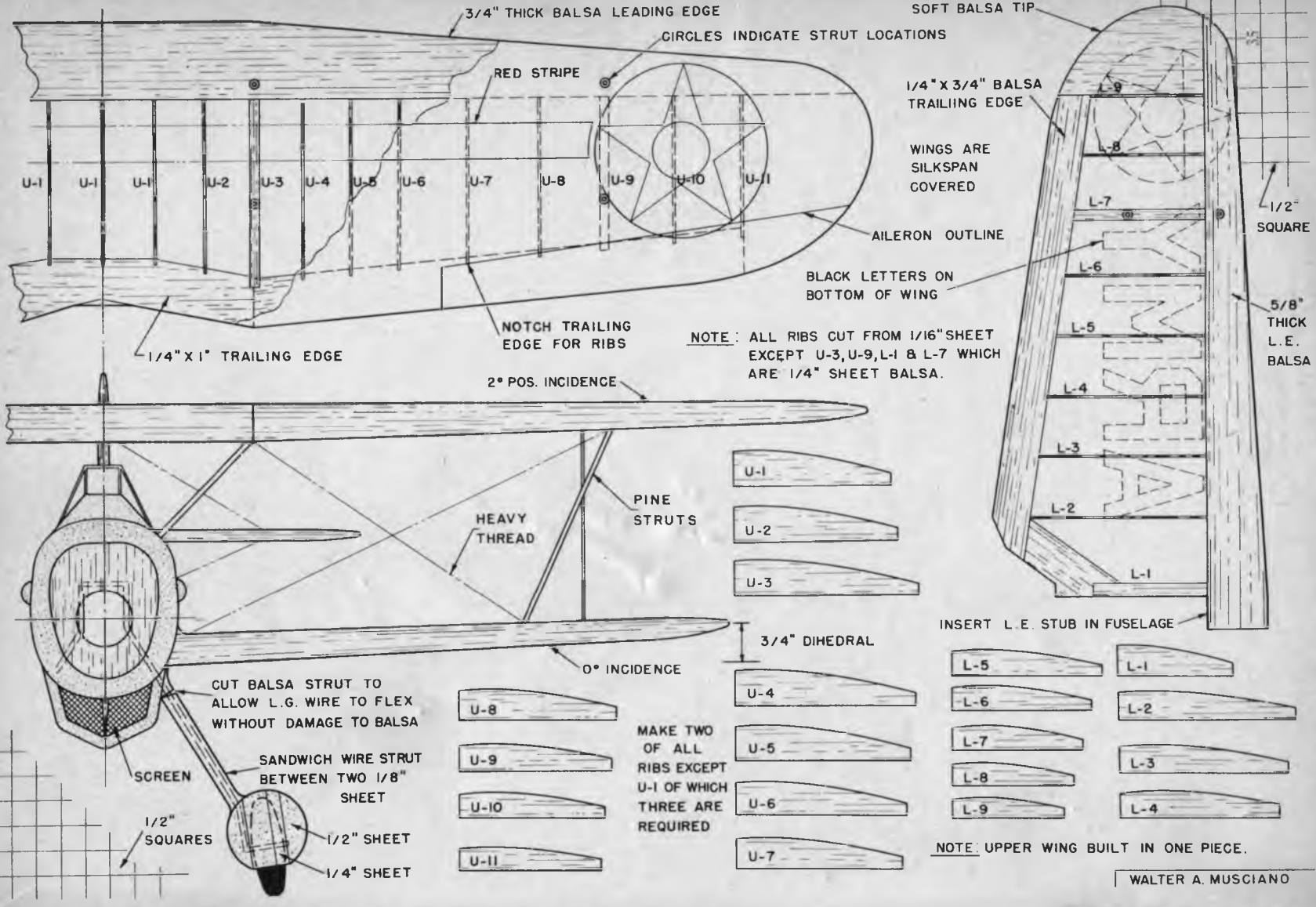
section for the correct shape by using a cardboard template.

The wings are made with a heavy leading and trailing edge and are covered with GM Silkspan. Cut the ribs from $\frac{1}{16}$ in. hard sheet balsa and taper the leading edge as shown in the front view. Now pin down the upper leading edge on your workbench. Because of the built-in dihedral you will find that only one half of the wing can be made at one time. Pin the ribs in place and then install the trailing edge by fitting the ribs in the notches. The wings should be constructed directly over the plan with a layer of waxed paper in between so the cement will not stick to the plan. The lower wing is constructed in two halves in the same manner. Be sure to install the root rib on the lower wing at the indicated angle in order to obtain the correct amount of dihedral. When the wings have been trimmed to the Clark Y airfoil shape (unless you plan to use your model for stunting, in which case a symmetrical airfoil is necessary) cover the surface with silkspan and apply four coats of clear dope. Sand lightly after each coat has dried. Finish by applying three coats of yellow dope.

Cut the landing gear fairings from the stock specified on the plans and cement to the strut after the wheels are in position. When this is dry the fairing can be cut to shape and sanded smooth. Using a sharp razor, cut the strut at the point indicated and bevel the edge as shown. This operation is necessary to allow the landing gear to flex without causing damage to the fairing. The fin and rudder are cut from $\frac{1}{4}$ in. sheet stock and after sanding to shape they are cemented in place. Add the tail wheel as the plan indicates, using plenty of cement.

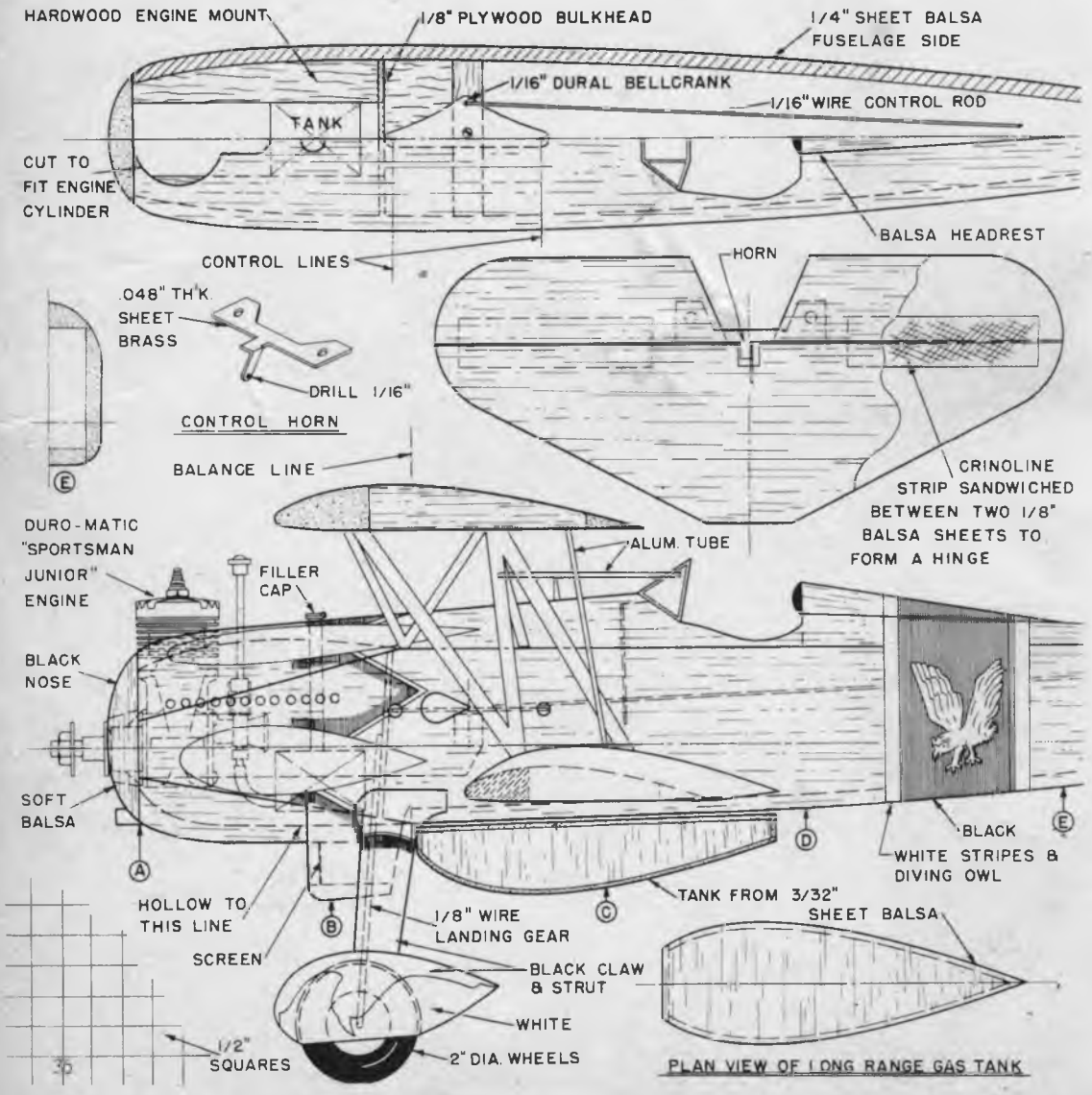
Apply two coats of clear dope to the fuselage and tail surfaces and sand thoroughly with 00 sandpaper. Follow by applying three coats of wood filler with wet sandings between coats. The entire tail assembly, except the rudder, is yellow. Paint the struts and attach to the upper wing. The fuselage should be now painted before the wings are attached. Apply the white paint first on the nose, landing gear and body where required. This coat does not have to be carefully applied as long as it covers the area required. When dry, mask off the color and proceed with the olive drab which in turn is masked and the black dope then applied. The lower wing can now be cemented to the fuselage by inserting the leading edge stub into the fuselage side. Make sure the wing is set at the proper dihedral angle. The upper wing with struts attached is now cemented in place. The struts should be pushed into the fuselage and lower wing about $\frac{3}{16}$ in. in order to obtain a strong joint. Rigging wires made from heavy grey thread and a windshield

Beautifully finished, the original model won many local beauty events. Power was a McCoy SPORTSMAN.


3/4" THICK BALSA LEADING EDGE
CIRCLES INDICATE STRUT LOCATIONS
RED STRIPE
U-1
U-1
U-1
U-2
U-3
U-4
U-5
U-6
U-7
U-8
U-9
U-10
U-11
1/4" X 1" TRAILING EDGE
NOTCH TRAILING EDGE FOR RIBS
AILERON OUTLINE
BLACK LETTERS ON BOTTOM OF WING
SOFT BALSA TIP
1/4" X 3/4" BALSA TRAILING EDGE
WINGS ARE SILKSPAN COVERED
L-9
L-8
L-7
L-6
L-5
L-4
L-3
L-2
L-1
1/2" SQUARE
5/8" THICK L.E. BALSA
NOTE: ALL RIBS CUT FROM 1/16" SHEET EXCEPT U-3, U-9, L-1 & L-7 WHICH ARE 1/4" SHEET BALSA.
2° POS. INCIDENCE
HEAVY THREAD
PINE STRUTS
0° INCIDENCE
3/4" DIHEDRAL
INSERT L.E. STUB IN FUSELAGE
CUT BALSA STRUT TO ALLOW L.G. WIRE TO FLEX WITHOUT DAMAGE TO BALSA
SCREEN
SANDWICH WIRE STRUT BETWEEN TWO 1/8" SHEET
1/2" SQUARES
1/2" SHEET
1/4" SHEET
MAKE TWO OF ALL RIBS EXCEPT U-1 OF WHICH THREE ARE REQUIRED
NOTE: UPPER WING BUILT IN ONE PIECE.
WALTER A. MUSCIANO

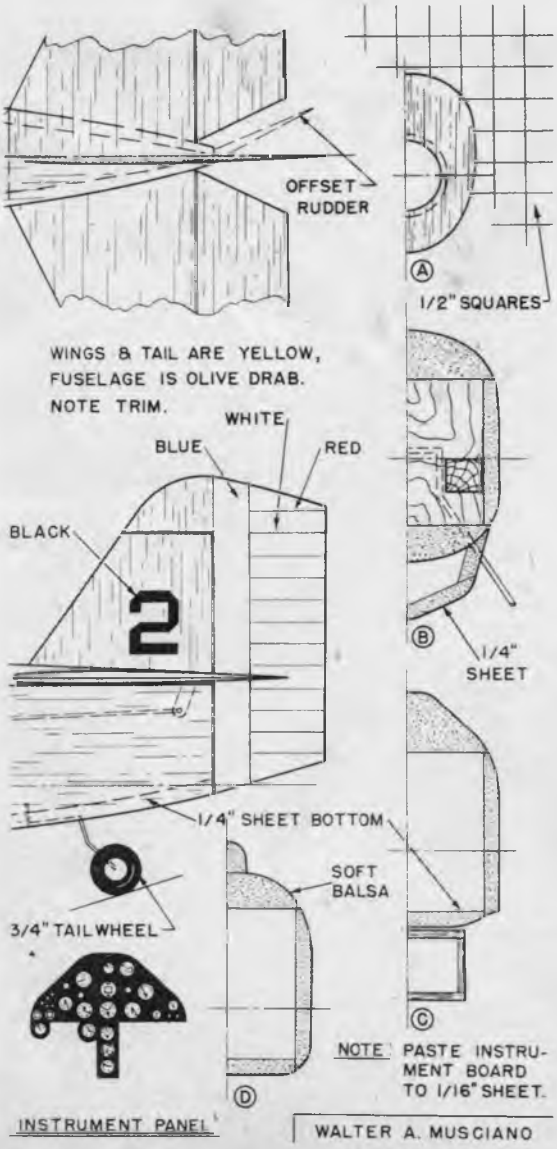
from celluloid add the final touch to construction. Black decals are used for the U. S. Army lettering on the bottom of the lower wing but it may be difficult to obtain the old style army insignia. If you can't find a decal, paint on the insignia.

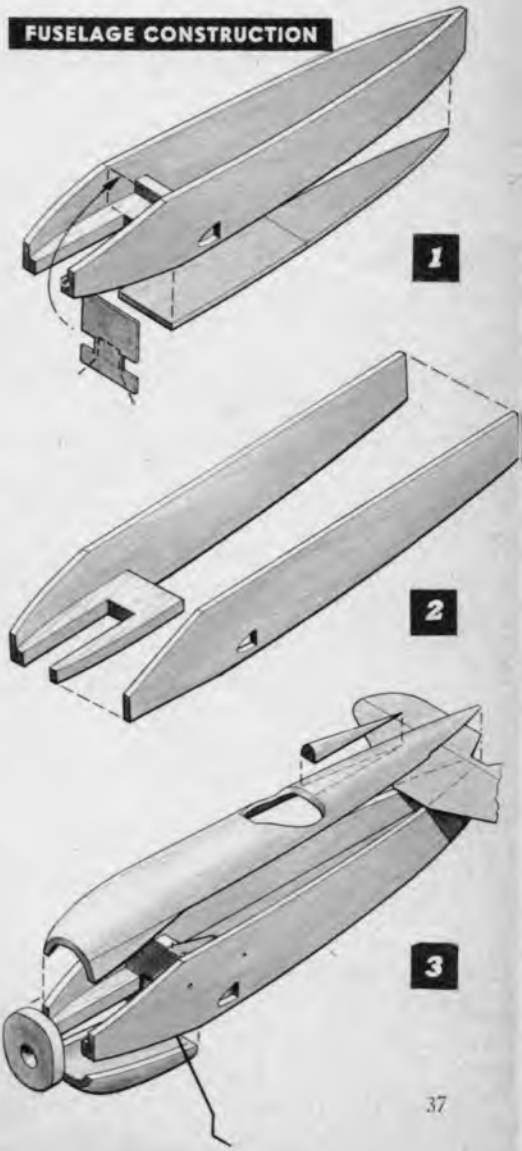
The auxiliary gas tank is optional and, if omitted, the plane, will still adhere to scale. The full scale airplane was equipped with a three-bladed propeller and therefore an X-cell three-bladed prop was used on the model with excellent results. Pitch was 10 in.; diameter 9 in. In order to provide access to the engine and tank, the forward upper portion



of the fuselage should be removable. Large dress snaps can be used to hold this hatch in place. If you intend to install an ignition system in your model, center it beneath the bellcrank and cut away the bottom of the fuselage to permit easy access to the coil and batteries. Medium batteries in a regular metal battery box (obtainable from your local hobby shop) are recommended.

Be sure the model balances at the point indicated on the side view of the plans before any flying is done. Select a smooth surface for the flying site because the wheel pants are bound to snag in grass no matter how short it is cut. Flights are most enjoyable when flying from sixty-foot lines. However, if a smooth take-off area is not large enough to accommodate lines of this length, the author recommends a Jim Walker U-Reely control handle. With this device the model can take-off on short lines and when in the air the lines can be lengthened, and at the end of the flight the model can be reeled in and landed. Use considerable power at all times in order to avoid mushing and loss of control. The rudder should be offset to cause the model to fly against the pull of the flying wires, this will insure taut lines at all times. If built and flown with care you are bound to have countless hours of flying enjoyment with this replica of a truly famous and historical airplane. •





control-line
SPIRIT OF ST. LOUIS

This 40-inch scale model of Lindbergh's famous plane makes a fine stunt and sport model. Power: any .23-.65 engine.

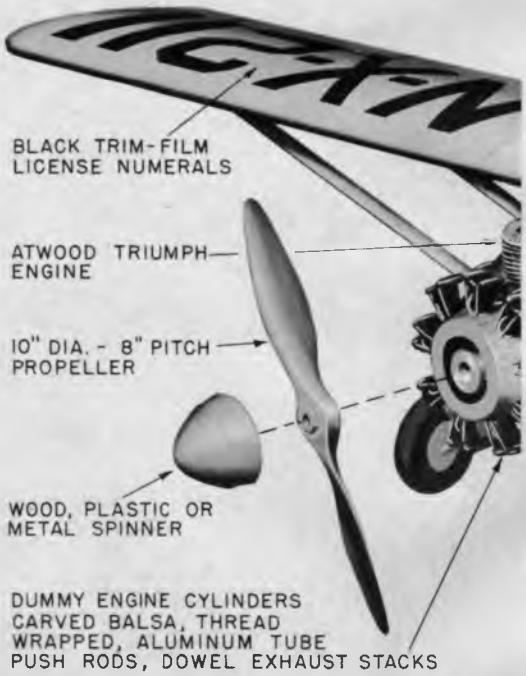
By Walter Musciano

"THE Kid Wins!"

In these three words a New York newspaper dated May 22, 1927 told its millions of readers that Charles A. Lindbergh safely flew from New York to Paris. History books relate how this youthful pilot —then 25—covered the 3610 miles in 33½ hours in his specially built Ryan monoplane named after the city of St. Louis. While his Paris flight was instrumental in labeling Lindbergh as the No. 1 aviator in the world it was only one of his many important feats that made him a leading airman in the aviation field.

As a technical consultant to commercial airlines (TWA, then Transcontinental Air Transport and PAA) it was Lindbergh who was instrumental in developing the route of these airlines.

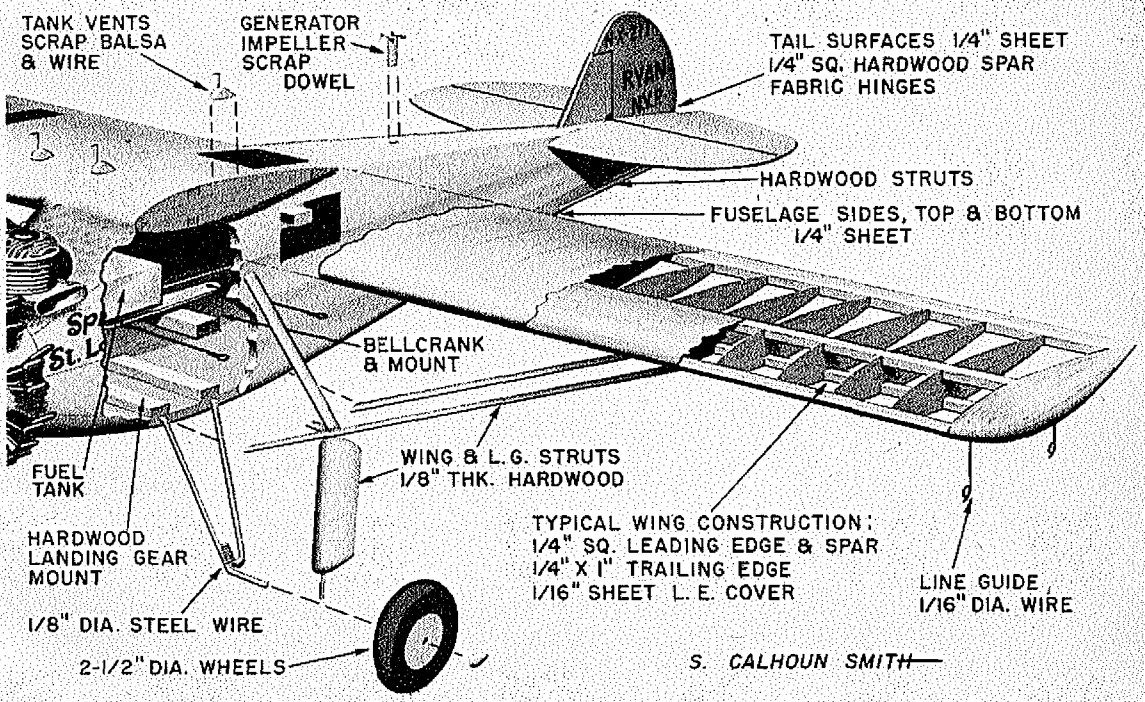
But perhaps Lindbergh's most important contribution to aviation came in recent



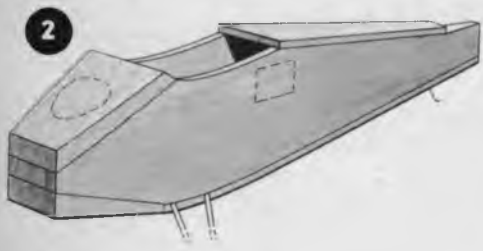
Original model, powered with an Atwood Triumph, was an excellent performer. Like it?

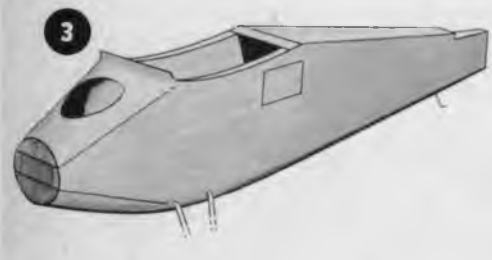
years, during World War II. To this day very few individuals are aware of his wartime achievements as a civilian consultant for aircraft companies supplying equipment to the armed forces. It was "Lindy" who improved the effectiveness of the Corsair fighter by initially adapting—and proving—it could carry a two-ton bomb load. And it was Lindy who helped teach the technique of maximum fuel consumption to fighter squadrons in the Pacific. These are just a few of his wartime contributions, contributions which were voluntary and often dangerous. Flying with a squadron of escort fighters (P-38s) Lindbergh is the only civilian credited with shooting down a Japanese plane!

The start of Lindbergh's impressive aviation career started with the Spirit of St. Louis and so it is quite appropriate that we present an exact scale control-line model of the famous plane.

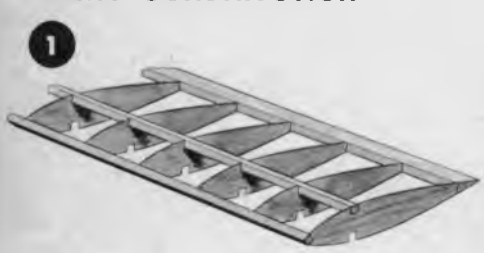


FUSELAGE CONSTRUCTION





WING CONSTRUCTION

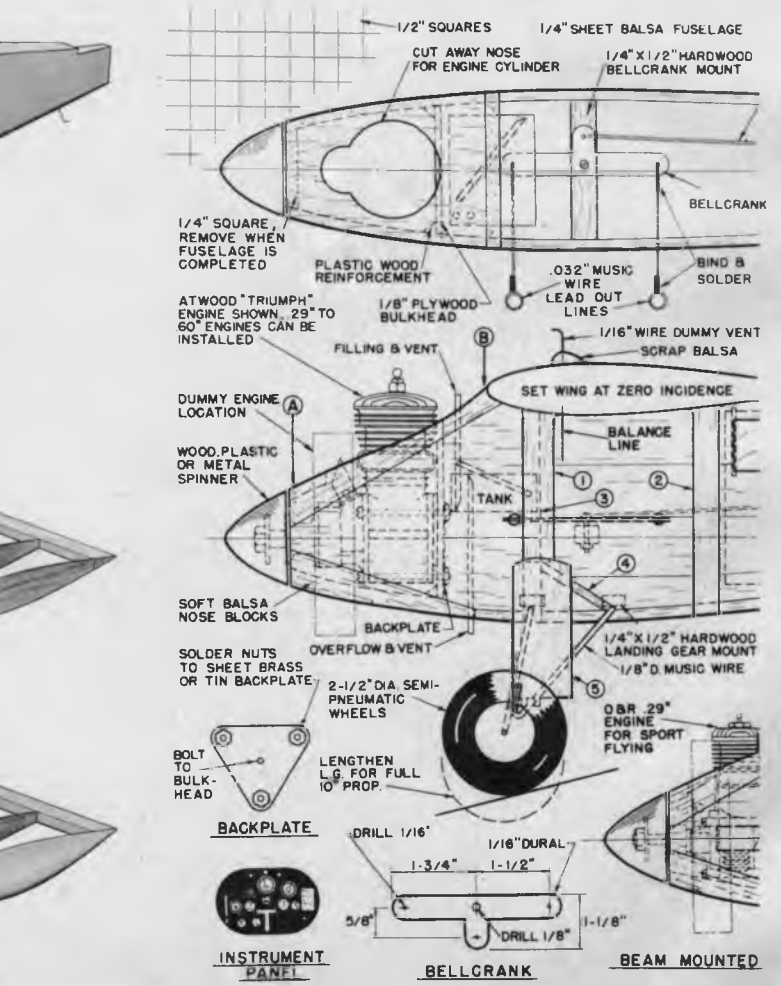


Actually, the Spirit of St. Louis was a redesigned standard Ryan M-1 mail and commercial service plane. The wing span was increased by ten feet because the Spirit of St. Louis was over twice as heavy as the M-1. The plane carried 451 gallons of gasoline to feed the 223 hp Wright Whirlwind engine.

In view of the large wing area and short tail moment arm we built our model as a stunt job. The model is so easy to fly we feel it makes an ideal beginner's goat if fitted with a class B engine and Clark Y airfoil.

Start construction with the fuselage. The sides are cut from ¼ in. medium soft balsa. After they are notched for the wing and stab. join the fuselage sides at the rear and install the ¼ in. square cross braces at station E. When dry, cement the remaining cross braces in place up to and including the plywood bulkhead at station B.

Now bend the wire landing gear. Bind and solder the legs together and then secure the gear to the hardwood supports with heavy

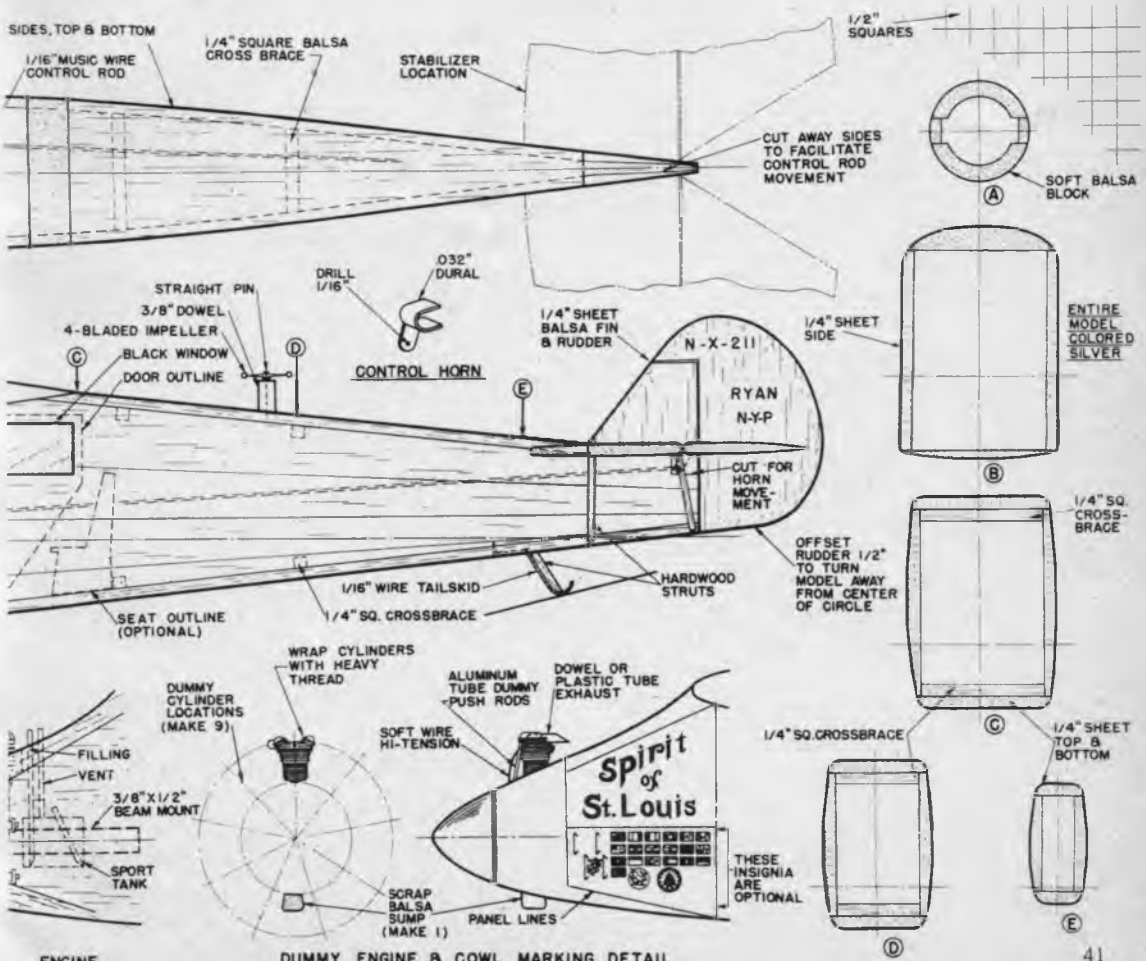


thread. The elevator and stabilizer are now cut to shape and sanded smooth. Install the hinge and horn and cement the stabilizer to the fuselage. Either fabricate the bellcrank or purchase one at your hobby shop. Attach the lead out lines to the bellcrank, bolt bellcrank to the mount and cement the assembly to the fuselage. Install the control rod and check the control system.

The engine of your choice—.20 to .65 cubic inch displacement—can now be installed. We mounted our power plan radially and this method is recommended; however, a beam mount is illustrated for those engines that cannot be mounted radially. Note that the bolts are soldered to a sheet of tin or brass which is then bolted or screwed to the rear of the plywood bulkhead. Don't forget that the location of the bulkhead depends upon the engine you use. Install the fuel tank now. A rectangular or cylindrical tank will do for sport flying however, a wedge tank must be installed if inverted flight, figure eights, outside loops, etc., are contemplated. Be sure the centerline of the stunt tank is in line with the needle valve body of the engine. The top of the sport tank should be about ⅛ in. below the needle valve body.

The fuselage top, bottom and nose blocks are now cemented in place. Use plenty of cement on the top and bottom but only tack the nose blocks in place. Cut the hole for the engine cylinder before installing the top nose block. Carve and sand the nose blocks and then remove them and hollow to the line shown. Cement back in place. Sand the fuselage once more and dope (clear) twice. Sand again. Install the fin and rudder.

All wing ribs can now be cut. The leading and trailing edges plus the spar should all be spliced before the wing is assembled. Pin the lower spar on the work table directly over the full size plans and cement



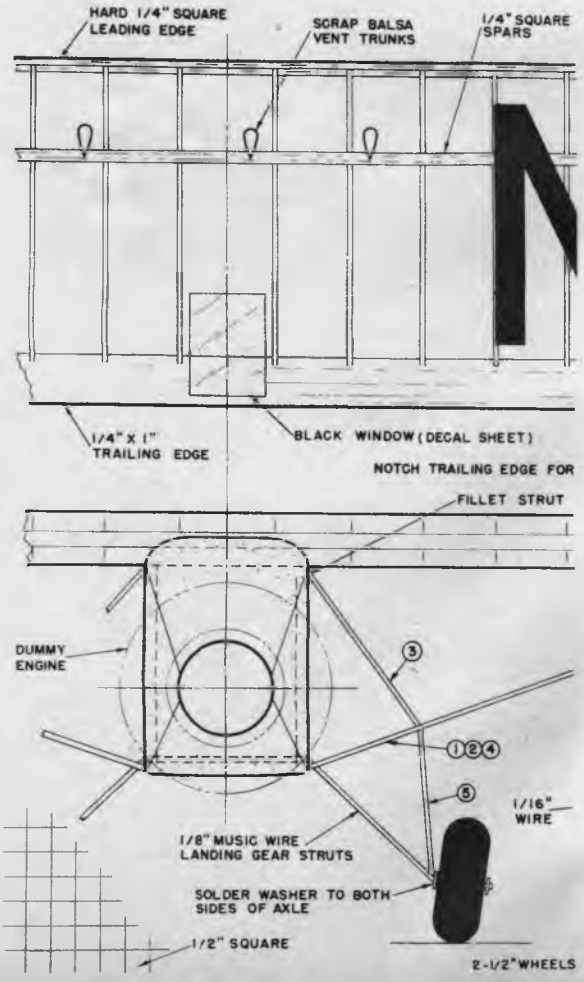
WALTER A. MUSCIANO

The landing gear strut is removable to permit the gear to absorb shock. Rudder is offset to the right to insure model flying against the circle.

all the ribs in place. The upper spar is now cemented to the ribs followed by the leading and trailing edges. Be sure to block up the lower spar $\frac{1}{16}$ in. when it is pinned to the work table, prior to adding the ribs. Use $\frac{1}{16}$ in. soft sheet balsa to cover the leading surface of the wing, both top and bottom. The soft balsa wing tip blocks are now added. When the structure is thoroughly dry, sand well. Cover the wing with heavy Silkspan paper using a 50-50 mixture of dope and cement as the adhesive. Apply five coats of clear dope to the wing with intermittent sandings with 6-0 sandpaper.

The wing can now be mounted on the fuselage. While drying, cut the required wing struts and landing gear fairings from pine strips. Cut and sand to the streamlined cross section shown on the plans.

All wood surfaces of the model should also be coated with a good grade wood filler which will insure a fine finish. The model is colored silver with black license numbers and markings. Seven coats of colored dope were used. Wait until each coat is dry before applying the next. When the last coat is dry (you may require from 6 to 10 coats depending on the quality of the dope) rub down the surface with a good grade of rubbing compound. The wing struts are now firmly cemented in place. The landing gear strut is re-

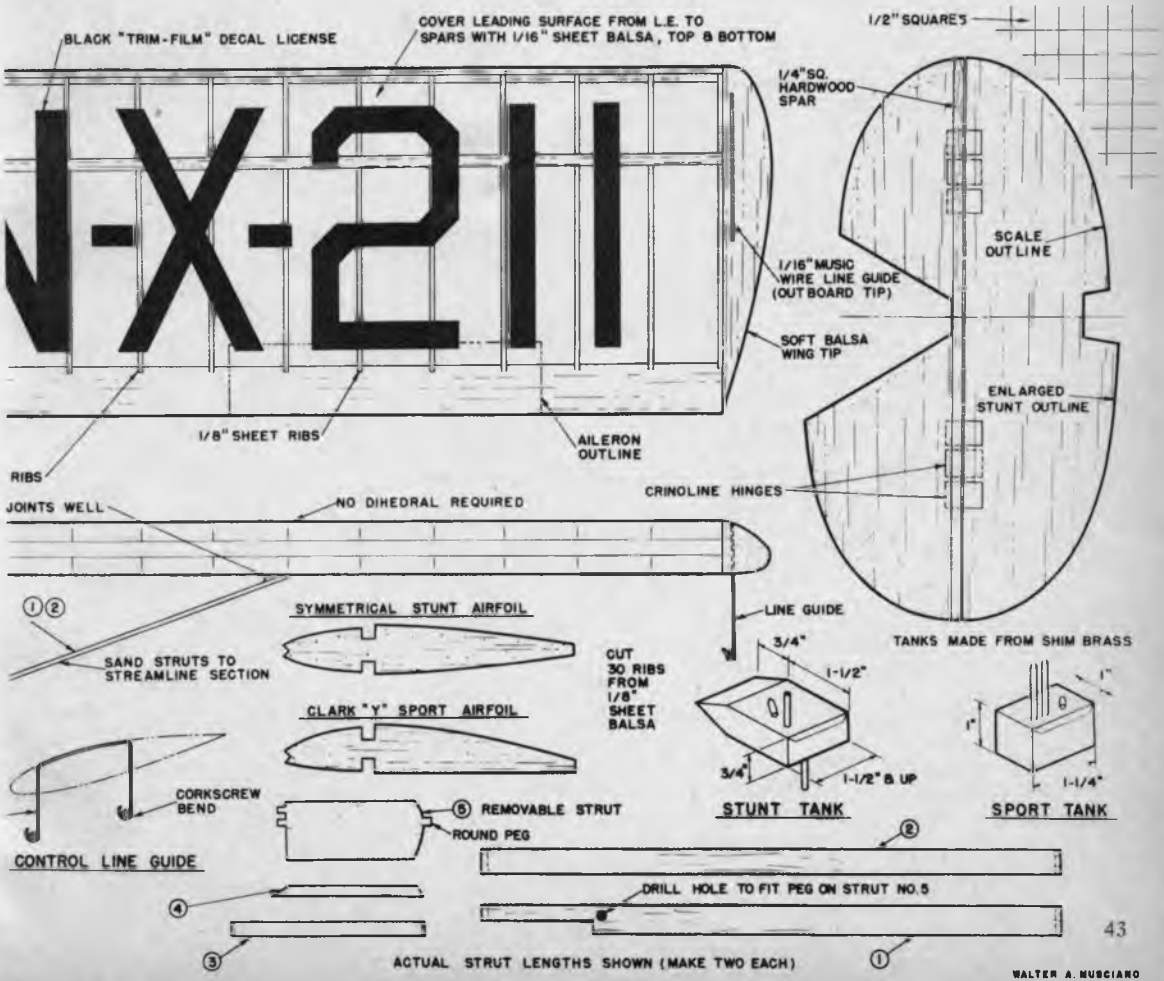


movable and is used only for exhibition. A single peg is pressed into the upper end while the lower end has two pegs. The twin pegs straddle the axle.

The radial engine adds much to the appearance of the model. Make the cylinders by rough cutting all the blocks from soft balsa. Cut out the front view on all cylinder blocks followed and then cut out the side view. Round off the cylinder barrels and then trim the rocker boxes. Sand all cylinders and clear dope once. Now, using heavy carpet or button thread or light fish line, carefully wrap the cylinders to simulate the cooling fins. Apply several coats of black dope and bevel the cylinder bottoms to fit the fuselage nose. Cement the cylinders in place. Drive a pin through the center of the cylinder and into the fuselage as reinforcement. The aluminum tube push rods and high tension wires complete the engine.

Add the license numbers, name and other markings, all of which were cut from black Trim Film. Cut off the engine hatch and remove the engine. Now apply a coat of transparent fuel proofer to the entire model, including the cowl interior. Install the engine, propeller and spinner and your model is complete!

Balance your model at the point indicated on the plan by adding lead to the nose or tail if necessary. Control lines should be .012 in. steel wire on the B powered model and .014 to .016 in. diameter wire on the higher powered versions. For sport flying use lines of from 30-50 feet long; for stunt flying use lines up to 80 feet in length. •



WALTER A. NUSCIANO

Howard Hughes RECORD RACER

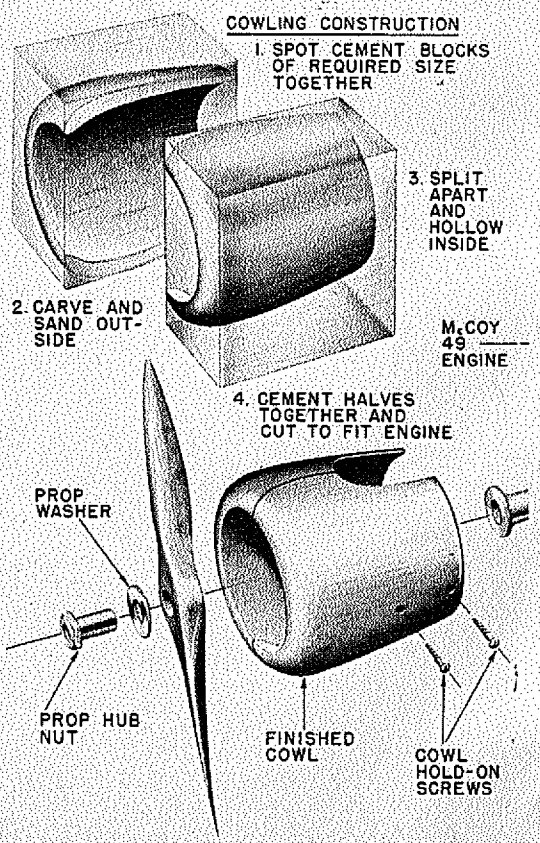
A 25-inch exact scale control-line version of the racer sportsman-pilot Howard Hughes made famous. Ideal for both beginners and expert.

By Stinson Smith

BACK in 1935, the year of the Flying Flea and the Boeing 299, another aviation milestone was passed. On the 13th of October of that year a tiny plane was flashing over a three kilometer course at Santa Ana, California, in an attempt to break the world's landplane speed record. Six times the ship roared over the course while the NAA timers below clicked their watches. The pilot was turning his ship back for a final dash when his gas tank went dry. He quickly switched to a reserve tank, but the 1000 h.p. P & W twin row Wasp Jr. refused to catch. The pilot made a skillful belly landing in a beet field, but the landing gear, which had been partially lowered, was wiped out.

Back at the judges' stand the NAA timers agreed that a new world's landplane speed record of 351.79 miles per hour had been set. The pilot who had just established this record was Howard Hughes and the plane, of course, was the now famous Hughes Racer.

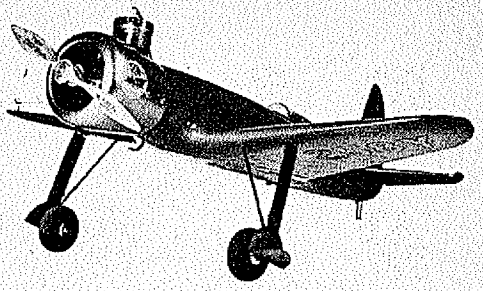
The Hughes Racer was chosen for a



model which could look realistic and yet fly fast. The design has a long moment arm, wide landing gear and stubby wings; all excellent characteristics for a control-line model. The wide chord and short span of the wings producing a high Reynolds Number which, in turn, produces low drag and high lift. The high, wide landing gear makes for excellent ground handling characteristics and slow takeoff and landings due to the high angle of attack while in the three point position. The model is built to a scale of 1"-1' and can handle almost any engine from a "29" to the big "60's". A McCoy 49 Redhead Jr. was used in the original MI model. Modelers will find their Hughes Racer to be exceptionally fast with any engine, and those who use a racing sixty such as a McCoy Sr., Hornet, Hassed, etc., may reasonably expect speeds close to 90 mph.

The first step in the construction of the Hughes Racer is the enlargement of the plane. This unpleasant chore can be neatly sidestepped by investing fifty cents in a set of full-sized MI plans at any hobby shop. After the necessary materials are purchased, construction can be started.

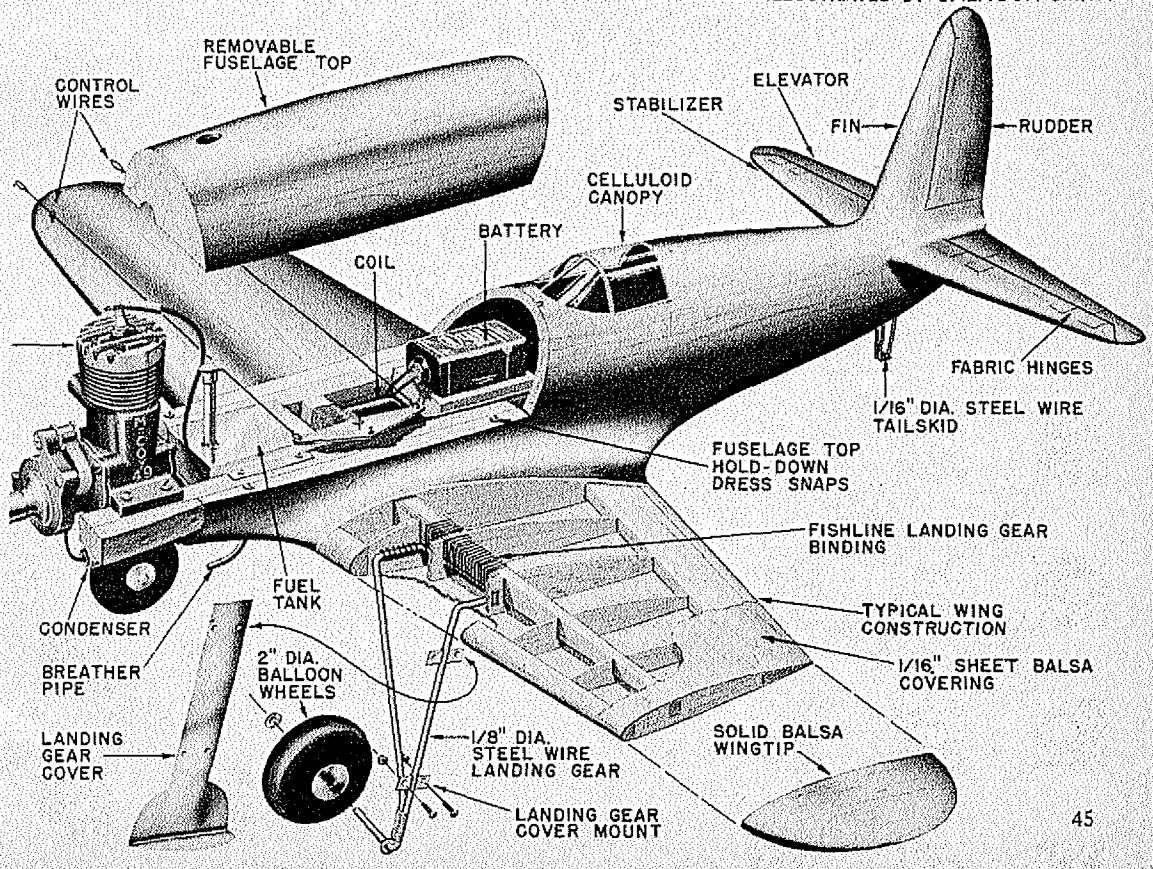
The fuselage is carved from two hard 2 x 4 x 24 in. balse planks joined as top and

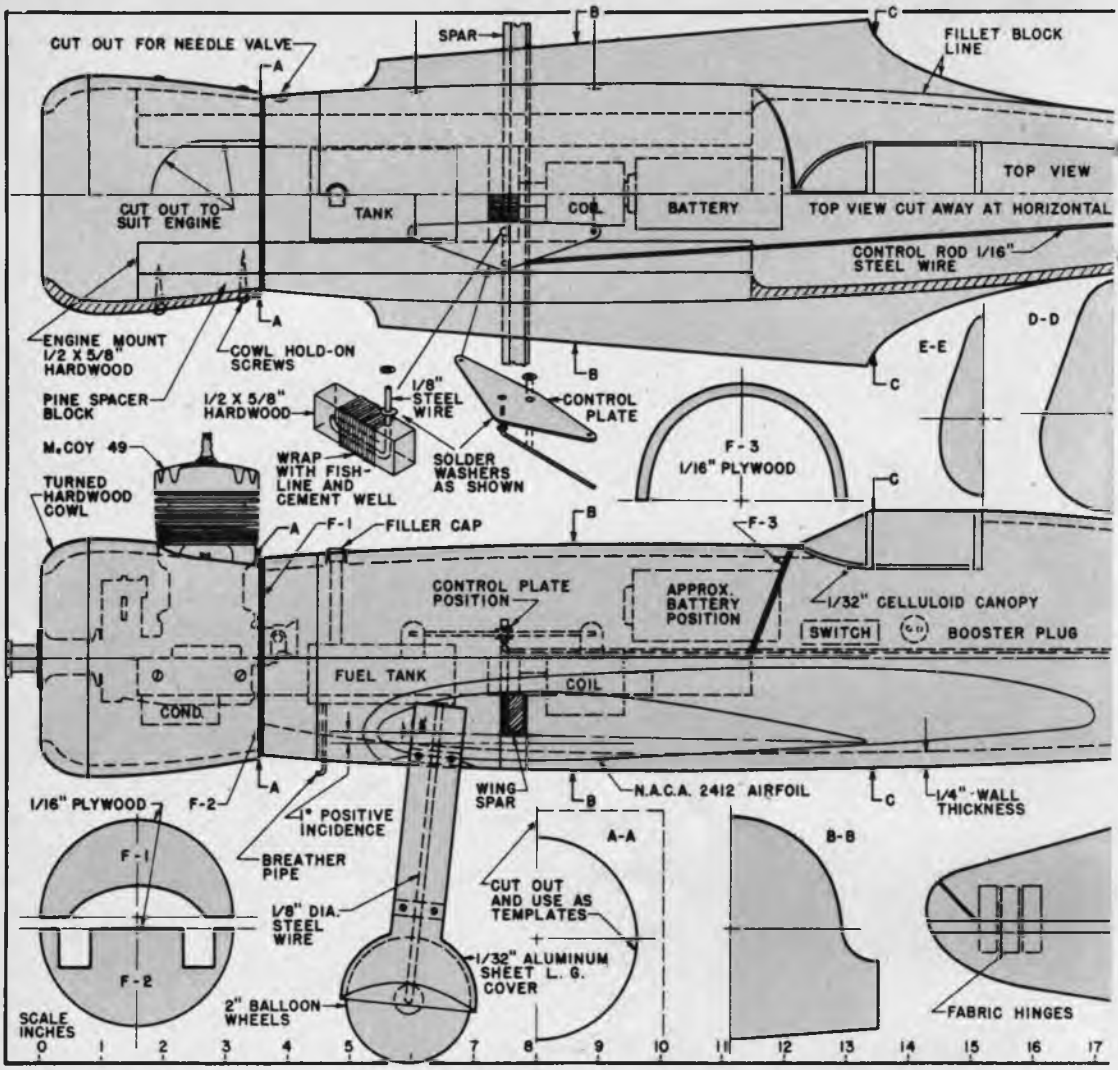


High gear struts and short nose cuts prop breakage to a minimum. Original mounted a McCoy 49.

bottom halves rather than two side-by-side blocks. Spot cement the blocks together, trace the side and top outlines and then cut the fuselage shape. Cut out the wing and rudder fillet blocks and cement them in place before starting to carve the exterior. Carve the fuselage to shape, using the templates on the plan to get the required cross-section. The fillets are left oversized and rough until after the wings and tail are mounted. After sanding the fuselage thoroughly (omitting the fillets), carefully split it apart. Cut two slots in the lower half of the fuselage to accommodate the engine mounts. Glue the mounts in

ILLUSTRATED BY CALHOUN SMITH

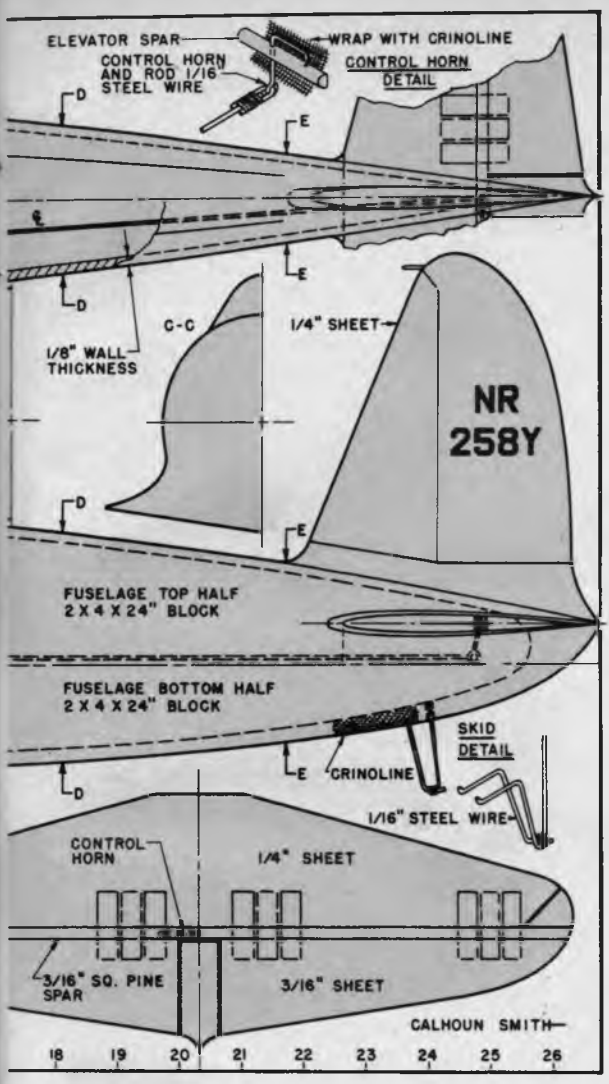




place with Casco or Weldwood glue and hold them with small C-clamps until thoroughly dry. If you plan to use any other engine than the McCoy 49 it will be necessary to make changes in the size and location of the engine mounts.

Interior is simple, yet efficient. Battery is held in place with rubber bands, cowl with screws.

The top half of the fuselage may be hollowed while the mounts are drying. An Exacto or King Kut gouge set is ideal for the hollowing process. Wall thickness of the top fuselage half varies from ¼ in. at the nose to ⅛ in. at the tail. Sand the inside smooth to remove all tool marks. Cut the top half just ahead of the cockpit as shown on the plans to form the removable portion of the fuselage top. Formers F-1 and F-3 are cut from 1/16 in. plywood and cemented to the front and rear of the removable portion. All of the lower edges of the removable portion may be covered with 1/32 in. mahogany veneer in order to insure a good fit and a hard edge when the hatch is in place. The bottom half of the fuselage may now be hollowed out. Wall thickness varies from ⅜ in. at the nose to ¼ in. at the rear. Sand the inside thorough-



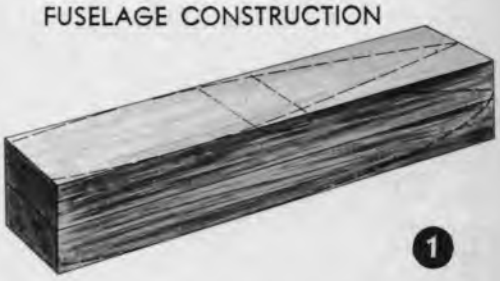
ly and cement former F-2 in place at the nose.

Trace the outline of the fin and rudder on ¼ in. hard balsa. Carve and sand to shape. Rudder offset should vary from ¼ in for the .29 engines to zero for the .60 powerplants. Cement the rudder in place on the fillet and finish carving the fillet down to fit. Sand thoroughly.

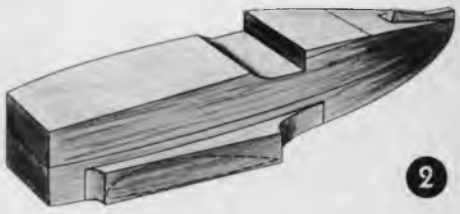
The one piece stabilizer is made of ¼ in. hard balsa. Elevators are made of 3/16 in. hard balsa and are cemented to a 3/16 in. square pine spar. Regular metal hinges or aircraft fabric hinges may be used. Install the 1/16 in. diameter piano wire control horn as shown, using plenty of cement. Mount the 1/16 in. diameter piano wire control rod on the control horn, as shown. The control rod is later joined to the control plate.

A portion of the bottom of the rear top fuselage half must be cut away in order to mount the stabilizer. Cement the stabilizer in place at zero degrees incidence and cement the portion of the fuselage which was cut away back into place. Paint the inside of the rear portion of the top and bottom halves with white Aero Gloss fuel resistant dope. The insides of the front halves should not be painted until after the control plate mount, coil mount, and bat-

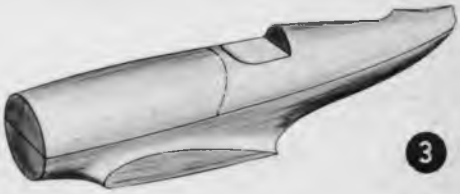
FUSELAGE CONSTRUCTION



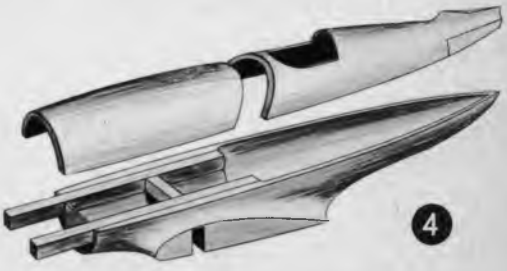
Obtain two hard balsa blocks (see plans for exact dimensions) and spot-cement together. Trace both the top and side view outlines as indicated.



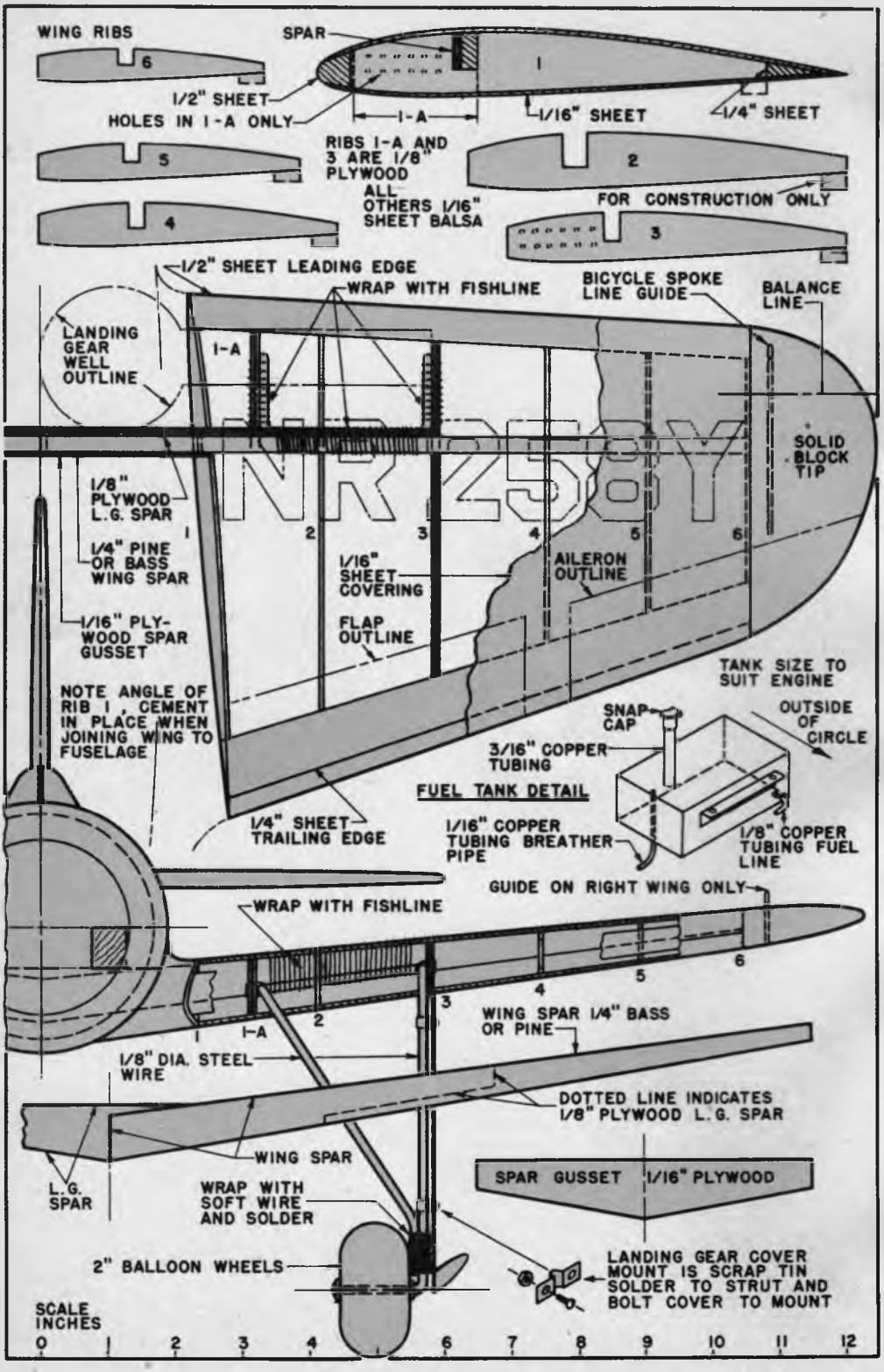
Saw both side and top view outlines with a jig or band saw and then cut out the wing and vertical fillet blocks. Cement blocks in place before carving.



Trace the fuselage templates on hard cardboard, cut out and use while carving the exterior. Leave all fillets oversize; trim and sandpaper to size later.



Cut the upper half for the removable section and then pry the blocks apart. Hollow out as indicated and install motor mounts to fit your engine.


WING RIBS
SPAR
1/2" SHEET
HOLES IN 1-A ONLY
1-A
1/16" SHEET
1/4" SHEET
RIBS 1-A AND 3 ARE 1/8" PLYWOOD
ALL OTHERS 1/16" SHEET BALSA
FOR CONSTRUCTION ONLY
1/2" SHEET LEADING EDGE
WRAP WITH FISHLINE
BICYCLE SPOKE LINE GUIDE
BALANCE LINE
LANDING GEAR WELL OUTLINE
SOLID BLOCK TIP
1/8" PLYWOOD L.G. SPAR
1/4" PINE OR BASS WING SPAR
1/16" PLY-WOOD SPAR GUSSET
1/16" SHEET COVERING
AILERON OUTLINE
FLAP OUTLINE
NOTE ANGLE OF RIB 1, CEMENT IN PLACE WHEN JOINING WING TO FUSELAGE
TANK SIZE TO SUIT ENGINE
SNAP CAP
OUTSIDE OF CIRCLE
3/16" COPPER TUBING
FUEL TANK DETAIL
1/4" SHEET TRAILING EDGE
1/16" COPPER TUBING BREATHER PIPE
1/8" COPPER TUBING FUEL LINE
GUIDE ON RIGHT WING ONLY
WRAP WITH FISHLINE
WING SPAR 1/4" BASS OR PINE
1/8" DIA. STEEL WIRE
DOTTED LINE INDICATES 1/8" PLYWOOD L.G. SPAR
WING SPAR
L.G. SPAR
WRAP WITH SOFT WIRE AND SOLDER
SPAR GUSSET 1/16" PLYWOOD
2" BALLOON WHEELS
LANDING GEAR COVER MOUNT IS SCRAP TIN SOLDER TO STRUT AND BOLT COVER TO MOUNT
SCALE INCHES
0 1 2 3 4 6 7 8 9 10 11 12

FULL SIZE PLANS

are available. Send 50c to MODEL BUILDERS' Plans Service, Fawcett Place, Greenwich, Conn. Order No. 381.

tery mount are installed. Now cement the rear top half of the fuselage permanently in place on the lower half of the fuselage.

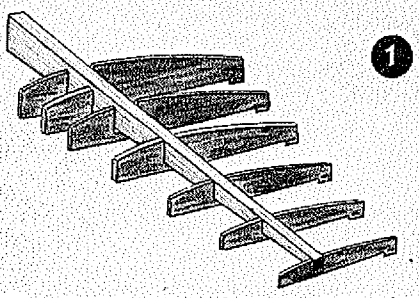
The plumbing of the airplane may be installed to suite the modeler's fancy. However, the coil and batteries should be mounted securely in approximately the positions indicated for proper balance of the model. A pressure breather pipe and outside filler pipe are features of the gas tank shown in the plans. The pressure breather pipe keeps above atmospheric pressure inside the tank and provides a constant flow of fuel to the engine without bubbles.

The control plate pivot pin should be bent to shape and size indicated and joined to a piece of ½ x ⅝ in. hardwood with fishline and cement. This assembly should be securely cemented in place between the engine mounts in the position shown. Assembly of the control rod and the control plate can be completed now. The elevators should have about ½ in. up and 3/16 in. down travel.

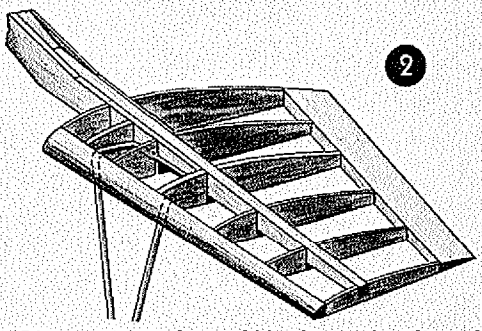
The removable fuselage toy is held in place by four dress snaps. Glue the snaps securely in place. The glue should be covered later with Aero Gloss dope in order to prevent softening.

If a lathe is available, the cowl may be turned from a 3½ x 4 x 4 in. block of hard balsa or soft pine. If a lathe is not available cement two pieces of 2 x 3½ x 4 balsa and carefully carve to shape. Split apart and hollow to the wall thickness indicated. And then cement permanently together. Cut out the top to suit your engine and follow by cementing the spacer blocks securely to the sides of the engine mounts. Four wood screws hold the cowl in place on the mounts. [*Continued on page* 142]

WING CONSTRUCTION

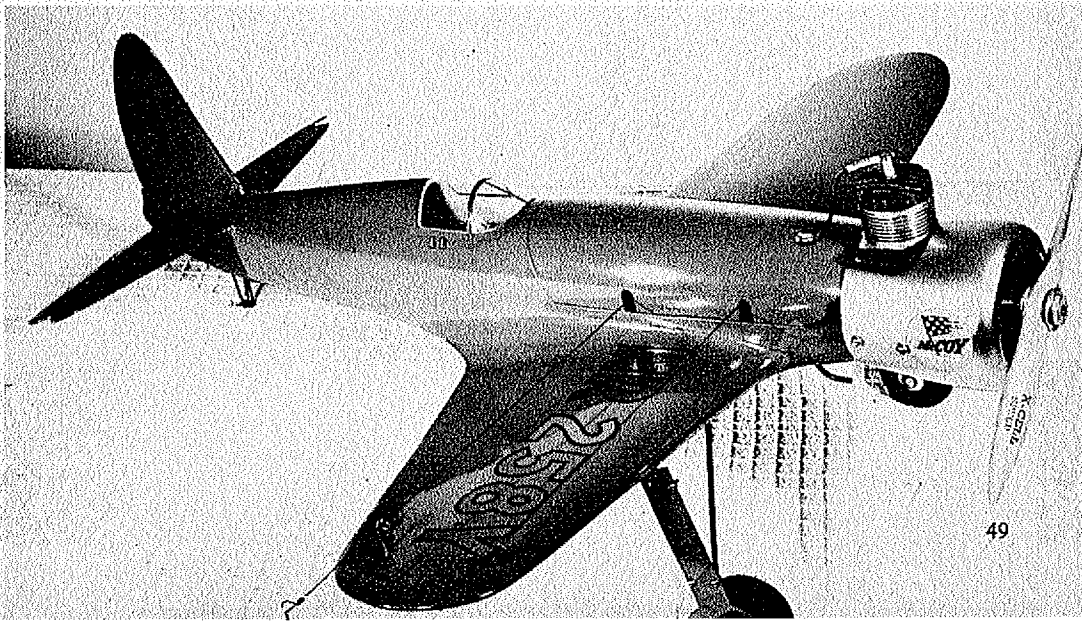


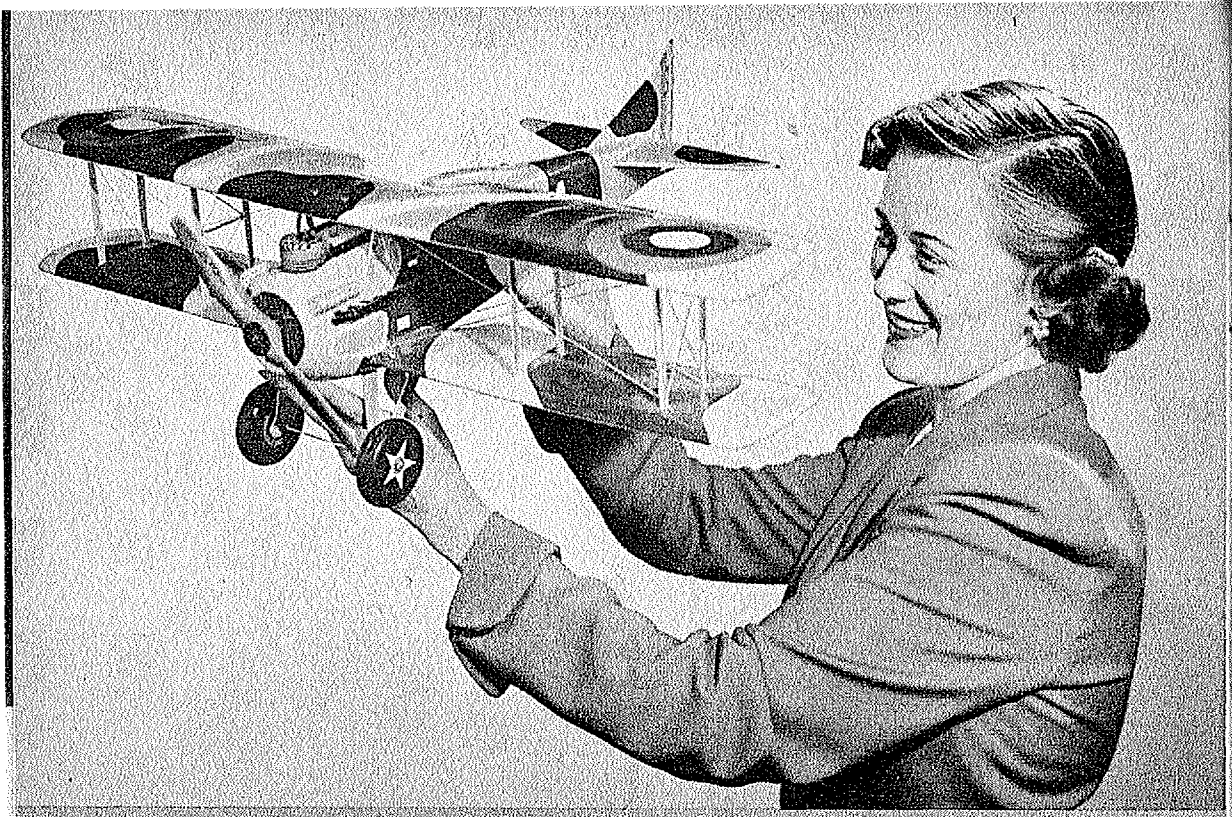
Wing is made in two halves and joined after both are partially complete. Pin ribs over plan at the indicated angle and cement spar in place.



After spar is in place, add leading and trailing edges and then remove structure from plan. Cut off edge of ribs, sand joints smooth and add the landing gear.

Mirror-finished with Aero Gloss fuel-resistant dope, the original model was pure red with a bright gold cowl. Note position of fuel tank cap.





rickenbacker's SPAD 13

INDIANAPOLIS race car driver and record holder, U. S. Ace of Aces during the first World War and self made successful industrialist is the amazing history of Edward Vernon Rickenbacker, often known as Captain Eddie.

During the first World War this ace shot down 21 enemy planes and four observation balloons in combat, more than any other American flier. Although his first victories were won using a Nieuport 28, Captain Eddie's major battles were fought in the famous French Spad 13-C1. Rickenbacker used two airplanes, both identical, resplendent in the white "number one" signifying the squadron leader and the famous "hat in the ring insignia" of the renowned 94th Pursuit Squadron. He would return from a patrol in one Spad, and quickly take off again in his other flying steed to engage the enemy in battle. Once he attacked seven enemy planes single handed and shot down two! For this he received the Congressional Medal of Honor.

This great man of aviation was an awesome fighter with nerves of steel. Often he would not fire his guns until he was less than 150 yards from his adversary, a marvelous judge of distance acquired during his pre-war race car days. Rickenbacker always checked his engines personally and examined every bullet that went into his Vickers machine guns. Flying almost seven hours a day at altitudes up to 20,000 feet without oxygen never fatigued this indestructible fighter.

Today Eddie Rickenbacker is president and general manager of Eastern Air Lines and incidentally, this is the only U. S. Airline that has shown a profit for the past fifteen years. He expanded the airline from 22 planes in 1937 to 90 planes today and has doubled the route miles.

The Spad 13 pursuit plane, the type used by Rickenbacker, Luke, Guynemere and other U. S. and French aces, was one of the most famous of allied airplanes. Powered with a 230 horsepower Hispano-Suiza eight cylinder, Vee type, liquid cooled engine this fighter attained a top speed of

135 m.p.h. Armament consisted of two Vickers machine guns synchronized to fire between the propeller blades. The airplane was very rugged and could withstand severe punishment. It may interest the reader to know why the Spad as well as scores of other planes of the same period had the trailing edges of the wings and tail scalloped. In view of the fact that the trailing edge was a non structural or load supporting member (unlike the spars and leading edge) and its only function was to hold the fabric covering in place the designers decided to use wire because of its thinness and tensile strength. Consequently when the fabric was doped and began to shrink it pulled in the wire between the ribs inadvertently forming the attractive scalloped effect. Many people think that the designers tried to imitate bird wings. However, this is not so.

This control line model of the famous Spad can be powered with engines from .19 to .33 cubic inch displacement. Although we used a .19 because we were after realistic flying, there is plenty of room in the nose and any larger engine can be installed which will really make the Spad "zip along." Built to the scale of one inch equals one foot, our model has a wing area of 235 square inches. An eight inch diameter, 6 inch pitch propeller was used on the prototype model with excellent results. Model weighs 21 oz. ready to fly.

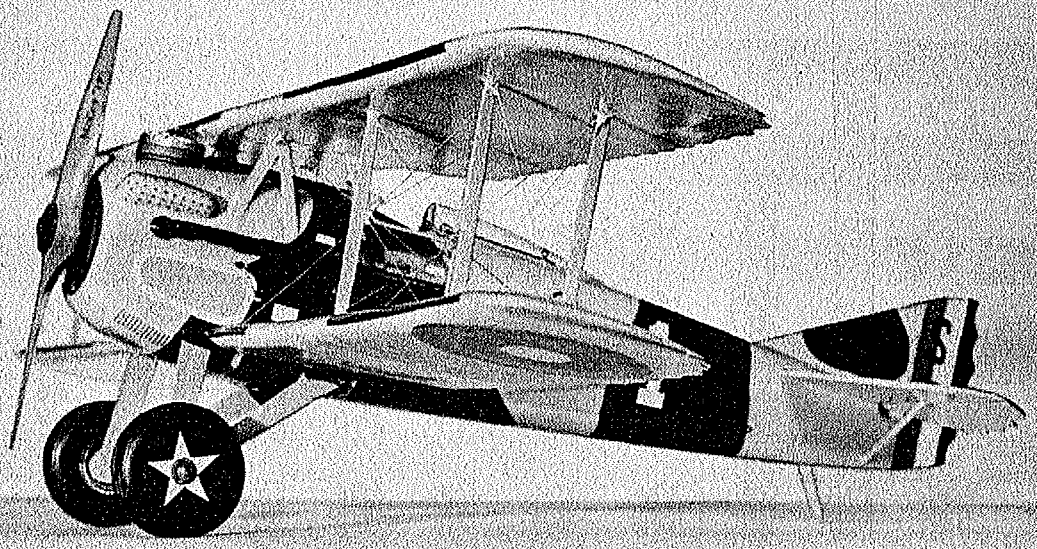
Begin construction by cutting the two hard ⅛ in. sheet balsa fuselage sides to shape. Cement together at the rear at the angle shown in the top view and install the formers securely working forward up to the plywood bulkhead. Our engine was beam mounted and the mounts are cemented in place to the formers securely at this time. Naturally the mount location will vary depending on the engine you intend to use. Bolt the bellcrank in place including the lead out lines.

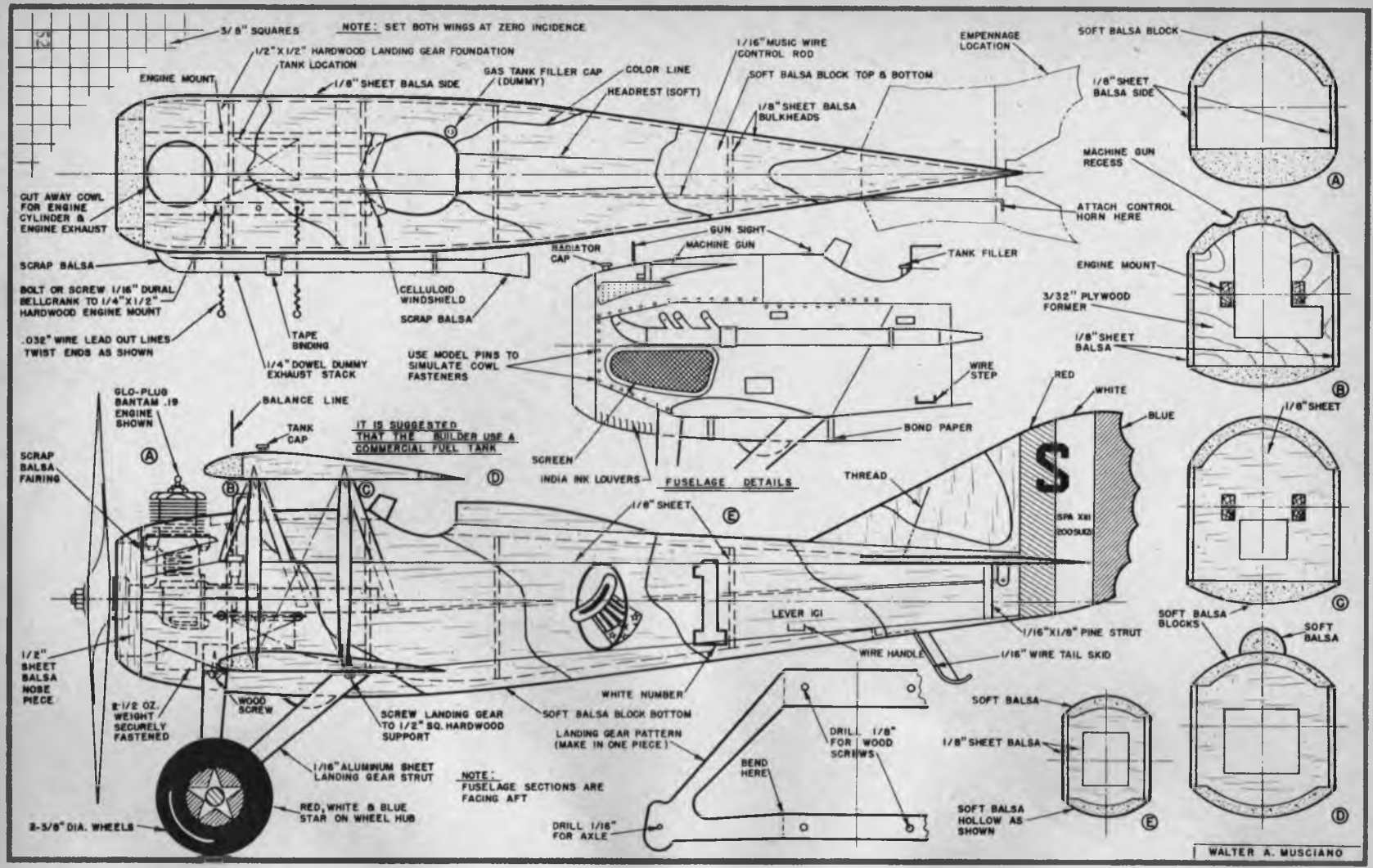
Cut out the tail surfaces and sandpaper them to a streamline cross section. Cement the elevator halves to the hardwood spar and attach the horn. Hinge the elevator to the stabilizer using crinoline (Band-Aid backings). Cement the stabilizer securely to the fuselage and install the wire control rod. Test the controls.

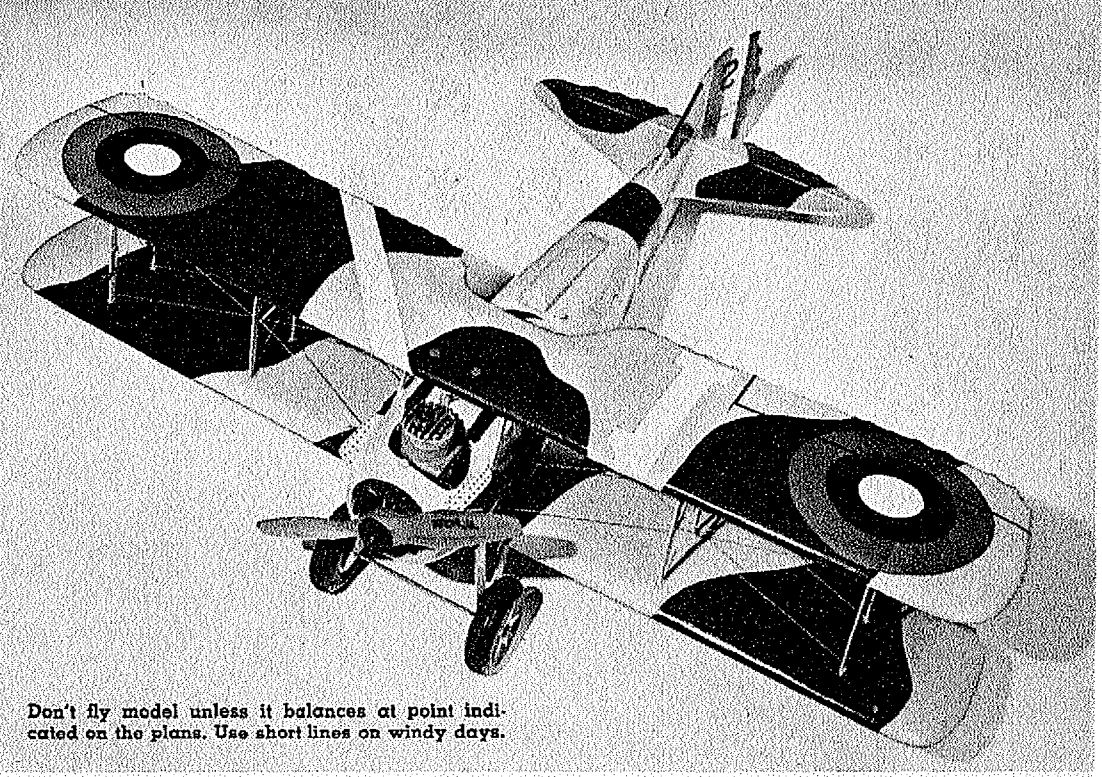
A 26½-inch control-line scale model of a famous World War I plane. For .19 to .33 engines.

By Walter A. Musciano

Built to scale of one inch equals one foot, this model Spad has a wing area of 235 square inches.




3/8" SQUARES
NOTE: SET BOTH WINGS AT ZERO INCIDENCE
1/2" X 1/2" HARDWOOD LANDING GEAR FOUNDATION
TANK LOCATION
ENGINE MOUNT
1/8" SHEET BALSA SIDE
GAS TANK FILLER CAP (DUMMY)
COLOR LINE
HEADREST (SOFT)
1/16" MUSIC WIRE CONTROL ROD
SOFT BALSA BLOCK TOP & BOTTOM
1/8" SHEET BALSA BULKHEADS
EMPENNAGE LOCATION
SOFT BALSA BLOCK
1/8" SHEET BALSA SIDE
MACHINE GUN RECESS
ATTACH CONTROL HORN HERE
CUT AWAY COWL FOR ENGINE CYLINDER & ENGINE EXHAUST
SCRAP BALSA
BOLT OR SCREW 1/16" DURAL BELLCRANK TO 1/4" X 1/2" HARDWOOD ENGINE MOUNT
.032" WIRE LEAD OUT LINES TWIST ENDS AS SHOWN
TAPE BINDING
1/4" DOWEL DUMMY EXHAUST STACK
CELLULOID WINDSHIELD
SCRAP BALSA
RADIATOR CAP
GUN SIGHT
MACHINE GUN
TANK FILLER
USE MODEL PINS TO SIMULATE COWL FASTENERS
ENGINE MOUNT
3/32" PLYWOOD FORMER
1/8" SHEET BALSA
WIRE STEP
RED
WHITE
BLUE
BOND PAPER
1/8" SHEET
GLO-PLUG BANTAM .19 ENGINE SHOWN
BALANCE LINE
TANK CAP
IT IS SUGGESTED THAT THE BUILDER USE A COMMERCIAL FUEL TANK
SCRAP BALSA FAIRING
SCREEN
INDIA INK LOUVERS
FUSELAGE DETAILS
THREAD
1/8" SHEET
LEVER IGI
1/16" X 1/8" PINE STRUT
WIRE HANDLE
1/16" WIRE TAIL SKID
SOFT BALSA BLOCKS
SOFT BALSA
1/2" SHEET BALSA NOSE PIECE
2-1/2 OZ. WEIGHT SECURELY FASTENED
WOOD SCREW
SCREW LANDING GEAR TO 1/2" SQ. HARDWOOD SUPPORT
WHITE NUMBER
SOFT BALSA BLOCK BOTTOM
LANDING GEAR PATTERN (MAKE IN ONE PIECE)
DRILL 1/8" FOR WOOD SCREWS
SOFT BALSA
1/8" SHEET BALSA
1/16" ALUMINUM SHEET LANDING GEAR STRUT
NOTE: FUSELAGE SECTIONS ARE FACING AFT
BEND HERE
SOFT BALSA HOLLOW AS SHOWN
2-5/8" DIA. WHEELS
RED, WHITE & BLUE STAR ON WHEEL HUB
DRILL 1/16" FOR AXLE
A
B
C
D
E
WALTER A. MUSCIANO



Don't fly model unless it balances at point indicated on the plans. Use short lines on windy days.

It is suggested that the wings be made at this time. The wings are made in one panel from tip to tip and it is recommended that the leading edge be cut from one piece of balsa without splices. Cut the ribs from the specified stock and pin directly over the plan on the workbench. Pin the roughly shaped leading and trailing edges plus tips and other required pieces in place and use plenty of cement during this procedure.

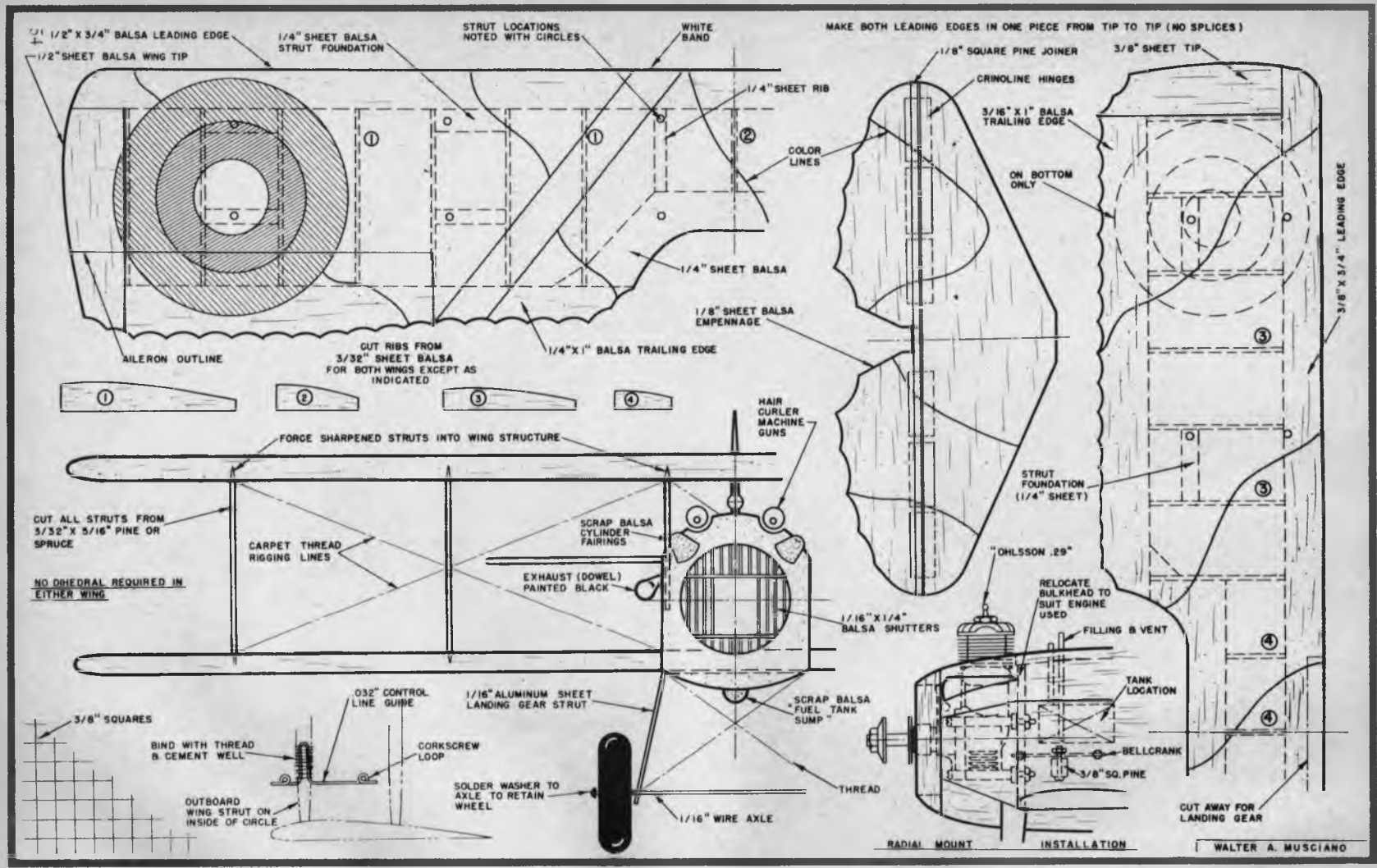
While the wing is drying the landing gear can be fabricated. We have found that with landing gears of this type, i. e.: where the struts are very wide and require liberal wood fairing strips, it is advisable to cut the struts from sheet aluminum. Apart from their realistic appearance they are very durable and easy to construct. Trace the strut pattern onto $\frac{1}{16}$ in. sheet aluminum (make in one piece) and cut it out with a fine hack saw. Now file the struts to a streamline cross section and drill holes for the axle and mounting screws. Screw the landing gear to the hardwood anchor. Easy, wasn't it?

Sandpaper the wing structures and cement all joints again. Cover both wings with light "Sky-Sail" using a mixture of dope and cement as the adhesive. Water the covering lightly and, when dry, apply one coat of clear dope. Cement the lower wing to the fuselage securely.

The landing gear is now installed. You will find it necessary to cut away a small portion of the leading and trailing edges in order to fit the landing gear properly. Use plenty of cement. Add the axle and install the wheels.

Cut the cabane struts from hardwood and cement securely to the fuselage inside. Cement the nose piece in place followed by the fuselage top and bottom soft balsa fairing blocks. These should only be spot cemented in place. When dry the fuselage is carved to shape consulting the fuselage cross sections as you "chop away." Sandpaper the fuselage well and apply one coat of clear dope. Pry the top and bottom block off and hollow with a gauge to the thickness indicated on the plans. Recement securely to the fuselage. Add the fin and rudder. Cut away the engine hatch with a sharp razor and install the engine. It will be necessary to cut away portions of the nose for the engine cylinder, exhaust, needle valve, etc. Now remove the engine and add the $\frac{1}{16}$x¼-in. balsa dummy radiator shutters. Both wings should have a total of three coats of clear dope.

Much care should be taken with the painting because it can "make or break" the model's appearance. All exposed wood surfaces should receive about four coats of wood filler liberally applied, sandpapering well with a fine grade between each coat. Captain Rickenbacker's Spads were decorated as follows: The entire undersurface of both wings and horizontal tail


1/2" X 3/4" BALSA LEADING EDGE
1/2" SHEET BALSA WING TIP
1/4" SHEET BALSA STRUT FOUNDATION
STRUT LOCATIONS NOTED WITH CIRCLES
WHITE BAND
1/4" SHEET RIB
COLOR LINES
1/4" SHEET BALSA
1/8" SHEET BALSA EMPENNAGE
1/4"X1" BALSA TRAILING EDGE
AILERON OUTLINE
CUT RIBS FROM 3/32" SHEET BALSA FOR BOTH WINGS EXCEPT AS INDICATED
FORCE SHARPENED STRUTS INTO WING STRUCTURE
CUT ALL STRUTS FROM 3/32"X 5/16" PINE OR SPRUCE
NO DIHEDRAL REQUIRED IN EITHER WING
CARPET THREAD RIGGING LINES
HAIR CURLER MACHINE GUNS
SCRAP BALSA CYLINDER FAIRINGS
EXHAUST (DOWEL) PAINTED BLACK
1/16"X1/4" BALSA SHUTTERS
.032" CONTROL LINE GUIDE
1/16" ALUMINUM SHEET LANDING GEAR STRUT
SCRAP BALSA "FUEL TANK SUMP"
3/8" SQUARES
BIND WITH THREAD & CEMENT WELL
CORKSCREW LOOP
OUTBOARD WING STRUT ON INSIDE OF CIRCLE
SOLDER WASHER TO AXLE TO RETAIN WHEEL
1/16" WIRE AXLE
THREAD
MAKE BOTH LEADING EDGES IN ONE PIECE FROM TIP TO TIP (NO SPLICES)
1/8" SQUARE PINE JOINER
CRINOLINE HINGES
3/16" X 1" BALSA TRAILING EDGE
ON BOTTOM ONLY
3/8" SHEET TIP
3/8"X 3/4" LEADING EDGE
STRUT FOUNDATION (1/4" SHEET)
"OHLSSON .29"
RELOCATE BULKHEAD TO SUIT ENGINE USED
FILLING & VENT
TANK LOCATION
BELLCRANK
3/8" SQ. PINE
CUT AWAY FOR LANDING GEAR
RADIAL MOUNT INSTALLATION
WALTER A. MUSCIANO

Three-quarter front view. Note that the side of the cowl is cut away for the needle valve. The wires between struts are not necessary structurally but make the model more realistic.

surfaces are colored very light cream. This is applied first. About three or four coats of a good grade of dope will produce a nice finish. Now paint the entire upper surface of the wings, horizontal tail surfaces and fuselage plus the fin a yellowish green or yellowish olive drab, sort of a mustard color. Three or four coats will do. Rub the entire plane with rubbing compound and wipe clean. Paint all wing struts and landing gear struts yellow. We used green "Trim-Film" for the camouflage patches. These worked very well. It is not absolutely necessary that the exact pattern we used be followed precisely. However, do not deviate from it to any great extent. Remember "Trim-Film" will not cover sharp compound curves without slitting first. Therefore, cover only single plane curves. When the patches are in place add the insignia, stripe, number, etc. These are all cut from "Trim-Film." The star on the wheel hubs is also "Trim-Film." Add the exhaust stacks and machine guns.

The struts are added to the bottom wing by applying plenty of cement and pushing the sharpened strut into the wing structure at the locations indicated. The top wing is added in the same manner. Check the incidence angle. When the final assembly has dried thoroughly the entire model should receive a coat of transparent fuel-proofer. The button thread rigging is now added. This item really gives the model that "Ancient Look." Do not forget to attach the control line guide securely to the outboard wing strut on the inside of the circle.

The airfoil of our Spad is such that only ordinary sport flying is possible. While the overall proportions are good for run-of-the-mill flights, don't expect outside loops or square figure-of-eights.

Never attempt to fly the model unless it balances at the point indicated on the plans and do not use the longer lines on windy days. Our model handled beautifully on both thirty-five and fifty-five foot lines. These were .010-inch thick stainless steel lines. Thinner lines are not recommended.

As is the case with most scale control-line models you can have greater flying pleasure by using Jim Walker's U-Reely control. This will make it possible for you to take off with short length lines (of less than 20 feet) and, depending upon the wind, reel out the model until the lines are over 150 feet! Always take off down wind and it is suggested that all flying be done from a smooth paved surface although the large wheels on this model do enable it to negotiate close cut grass. The model Spad proved easy to handle and was not oversensitive to the controls partially due to the long tail moment arm.

If built with care and flown with good sense, you will have a model whose performance is so realistic that you can picture Captain Eddie in the cockpit zooming to another victory. •

Control-line model with 28-in. wing span. Can be powered with .19 to .35 engines.

SPITFIRE IX

By Dick Struhl

WHEN Winston Churchill spoke those immortal words, "Never was so much owed to so few by so many," he was referring specifically to the young men who flew the "Spits." And truly no other fighter of World War II has a more enviable or dramatic record. In the darkest hours in Britain's modern history the "Spit" was the only fighter that kept the torch glowing. So versatile was the Spitfire design that with minor modifications the planes were used for a very wide range of operations. There were day fighters and night fighters, low-altitude pursuits and high-altitude pursuits, and even a "Seafire" version for carrier duty. Rolls-Royce engines of 990 to 2,000 hp. were used in these models.

The configuration of the Spitfire is ideal for control-line gas models. Simply built for lightness and good flying ability, this miniature Spitfire is nevertheless very attractive and very much worth the effort required for its construction. To attest to the strength and durability of the model, we call your attention to the fact that the photos were taken after more than 100 flights had been made. An Ohlsson .23 with rotary valve and Glo-plug proved to be amply powerful. The original was also flown with a .199 Bantam, but stunts of course were limited with a plant that small. We strongly advocate the use of Glo-plugs because the resultant reduction in ignition weight will be turned into higher flight performance. And now to the construction.

Build the fuselage crutch first. It is made from ⅛x⅜-in. balsa. Note that the engine bearers are integral parts of the crutch. Space the bearers to suit the engine you'll use. The bell-crank mount is inserted between the two engine bearers.

Now cut the top segments of the fuselage bulkheads from ⅛-in. sheet balsa and cement in their proper positions. After the cement has set, add the bottom segments

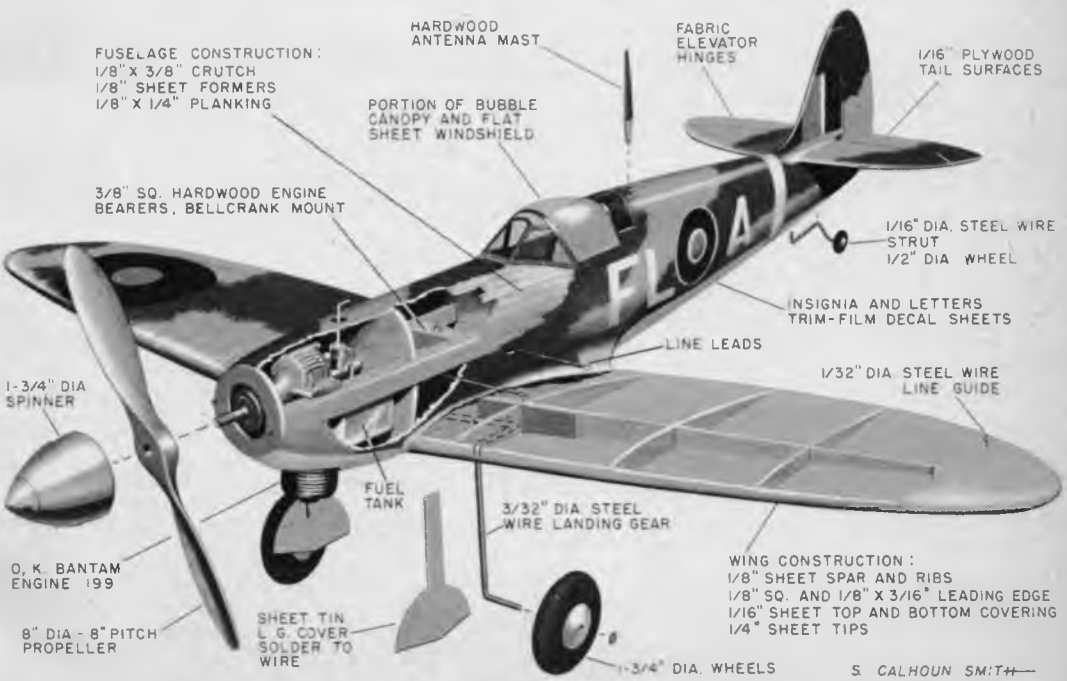
of the bulkheads, the bell crank, and the control rod. You can now plank the fuselage with $\frac{1}{8}$x$\frac{3}{8}$-in. soft-balsa strips. Leave the bottom planking off between stations B and D until the wing is cemented in place. Lightly cement the nose blocks in place and carve to shape. Remove them, hollow out as shown, bolt the engine in position, and permanently cement the nose blocks in place. Do not complete the rear planking until the control rod is connected to the control horn of the elevator.

The tail surfaces are cut from warp-free $\frac{1}{16}$-in. aircraft plywood. Note that the elevator is cut from one piece as is the stabilizer. Make the control horn from sheet brass or tin-can metal and cement it in place at the elevator center section. Bind with heavy thread. Conventional fabric or cloth hinges are used as shown in the plans. Cement the elevator and stabilizer in place, making sure the control horn has ample room for movement. Before adding the rudder, cut out the small notch to allow for the elevator movement. Offset the rudder about $\frac{1}{8}$ in. against the control lines. The $\frac{1}{2}$-in. tail wheel is mounted on $\frac{1}{16}$-in. steel wire and cemented to the fuselage.

The monocoque wing is quite simple to build if you follow the procedure outlined here. First cut the $\frac{1}{8}$-in. hard-balsa wing

You'll get many hours of swell flying with this fine replica of the British Spitfire.

spar. It is tapered from $\frac{1}{16}$ in. at the center to $\frac{1}{8}$-in. high at the tip. Join the two halves together with a 1-in. dihedral under each tip. Cut the wing-spar joiner from $\frac{1}{16}$-in. plywood and cement to the dihedral joint. Now lay the full-size plans upon a flat working board that has a 2-in. slot at one end to allow the landing gear to stay in position while the wing is being constructed. Bend the landing gear to the shape shown from one piece of $\frac{3}{32}$-in. steel wire 13 in. long. Bind the landing gear to the spar and joiner with strong thread. Pin the spar to the drawing of one half of the wing. We shall build one complete half of the wing before finishing the other half. Cut the ribs from the prescribed

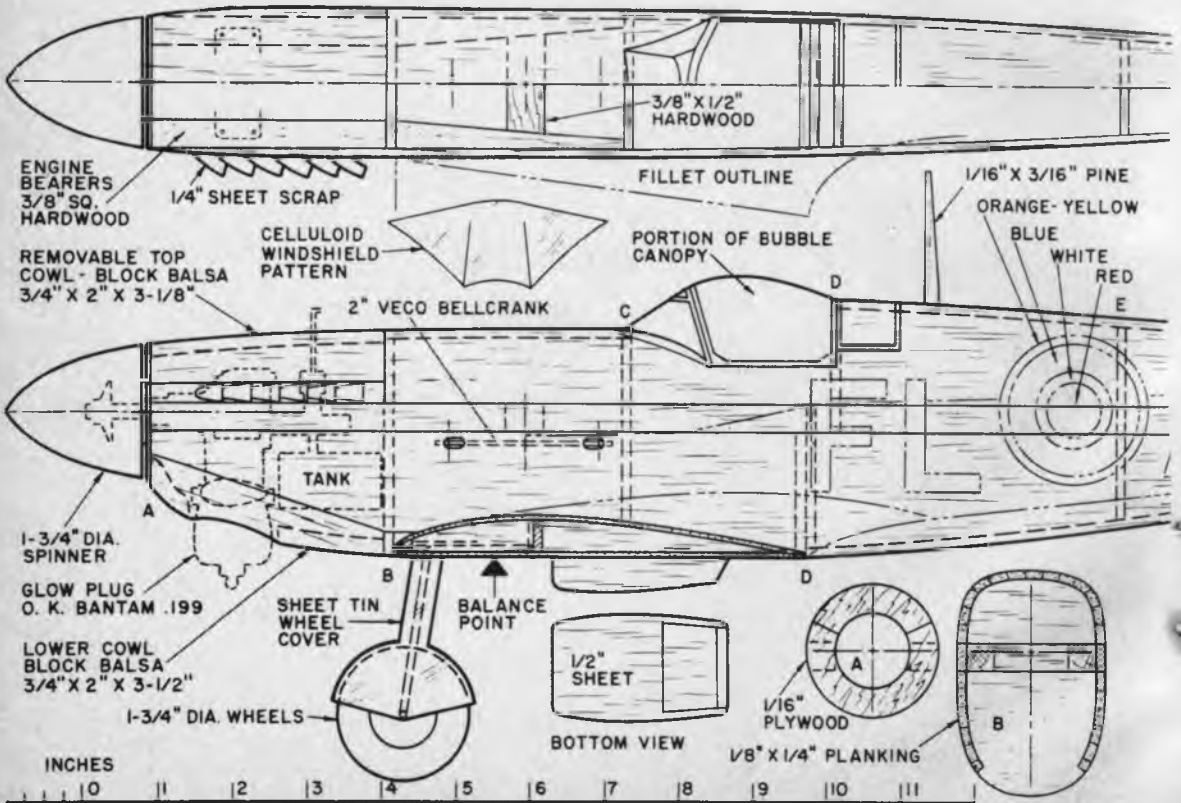


stock and cement in place. The leading edge is built of two strips of balsa cemented together as shown in the plans. Insert small slivers of balsa under the leading edge to block it in place with the ribs. Bend the $\frac{1}{8}$x$\frac{3}{16}$-in. piece first and glue to the ribs. Then bend the $\frac{1}{8}$-in. square piece, cement it to the first strip, and bevel to proper cross section. Note that till now there is no trailing edge. It is formed by the joint of the top and bottom wing covering. Butt-join two 3-in. sheets of $\frac{1}{16}$x13-in. balsa. Cut this sheet to the outline of the half wing. It will become the top wing covering. Bevel the trailing edge on the *inside* and, working very swiftly, cement in place using pins to hold firmly. As the camber is rather slight, there is no need to wet or steam the covering to shape.

When the cement has set, remove the structure from the plans and trim off any cement that has run down on the bottoms of the wing ribs. Bind the landing gear to the plywood rib as you did to the joiner. Add a triangular plywood gusset over the top of the front part of the gear wire. The bottom of the wing is covered in exactly the same manner as the top except you will need a small hole to allow passage of the landing-gear strut. Use small clothespins or Scotch tape to hold the trailing edges together until the cement sets. Proceed to make the other half of the wing in the same manner. Shape the wing tips from soft ¼-in. sheet balsa and cement in place. Sandpaper the leading edge to the airfoil section shown. Bend the wing guide from .050 wire and install it at Rib "D" on the inside wing tip. Add the 1¾-in. wheels.

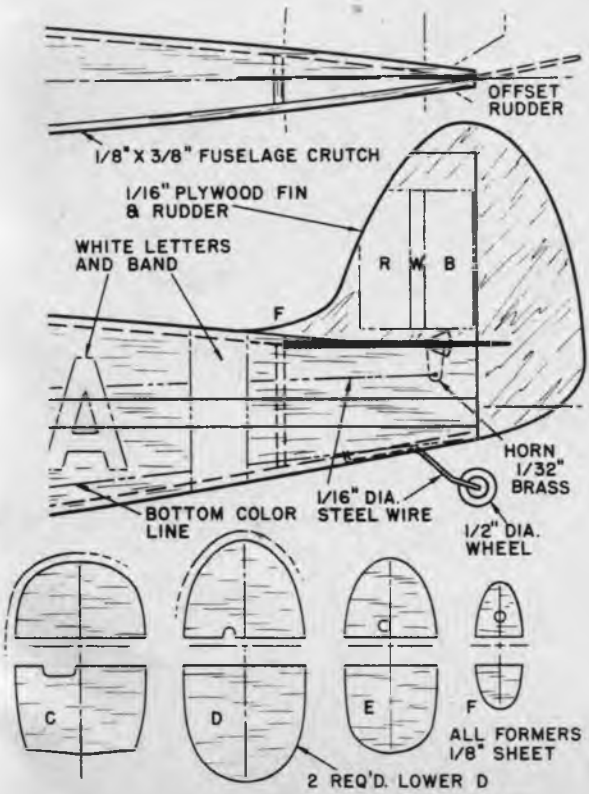
The wing is now cemented in place between the two bulkheads. Use many coats of glue here and, when dry, fill in the planking around the wing. The sheet-balsa wing fillets are next added.

To prevent splitting of the balsa covering, the wing and fuselage should be covered with a fine grade of silk after final sanding. Use heavy dope as adhesive. It is not necessary to cover the tail surfaces as the plywood is quite resistant to splitting. The entire model is now given several coats of filler made of talcum powder and dope. Be sure to fill up all the grain of the wood and silk before you apply the finish paints. Follow the methods described in MI, Jan. '48 (*It's the Finish that Counts*) to get that real professional paint job. Paint the white sections in and, when dry, lay masking tape over them and

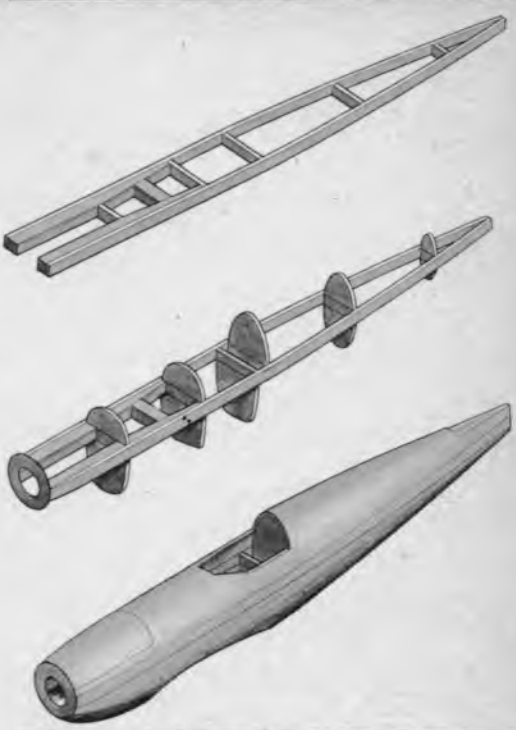


proceed with the doping. Spray the entire bottom (wing, fuselage, and stabilizer) with sky blue. Use a little more dope than is needed to get a solid color as the rubbing compounds will take some off. When dry, mask off the bottom and spray the entire top with light-brown dope, or so-called "sand" color. When this dries, spray on the "spinach" color. Either set the spray for a very fine stream or use pieces of newspaper to act as masks to achieve the camouflage effect. Check the photos for layout of camouflage colors. The insignia may now be applied, using brush and masking tape or *Trim-Film* decal sheets cut to sizes indicated on the plans.

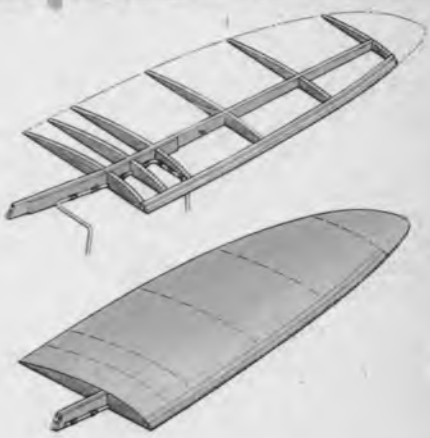
Now add the various details. The curved portion of the cabin is cut from a commercial bubble canopy (for P-51's). The windshield pattern is given. Cement these pieces in place carefully so as not to cause the dope to run. Add the wing radiator and the exhaust stacks. The landing-gear cover plates are cut from thin sheet tin and held in place with drops of solder. We advise making them removable as experience has shown us that they get knocked off or bent up from the grass or stones every few flights. The radio mast is cut from



FUSELAGE CONSTRUCTION

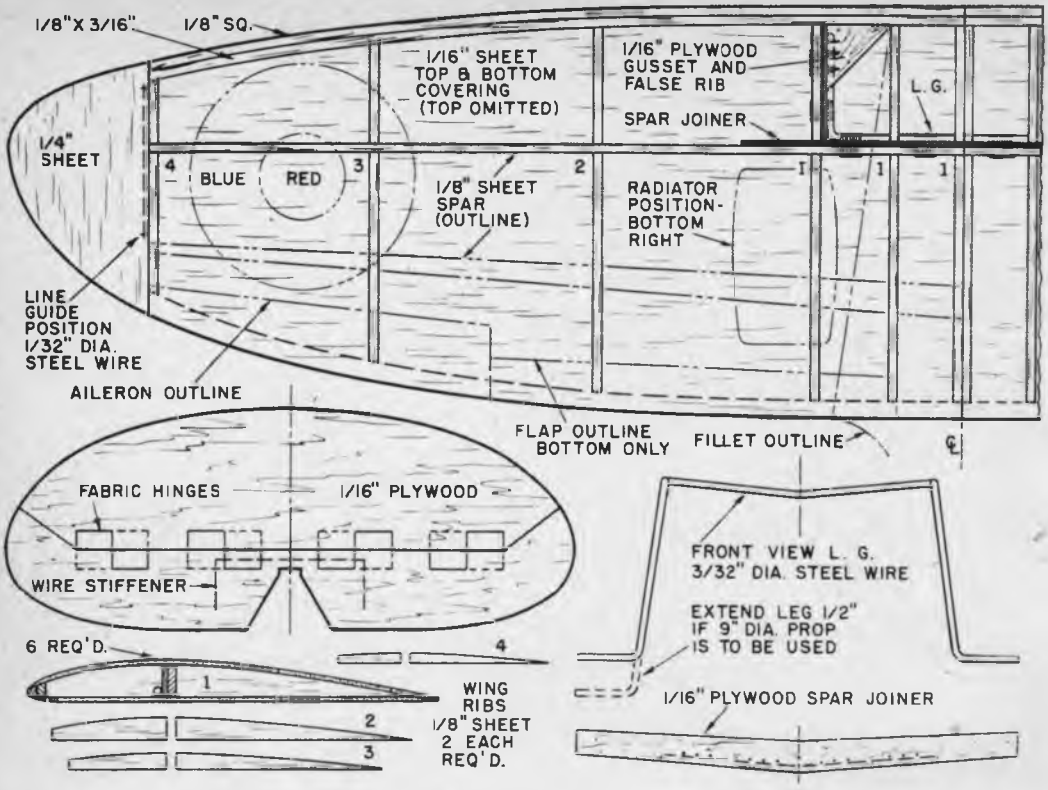


WING CONSTRUCTION



FULL-SIZE PLANS

of this model can be obtained by sending 50c to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 419.



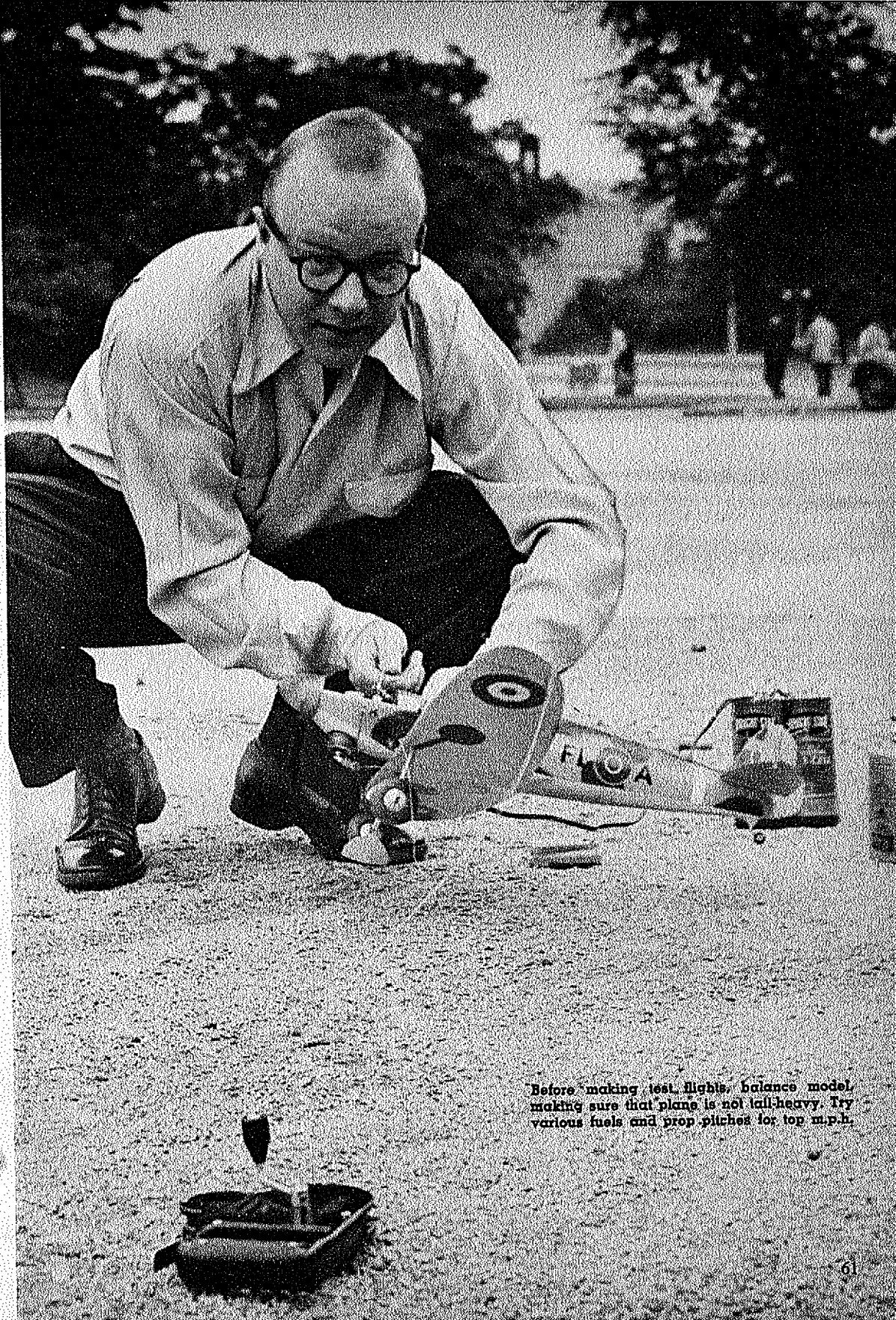
hardwood and painted black. The antenna is black thread. Since you will need to use "hot" fuels with the Glo-plug engine, you must protect the finish of the model. One of the best "hot-fuel proofers" on the market is put out by Midwest Model Co. Spray two thin coats of this proofer over the entire model.

Before any test flights are made, check the balance of the model. Above all, do not have the model tail-heavy as this will prove disastrous on the very first flight. If anything, you should have the model nose-heavy for the first few flights just to "feel" your model out. It is wise to attach a 1x1-in. flat tin plate with Scotch tape to the outside-wing leading edge near the tip to create a slight yaw, thus holding the model out on the end of the wires. This can be taken off later when you know that your model will not fly into the lines. Exercise due caution during the initial flight periods and you will be rewarded with a fine replica of the British Spitfire that will give you many hours of swell flying.

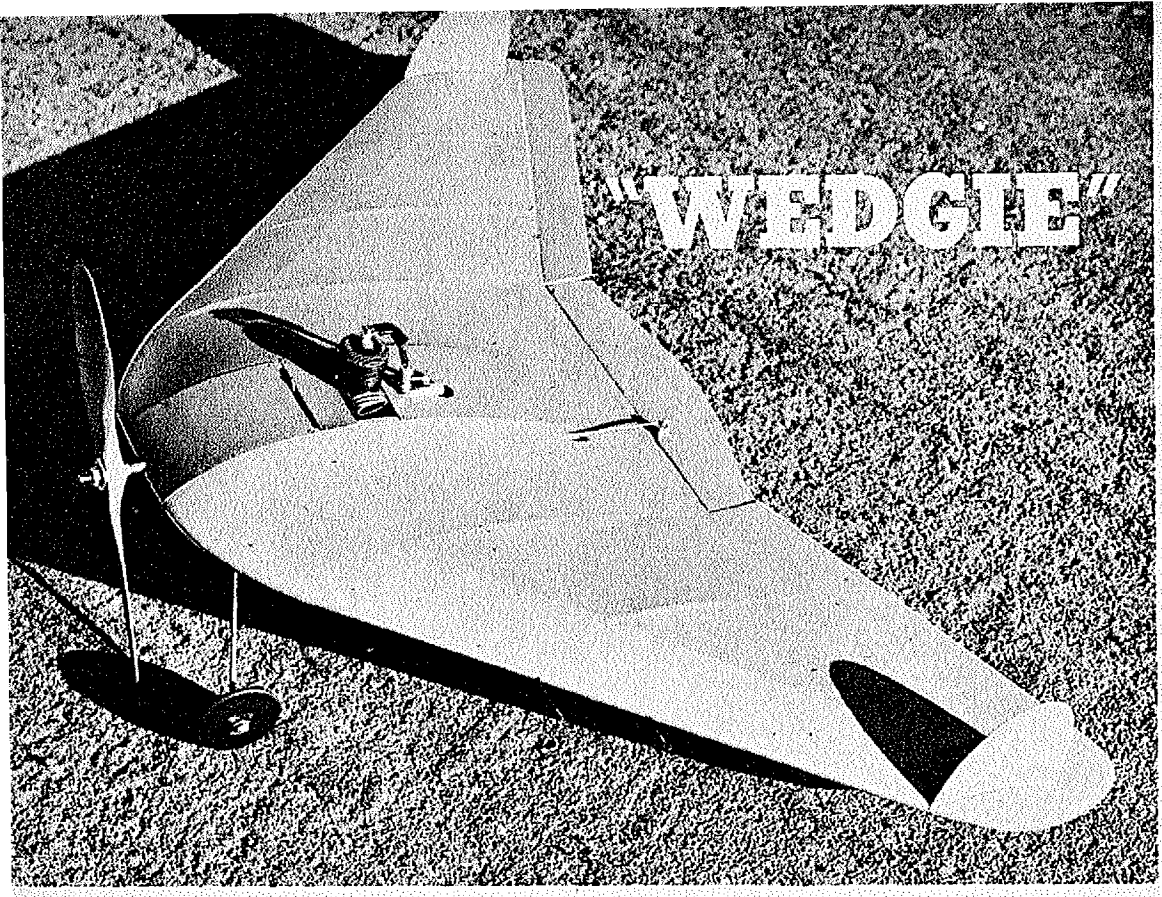
You will find that this is a beautifully responsive machine that, with one of the larger of the specified engines, can maneuver spectacularly without getting the pilot into trouble. It has full-size airplane characteristics.

To squeeze out the last possible m.p.h., you may want to experiment a bit with the fuel and the diameter and pitch of the prop. Go ahead. That's s.o.p. for modelers! •

This model has over 100 flights to its credit and is still as good as new, which, we think, is pretty good proof that the construction is unusually sturdy for a scale model that is light enough to fly well.



Before making test flights, balance model, making sure that plane is not tail-heavy. Try various fuels and prop pitches for top m.p.h.



Looking for something *really* new in control-line flying? Then build and fly this simple 27-inch experimental flying wing.

By H. A. Thomas

CONTROL-LINE flying provides the ambitious modeler with an ideal opportunity to develop new and different types of aircraft. The fact that he can exert some measure of control enables him to complete test flights and make further changes and adjustments when the same slight errors would have been disastrous in the case of a free-flight model. Thus, Wedgie is not only a "flying wing classroom" but also offers pleasant construction and flying sessions.

The apparent simplicity of a flying wing is, however, often a delusion because there are problems of stability to be solved which are identical to those of more conventional models. Though our test model was completed before details of the Armstrong-Whitworth AW-52 jet flying wing were released, Wedgie is of the same general arrangement as the British craft.

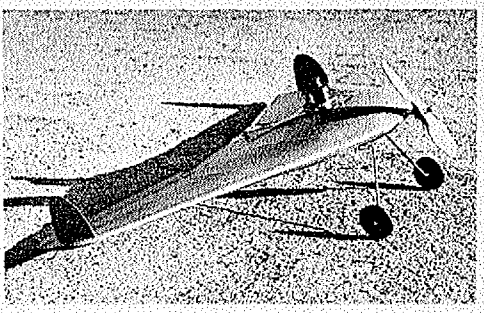
Briefly, the stability required for a model flying wing can be assured: Directionally, by sweepback; Laterally, by dihedral; and Vertically, by sweepback and "longitudinal dihedral" — a difference in incidence between the root and the tip wing sections. In the case of a control-line model we felt that sweepback, plus a rearward placement of the wing guide tubes would give the slight outward yaw necessary to hold the lines taut. Lateral stability in a control-line model is no problem so we more or less skipped it. For fore-and-aft stability (about the lateral axis) we depended on upturning the wing trailing edge tabs just as one would employ less incidence in the stabilizer than in the wing on an ordinary model. We decided to control the model with a central elevator, its short moment from the center of gravity being corrected by its considerable area.

Were it not for the landing gear, the model could likely fly very well without the tip fins. This was a last minute concession, meant to offset the side area of the wheels which are forward of the C.G. and which otherwise would have had a detri-

mental effect on the model.

The engine extension shaft is used to keep the weight of the engine rearward, assuring the center of gravity of having the correct location, and also to keep the leading edge of the wing at the center clean for more efficient air flow. We purchased the complete extension shaft from the model dealer, though any capable modeler could make one of a length of drill rod.

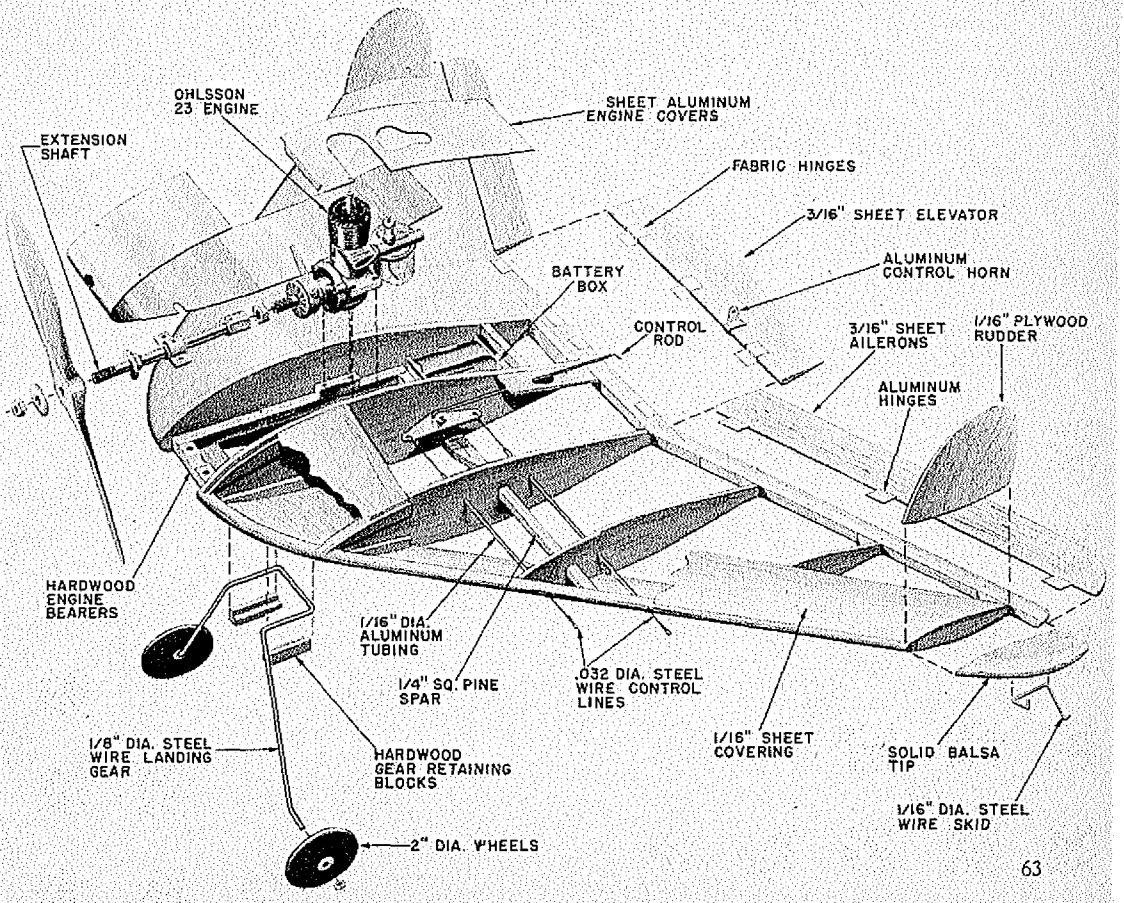
Wedgie is built around two main reinforced central ribs and a hardwood spar. You will appreciate the ease with which the model assumes shape. After cutting all parts to shape, glue the plywood reinforcements and the engine mounts to the center ribs, using Cascamite glue and small wire brads. Next, add the pine spar then work outward with the wing structure. Mark rib spacing on the leading and trailing edges as well as the spar and pin the ribs in place while the cement hardens. Veneer the leading edge, top and bottom, with 1/16 in. sheet balsa for smoothness and strength. Sand the completed wing frame everywhere the covering is to come in contact

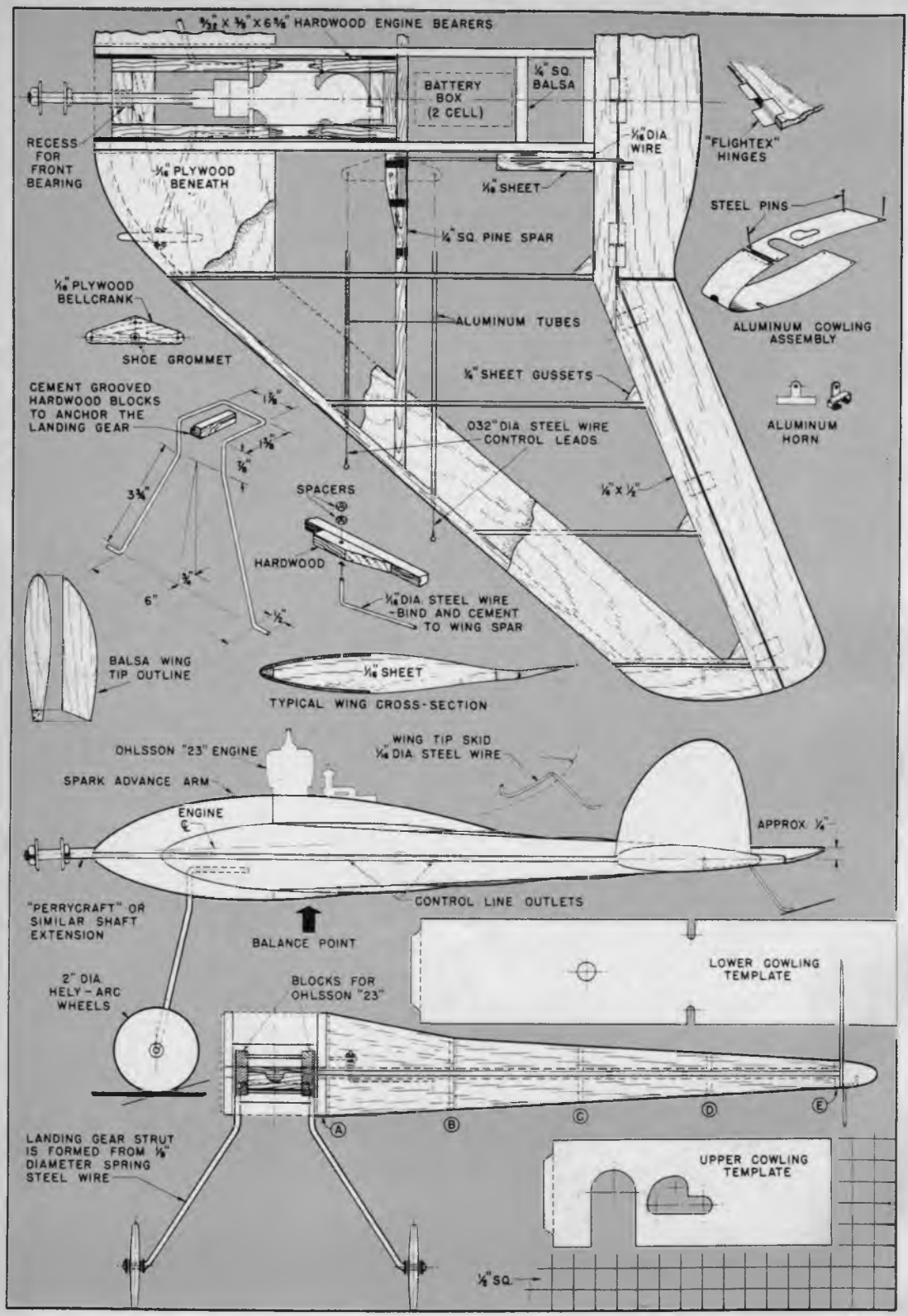


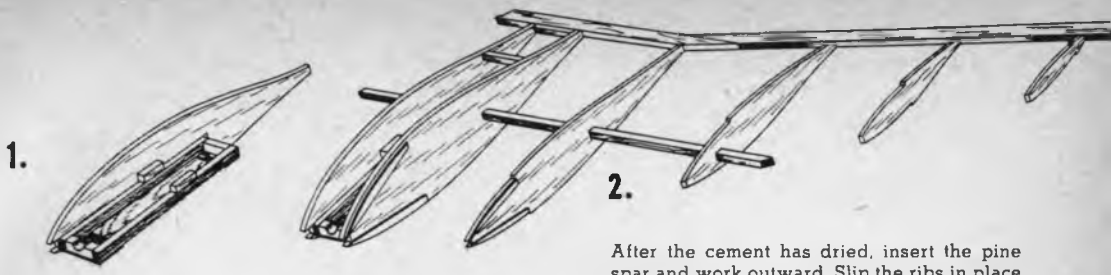
Engine mounted in center of the wing aids streamlining, compensates for weight of landing gear.

with it. The control plate support is carefully built up, being literally cemented and wrapped with thread. Add the pushrod and the tubes for the control-line leads.

Tip fins are of 1/16 in. plywood, sanded and tapered at the edges. The wing tips are shaped of soft balsa. Cover the wing with heavy Silkspan or gas model weight bamboo paper. Spray the surface with water and follow with at least two heavy coats of

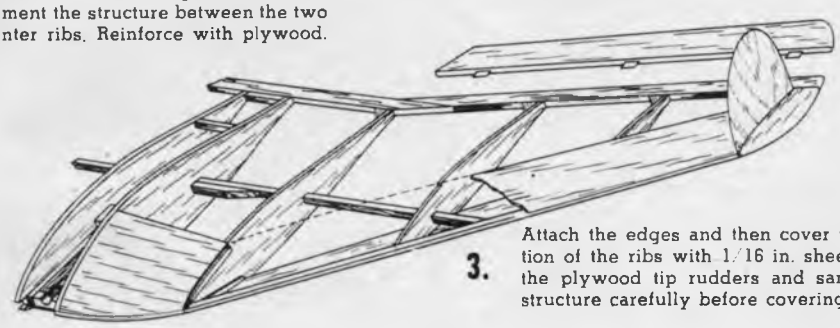



3/32" X 3/8" X 6 3/8" HARDWOOD ENGINE BEARERS
BATTERY BOX (2 CELL)
1/4" SQ. BALSA
RECESS FOR FRONT BEARING
1/16" PLYWOOD BENEATH
1/16" DIA WIRE
"FLIGHTEX" HINGES
1/16" SHEET
STEEL PINS
1/4" SQ. PINE SPAR
1/16" PLYWOOD BELLCRANK
ALUMINUM TUBES
ALUMINUM COWLING ASSEMBLY
SHOE GROMMET
1/4" SHEET GUSSETS
CEMENT GROOVED HARDWOOD BLOCKS TO ANCHOR THE LANDING GEAR
ALUMINUM HORN
.032" DIA STEEL WIRE CONTROL LEADS
SPACERS
1/4" X 1/2"
HARDWOOD
1/16" DIA STEEL WIRE - BIND AND CEMENT TO WING SPAR
BALSA WING TIP OUTLINE
1/16" SHEET
TYPICAL WING CROSS-SECTION
OHLSSON "23" ENGINE
WING TIP SKID 1/16" DIA STEEL WIRE
SPARK ADVANCE ARM
ENGINE
APPROX 1/4"
CONTROL LINE OUTLETS
"PERRYCRAFT" OR SIMILAR SHAFT EXTENSION
BALANCE POINT
LOWER COWLING TEMPLATE
2" DIA HELY-ARC WHEELS
BLOCKS FOR OHLSSON "23"
LANDING GEAR STRUT IS FORMED FROM 1/8" DIAMETER SPRING STEEL WIRE
UPPER COWLING TEMPLATE
1/2" SQ.



Build the motor mount unit, drill the holes for the mounting bolts and then cement the structure between the two center ribs. Reinforce with plywood.

After the cement has dried, insert the pine spar and work outward. Slip the ribs in place and then mark their position on the leading and trailing edges. Pin in place and cement.



Attach the edges and then cover the front portion of the ribs with 1/16 in. sheet balsa. Add the plywood tip rudders and sand the entire structure carefully before covering the Silkpan.

dope. The control surfaces can be tapered by hand or by use of a table saw. Finish these to thin trailing edges, cover them with tissue, and attach them to the wing. The center edge is fitted with Flightex hinges; the outer edge of both panels with aluminum strips embedded into the wood.

Bend the landing gear from 1/8 in. diameter steel wire and cement it beneath the engine bearers with grooved wooden supports. Retain the wheels to the axles by soldering washers to them. Take great care in aligning the extension shaft and in mounting the front bushing. Bolt the engine firmly, using lock washers or pack nuts. Complete the wiring system, making it as compact as possible.

Paper patterns of the two aluminum cowl parts should first be fitted, since the patterns indicated on the plans may not fit perfectly to your particular installation. Straight pins, forced into the center ribs, hold the cowling in place. Add the wire tip skids and connect the control rod to the control flap. The model is now ready for painting and decorating according to your particular taste. Ready to fly, the original model, with an Ohlsson 23 engine, weighed twenty ounces.

FULL SIZE PLANS

of this model are available. Send 50c to MODEL BUILDERS' Plans Service, Fawcett Building, Fawcett Place, Greenwich, Conn. Specify Plan No. 382.

Although Wedgie was designed especially for the Ohlsson 23 power plant, you can alter the center section construction enough to permit successful installation of most any engine ranging from .19 to .29 cubic inch displacement. When changing the structure to accommodate your engine, bring the mount together or spread them apart, as necessary. It is of great importance to have balancing point as indicated on the plans. The best method of obtaining this balancing point is to shift the batteries. The original model was equipped with a regular penlite battery box but the smaller plugtype batteries manufactured by Bright

Because Wedgie is all-wing, construction time is but one-third that of conventional gas models.

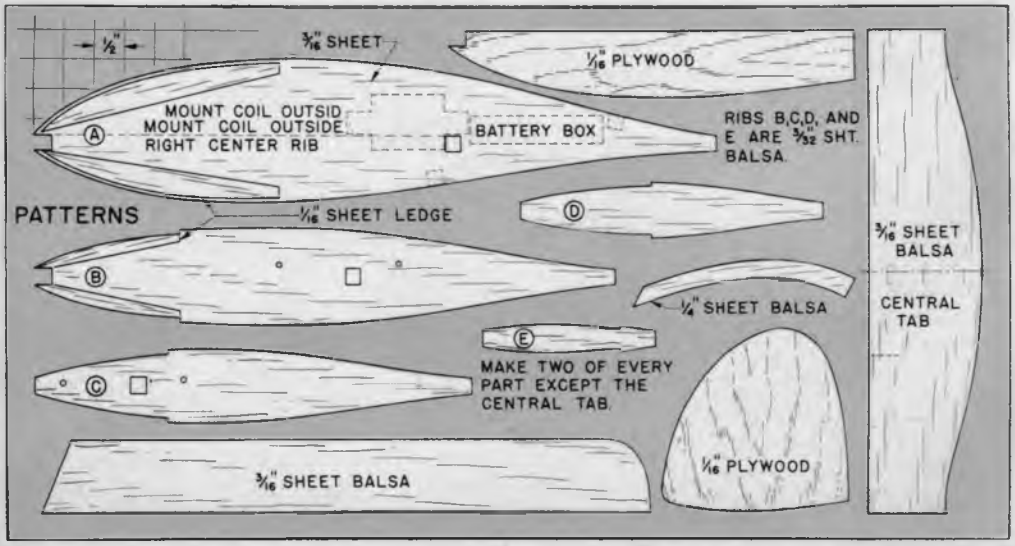
Engine is mounted in center of wing and the prop driven via a standard extension shaft.

Star, Burgess and General can be neatly substituted. When plug batteries are used, hold them in place with rubber bands.

Before flying Wedgie, check the alignment of the surfaces and the thrust line. Carefully bend the outer wing tabs (trailing edge) up to the angle indicated on the plans. On the first test hop, rev the engine up to about half throttle to assure sufficient speed to maintain full control. As you learn the flight adjustments, by making finer tab adjustments, slowly increase the engine speed.

Your first flight should be on about 25 foot .010 steel control lines. Once adjusted so the model does fly in toward the center of the circle, it will be safe to increase the line length to 35 or 50 feet.

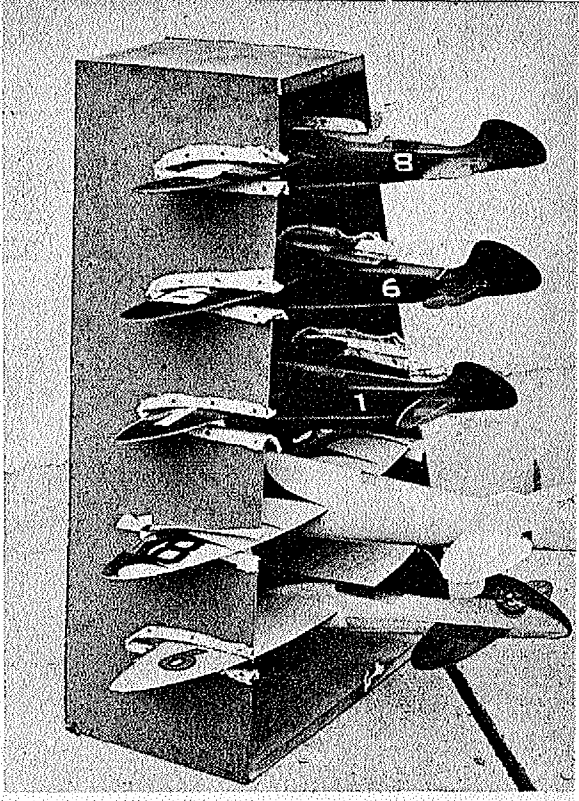
In publishing Wedgie, Model Builders features something really new in gas models. The basic design, with modifications, also holds promise as a free-flight model but definitely is the answer for record breaking control-line speed jobs. Many flying wing models were built and broken before this successful design was reached. Many more—yours and mine—will undergo major changes before the all-wing model becomes as popular as the conventional jobs. Knowledge of your experiments—what worked and what didn't—and pictures of your model would be appreciated. Address all correspondence on this subject to Editor, Handbook For Model Builders, 67 West 44th Street, New York 18, N. Y. •

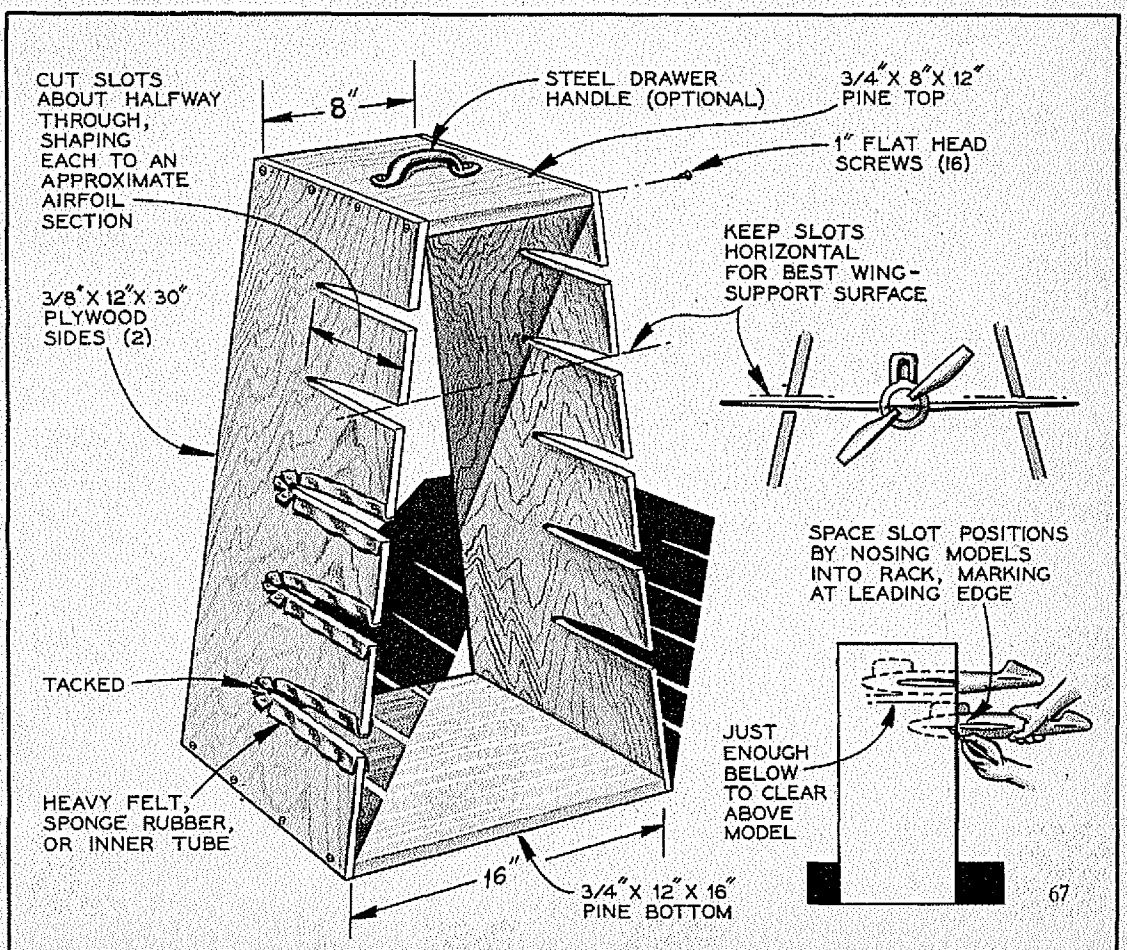


Model Rack

AFTER having several plane models damaged while traveling to and from flying sites, I decided to build this inexpensive, handy gadget. It's designed to fit on the rear seat of a car and to hold five models. When you attend a large meet, its utility will be more than appreciated by the end of the day. The construction is really very simple, the rack consisting of but four parts that are cut to size and assembled with screws. The original one was made of Masonite and reinforced with pine strips. The plywood version shown in the drawing, however, is much simpler and can be put together in short order.—*H. deBolt*

Construction sketch below shows simple details of plywood rack. Original model in photo at right was made of Masonite reinforced with pine strips.





"Mister MULLIGAN"

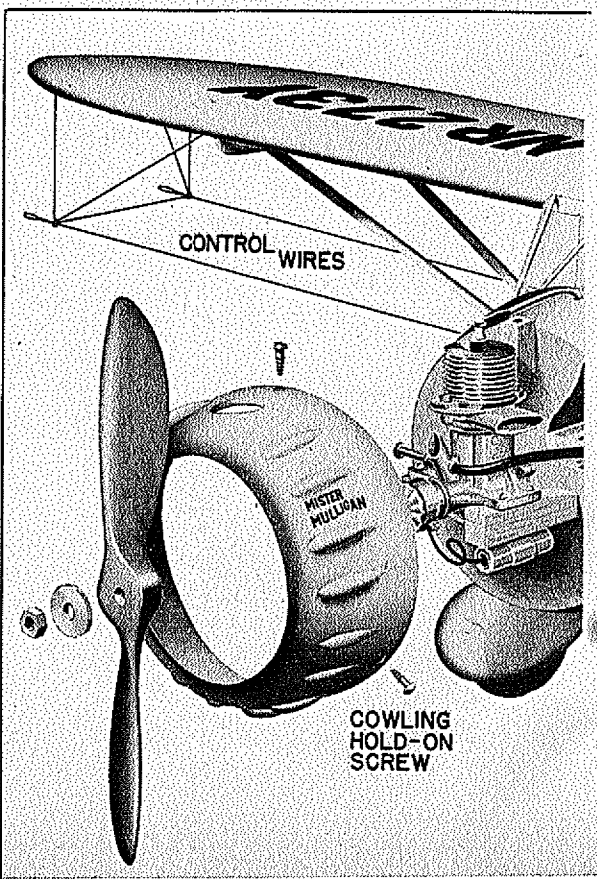
A 39-inch control-line scale replica of the famous 1935 Thompson & Bendix air race winner.

BY STINSON SMITH

BACK in 1935 one of the most unusual planes ever to enter the Thompson trophy event of the Cleveland Air Races won that classic with an average speed of 220.2 mph! Three days earlier this same ship won the Bendix cross-country race. Oddly enough, the ship, Benny Howard's "Mr. Mulligan," was unusual in the very fact that it was so conventional in appearance —for a racer. Who would ever imagine a sporty looking cabin job like the "Mr. Mulligan" winning a race against a field of hot-looking racers?

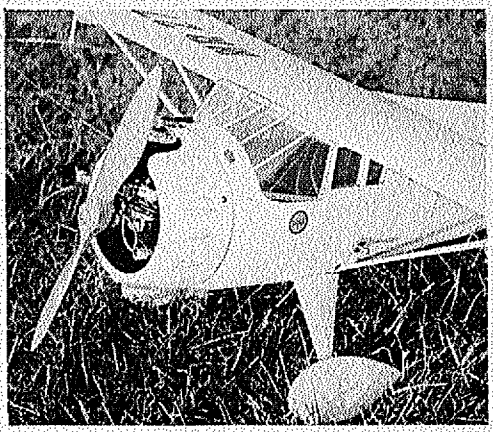
Benny Howard knew that looks didn't mean as much as design and proved it the hard way. Howard, with his "Mr. Mulligan," introduced something new in racing planes. Instead of building the usual flying engine type, he built a ship that was large enough and stable enough to be reasonably safe to fly. Equally important was a little item which Mr. Howard fondly called "go-grease." No, it doesn't come in cans. Application of "go-grease" to an aircraft merely means the reduction of parasitic drag. "Mr. Mulligan" was "greased" by having its finish rubbed mirror smooth and by applying a fillet of model airplane cement around every little surface projection.

At first glance, the Mulligan might appear too stubby for a control-line model. However, close inspection will reveal that the stubbiness is merely an illusion. Actually, the ship has a long tail moment



arm and generous wing and tail area; all excellent properties for a control-line model. The original model proved to be fast and stable with a good glide. While the Vivell 35 provided plenty of oomph for ordinary sport flying, a "60" is necessary for real stunting. Full size plans are necessary so either enlarge the drawings appearing on these pages or else visit your local hobby dealer for full size drawings.

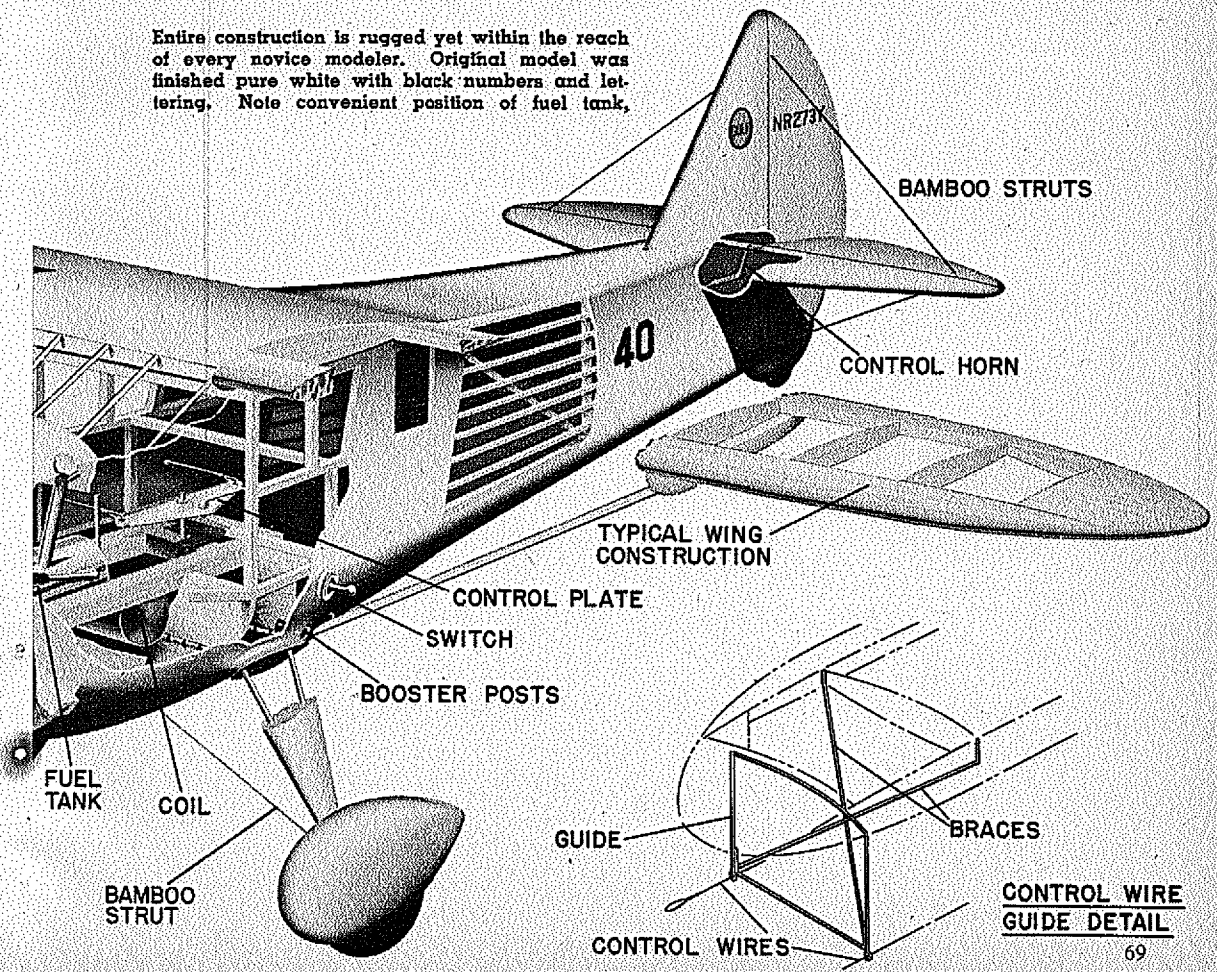
The fuselage is of box type construction and is much stronger than those using the keel-bulkhead method. Start construction by pinning the hard $\frac{3}{16}$ in. square longerons directly over the plan and then filling in the uprights. After one side is complete, lay and build up the second side directly over the first. Allow the cement to dry thoroughly before removing the structure from the plans. Build up the two rectangular nose sections against which bulkheads No. 1 and 2 are mounted and form the framework as shown in the perspective views.



Spacious cowl makes installation of any engine possible. Cowl is held in place with three bolts.

Before proceeding further, install the motor mounts and then cement the bulkheads in place. The plan measurements are for a Herkimer 29 engine although any engine from a top displacement class A to one of .65 displacement can be used.

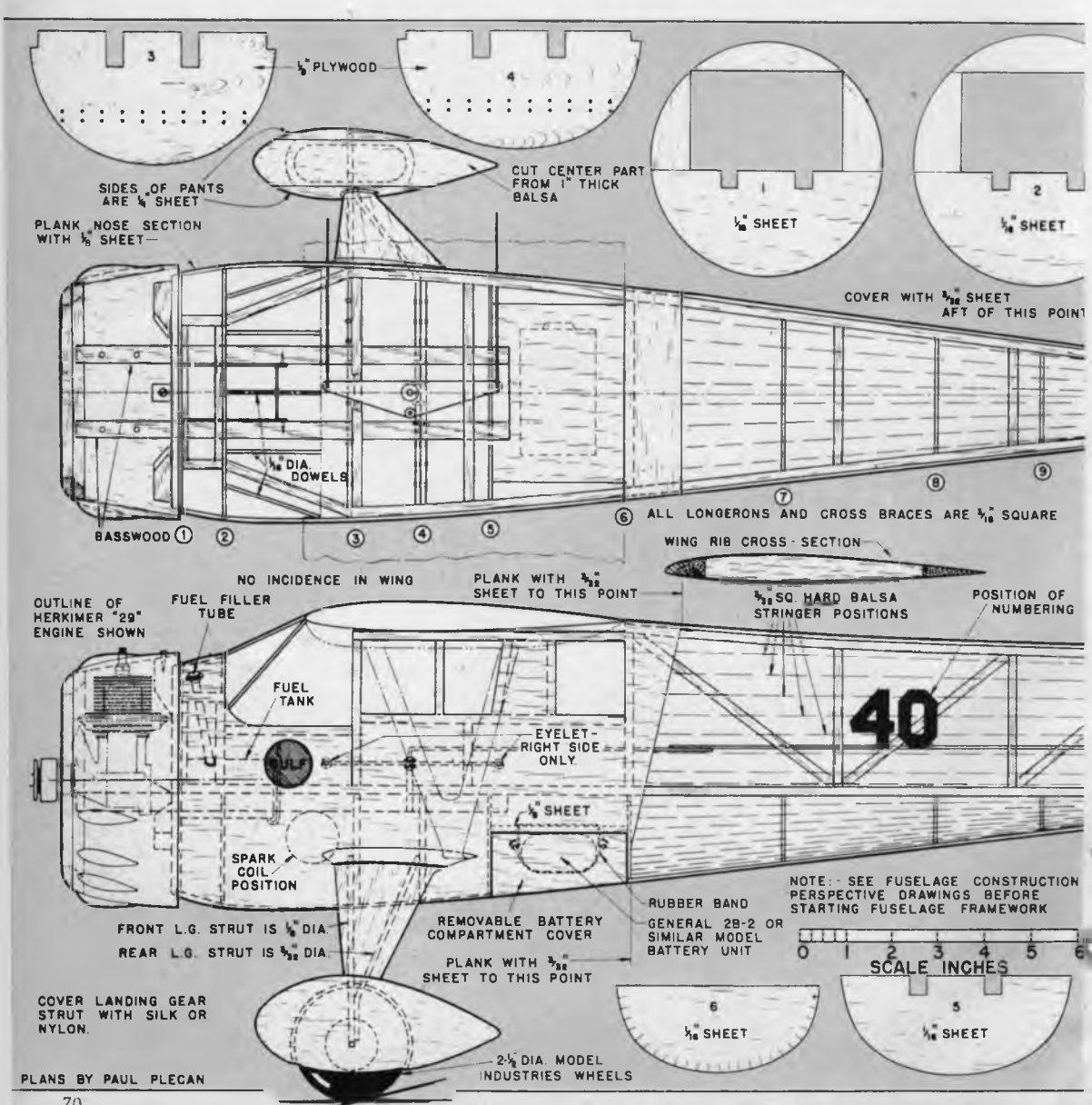
Entire construction is rugged yet within the reach of every novice modeler. Original model was finished pure white with black numbers and lettering. Note convenient position of fuel tank.



Merely alter the mount position to fit. Once the bulkheads are secure, form the landing gear and bind in place against bulkheads No. 3 and 4.

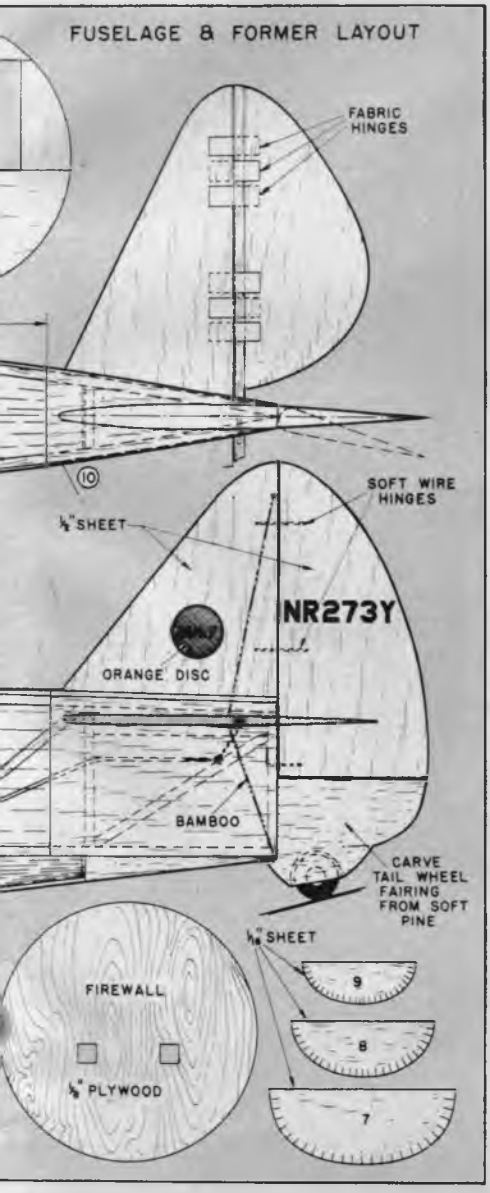
Dimensions for the front gear strut are shown in the right half of the front view drawing while the rear strut measurements are shown in the left half. After the gear is in place, install the ignition system and tank and then add the control mechanism. Mounting of the battery unit (wet cells or pack type), is left to the initiative of the builder. The battery rests between bulkheads No. 5 and 6, as shown on the plan. The removable hatch, which is held in place by large dress snaps, is carved from solid balsa and hollowed out.

The nose is now planked with soft 3/32 in. sheet balsa. Use fairly wide pieces for the sides and narrow strips for the curved bottom. Allow the cement to dry thoroughly before planing and sanding the planked area smooth. The stabilizer is next cut from $\frac{3}{16}$ in. sheet and carefully sanded so the airfoil is symmetrical. Hinge the elevator as indicated and then mount the control horn. Cement the elevator in

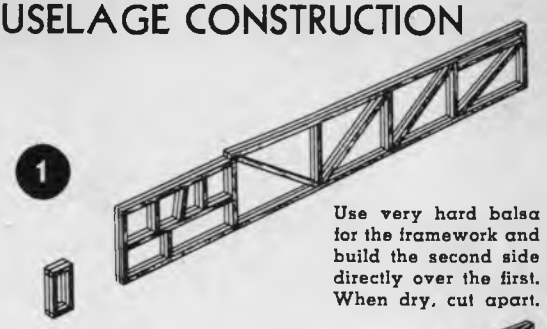


the slot provided, cutting away the rear covering and upright to permit slipping the unit in place. Finally cover the rear section with 3/32 in. sheet and then connect and test the control surfaces.

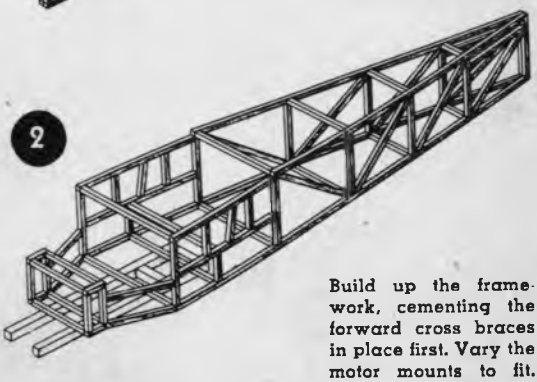
The 3/32 in. square stringers are next attached directly over the fuselage sides and bulkheads. In joining the stringers to the planked area, notch the latter about 1/8 in. to fit each stringer. The landing gear fairing and



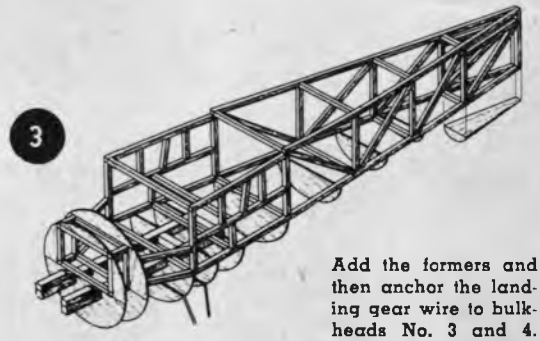
FUSELAGE CONSTRUCTION



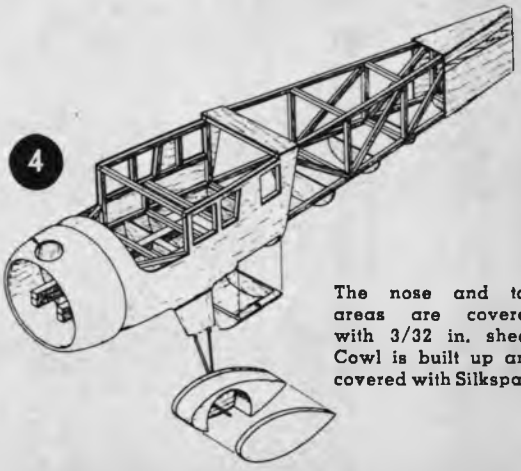
1 Use very hard balsa for the framework and build the second side directly over the first. When dry, cut apart.



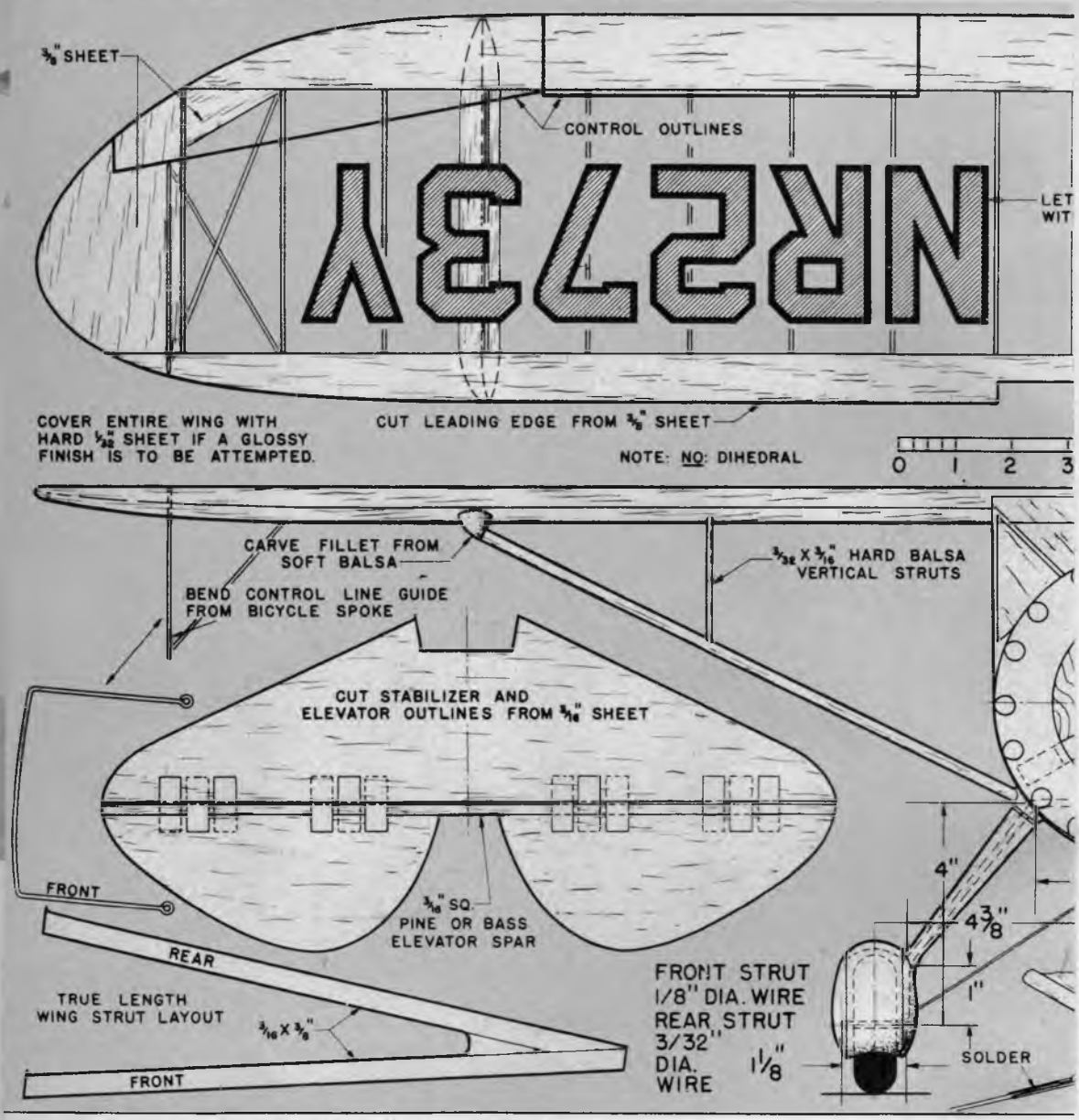
2 Build up the framework, cementing the forward cross braces in place first. Vary the motor mounts to fit.

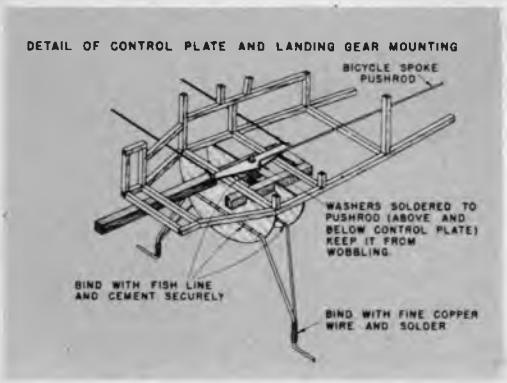


3 Add the formers and then anchor the landing gear wire to bulkheads No. 3 and 4. Reinforce with glue.



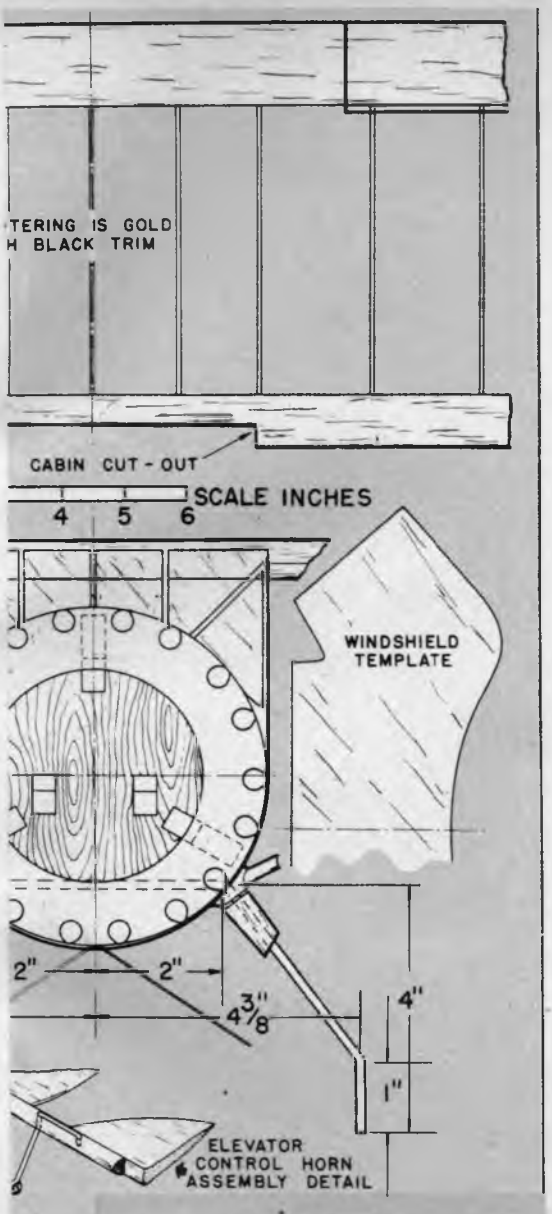
4 The nose and tail areas are covered with 3/32 in. sheet. Cowl is built up and covered with Silkspan.





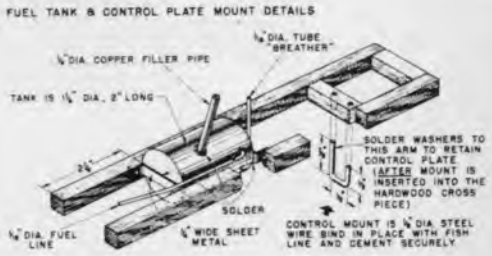
wheel pants are now built and carefully mounted to the legs. Note that a 1/8 in. space exists between the fairing and the soft balsa fuselage fillet, thereby permitting the gear to absorb shock.

Build the cowl next. First cut a balsa ring about 1/2 in. larger in diameter than bulkhead A and spot cement it to the firewall. Obtaining the exact measurement from the plan, cut the second nose ring and spot cement it to the motor mounts. Cover the edge of the firewall ring with Scotch tape and then plank



FULL SIZE PLANS

of this model will greatly simplify construction. Send 50c to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 374.



with medium grade 1/8 x 3/8 in. planking.

After the cement has dried, carve and sandpaper the ring so a smooth surface results. Next, cut the extreme front ring and cement in place. Round off the edge and then pry loose the entire cowl. Cut out the inside of the second disk, sand smooth and cover the inside and outside with Silkspan tissue. Now, cut loose the rear disk and your cowl is complete.

Wing construction is extremely simple. Cut the leading and trailing edges to shape, pin each edge directly over the plan and cement the ribs in place. The fact that the wing does not have any dihedral makes it possible to build the structure in one piece. Add the tips and line spreader and then mount the structure to the fuselage after the latter has been covered with Silkspan tissue. •

Not the prototype Mr. Mulligan, merely the model photographed against a background of private and army aircraft. Two planes at right are Vultee BT-13s.

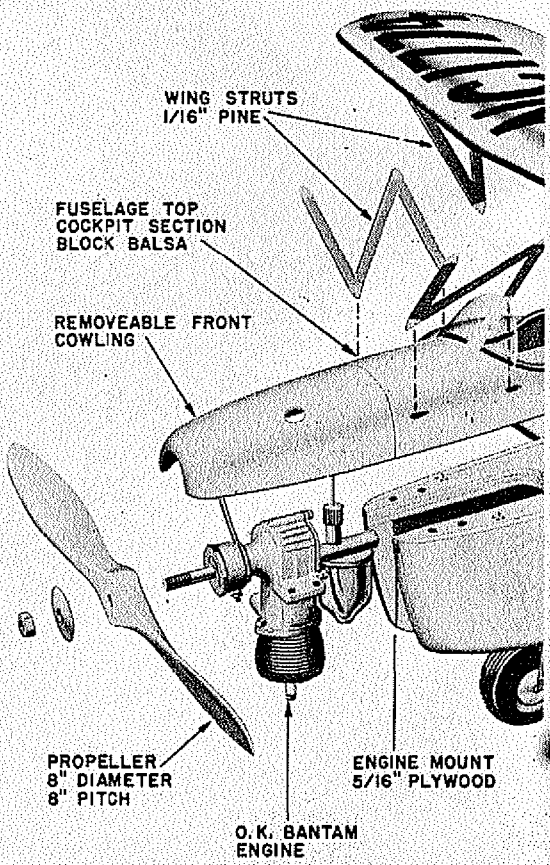
GREAT LAKES TRAINER

A 25-inch scale control-line model of one of aviation's most noted flying machines. Power with .19 to .29 engines.

BY DICK STRUHL

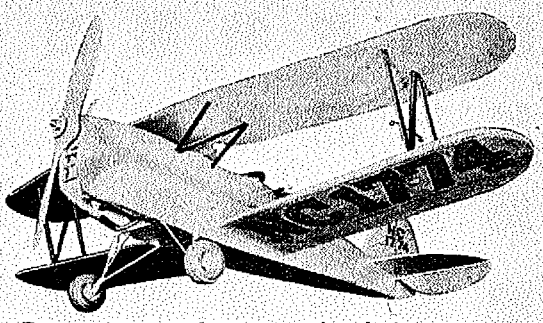
ONE of the most popular light planes of the '30's was the famous Great Lakes Trainer. In a sense it was the work horse of that era for in addition to being used as a trainer, it doubled as a sky writer, crop duster and the like. Of the many different designs produced during those years, the G L contributed as much to the growth of aviation as any other single airplane. Proof of the pudding is that some of the G Ls are still flying!

As a subject for a control-line model, the Great Lakes leaves very little to be desired. The strength of a bi-plane speaks for itself and the flying characteristics are ideal for the beginner as well as the expert. For sport flying, the G L has everything to offer; safe, consistent, easy flying. And here is a new wrinkle for those who lean toward acrobatics. Note that the stabilizer is set at a slight positive angle of incidence. This produces a faster take off and most important, when you are flying inverted and coming into the down-wind leg, the model will pick up speed—which can prove most disastrous if you are close to the ground. With a positive stabilizer setting, the nose will have a



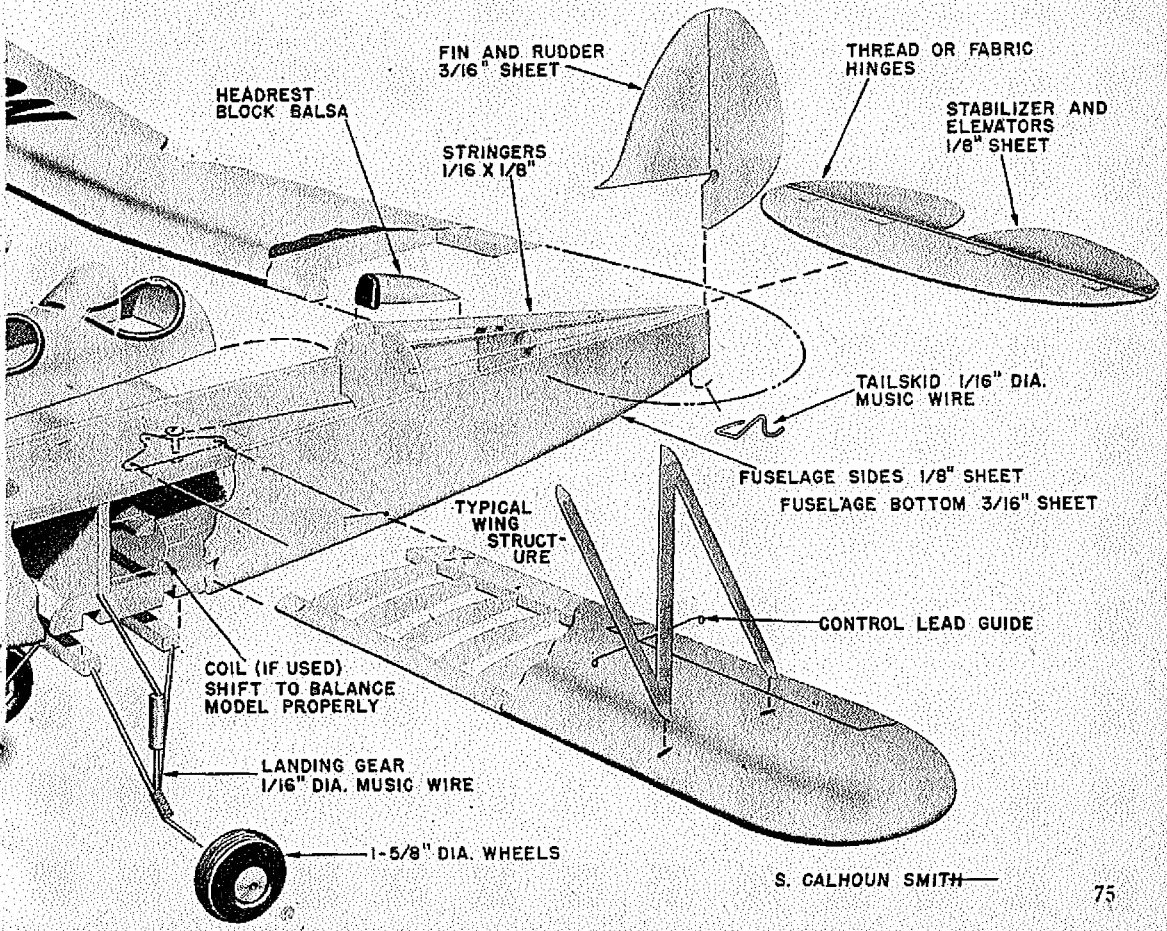
tendency to lift up when the speed is increased in inverted flight. Of course, just the opposite is true in the normal flight position but it is easier to correct the flight path than when the model is up-side-down. The original model used the O.K. Bantam engine for power but any other engine from .19 to .29 displacement can be installed. When using any other engine, just bear in mind that the center of gravity should be directly over the control plate pivot. You will find this Great Lakes model not only very peppy and easy-to-fly, but also a model project that can be quickly mastered on both the flying field and workbench by most beginners. The construction is simple and exceptionally rugged.

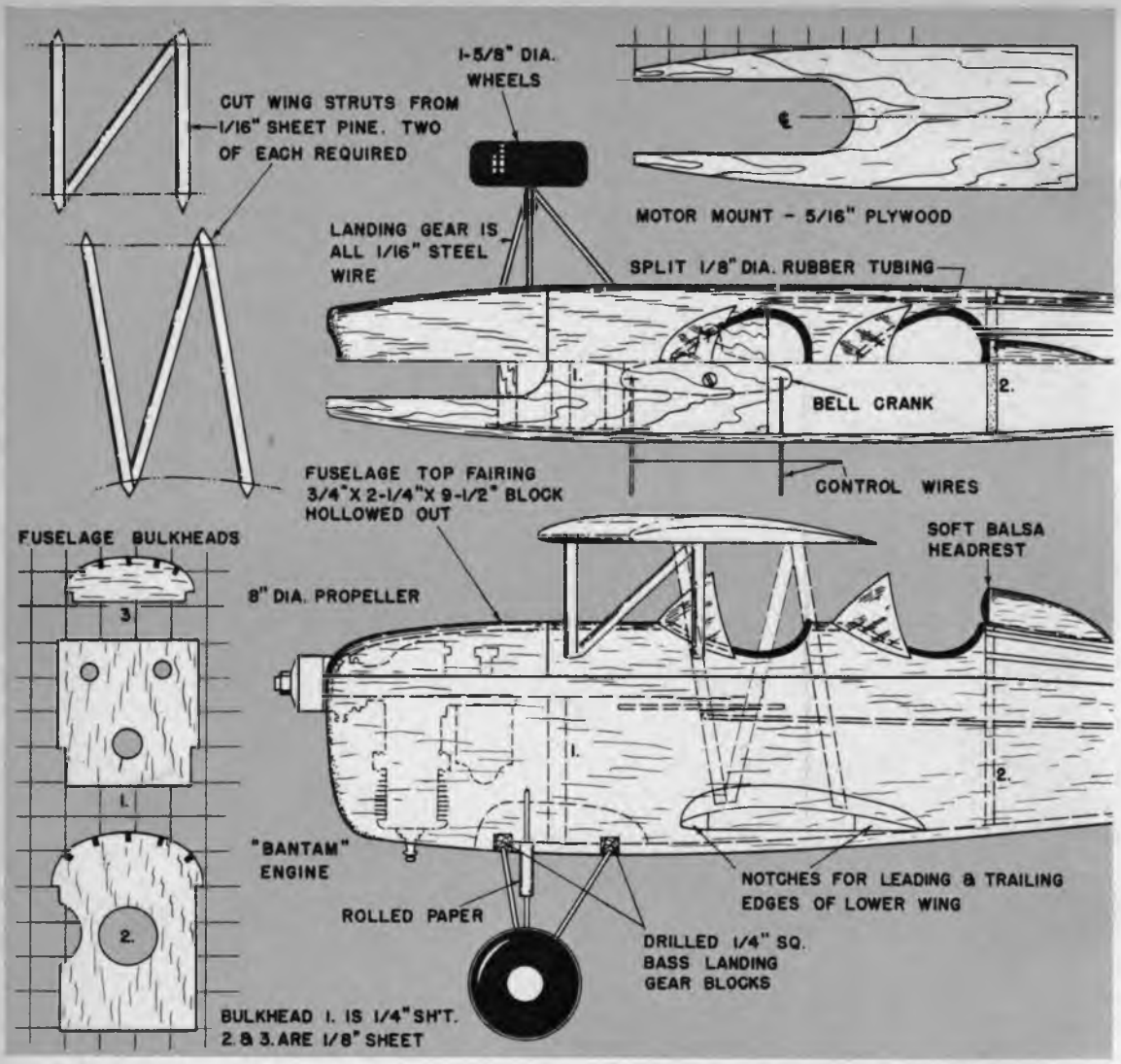
The fuselage is merely a box with a little fairing. Cut the two sides from stiff ⅛ in. sheet balsa and the fuselage bottom from 3/16 in. stock. To assemble, first pin and cement bulkheads Nos. 1 and 2 to one side of the fuselage. Now add the bottom and finally pin and cement the other side in place. When the cement has dried, join the tail ends together. Next, cut the motor mount



For consistent performance and realistic appearance, the G L has no match. Original was Bantam powered.

from ¼ in. or 5/16 in. birch plywood and cement it in place, bringing the front end of the fuselage together to form the slight curve. If desired, the front edge of the fuselage may be backed up with some ⅛ in. x ¼ in. strips for extra strength. Now install the landing gear braces and then add bulkhead No. 3. After the cement has dried, attach the 1/16 x ⅛ in. stringers. The top is shaped from a soft balsa block measuring ¾ x 2¼ x 9½ in. After the block is rough carved, cut the two cockpits and then scoop



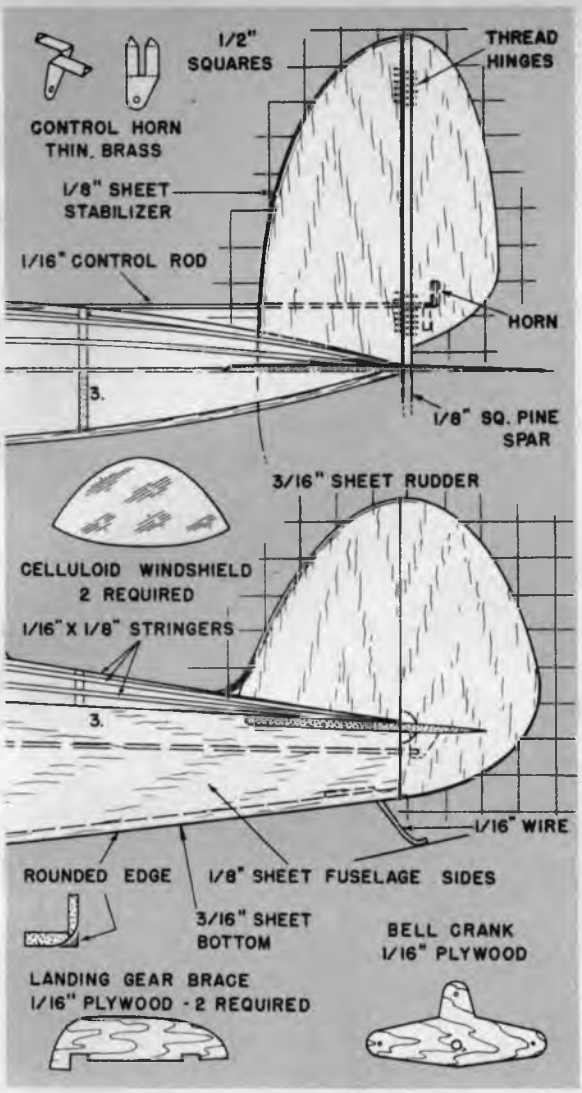


Easy to fly—and fly it will! Although small (wing span is but 25 inches), flying is stable even in brisk winds.

out the interior so a ⅛ in. wall thickness exists. The front portion of this block is removable, as indicated, to permit trouble-shooting, refueling, etc. The rear portion is cemented to the fuselage sides. Note that the bell crank is mounted on the underside of the motor mount plate.

The landing gear is now shaped from 1/16 in. piano wire. The pieces that act as the shock absorbers are free to ride in holes provided for them in the fuselage sides and are not connected together. The main gear members are inserted in drilled ¼ in. square bass blocks and bound neatly with thread. These blocks in turn are inserted in the spaces provided for them in the landing gear braces. Use plenty of cement at this joint. The tail skid is 1/16 in. music wire.

The rudder is cut from medium 3/16 in. sheet balsa. The stabilizer is cut from ⅛ in. stiff sheet balsa and is made in one piece. The elevators are cemented to the ⅛ in.



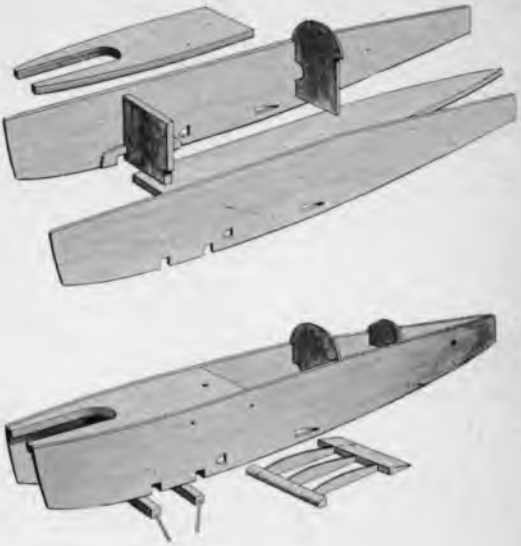
square hardwood spar and attached to the stabilizer by thread hinges. The control horn is bent from thin sheet brass or may be cut from a tin can. Note that the control rod emerges from left side of fuselage between bulkheads Nos. 2 and 3.

Both wings are quite simple and are built up directly over the full size plans. The top wing is built in one piece and has no dihedral; the lower wing is made in two halves. The tips are all solid balsa as are the four wing strut blocks. Carefully sandpaper the tips to follow the contour of the airfoil so no breaks exist. The lower wing leading

FULL SIZE PLANS

of this model are available by sending 50 cents to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 387.

FUSELAGE CONSTRUCTION



After bulkheads, fuselage sides and bottom are cut from the prescribed stock, cement bulkheads to one side, add the bottom and then cement the remaining side in place. Cut out the motor mount to fit your engine before attaching.

WING CONSTRUCTION

To mount bottom wing, cut out fuselage sides as shown and insert edges. Check incidence angle.

and trailing edges extend a bit and are inserted into the fuselage sides. The wings are covered with GM Silkspan, sprayed with water and then given two coats of clear dope. The wing struts are cut from 1/16 in. thick sheet pine as indicated. Force the center section struts into the balsa fairing on top of the fuselage and then mount the top wing into position. The lower panels are inserted into the fuselage notches and then the outer wing struts are attached.

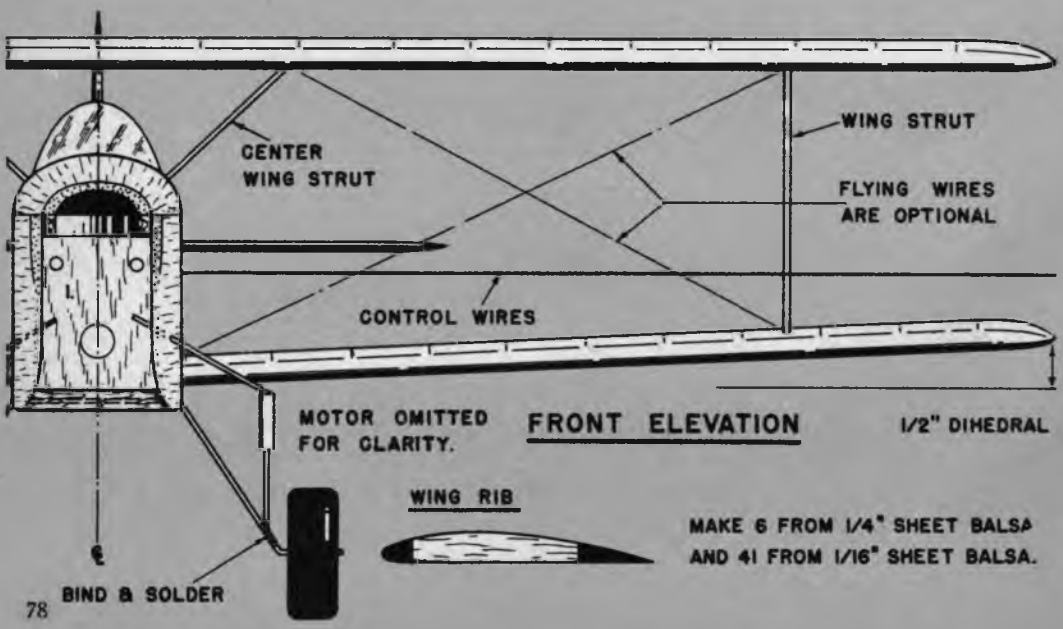
Bolt your engine in place and, if you are using a complete ignition system (coil, condenser and batteries), place the battery (Bright Star 459 or equivalent) in the rear cockpit and juggle the coil position so the model balances at the bell crank pivot. In most instances the coil position will be just behind the firewall but check the balancing point before permanently anchoring the coil in place.

Since the majority of present day model

Note that the control-line leads extend about 4 inches from the side of the fuselage. The control-lines are first slipped through the guide on the wing struts and then hooked on to the leads.

builders use glow plug engines and the original Great Lakes model had a conventional ignition system, if you are using a glow plug, cement a piece of lead to either the nose or the tail to balance correctly.

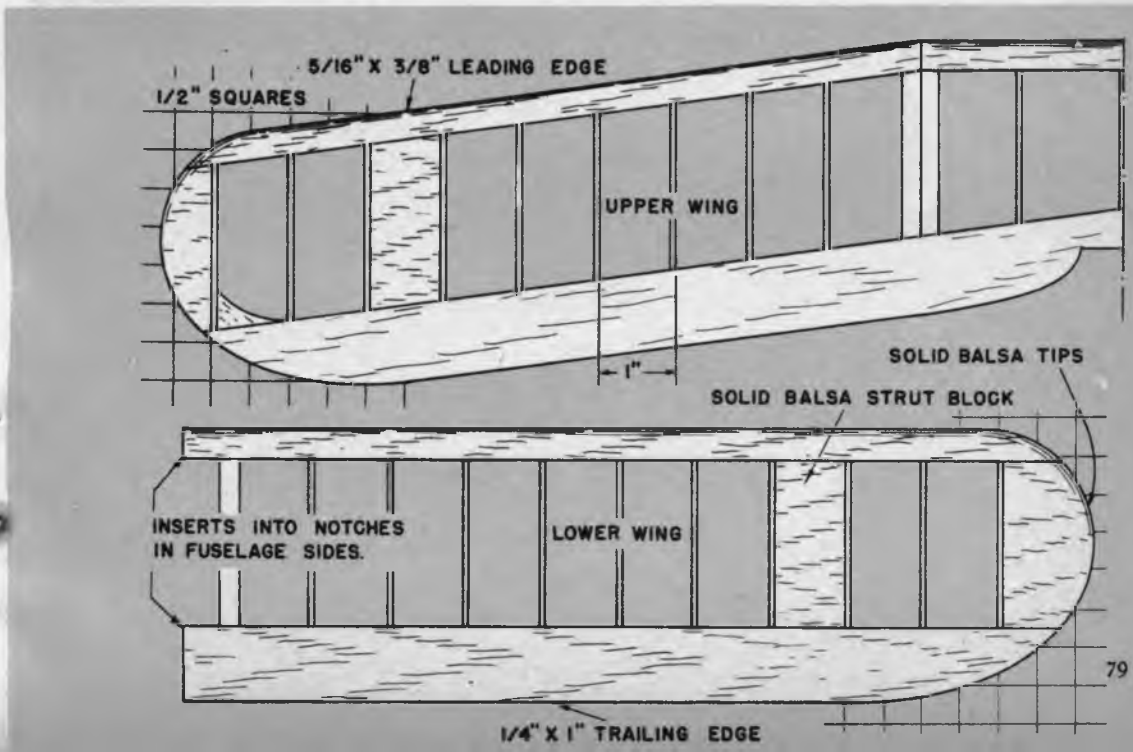
The model is now ready for the finishing touches. The original job was doped silver with red trim, and black numbers and ailerons. Apply at least six coats of silver dope (brushed on or sprayed) over the entire model and then add the trim. The numbers on the lower left and upper right wing panels really add the finishing touch of realism. Cut them from black Trim Film and slide in position in the same manner as applying a regular decal. If you



The fact that the engine is inverted results in a very high line of thrust, making it possible not only to effectively house larger engines, but to also use larger propellers without lengthening the gear.

don't care to use Trim Film for the fuselage and wing stripes, mask off the striped areas with tape and paint. After the celluoid windshields have been added and all struts painted black, spray the entire model with your favorite fuel proofer to preserve the finish from the dissolving effects of the fuel.

You will note that the model flies with the torque, which makes it absolutely necessary to offset the rudder so the pull is against the circle. If you're using an engine in the .19-.23 class keep the lines around 25 feet in length. Remember that the shorter the lines the better control you'll have in brisk winds. •



free-flight
BURNELLI TRANSPORT

Here's a high performance model of a famous lifting body plane. It is designed for .19 to .29 engines.

By Walter A. Musciano

"MYSTERY of how North Koreans maintained their tanks, hundreds of which have been knocked out, may be solved from two widely separated sources. Soviets, according to almost identical descriptions from Eastern Europe and Japan, are in quantity production of a Burnelli lifting body design transport capable of carrying a 33 ton tank complete with crew 1,500 miles."

The above paragraph was published in Aviation Age for Sept. 1950 (a page in Aviation Intelligence). Other reliable sources claim that a Burnelli design landed at a Prague airport and was quickly put into a locked hangar before anyone could take a photo. It seems that the countries behind the "iron curtain" recognize and utilize modern concepts of aerial transportation much quicker than our own government officials and airline operators.

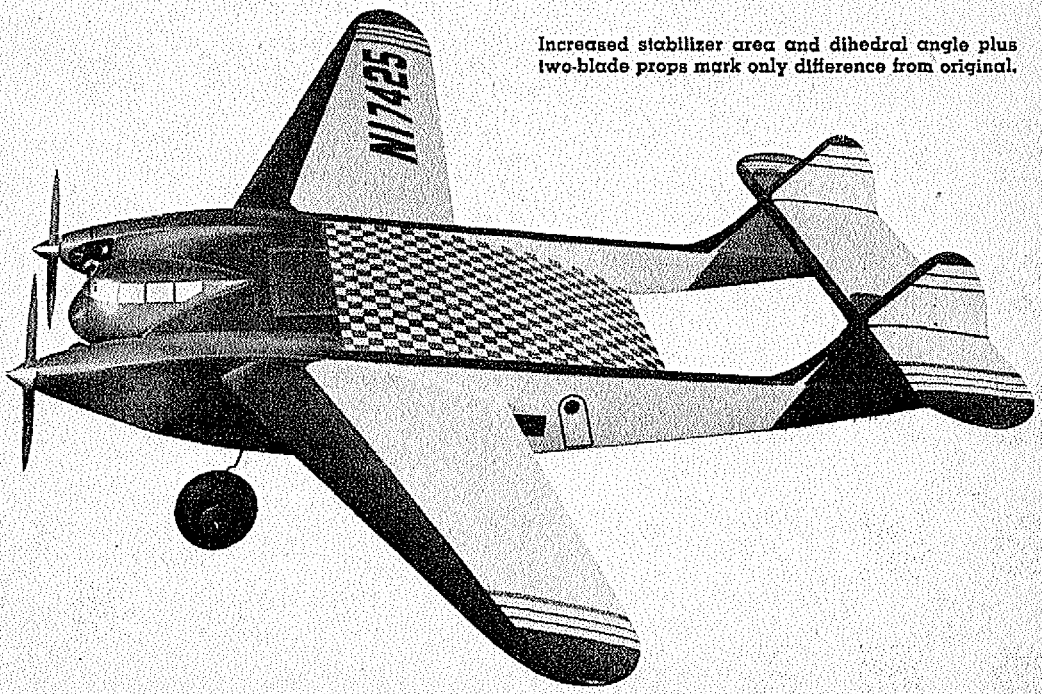
Vincent J. Burnelli, a Texan, designed the first lifting body airplane over twenty-five years ago and has designed many modern versions as transports, bombers and cargo carriers. Burnelli designed "All Wing" airplanes have, for many years, proven themselves superior to conventional airplanes in safety, strength, speed and payload lifting capacity. Despite these advantages Vincent J. Burnelli has met with only mild success in promoting his designs. This is due, mainly, to the human negative reaction toward anything advanced or strange no matter how good the item in question may be. Clyde Pangborn, famous round the world flyer, has enthusiastically demonstrated the advantages of the Burnelli design for several years and stated that "sixty per cent of the victims in recent air crashes would have been saved in a Burnelli type plane." One of the latest Burnelli planes was built by the Canadian Car and Foundry Company and this plane has proven its superiority over many years of operation. Safety is of prime importance to air travelers and Burnelli alone can boast of all the following safety features: (1) Engines and landing gear compart-

ments are accessible during flight for repairs or adjustments. (2) Compact airfoil body possesses greater resistance to telescoping on impact. (3) Wheels transmit landing shocks to a strong body instead of thin wings. (4) Propellers are close together, therefore plane needs hardly any corrective use of controls during single engine operation. No spiral tendencies. (5) Engines and propellers are ahead of all structures, thereby engines absorb much of the impact during emergency landings on rough terrain. (6) Propeller failure is less likely to damage main structure because of the forward location. (7) The wide fuselage has good flotation qualities for emergency landings at sea. (8) Engines and fuel tanks are located far apart, thereby minimizing fire hazard. (9) The design combines flying wing efficiency with conventional plane stability. Model builders especially will appreciate items 2, 3, 4 and 9.

Our model is patterned after one of Mr. Burnelli's latest designs. This is a sleek four engined transport of turbo-prop. propulsion. Two 2800 hp Allison T-40 turbine engines are housed in each nacelle driving contra-rotating propellers. This arrangement is similar to the new Douglas A2D—"Skyshark" and is the powerplant of the near future. Maximum speed is over 475 mph and cruising range is 3500 miles. As an airliner 70 passengers could be carried by day while sleeping accommodations can handle 40 persons. The payload that can be carried is 44,000 lbs. which is remarkable when we consider the fact that the total weight of the plane empty is only 40,000 lbs. Of course even a greater payload can be carried if the cruising range was to be shortened. As a tank carrier the Burnelli design is ideal in view of the fact that the vehicle can be loaded and unloaded into the center wing between the booms and even dropped by parachute if necessary, as Mr. Burnelli once demonstrated to the Armed Forces. The high location of the tail makes the latter very practical.

We wish to express our gratitude to Vincent J. Burnelli for such information and valuable design data and to Paul Palanek for his assistance.

In order to obtain a stable free flight model of maximum stability we increased the stabilizer area and the dihedral angle slightly. Conventional two bladed propellers were substituted for the contra-rotating three bladers of the full scale design. The fact that the engines are very close together prevents the model from veering sharply if one engine should inadvertently stop and thereby prevents a possible spin with resulting smash up. We originally intended using one fuel tank for both engines, however some difficulty was encountered because of the length of feed lines. Instead, "Maeco" transparent tanks were used with great success. These tanks



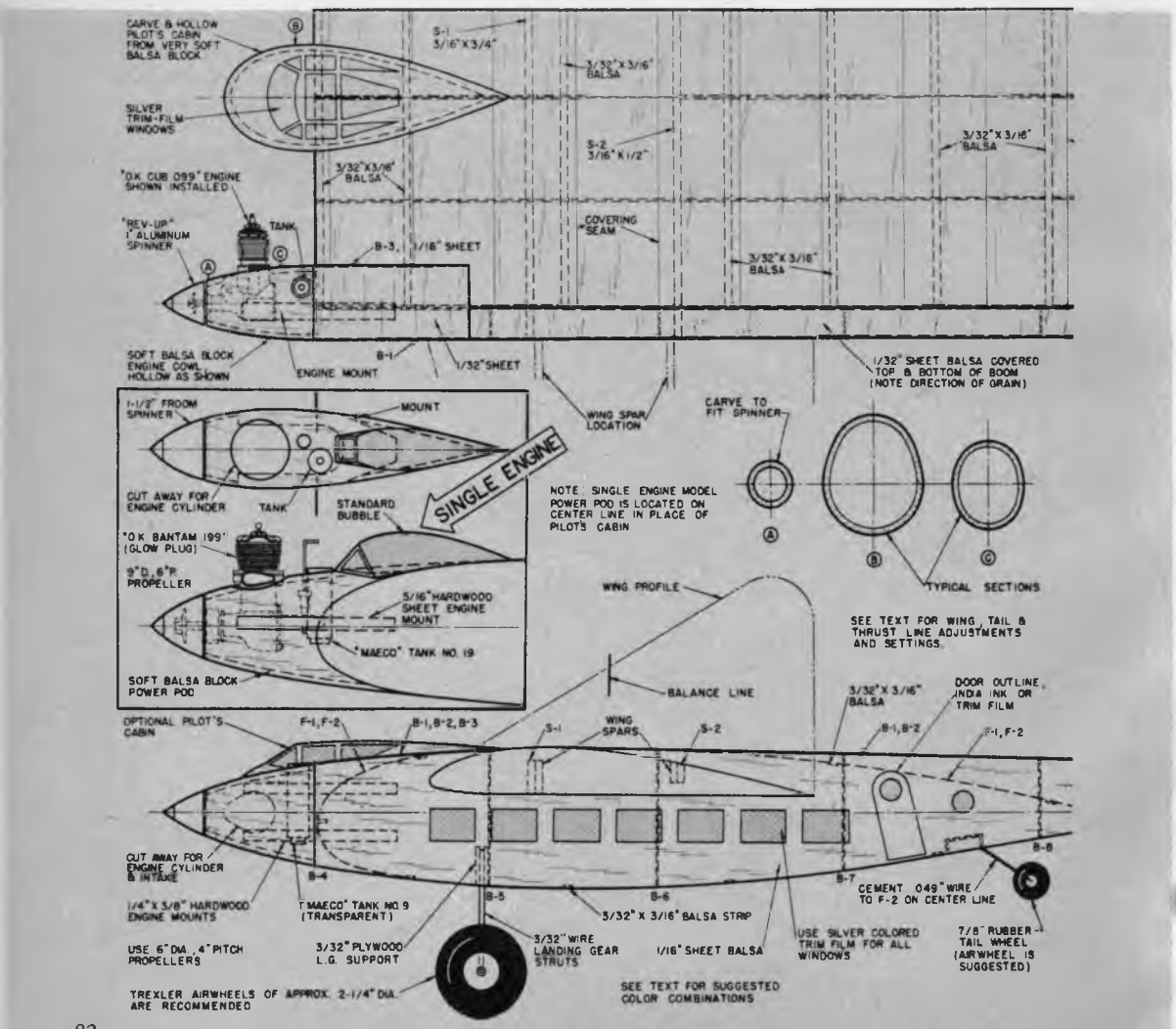
Increased stabilizer area and dihedral angle plus two-blade props mark only difference from original.

are specifically made for 30 second engine runs for .049 to .19 engines. Use number "9" tank for the Cub .099 engine. Use of these tanks eliminates the need of flight timers. Our model Burnelli can be powered by engines from .074 to .199 cubic inch displacement depending on the amount of climb you desire. We used O. K. Cub .099 engines and performance couldn't be better. Although the climb is not of the "Skyrocket" variety the ship gets "upstairs" soon enough. The glide is super. This can be attributed to the 420 square inches of wing area and the low weight of 31 oz. Yet the model is strong and can take plenty of punishment.

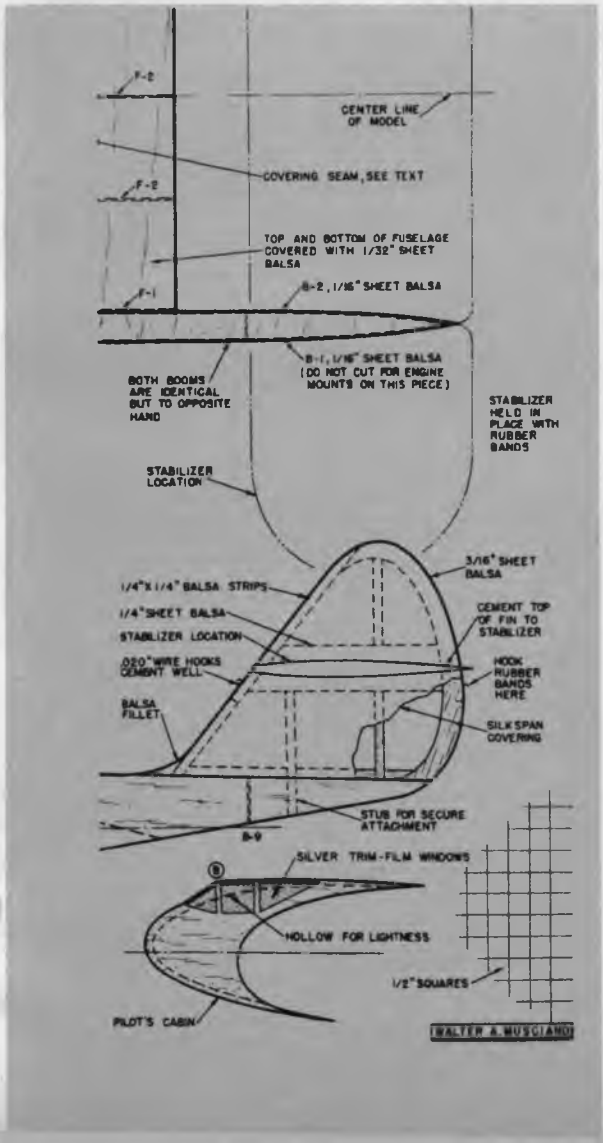
It will be noted that the plans include a single engine version. This was done for the benefit of those who do not have two engines of equal power or prefer single engine planes and yet would like to build this interesting design. Any engine from .19 to .29 cubic inch displacement can be used to power the single engine model.

We suggest that close attention be paid to the construction procedure in order to insure a successful model. Read the entire instructions before commencing construction. Trace all wing ribs, boom bulkheads and sides plus fuselage formers onto the specified size of balsa wood. Cement the engine mounts to B-2 securely. Join the boom sides at the rear and cement the formers in place. Add the top and bottom sheet covering up to bulkhead B-5. Set booms aside and cement all fuselage formers to the two main root spars S-1 and S-2. Add all the $\frac{3}{32}''$ x $\frac{3}{16}''$ auxiliary stringers in place, cementing well.

The booms are well cemented to each



Burnelli has superb glide owing to 420-square inch wing area and 31-ounce weight. Test in tall grass.



side of the fuselage at this time. Be sure the protruding inboard side of the engine mounts lock into former F-1. The wire landing gear struts are bent to shape and sewn between the two plywood sheets. Add plenty of cement. Install the landing gear assemblies by sliding into notches in F-1 and B-2. Use plenty of cement. The tail wheel assembly is also installed at this time.

We should now construct the two wing panels. Pin the bottom spar to the workbench directly over the plans of the wing, then pin all ribs in place. Add the upper spar and trailing edge followed by the leading edge and wing tip. It should be noted that rib number one should be tilted in order to align itself with the boom because of the dihedral required. Also remember to construct one left and one right panel. Apply plenty of cement to all wing joints and remove from table when thoroughly dry. Now add the leading edge covering which can be soft $\frac{1}{16}$" sheet or 1/20" hard balsa sheet. When dry sand the trailing edge and tips to fair into the airfoil and wing contour. See plans. Cover the wings with heavy silkspan and water lightly to shrink tight. Cement the wing panels securely to the fuselage and booms. Apply several coats at the spar connections and wrap spars together with fine thread and smear with cement.

Cement the fuselage covering in place. We suggest that two inch widths of $\frac{1}{32}$" sheet be cut to the correct length (distance between booms) and butt jointed together before installing. The plans indicate the seams. Use a slow drying cement for this purpose. When completed add piece B-3 and cover the remainder of the

boom top and bottom with $\frac{1}{32}$" sheet balsa.

Bolt or screw the engines in place at this time and add the fuel tanks. Select very soft balsa blocks and carve the engine cowling hollow as shown and cement in place. We used 1" "Rev-Up" aluminum spinners. Be sure the cowl fairs into the spinner shape perfectly.

The fins are made in one panel each and cut along the stabilizer line when finished. The balsa strips and curved pieces are pinned over the plan in a similar manner as the wing. The stabilizer is also fabricated at this time and the entire empennage is covered with silkspan. Water lightly to shrink the covering and, when dry, clear dope the empennage and wing three times, checking for warps between coats. The upper portions of the fins are now cemented securely to the top of the stabilizer.

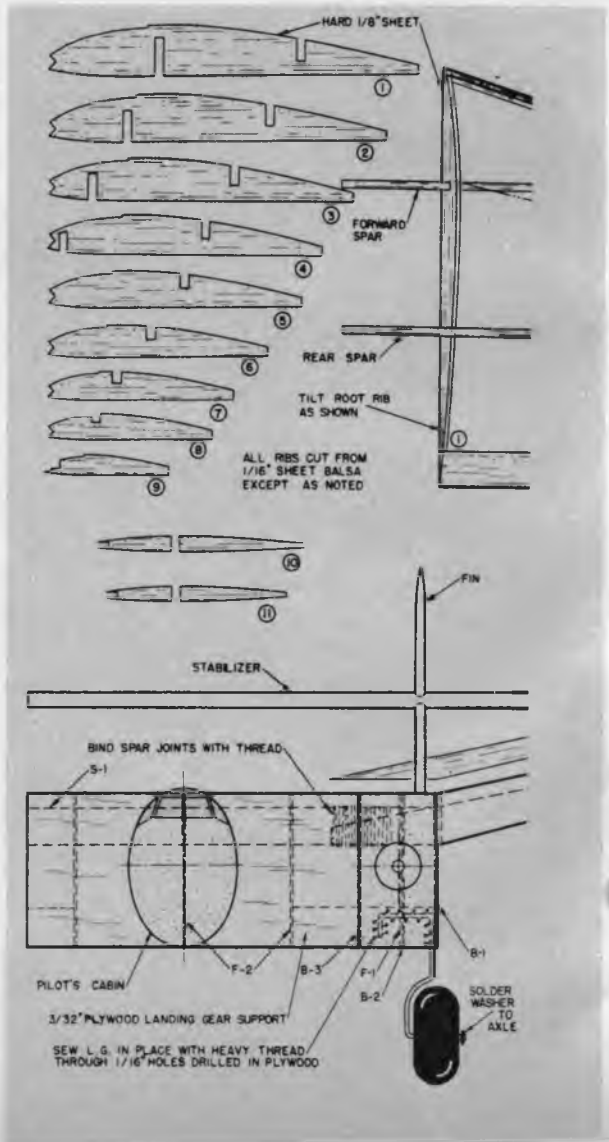
Select two very soft balsa blocks for the pilot's cabin and cement together along the longitudinal center line. Saw to the proper outline, first the top and then the side view. Carve to shape and sand smooth. Separate the blocks and hollow as shown. Recement them together and attach to the fuselage securely. If desired, the pilot's cabin can be omitted completely as it is only a scale attachment and contributes nothing to the model's performance.

Dope all exposed wood surfaces with two coats of clear dope. Then paint the model with two coats of your favorite colored dope. Combinations such as: Yellow and red, grey and orange, cream and dark-green or even black and white are very attractive schemes. Be sure to apply the light color first then mask off and apply the dark color. "Trim Film" is recommended for striping and checkerboard trimming as well as license numerals. Apply one coat of clear fuel proofer to the entire model as well as the cowl interiors.

Neat and careful construction is very important for good performance, however still more important are balance and force arrangement. Be sure the model balances as shown and the incidence and thrust settings are as follows:

Both thrust lines (centerline of engine crankshaft) should be offset downward about 4° and outward from the plane centerline 1°. The wing panels should be set at plus 3° incidence while the stabilizer is set at zero degrees, these latter settings are relative to the plane centerline. One of the upper fins should be offset for a right turn ¼". These are the settings we found to provide the best flying characteristics.

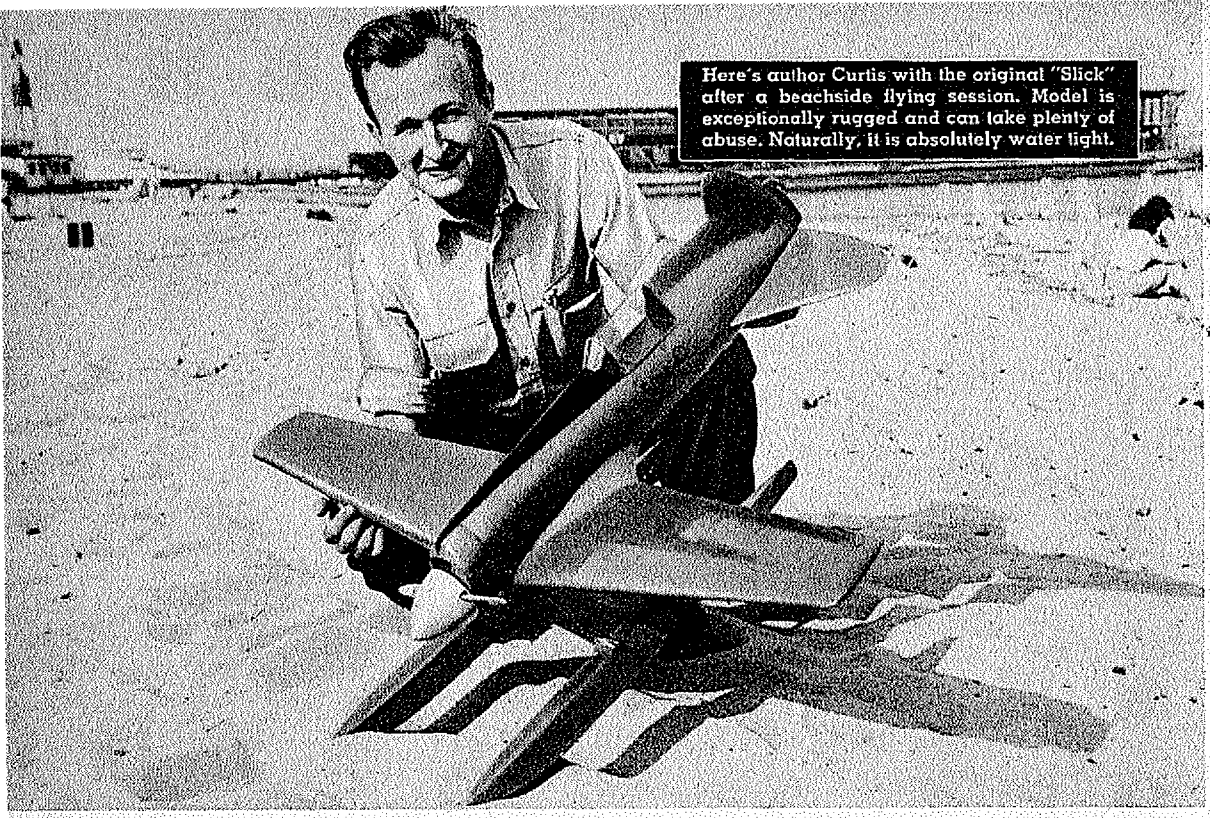
Extreme caution should be exercised in testing. Select an area of tall grass (about 18" high) for test gliding. Always launch the model into the wind with a smooth push, just enough to get the model airborne. Aim the model at a point on the ground about thirty feet ahead. Launch at shoulder height. Once the glide is flat and slightly to the right powered flight can be enjoyed. •



1/4" SQ. HARD BALSA LEADING EDGE
1/8" X 1/4" HARD BALSA LEADING EDGE
LEADING SURFACE OF TOP OF WING COVERED WITH 1/16" SHEET BALSA UP TO THIS LINE
3/16" X 3/8" HARD BALSA SPAR
1/16" SHEET BALSA
SILKSPAN COVERING
CENTERLINE
REINFORCING
SILKSPAN COVERING
1/8" SHEET BALSA TIP
1/8" X 1/2" BALSA TRAILING EDGE
3/16" SHEET BALSA WING TIP
3/16" X 3/4" MEDIUM BALSA TRAILING EDGE
TRIM FILM LICENSE NUMERALS (USE ANY NUMBERS)
REAR SPAR CUT FROM 3/16" HARD SHEET BALSA
CUT ALL FORMERS FROM 1/16" SHEET BALSA
B-4
B-5
B-6
B-7
B-8
5° DIHEDRAL REQUIRED
B-2 FORWARD PORTION, 1/16" SHEET (REMAINDER SAME AS B-1)
1/2" SQUARES
B-3, 1/16" SHEET
ENGINE MOUNT RECESS
FORWARD SPAR 3/16" HARD SHEET BALSA
CUT OUT THIS SPACE ON F-2 ONLY
CUT ON F-1 ONLY
F-1, F-2
CUT FOR LANDING GEAR
F-1 FORWARD PORTION 1/16" SHEET (REMAINDER SAME AS F-2)
F-2 FORWARD PORTION SHOWN HERE
SINGLE ENGINE ONLY FOR MOUNT
SEE DETAIL FOR F-1 FORWARD PORTION
L.G. CUT

N27639

WALTER A. MUSCIANO



Here's author Curtis with the original "Slick" after a beachside flying session. Model is exceptionally rugged and can take plenty of abuse. Naturally, it is absolutely water tight.

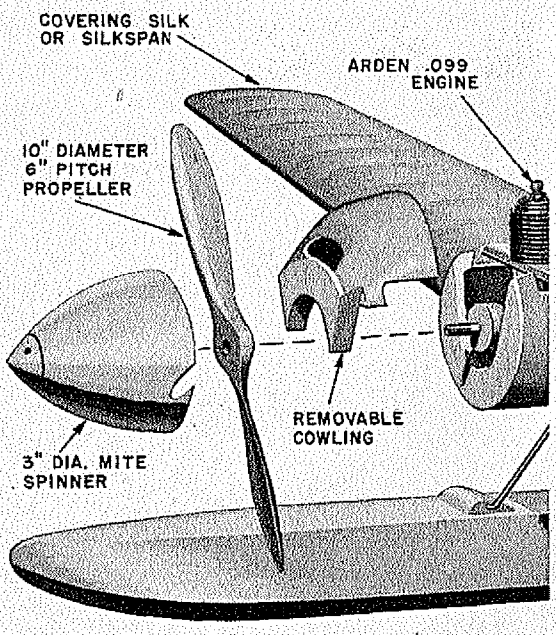
"SLICK"

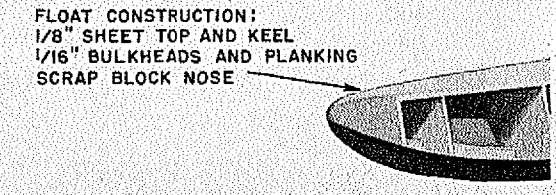
free-flight float plane

By Stephen Curtis
RICHMOND MODEL FLYING CLUB
STATEN ISLAND, N. Y.

IF ordinary free-flight models no longer capture your interest, and the thrill of flying control-line jobs is wearing off, then we think you should make a change—and that change should be to seaplanes! We've been flying contest free-flights ever since the days of Maxwell Bassett, and when Jim Walker came along with his famous Fireball we stepped right in and had our share of control-line flying.

Ordinary free-flight and control-line flying have their respective merits but if you would like a new field to master then make your local pond, lake or bay your airport —and fly with floats. This Slick model, with its 45-inch span, is just what you need for a starter. Designed for the smaller engines, the original job was powered with an Arden

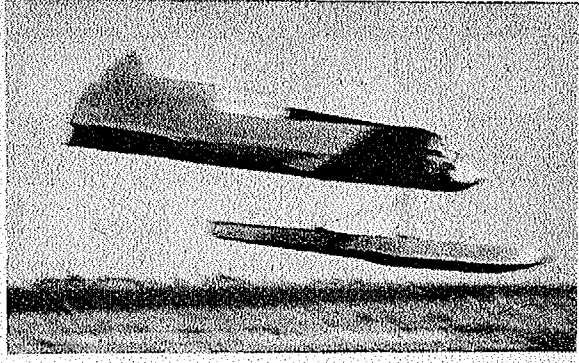




.099 and also the Arden .199 power plants, fitted with glow plugs. Other engines up to this displacement can, of course, be used but installation will require slight alteration in the nose structure.

Start construction by cutting the one piece stabilizer trailing edge from $\frac{3}{16}$ in. medium hard balsa. The tip is cut from ¼ in. sheet, the leading edge is ¼x½ in. medium hard stock and the spar ⅛x¼ in. hard balsa. Trace the stabilizer outline on a separate piece of paper so you can build the entire structure directly over the plans. Cement the edges and tips together and then add the $\frac{1}{16}$x¼ in. ribs. When dry, carve the leading and trailing edges and ribs to form the slightly cambered section shown.

Now cut from ⅛ in. sheet balsa the float keels and the top. Cut the float bulkheads from medium $\frac{1}{16}$ in. stock and then cement each bulkhead in place. Cement the keel in position and then cover the sides of the float with $\frac{1}{16}$ sheet. After the sides are trimmed cover the bottom. To complete the float, cement small blocks of scrap balsa to the nose and carved to shape. After each float is sanded thoroughly, apply five coats of clear dope, sanding between each coat.

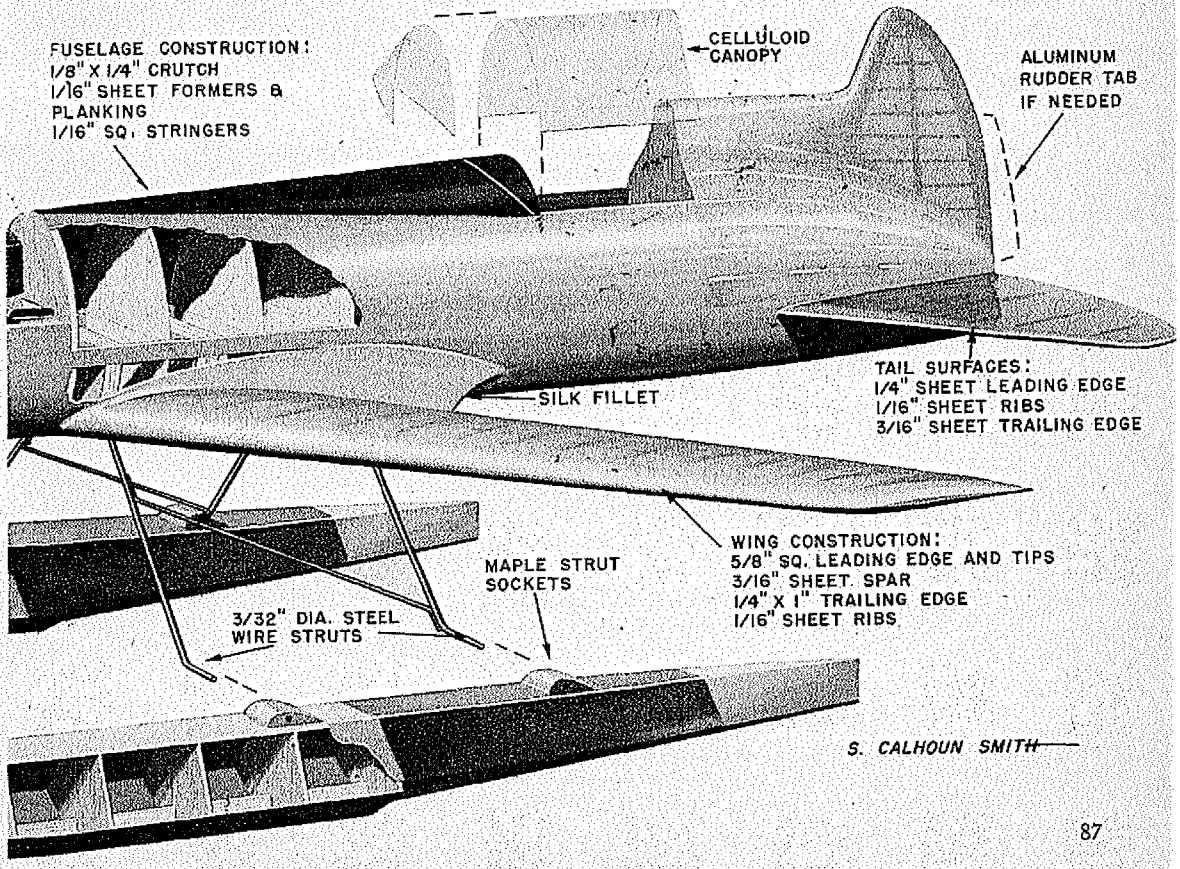


Coming in—fast and flat—for a good landing. The floats are attached to wire struts with rubber bands.

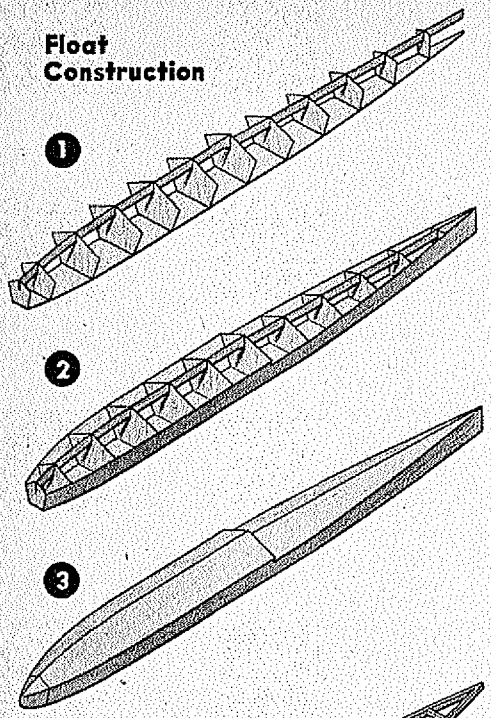
The landing gear strut attachment blocks are then carved from maple and cemented in place on the float top. Cover the entire float with tissue or Silkspan, and apply eight to ten coats of thinned colored dope.

For the sake of clarity, all other structures except the crutch and bulkheads have been omitted from the fuselage top view.

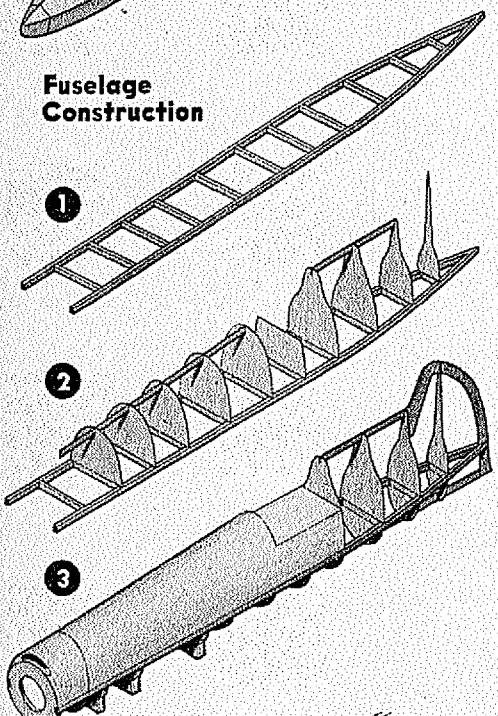
Using hard ⅛x¼ in. strips, construct the crutch directly on the full size plan. All cross pieces with the exception of station 1 are put in at this time. While the crutch is drying, trace and cut from $\frac{1}{16}$x3 in. sheet balsa, bulkheads No. 3 through 11. Note that bulkhead No. 12 is cut from ⅛x2 in.



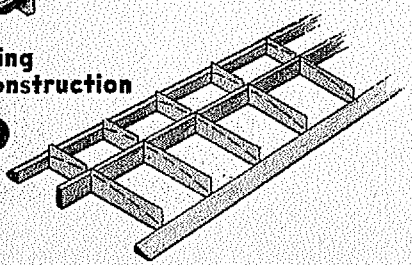
Float Construction



Fuselage Construction



Wing Construction



medium balsa. Notch bulkheads No. 9 through 12 for the $\frac{1}{16}$ in. square hard stringers and then cemented in place.

Next, cut the rudder outlines from ¼x3 in. sheet and cement in place. The ¼ in. sheet block on the dorsal fin is now added and then the cockpit floor cemented in place.

Remove the upper fuselage assembly from the plan and cut out bulkhead No. 1 from $\frac{1}{16}$ in. stock. Mark off the line where the cowl will later be cut to accommodate the engine. Bulkhead No. 2, the firewall, is cut from ⅛ in. plywood, drilled for the engine mounting bolts. Bulkheads No. 1 and 2 are then cemented in position on crutch.

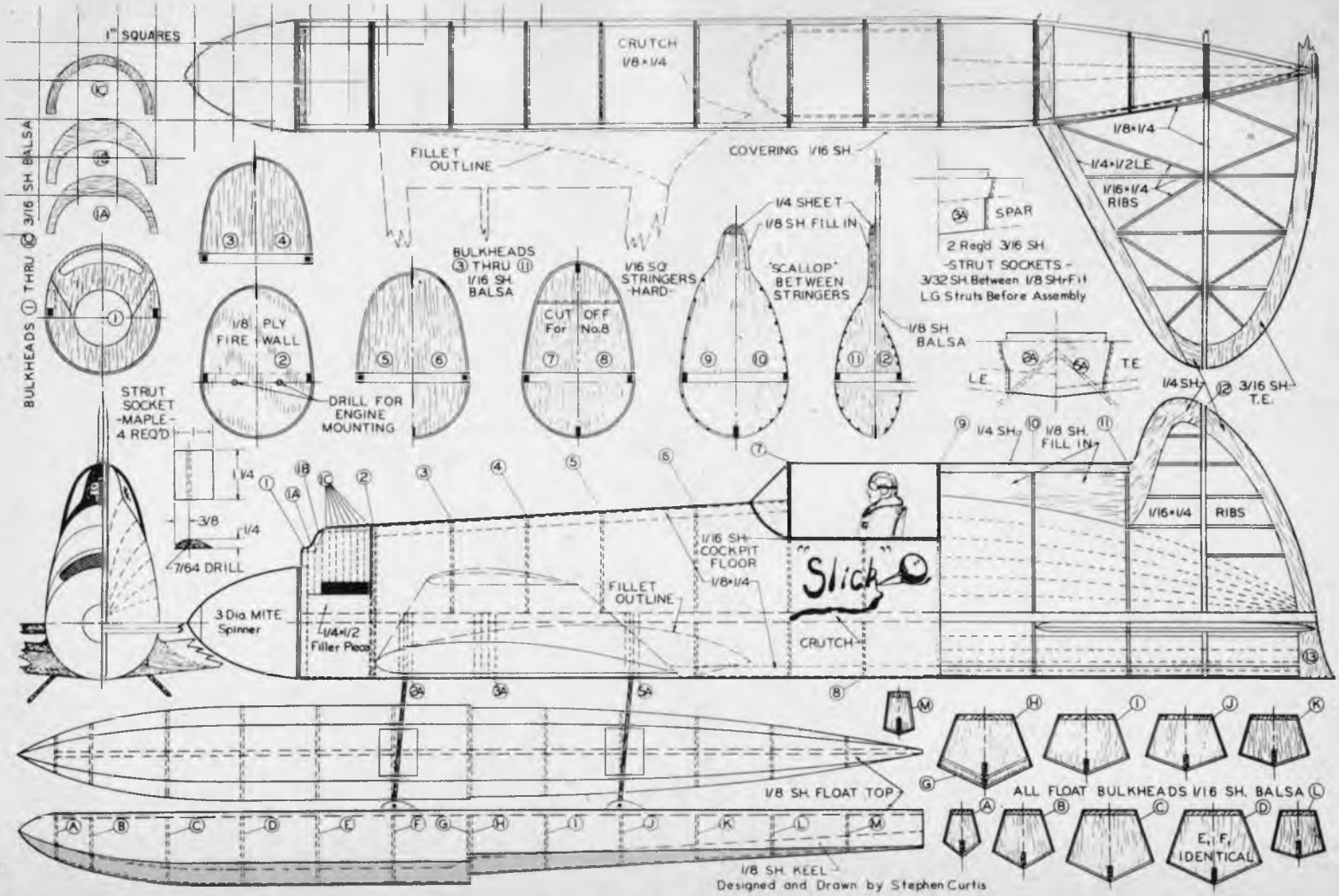
Form the landing gear struts from $\frac{3}{32}$ in. diameter piano wire. Cut two each of bulkheads No. 2A and 5A and then cut the filler pieces from $\frac{3}{32}$ in. hard sheet as shown on plan. Cement the upper filler pieces on bulkhead No. 2A and 5A, trimming to assure a perfect fit and alignment of landing gear struts. Cement the remaining No. 2A and 5A bulkheads to the fillers, forming a socket into which the struts are later inserted. Now cut the two spar reinforcing bulkheads (No. 3A) and filler piece. Then cut out the remainder of the lower bulkheads, and the No. 13 tailpiece, and set aside.

Now, cement together two sheets of $\frac{1}{16}$x3x18 in. balsa and one piece $\frac{1}{16}$x2x18 in. stock to form an 8x18 in. panel with the 2 in. sheet in the center. While these sheets are drying, pin them to board to prevent warping.

Fill in the dorsal fin sides with ⅛ in. soft sheet balsa, as shown. Cement the rudder ribs in position and then add the filler pieces to blend in with dorsal fin. Carve and sand dorsal fin, rudder outlines and ribs to shape.

Now sand the $\frac{1}{16}$x8x18 in. panel to remove all saw marks and seam lines. Apply cement to bulkheads (No. 2-9), the upper keel, and crutch sides. Wrap gauze bandage around the panel, using rubber bands, or pins to hold in place while drying. Check fuselage alignment during drying process and correct any twisting tendency. When dry, trim to outline and then notch out the sheet covering at bulkhead No. 9 for the $\frac{1}{16}$ in. square hard stringers. The stringers are then added.

The stabilizer is now cemented to the fuselage crutch and then the lower bulkheads, No. 6-13 are added. The section between bulkheads No. 6-9 is now covered with $\frac{1}{16}$ in. flexible sheet balsa. Notch the sheet covering of bulkhead No. 9 for the stringers and then add the stringers. Fill in the area between stabilizer and first


1" SQUARES
BULKHEADS ① THRU ⑫ 3/16 SH. BALSA
CRUTCH 1/8 × 1/4
FILLET OUTLINE
COVERING 1/16 SH.
1/8 × 1/4
1/4 × 1/2 LE
1/16 × 1/4 RIBS
BULKHEADS ③ THRU ⑪ 1/16 SH. BALSA
1/16 SQ. STRINGERS -HARD-
1/4 SHEET
1/8 SH. FILL IN
"SCALLOP" BETWEEN STRINGERS
3A SPAR
2 Req'd 3/16 SH.
-STRUT SOCKETS-
3/32 SH. Between 1/8 SH. Fill
L.G. Struts Before Assembly
1/8 SH. BALSA
2A
5A
T.E.
L.E.
1/4 SH.
⑫ 3/16 SH. T.E.
⑨ 1/4 SH.
⑩ 1/8 SH. FILL IN
⑪
1/8 PLY FIRE WALL
DRILL FOR ENGINE MOUNTING
CUT OFF For No. 8
STRUT SOCKET -MAPLE- 4 REQ'D
1/4
3/8
1/4
7/64 DRILL
3 Dia. MITE Spinner
1/4 × 1/2 Filler Peice
1/16 SH. COCKPIT FLOOR
1/8 × 1/4
FILLET OUTLINE
"Slick"
CRUTCH
1/16 × 1/4 RIBS
1/8 SH. FLOAT TOP
1/8 SH. KEEL
ALL FLOAT BULKHEADS 1/16 SH. BALSA
E, & F, IDENTICAL
Designed and Drawn by Stephen Curtis

stringer to facilitate covering the fuselage.

Cut the wing spars from $\frac{3}{16}$ in. hard sheet. The leading edge is $\frac{5}{8}$ sq. medium stock tapered to $\frac{3}{8}$x$\frac{5}{8}$ in. at the tip. The trailing edge is medium ¼x1 in. stock. The wing is made in two panels, a left and a right.

Cement the root ribs in position, using bulkheads No. 2A and 5A as templates for correct angle and spacing. Position the tip ribs and, in each rib position shown, cement a "blank rib." These are $\frac{1}{16}$x$\frac{7}{8}$ in. strips cut to fit. Now rough carve the tips from scrap $\frac{5}{8}$ in. sq. stock and cement in place. Before joining the wing panel together, carve leading edge, ribs and tips and sand smooth.

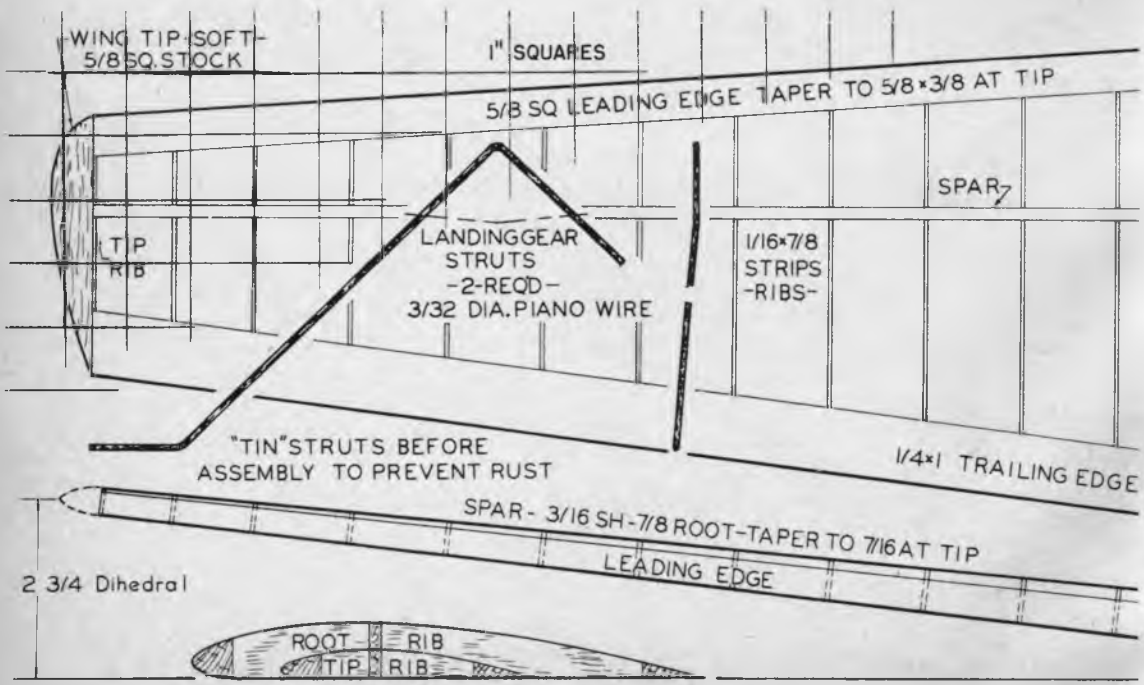
When joining the panels block up each tip 2½ in. and then trim the leading and trailing edges and spars for a good joint at the center. Cement together, add the spar joiners and filler and the landing gear socket bulkheads. Fill in the small triangular sections between the leading and trailing edges and also the strut socket with scrap balsa. When dry, fill in upper surface of each panel between the first two root ribs with $\frac{1}{16}$ in. balsa.

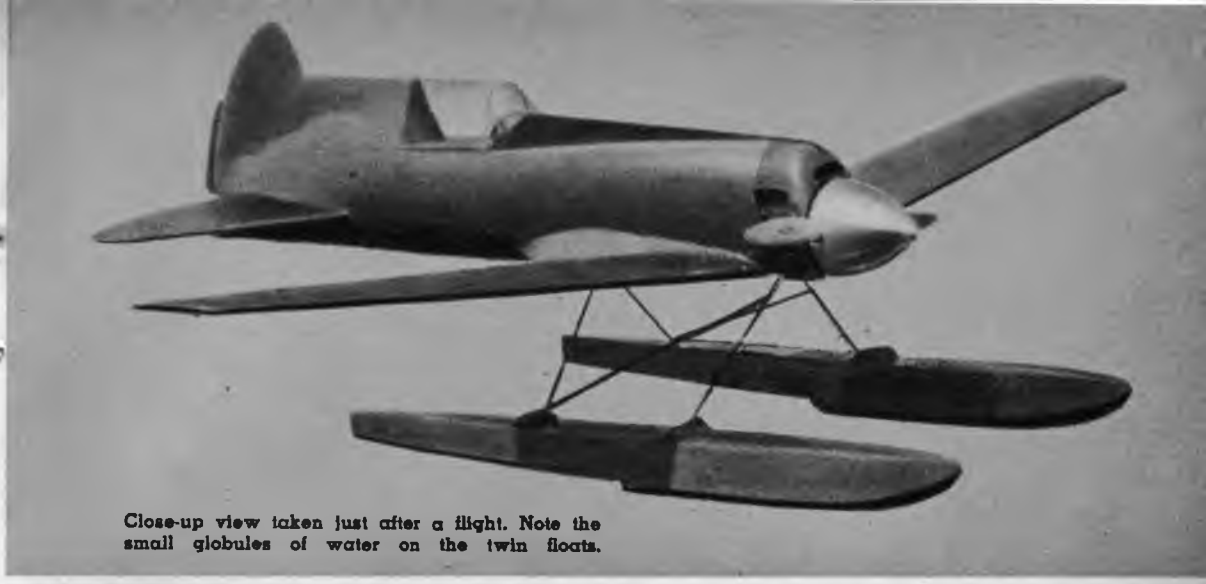
Now trim the leading edge to fit flush against rear of bulkhead No. 2. Glue in place and hold with pins. When thoroughly dry, cover the sections around the wing root and nose of fuselage with $\frac{1}{16}$ in. sheet. The ¼x½ in. cowl filler pieces are now cemented in place. The laminated bulkhead sections (No. 1A, 1B and 1C) are cut from $\frac{3}{16}$ in. soft sheet and cemented together, as shown. After carving and sanding the cowl section to shape, cut through the two pencil lines to remove the upper cowl section. Then carve and sand the inside of cowl for engine clearance.

Before installing the landing gear struts, coat the apex of struts with cement and insert the ends into the sockets in the fuselage. Coat the $\frac{3}{32}$ in. sheet filler pieces with cement and push into aperture.

Fill in the bottom of each wing panel with $\frac{1}{16}$ in. sheet balsa, as indicated, notching where necessary to fit around the landing gear struts. The wing fillet is made by marking the fillet outline on the fuselage and wing, as shown on the plans, and then cutting out a piece of silk to roughly fit over the pencil lines. Then cement the forward end of the fillet in place and carefully spread the edges to fit over the pencil lines. Use pins to spread the silk. After each fillet is in place and the glue dry dope three times.

Before covering the rear of the fuselage section, sandpaper: "scallops" between the stringers on bulkheads No. 10, 11 and 12. Due to the compound curves on this section, cover with silk or moistened Silkspan tissue to insure a smooth finished job.





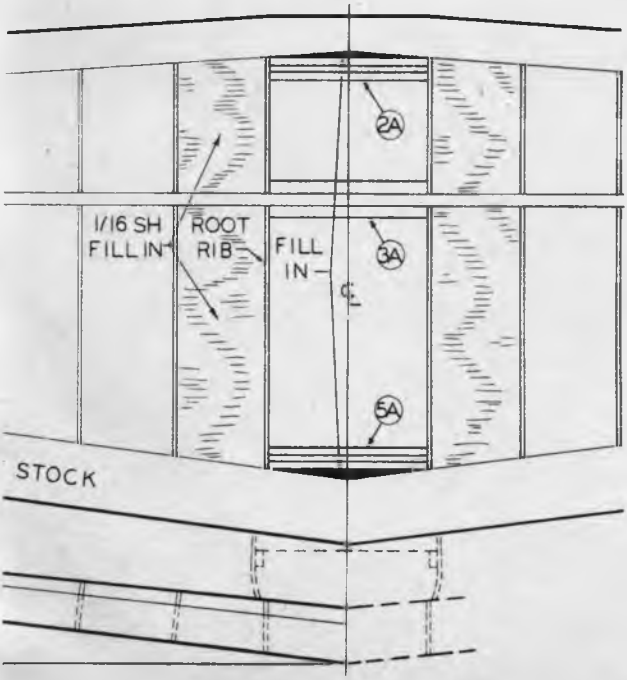
Close-up view taken just after a flight. Note the small globules of water on the twin floats.

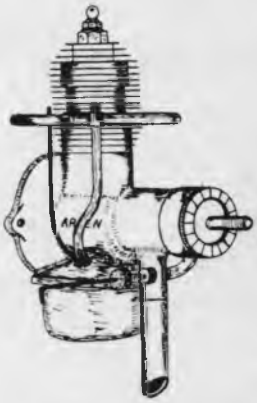
Cover the stabilizer and wing with a light grade of Silkspan. All wood sheeting and exposed wood parts are also covered with tissue or Silkspan.

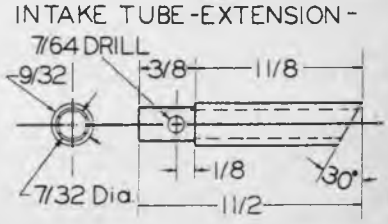
Now brush or span the covered model with four coats of clear dope, sanding lightly between coats. The original job was colored bright red with a black stripe on upper cowling. The floats were red with the bottom surfaces black. Five to seven coats of thinned out dope applied carefully will assure a fine finish. [*Continued on page* 141]

FULL SIZE PLANS

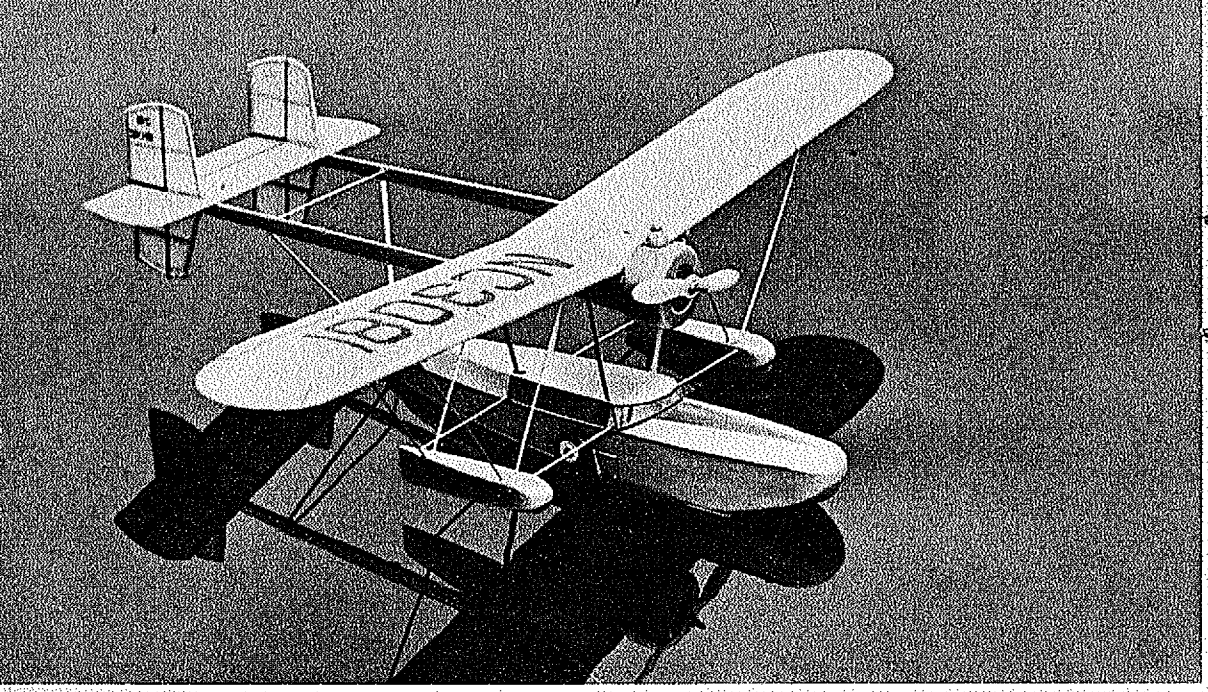
of this model are available by sending 50 cents to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 413.







MAT'L - 5/16 O.D. x 3/16 I.D. ALUM



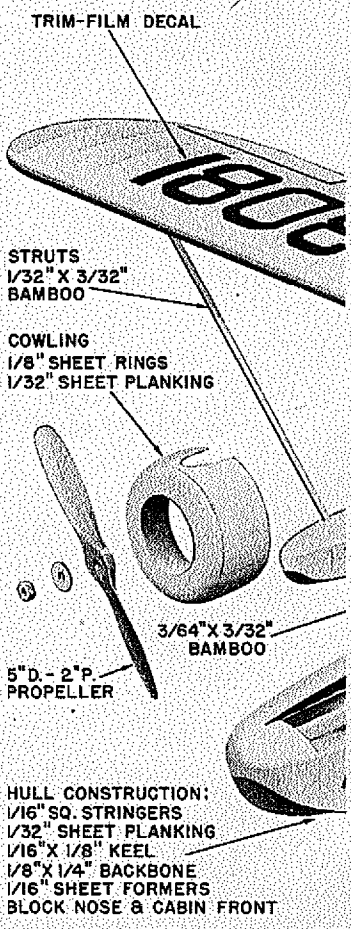
Sikorsky Amphibian

This twenty-eight-inch free flight scale model is a sterling performer over land or lake. Power with any .020 to .049 engine.

By Dick Ealy

A whole new field of model building was created by the production of the baby engines which are especially good for powering scale model flying ships. We decided to build a model of the Sikorsky S-38. It satisfied the desired qualities of good appearance, with a high wing for stability and simple construction. The general appearance of the original plane has been retained, but some small changes have been made for simplicity and to improve the model's performance.

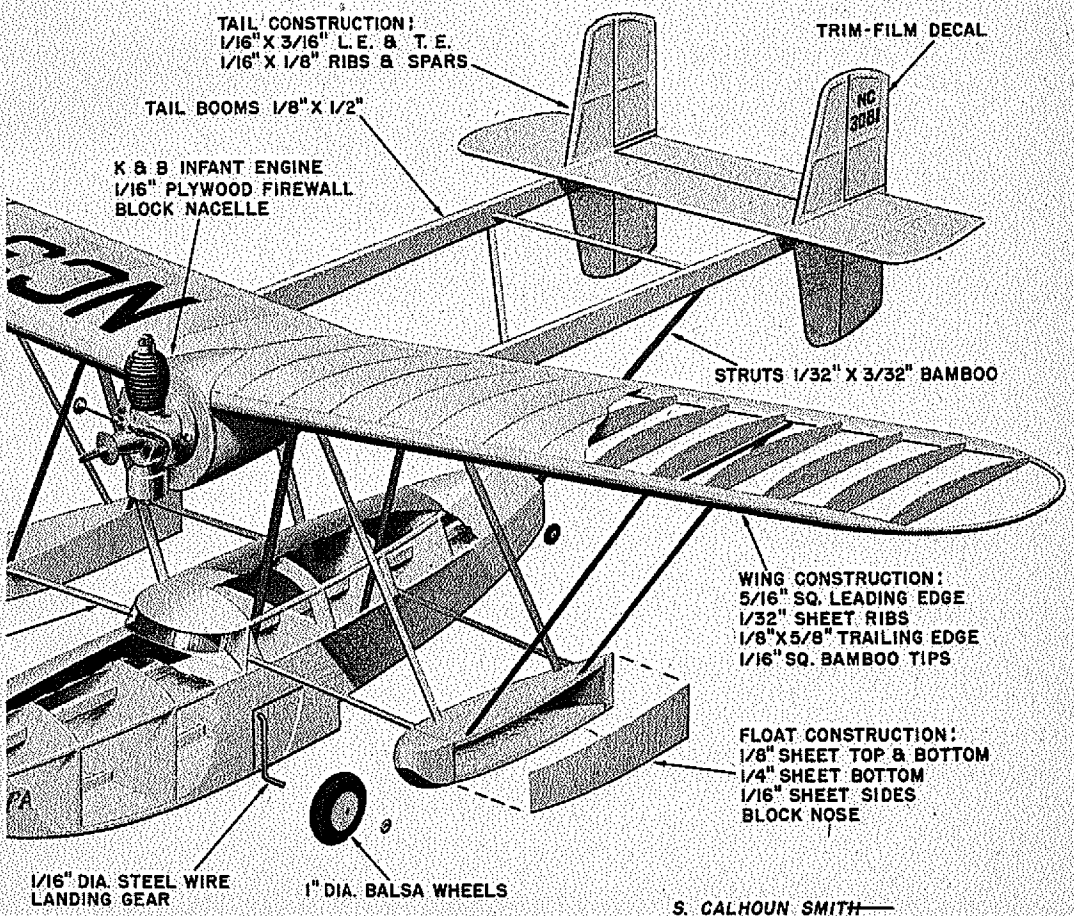
Igor Sikorsky's flying boats were both rugged and reliable, so that quite often they were chosen for pioneering new air routes. It was the Sikorsky S-38 that Colonel Charles A. Lindbergh used on his Central American trail blazing flight for the Pan-American Airways.

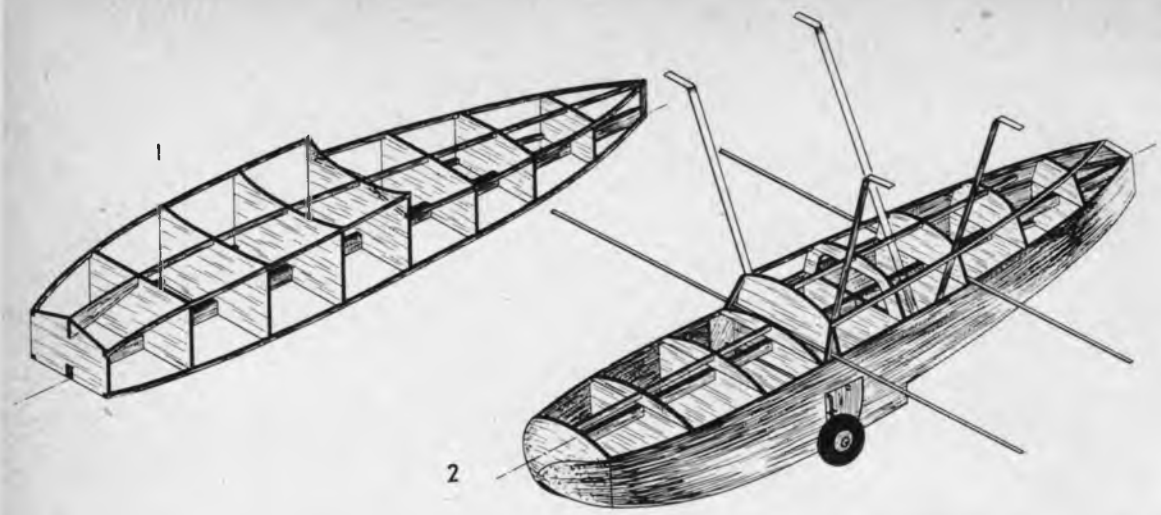


Study the drawings and read the instructions carefully before starting construction.

Start to work on the hull first. It is built inverted on the top view of the drawing. Cut out $\frac{1}{16}$ in. sheet formers and place in the proper position over the $\frac{1}{8}$x$\frac{1}{4}$ in. backbone spar. Make sure the formers are vertical while the cement drys. Next cement $\frac{1}{16}$x$\frac{1}{8}$ in. keel from B to the tail end. A piece of $\frac{1}{16}$ in. sheet is used for the keel from A to B. Place the $\frac{1}{16}$ in. square sheer and chine stringers and cement well. Make the retractable landing gear and install as shown in detail. Plank bottom of hull with $\frac{1}{32}$x3 in. sheet balsa. Work forward from E with another piece. Make paper templates of cut-out for landing gear on the side planking. Slip side panel, made from $\frac{1}{32}$x2 in. stock, over gear and cement in place. Now you can lift the hull from the board and turn right side up. Cement formers AT, BT, etc. in place. The dash board is the same as CT. Add the cabin stringers made from $\frac{1}{16}$ in. square balsa. Make the tail post from $\frac{1}{16}$x$\frac{1}{8}$ in. Split bamboo is the best for the main struts. Bend as shown over a candle flame or gas jet. You might substitute .040 in. steel piano wire. Cement these struts with several coats of cement. Mount the outrigger bamboo or .040 in. wire as struts as indicated in the plan. Place the $\frac{1}{16}$x$\frac{1}{8}$ in. top stringer in its place and cement it. Plank deck and cabin top with $\frac{1}{32}$x3 in. sheet balsa. Cement oversize nose block and the fore and aft cabin blocks in place. Trim on assembly as illustrated. Sandpaper the entire hull with some No. 4/0 sandpaper and then brush on two thin coats of clear dope, then sand again. Cover hull with Jap tissue and give it three coats of thin silver dope, sanding it between each coat. Cement .010 in. celluloid windshield and windows on last.

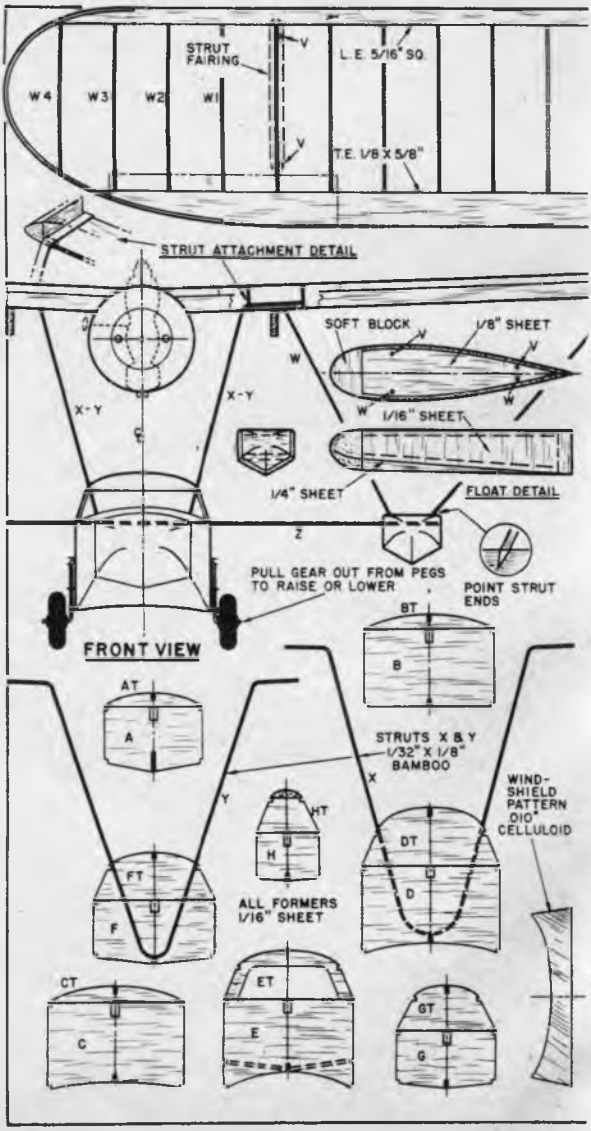
Make the wing next. Cut the ribs as indicated and assemble the frame on a flat surface. Omit the center rib until later. The wing tip should be made of bamboo. Bend a piece $\frac{1}{16}$x$\frac{1}{8}$ in. over a flame and split





to make two identical tips. Balsa tips made of $\frac{1}{16}$ in. sheet may also be used. Notch spars at the center and crack, to form $\frac{9}{16}$ in. dihedral at each tip. Add $\frac{1}{16}$ in. sheet balsa gussets and flush bottom inserts for boom and nacelle attachment. Round off the leading edge and sandpaper the frame. Mount the wing as shown in attachment detail. The bottom of the wing and the base line should be parallel. Make the tail booms from $\frac{1}{8}$x$\frac{1}{2}$ in. stock and taper as shown. Cover them with Jap tissue and clear dope. Give them three coats of thin silver dope, sanding lightly between each coat. The horizontal tail and two vertical rudders are made next and covered with yellow Jap tissue. Brush on two thin coats of thin clear dope. Cement both booms in place on the bottom of the tail. Slip the vertical rudders over the tail from the rear and cement them in place. Mount the boom and the tail assembly to the underside of the wing. There should be zero incidence between the tail and wing under surface.

Carve the engine nacelle and hollow it out as shown. Make the firewall from $\frac{1}{16}$ in. plywood and drill to fit your motor. Attach your engine to the firewall. Give both surfaces several thin coats of cement before cementing the firewall to the nacelle permanently. Cover the nacelle with strips of Jap tissue and clear dope. Brush on three thin coats of silver dope and sand between



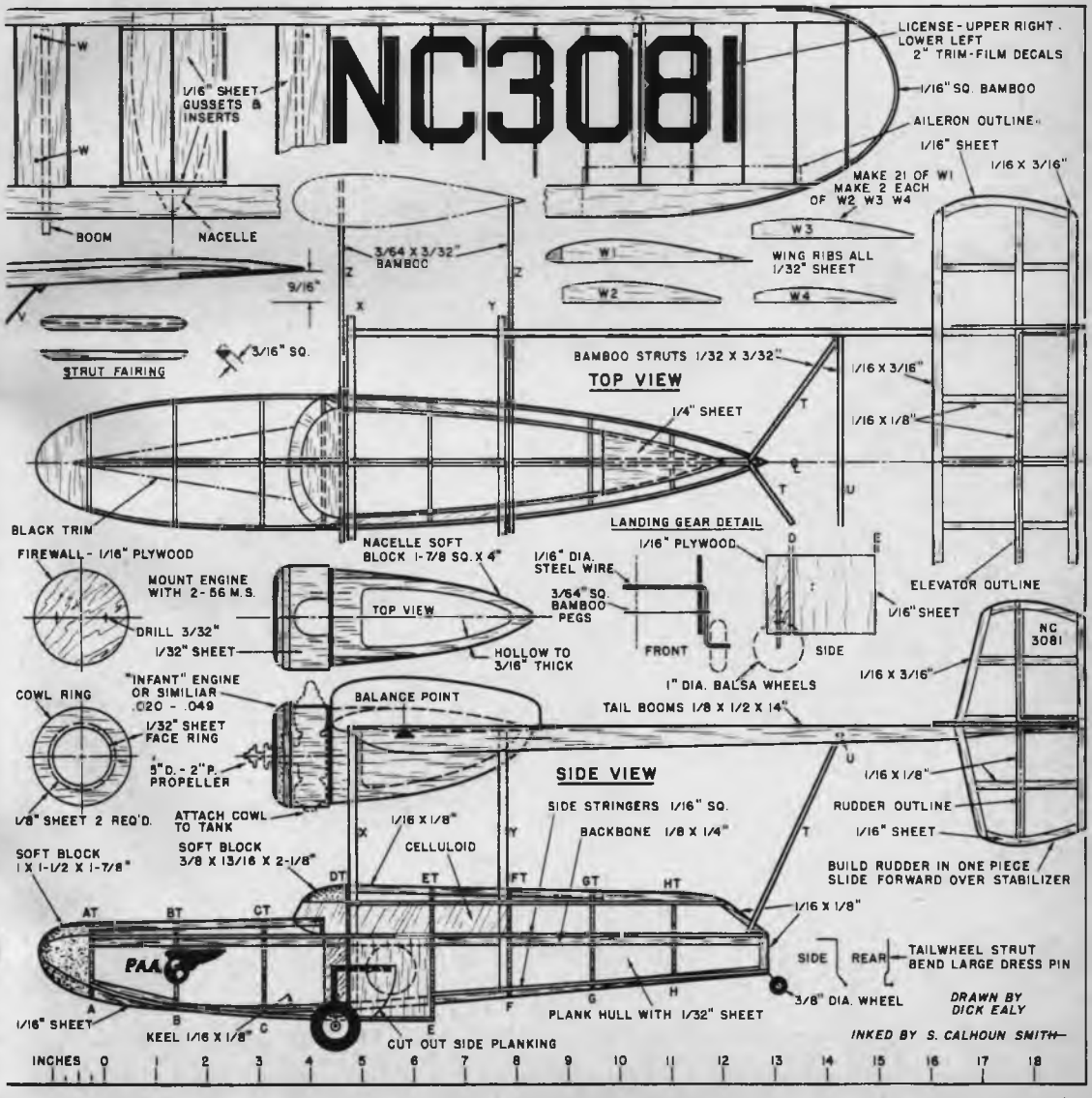
FULL-SIZE PLANS

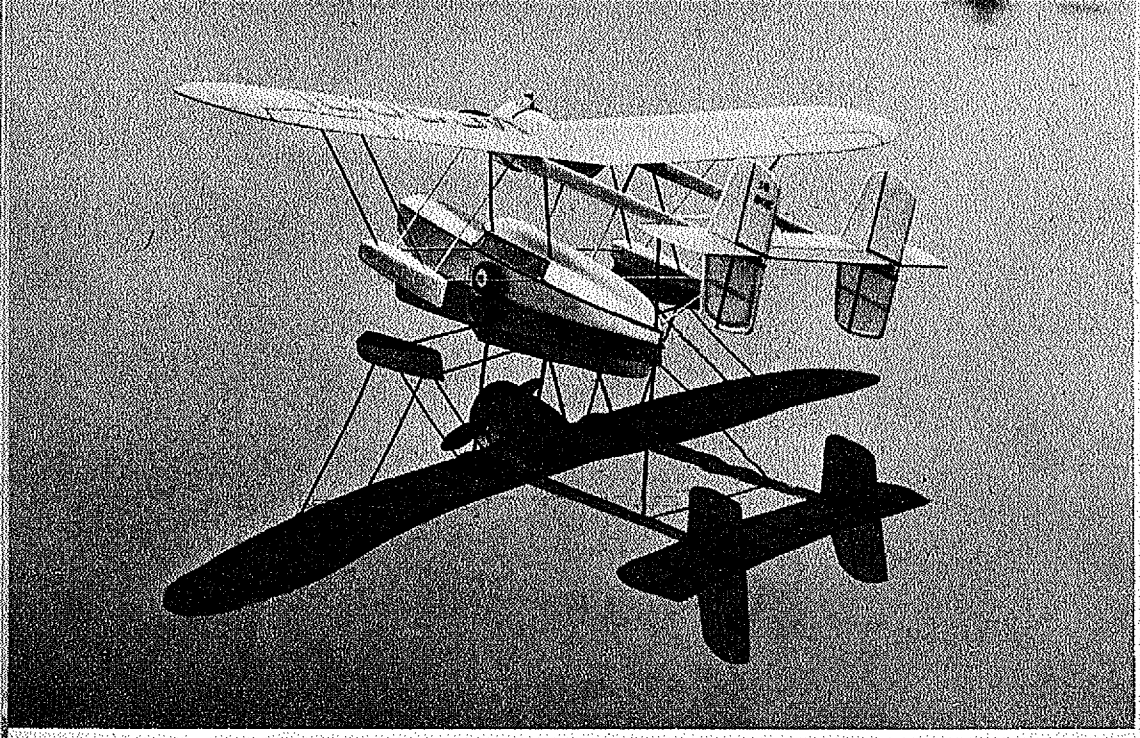
of this model can be obtained by sending 50c to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Conn. Please specify Plan No. 421.

Hand launch your model on its test flights before you try ground or water flights to check stability and avoid accidents.

1 Start work on the hull first, building it in inverted form. Attach 1/16-in. formers to the backbone, add keel sheer chine stringers. Mount landing gear. Plank bottom and the sides.

2 Turn the hull right side up and add the nose block and cement fore and aft cabin blocks in place, after adding top formers. Install the strut outriggers, top stringers. Then plank the deck.





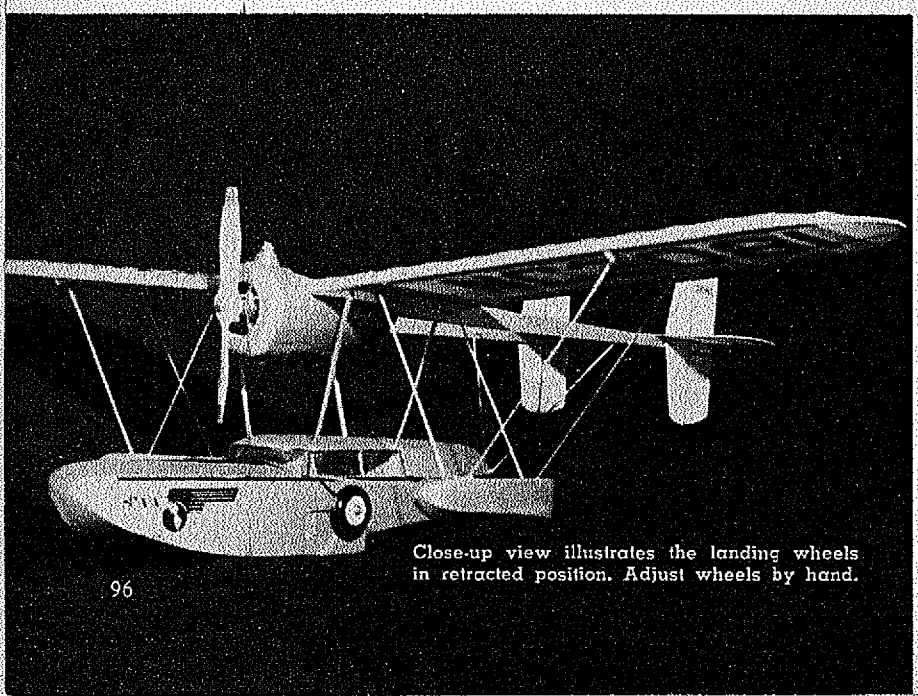
The Sikorsky scale model floats on its main hull. The outriggers or exterior floats give stability during takeoffs and landings.

each coat. Use the same cementing procedure in attaching the nacelle to the wing bottom as used for the firewall.

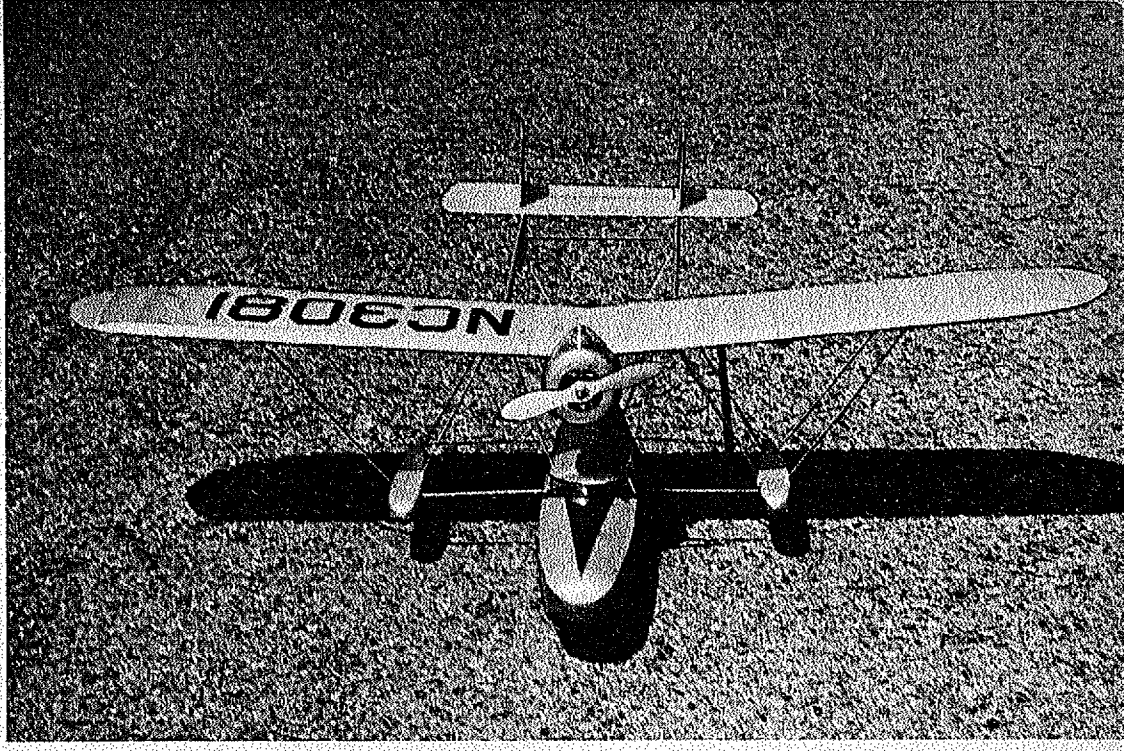
Cover the wing frame with yellow Jap tissue and shrink with water before brushing on four thin coats of clear dope. Make balsa engine cowl and cover with tissue and clear dope. Give it three coats of thin silver dope and attach to the tank as shown.

Build the floats inverted and cover them with tissue and clear dope and then apply three thin coats of silver dope. Attach the outrigger struts and add the remaining struts and paint them silver. Cement the tail wheel to the rear end of the hull.

Decorations such as the Pan-American insignia, window frames, ailerons, rudder and stabilizer, outlines and license can be



Close-up view illustrates the landing wheels in retracted position. Adjust wheels by hand.



The motor of the Sikorsky is mounted high up on the engine nacelle. Plane will give you no trouble with broken props!

cut from black tissue or Trim-Film decal. A coat of hot-fuel proofer over the entire model will preserve the plane much longer and it is recommended. The original model balanced at ⅓ of wing chord. Glide by hand over grass before you make a power flight to check its balance and stability. A little right rudder may be used to circle the model. Hand launch your model for test flights before trying flights from ground or flights from water. The ship will climb fairly fast and glide nicely so be ready to chase your flying boat.

One of the important things to remember when flying your scale model plane is the same thing that pilots of all amphibians worry about, the landing gear. You can get into as much trouble on a smaller scale if you have the gear in the wrong position for a landing. More than one pilot has had quite a surprise as he tore the belly out of his plane by not having the gear down. •

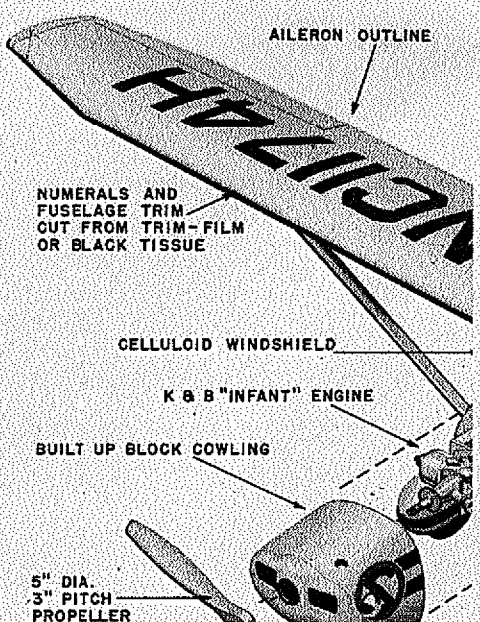
Action view of model coming in after a flight with wheels retracted for a water landing.

free-flight LUSCOMBE SILVAIRE

For all around sport flying you can't beat this 35-inch balsa Luscombe replica. Fly it free with any .02 to .049 displacement engine.

UNTIL the mass appearance of the *really* small engines such as K & B's .02 Infant and .035 Torp, Jr., the Anderson .045 Spitfire and Herkimer .049 Cub, only control-line models that could be flown in confined areas had proved practical in many parts of the country. Powerful, large engines made necessary cumbersome free-flight models that were difficult to transport, hard to fly without an expensive crack-up, and likely to become lost on a thermal flight.

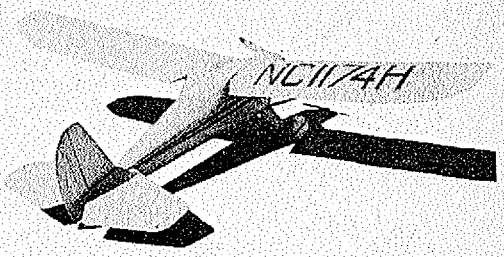
These small engines make it possible to fly small free-flight models in any reasonably sized lot or field. On the Coast, free flight contests for .02 displacement models have been held in a large parking lot. Moreover, these engines are ideal for small flying-scale ship, such as the Luscombe Silvaire. Selection of the Silvaire for a subject will permit the craftsman to enjoy himself duplicating the all-metal construction of the real ship with nothing but sheet balsa. There is not



a square inch of paper on this airplane! The original model was powered with the K & B Infant but any of the slightly larger engines can be used.

Several things should be pointed out before beginning construction. Your workmanship must be light for 3½ to 4 ounces maximum is about tops for the Infant; no more than 7 ounces for the .045 and .049 engines. All wood is coated with a mixture of clear dope and castor oil—about half a teaspoonful of oil to two ounces of dope. This coating not only smooths the wood but toughens it as well. The oil prevents brittleness and hence retards splintering, usually the drawback of sheet-balsa design. The wings are made in two panels which are mounted to detach instantly in a crack-up; the landing gear is flexibly mounted to the fuselage for the same reason. The on-side mounting of the engine preserves the cowl line and, in fact, gave better results than an upright engine which, in the case of the Infant, sometimes had trouble drawing fuel up from the tank.

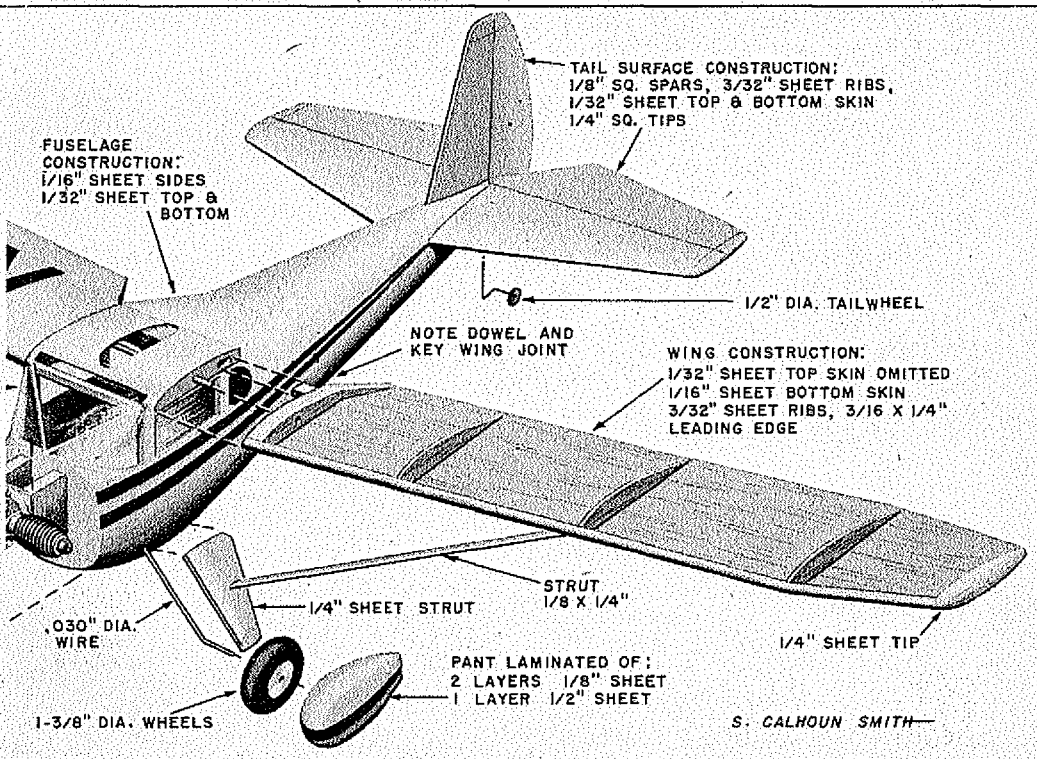
Start construction with the fuselage. Note that the various sheet sections of the covering are designated by letters, as A, B, etc. All the bulkheads are medium hard



Because of the extreme light weight and rugged all-balsa construction, you can never completely crack up this Luscombe model.

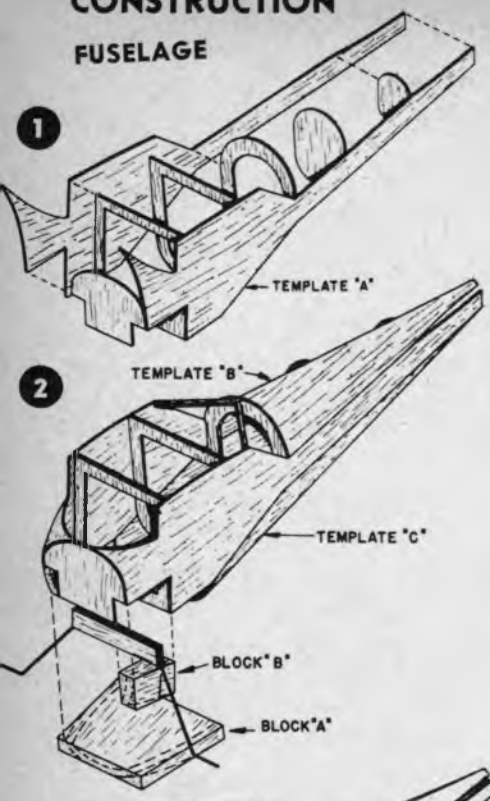
$\frac{1}{16}$ in. thick sheet balsa; template A and the cabin roof are $\frac{1}{16}$ in. sheet. The remainder of the body covering is $\frac{1}{32}$ in. sheet. It is imperative that the wood be carefully selected for lightness, and for grain. Wood for bulkheads should resist bending, while wood for the top and bottom covering of the body, wing and tail should bend readily. These qualities are felt easily with the fingers.

The first step is to cut out all the bulkheads and template pieces. Use small

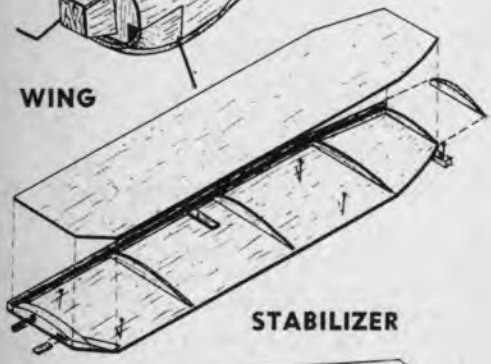


CONSTRUCTION

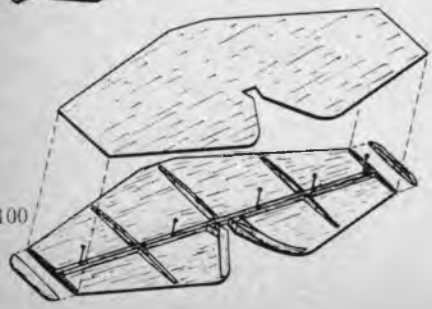
FUSELAGE



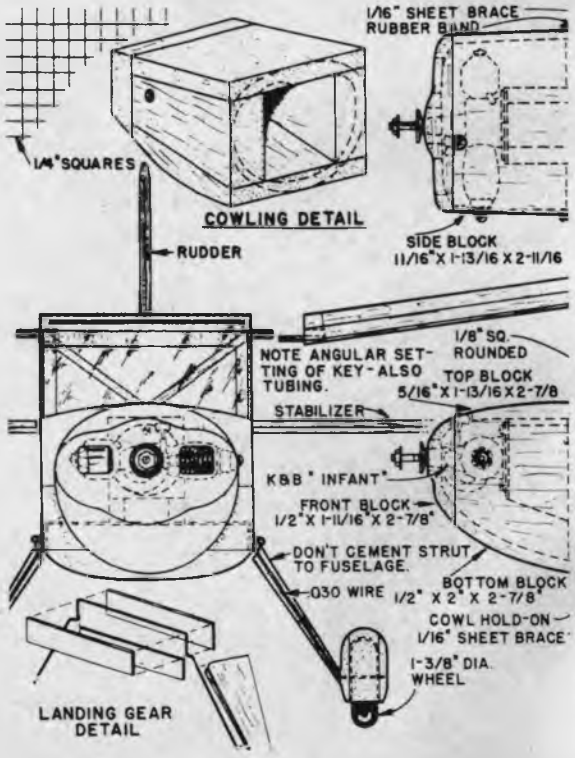
WING



STABILIZER



model builders pins, not big straight pins, to help assembly. Spring-loaded wooden clothes pins make handy clamps. Check alignment of bulkheads and sides with a triangle. It is suggested that the two templates marked A be soaked for 15 minutes in boiling water, then rolled over a milk bottle to obtain the gradual curve noticeable on the top view. Begin by cementing bulkheads F-2 and F-3 to both side templates A and then reinforce them at the top with a $\frac{1}{16}$ in. square cross piece. When dry, add Former F-1 and then Block A, which is shown on side view and in detail. Use very soft wood and hollow with the proper gouge. The landing gear must go in place before Block A is permanently glued. Note that the axle is one piece of .030 music wire running through the fuselage. It is mounted in a three-ply sheet balsa sandwich as shown, the whole being glued to the front face of Bulkhead F-2 and to the top of Block A. The landing struts are streamlined from pieces of ¼ in. soft sheet balsa; the pants are made from three plies as shown in the wheel-pants detail. The finished pants are rounded and streamlined. The joint between pants

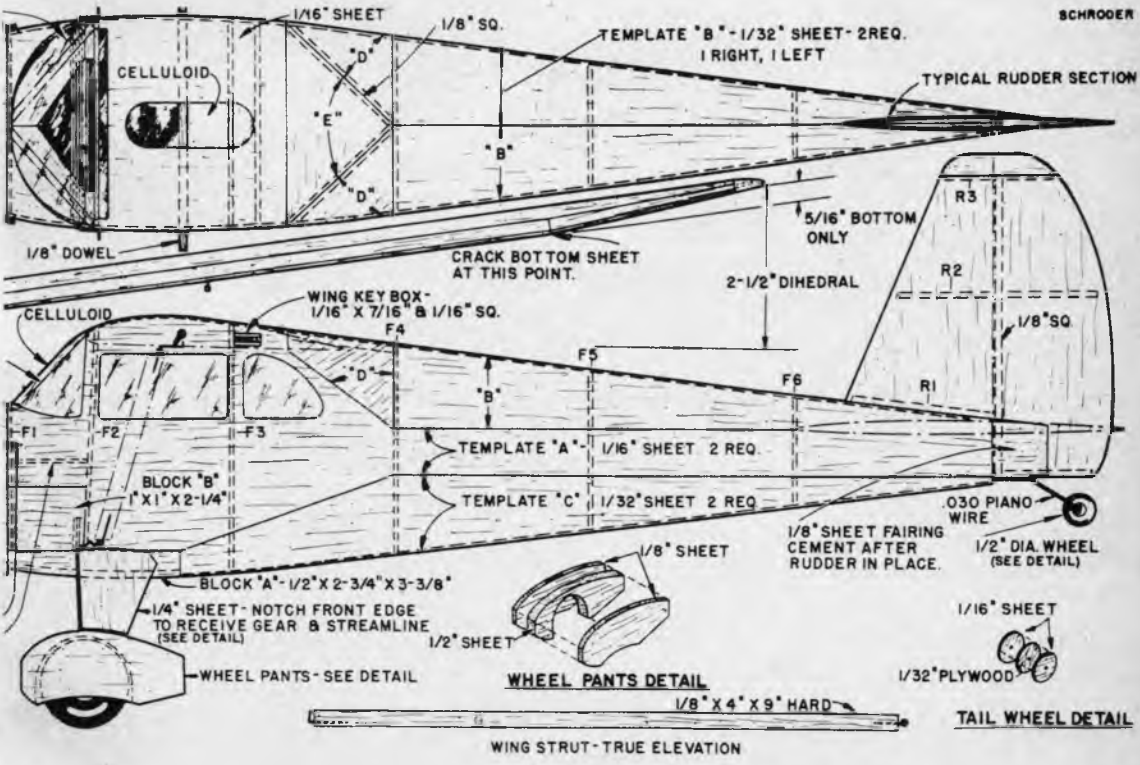


and struts is well filled and cemented several times. Be positive to use *light weight* wheels.

Join the side pieces A at the rear and cement the remaining formers in position. Install templates B and C, then build up the Vee-shaped bracing of 1/8 in. square balsa that supports templates E and D (see top view). Build the wing key box and cement it and the 1/8 in. dowel through the top of the cabin as shown. Cover the top of the cabin with 1/16 in. sheet and position templates D and E. Use emery sticks or small sandpaper blocks for trimming. Note the 1/16 in. sheet bracing behind the cowl, inside the cabin, as seen through the windshield on the top view. Also the 1/16 in. round windshield supports.

Construction of both stabilizer and rudder is identical. The skin is formed from sheets of 1/32 in. sheet butted together for the necessary width. After cutting out the pattern pieces, place the bottom surface of the stabilizer on the bench and glue to it the 1/8 in. square spar and the 1/32 in. thick sheet balsa ribs. It will be necessary to raise the edges of the tail surfaces from the bench due to their streamlined cross section. Do this with small slivers of sheet balsa before pinning in the cross pieces. When dry, cement the upper surface in place, then, after the finished work is lifted from the bench, attach the 1/4 in. thick soft balsa tips. Plans show details of the cut-out between the elevators for the rudder. Make the rudder in the same manner. To attach the stabilizer to the fuselage cut a slot through the body as shown on the side view, slide the tail in place, and cement. The rudder fits atop the fuselage and against the rudder post. Fill in at the rear of the fuselage with 1/8 in. sheet as shown. The tail wheel assembly glues to the bottom of the rudder; bend over the end of the .030 wire axle to imbed in the wood.

The wings are as easily made as the tail surfaces. Begin by placing flat on the bench the soft, light 1/16 in. thick sheet balsa —butt jointed for width if necessary and then cement to it the leading edge and the ribs. Note the cross section given for the airfoil, and the details of the strut attachment to the wing, the root rib, balsa key, etc., all of which are shown on the plan. One important point is that the under surface of the wing is purposely cracked near



the tip, where the planform tapers to the tip itself. See the front view. This cracked section is supported at the tip from the bench with small blocks while glue sets to hold it in position. The top surface of the wing is added from $\frac{1}{32}$ in. sheet balsa, butt jointed for width. Be sure to note in the front view how the root rib of the wing is slanted to meet the fuselage at the proper angle. There is no trailing edge; the under sheet is beveled to make a joint with the top sheet as seen in the cross section. The wing support struts and their attachment fixtures are seen on the side view and on the planform of the wing. The struts themselves are sanded to a streamlined cross section, round in front, pointed in back.

The motor is mounted on a pylon-type structure (see side view and top view) which is built up from two side pieces of ¼ in. thick sheet balsa, a top piece of ⅛ in. sheet balsa, and a front piece of $\frac{1}{16}$ in. plywood. The plywood is drilled to take the two 2-56 machine screws that hold on the engine.

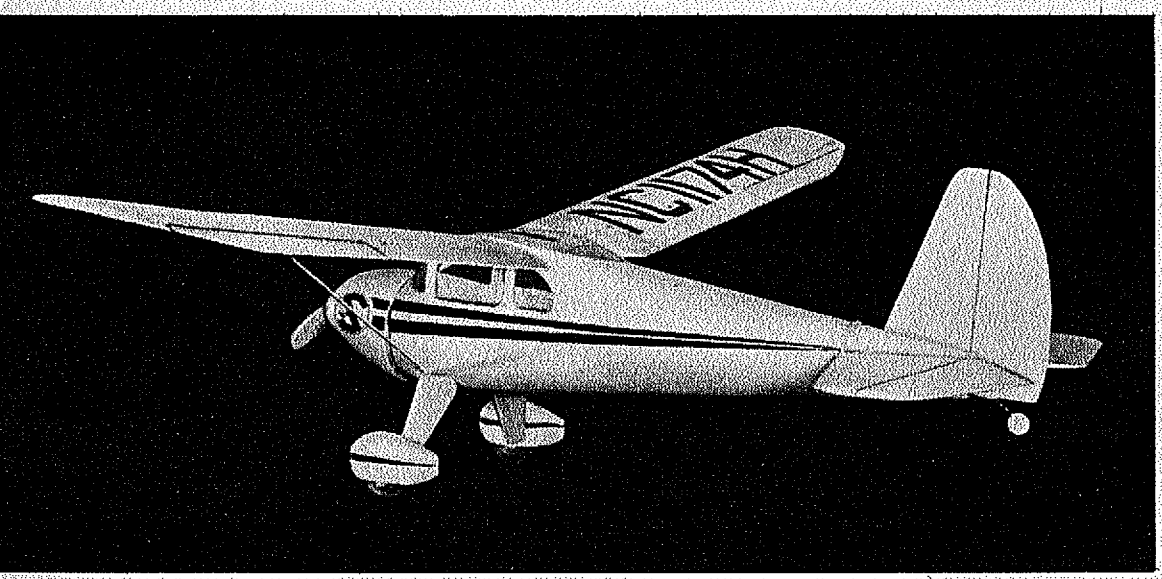
As shown in the detail drawing, the cowl is built up from four soft blocks. When the cowl has been shaped to the front and rear sections indicated on the front view, the front block is shaped and attached. However, the hollowing out process will prove easiest when done with the proper chisels before the front block is glued permanently in place. The finished cowl slides off after the propeller is removed. Two small rubber bands and hooks retain the cowl in position.

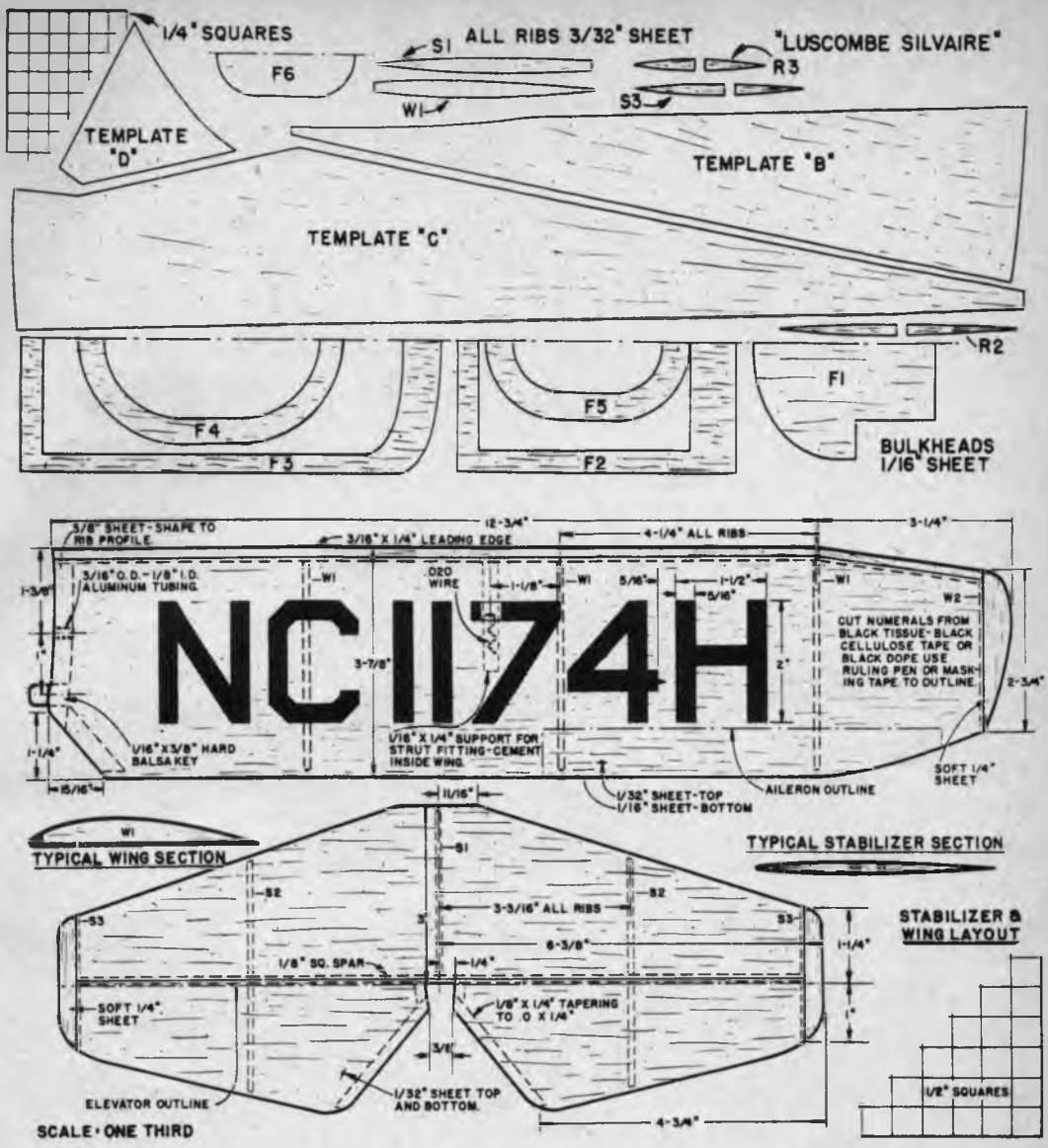
First install all parts to check alignment, making necessary adjustments before finishing the wood surfaces. Blocks and thicker sheet sections may be sanded firmly but do no more than remove the fuzz and saw marks from the $\frac{1}{32}$ in. sheet. Coat the entire airplane with the dope and castor oil mix. Cement the celluloid windshield and windows in place. Before running the engine coat the entire inside and outside of the cowl and mounting with hot fuel proofer, also the cabin back to the rear window line.

If you are not concerned with the flying qualities of the machine, the wood may be treated with Testor's sanding filler which gives a smooth surface for painting. If color dope is used, cut half-and-half with thinner and use two coats.

The Silvaire is not meant to be a spectacular flier. It will climb moderately with the Infant and should perform several circles under power in a small field. Hand glide the machine over some soft surface to begin your tests. If everything is in alignment your ship should prove slightly nose heavy. Nose heaviness or diving tendencies are corrected by adding weight—solder or clay to the tail; and tail heaviness of steep climbing tendencies are corrected by adding weight to the nose. If the model glides well without exhibiting any stalling tendencies, but tends to nose up and stall under power, incline the en-

Gliding in for a smooth landing after a tankful of flying. Original model weighed about 3½ oz. and was powered with the K & B Infant engine. Heavier models should use the Torp, Jr., or Cub powerplant.





gine downward slightly for a little "down thrust." This may be done by loosening the machine screws and shimming up the back plate of the engine as necessary. If the airplane circles violently, check the alignment of the wings and the rudder. More angle in one wing will make that wing ride high causing a circle, while an offset rudder has the same effect. A small aluminum tab about an inch long and a half inch wide may be glued to the rear edge of the rudder; this tab may be bent for circle control. •

FULL SIZE PLANS

of this model are available by sending 50 cents to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 411.

STUNT KING

For novice or expert, here's a stunt ship that can hold its own with the best. Span is 41 inches; power with most any .29 engine.

THE Stunt King is a highly maneuverable but easy to fly stunt model especially designed for the host of control-line fans who like to cut capers. It embraces all the latest and most popular stunt model features plus an unusually thick wing which gives exceptional float and slow flying traits without interfering with the ship's ability to perform vertical and overhead eights.

Ready to fly with K & B 29 glow-plugged engine, and three coats of colored dope, the model weighs two pounds. The ardent stunt man should leave off extra coloring for an added increase in performance.

To a large extent this ship's stuntability is derived from the flap action which is opposite to that of the flippers. When the flippers are up, the flaps depress, and vice versa. Veco's popular stunt line uses full span flaps and, in fact, Veco control horns and bellcrank are used in the Stunt King. However, the linkage has been altered for less flap movement which, in connection with wider flaps, gives maximum lift increase without a corresponding increase in drag.

Nylon covering adds greatly to strength. The original model once dived in almost vertically, burying its nose in dirt, without bad damage! This ship has been tested by two impartial stunt pilots and will perform the entire stunt pattern with ease.

While fuselage construction is ordinary, select fairly hard, tough wood for the sides; the wing cut-outs are made when the sides are first cut out. It is advisable to build the wing (with bellcrank mounted), and slip it in place before the rear, top, and bottom of the fuselage is closed in. If the flaps are assembled first, they can be located through the wing cut-out holes, before the wing proper is installed. Covering is done after the model is completed.

Engine installation should be worked out

at the beginning. Cement the hardwood bearers to the side sheets before joining the sides by means of bulkheads or formers (F-2, 3, 6, 7 and 8). Note that there are three ⅛ in. thick ply formers (F-1, 2 and 3) which lock the engine bearers in place. The large wedge fuel tank must be placed absolutely level, but with its narrow edge toward the outside of the circle; the tank is skewed so that the rear tip is further away from the centerline than the front tip. The fuel outlet must be on a line with the engine needle valve. Follow these directions and fuel feed will be proper in all positions, upright or inverted. The tank rests on the engine bearers and is blocked into place with small wedges of wood, cemented well. The landing gear attaches to one of the ⅛ in. thick plywood bulkheads (F-3) by means of two strap fittings, made from tin and bolted to the plywood with the 2-56 machine screws. Shape the gear and install before putting the wing in place or covering the top and bottom of the fuselage.

The engine itself must tilt toward the outside (to the right) of the circle so that the right side prop tip—when prop is horizontal—is ¼ in. behind the opposite tip. The thrust pulls toward the right, thus helping to keep the model out on the lines. Place the engine on the mounts, mark the holes, then drill. Run the bolts through the engine and bearers, tighten up the nuts, and then cement them in place. When dry, coat again with cement. When done, remove engine until airplane is finished.

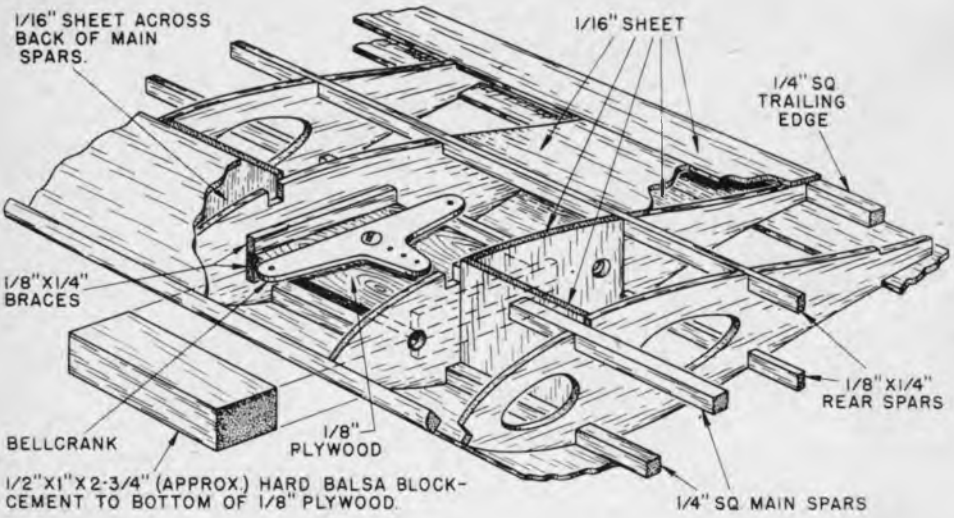
At least four other features help keep the ship out on the lines. First, the lead-outs angle back toward the wing tip, which causes the nose to slew out. Secondly, the rudder is tilted ½ in. toward the outside of the circle. Lastly, lead weight is placed in the outside wing tip. The actual amount is determined by balancing the ship on the fingers on its centerline, a finger at the front and the other at the rear.

Rotate the ship 45 degrees—lowering the tip which contains the lead outs—and, when sufficient weight has been incorporated in the outer tip, the model will rotate back level and on through with the outer tip dropping. This compensates for the weight of the lines. Not so visible is the off center mounting of the wing which is 18½ in. to the tip rib on the left and 17½ in. to the right tip rib. The acutal tips add three inches to each panel.

The wing construction is fairly difficult due to the symmetrical section which prevents building it flat on the bench. The easiest method of assembly is to pin down the bottom main spar, then block up at the proper height above the bench, the trailing

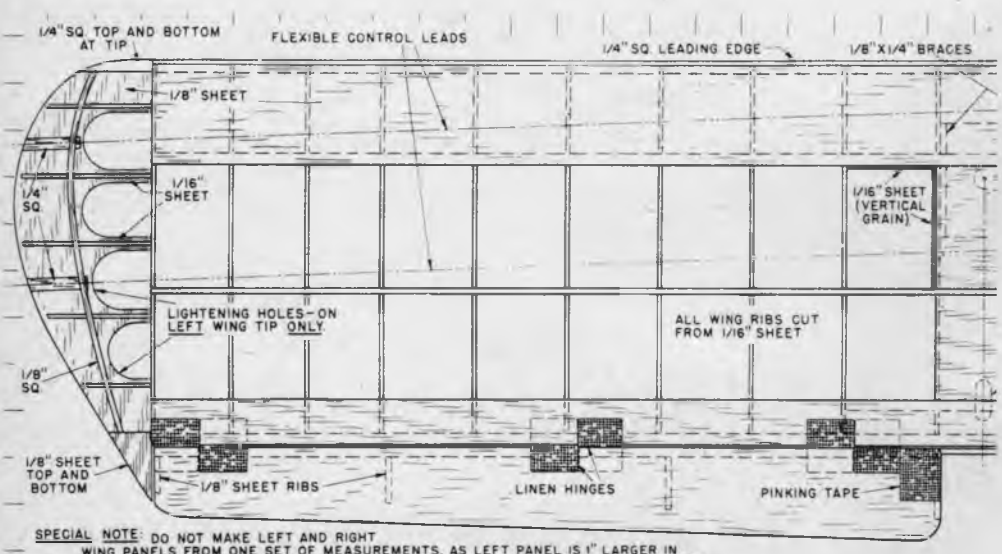
Instant reaction to controls is achieved from wing trailing edge flaps and elevators which work against each other. See drawings for details.

WING CENTER SECTION DETAIL



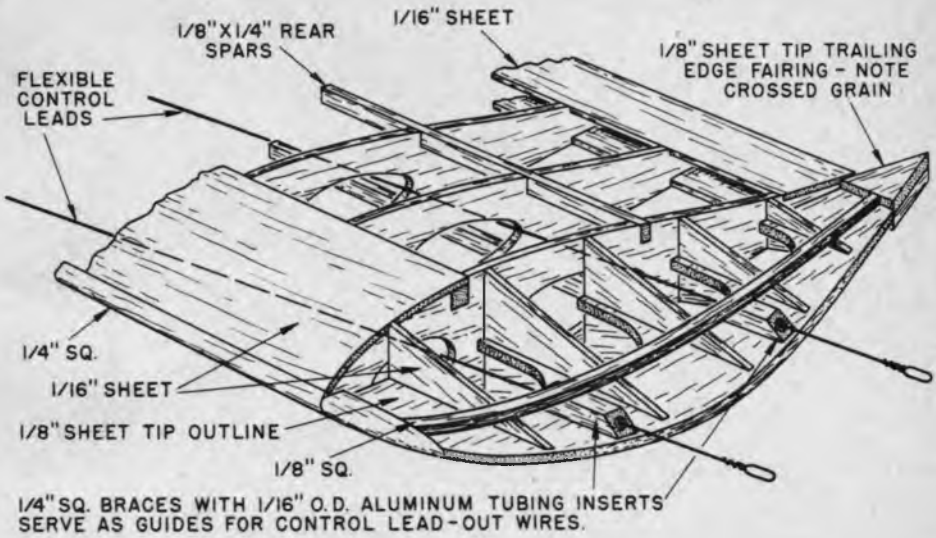
edge, following which the ribs may be cemented in place. Then cement on the top main spar. The ¼ in. square leading edge can be slipped into place and cemented. The wing is then taken up and completed. Note $\frac{1}{16}$ in. sheet covering forward of main spars; this is essential for a strong wing.

For easy alignment of the pushrods, do not cement the tail group in place until the rods are fitted through the horns. Then, with the bellcrank locked in level position (fore and aft), cement on the tail, watching that the elevators are precisely in neutral. The same applies to the flaps. It is vital



SPECIAL NOTE: DO NOT MAKE LEFT AND RIGHT WING PANELS FROM ONE SET OF MEASUREMENTS, AS LEFT PANEL IS 1" LARGER IN SPAN THAN RIGHT. ASSEMBLE WING DIRECTLY OVER FULL SIZE PLAN OF ENTIRE WING.

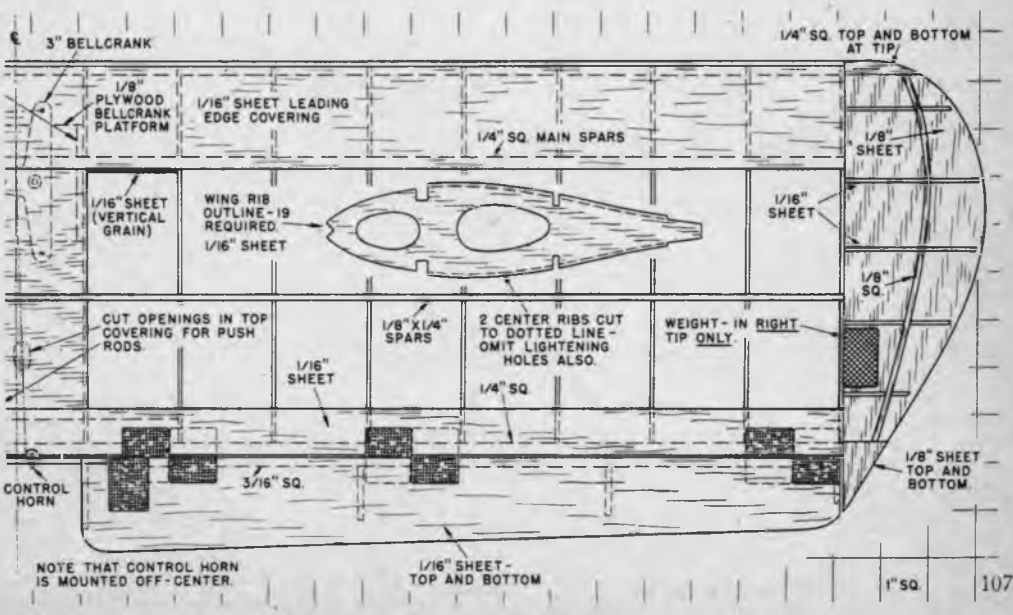
WING TIP DETAIL



that the ends of the rods, where they pass through the horns, be capped in some manner to prevent their pulling out. The flexible wire lead outs bend back on themselves after going through the bellcrank holes, wind around themselves, are bound with fine wire wrapping for at least an inch, then

FULL SIZE PLANS

of this model will simplify building and insure an accurate model. For yours send 50 cents to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Conn. Please specify Plan No. 424.

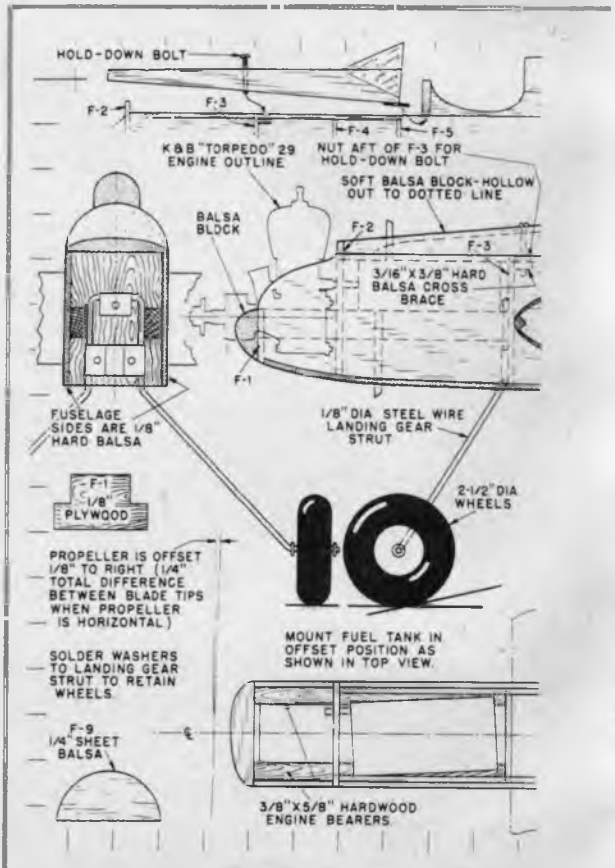


sweat-soldered. The outer ends may be wrapped around eyelets and soldered in similar fashion.

The bellcrank mounts on a ⅛ in. thick plywood platform which in turn cements to the inside faces of both center section ribs. A piece of ⅛x¼ in. strip is cemented against the ribs, over and under the platform. Between the bottom of the platform and the lower main spar, a hard balsa block one inch wide is cemented in place; the bellcrank bolt runs through both ply and block.

While the bellcrank is mounted in the wing and the center section sheeted over after the front ends of the rods have been bent and inserted (from the bottom of the crank), this sheet may be cut away as necessary later on. However, minimize the cut outs. All hinges are of linen or heavy, tough cloth.

To cover, dope all surfaces to which the fabric will adhere and allow to dry. The lightweight nylon is cut to fit with about one inch of overlap, then is wetted and laid over the surface. Dope down the outside edges while wet and pull out the wrinkles while doing so. When dry, the covering will be taut and smooth. It is then doped with four coats of clear dope cut half

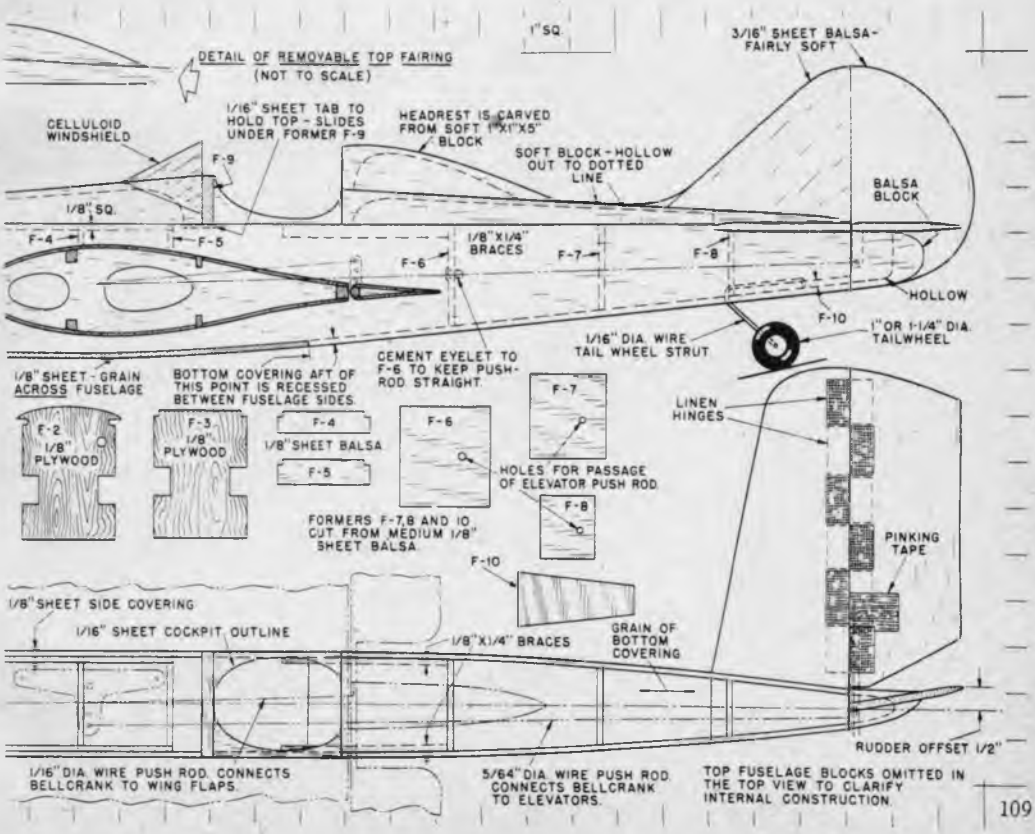


and half with thinner. The thinner will partly evaporate for the last couple of coats. If no colored dope is to be added, use six coats of clear; otherwise, four clear and two to three colored are sufficient. For best results cut the colored dope half and half with thinner. If regular dopes are used, finish with a hot fuel proofer (Kerrs used on the original). However, "STA," Aerogloss, or other hot fuel proof dopes may be used, but do not employ in connection with any regular dope material, even wood or sanding sealer or results will be bad.

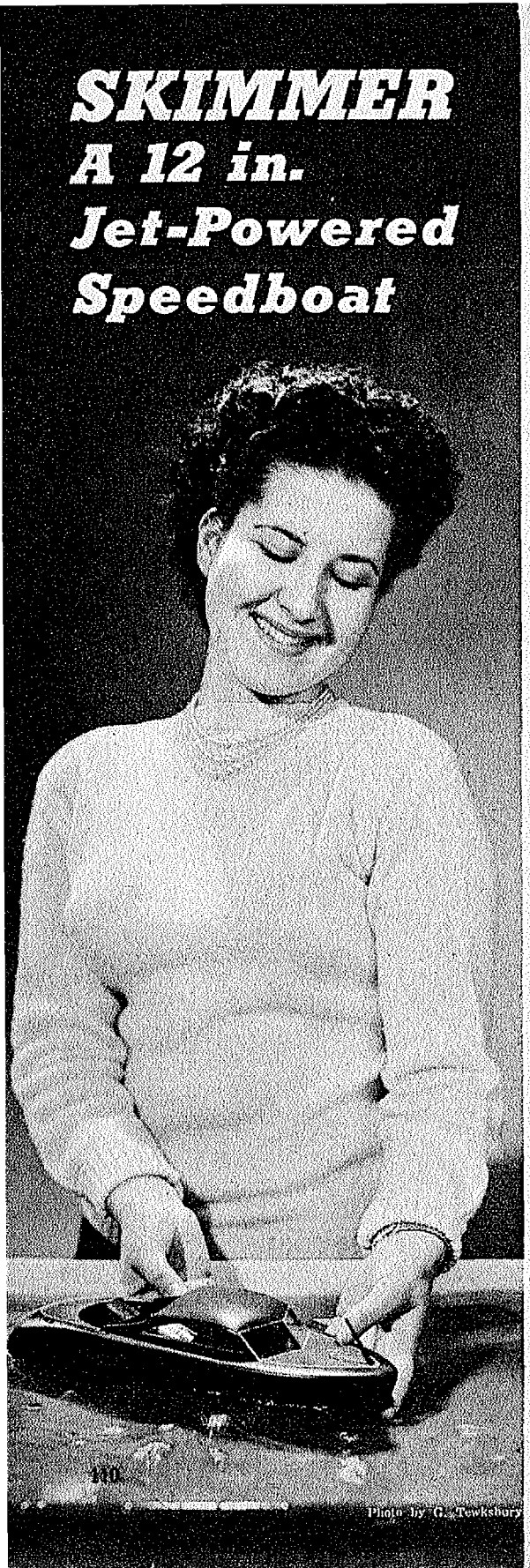
Though a K & B "29" is used, any good 29 through 35 is proper, such as the new Forsters, the Fox, Veco, McCoy's, etc. The original was flown with Powermist fuel and a 10-6 Powerprop made by Top Flite. Be careful of prop selection as wide pitch variations will cause any model to drop dead in flight.

The control linkage is as follows: the flap pushrod runs from the inside hole (Veco bellcrank and horns) to the outside hole on the horn; the elevator pushrod from the outside crank hole to the outside control horn hole. This movement was found most satisfactory on the original model. •

The tremendous wing area as well as the short tail moment arm make flying extremely easy.



SKIMMER
A 12 in. Jet-Powered Speedboat



As modern as tomorrow, this beautiful little balsa-wood model is designed for either jet or electric-motor power.

By Paul Plecan

SKIMMER was designed with one thought in mind—maximum enjoyment with a minimum of construction effort. Due to its simplicity, very little time is required to build this craft, and it really can *travel*. It makes an excellent beginner's project, but, as the photos show, it can be dolled up by the experienced modeler as a mantelpiece decoration.

Details are shown for both jet and electric-motor versions, although the jet version is the faster of the two by virtue of its lighter weight. The electric motor weighs about the same as the jet, but the added weight of batteries causes the boat to ride low in the water, making it slow to reach "planing" speed. On the other hand, the lighter jet version increases its speed as it goes along, due to the decreasing weight as the fuel charge is expended. A Jetex 100 unit was used in the original boat with excellent results. For the electric type, any of the small motors on the market should suffice, providing that two pen-cells give it enough "oomph."

Use fairly light balsa for this boat if you desire to obtain any amount of speed. For really spectacular results, the hull can be hollowed out to an average wall thickness of $\frac{1}{8}$ or $\frac{3}{10}$ in. to reduce the weight as much as possible consistent with desired strength. The cabin can be omitted also, to decrease air drag.

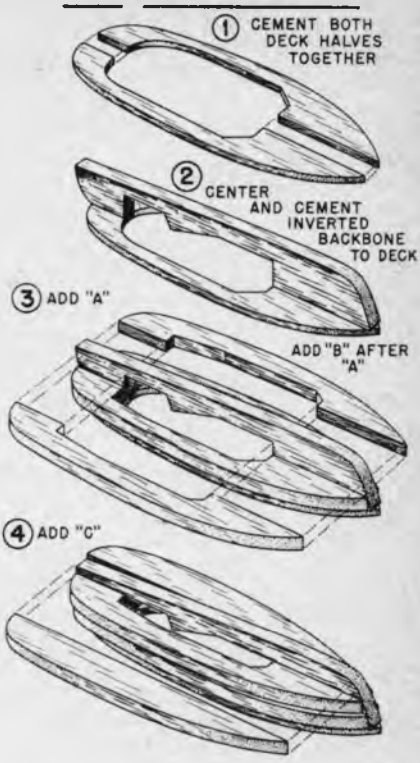
After tracing the outlines from the parts patterns, cut out the required balsa parts on a power jigsaw. Assembly should be easy if you mark the parts in ink as you progress and if you refer to the hull-construction sketches, which show the step-by-step procedure. Once the hull is assembled, it should be laid aside to allow the cement sufficient time to dry properly. If you are using model-airplane cement, an hour should be ample time. In the interim, cut out the metal parts, such as the rudder and deflector. To save weight, sheet aluminum or dural is best, but copper, brass, or scrap tin-can stock will do. It will pay to use templates to insure accuracy in carving the hull, so prepare a set by tracing the full-size cross sections onto thin cardboard

and cutting out the inner parts of the curves.

Carve the hull bottom carefully and follow up with successively finer grades of sandpaper to get a smooth surface. The speed of the boat will depend largely on your ability to carve and sand without leaving bumps and hollows on the bottom of the hull. Once the hull has been carved and sanded, a coat of wood filler should be applied. Sand lightly with fine sandpaper, then apply a coat or two of airplane dope. The surface should be slick enough now so when you sight along the length of the hull toward a light, you will be able to detect minor hollows or bulges. Sand to eliminate these irregularities as much as possible.

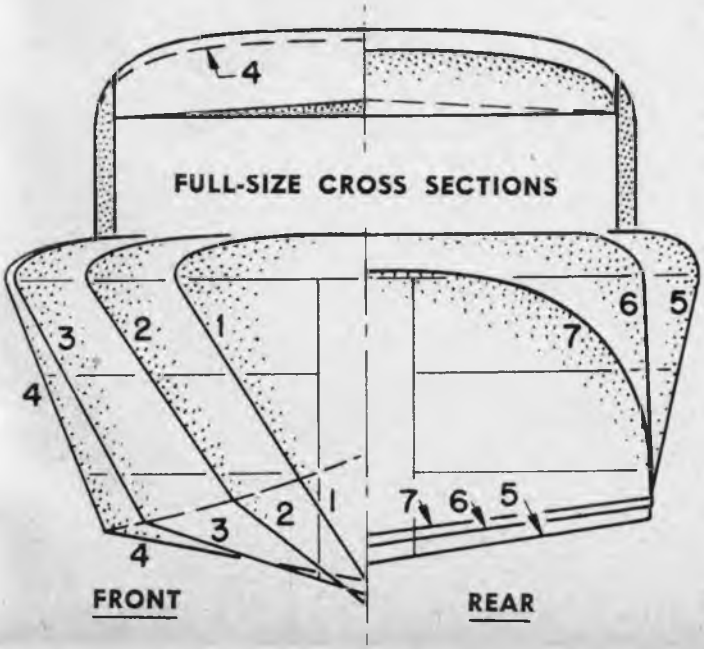
The power plant is the next item on the program. If an electric motor is used, it will check the alignment of the motor and shaft. The wiring should be taken care of now, to prevent damaging the finish later with the hot soldering iron. If you should hold the iron too close now, you can still cover up the burns with wood filler, whereas once the model is painted, it will mean much more work. In the jet version, it is fairly important to keep the jet unit from pointing to either side. However, minor adjustments can take care of this later. Note that although the cabin and mast details are not duplicated on the electric-motor version,

HULL CONSTRUCTION

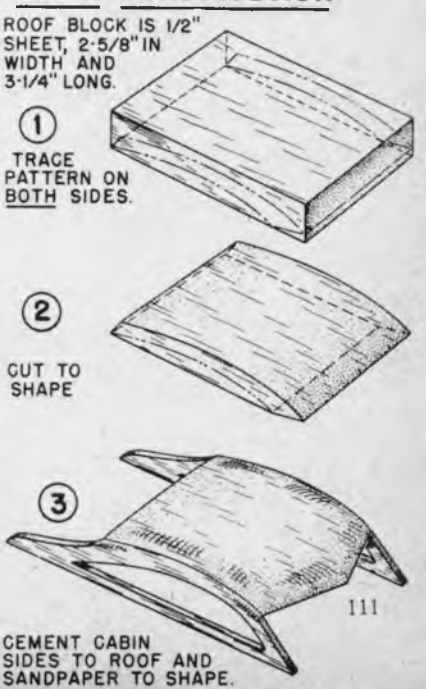


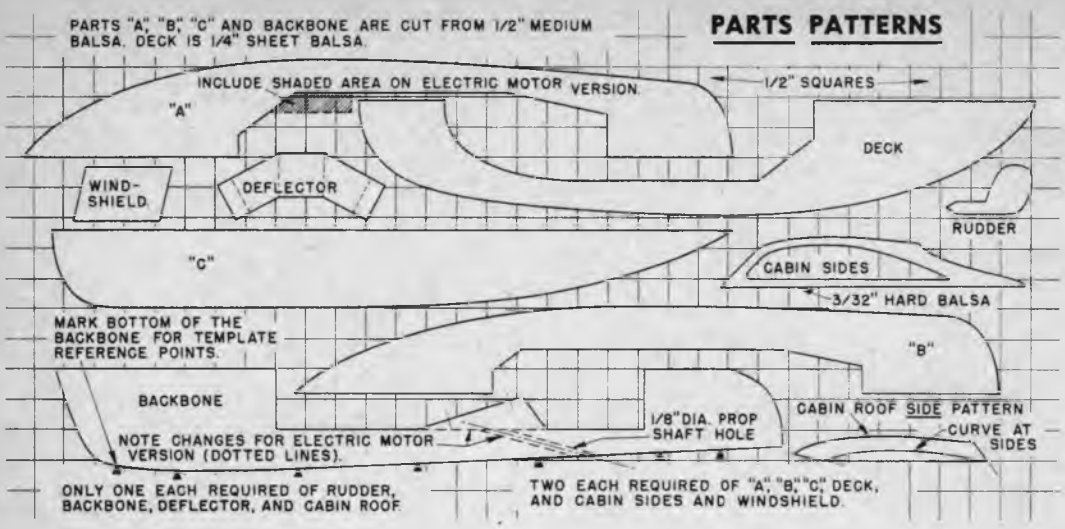
FULL SIZE PLANS

of this model are available. Send 25c to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich Connecticut. Please specify Plan No. 417.



CABIN CONSTRUCTION





they apply nevertheless. If just a windshield is used (open-cockpit type), it looks better when placed aft about ¼ in. compared to the cabin-type windshield.

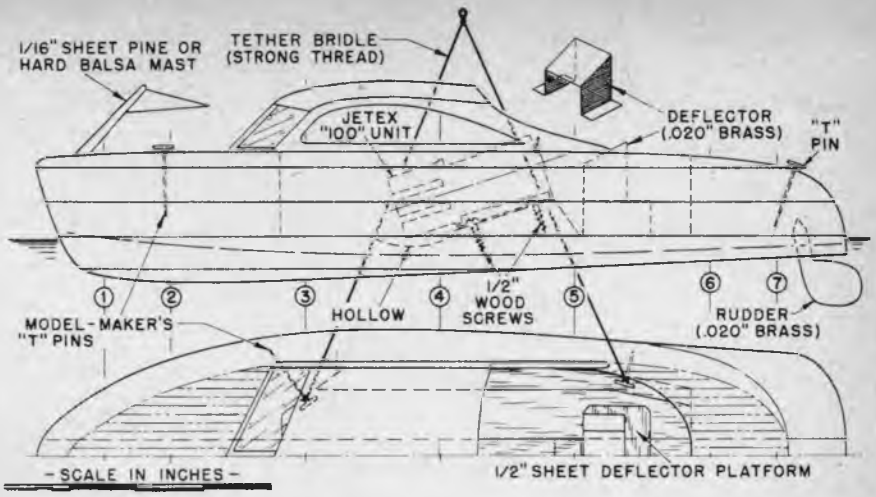
Since the cabin construction is well detailed in the sketches, you should have your model ready for painting now. Access to a power sprayer will help in obtaining a slick paint job, but if you have only a brush, you can still get good results by thinning the dope sufficiently so brush marks will not be left. A good red-sable or camel's-hair brush will go a long way in helping you with the paint job. The real secret, whether spray gun or brush is used, depends on your ability to allow the dope to dry completely before using a fine grade of sandpaper with *light* strokes. Use 360 or 400-grit wet-or-dry paper between the last few coats.

Once the model is finished, the urge to run out and try it will be very strong. A few precautions will save you time and headaches. . . . Wait for a *calm* day to use the boat. If there is a light breeze, that is well and good, but remember to operate the boat at the *downwind* part of the lake or pond. If the power plant should stop far from shore, the boat will then drift back in your direction. Naturally, this doesn't apply if you are using a tether or have a rowboat with which to retrieve the model.

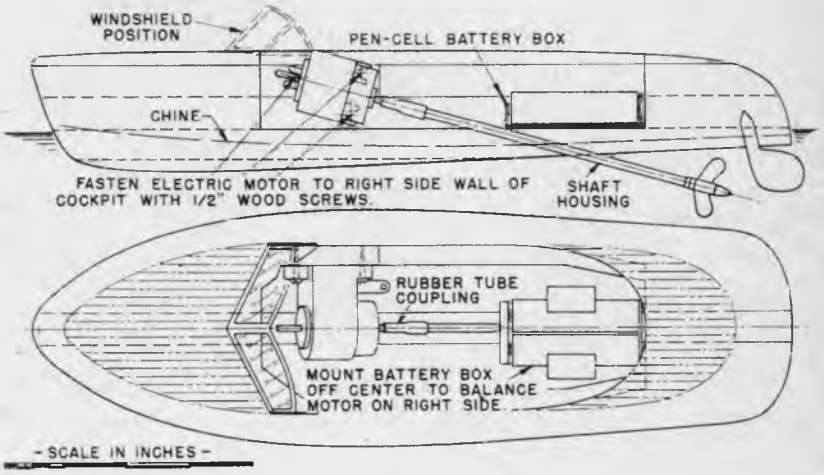
The rudder needs but a very slight offset to make the boat circle around. Too tight a circle (less than 15 feet in diameter) will slow it down. A trial run or two will show you how much to offset the rudder to obtain a run of about 50 to 60 feet in diameter.

Ordinary sewing thread will serve as a tether. In a tethered run, leave the rudder straight to keep the line taut and up out of the water. •

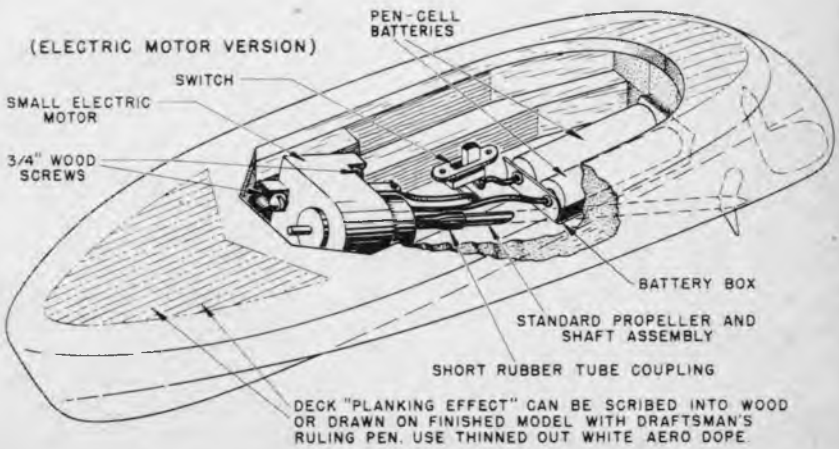
"JETEX" VERSION

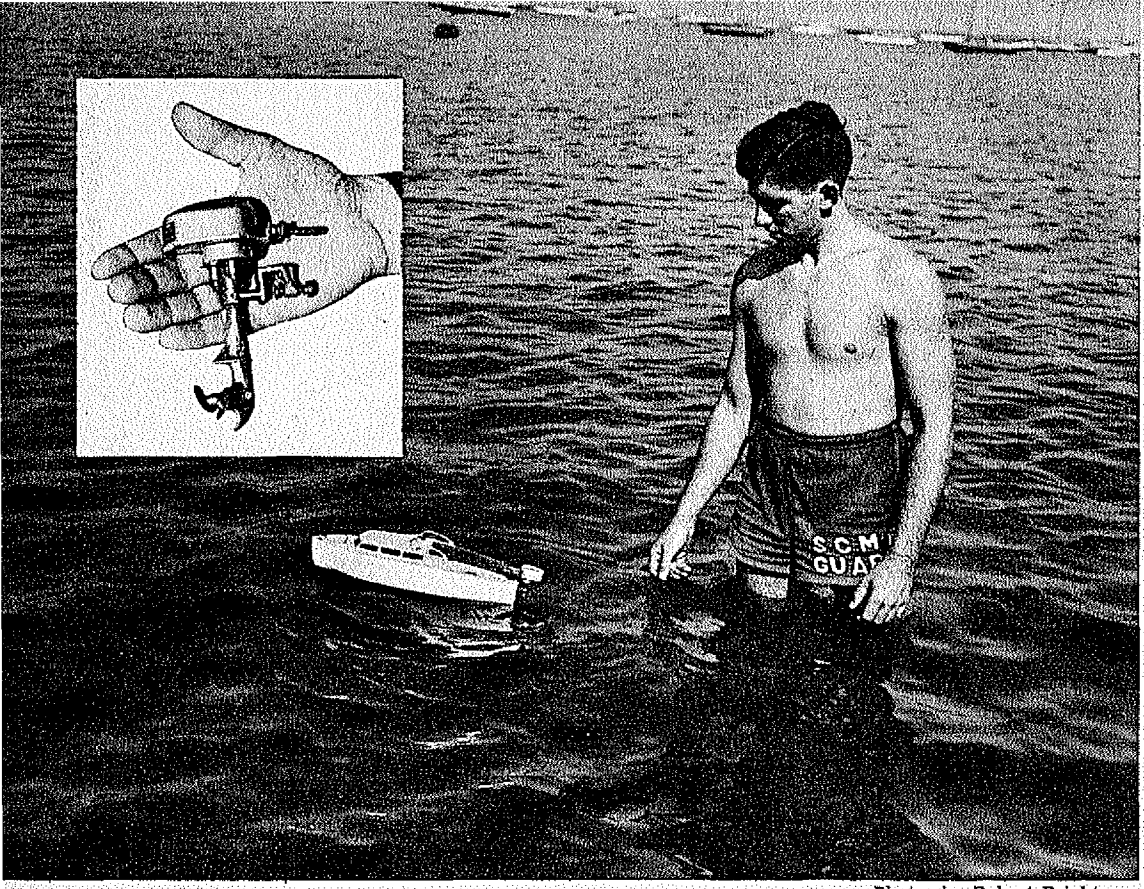


ELECTRIC-MOTOR VERSION



GENERAL ASSEMBLY





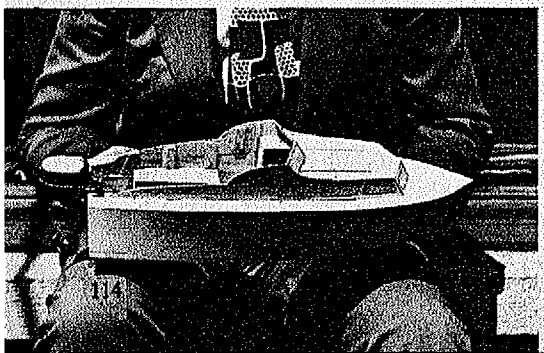
Photos by Robert Brightman

BATTERY MATE

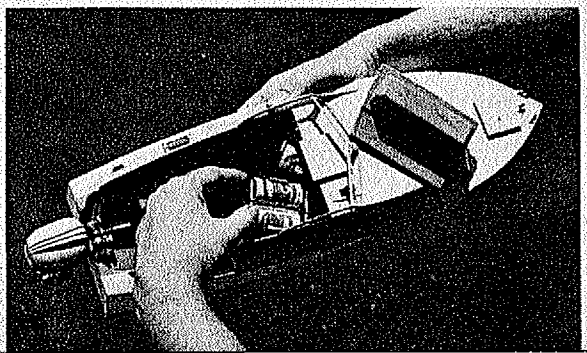
Midget outboard cruiser performs realistically with battery-powered scale-model outboard motor.

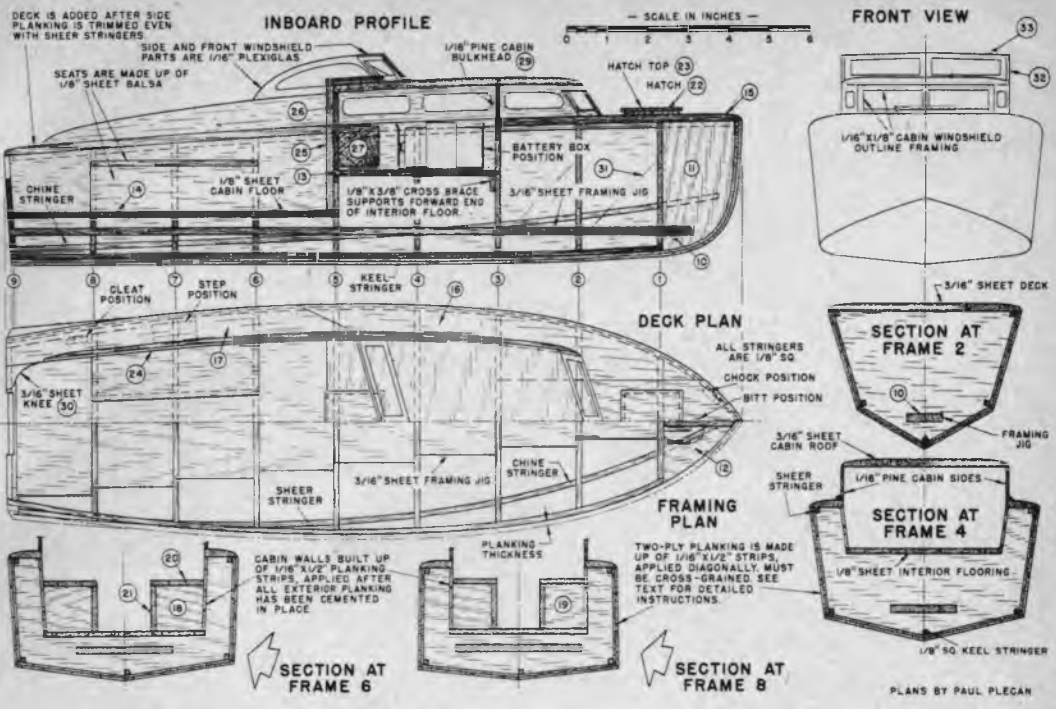
By Paul Plecan

Here's the model with the cabin, windshield, and cockpit coaming in place. Note how scrap wood and pins are being employed as gluing clamps.



Make the entire bulkhead between the cabin and the cockpit removable so you can get at the dry cells, which are mounted inside the cabin.



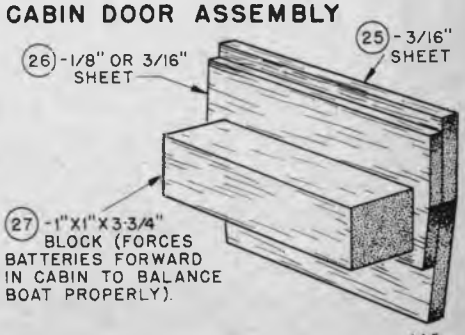


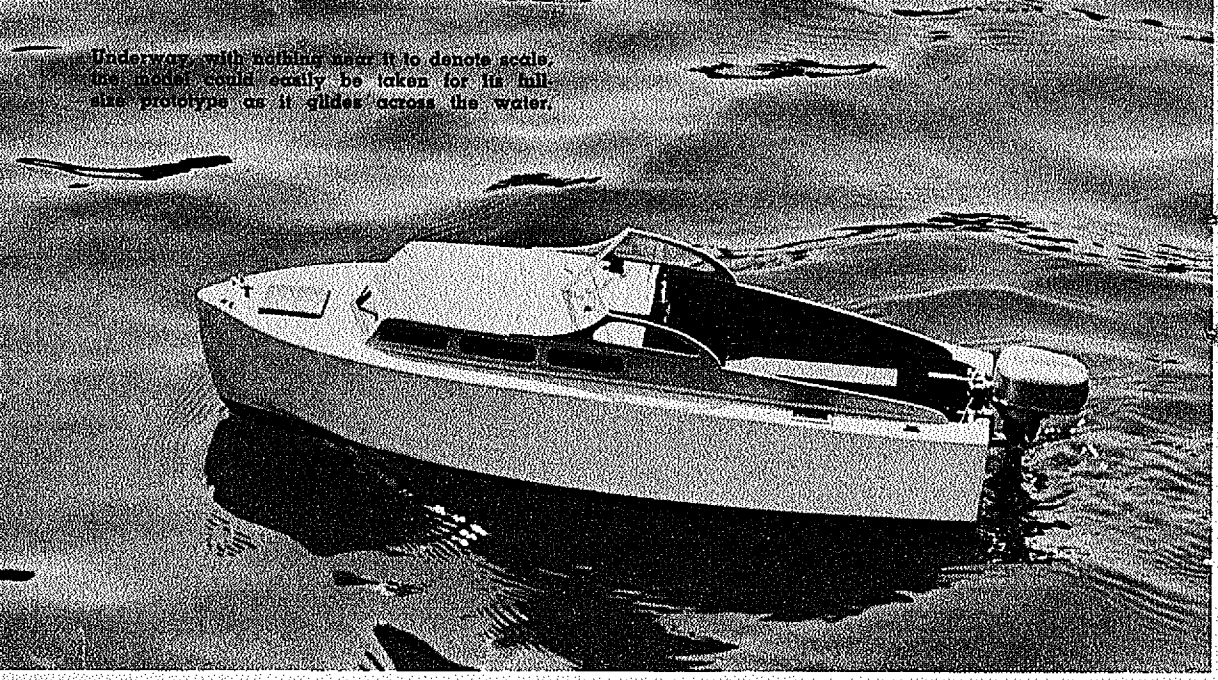
EASY to make and pleasing to the eye, *Battery Mate* is an ideal project for the hobby fan who wants a *working* model that also is a fine decoration for the den. The lines of this 18-in. boat may be familiar to some MI readers, as it is a scaled-down and simplified version of *Ha-Penny*, a full-size design by Jock Kingdon that appeared in MI's companion book How to Build 20 Boats, No. 10.

What makes this project particularly interesting is the realistic midget outboard motor. The one shown in the photos is an Imp, made in occupied Japan and imported by International Model Products, 879 Eighth Ave., New York, N. Y. It runs well on three, four, or five flashlight cells hooked up in series. Another motor of the same size has been announced by a Kansas City firm, and in all probability a third model will be produced by the time this appears in print.

Construction is mostly of balsa, with plywood parts where strength or thinness is needed. Assembly is made easy and very accurate by the use of a framing jig. Cut

Setting out on a trial run under ideal weather conditions. The motor, here set for a straight run, could be turned so boat would go in circle.





Underway, with nothing near it to denote scale, the model could easily be taken for its full-size prototype as it glides across the water.

out all the required parts from the Parts Patterns and check the step-by-step assembly sketches before attempting actual construction. Needless to say, accuracy in cutting out the parts will pay off in the end, as the boat will literally "fall together" if all the parts fit properly.

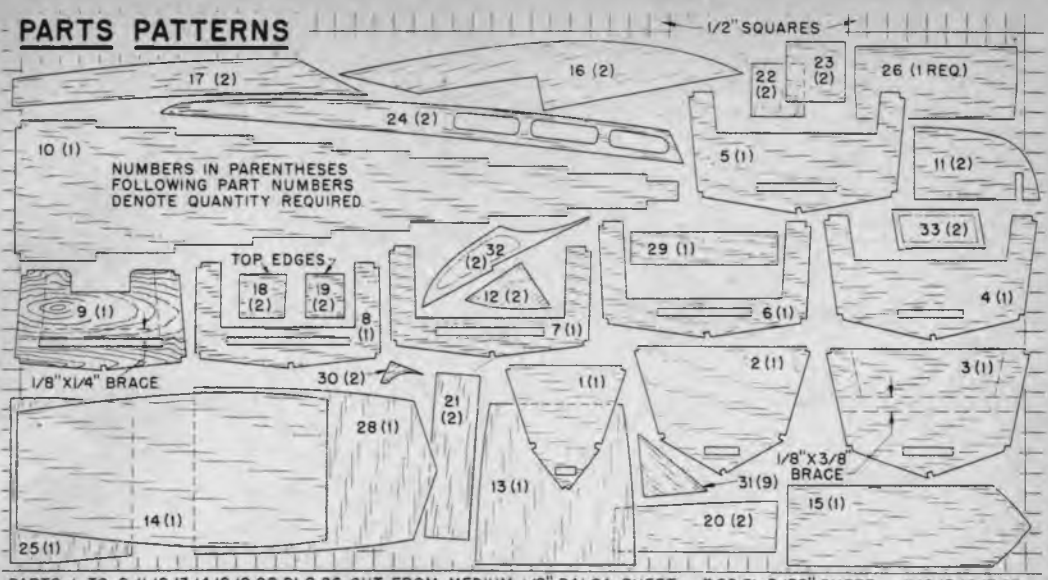
Slide Frames 1 to 8 into place on the framing jig (Pc. No. 10). Frame 9 (the transom) slips into place from the rear. Add the gussets (Pcs. No. 31) to tie the frames and framing jig together properly. On Frames 6, 7, and 8, temporary $\frac{1}{8}$x$\frac{1}{8}$-in. crossbraces will be necessary to provide attachment points for the upper ends of the gussets. Note that the transom is set at a slight angle off the verticle—the exact angle is not critical, so just approximate the angle shown in the inboard profile.

The sheer and chine stringers are $\frac{1}{8}$-in. square stock. Cement the sheer stringers in place first, then the chine stringers. The cabin floor (Pc. No. 13) is now glued in place, followed by the cockpit deck (Pc. No. 14). Note that a $\frac{1}{8}$x$\frac{3}{8}$-in. strip on the aft side of Frame 3 and a $\frac{1}{8}$x$\frac{1}{4}$-in. strip on the forward side of the transom are required to support the decks. Any gussets that are in the way should be removed or cut down when the decking is added. To be on the safe side, add the fore deck (Pc. No. 15), the stem (Pc. No. 11), and the stem side braces (Pcs. No. 12) to stiffen the structure before cutting away the aforementioned gussets.

Plank the sides first, using $\frac{1}{16}$x$\frac{1}{2}$-in. strips and cementing them to the hull at a 45° slope in reference to the sheer or chine when viewed from the side. When the cement is dry, trim the edges of the planking even with the sheer and chine stringers and apply the bottom planking (this is at a 45° angle to the center line of the hull). Note that the keel stringer is offset to one side. When one side of the bottom planking is completed, trim the planking even with the edge of this stringer. This automatically "centers" the seam between the two sides of bottom planking. In planking the second side of the bottom, butt the planks into this trimmed edge. Once the two sides of the hull and the bottom are planked, allow time for the cement to dry completely; then apply the second layer of side planks. Trim the edges flush with the sheer and chine and add the bottom planking.

Bore small holes through Frames 5 to 8 on the port side and run two lengths of No. 16 stranded rubber-covered wire through the holes. The cabin and cockpit walls are now built up, using $\frac{1}{16}$x$\frac{1}{2}$-in. balsa strips laid lengthwise along the inner edges of Frames 3 to 9. Four strips along each side should do the trick. Once the cement is dry, trim the top of this sheathing even with the frames and add the decking (Pcs. No. 16 and 17). The sketch given on the plans should explain the seats—each consists of two ends (Pcs. No. 18 and 19), a front (Pc. No. 21), and a top (Pc. No. 20). The two stern knees (Pcs. No. 30) are next added.

Sandpaper the hull assembly with progressively finer grades of garnet to obtain

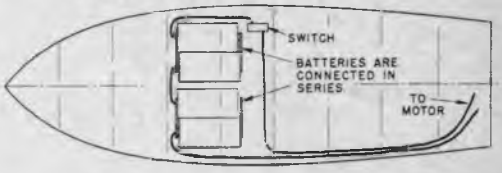


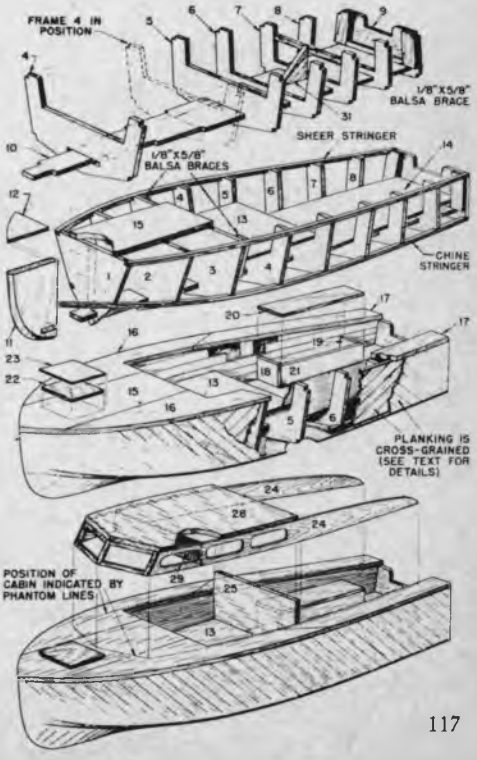
PARTS 1 TO 8, 11, 12, 13, 14, 18, 19, 20, 21 & 26 CUT FROM MEDIUM 1/8" BALSA SHEET. #22, 31 - 3/32" SHEET. #10, 15, 16, 17, 25, 28, & 30 - 3/16" SHEET. #9 IS 1/8" PLYWOOD. #23, 24, & 29 - 1/16" PINE OR PLYWOOD. #32, 33 - 1/16" PLEXIGLAS OR LUCITE. #27 PATTERN NOT SHOWN, AS IT IS A 1" X1" X3-3/4" BALSA BLOCK

a smooth over-all effect and to conform with the cross sections given on the plans. Wood filler is now applied to fill in the pores and grain marks of the wood. Two or three coats are sufficient, with ample time allowed for drying between coats. Next, a coat or two of Duco white lacquer should be applied (brushed or sprayed) and sanded down with 250 or 320 wet-or-dry paper. With the addition of more lacquer, 400 paper should be used so a perfectly smooth surface is achieved.

A pine bulkhead (Pc. No. 29) is now cemented to the deck directly over Frame 3. With the cabin door (Pc. No. 25) in place, the two cabin sides (Pcs. No. 24) should be bent and cemented in place. Note that these sides are cemented to Pc. No. 29, but not to Pc. No. 25, as that part is removable for battery replacement. Cement on the cabin roof (Pc. No. 28), add the front end of the cabin, and sand the roof to round off the corners on the sides and front top edges. Proceed with the wood-filler-and-sanding routine as described previously for the hull. Also cement the two hatch parts (Pcs. No. 22 and 23) [*Continued on page* 143]

WIRING DIAGRAM (NOT TO SCALE)

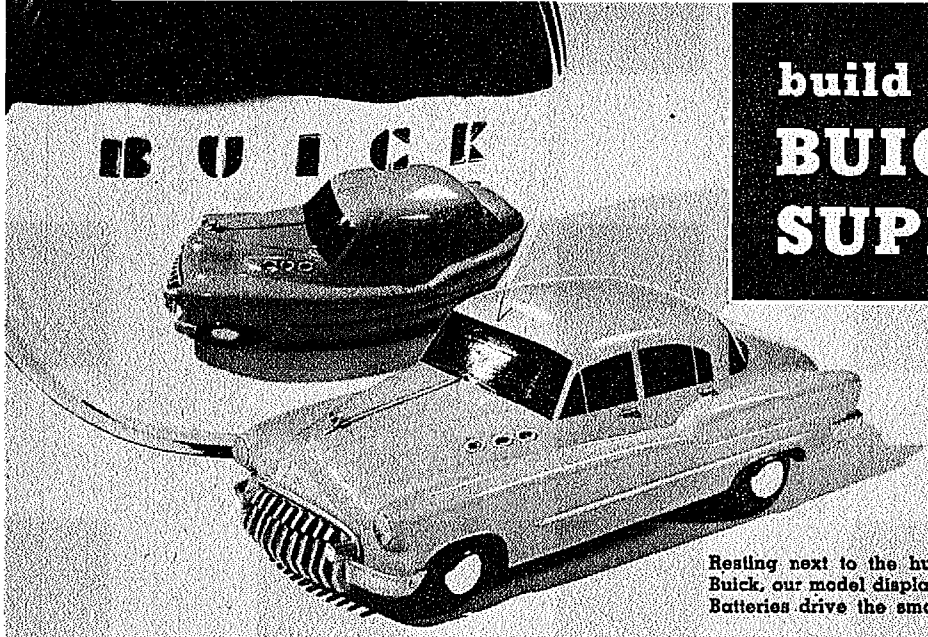




FULL-SIZE PLANS

of this model can be obtained by sending 50c to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 420.

build this BUICK SUPER



Resting next to the hub cap of a real Buick, our model displays its sleek lines. Batteries drive the small electric motor.

An 11-inch electric motor driven scale model of the 4-door Tourback Buick.

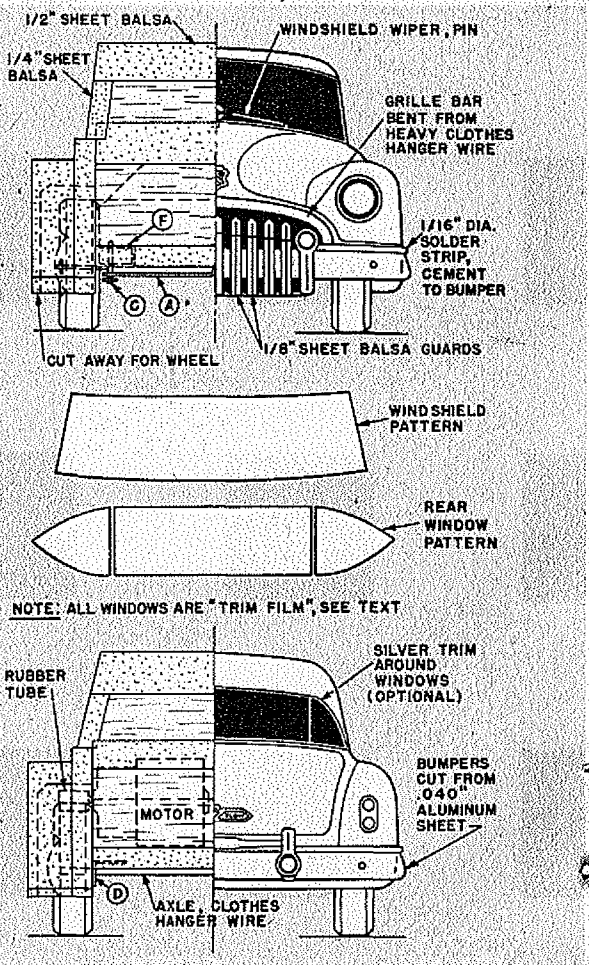
By Larry Eisinger

ALWAYS want a Buick? Well, here's your chance to make an exact scale miniature—and, for its size, it'll have just as much pep as the real car!

It doesn't have Dynaflow but it does have a miniature electric motor which in turn is driven by two medium-size flashlight batteries, a flick of the switch will speed this Super over any smooth surface.

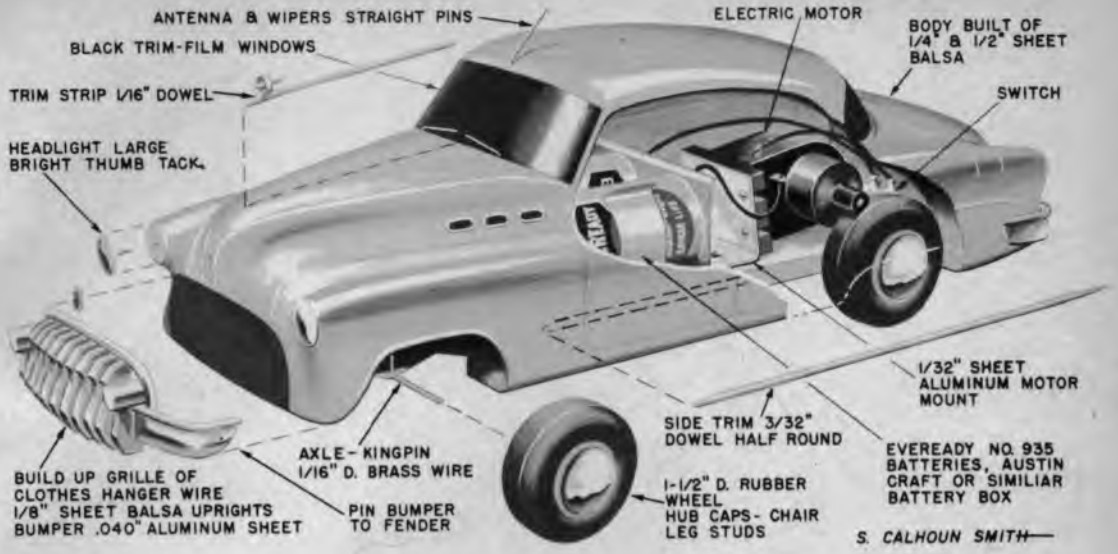
The model is extremely easy to build, consisting of ½ and ¼ in. sheets cemented together and then carved to the final shape.

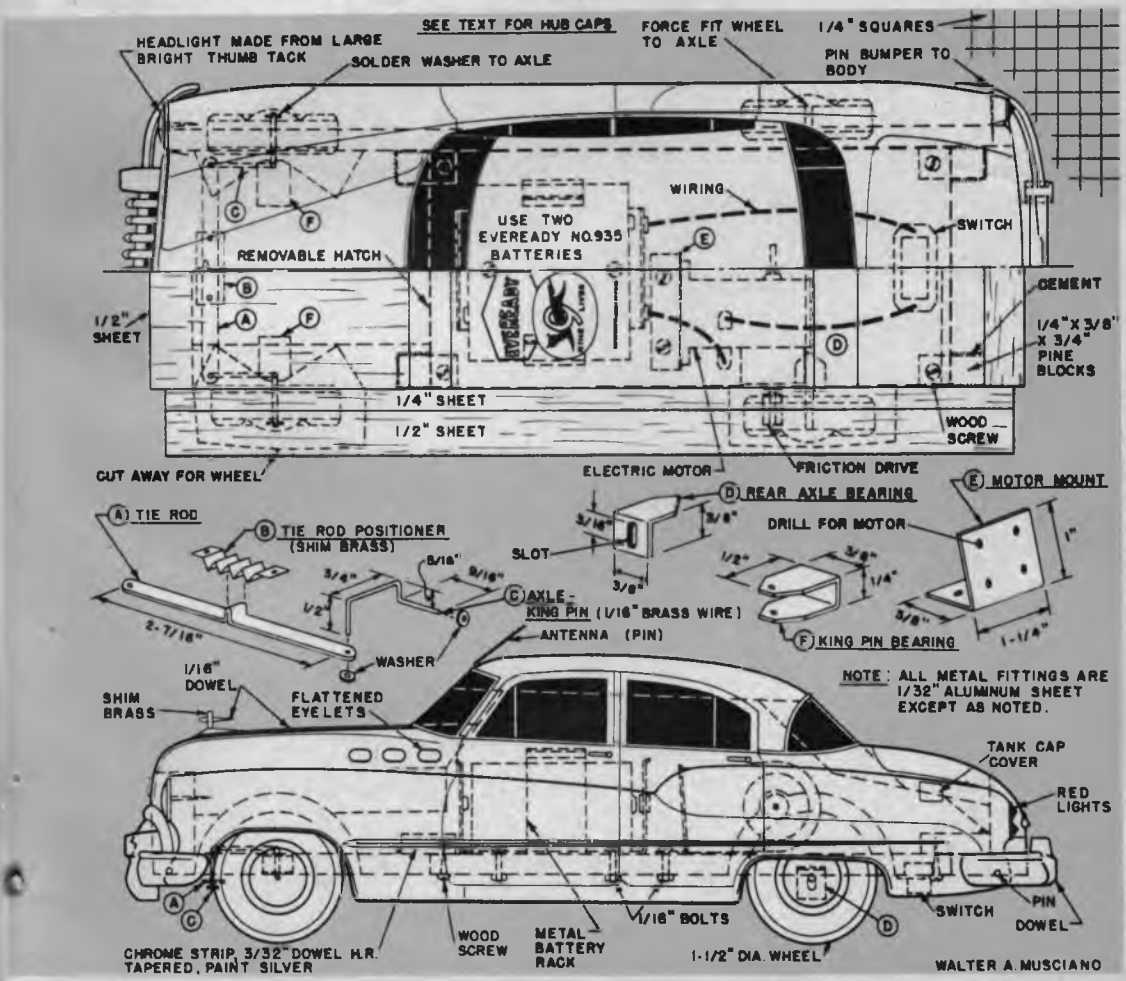
First cut out the ¼ in. hard balsa base, notch the front for the wheels and then cut out the section for the removable motor and battery assembly. Spot-cement this section back in place and then trace the side of the body, indicated by the heavy lines. Cement the hardwood blocks for the screws in place and then cut the various fill-in pieces for the front, top, hood, trunk. The perspective drawing will give you the location of the [*Continued on page* 143]



FULL SIZE PLANS

of this model will greatly simplify construction. Send 25c to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 414.


ANTENNA & WIPERS STRAIGHT PINS
BLACK TRIM-FILM WINDOWS
TRIM STRIP 1/16" DOWEL
HEADLIGHT LARGE BRIGHT THUMB TACK
ELECTRIC MOTOR
BODY BUILT OF 1/4" & 1/2" SHEET BALSA
SWITCH
1/32" SHEET ALUMINUM MOTOR MOUNT
SIDE TRIM 3/32" DOWEL HALF ROUND
EVEREADY NO. 935 BATTERIES, AUSTIN CRAFT OR SIMILIAR BATTERY BOX
AXLE-KINGPIN 1/16" D. BRASS WIRE
1-1/2" D. RUBBER WHEEL
HUB CAPS- CHAIR LEG STUDS
BUILD UP GRILLE OF CLOTHES HANGER WIRE
1/8" SHEET BALSA UPRIGHTS
BUMPER .040" ALUMINUM SHEET
PIN BUMPER TO FENDER
S. CALHOUN SMITH


SEE TEXT FOR HUB CAPS
HEADLIGHT MADE FROM LARGE BRIGHT THUMB TACK
SOLDER WASHER TO AXLE
FORCE FIT WHEEL TO AXLE
1/4" SQUARES
PIN BUMPER TO BODY
WIRING
SWITCH
USE TWO EVEREADY NO.935 BATTERIES
REMOVABLE HATCH
CEMENT
1/4"X 3/8" X 3/4" PINE BLOCKS
1/2" SHEET
1/4" SHEET
1/2" SHEET
WOOD SCREW
CUT AWAY FOR WHEEL
ELECTRIC MOTOR
FRICTION DRIVE
(A) TIE ROD
(B) TIE ROD POSITIONER (SHIM BRASS)
(C) AXLE-KING PIN (1/16" BRASS WIRE)
(D) REAR AXLE BEARING
SLOT
DRILL FOR MOTOR
(E) MOTOR MOUNT
(F) KING PIN BEARING
ANTENNA (PIN)
WASHER
1/16" DOWEL
SHIM BRASS
FLATTENED EYELETS
NOTE: ALL METAL FITTINGS ARE 1/32" ALUMINUM SHEET EXCEPT AS NOTED.
TANK CAP COVER
RED LIGHTS
SWITCH
PIN DOWEL
1/16" BOLTS
WOOD SCREW
METAL BATTERY RACK
1-1/2" DIA. WHEEL
CHROME STRIP, 3/32" DOWEL H.R. TAPERED, PAINT SILVER
WALTER A. MUSCIANO

remote-control STATION WAGON

A 7½ inch scale model of the Jeep Station Wagon. Powered with a miniature electric motor, you can "drive" it yourself.

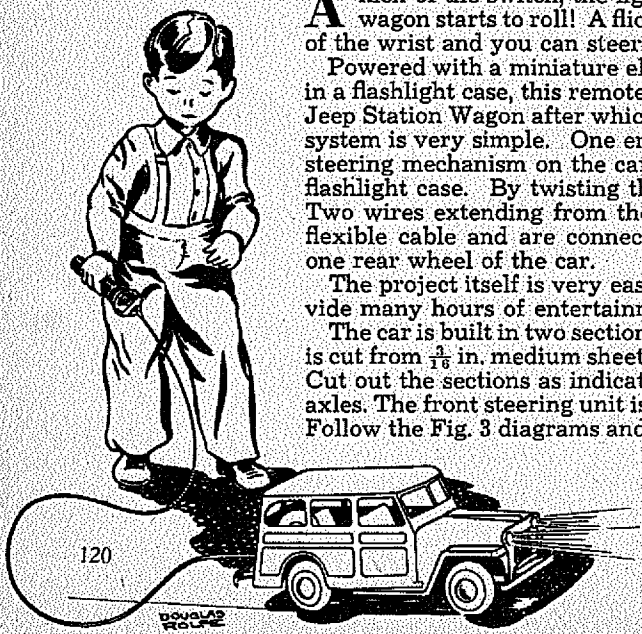
By Douglas Rolfe

A flick of the switch, the lights go on and this realistic little station wagon starts to roll! A flick of the switch and it'll back up! A twist of the wrist and you can steer it to the left or the right!

Powered with a miniature electric motor driven by batteries housed in a flashlight case, this remote control model car is as agile as the real Jeep Station Wagon after which it was patterned. Actually, the control system is very simple. One end of a flexible cable is connected to the steering mechanism on the car while the other end is attached to the flashlight case. By twisting the case the front wheels can be turned. Two wires extending from the batteries in the case are taped to the flexible cable and are connected to the electric motor which drives one rear wheel of the car.

The project itself is very easy to build and, once complete, will provide many hours of entertainment.

The car is built in two sections, the chassis and the body. The chassis is cut from $\frac{3}{16}$ in. medium sheet balsa to the dimensions shown in Fig. 2. Cut out the sections as indicated and attach the front and rear wheel axles. The front steering unit is built up from the large size paper clips. Follow the Fig. 3 diagrams and keep the play as little as possible. The



By walking behind and twisting the battery case you can steer the model in any direction.

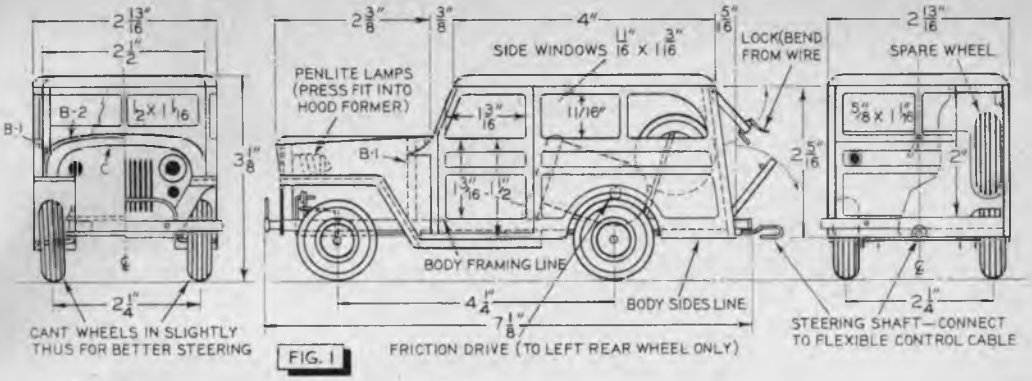


FIG. 1

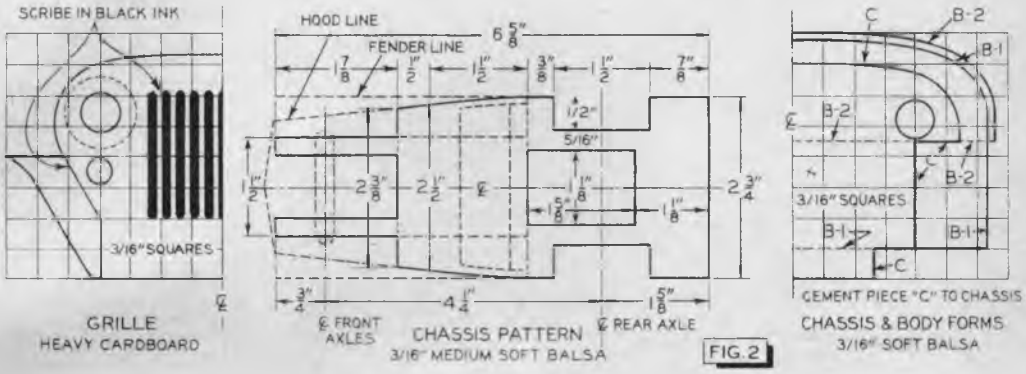


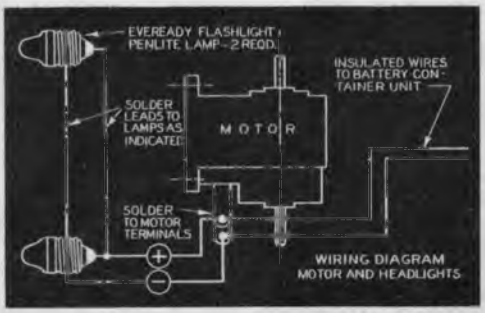
FIG. 2

wheels and other supplies can be purchased at most any hobby shop.

After the motor is mounted proceed with the body. Using the side and front view outlines in Fig. 1, build up each side, the top, the front and rear and assemble as shown in Fig. 3. You will note stiff cardboard was recommended for some of the parts but $\frac{1}{32}$ in. sheet balsa can be substituted.

The battery container is a standard two-cell flashlight with the bulb and glass removed and a special single-pole-double-throw switch installed. Thus, by flicking the switch forward the car will run forward; by flicking the switch backward the car will reverse itself. Your local radio repair man should have a switch of this type available and, if needed, he can make the necessary hook-up. The flexible cable, which is a speedometer cable, can be obtained from any automobile parts supply house. Connect the cable to the car and flashlight holder in the manner shown and run enameled wire from the batteries along the cable to the motor in the car. Tape the wires to the cable at 6-in. intervals.

The paint job is up to you. The original model was painted dark red or brown for



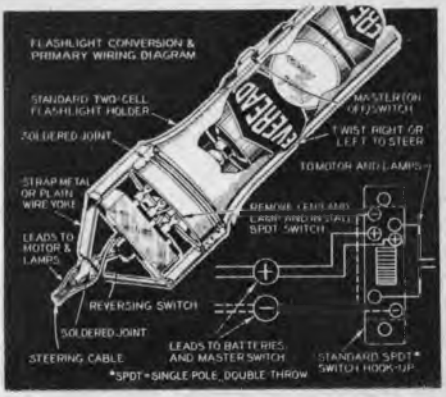
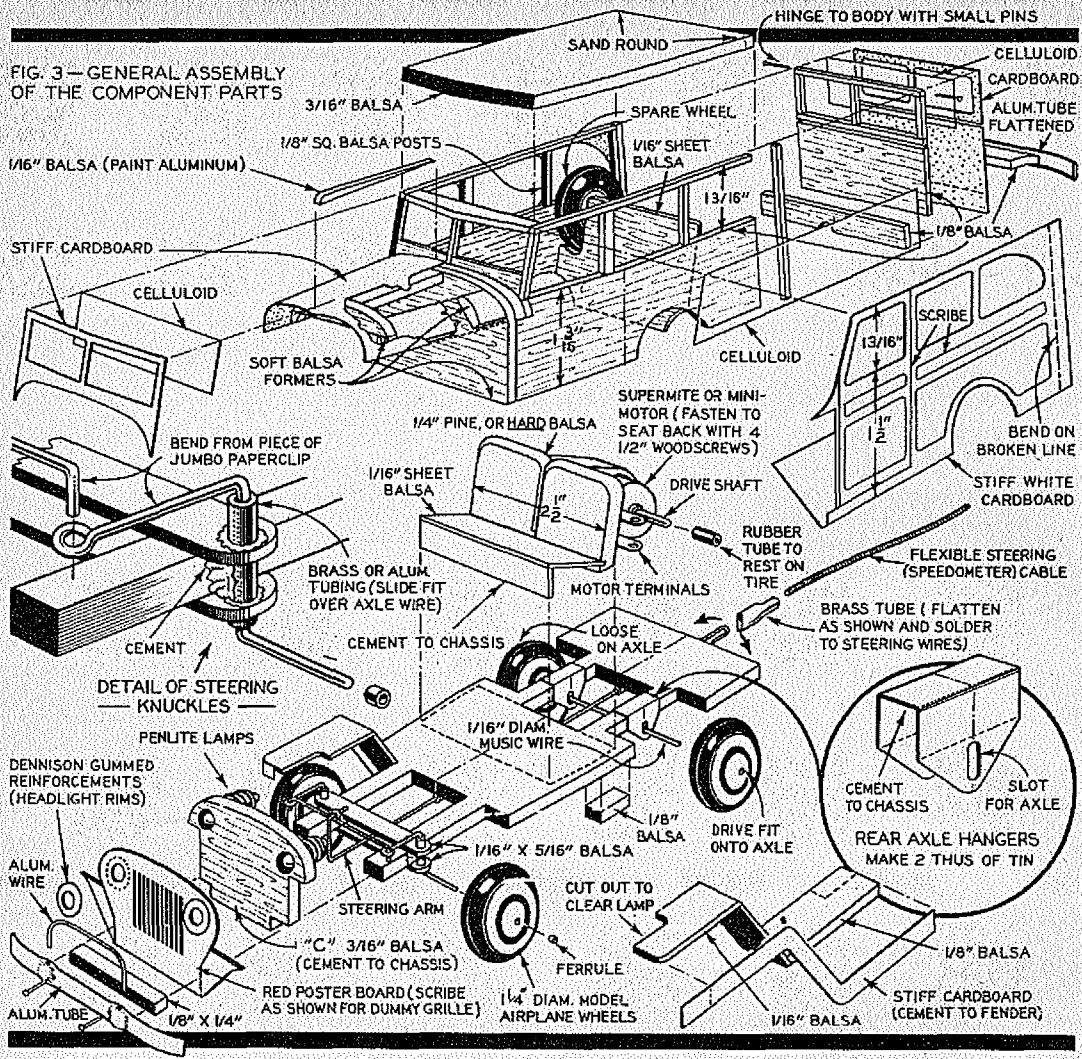
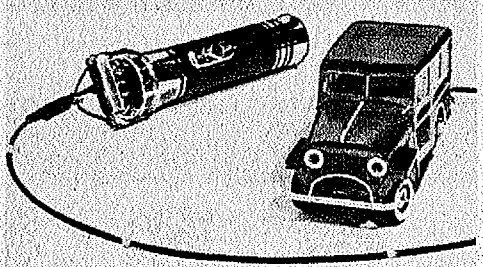


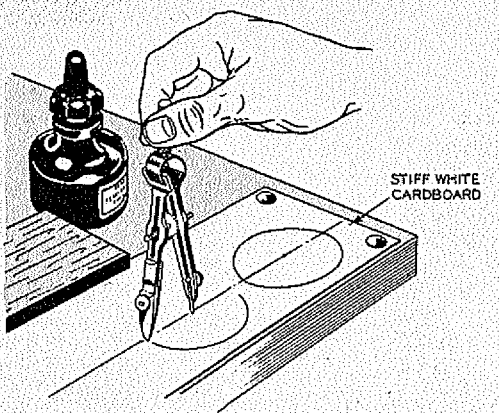
FIG. 3 — GENERAL ASSEMBLY OF THE COMPONENT PARTS



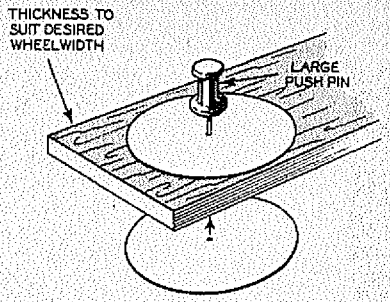
Housing the batteries in the control case results in a very light model which in turn makes it very responsive. Original model was powered with Arpin's Mini-Motor.



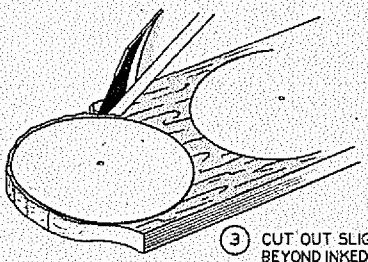
the top, hood and fenders; bright yellow for the body trim and a deeper yellow for the body panels. Before applying the finish coat brush on a coat of wood filler, sand with paper and then add another coat of filler. This will fill the balsa pores and pave the way for a metal-like professional surface. Colored model airplane dope obtained from your local hobby shop is ideal. Once complete you'll find your model not only looks like the real thing, but with you "driving," it handles equally well! •



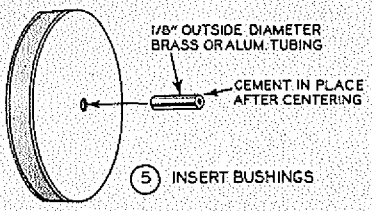
1 SCRIBE CIRCLES TO DESIRED DIAMETER OF WHEELS – 2 DISCS TO EACH WHEEL



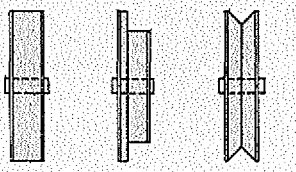
2 CENTER DISCS AND CEMENT TO PIECE OF HARD SHEET BALSA



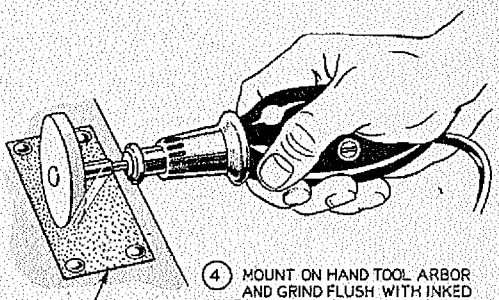
3 CUT OUT SLIGHTLY BEYOND INKED LINE



5 INSERT BUSHINGS



THREE TYPES OF RIMS



4 MOUNT ON HAND TOOL ARBOR AND GRIND FLUSH WITH INKED LINE. (USE SMALL TRIANGULAR FILE INSTEAD OF SANDPAPER TO FORM GROOVED RIM FOR V-TYPE PULLEYS)

Wheels For Models

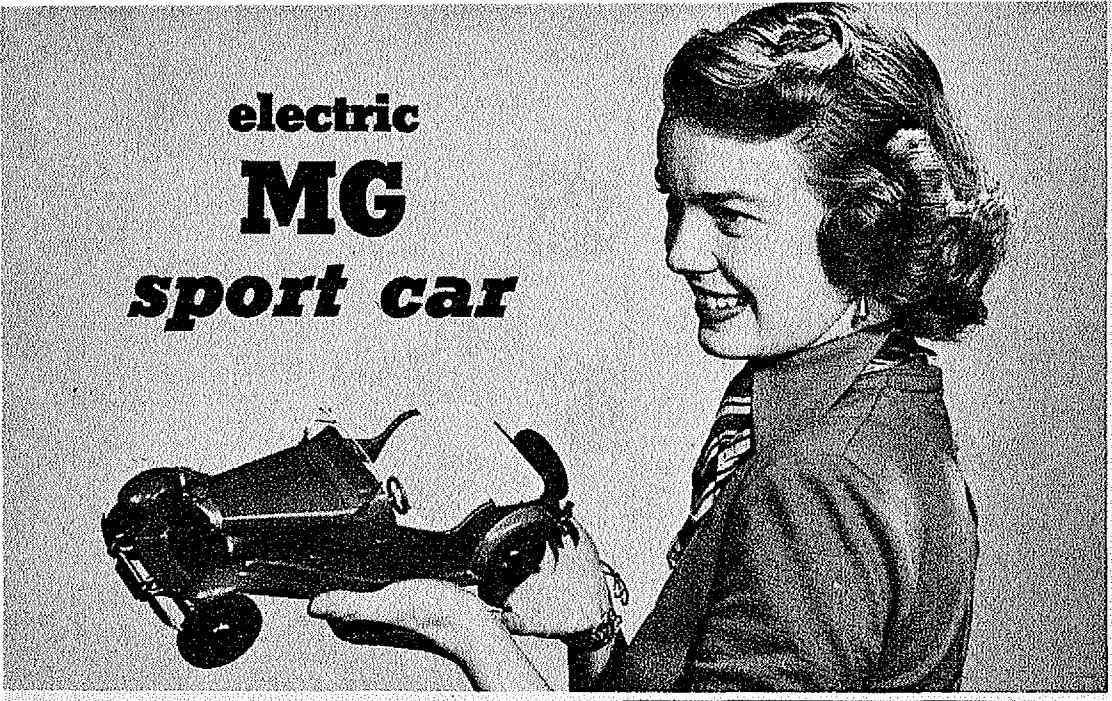
PRACTICALLY every model builder at some time or other runs up against the problem of securing wheels exactly suited to the particular project on hand. While most model supply houses carry a fairly wide selection of wheels, they cannot meet the requirements of many projects. And if the builder lacks lathe facilities he is out of luck.

The simple technique described above allows you to make your own wheels, pulleys, etc. The only power tool required for the job is any one of the many simple hand power tools now on the market. Materials required are a small sheet of stiff white cardboard, some hard sheet balsa, model airplane cement and an ink compass with which to scribe the circles.

The scribed circle serves as an exact guide line when grinding the wheels to their final shape, and the cardboard plys also serve to strengthen the wheels. Excellent locomotive wheels can be made by employing this method and, when scribed to follow locomotive wheel rims and spokes, will look like the real thing—especially after they have been given a coat of blue railroad paint.

When grinding the wheels down to the guide line, care must be used to meet the line and not to go beyond it. A perfectly true wheel will result by following these instructions, and you can accommodate any project you undertake.—*Douglas Rolfe.*

electric MG sport car

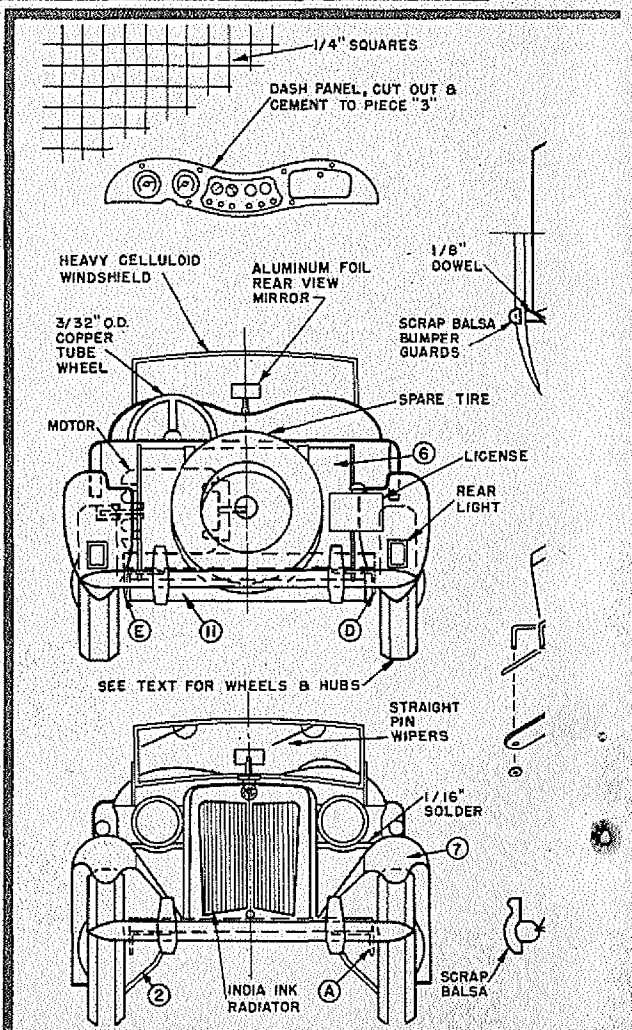


Here's a flashy 12-inch scale model of one of the most popular foreign sport cars on the road.

THIS low slung sport car is one of the most popular foreign cars on American roads today. This new model, called Series TD, has been Americanized slightly over the previous models (disc wheels, curved fenders, large bumpers, and more comfortable riding). However, it has lost none of its distinction in appearance or performance. Acceleration and speed are high and it can negotiate sharp turns at high speeds with safety.

Many MG Midgets are used for racing in Europe. The twin carburetors, 4 cylinder engine develops 54 bhp at 5,200 rpm. Weight of the car is 2,009 lbs. and fuel capacity is 12½ Imperial gallons, enough for about 300 miles of driving. No tank gauge is supplied, however a light on the dash panel illuminates when fuel is down to 2½ gallons. The two main instruments on the dash panel are speedometer and tachometer. With four speeds forward and one reverse this English road hugger lives up to its slogan of "Safety—Fast."

Our model is simple to build and is also easy on the pocketbook. Powered by a

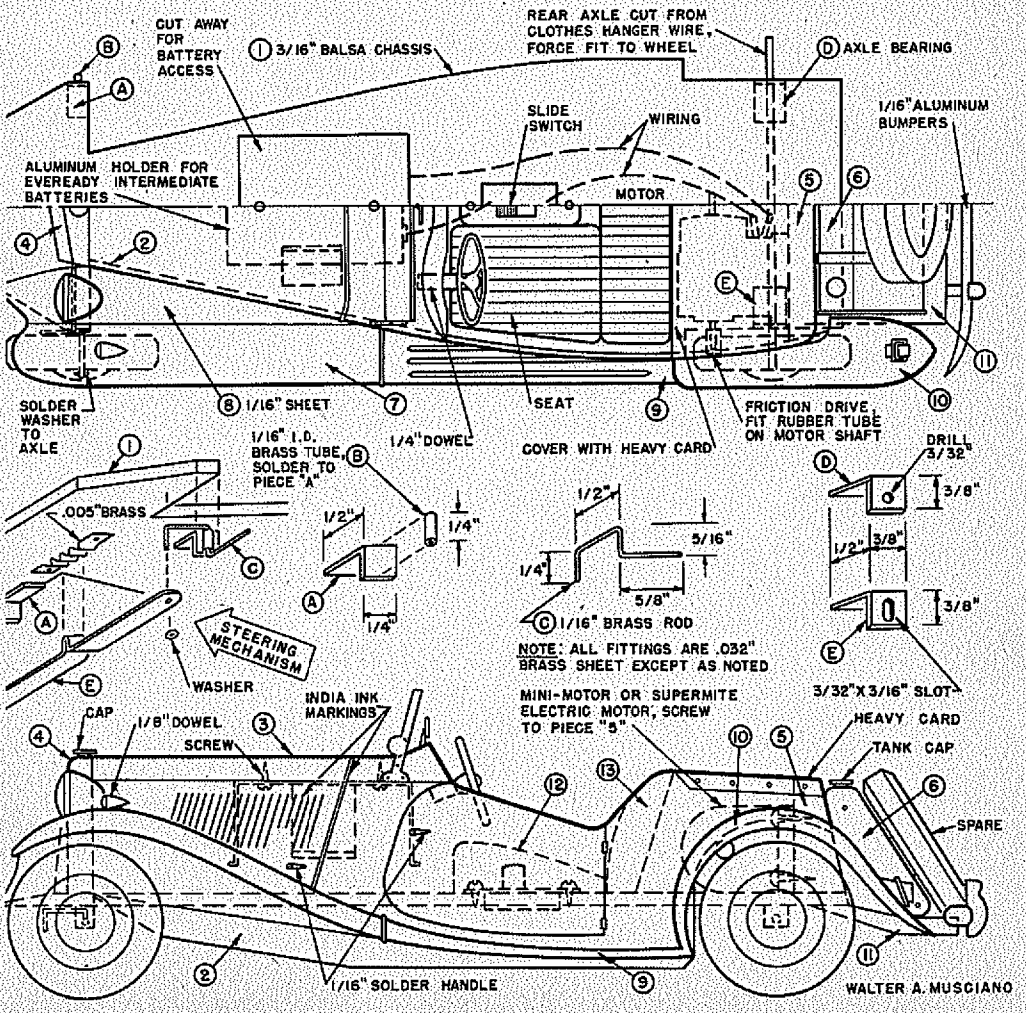


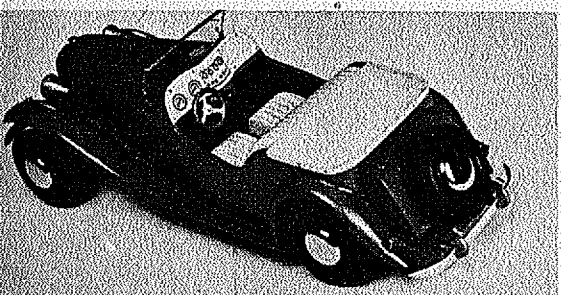
miniature electric motor the model can be set to travel in circles or straight away. First trace all the patterns on the correct size of balsa and cut to shape, then screw the motor to piece No. 5 and the metal battery holder to piece No. 3. When using screws on balsa it is advisable to apply a drop of cement on the balsa before using the screw and be sure to stop turning the screw the instant it is tight in order not to strip the soft wood. Cement, pieces No. 4 and 6 to the chassis (No. 1). Then cement pieces No. 2 to the chassis holding them in place with straight pins until dry. Piece No. 3 is added now.

All the fittings should be cut at this time. It should be noted that the rear axle bearings are not identical in that the driving wheel axle bearing is slotted to insure positive contact between the wheel and drive shaft. Solder the brass or copper tubing (piece B) to piece A, then bend piece C from brass rod. Music wire can be substituted for this item. Cement pieces A, D and E to the chassis and add the positioner of .005 in. brass sheet. Bend the tie-rod (piece E) and drill holes at the proper location to fit the piece C. Solder washers to the piece C to hold the piece E in place. Add the rear axle (cut from wire clothes hanger) and add the wheels. We used 2 in. Veco semi-pneumatic rubber tired wheels on our model. These wheels are a bit heavy, however they are very realistic and save a lot of work. Of course if you have access to a lathe, the wheels can be turned from hardwood such as pine or birch. The rear wheels are forced onto the axle while the front wheels should spin freely. Washers soldered to the axles hold the front wheels in place.

Add the slide switch in place and solder the wiring circuit in place as the plans indicate. Test the drive mechanism and steering mechanism now. Sand the model till smooth.

The fender pieces 7, 9 and 10 are carefully cut from ¾ in. medium balsa using



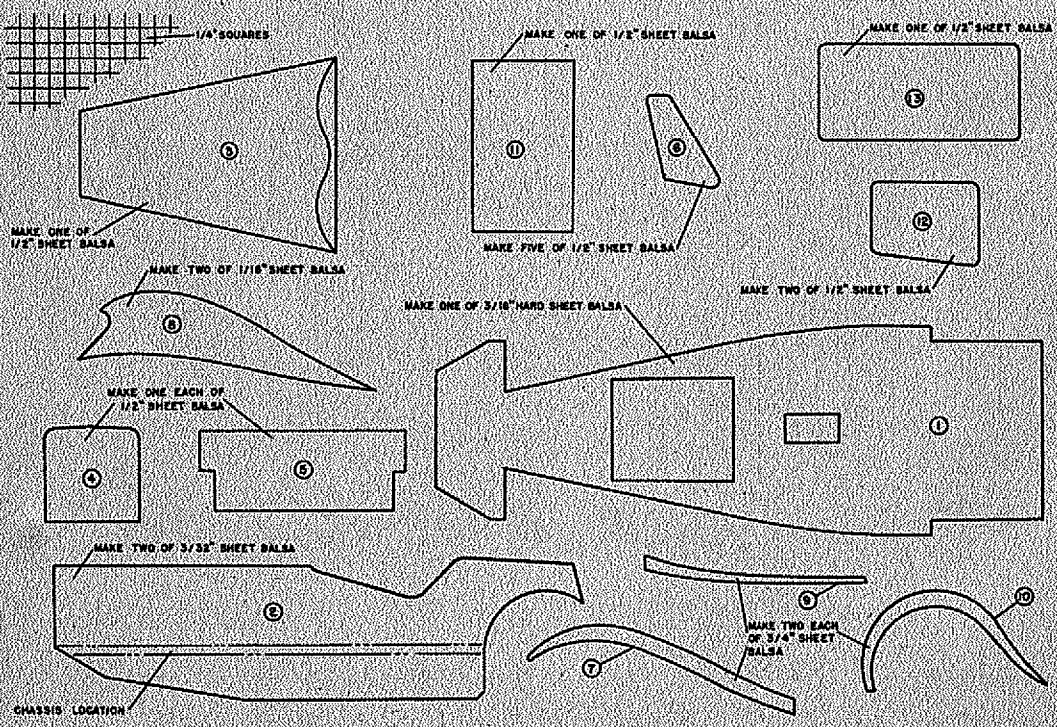


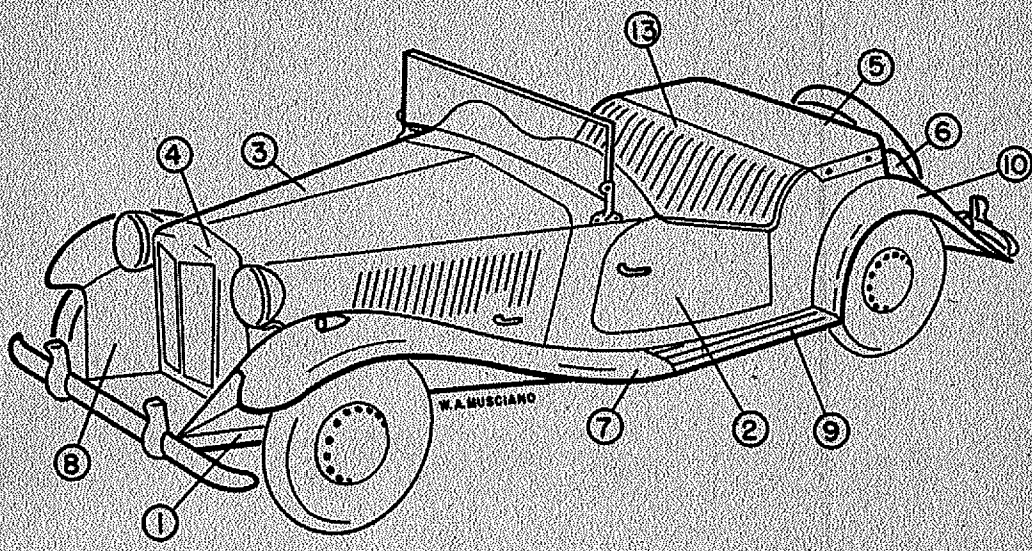
Battery-powered, the sporty MG model zips along at a snappy pace. Lighten car to increase speed.

a fine coping saw. Bevel the inside edge about 45 degrees to fit the fender fairings (piece No. 8). Cut the fenders to fit the body curves and cement in place. When dry add the $\frac{1}{16}$ in. fender fairings and carve the fenders to shape, using a very sharp razor blade. Sand carefully and apply three coats of wood filler, sanding well between each coat. Cover motor space with heavy cardboard.

The prototype model was painted bright red with beige upholstery, dash panel and convertible top storage cover. Other MG color schemes are: black car with red, green or beige trim—forest green with beige trim—ivory with red or green trim—blue with beige trim. We used Testor's airplane dope. Four coats should produce a fine finish.

Cut bumpers from aluminum and file and emery cloth till smooth and shiny. Use ⅛ in. dowel to hold the bumpers to the car. Add the fuel tank and spare tire. Install seats. Bend the steering wheel from $\frac{3}{32}$ in. copper tubing. This is soldered to brass spokes and this assembly is attached to the dowel steering column. Installation of lights, windshield, license plates completes the assembly. •

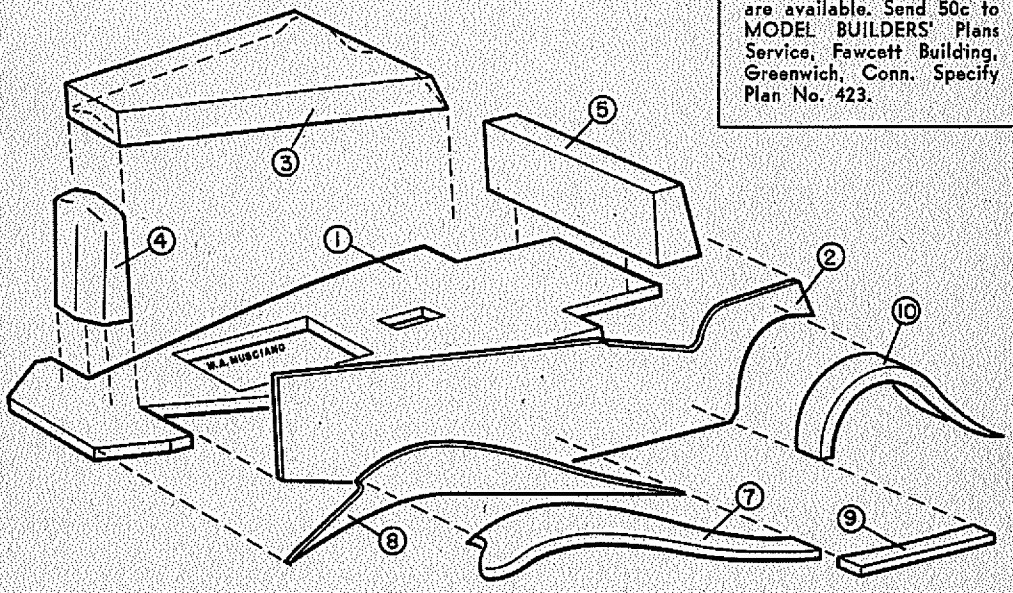




COMPLETED MODEL

FULL SIZE PLANS

are available. Send 50c to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Conn. Specify Plan No. 423.



BASIC ASSEMBLY

THE BRIG LEXINGTON

A real challenge to the modeler's skill, this built-up model is an accurate scale reconstruction of a famous Revolutionary War vessel.

By Clyde M. Leavitt

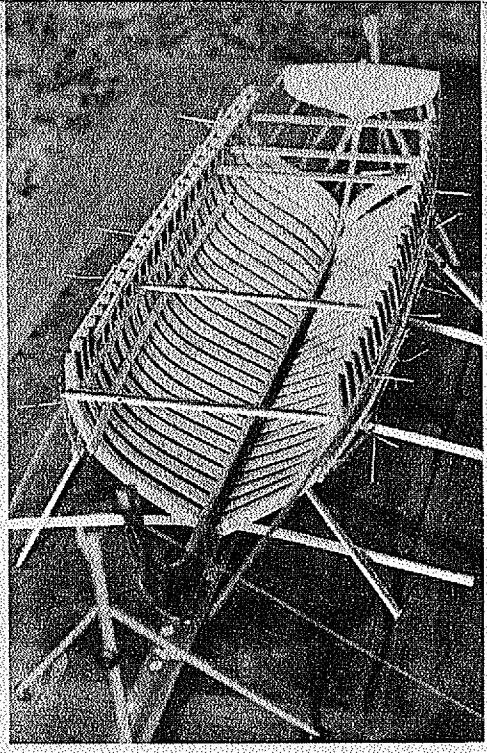
THE Lexington was one of our country's first naval vessels. Originally a merchantman she was converted for naval use in the year 1775 at Philadelphia and had a distinguished career during the Revolutionary War. The 166-ton Lexington was one of our first military conversions in addition to being one of our first warships.

At the outset it must be stated that the model as constructed required a considerable number of man hours, something on the order of 2000. This time could have been reduced by the omission of guns and certain of the less important items of fittings and equipment. A very considerable increase in hours would have been required if masts, yards, running and standing rigging had been shown. As will be seen from the photographs the little ship presents an attractive picture even without her spars and is certainly far more portable and less space consuming than a rigged model. Many will find a model left unrigged, as were many of the Admiralty models, a refreshing change from the conventional. Limitation of space does not permit the inclusion of detail plans or descriptions of every portion of structure or item of equipment. The photographs accompanying this article should, however, leave few if any questions in the mind of the model maker and details of fittings, armament and so on are readily developed from easily available books.

The woods used were white pine, basswood, cottonwood and boxwood. These were selected due to their suitability and availability. Such items as bitts, pin rails, belaying pins, cleats, steering wheel and raised carvings on transom and trail boards were made from boxwood. Cottonwood was used for the cat heads where a relatively hard wood with a ninety degree bend in the grain was desirable for strength and appearance. The wood was cut in a vacant lot, a section of the main stem of a sapling with short lengths of branches growing out at right angles. After debarking, the wood was boiled in two waters to remove most of the sap, was dried and then shaped. The day after cutting the green wood the cat heads were finished and installed.

The hull structure of the model requires a number of knees and the real enthusiast may wish to use all natural grain knees rather than merely cutting them out of

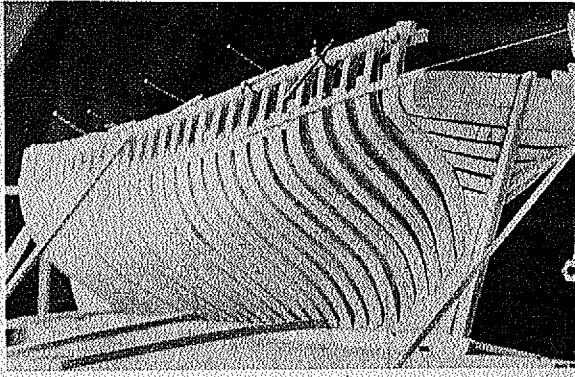
Photos by Luther H. Tarbox



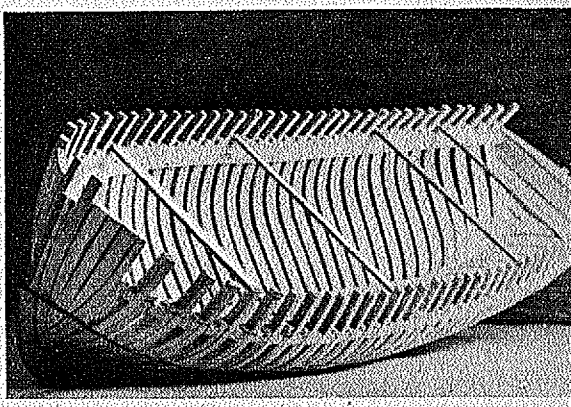
Model on building board with full frames erected. Temporary cross spalls and shores support frame.

straight grain wood. Basswood was employed for the deck planking because finished sawn strips of the proper breadth and thickness were readily obtainable. The remainder of the model, keel, keelsons, frames, ceiling, planking, deck beams, rudder and masts was made from white pine. The wood was straight grained and free from knots, checks and other defects. It offered an advantage in being soft enough to carve readily, a useful quality when shaping the many frame futtocks. It took metal fastenings easily without splitting, even when holes were not drilled, and had a pleasing natural color. Small fittings and members are, however, best made from hard wood as otherwise they would be excessively fragile.

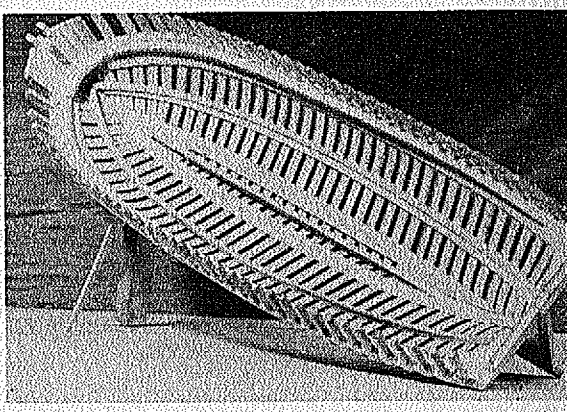
The building slip or ways for the model can be a regular drafting board 3 or 4 inches longer than the hull or a piece of three-quarter inch thick plywood of about this size. In any event it should be smooth and lie in a true plane without any tendency to warp as it is to be used as a reference plane for checking plumbness of stem and stern frames, setting deck heights and so on during construction. While the model will eventually become very strong and rigid, it is quite flexible during its initial stages and therefore a good building base is a prime requisite just as for a real ship.



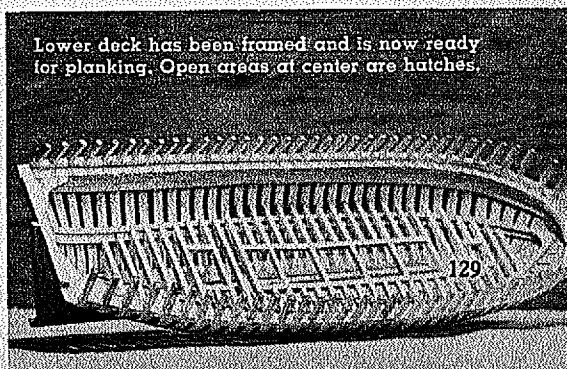
Here the framing has been completed. Note transom framing and weight to hold the sighting line taut.



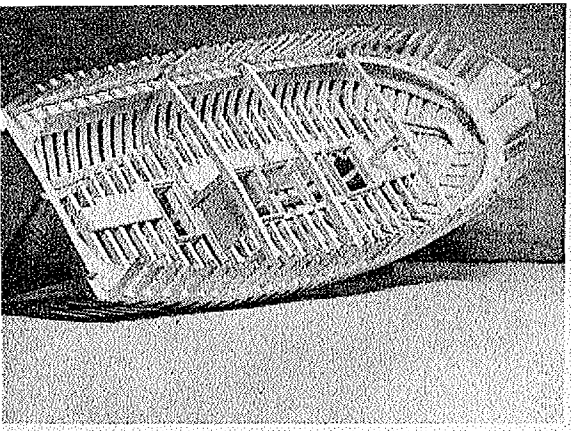
Model framed out. Knightheads, clamps placed; chocks between frame heads at main deck level.



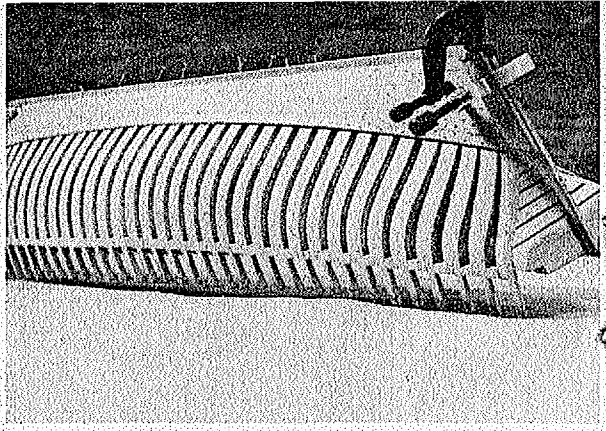
The hold ceiling, clamps, shelves and breast hook installed. Four temporary cross spalls removed.



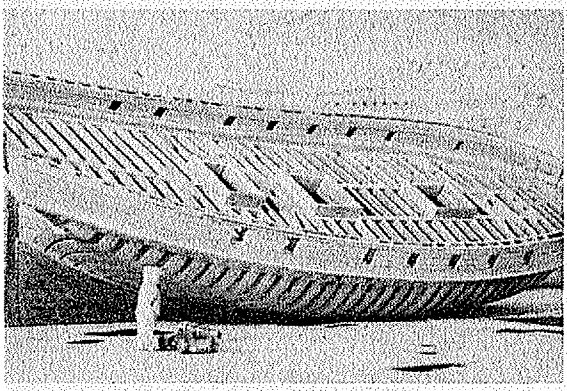
Lower deck has been framed and is now ready for planking. Open areas at center are hatches.



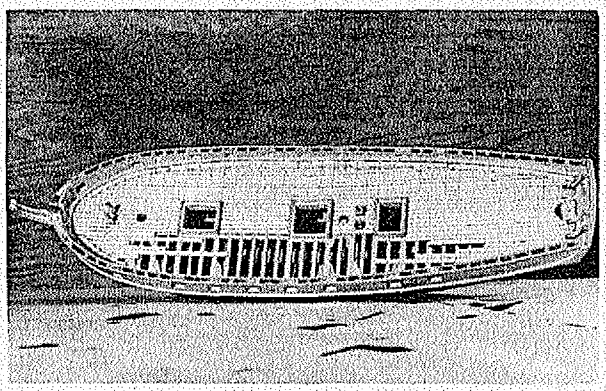
Lower deck partially planked. Note main deck strong beams and 'tween deck bulkhead aft.



Bottom planking shown during installation. Frame head chocks are seen clearly in photograph above.



Main deck hatch coamings in place, beams ready for planking. Ceiling and gun ports are cut.

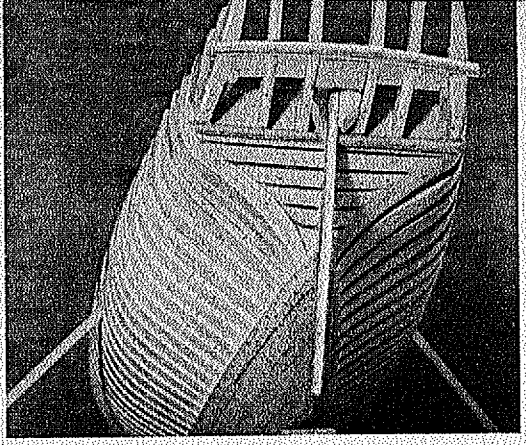


Main deck planked. Note area left open to show construction and permit examination of hull interior.

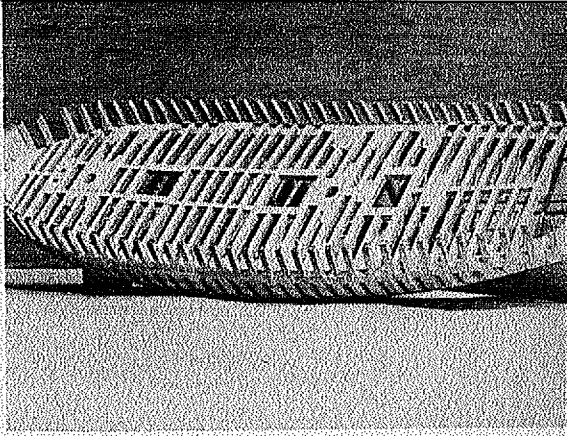
Along the center of the board nail a pine batten about 1x1 in. This batten serves as a keel track and supports and temporarily stiffens the keel. Pencil the centerline on the keel track and glue on four sets of chocks to prevent sideways movement of the keel. Also set two half pins in the centerline with their exposed points projecting upward for ¼ in. to prevent fore and aft movement of the keel when it is pressed down over the pin points and between the chocks. At each extreme end of the keel track fasten a vertical strut. One side of each strut must be precisely on centerline. The upper ends of these struts are to support an upper centerline thread which affords means of easily checking the trueness of the structure as the work proceeds. The struts should be long enough for the centerline thread to clear the hull. Instead of tying the thread ends to the strut ends it is better to glue a cleat to each strut head and lay the thread in the vees formed by cleats and struts. Each end of the thread is weighted to keep it taut. With this method we build our hull between an upper and lower centerline. The lower centerline is on the keel track which is rigid and is connected to the keel. The upper line is clear of the ship entirely and will at once show up any misalignment of the frames in plan view or any tendency of the hull to twist.

The model is kept in place on the building board until it is completely framed and ready for fairing of the inside and outside of the frames preparatory to ceiling and planking. Even as this work progresses it will be well to occasionally return the hull to its building site for checking for misalignment.

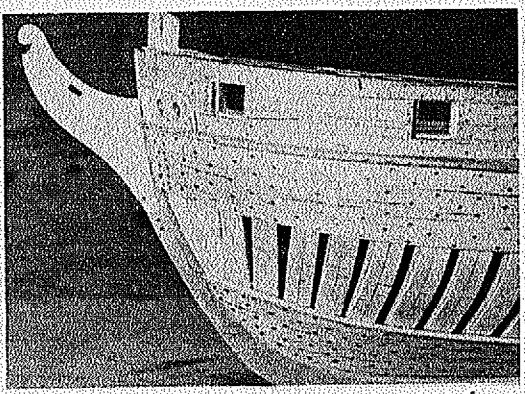
The fastenings used are treenails or hard wood pegs, common pins of various sizes and waterproof cement or glue. The treenails are hardwood dowels, a scant $\frac{1}{16}$ in. in diameter, several inches long to be cut off



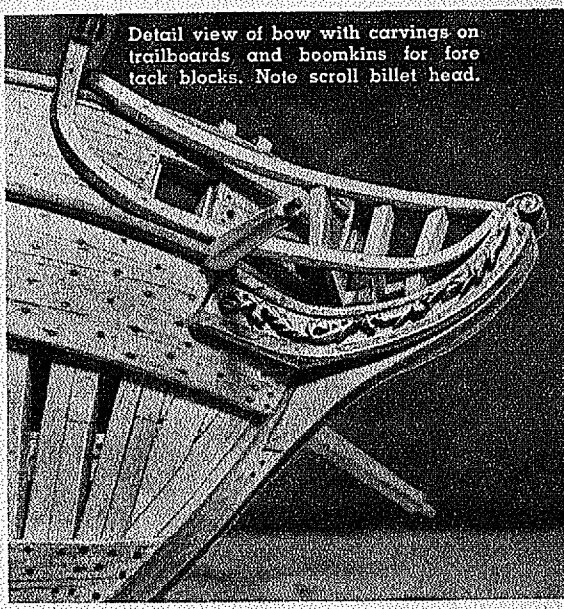
Here is stern view of The Lexington indicating timbering of outer transom and also the rudder port.



Mast partners, quarter knees and lodge knees in place. Hanging knees are under strong beams.



Knee of head, hawse pads, topside planking completed. Two fastenings in each plank at each frame.

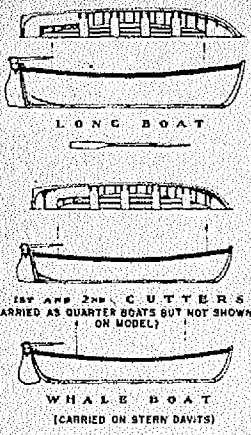


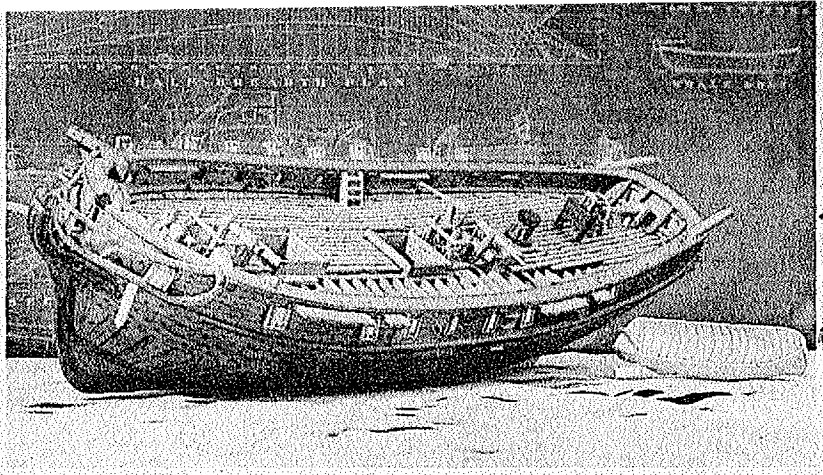
Detail view of bow with carvings on trailboards and boomkins for fore tack blocks. Note scroll billet head.

as each is used. If dowels of the proper diameter are not available, wood applicator sticks can be procured from the drug store and reduced in diameter by pulling through successively smaller holes in a thin brass or steel plate. Four or five passes may be needed and each pass removes a thin shaving all around for the length of the stick. The same method can be used to remove the taper from round toothpicks in the event that it is more convenient to use these as raw material. Treenails are used for fastening the futtocks and floors when assembling them into frames, for fastening the heels of half and cant frames to the deadwood and for securing the deck planking to the deck beams and carlings.

The heads of all pin fastenings are to be cut off and the projecting part of the shank filed off smooth. A diesinker's flat file will be useful, due to its flexibility, when working on the old ceiling which has a concave curve. Steel pins are generally more

Stern view of rudder carving, stern chaser ports and whale boat davits.





Topsail bitts, pumps, capstan, binnacle, wheel and tiller are now installed. Long boat under construction. Fitting out now well advanced.

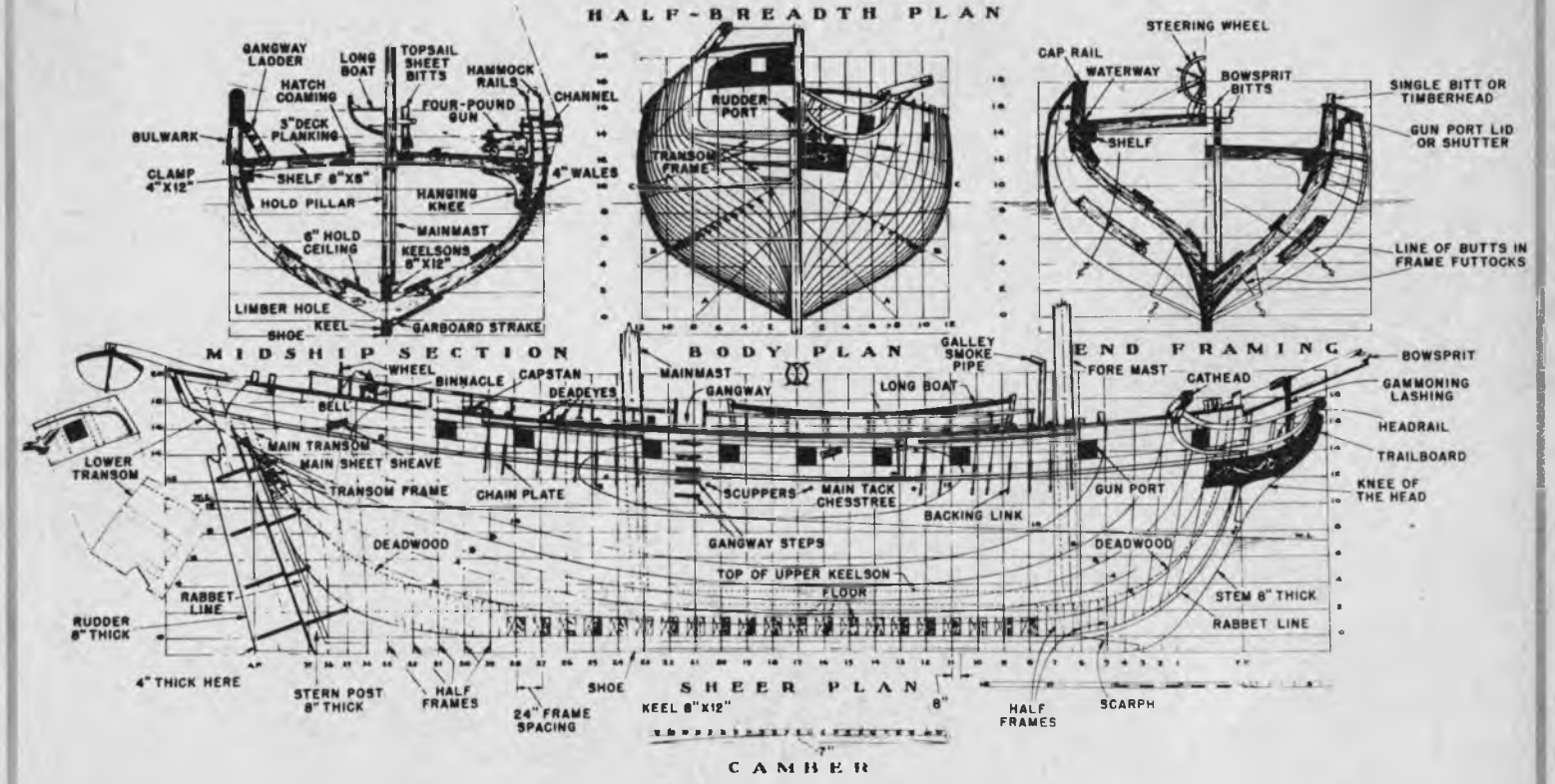
satisfactory than brass as the former are less likely to bend when being pushed into place. Where possible holes should be drilled for pin fastenings. This is not feasible when planking as the pins must be put in quickly before the glue has an opportunity to dry. As a general rule pin fastenings should be inserted at an angle to improve their holding power. This is most important for outside planking and inside ceiling as otherwise the planks will tend to spring away from the frames before the glue has set.

In addition to fastening by pins and treenails, practically all joints were glued as well. Cement of the model airplane variety was used with excellent results although Cascamite or some similar preparation might have been stronger if less convenient to use. If model airplane cement is used both surfaces of the wood must be well primed before finally making up the joint.

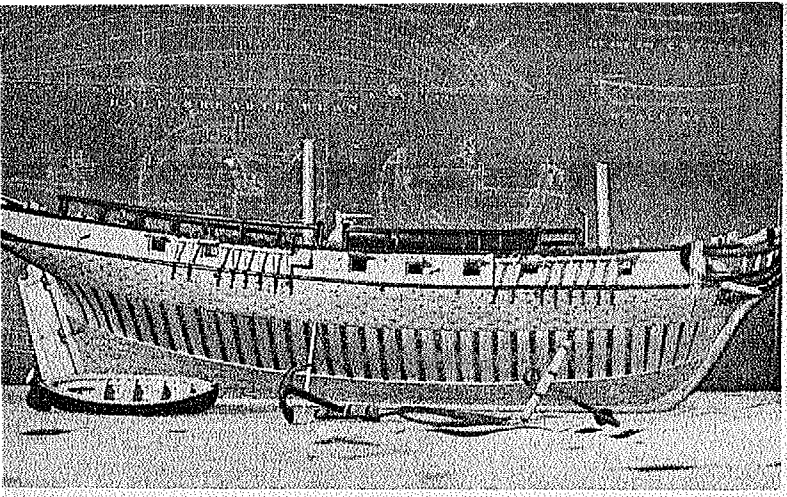
The fabrication and assembly of the frames may be started at any time, before the laying of the keel, if desired. A small amount of stock is to be left on the heels of the half frames and a more generous quantity of extra material on the heels of the cant frames at the ends of the ship. The amidships frame, number 17, should be made first. Like all of the full frames it is made up of seven pieces, one floor which rests horizontally on the keel and six futtocks, three on each side. As this frame is at the middle of the ship there is no bevel to consider.

The shape of each of the seven parts is to be pricked off through the plan onto wood of 8 inch scale thickness. The grain of the wood should run, on the average, with the mean line of the floor or futtock. The members are then sawed roughly to shape and finished with a knife. A little extra material should be left on the inside and outside edges, additional filing and scraping will be needed to fair the frames after they are in the ship, and about ¼ in. extra length should remain at the heads of the futtocks in way of the main deck and main rail or bulwark cap. The pieces are then to be assembled over the drawing to verify that the butts will fit tightly without gaps. It will probably be necessary to do a little filing here and there. After the shape of each of the seven pieces has been checked and rechecked they may be glued together, still working over the drawing to insure that the shape of the assembled frame will conform to the plan. After the glue is dry, drill for the treenails, coat same with glue and push into place. Cut the projecting ends off flush and then rub both sides of the frame on a piece of sandpaper laid on a smooth surface to remove any irregularities. Mark with pencil on the outside of the frame the designed heights of main deck and main rail.

Having completed the amidships frame, the remaining full frames are to be constructed, working each way from midships. The method is the same and a little stock is to be left inside and outside as well as at the tops (about ¼ in.) of the second and third futtocks. Clear of amidships we get into the beveled frames. A little extra attention in pricking through the paper to outline the shape of the floors and futtocks is needed here. As noted above, the frame line, it is actually a plane, transversely divides the completed frame which extends for equal distances forward and aft of the frame line. If we consider a forward frame, the timbers forming the forward half must be relatively V shaped to suit the inward curve of the hull. Aft of the frame line



• 16 GUN BRIG LEXINGTON • SCALE 1/4" • 1 FOOT • DRAWN BY CLYDE M. LEAVITT



Ship painted. Broken off bow sprit and masts seen in place. The anchors and whaleboat in foreground.

the hull is fuller and consequently this half of the frame tends more to the U shape. As for the outside, the inside of the hull is to be partially planked and therefore the bevels must be accurately reproduced on the insides of the frames. Having cut out the floor and the six futtocks for a beveled full frame, the parts are glued together over the frame plan. Owing to the inward curvature of the hull toward the ends, the assembled frame will be stepped on its inner and outer surfaces. After the glue is dry the two high corners or edges on each side are carefully carved away, checking against the plan as the work progresses.

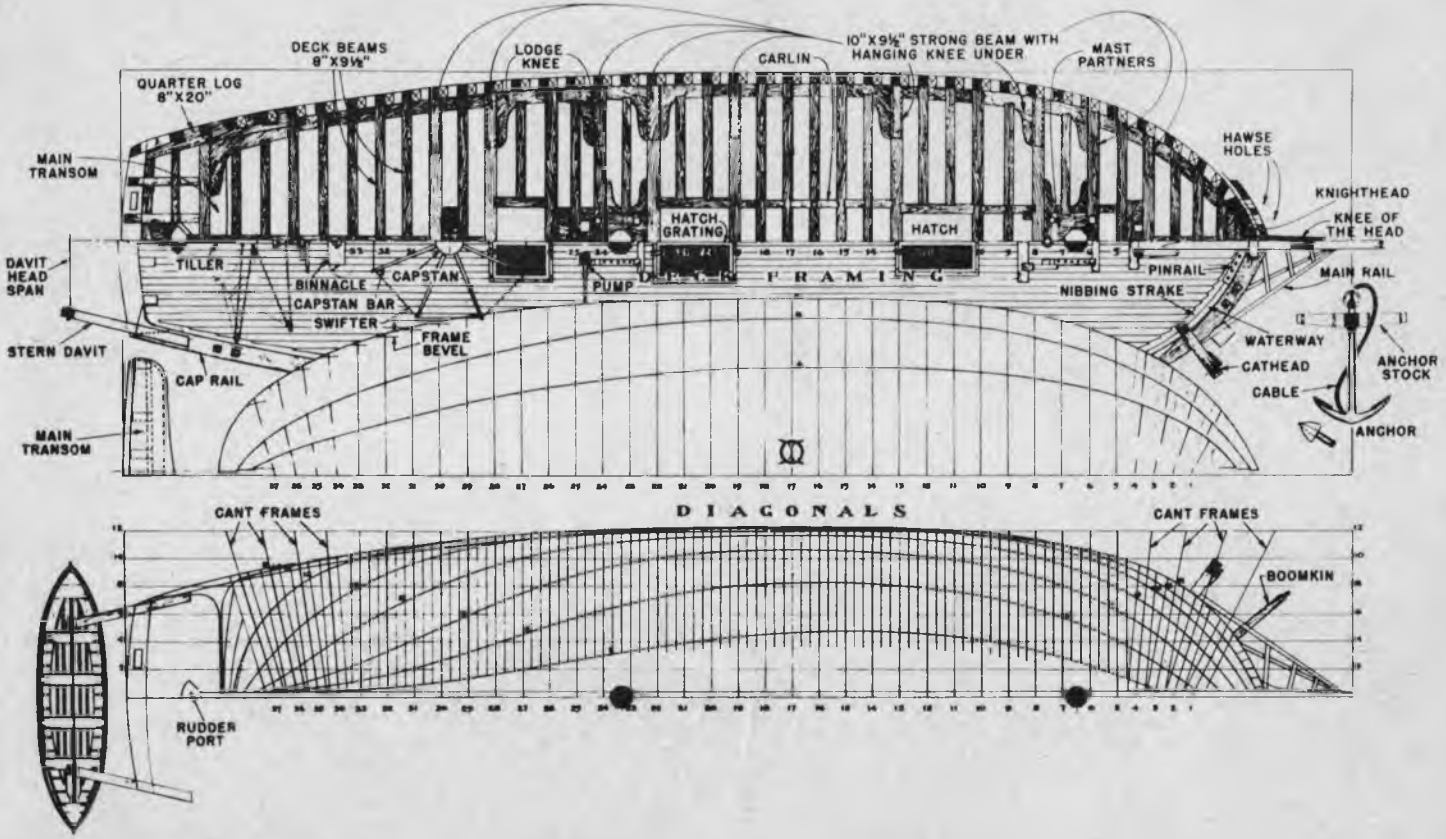
The frame is now to be treenailed, this operation having been delayed so that the treenails will not run through any of the high corners which we have just removed. The half and cant frames are similar but have no floor across the keel as their heels fay against the deadwood and are glued and treenailed in place. For easy identification each completed frame should be numbered in pencil on some part that will be eventually concealed. Having constructed all of the frames, it will be of interest to arrange them, except for the cants, in consecutive order in a stack and note how they will form the shape of the hull. To hold the heads of the full frames in their proper relative position temporary across spalls or battens, about $\frac{3}{16}$ in. by $\frac{1}{8}$ in. are pinned between port and starboard frame heads. Each cross spall is to have pencilled on it the centerline and half-breadth. The spalls should be placed just above the heads of the second futtocks and be pinned to the third futtock. In this position they will resemble deck beams.

With the keel in place on the keel track the frames may now be erected. Each is glued to the top of the keel at the proper center to center spacing of 24 inches and is further secured by a stout pin pushed vertically through the floor into the keel. As each frame is erected it is checked with scale and triangle to see that it is exactly perpendicular to keel in side elevation, that its plane is normal to centerline of ship in plan view and that the centerline mark on the cross spall lines up with the centerline sighting thread and the centerline of the top of the keel. It should also be verified that the port and starboard marks locating the underside of main deck are the same distance above the base board.

Following erection of all of the full frames the keelsons should be installed and fastened with long pins going right through keelsons and frames and into the keel. One such fastening is to be placed at each frame and with the pin already located at each floor provides a double fastening of each complete frame to the keel. When all of the full frames have been erected it will be found that the assembly is quite flexible. To temporarily reinforce and align the structure two sets of light battens are installed on each side. Each set consists of a batten inside the hull with another batten parallel to it and outside the hull. The upper sets of battens are fitted a little below the deck edge and the lower sets are located about halfway between deck edge and keel.

Now that we have the full frames temporarily reinforced and lined up the next step is to permanently join their heads together, at main deck level, so they will have sufficient rigidity while smoothing and fairing inside and out. The distance between the forward face of one frame and the after face of the next frame forward is the same as the thickness of the wood used to cut the floors and frame futtocks, namely 8 in. scale.

After fairing of the interior the shelves, clamps and ceiling below main deck are


DECK BEAMS
8"X9½"
LODGE
KNEE
CARLIN
10"X9½" STRONG BEAM WITH
HANGING KNEE UNDER
MAST
PARTNERS
QUARTER LOG
8"X20"
HAWSE
HOLES
MAIN
TRANSOM
KNIGHTHEAD
KNEE OF
THE HEAD
HATCH
GRATING
HATCH
DAVIT
HEAD
SPAN
TILLER
BINNACLE
CAPSTAN
PUMP
FRAMING
PINRAIL
MAIN RAIL
CAPSTAN BAR
SWIFTER
NIBBING STRAKE
FRAME
BEVEL
WATERWAY
STERN DAVIT
CAP RAIL
CATHEAD
ANCHOR
STOCK
CABLE
MAIN
TRANSOM
ANCHOR
DIAGONALS
CANT FRAMES
CANT FRAMES
BOOMKIN
RUDDER
PORT

installed, being both glued and pinned. In a full sized vessel the various longitudinal members on the inside of the frames would be fitted in two or more lengths to facilitate working and handling and also due to the impracticability of securing sufficiently long single pieces. In the model it is as well to use full length pieces for added strength.

If butts are desired, they can be represented by scoring across the member after installation. In cutting out the planking or ceiling it must be borne in mind that the girth of the hull at the ends is less than the mid-girth and that therefore the planks must be tapered toward their ends so that there would be just room for all of the planks if the inside of the ship were to be completely ceiled or closed in.

The first step in outside planking is to cut the rabbets in keel, stem and stern frame to receive the garboard strake. Then file and sand the outside of the frames to a smooth, fair surface. As for the inner planking, use a thin batten to verify that there are no humps or hollows before you start with the planking. Similarly to the inside work, each exterior plank was made in one length and was pinned and glued in place.

The main deck beams are of two sizes as shown by the plans. The top and bottom surfaces of the beams are beveled to suit the sheer of the deck and in the other direction the beams are cambered or arched. The top surfaces of the beams must be filed and sanded into a fair surface before the deck planking is laid. Before proceeding with the deck planking the numerous horizontal or lodge knees the vertical or hanging knees must be cut out, fitted and pinned and glued in place.

The hanging knees which go underneath the deck beams are put in first. Forward and aft their inner edges should be beveled to the curvature of the side for appearance sake. A few of the regular deck beams should be left out in way of each main beam under which a hanging knee is fitted to provide better access.

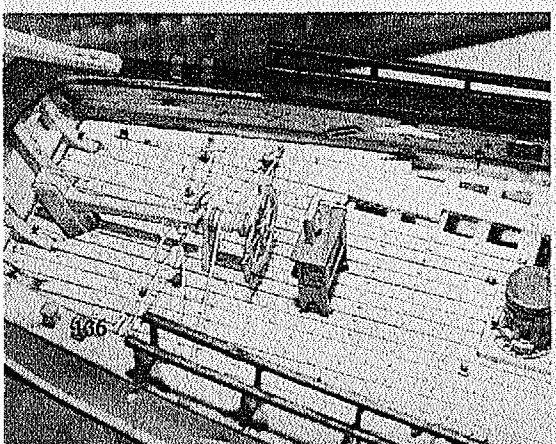
The main deck planking is carried out as for the lower deck, starting at the center line and working outboard. This being a weather deck, however, we must represent the paying of the seams. The melted tar used in a real ship is represented by rubbing the edge of each plank before installation with a large pellet of black roofing compound or similar composition that has partially dried.

As the entire exposed surface of the model is to be coated with boiled linseed oil as a preservative it is necessary that a seam compound be selected that will not readily dissolve in the oil. This should be tested in advance to insure that no dissolved paying will be carried along the grain of the planks by the linseed oil. Immediately inboard of the waterway a nibbing stake is installed to take the ends of the deck planks. A parallel sided strip cut to the proper curvature, in short lengths forward, is fitted and the triangular cut out made to suit the end of each plank as it is laid.

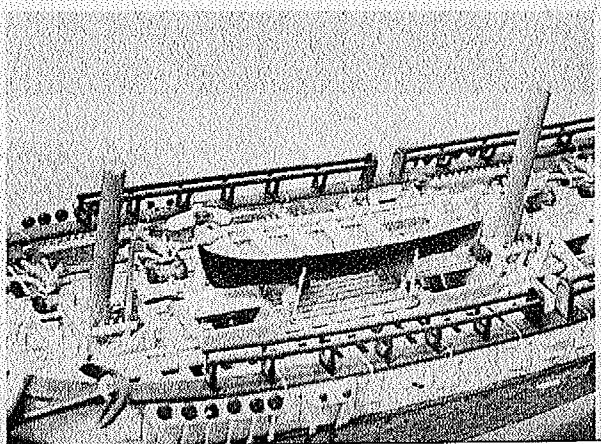
Several types of fittings were purchased from model supply houses. Material bought included brass sheaves for use in the wood shelled blocks and elsewhere, anchor castings, brass gun barrels, gun carriages, small blocks without sheaves for the many gun tackles, deadeyes and chain backing links. The wooden block sheaves would be more technically correct if available.

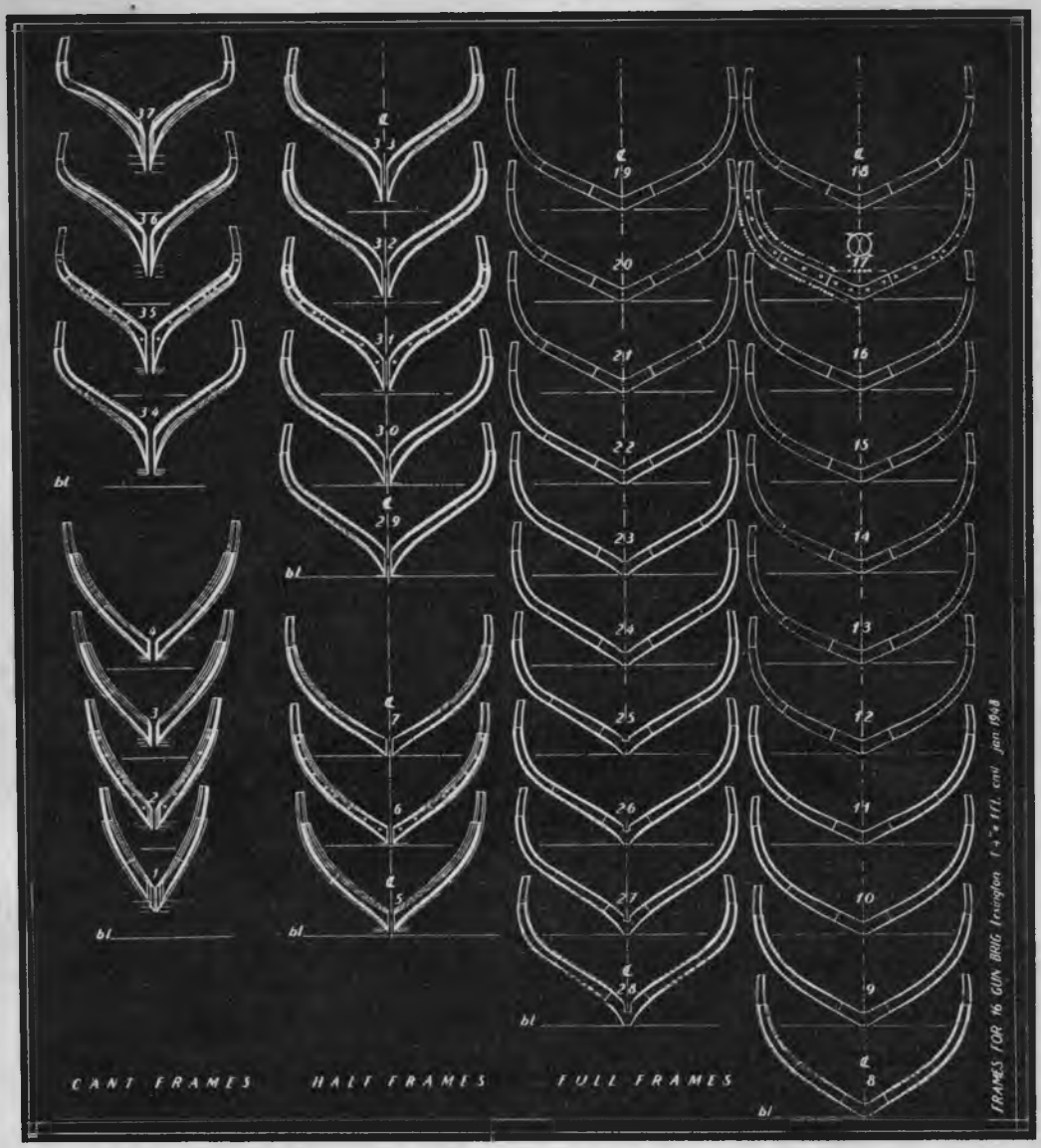
With construction practically complete the entire model was coated inside and out with a minimum of two coats of boiled linseed oil to add color and to act as a preservative. An artist's air brush was used for spraying the oil between planking and hold ceiling and into the interior of the hull. Possibly a more thorough job could have been done by total immersion in a bucket of oil but it was feared that

Quarter deck view. Note working blocks in tiller tackles. Capstan has circular rack, working pawls.



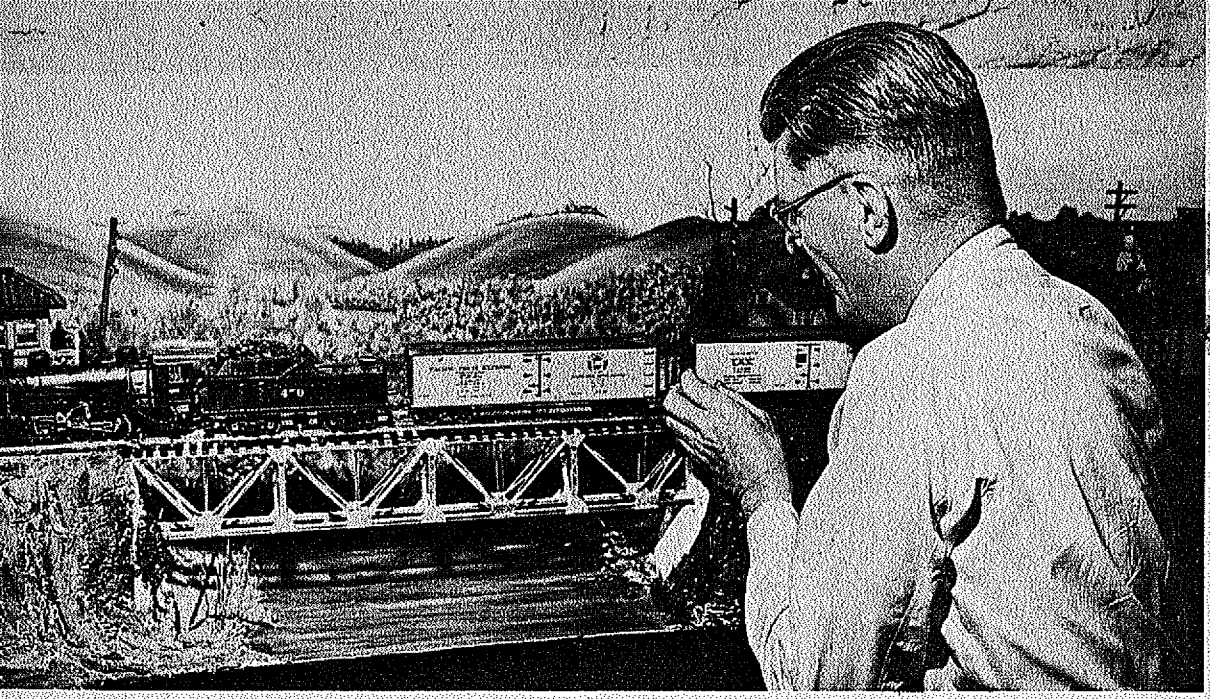
Battery, long boat, hatch gratings and deadeyes installed. Note gripe lashings to secure long boat.





Drawing above is reduced from original plans. Take dimensions from body plan with scale on Page 133.

complete drainage would have been difficult. The model could well have been left in this condition but to add a touch of color the outsides of the bulwarks were painted chrome yellow with just a trace of orange added, the gun carriages and the insides of the gun port lids were painted bright red while the acanthus leaf carvings on the trail boards forward and the eagle on the stern were glided. The hammock rails, main rail, rub strake, transom, trail boards and exteriors of boats were painted black. •



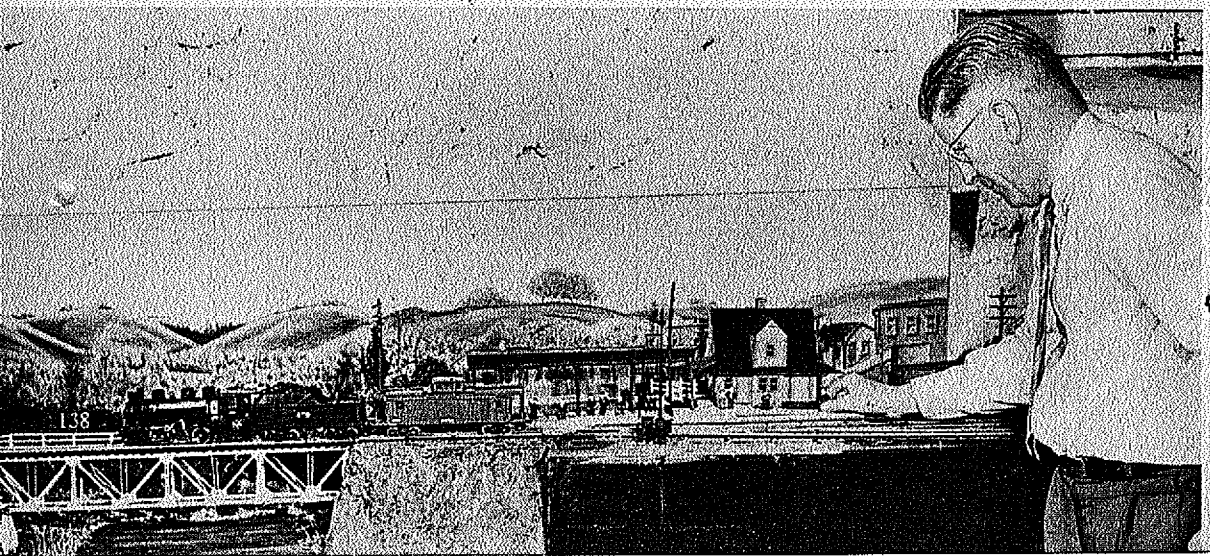
O-Gauge Truss Bridge

By William F. Crosby

Below: The bridge installed on the "main line" of the Southern Westchester RR. Abutments are made of hardware cloth covered with plaster.

THERE'S nothing like a well-detailed bridge to give your layout a touch of realism and also give you a chance to work in some interesting details. This one is a scale model of the single-track truss bridges that are used on big roads throughout the country. It is light but strong and actually supports the rails and rolling stock without being dependent on any supports other than the abutments at either end.

The construction of the bridge is quite simple with small brass channel used for the girders and sheet tin bent to form the diagonal sway bracing.

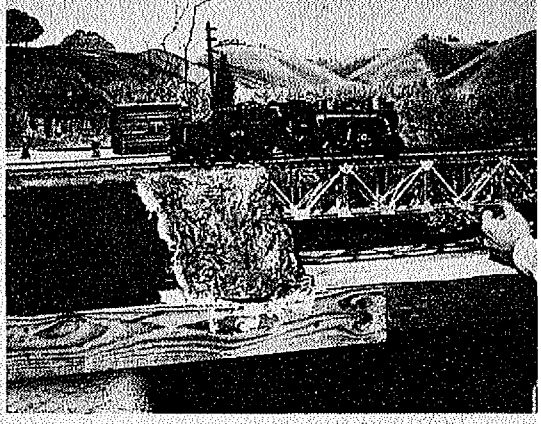


Your first step is to cut the channel to length for the stringers, cross pieces and uprights. Clean the brass with sandpaper where it will be soldered and then tack the long stringers to the bench at the right spacing. Next, insert the cross pieces and solder them in place, repeating the process for the uprights.

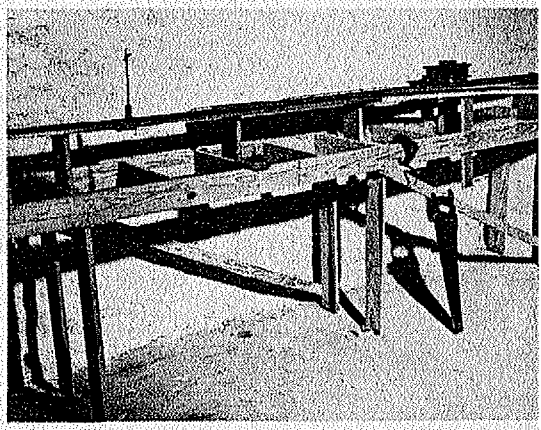
The diagonal braces are made next. You can cut old tin cans in ¼ in. strips for these, hammering them over in a vise to form the angles. Solder the diagonals to the span, both top and bottom, and then add the plates at each end. When they're in, cut the sway braces from one piece of tin and solder them in place. The uprights are made of copper wire soldered to the stringers. At this point, you can assemble the track, laying the ties on the bench and spiking the rails to them. Cut the spikes off underneath and then add the guard rails, making them 3 in. longer than the actual track. To fasten it to the bridge, twist copper wire around the cross pieces and over the guard rail at a few spots.

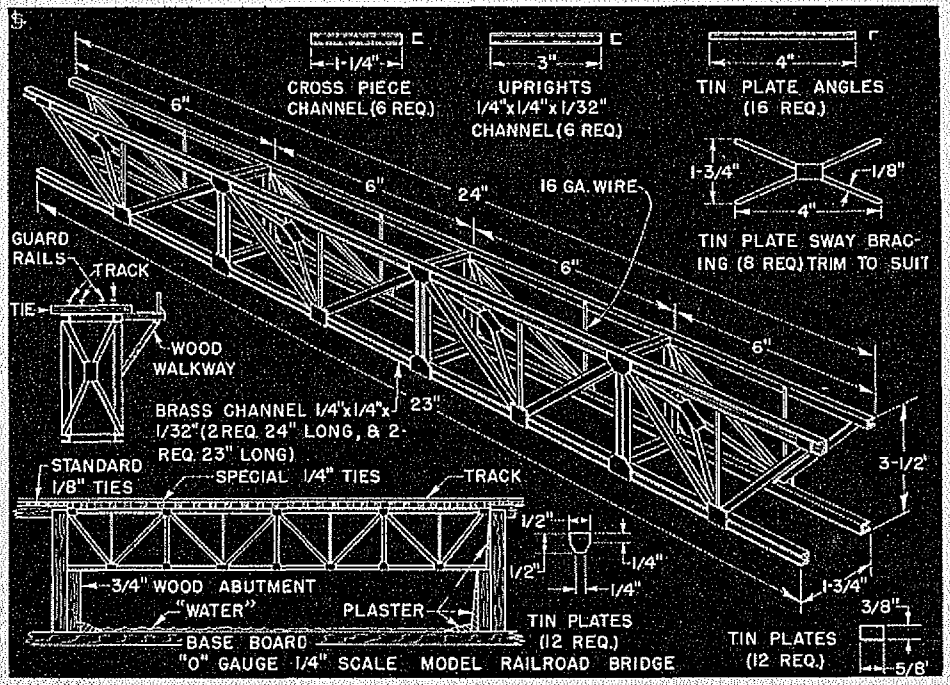
You can now make the wood abutments, nail them securely to the baseboard and cover them with plaster to simulate concrete. Don't fasten the bridge down, just rest it in place and spike the overhanging guard rails to the regular ties on either side.

To complete the installation, make fills and grades on each side of the abutment, using old screen cloth covered with plaster and painted with mottled blue, green and black show card colors. Paint a piece of cardboard with blue, light green and white colors for the "water" and make the shore line from painted plaster, fringed with sand and trimmed with dead trees and swamp grass made from broom straws. You can make trees from twigs and green cotton or buy them from a model railroad supply store. •



Above: Bridge in place with abutment and fill partly covered with plaster and painted. Landscape is painted cardboard backdrop. Below: Framing for roadbed is made of 1 by 4 in. shelving, securely nailed and well braced. Note start of spur track to the right.





Radio Control For All

[*Continued from page* 21]

placed on edge and cemented to the fronts of the ribs. When dry, make and add the false or half ribs. These provide greater strength at less weight than sheeting over the edge forward of the front spar.

The wing tips are made by running $\frac{3}{32}$ in. soft sheet chordwise then, when dry, adding a second ply underneath from $\frac{3}{32}$ in. sheet with the grain spanwise. One-quarter inch thick edging is cemented around the outlines of the tips and the whole is sanded to shape. The plans and details show various pieces making up the tip.

The center section is not sheeted until the two panels have been joined. The spars butt join, then are faced front and back with $\frac{1}{8}$-in. plywood. The $\frac{1}{16}$ in. center section sheeting has spanwise grain, butt joins along the center rib of the wing. This rib, incidentally, is cut out to suit the various joiners before cementing in place.

Covering: Sand the entire plane, rounding edges, etc., as necessary. Wet covering with nylon is recommended. Coat the framework with dope wherever covering is to attach. Let dry. Wet the nylon to be applied and lay it over the part to be covered. Use a mixture of dope and cement (half and half) to apply the edges of the material.

The finished covering is given six coats of clear dope cut half and half with thinner. If solid painting won't be used, finish with a coat of full strength dope. For painting, mix your colored dope half and half with thinner and apply three coats minimum. Fuel proof dope can be used, or fuel proofer added over finish.

Flying: Hand glide the ship without radio, batteries or prop. Run swiftly about a half dozen steps and launch the ship on the run, the nose pointed *down* slightly. If the ship dives repeatedly raise the leading edge of the wing, or lower the leading edge of the stabilizer. It will not stall if built as shown unless launched too violently or with nose high. Try short power flights with 15 seconds motor run, plug intake and run rich. If power isn't enough to get airborne, lean mixture slightly. Minimum power flights will enable a check on trim without crackups. Add the radio batteries and make additional power check flights. Finally add the radio. (The MacNabb radio is almost indestructible.)

The idea is to obtain straight flight, both under power and in the glide. Climb should be shallow angle, never hanging on the prop. If turns are too abrupt decrease movement of the rudder linkage, or remove some of the rudder area. •

Starting Model Building

[*Continued from page* 5]

wear well.) In the smaller engines consider the cost and whether or not you get a tank and propeller, or such items as a clip-on attachment for attaching the battery wires to the glow plug. In some cases an engine kit is available at a saving; these are easy to put together and require no machine or tool work, other than using a screw driver or wrenches that come with the kit. The best way to learn the merits of an engine before buying it is to talk with other model builders.

Engine Operation and Fuel: Practically all engines today utilize a glow plug, rather than a spark plug, and require no ignition system. This is entirely true of the smaller engines. The glow plug contains a small wire that glows red hot inside the cylinder when you connect your booster batteries to the plug. After the engine is started and running, the batteries are disconnected from the plug before the added heat of running can burn out the plug wire. Batteries, incidentally, should be two No. 6 or doorbell dry-cell batteries, obtainable for *approximately* 75c apiece at any hardware store. All glow engines operate on special glow fuel. This fuel comes in convenient cans, costing the better part of a dollar. Price varies somewhat, depending on whether the fuel is for sport or for the maximum contest performance. •

Engine Survey

[*Continued from page* 6]

larger classifications are accounted for by the fact that official contest rules divide displacements into classes and it is customary to use the largest displacement in each class for competition work, such as .49s and .60s. Radio models work well with anything from a .074 to .29 as a rule, depending on weight to be carried.

While it is true that you get what you pay for and that, therefore, a $10 engine won't give the same performance of a similarly sized $20 engine, you should exercise care in evaluating competitive powerplants in the same price bracket. If two engines cost the same and are otherwise equal, the one with the ball thrust bearing has the edge. You will note that the super speed motors, like the McCoys and Doolings, have ringed pistons and rear venturis. Longer strokes usually mean more power at lower r.p.m., good for free flight, while short stroke engines will turn up more for U-control. The all round engine has a bore and stroke that are approximately or actually equal. Note long stroke on Cameron 23 and short stroke on the Doolings, as examples. •

Glider Pick-up

[*Continued from page* 25]

must be exactly as shown, and wing and tail surfaces must be set at 0° incidence. Weight should be about 8 ounces. The lengths of the Dihedral Tow Bar and its relationship to the center of gravity should be closely maintained.

In the air you may find that the glider will tow in a bank considerably greater than the tow plane. This results from the stability of the glider, which assumes a true bank for the rate of turn and speed involved. The tow plane of course, does not bank at the true angle because of the line guide on the wing. In the interest of realism, to make the glider bank more closely approximate that of the tow plane, the bridle on the tow bar should be offset toward the inside of the circle, that is, the inside line should be an inch or so shorter than the outside line.

In preparing for a snatch pick-up, the poles should be spaced as shown in the photographs. Place the loop on the poles and line up the glider not more than three feet behind the poles. Center the tow plane in front of the poles and reel out your control lines. Mark the exact length of your control lines away from the center of the pick-up station with a stake or plate. Your control handle must be over this spot when snatching the glider, otherwise you are likely to fly into a pole.

Check your two-speed control in the first few laps with plenty of altitude. In approaching for the snatch, put engine in low speed and gradually lose altitude until the plane is flying just above the ground station. You will probably take a few laps to settle down to judging the plane's height accurately. Watch the plane shadow on the ground as you pass the ground station. When you are set, be sure your handle will pass over the center marker and then fly up to the ground station and switch to high speed as you hit the station and climb the tow plane sharply to get the glider into the air cleanly. As the slack in the loop and Unolyn acceleration is used up you will feel a good tug on the tow plane, this is the most critical time of the pick-up, and you should maintain a shallow climb until the tow plane gains normal speed. •

Full size plans are available. Send 50c to MODEL BUILDERS' Plans Service, Fawcett Building, Greenwich, Conn. Specify Plan No. 427.

"Slick" Float Plane

[*Continued from page* 91]

After the final coat of dope, the cockpit canopy is added. Bend heavy copper wire to the shape shown on the plan and cement the ends into the cockpit floor. The windshield is shaped by first pinning a piece of celluloid in place and then trimming the edges. Black or silver cellulose tape around the "greenhouse" as shown improves the appearance.

When installing your engine remove the upper cowl, mark off the needle valve position and cut a clearance hole. Also cut out a section for the air inlet, which also doubles as oil drain. An extension on the intake tube through bottom of the cowl makes it possible to choke your engine with your finger.

Because the engine is completely cowled in, it will be necessary to provide an extension on the tank filler and a vent line. Arden exhaust stacks will insure the expulsion of most of the oil from the exhaust. To add the finishing touch to the nose, a 3 in. diameter Mite aluminum spinner is marked off, cut, and filed to receive a 10 in. diameter 6 or 8 in. pitch propeller. Best results were obtained using a Flo-Torque 10 in. diameter 6 in. pitch prop. To mount the floats, insert strut ends into maple strut sockets and loop rubber bands around struts and axle ends. This type mounting is flexible enough to absorb the shock of "dry landings" and will also facilitate easy removal of floats for minor repairs.

Your Slick should balance at the main spar. The weight of the model should not exceed 16 ounces with an .099 engine. At this weight, the take off run is fairly short and the glide fast and flat.

Test flight procedure is really not needed since, with this rugged little ship, there is plenty of time to find out what adjustments are best. Until you are sure of the flight characteristics, remain a considerable distance from shore, docks or other boats. Taxi tests, to familiarize yourself with the surface characteristics, can be run at half throttle. For take off, launch ship crosswind, or have quartering wind from left wing tip. The normal torque circle will bring her about into the wind as she leaves the surface. With the Arden engine, the tank was sufficiently small to limit the possibilities of the model flying away. However, installation of a flight timer and adjusting it for fifteen or twenty seconds will make flying in a slight breeze easier. You won't have to row so far!

After enjoying a fast take off, sharp climb, flat glide and gentle landing, all of which happens to make up a typical flight, you'll probably wonder why you waited this long before switching to floats! •

Hughes Racer

[*Continued from page* 49]

The wing is made extra sturdy to take landing shocks. Make the spar of ¼ in. bass or pine. Use ⅛ in. plywood for the landing gear spar and $\frac{1}{16}$ in. plywood for the spar gusset. Notice that Ribs 1-A and 3 are made of ⅛ in. plywood and that all others are $\frac{1}{16}$ in. (or $\frac{3}{32}$ in.) hard balsa. The leading edge is cut from hard ½ in. sheet balsa tapered as shown on the plans. The trailing edge is ¼ in. sheet hard balsa.

The following wing construction procedure should be adhered to so that you can build this tapered wing with a minimum of difficulty. First pin the ribs down over the plans for half of the wing at the angle indicated in the front view. Omit Rib 1 at this time; it will be added later. Next, cement the spar in place. Carve the leading and trailing edge to rough shape and cement in place. Repeat this procedure for the other half. When thoroughly dry the panels can be removed from the plan and joined at the proper dihedral angle with the leading gear spar and the spar gusset. The landing gear can now be installed. Wrap and stitch securely with fishline where indicated and use plenty of cement.

Each landing gear strut is made of one piece of ⅛ in. diameter music wire. Bend the struts in a vise and check the dimensions carefully after each bend. Bind the struts to the ribs and spar with fishline and cover over all with glue. Bind the struts together at the bottom with fine wire and solder. Two inch Comet sponge wheels are mounted between two washers, one soldered to the axle on each side of the wheel. Make the small landing gear cover mounts from brass or tin and solder them directly to the struts. The landing gear covers are made of $\frac{1}{32}$ in. aluminum sheet and are held in place by short $\frac{1}{16}$ in. diameter bolts. The covers and mounts may be removed for flying on rough fields.

To assemble the fuselage and wing, cut a slot across the bottom of the fuselage and wing fillets to accommodate the wing spar. Notice that the wing spar rests on the bottom of the engine mounts. Cement the wing securely in place at the incidence angle shown on the plans. This angle is the one at which the NACA 2412 flies with the highest L/D ratio. Rib 1 can now be cemented into place to aid in getting the proper angle of incidence. Cement the wood cut out of the slot in the fuselage back into place.

The wing can now be covered with hard $\frac{1}{16}$ in. balsa. The balsa may have to be steamed in order to get it to bend around the highly cambered airfoil. Mount the solid, hard balsa tips and carve to shape after the covering dries. Carve the wing fillets down to fit and then sand the entire assembly.

Bend the tail skid from $\frac{1}{16}$ in. diameter music wire and cement securely in place. A small piece of crinoline cemented in place as shown will greatly strengthen the assembly.

Mount the engine and cut out the top of the cowl to fit around the engine head. Cut any holes necessary for the needle valve and timer arm (if one is used) in the cowl. Also, cut out for intake pipe in firewall and fuselage top. Naturally the position will vary depending upon the engine used.

Make the canopy from celluloid. Acetone, used very sparingly, will fuse the windshield to the rear part of the canopy.

Paint the remainder of the inside of the fuselage and install all the ignition.

The fuel resistant finish was applied to the original airplane in the following manner: First, all holes and cracks filled with Mike-O-Fill and the entire plane dry-sanded with 320 wet-or-dry sandpaper. Then two coats of Aero Gloss undercoat were sprayed on and allowed to dry. The undercoat was sanded wet with 320 wet-or-dry sandpaper. Next, three coats of Stearman Red Aero Gloss were sprayed on and when dry were wet-sanded lightly with 400 wet-or-dry sandpaper. Final lustre was achieved with plenty of elbow grease and 600 Speedite rubbing compound. The cowl was sprayed with gold dope and then sprayed with clear Aero Gloss. License numbers were gold decals. The prototype had dark blue wing panels outboard of the fillet with the balance of the plane silver. If you are fortunate to have an electric starter it would be wise to install a Froom spinner.

With the model completed and the engine bench tested, the following points may prove helpful in test flying. Balance the plane about 1 in. behind the leading edge. Tail-heaviness is a short cut to the junk heap. The model should be tested under full power in order to insure against slack lines. The takeoff will be fast when large engines are used and care must be exercised in order to avoid a wild climb on the takeoff. Three point landings can easily be made with the high landing gear. Fly on either 52 or 75 foot lines and choose a fairly smooth spot for the test hop. After you have the "feel" you can, if necessary, limit the control plate movement by building up around the plate mount. The NACA 2412 airfoil will have a tendency to stall out suddenly rather than gradually, so the modeler must take care not to level off too high when approaching a landing. •

Build This Buick Super

[*Continued from page* 118]

various pieces. Pin and cement the sections together, taking care so the sides and top are parallel. Allow the cement to dry and then carve the exterior lines. Always use a sharp blade, cutting small slivers rather than attempt to "chop" out the body. Use plenty of sandpaper, starting first with No. ½ and finishing with 00.

Next, cut away the removable section of the floor and install the motor, battery box, wiring and rear wheels. Note that the motor is bolted to an L-shaped piece of aluminum which is attached to the ¼ in. sheet balsa bottom. The friction drive consists of a small piece of rubber tubing on one end of the motor shaft. By elongating the rear axle bearing so the weight of the car pushes the wheel against the motor shaft you have a positive drive.

The front wheels can now be mounted in place. With the aid of the drawings, form the king pins from $\frac{1}{16}$ in. wire (large paper clips will also do) and assemble. Thus, by moving the bent section of the metal tie rod in each of the notches you can set the angle of the wheels.

We're now ready to finish the exterior. Apply a coat of wood filler, sand down and then brush on a second coat. This should fill up the pores sufficiently so two or three coats of your favorite color dope will produce a smooth, metallic-like surface.

After the final coat of dope or lacquer has been applied, rub down the surface with pumice stone. Mark off the various lines for the door, hood and fenders with a blunt lead pencil. The point will not mark the surface but it will create the desired slight indenture. The front bumper, most distinguishing part of the Buick, consists of an aluminum band with wooden upright sections. The individual vertical grill units are first cut out from $\frac{3}{32}$ in. sheet balsa and then cemented in place on the aluminum bumper.

The windows are cut from black Trim-Film. This is actually a decal mounted on paper. You first cut the paper to the size of each window, then soak in water. After a half minute or so you will note the black cellophane covering will separate from the paper backing. Merely slide this covering in place over the window area.

The hub caps are chrome plated discs glued to the outside of each wheel. These may be obtained from any hardware or 5 & 10 cent store and are called chair slides.

The hookup shown in the plan is for three volts but if greater speed is desired, four penlite cells can be hooked up in series to produce six volts—and plenty of zip. •

Battery Mate

[*Continued from page* 117]

and apply wood filler. When absolutely smooth, the hatches can be cemented in place, ready for the final coloring and rubdown.

Next, mount the switch and complete all wiring. Four Eveready No. 935 cells are fitted in series into two Austin battery cases. In order to achieve proper trim, the batteries should rest as far forward in the cabin as possible. A 1x1x3¾-in. balsa block (Pc. No. 27) on the forward side of the cabin door will help press the batteries forward. The door is held in place by a pin through the hatch into it and another pin through the door and Frame 5. A sketch shows the door assembly clearly. To remove the door unit, twist one side back, slide backward slightly and lift out. The steering wheel is optional, depending on whether it is available at your local hobby shop. The same goes for the other fittings.

The windshield assembly should be almost self-explanatory. The only thing to remember is to leave the protective paper on the Plexiglas, as it is easy to draw on and can be cut away as required to act as masking when painting.

The color scheme is up to the whim of the individual hobbyist, but the original model was colored thus: hull sides—white; interior of cabin and cockpit—true blue; deck, cabin exterior, and windshield outlines—light blue (about three parts of white to one part of blue); hull bottom—bronze (or orange); boottopping strips—red. For realism, the deck fittings (cleats, chocks, and bitt) were sprayed bronze. Follow all this up with Simonize or its equivalent.

When operating the boat, it will be found that the batteries will *seemingly* run down quite rapidly, especially on a hot day. Just a few minutes rest will pep them up again. The size of circle or course the model is set on can be varied by offsetting the motor slightly. For really extended free runs, four large flashlight cells would be best, but these make the cabin very cramped. One solution is to lower the floor an inch or so. Another solution would be to use two wires (insulated, preferably rubber) to run the boat in a circle. In this way, large doorbell dry cells could be used, held by the operator. Without batteries in the hull, greater speed could be realized, plus extended runs, without waiting for the batteries to "revive." To trim the boat, weight should be added forward and aft of Frame 1. Placing the weight far forward will minimize the amount required. Lead fishing sinkers should be ideal for ballast. Put the weight as low as possible to maintain stability. •

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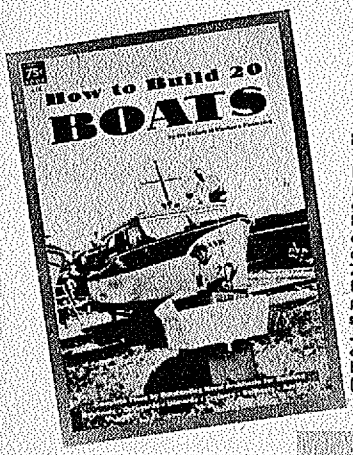

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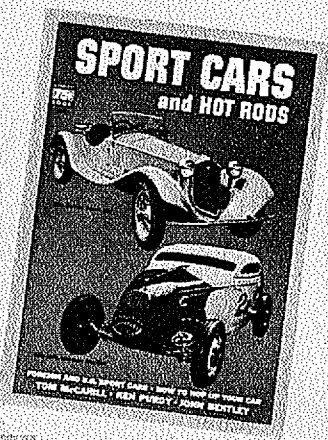

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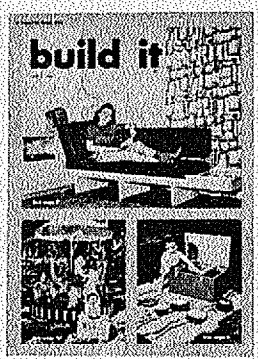

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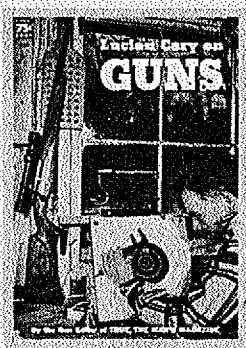

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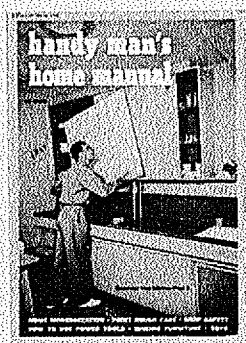

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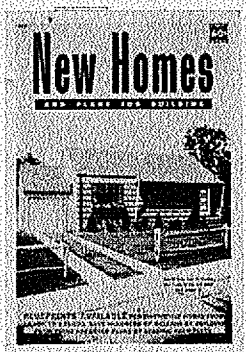

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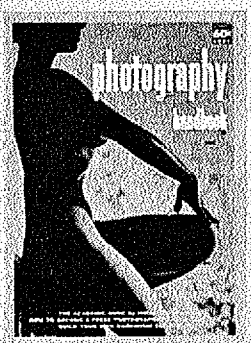

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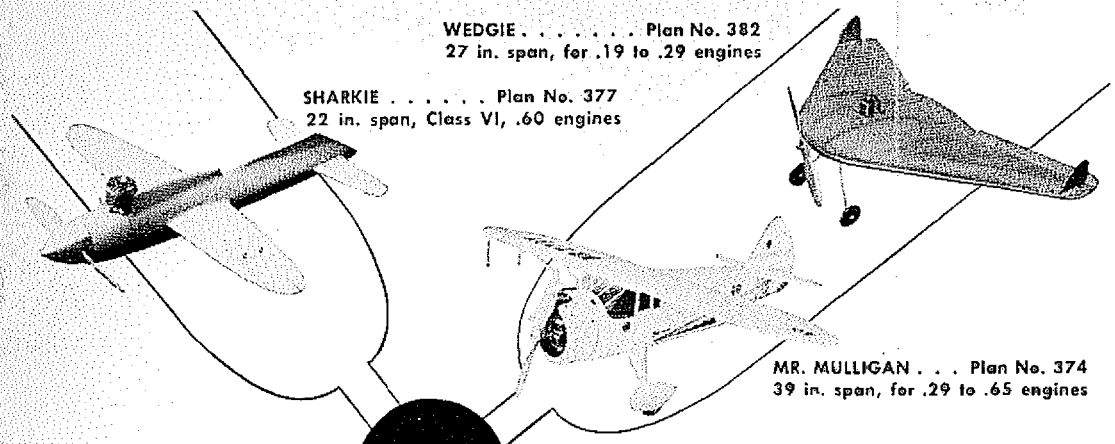

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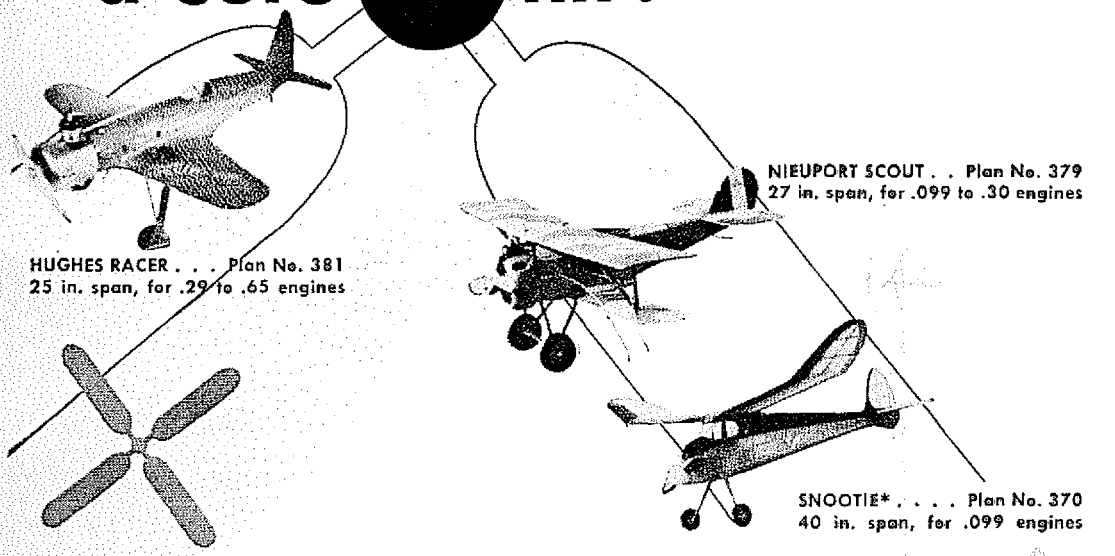

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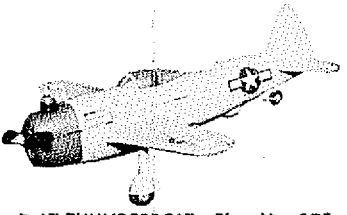

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