The full-size airplane that this model is patterned after was one of several variations on a basic theme that appeared in the early Thirties. The model is purely intended for RC sport flying—and it's great at that—but with a readily-identifiable Scale appearance. For .30-.40 engines, four channels. ■ Dee B. Mathews

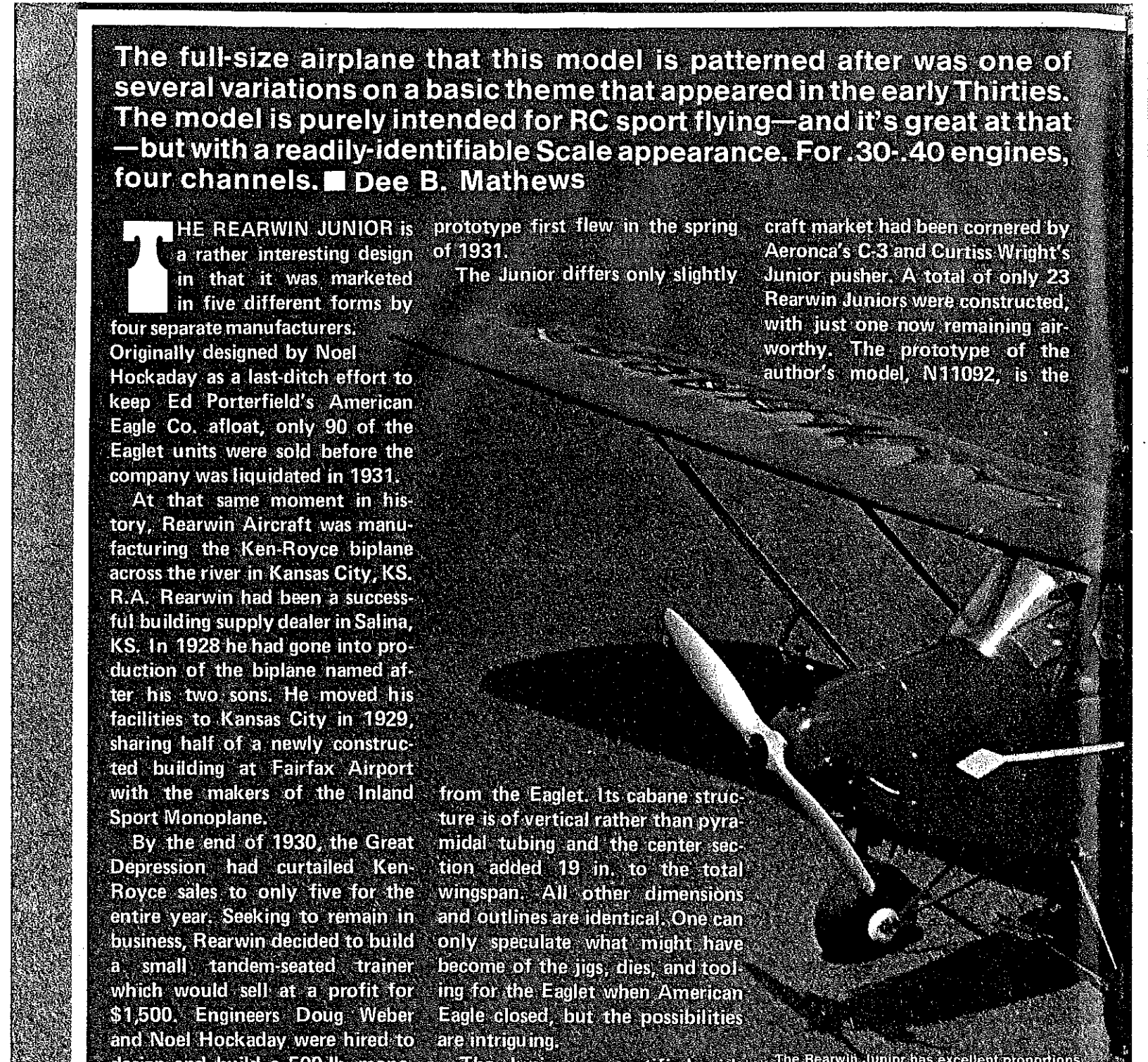
THE REARWIN JUNIOR is a rather interesting design in that it was marketed in five different forms by four separate manufacturers. Originally designed by Noel Hockaday as a last-ditch effort to keep Ed Porterfield's American Eagle Co. afloat, only 90 of the Eaglet units were sold before the company was liquidated in 1931.

At that same moment in history, Rearwin Aircraft was manufacturing the Ken-Royce biplane across the river in Kansas City, KS. R.A. Rearwin had been a successful building supply dealer in Salina, KS. In 1928 he had gone into production of the biplane named after his two sons. He moved his facilities to Kansas City in 1929, sharing half of a newly constructed building at Fairfax Airport with the makers of the Inland Sport Monoplane.

By the end of 1930, the Great Depression had curtailed Ken-Royce sales to only five for the entire year. Seeking to remain in business, Rearwin decided to build a small tandem-seated trainer which would sell at a profit for $1,500. Engineers Doug Weber and Noel Hockaday were hired to design and build a 500-lb. monoplane to be powered with a 45-hp Szekely motor. Dubbed the Junior, it was—for all practical purposes—a refinement of the Eaglet. The prototype first flew in the spring of 1931.

The Junior differs only slightly from the Eaglet. Its cabane structure is of vertical rather than pyramidal tubing and the center section added 19 in. to the total wingspan. All other dimensions and outlines are identical. One can only speculate what might have become of the jigs, dies, and tooling for the Eaglet when American Eagle closed, but the possibilities are intriguing.

The Junior was certified with the Szekely in July 1931, and was placed into limited production. It was reputed to be docile, sturdy, and reliable, but the ultra-light aircraft market had been cornered by Aeronca's C-3 and Curtiss Wright's Junior pusher. A total of only 23 Rearwin Juniors were constructed, with just one now remaining airworthy. The prototype of the author's model, N11092, is the



The Rearwin Junior has excellent proportions to make a very flyable model. The stabilizer has been enlarged a bit from true scale, the wing dihedral has been increased slightly, and the wing chord has been widened a smidge. All of these changes are hardly noticeable, but they work together to produce tame flight qualities.

REARWIN

#338

property of Oscar Cooke of Decker, MT. Photos of the full-scale aircraft are available from Collect-Air Photos, P.O. Box 14234, Milwaukee, WI 53214.

Meanwhile Ed Porterfield, a successful Ford automobile dealer in Kansas City, KS organized a new firm bearing his name. Incorporated in 1933, the new firm purchased production rights to the Wyandotte Pup, a product of the shop classes of Wyandotte High School. The design was based on a modified set of Eaglet drawings, with the fuselage narrowed slightly to clear the shop door. Renamed the Model 35 Sportster, it proved to be moderately successful as a commercial venture. In 1937 Porterfield asked Noel Hockaday to once again revive the Eaglet—this time to be powered with the new 4-cylinder Continental A-40 horizontally-opposed engine. Only one parasol Zephyr has been documented, but the version with a cabin sold fairly well.

The Zephyr was replaced in the Porterfield line by the Collegiate of 1939.

A fifth derivation of the basic Eaglet, the Eaglet-craft A-31, is mentioned in Underwood's Vintage and Veteran Aircraft Guide. My limited research has not revealed any information on this aircraft. However, the interesting fact remains that American Eagle Aircraft's Eaglet, Rearwin's Junior, Porterfield's Sportster, and two forms of Zephyrs, as well as the Eagle-craft, were all sisters under the fabric.

For variation, this model could be built with pyramidal wire cabane structure and reduced span to become an Eaglet. A superb three-view drawing accompanies Tom Laurie's electric-powered Free Flight version in Model Builder magazine of February 1976.

Substituting a Continental A-40 and appropriate cowl would produce a Porterfield Zephyr, while adding a cabin would develop it into a production Zephyr. See Flying Models magazine of December 1978 for an RC version of Zephyr.

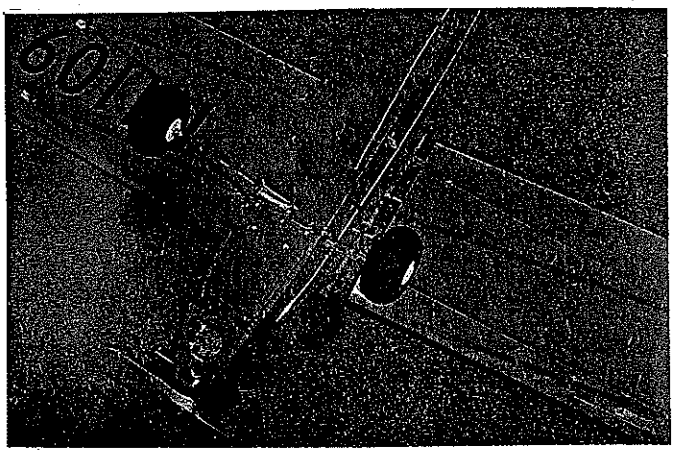
THE MODELS. We chose to develop a Rearwin Junior to utilize our pet plug-in wing and cabane strut system, and to display how much "character" a dummy engine and pilot can add. Another strongly influencing factor was that, to the best of our knowledge, this is the first RC Rearwin Junior to be published.

The prospective builder likely will recognize this model as an oversized Free Flight Scale design with radio assist. The goal was to blend Old-Timer parameters with contemporary structural techniques in a Scale-like model. The model flies with the gentleness of an Old-Timer Free Flight, possesses a remarkable strength-to-weight ratio, is relatively simple to build, and displays a delightful Scale look.

We have coined the term, Silhouette Scale, to describe this combination of design and flight features. Many of us recall the

JUNIOR

Our intrepid pilot has only a motorcycle-type windscreen to keep bugs out. No side or rear windows were available with the Rearwin Junior. Use Williams Bros. LeRhone cylinders and 2⅝-in. sportsman pilot.



Simple two-piece "torque bar" gear appears much like the prototype's, with addition of non-functional cross members and shocks. Trap door provides easy access to fuel tank and battery pack.

small black models used during WW II to train air crews, anti-aircraft gunners, and ground spotters to recognize the silhouettes of friendly and enemy aircraft. These models were not highly detailed, nor elaborately finished, but they were instantly recognizable to the trained eye. This concept has been carried into the design and development in this Rearwin Junior model.

Its outlines, shape, and general appearance are identifiable without question as a Rearwin Junior, but it is not highly detailed, nor are its dimensions to absolute scale.

It has a scale silhouette. This design is intended for those who are interested in a strong, highly flyable model, but who are not prepared to commit the large amount of time and effort usually required in building "museum" Scale models.

Frankly, the largest reward in building Silhouette Scale lies in the flying. As the model gracefully cruises around a cloud-speckled sky, one can thrill to the illusion of full-scale appearance that, at distance, seems equal to a Precision Scale rendition of the same prototype. Yet the wing and power loadings are so reasonable that the flier does not need to fight the model or fear that he can't maintain control.

The use of a scale ruler on this design will reveal an enlarged stabilizer, increased dihedral, and a slight increase in wing chord. These all are changes that are virtually indistinguishable in the air, but which add to the overall docility of the aircraft's flight.

Construction. Since anyone who has constructed an Old-Timer or Free Flight Scale model should not encounter any difficulty in constructing this model, we will not waste space with a Part-A-to-Part-B description. Rather, we shall try to explain just the more unusual and novel aspects of the model's construction.

The engine cowl is really rather simple to fabricate, although the foam plug and epoxy/glass technique may seem rather awesome to those who have never worked in these materials. A plug is rough-cut from Sig (or equivalent) one-pound foam polystyrene, then tack-glued to the firewall with 5-min. epoxy. It is then carved to shape using a knife and sandpaper. It does *not* need to be perfectly smooth, only well shaped.

Remove the plug, and coat it with a layer of Hobbypoxy Formula One or Devcon 30-min. epoxy. This coat provides a firm surface to which the subsequent layers of glass will be applied.

Cut gores (shapes like the sections of a football cover) to fit the plug. Avoid multiple sharp corners to be covered with the same section. It's better to use several smaller gores than one large one.

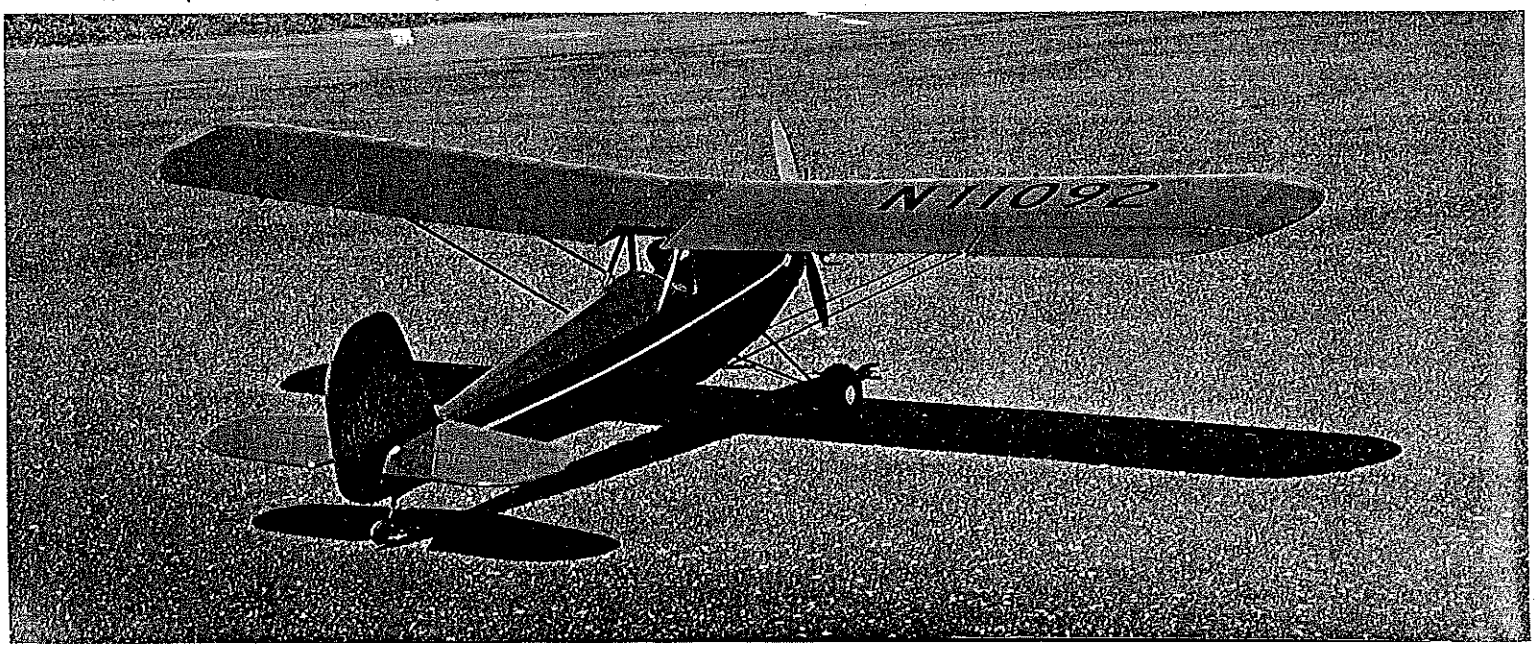
The fiberglass to use is the heavyweight type, for repairing car bodies and ship hulls. We had miserable luck in attempting to use the type of glass tape used for wing and nose reinforcements on models. Heavyweight glass cloth is available in boat sections of stores such as Sears and K-Mart.

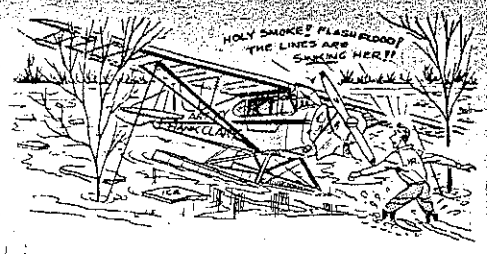
Mix a batch of epoxy, and spread a thin layer over the area of the plug to be covered by the gores. Lay the pre-cut glass onto the epoxy, then flatten and contour it with a section of plastic wrap (such as Saran). Once it is properly positioned and the epoxy has been pushed up through the weave, remove the plastic wrap and smooth out the epoxy with a moist finger; saliva seems to be the most effective solvent. Hands can be cleaned in butyrate thinner.

Additional gores are applied in the same manner until the surface of the plug is completely covered. Overlaps are sanded to a feather edge once the epoxy has cured. Use #60 or #100 aluminum oxide paper. Repeat the build-up steps until all sections have at least three layers of fiberglass, with a fourth on areas of high stress. Since the multiple layer steps take much longer for the epoxy to set than is taken up in the actual work, it is helpful to be fabricating the cowl while simultaneously building other components of the model.

Sand the final layer with #220 paper, then mix a *large* batch of epoxy and spread it over the complete surface. Attempt to place more epoxy at the nose of the plug, as the next step tends to push the epoxy toward the back.

The Rearwin Junior looks good from any view. Trexler air wheels, dummy cylinders, and pilot figures all work to create a remarkably realistic model. Author's plane was covered with Sig Koverall in a novel mannner described in text. Any of the high-temperature covering films okay.





1/4" BALSA TIPS RUDDER AND STABILIZER

1/4" X 3/8" BALSA T.E.

1/8" X 1/4" RIBS

1/4" X 1/2" POSTS FOR FIN AND RUDDER

1/4" X 1/2" ELEVATOR AND STABILIZER SPARS AND L.E.

1/16" BENT WIRE JOINS ELEVATOR HALVES

1/4" X 3/8" T.E.

1/8" X 1/4" HARD BALSA TOP STRINGERS

1/16" WIRE PUSH ROD TO SERVO

1/8" LITE-PLY HATCH

3/16" X 3/4" SPRUCE BLOCKS SANDWICH 1/16" WIRE HOOKS

1/8" BALSA PLANKING

1/8" LITE-PLY RIBS DOUBLED

1/8" PLY CAP RIB

1/4" X 1/2" SPRUCE STRUTS (4)

1/4" X 1/2" BALSA BLOCKS

1/4" SQ. SPRUCE BRACES (2)

1/32" PLYWOOD COWLING

3/4" TAILWHEEL ON 1/16" WIRE THROUGH SIG SH-132 BRACKET

1/4" SQ. BALSA LONGERONS AND FRAMES

1/8" X 1/4" BALSA DIAGONALS

3/16" O.D. BRASS TUBE LOCKED IN 1/16" PLY PLATES AND SPRUCE FILL

1/8" LITE PLY MOUNT FOR STRUT HORN - WITH T-NUTS

1/32" PLY PLATE

5/16" X 1 1/4" BALSA T

1/4" X 5/8" AIL. SPA

1/4" FILLER

DU BRO DUAL T.O.

.015 PLASTIC

1/32" PLYWOOD DECK

(2) 1/8" LITE PLY FORMER

2" WILLIAMS BROS. L.E. RHONE CYLINDER(3)

1/4" PLYWOOD FIREWALL

BRASS SLEEVE

1/4" X 3/4 AILERON HINGE SP

1/4" BALS FILLERS

(3) 1/8" LITE-PLY FORMER

1/2" K-S STREAMLINE TUBE

1/4" BALSA WING TIPS

FIBERGLASS COWLING

1/8" LITE-PLY SIDES, DOUBLED

3/32" STEEL WIRE

3/16" SQ. SPRUCE SPARS TOP & BOTTOM

SIG SH 552 LINKS AT ENDS

FOX 40 ENGINE ON KRAFT HAYES MOUNT

1/4" SHEET BALSA BOTTOM COCKPIT ONLY

3/32" BALSA RIBS (PLYWOOD AT ROOTS)

SHAPED NYLON HORN AT WING AND FUSELAGE

1/8" LITE-PLY MOUNT FOR 90° BELLCRANK

1/8" PLYWOOD HATCH WITH 4-40 BOLTS INTO T-NUTS IN 1/4" X 1/2" SPRUCE BLOCK

NYLON STRAPS SECURE L.G.

5/8" X 3/4" BALSA L.E. STOCK

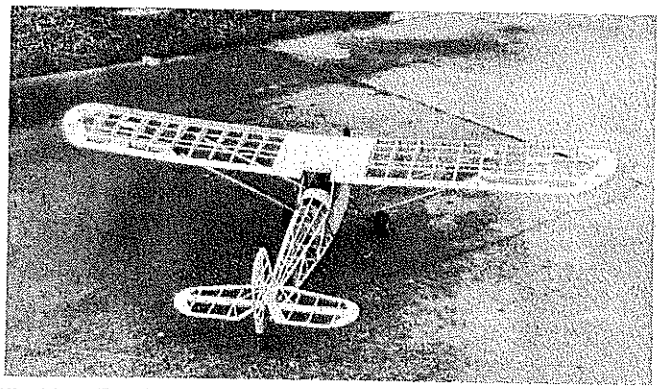
SHOCK STRUT WIRES

SIG SH 125 L.G. BLOCKS

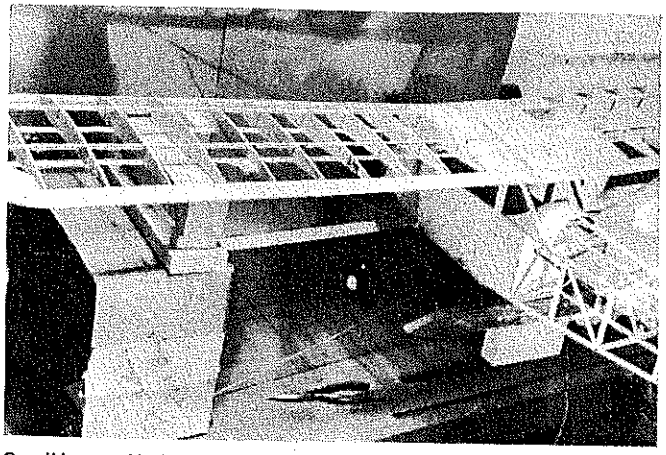
TREXLER 10 G-3 1/2" WHEELS

5/32" WIRE L.G. STRUTS (REAR ONE SLIDES IN SLOT)

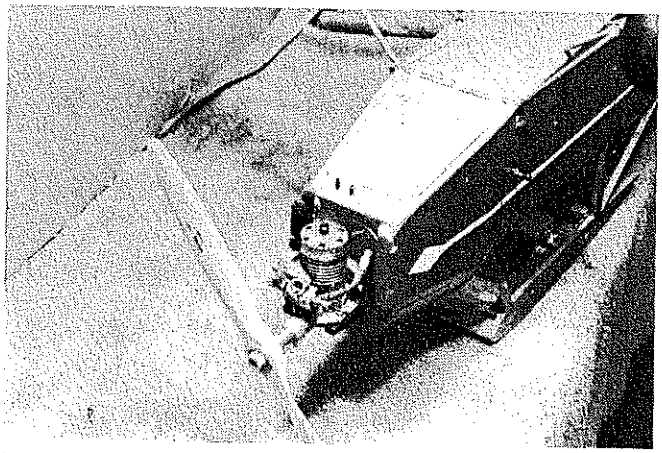
Laminated Lite-Ply sides provide solid anchoring for spruce cabin superstructure. Model is exceptionally rugged, though light in weight.



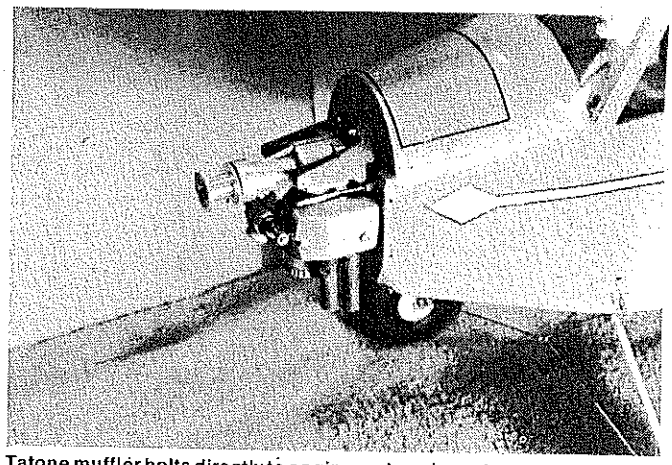
Kinship to Free Flight Scale is readily apparent in uncovered framework views. An outstanding example of author's Silhouette Scale concept.



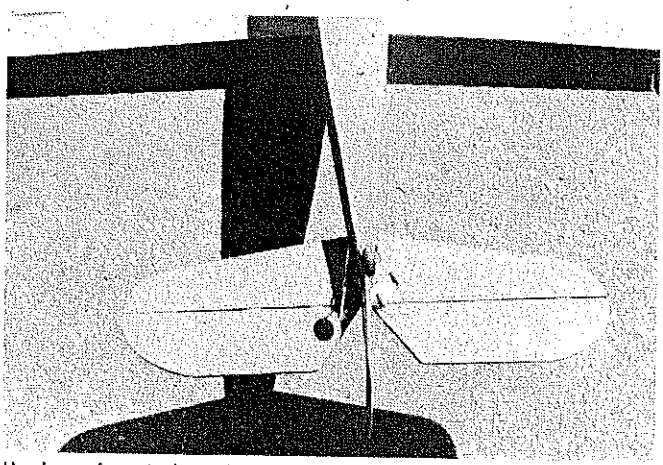
Small box and balsa blocks hold wing at proper dihedral while struts are fitted. Struts attached with clevises and cut down nylon control horns.



Davis Diesel conversion of Supertigre .35 provides plenty of power. Note fill/drain lines and the fuel filter—latter important for dependability.



Tatone muffler bolts directly to engine and carries exhaust out bottom of the cowling—big help in keeping residue away from open-sided cabin.



Hookup of controls and steerable tail wheel is straightforward. Slow flight of model permits large control surfaces without throw reducers.

Inflate a *large* rubber balloon and press it down over the epoxy-coated plug until it covers the rear to excess. Slowly deflate the balloon, making sure the back side folds under the rear of the plug. Allow the epoxy to cure, then remove the balloon by peeling it off. The surface should be level, smooth and relatively free of voids. If by some chance it is not, repeat the balloon step with a thinner layer of epoxy. Small voids or bubbles can easily be filled with micro-balloons in epoxy, or Hobbypoxy P.F.C.

The foam can be removed from the inside of the cowl with a spoon or similar instrument. The remaining small pieces will dissolve in thinner or gasoline. **Danger:** The above should be done outdoors, as the "glop" that forms is extremely toxic when inhaled. The residue should be placed in a tightly sealed container and buried in a sanitary landfill. It should not be left lying around, nor should it be dumped in the sewer.

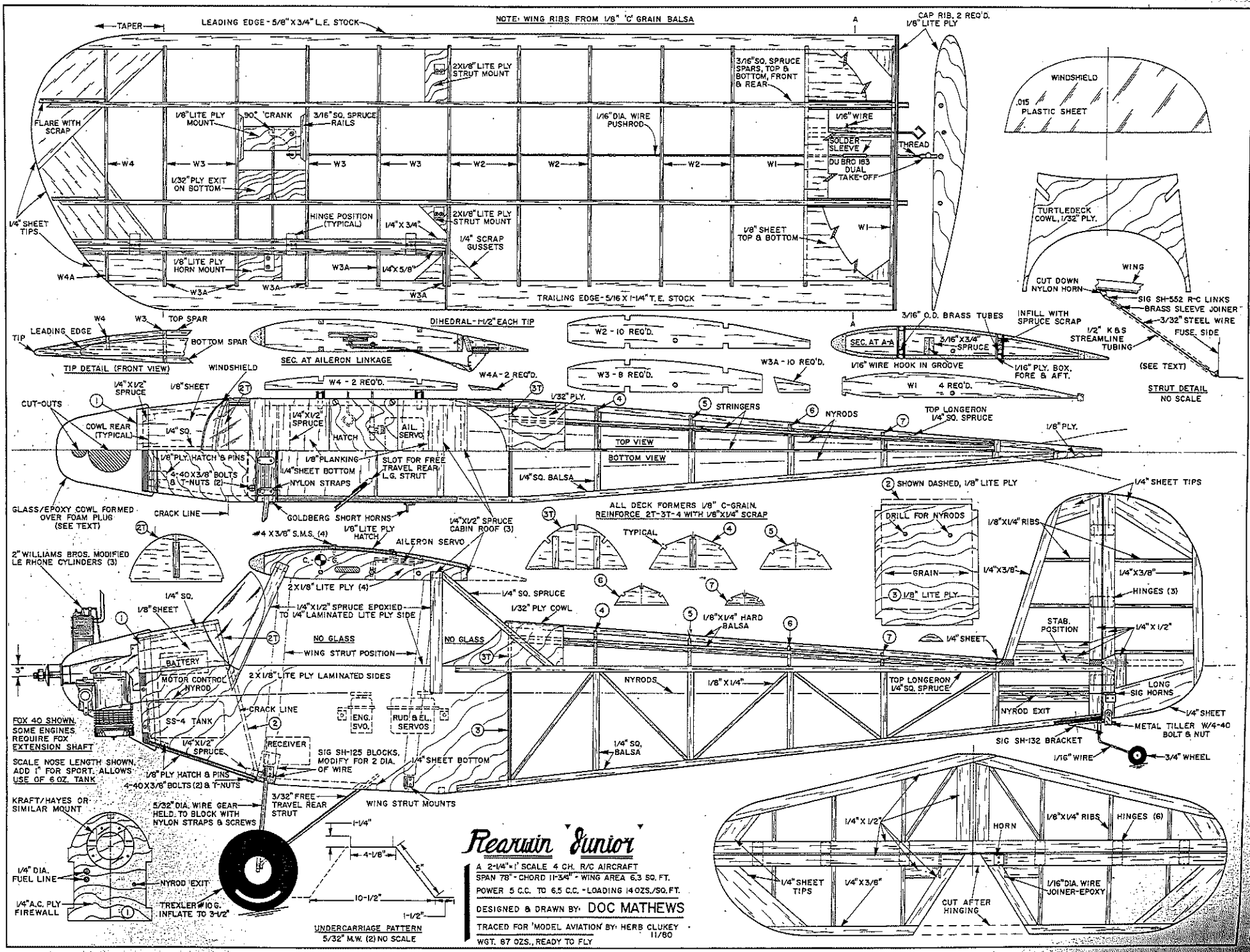
This technique was pioneered by Hobbypoxy as the "EZ-does it" method. We use fiberglass (rather than Dynel cloth) because the epoxy works up through the weave more freely. This technique is relatively simple and very difficult to goof up. The resultant cowl is attractive, is much less expensive and more simple to fabricate than a traditional block balsa unit, and durability is excellent.

The cowl unit is completed by placing a vertical cylinder at the top and two at 120° to it. We used 2-in. scale Williams Brothers LeRhone cylinders with the exhaust stacks pointed upward. A 1/16-in. hole is drilled in the stack and into the cylinder; the units are then joined with a piece of music wire and Wilhold R/C 56 adhesive. This provides a flexible joint, which avoids popping off the stacks in handling.

The cylinders are placed in holes cut in the glass with a carbide cutter in a Dremel Moto-Tool, or they can be cut by hand using a round file of the appropriate size. They are held to the epoxy/glass with a small dab of 5-min. epoxy. When set, Hobbypoxy P.F.C. is forced around the cylinder bases from the inside of the cowl; remove any excess that squeezes out.

(Editor's note: A photo essay on this method of cowl construction and dummy engine installation is scheduled for an early issue.)

Fuselage: The use of laminated ⅛-in. Lite Ply is rather novel, but is highly utilitarian. The resultant ¼-in. epoxy and Lite Ply is nearly as strong as aircraft ply, yet is much lighter in weight. The sheets are joined with a thin coat of 5-min. epoxy that has been spread over the surface with a scrap of ply used like a trowel. The sections must be



Rearwin Junior

A 2-1/4" = 1' SCALE 4 CH. R/C AIRCRAFT

SPAN 78" - CHORD 11-3/4" - WING AREA 6.3 SQ. FT.

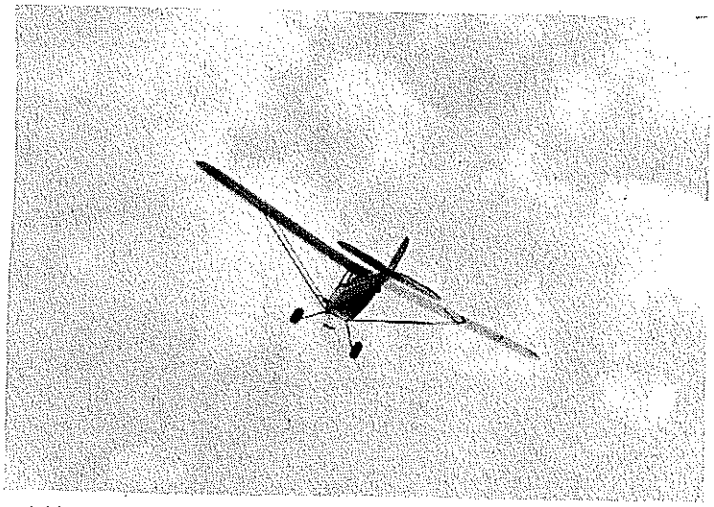
POWER 5 C.C. TO 6.5 C.C. - LOADING 14 OZS./SQ. FT.

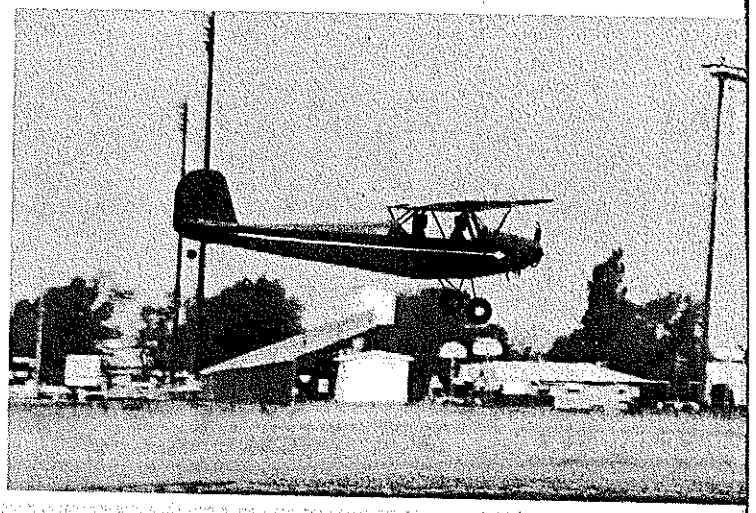
DESIGNED & DRAWN BY: DOC MATHEWS

TRACED FOR 'MODEL AVIATION' BY: HERB CLUKEY 11/80

WGT. 87 OZS., READY TO FLY

FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 140





laid out on a flat surface and weighted down while the epoxy cures. It's best to cut parts out of previously laminated sections. Drill all holes at the time of cutting.

Two fuselage sides are constructed one over the other in the classical manner, except that the wing roots and cabanes are assembled integrally with the sides. The ply is cut at the crack line, and the firewall end is blocked up ½-in. while epoxy cures in the crack. Be sure to develop a left and a right side—not two of one or the other.

The cabin sides are perfectly flat from B to C, so the fuselage box can be constructed with one side down on the building board; add formers, then install the opposite side. Check for alignment in all planes with triangles and/or squares while the epoxy cures.

Block up the tail post 2 in., pull the opposite post down onto it, and epoxy. Add the cross members and cabin fillers, as well as the firewall and landing gear mount, while the box is still flat on the board. If care is taken in alignment in the early steps, the fuselage is almost sure to be straight and true.

The landing gear blocks are widened by cutting a 5/16-in. slot, then drilling 5/32-in. holes into the side blocks. One hole must be at the front of the slot and the other at the rear. bending a 5/32-in. music wire gear might be intimidating, but a solidly anchored 4-in. bench vise and a length of ¾-in. pipe simplify the chore.

The rear wire is not functional on this model; it merely slides up and down in a slot in the fuselage bottom. The torque bar principle, combined with the half-flat Trexler airwheels, will smooth out all but the most ghastly of landings, and with more than enough strength.

The use of spruce without music wire reinforcement in the cabane structure might appear marginal, but it has proven to be more than adequate for a model of this size and weight. I once pranged a similar project onto the roof of a shed while attempting a stall turn at low altitude. The nose section broke off to the first bulkhead, the wings disconnected and bounced 10 ft. or so, but the cabin structure didn't so much as crack at the epoxy joints. Believe me, the cabanes are stronger than the motor mount.

Full-scale, or Scale model? Flight shots (by Bob Corns) exhibit remarkable realism. Only the exhaust and radio switch are give-aways that it's a model. Buildings not really close in top right pic—telephoto lens just makes them look like they are. Model is very forgiving.

The nose length on the drawing is to scale; if a smaller (lighter) engine is to be used, add one inch to the nose as we did. A larger tank can also be used with the extended nose, of course. The firewall and construction directions will work with either nose length.

This is the prototype for the author's model—a fine example of the aircraft restorer's art. Pic by Collect-Air Photos. Photo packs of this and other aircraft available. Address in article.

Wings. The sections are designed for building flat. The notches in the leading edge can be cut nicely with a jig saw if the blade is reversed so that the marks on the wood can face the operator while sawing. Tip outlines can be cut after the wing is completely assembled. The tip ribs and fillers are cut from scrap sheet, cemented in place, then block-sanded to contour. The bottom planking is built in while the wing is on the board. Add the top planking after the dihedral angles are in.

The brass tube stubs and music wire hook are installed *after* the panel has been blocked up 1½ in. and the root is block-sanded to the resulting angle. Pre-cut and trial-fit the spruce and ply filler sections around the tubing before epoxying the units together. Use the ply cap ribs to exactly position everything. Clothespins (spring type) are useful clamps in holding the ply against the spars.

You can use W-1 blanks which have been cut down for the planking to change them to W-2 ribs. Place a plywood master rib over the blank to use as a guide.

Whether to use shear webs or glass tape at the center section depends on the size of engine. If a .40 engine is used, the added strength may be needed. The original model, with a .35, didn't need the reinforcement, and a .30 would be ideal. A .40 would need to idle very slowly in order to successfully perform touch-and-goes with the

Continued on page 108

can horse it around for 3 min., doing consecutive loops, hammerheads, and inverted—and still have time to gain altitude for a good thermal flight. When you come down, and are short of the field, you can switch on again, and the plane purrs right in by your feet.

"The Ace three-channel fits like a glove," Heinz goes on. "You need only two battery packs to 'stay up all day long.' Data: Astro 02, 5¼ x 3 prop, 4 x 1.2 Ah cells, span 56 (same as Falcon 56), area 360 squares, weight 24 oz., loading 9.6 oz., length 31 in. Controls are on-off, rudder, and elevator.

There is no fun at all in fly-away RC jobs, or interference, or unexplained crashes. It would be so nice if nothing happened (more or less) when a transmitter quits, some goof-ball invades your frequency, strange things in the ether take over, or a plane gets too far downwind, or away, to be saved. Believe it or not, there is a device, on the market for several years, that can save your airplane! However, when we talked to name experts, they all said, "Oh, just something more to go wrong." We came to the conclusion that if this were true, we'd still be flying our Good brothers vacuum-tube single-channel from 1948—and escapements! We'll tell you about it, and you are on your own to investigate.

This "miracle" device is manufactured by CEL Electronics (Harlow) Ltd., Coachworks House, River Way, Harlow, Essex CM 20P, England. It is called "Electronic Fail-Safe Unit." It plugs in between the receiver and servos. Since it works off the receiver decoder, it passes all normal signals through to the servos. Should signals be disrupted, causing servos to throw the model out of control or to cease functioning, the device switches out receiver outputs, and switches on preset control signals to move the servos to "safe" positions. As made, it functions with most three-wire servos with a positive pulse of one to two milliseconds. Being British, we recognize only two familiar radio systems listed—Futaba and Sanwa. In its safe mode it handles: transmitter and receiever failures, out-of-range, interference from another transmitter, from speech interference, and severe impulse (ignition) interference. It handles up to four channels. (More channels requires a second unit.) All that CEL claims is that, whatever the circumstances, the device will at least give additional time to seek recovery of the aircraft. (Address Miss Pamela Lee, and tell her we sent you.)

Before we get ourselves in Dutch by that recent description of Bob Smurthwaite's excellent Engelman spruce, we should give equal time to Sig, who also has good stuff (we use it, too) and now to Midwest Products who announced two days ago (as this is written) their new spruce. Samples look good indeed.

Also, we had just received a letter from Tom Runge (Ace) discussing his firm's acquisition of Pro Line. Ace will continue the fine tradition of Pro Line Electronics, once the favorite of experts—a select line of systems. Ace has a most versatile radio in their Silver 7 which, however, is in kit form, and now they will offer both a first-line kit and a top quality ready-to-use system as well. For Pro Line owners, Ace will provide a network of approved service centers throughout the world—we presume existing Ace centers provide the base. But no warranty work can be done on systems manufactured by the last corporate owner. For info, address Pro Line Division, Ace R/C, Inc., 203 W. 19th St., Box 735, Higginsville, MO 64037.

Bill Winter, 4330 Alta Vista Dr., Fairfax, VA 22030.

Rearwin Jr./Mathews

Continued from page 26

Junior.

The struts on this model are functional, and they are remarkably simple to fabricate. Sig SH-552 heavy duty clevises and rods are soldered onto 3/32-in. music wire, using short lengths of brass tubing for joiners. The wing panel is inserted into the wing root, and the tip is blocked up to the proper dihedral angle with boxes and scrap wood. Once the proper angle is established and the clevis/wire lengths fit, solder the joint. Small tabs of tin are crimped and soldered to the wire, trimmed to slide into K&S airfoil tubing; then the assembly is secured with P.F.C. forced around the tabs. This secures the tube to the wire, and avoids rotation.

All nut plates for the cut-down horns should be secured to the interior with Hot Stuff or epoxy. Once the covering is applied, they will not be accessible.

The use of clevises in the horns provide some degree of rigging, as the degree of washout or washin can be adjusted. They also make wing attachment super simple.

Always use two rubberbands between the hooks in case one should break.

Radio installation: After all the components of the structure are completed, install all the hardware. Adjust the servo tray unit fore and aft to obtain a center of gravity (CG) approximately ¼-in. ahead of the finished point. This allows for the added weight of the covering and finish aft of the CG. The ⅜ x ⅜ bass or spruce cross beam can be permanently secured to the fuselage sides with sheet metal screws through the ply sides.

The receiver can be placed under the servos or in a scrap ply box forward of them, whichever helps the CG to be in the proper location. We used Sullivan semi-flex pushrods, but whatever is used, anti-flex cross members should be installed every six inches or so. We used threaded clevis studs on the horn ends, and studs running into EZ connectors on the servo ends. Threaded studs can be installed into nylon pushrods very easily by chucking them in a ¼-in. drill and "blipping" them into the rod.

As an exercise in creative engineering, we originally connected the ailerons to the servo with a pair of Du-Bro #190 ball links and snaps. We adjusted the throw by varying the holes used in the horns. This technique was satisfactory until the links were accidently snapped on the wrong balls!

A more practical system was subsequently installed using Du-Bro #183 aileron connectors. The connector is turned all the way up on one threaded rod to remove the wings. Attaching the wings requires the opposite steps. With a little practice, the wings can be removed and reinstalled in a minute or two.

Covering and finish. The fuselage of the prototype was covered with Sig's Koverall applied in a new and novel manner. We painted the framework outlines with two coats of 50% water and 50% Elmers white glue, allowed the mix to dry, then ironed on the Koverall. That's right, we ironed it on. The iron must be set on the Coverite temperature to generate enough heat to pull the white glue up into the fabric's weave. Once it's there, the edges stick down very well, and one can run the iron over the surface to shrink the fabric tightly.

Overlap areas require a repeat coat on the first

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surface before the second is applied. Koverall will seal and fill with two or three coats of K&B nitrate dope. This combination accepts polyurethane paints with no blistering or peeling.

The wing and tail surfaces can also be covered with Koverall for a highly durable, structurally strong, and inexpensive finish. However, the wings and tail are sufficently rigid for safe use of such films as MonoKote. I'm not sure about the lower temperature films, however.

Flying. A thorough check-out of all systems and components should be conducted at a leisurely pace at home. Once everything is working perfectly, haul yourself and the Rearwin Junior to the nearest flying field. Be prepared to have a ball!

Ground handling is not at all squirrely for a tail-dragger. Just advance the throttle slowly until the rudder gets a bite of air. As the throttle is advanced, it will break ground with little need for up elevator.

Turns with rudder-only are gentle; slightly reverse rudder control to level the wings. With ailerons, the model requires some opposite rudder to counteract the dihedral, particularly in a left turn.

Landings are so slow and gentle that one needs only to line up with the runway about 150 ft. out and 30 ft. high, then retard throttle and let her float in. The glide is such that one may have to resort to down elevator to get the wheels onto the grass. The Junior has a natural tendency to land in a three-point attitude if sufficient speed is burned off.

This airplane can be flown by anyone who has had a bit of stick time with an Old-Timer. Stalls are mushy; we haven't been able to spin it. It has no tendency to snap at low speed nor to pitch at high speed. The Rearwin Junior flies like a heavy Old-Timer with RC assist—not a surprising development, as that's really what she is.

Build yourself one. The construction is simple but strong. It flies beautifully. Most of all, it is amazingly realistic in the air. The fun-to-work ratio on this design leans strongly to the fun side. Enjoy.

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Big Bangers/Beckman

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respect for the Quadra and its capabilities. All three engines were easy starting. Thrust outputs were, in some cases, surprisingly high, and improving with running time. Vibration levels were not excessive and were lower than some of the other chainsaw-derived engines. With the added considerations of availability and price, it's hard to beat.

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HELI-FLI/Burdin

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you are not doing the maneuver correctly. Forward flight will come in Level V, so get more practice on the basics here.

When you are finished with calm weather practice, go back and repeat the Level IV maneuvers in a light breeze.

(JS): Don't think of trying the circle-arounds in the wind until all previous work has been practiced in windy conditions. The wind direction will be constant, but its effect on your Helicopter will continously change as you fly around the circle. Approach the maneuver with the same caution as you did your first circle-around. The practice in the wind is not emphasized in this level, but unless you learn to do it, you'll always be waiting for a calm day or evening, and you'll get in little flying. (JS)

When you are finally comfortable in the wind and with various orientations, it's time to remove the training gear and return to the original factory-supplied equipment. There will be some obvious changes to your machine's performance