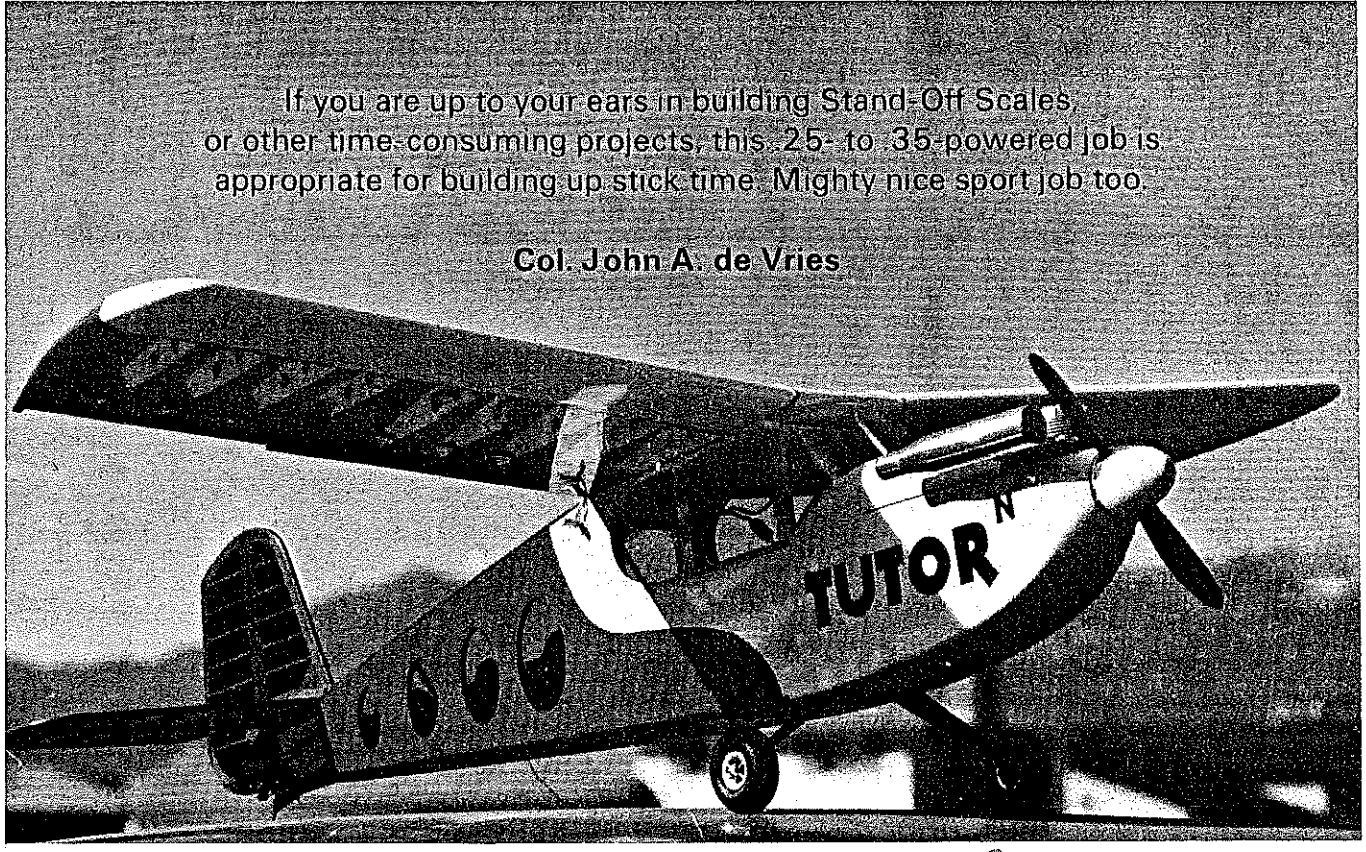
If you are up to your ears in building Stand-Off Scales, or other time-consuming projects, this .25- to .35-powered job is appropriate for building up stick time. Mighty nice sport job too.

Col. John A. de Vries



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TUTOR^n

THERE ARE, generally speaking, two kinds of RC'ers who participate in Sport-Scale contests. The first is the competent flier who builds a scale kit so that he can compete in both events at the usual Pattern/Scale contest. The other is the dedicated "scale nut," who would rather build than fly—and enters contests because, with six entrants and five prizes, he stands a good chance of taking home some loot. This latter type is satisfied if he keeps his miniature airplane in one piece—and he often leaves something to be desired as a stick-twiddler.

The Tutor^n is designed for the dedicated Stand-Off Scale Nut—to let him obtain (and maintain) his *flying proficiency* while he counts rivets, checks out exact color schemes and builds beautifully-detailed replicas. It's a quickly-built, relatively stable flying design that has many of the characteristics of the usual scale model. It's a tail-dragger, because the preponderance of scale models feature a tailwheel. It's a high-winged monoplane, because many stable scale ships have this configuration. It has a cabin as a concession to semi-realism. It can be built in about three weeks of evenings and a couple of weekends—because no true scale builder will want to dawdle over the construction of a mere trainer! It has inset ailerons since few, if any, "real" airplanes have strip ailerons. Finally, the model is comfortably mid-sized. It may be flown with a .25- to a .35-size engine yet, with its 46-in. wing, it'll fit into most cars, assembled. If you have a choice, underpower it a bit and it'll probably respond like your scale model. Incidentally, the name Tutor^n indicates a training model raised to the Nth Power. It isn't intended as a model for the absolute RC beginner. Rather, it requires flying and building abilities of a modeler with two or three successful RC birds "under his belt."

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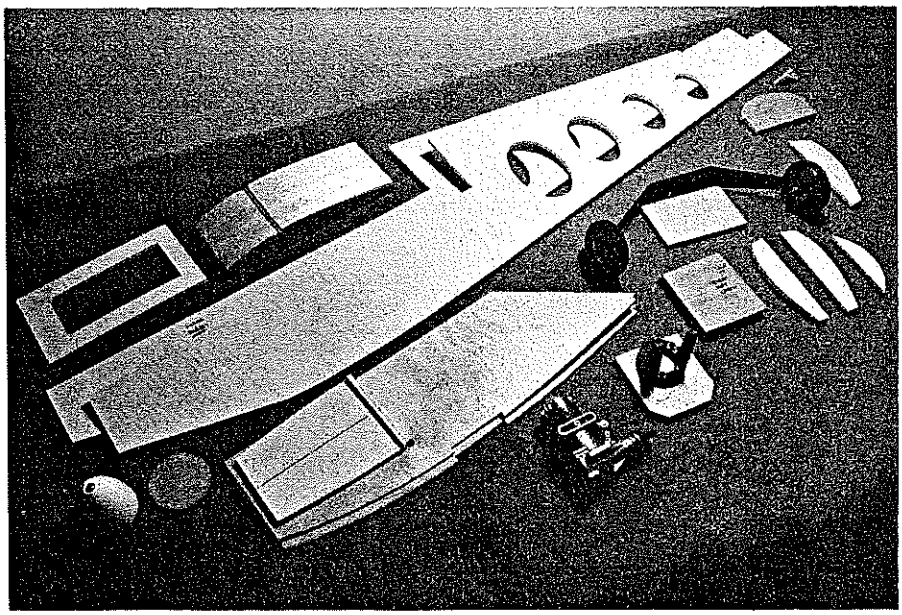
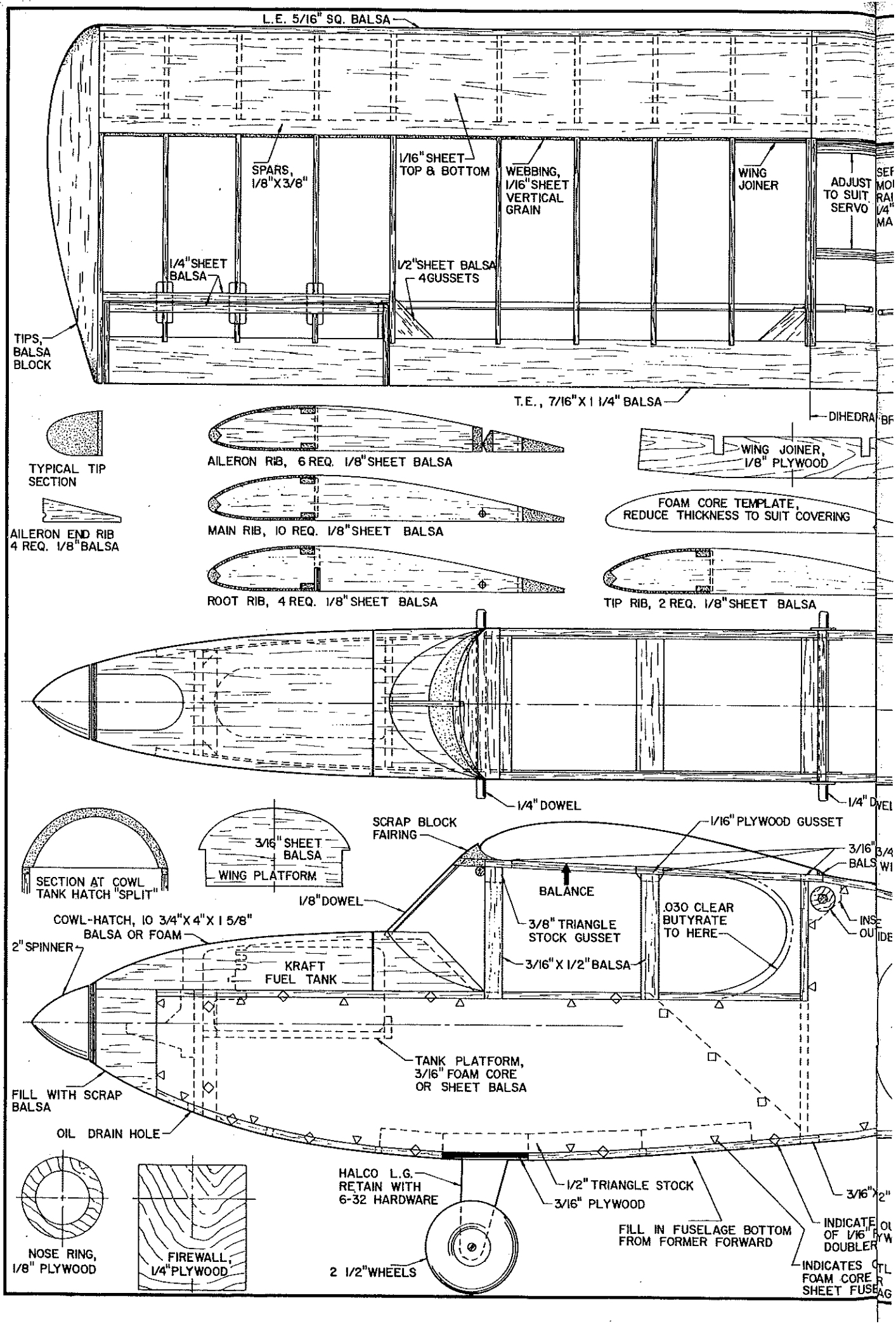
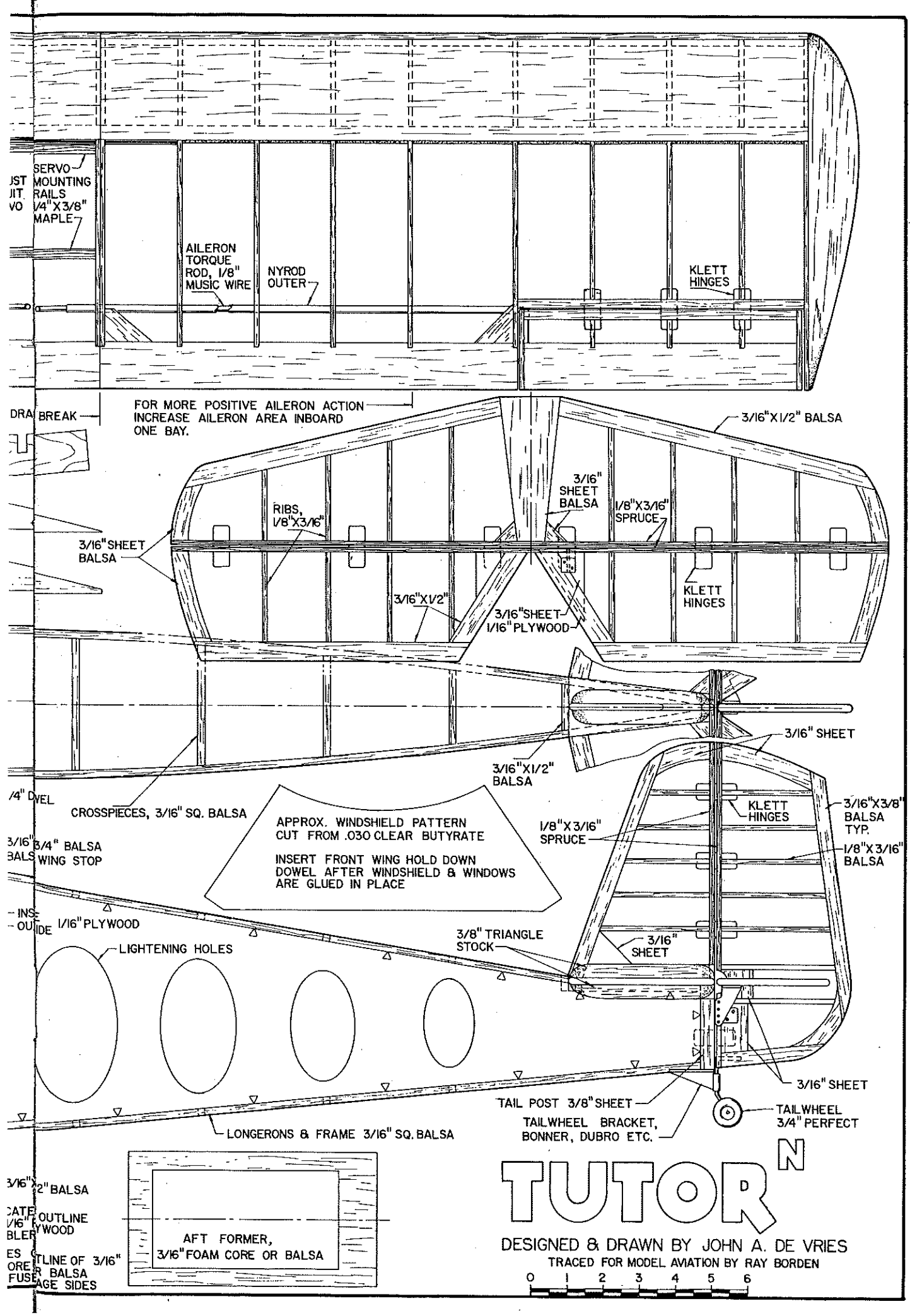


Top: Transparent Solarfilm shows off what's inside as the prototype sniffs the clear Colorado air. Tutor^n builds fast—was ready for flight less than two months after designer's pencil was first touched to paper.

The way to go with scratch-built models—pre-kit them. Bits and pieces ready for assembly. Fuel tank platform rests on 1/16" plywood fuselage doublers. Fuselage sides are foam-core, framed with 3/16" sq. balsa strips.


L.E. 5/16" SQ. BALSA
SPARS, 1/8"X3/8"
1/16" SHEET TOP & BOTTOM
WEBBING, 1/16" SHEET VERTICAL GRAIN
WING JOINER
ADJUST TO SUIT SERVO
1/4" SHEET BALSA
1/2" SHEET BALSA 4 GUSSETS
TIPS, BALSA BLOCK
T.E., 7/16"X1 1/4" BALSA
DIHEDRA
TYPICAL TIP SECTION
AILERON RIB, 6 REQ. 1/8" SHEET BALSA
WING JOINER, 1/8" PLYWOOD
FOAM CORE TEMPLATE, REDUCE THICKNESS TO SUIT COVERING
AILERON END RIB 4 REQ. 1/8" BALSA
MAIN RIB, 10 REQ. 1/8" SHEET BALSA
ROOT RIB, 4 REQ. 1/8" SHEET BALSA
TIP RIB, 2 REQ. 1/8" SHEET BALSA
1/4" DOWEL
1/4" DOWEL
SECTION AT COWL TANK HATCH "SPLIT"
3/16" SHEET BALSA WING PLATFORM
SCRAP BLOCK FAIRING
1/16" PLYWOOD GUSSET
3/16" BALSA
1/8" DOWEL
BALANCE
3/8" TRIANGLE STOCK GUSSET
.030 CLEAR BUTYRATE TO HERE
COWL-HATCH, 10 3/4"X4"X1 5/8" BALSA OR FOAM
2" SPINNER
KRAFT FUEL TANK
3/16"X1/2" BALSA
TANK PLATFORM, 3/16" FOAM CORE OR SHEET BALSA
FILL WITH SCRAP BALSA
OIL DRAIN HOLE
NOSE RING, 1/8" PLYWOOD
FIREWALL, 1/4" PLYWOOD
HALCO L.G. RETAIN WITH 6-32 HARDWARE
1/2" TRIANGLE STOCK
3/16" PLYWOOD
2 1/2" WHEELS
FILL IN FUSELAGE BOTTOM FROM FORMER FORWARD
INDICATE OF 1/16" DOUBLER
INDICATES FOAM CORE SHEET



TUTOR

DESIGNED & DRAWN BY JOHN A. DE VRIES

TRACED FOR MODEL AVIATION BY RAY BORDEN

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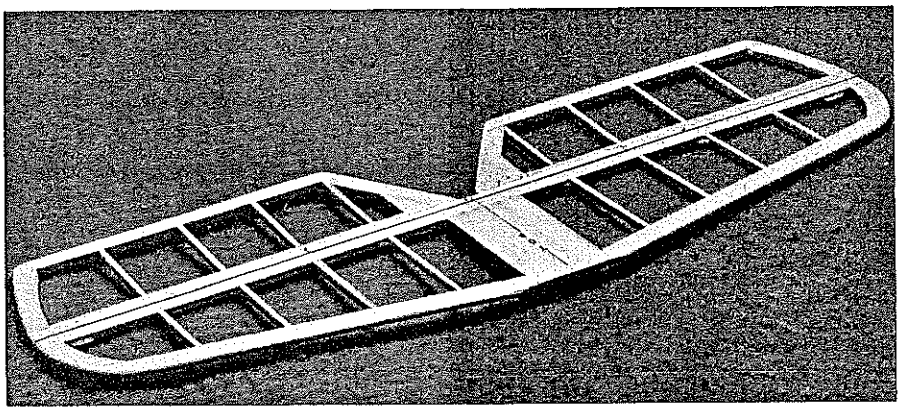
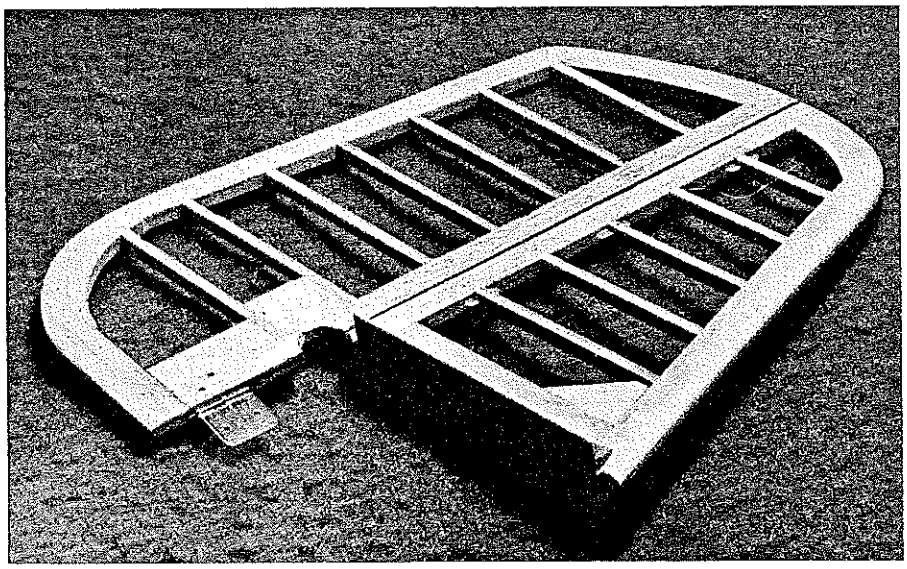


Left: The stabilizer ready for covering. The prototype model used transparent red Solarfilm. Tutor n purposely was given many of the characteristics of the usual scale model—hence it makes good trainer for scale fans.

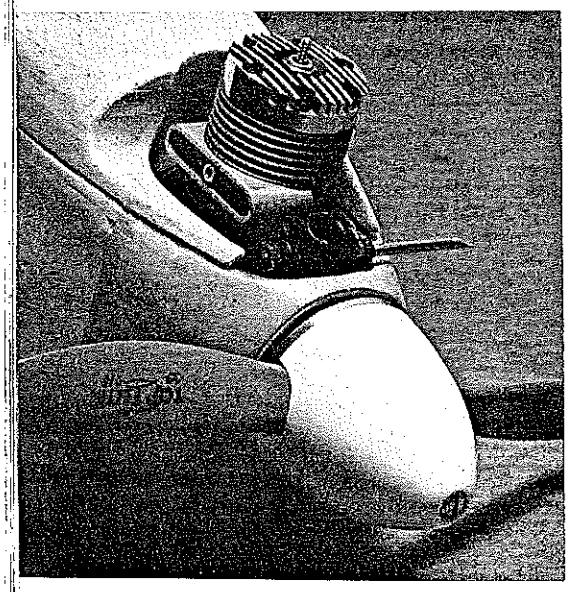
Below: Sanded and hinged, the fin/rudder has triangular stock added to fin's base, providing for strong gluing. Lower hinge is keyed in place by rudder horn's mounting holes.



Construction

If you choose to go the foam wing route, the Tutor n builds super-fast. The plans show ribs for both foam or built-up wings. We show the foam wing template full-sized—without any allowance for covering or planking. Thin it to the extent required for the material you intend to use (1/16" sheet balsa, plywood veneer, card). Inlet the ⅛" plywood "spar joiner" for center-section strength in a foam wing and don't forget to groove the foam cores for the aileron torque rods before you cover them. Aileron spars of ¼" sheet balsa should be Titebonded in place to give the hinges an attachment area.

We chose to make the built-up wing for the prototype model. It requires 22 ribs, cut from ⅛" sheet balsa. Just for looks, we cut five lightening holes in each rib (because we knew our handiwork should be visible through the transparent Solarfilm we intended as a covering material). While the ribs were still stacked, the torque-rod holes were drilled through all of them. Spars are ⅛ × ⅜" balsa. The leading edge is 5/16"-sq. balsa and the ribs are inlet ⅛" into standard Sig 1¼" trailing-edge stock. Note that the built-up wing rib pattern calls for 1/16" sheeting on the leading edge, aft to the spars. The ailerons, of course, are built as part of the wing, and cut loose later.



Front-end view showing how the 1/8" ply nose ring contours are faired into the boxy-shaped fuselage. Upper cowl cut away to provide clearance for the muffler and needle valve.

Wing tips for either type wing may be carved from balsa blocks, laminated balsa sheet or foam blocks. Dihedral is 1¾" at the tip rib (above the flat center section), for each wing panel. Add the aileron torque rods *after* the wing is assembled. A length of outer Nyrod acts as a full-length torque rod bearing for the ⅛ music wire actuating rod. Strip-aileron-type hardware ties torque rod to servo and provides slop-free aileron action. Of course, you can use bellcranks for aileron movement, if you prefer. Before we leave our finished, but uncovered wing, the plans show 1/16 balsa webbing between the spars and ribs. Add it for a super-strong wing.

The fuselage is constructed of 3/16" foam-core, framed in 3/16-sq. balsa. It can be completely built in about three hours, using Titebond to hold balsa to foam-core and Zap for balsa-to-balsa joints. Warning! Keep Zap or Hot Stuff away from the foam in the foam-core—it melts the foam!

Cut the fuselage sides from foam-core—the material that consists of two layers of card surrounding a closed-foam layer. It's usually available at well-stocked lumber yards where it's sold as an insulating board. Foam-core is a fantastic modeling material. The 8-in.-deep fuselage sides cost 60¢ a pair compared to $5.60 if balsa had been used! And, when you cut the aft-wing lightening holes, it's lighter than "Ecuador gold."

"Frame" the cut-out sides with 3/16-sq. balsa, using Titebond and masking tape strips to hold the wood in place. Pin the framed sides to the plan and build-up the cabin structure. The wing's incidence is "set" by the cabin, so align the 3/16-sq. upper longeron carefully and fit the 3/16 × ½" cabin uprights precisely. The balsa fuselage framing is intended to permit "Zapping" the cross pieces in place when the fuselage is "boxed"—and they may be rounded to relieve the square look of the fuselage.

Of course, the 1/16 plywood forward fuselage doublers should be contact-cemented in place before "boxing" the fuselage, making sure that a right- and left-handed fuselage side is produced. Note that the doublers reinforce the cabin uprights. The right side doubler should be cut 1/16" *shorter* at its front edge than the left one, thus building in the proper amount of right-thrust. The ¼" plywood firewall butts against the doublers in the assembled fuselage. Drill the firewall for an appropriate

Kraft-Hayes (or other) engine mount and add blind nuts to its rear face. Do the same with the rectangular 3/16″ ply landing gear mount—a Hallco landing gear (P/N B105-3) will be bolted to it later.

There's only one "former" in the fuselage. It's cut from foam-core and serves primarily as a point of support for rudder and elevator pushrods. Assemble the fuselage by gluing four 3/16 × ½″ cross pieces in place in the cabin area. Rather than sizing these cross pieces from the plan, measure them for precision. Three of these cross pieces are 3⅝″ long (one at the instrument panel and two at the fuselage bottom at the front and rear of the cabin area). The fourth cross piece is 3¾″ long at the aft upper cabin. The top fuselage cabin front former (of 3/16 balsa sheet) completes the basic assembly process.

The aft-wing 3/16″-sq. cross pieces may be fitted after the fuselage sides are drawn together at the tail and Titebonded together and the ⅜″ rudder hinge block added. Epoxy ½″ quarter-square (triangular stock) balsa reinforcers to the firewall-fuselage joint after the firewall is epoxied in place. Trace the area forward of the instrument panel and aft of the firewall in plan-view onto foam-core and cut it out as the fuel tank platform. Its position, within the nose, depends on the engine you're using (the prototype model used an O.S. .30 "hummer"). Raise or lower its position to keep the centerline of the fuel tank aligned with the needle valve. When it's glued in place, it strengthens the fuselage substantially.

Epoxy the gear mount in place and the foam-core rectangles to form the fuselage floor and reinforce them to the fuselage doublers with triangular stock.

Bolt the engine mount in place, bolt the engine to it and put prop and 2-in. spinner on the engine shaft, after hanging the ⅛″ plywood nose ring around it. Tape the plywood ring to the spinner back-plate (with a couple of 1/16″ ply temporary spacers in place) and fill in the nose area with balsa or foam blocks, gluing it in place. After the blocks dry, "pull the engine" and its mount and tack-glue the upper and lower fuselage fairing blocks in place. Precut the upper block (balsa or foam) for the fuel tank hatch separation and then sand the whole nose of the fuselage, fairing it back from the plywood nose ring with sanding blocks. Microballoons and resin will fill any "dings" or depressions resulting from the sanding process.

When the cowl is sanded to shape, remove the tank hatch and hollow it for tank clearance. It'll have to be cut out to clear the engine, exhaust pipe (and muffler) as well as the needle valve. Devise a hatch hold-down (the prototype model used a long 4-40 bolt which screwed into a tapped hole in the top edge of the firewall—the rear edge of the hatch was wide enough to prevent its twisting).

Wing dowel ply doublers are glued in place as well as cabin gussets (ply in the center, quarter-square under the forward cabin former) and the aft-wing "stop" is squared with the fuselage and epoxied to the proper position.

Nothing too exotic about the Tutor"'s tail feathers. The plans show hardwood spars (⅛ × 3/16″ spruce) in both rudder and stabilizer, but the local hobby shop was out of the wood so we substituted 3/16 × ½″ balsa for them on the prototype model. Rudder and stab ribs were stripped from 3/16″ balsa sheet (they're ⅛″ wide) and glued to the 3/16 × ½″ leading and

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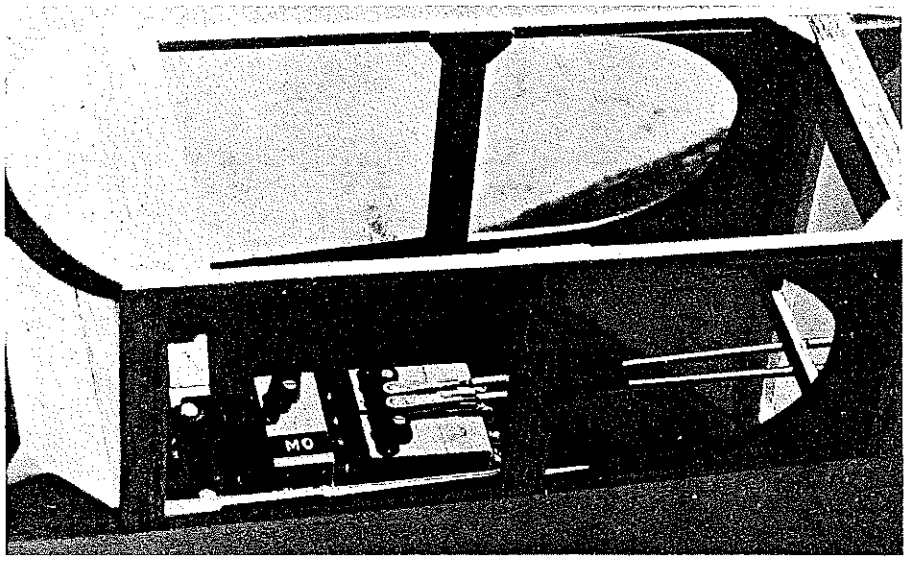
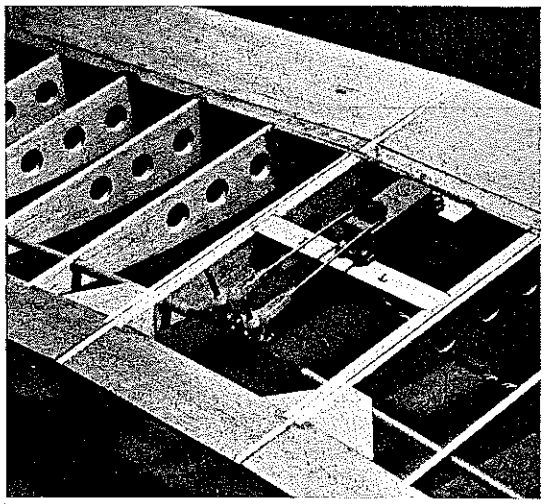
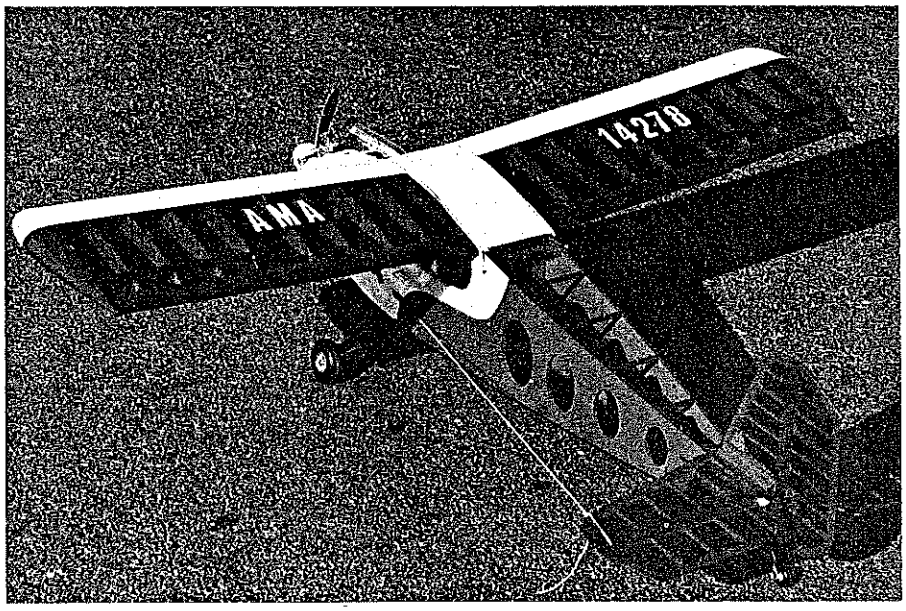


Servos are lost in space! Note the fuselage former being used to hold servo ends of the elevator and rudder pushrods and gusseting in the cabin areas. Only one former—foam core.



Right: Assembled wing center section, showing torque rod aileron actuating system. Foam cores can be substituted—and build faster.

Below: Eye-catcher, we think you'll agree. Leading edge and center section are covered with white Super Monokote.



CL Navy Carrier/Perry

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and for some Profile Carrier models. Not only are they illegal, but they are also unsafe. At the Nats this year a large Perfect clip failed during pull-test when it was subjected to a 25-lb. load. A well-known Carrier modeler (whose name I will not mention) lost a Class II model this year when a Perfect clip on his up line failed in flight. I've seen similar accidents in other events.

The photograph accompanying this column depicts Pylon brand line connectors by Sullivan. These clips come in two sizes rated at 80 lb. and 110 lb. The only other type of clip that I will use is one I have made myself.

The photo also shows the wrapped line terminations and thimbles that are recommended in the rule book for two-line construction. Wrapped lines are stronger than crimped terminations and are easier to inspect for possible damage. They are also easy to make. A set can be made while watching a favorite TV show. The thimbles are available from Perfect with sleeves for crimped line ends and from Sullivan with serving wire included. Larger thimbles are included free with each small package of modeling hardware that you buy at your local hobby shop.

Don't take a chance on losing an airplane and engine and possibly injuring a spectator or fellow modeler. Do it right the first time, and you don't have to do it again.

Soapbox Department: There are numerous proposals before the CLCB to require or reward realistic Profile Carrier models. I would like very much to see more realistic models in this event, and I have talked to many Carrier modelers who agree. There are problems, however, in almost all of the proposals. Of principal concern to me is that existing models not be made obsolete by a rule change. A mandatory requirement for scale outlines or even "close resemblance" would make most existing models illegal. Scale bonus points can be used effectively if the points awarded are few enough that non-scale existing models are not automatically eliminated from competition. A requirement for 5% scale tolerance, however, would eliminate most, if not all, kit airplanes—even the G-S Bearcat. I do not think that is a good idea.

Review the proposals and be thinking about how you would like to solve the problems. Get ready with cross proposals if you would like to add realism to the Profile event. Write your CLCB representative and tell him of your support or opposition to the various proposals.

The way to a better event is through participation in the rules-making process. No one has any right to complain about the rules if he has never taken time to let his CLCB representative know his opinions.

Richard L. Perry, 5016 Angelita Ave., Dayton, OH 45424.

Tutor ⁿ/de Vries

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trailing edges. Triangular stock was added to the aft fuselage to serve as a widened stabilizer platform and to the fin to provide a reinforced fin/stabilizer gluing joint. On the prototype model a bit of ⅛" plywood had to be inlet into the lower edge of the rudder so that the commercial tailwheel assembly chosen would fit the 3/16"-thick surface. A long 3/32 music wire tailwheel strut will work with most other tailwheel brackets—and hold the ¾" diameter tailwheel. Extra rudder hinges (four are recommended) assure good rudder action *and* reliable tailwheel steering.

Nothing much left to do but covering, radio installation and the always-onerous details of finishing the model. Add the windshield front dowel and the "glassed" areas (use .030 clear buytrate plastic for windshield and windows). Epoxy wing hole-down dowels in place. Bolt engine and landing gear in place (use 2½" diameter main wheels).

Most radios are "lost"in the cavernous fuselage of the Tutorⁿ! There's lots of room to swathe receiver and batteries in anti-vibration foam and protective plastic "baggies." Use servo trays for the fuselage installation, making sure that they're positioned so that no strain is placed on their connecting wires (or the wires to the aileron servo). There's no problem, balancing the Tutorⁿ! In fact, the receiver and the 450-mah battery of the prototype model are positioned *aft* of the servos, against the fuselage former! The balance point is on or slightly forward of the wing spars.

Flying

The airfoil is a computer-plotted 9¾" Clark-Y section. The model is a slightly-heavy (4½ pounds), slightly-underpowered (on purpose) tail-dragger. Make sure that the model's balanced and that the main gear and tailwheel track straight ahead. Triple-check everything on your first-flight check-list and fire 'er up!

Like many high-winged models, the Tutorⁿ is a "rudder airplane"—the ailerons aren't too effective (hence, the suggestion on the plans that the ailerons should be extended one full rib-bay on each side). There's a *lot* of rudder and elevator area, so use them gingerly until you have a "feel" for their effectiveness. Remember that the Tutorⁿ is designed to react like a scale model, not a pattern ship.

On takeoff, with any wind above 10 knots, the Tutorⁿ will leap into the air, particularly if your helper holds the model while you run the engine up to maximum revs. Fly it with rudder until it's well up and you can check the effect of the ailerons. Landings are made in an almost-level attitude since that's the way the gear is "set". Rudder and elevator are effective at gliding speeds so the final approach may be "played" almost down to stalling speed.

So use the Tutorⁿ to build up your flying time and proficiency while you build those precise, beautiful, complex examples of the model-building art!

Hall of Fame/1976

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Plans for more than 80 different Ehling-designed planes have been published in modeling magazines through the years and many of his original designs have been kitted by Jetco, Jasco, Scientific and Polk's. His designs have won a great number of contests and have been responsible for starting many new trends in model plane design. Since many of Frank's models were designed with the newer and younger modelers in mind; they were simple and foolproof yet always maintained a high level of performance.

As a result his model designs were instrumental in attracting many young people into the aeromodeling field.

Ehling has always been an innovator. His early competitor expertise in recognizing loopholes in rules has contributed to his success as Technical Director for the Academy of Model Aeronautics. In the 20's, competition rules were much simpler than they are today. Intended for the new (then) compressed-air model motors, the rules stated "any power may be used." A famous story has it that at one contest Frank waited until all the other fliers had their turn, then called for a timer. The plane was tiny—many thought too small to be successful—and it had a string attached to it, which ran into a cigar box. Ehling launched his ship for an official flight by opening the box. Out flew a pigeon, pulling the model aloft for an O.O.S. max!

Frank's crowning achievement is his Delta Dart. No single model design has done more to create good will and good publicity for model aviation, as well as to introduce more youngsters, all over the world, to this wonderful sport of building and flying model planes. Hundreds of thousands of these kits have been produced to date, all without any profit to Ehling (other than personal satisfaction), since he donated the design to AMA and the model industry.

As Technical Director of the Academy of Model Aeronautics and also as Advertising Manager of AMA's monthly magazine, *Model Aviation*, Frank is currently a key figure in our national organization. He is very much respected by everyone in the model aviation industry for his abilities and accomplishments. Few men in aeromodeling are as well known all over the world.