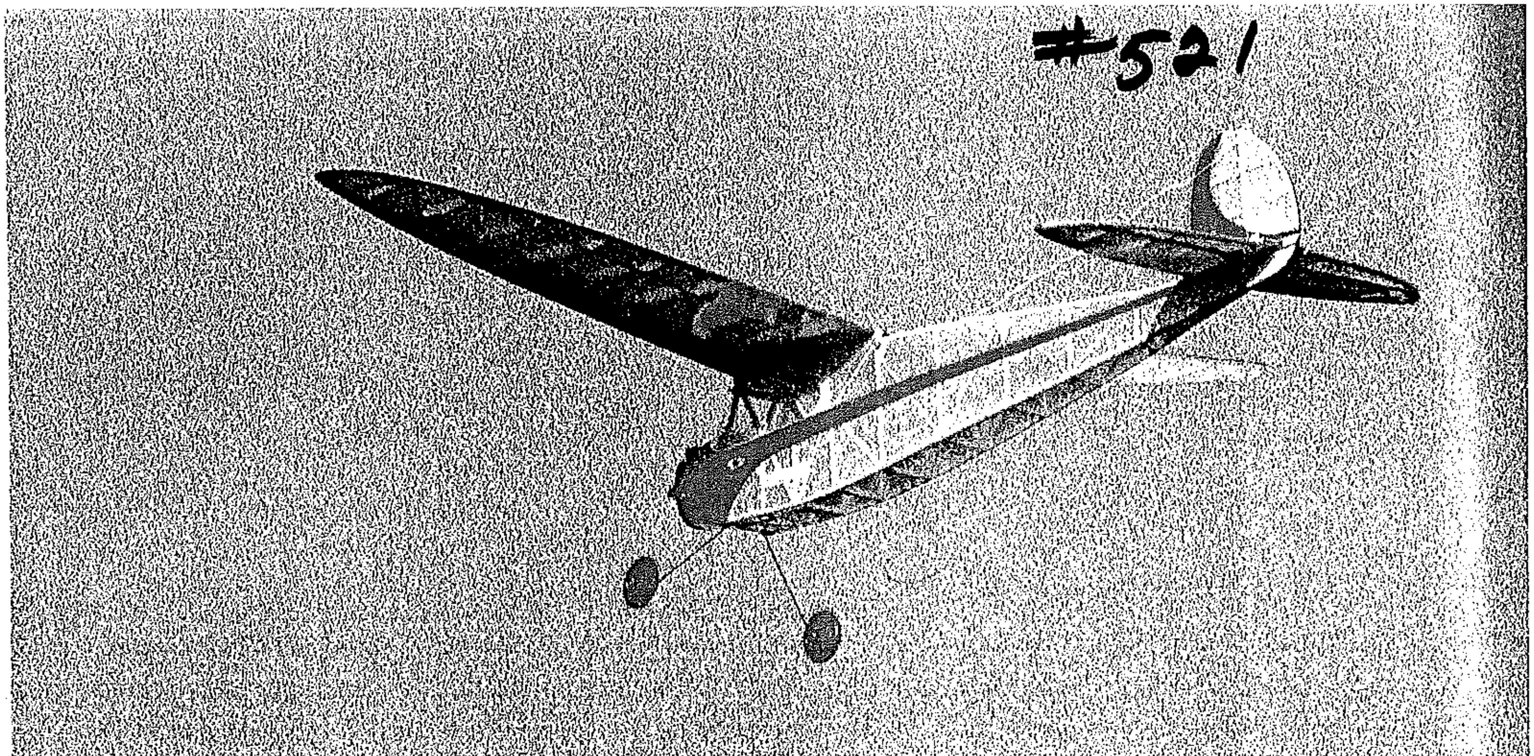
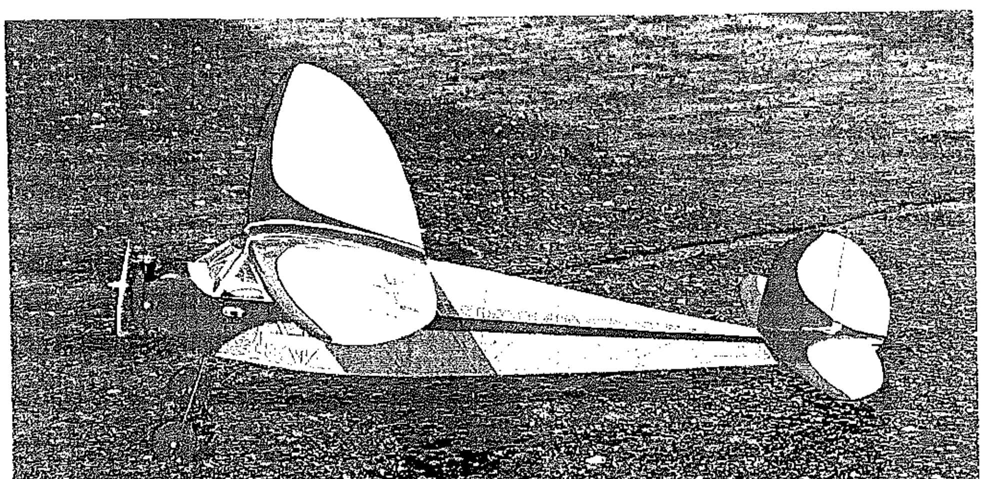
#521



For those who remember this model from the early days when it was rubber-powered, we don't need to tell you how well it flew. For those of you [illegible] to modeling, this [illegible] up ½A RC-assist version is your [illegible] amazing little design. ■Dr. D. [illegible]

Comet Jr. Clipper [illegible]

THE PROTOTYPE MODEL was a Comet Models' kit called the Jr. Clipper. It had a 36-in. wingspan and was for rubber power. The model presented here is enlarged 35% over the original, and the structures have been redesigned for use with ½A engines. It is a great fun flier. Although it is the size of a ½A Texaco model, it is not eligible for Society of Antique Modelers (SAM) competitions due to its rubber-power origins.

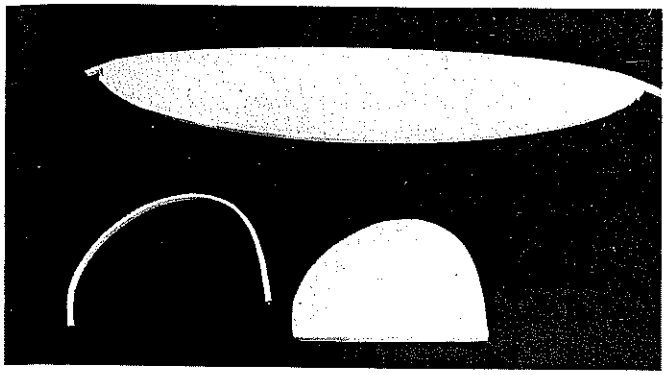


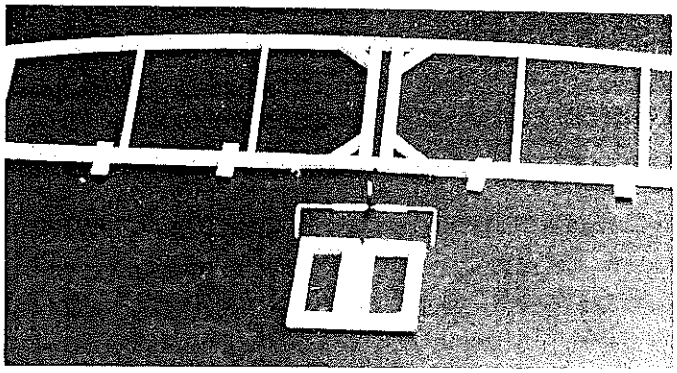
Top: No matter which size you see, all the Clippers are beautiful to behold, particularly in flight. This classic gem is almost irresistible as it gently cruises across the sky. Above: Carl Goldberg reduced his immortal 6-ft. Clipper Mk I gas design to a 36-in. rubber-powered sport model. Now Doc has enlarged it slightly into a contemporary ½A radio-assist design.

The original kit was introduced in 1938 as one of a series directed to those who lacked funds to buy engines but who were attracted to the larger gas-type models. They all featured some sort of device to produce a hum as the rubber motor unwound. Usually a ratchet was attached to the propeller which then vibrated a strip of metal. The resulting sound was much like that which today's kids produce by sticking playing cards into the spokes of a bicycle.

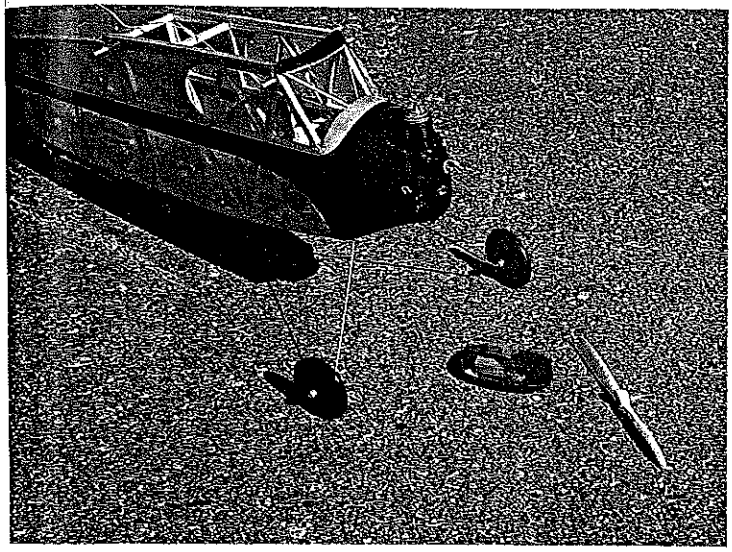
Several manufacturers produced kits with such devices, including Scientific Models' Flea, the Berkeley Buccaneer 30, and Cleveland Models' Polish Valor. Comet also had a similar rubber-powered Zipper, but the Jr. Clipper remained in the company's line well into the 1950s—seeming to indicate that it was the more popular.

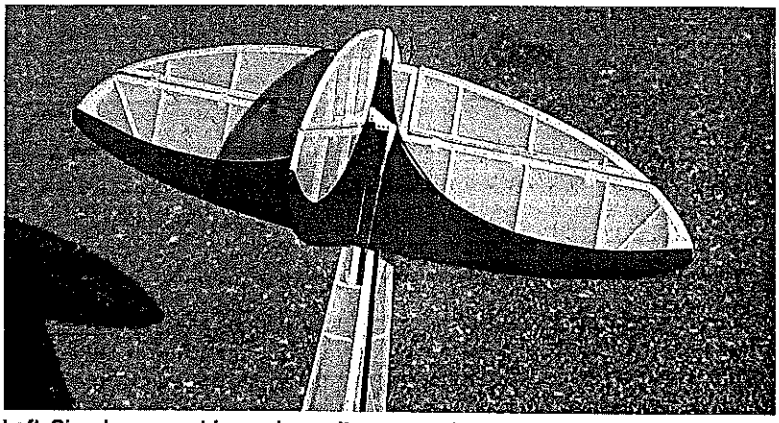
Placing the Jr. Clipper drawings alongside those of the classic 6-ft. Clipper Mk. I shows the rubber-powered version to be an almost exact half-size reduction of the big one. Although the Jr. Clipper plans do not





Left: Elliptical shapes are formed by soaking balsa strips in ammonia water and laminating them around foam board outlines. Allow the glue to dry overnight to make sure they retain their shape. Right: The simple-to-fabricate elevator horn and filler piece make a neat and efficient system. Note the very thin hinges possible with Mylar sheet material. These are almost essential to hinge the thin strip that makes up the tail.





Left: Simple removable cowl permits easy engine access and maintenance while retaining original rubber-powered nose outline. The kit had a "dummy" balsa and hardwood engine cylinder combined with a clicker to make engine-like noise. Above: Elevator and rudder are hinged with small sections of Rocket City Mylar hinge material. Lightweight connector system is described in text.

list a designer, the genius of Carl Goldberg is obviously present.

Structures of the Jr. Clipper are much simpler than the Clipper Mk. I, and these simplifications are retained in the ½A version. The flat-bottom wing airfoil with spars on the outer surfaces and the flat stabilizer are fast to work with as compared to the big gas-powered version. Nonetheless, the enlarged Jr. Clipper has all the aesthetic beauty of the big one with its lovely elliptical planform and lines.

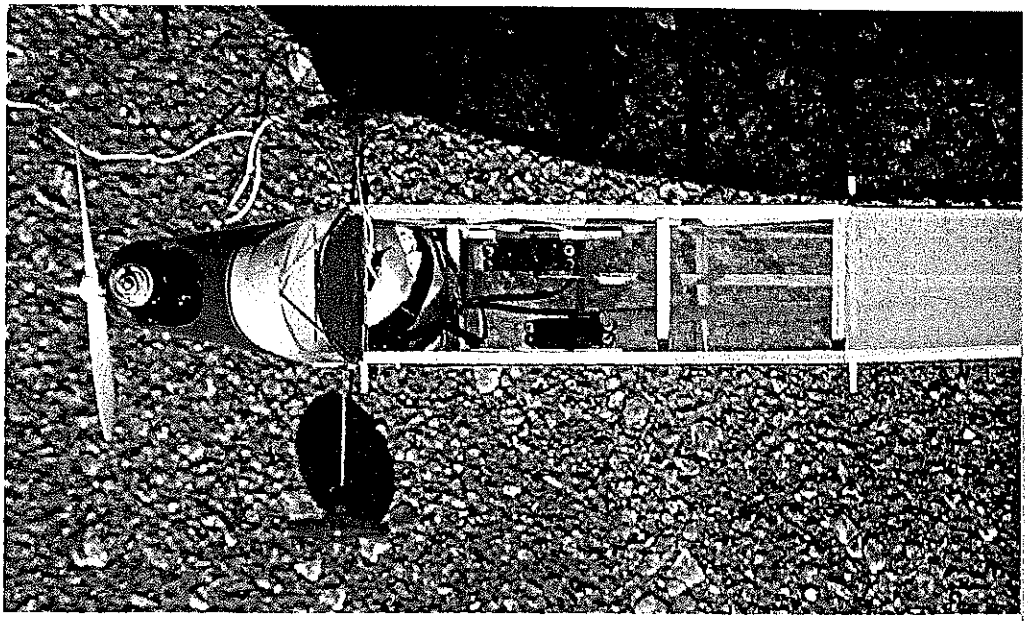
The Jr. Clipper +35% possesses better than average wind penetration for models of this size and type. It thermals even with light lift. This may be just the model for anyone who wanted a small-size Clipper but was put off by the need to cut out all those ribs, etc.

Construction. Wood sizes are close to the minimum for adequate structural integrity. No doubt the fuselage could have been built with ⅛-in.-sq. balsa, but the specified 3/16 in. weighs very little more, especially when the corners are sanded round. The larger size also provides more rigidity to aid in the boxing step.

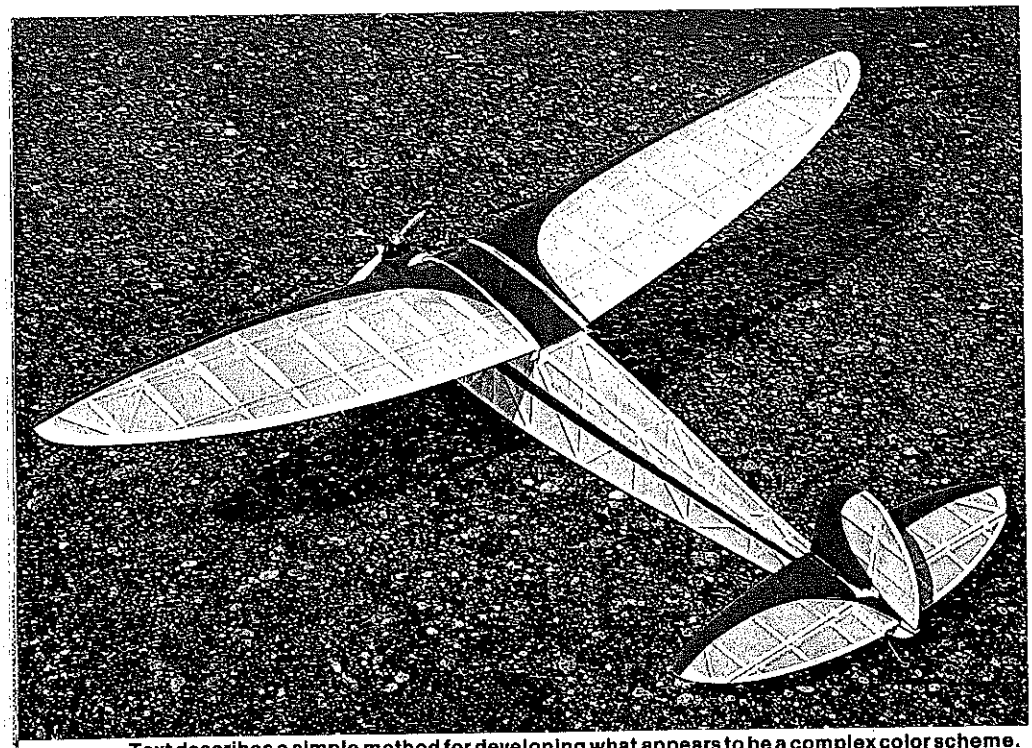
The laminated outlines of the stabilizer/elevator and fin/rudder are made with flexible balsa strips which have been moistened with ammonia diluted with water. A form of the inside outline shape is first cut from some rigid material such as foam board (trace the plan shapes onto the form material with the aid of carbon paper). The moistened balsa strips are coated with aliphatic resin (such as Sig Bond) and then pulled over the form and held with masking tape. Allow overnight for drying or place in an oven set at 125°F for a few hours.

A cyanoacrylate glue (CyA) can be used for nearly all the construction steps; which will greatly speed up completion of the project while keeping weight to a minimum. Use 5-min. epoxy to join the wing halves and install the firewall.

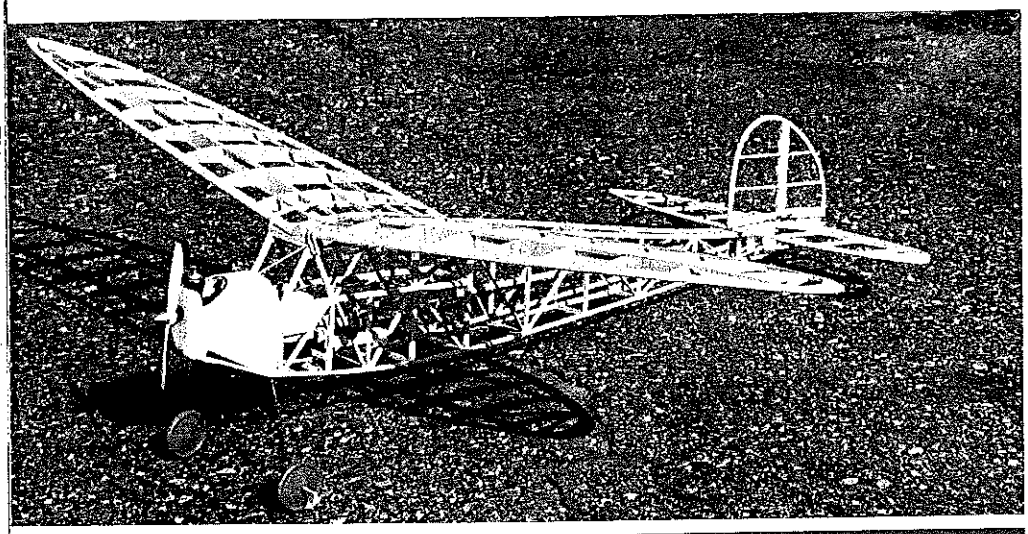
Wing. Cut the trailing edge (TE) sections from very lightweight balsa. Trace the plan shapes onto the balsa with carbon paper. Laminate the leading edge (LE) directly over the drawing; hold with pins placed



Ultra-simple servo mounting is done with tape. Linkages are "Z" bends in .045 wire ends. Balsa stick pushrods work well, and there is ample room for servos and 225 mAh battery.



Text describes a simple method for developing what appears to be a complex color scheme. Seems that Clippers, no matter what size, always look best done in yellow and something.



It would be almost sinful to cover such a beautiful structure with an opaque material. No doubt our Jr. Clipper would make a delightful rubber-powered model if the engine and RC gear were left out and a sizable braid of rubber and a big prop were substituted.

Shelly Lorance shows off her dad's latest pride and joy, an enlarged Comet Jr. Clipper.

outside the strips.

The easiest method for making the ribs is to first make a Xerox copy from the plan, cut out each rib pattern from the copy with scissors, and affix each pattern to the appropriate-size sheet of C-grain balsa with rubber cement. Cut the ribs in pairs, then carefully remove the paper and cement and sand them.

The wing is constructed completely flat on your building board. The top spars are pulled down at the tips; no tapering of the spars is required. Add the shear webs to the front spars while the wing is still on the building board to prevent warping.

Using the pre-tilted center section ribs (after both wing halves have been built), block up each tip to dihedral height and block-sand the proper bevel with the aid of a square edge on your building board. The two halves are then joined with 5-min. epoxy; clamp the center ribs together with clothespins.

Add the center section strips and a 1/32 ply dihedral gusset if you feel uncomfortable without one. (Our model did not have a dihedral gusset, and it has been spun without any damage occurring.)

Sand the LE and TE to the contour shown on the plans either before or after putting in the dihedral. When covering the wing, shrink both sides of a panel equally as you go along; this helps to prevent warps.

Tail surfaces. Use the lamination technique to make the outlines, then place the outlines over the drawing, and add the internal structures. Cut the sections apart, and trial-fit the hinges and horns. We prefer to cover the sections before installing the hinges.

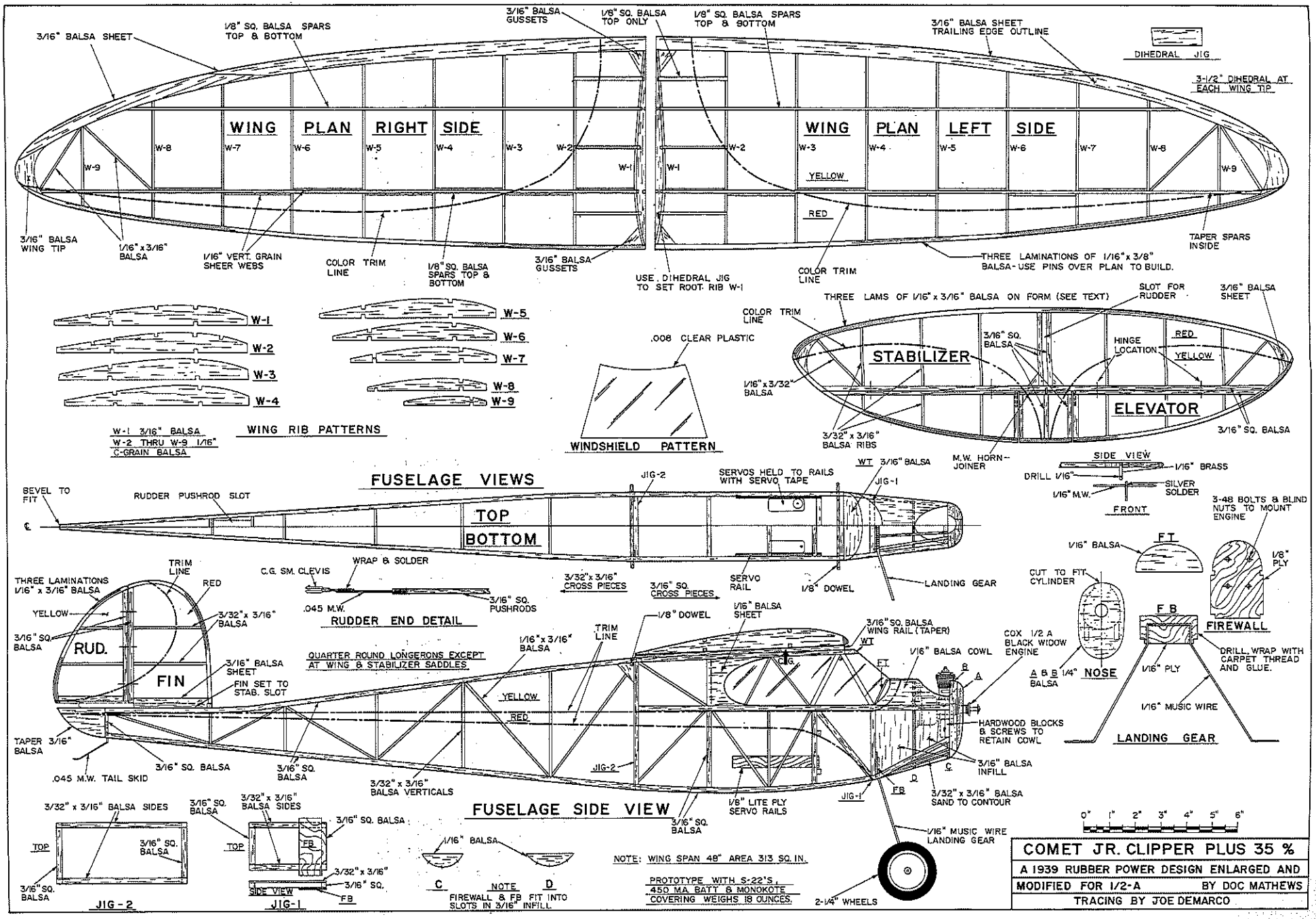
The elevator "tiller" is not required for performance reasons, but using it makes the model look nice. It is fabricated of music wire and K&S brass strip silver-soldered together (StaBrite solder works well with an electric soldering gun). Obviously, an external horn could be used with a wire joiner to connect the two elevator halves.

We used section of Radio South Mylar-fiber-coated hinge material CyA-glued into slots and anchored with small sections of toothpick. Other choices would include Ace RC nylon hinge material and Mono-Kote hinges.

Fuselage. Construction is the classic two-sides-built-one-over-the-other using scraps of masking tape to prevent sticking. The sides are then popped apart with a table knife and assembled into a box.

Cut and drill the firewall for 3-48 bolts

Continued on page 162



COMET JR. CLIPPER PLUS 35 %

A 1939 RUBBER POWER DESIGN ENLARGED AND MODIFIED FOR 1/2-A BY DOC MATHEWS

TRACING BY JOE DEMARCO

Full-Size Plans Available . . . See Page 164

Apply the first coat of polyurethane varnish, and let it dry thoroughly. Finish-sand the polyurethane with 320-grit paper, and apply a second coat. When the box is dry, install all the hardware and covers. To ensure that the small hinge screws will hold, squirt some Zap-A-Gap into the screw holes before assembly.

Cut and slit the pipe insulation material for the airplane support slots in the cover. Cut and Zap-glue the foam rubber into the transmitter and fuel can cavities. Mount the handle, axle, and wheels to ensure that they fit properly. You may have to trim excessive polyurethane from the mounting holes.

The first time you use your Flight Assistant at the flying field, be prepared to endure the jealous remarks of your fellow modelers. You will find, however, that after the first barrage of snide remarks (referring to your laziness and lack of strength to carry your own flight box wherever you go), your friends will start asking such questions as: "Where did you get the plans?" "How long did it take you to build it?" "How about building me one?"

Jr. Clipper/Mathews

Continued from page 90

and blind nuts. *Do not mount the engine with screws!* Fabricate Jigs 1 and 2 directly over the drawing. Part FB is 1/16 ply and should be drilled to accept the already-bent landing gear unit.

Place the left frame over the plan, and weight it down. Install the two jigs in their appropriate slots, checking for absolute squareness in both planes. A carpenter's square or a 90° triangle should be used to check for squareness in each step of the assembly.

CyA-glue the jigs to the left side, then place the right side over them. Again check the alignment. When satisfied, CyA-glue the right side to the jigs.

Pull the tail posts together and hold with clothespins while again checking for squareness, then CyA-glue them together. Cut the cross braces in pairs using the top view as a guide. Install them, working from the front to the back. This technique will produce a well-aligned fuselage box every time.

Remove the box from the building board, and install the firewall with the aid of the top view as a guide. The landing gear must now be installed, followed by Bulkheads C and D. Finish the fuselage by adding the front sheeting and nose blocks; sand the unit to a nice contour.

Radio installation. The prototype model came out slightly under 18 oz. with a 100 mAh battery, indicating that use of micro servos is not a must. Our servos were mounted to the Lite Ply rails with servo tape. If the wood is first hardened with an application of CyA, the tape will stick without pulling loose from the wood grain.

The plan details a simple, lightweight pushrod system. (Unfortunately, available flex-rods are not light enough for use with this type of model.) With the elevator horn buried, one needs to be very careful to set the servo end Z-bend for neutral before placing it permanently. Some adjustment, of course, is available by positioning the servo.

We placed the 225 mAh battery against the firewall, the Royal Vanguard receiver wrapped in foam immediately behind it, and the servos almost directly under the center of gravity (CG). No ballast was required with this setup.

Control surface throws on a model such as this with a wide speed differential from power on to power off are mostly a matter of pilot skill. Should you have a dual-rate system for elevator and rudder, use minimal throws in power, then switch to much higher throws for the glide. Ours is set up

with 1 in. total for the rudder and ¾ in. total on the elevator, measured at the widest point. We don't have dual rates on this particular system, but we use a gentle thumb during the powered portion of the flight.

Another variable lies in the particular approach you like for Old-Timer-like RC-assist flying. Some prefer using two head gaskets in the engine in conjunction with 5% nitro fuel and an 8-3 prop for a long, low-powered engine run. Others like to use 30% nitro and a 6-3 prop to get way up in a hurry. Which you choose, of course, will affect the desirable amount of control throw.

Covering and decorating. The prototype Jr. Clipper +35% was covered with Mono-Kote. It would have been lighter if covered with Japanese tissue and clear dope, and this would be a viable choice if larger radio equipment is used. My wife is violently allergic to dope fumes, so I usually choose a heat-shrink covering material to avoid having to dope outdoors.

The decoration outlines of the original kit model are shown on the plans. By placing the covered sections over the plans, one can trace the decoration outlines through the transparent covering with a pencil designed for use on Mylar overhead projection plates. Ours is a Dixon Vis-aid 38, but most school supply firms carry equivalents.

An adjustable French curve (one of those rubber-covered wire things sold in drafting supply sections) is useful in developing

FULL SIZE PLANS

No. 517 Fake Ford $5.75
RC Sportster is reminiscent of Ford Trimotor for 3-½A engines, 3 RC channels. Wingspan 50 in. Two plan sheets.

No. 518 Project P-13 ..... $3.25
FF Scale German WW II flying wing has twin rubber motors, spans 26 in.

No. 519 Gee Bee R-1 ..... $4.75
CL Profile sport flier for .25 engines spans 36¼ in.

No. 520 Flight Assistant $11.50
Flight box on wheels helps Power-plane modelers. Two sheets.

No. 521 Comet Jr. Clipper Plus 35 ..... $6.50
RC Old-Timer sportster for ½A, two RC channels. Wingspan 48½ in.

No. 193	**Stiletto:** CL Stunt model (McDonald) winner 1976, 1980, 1982 FAI World Champs	$ 3.75
No. 239	**Blue Birds:** RC Ken Willard's formation plane, 4-channel, .10-power	$ 3.75
No. 262	**Crashmaster:** CL Crash-proof trainer, two sizes—.15-.30- and .35-.40-power	$ 1.25
No. 302	**Mini F-16:** RC Sarpolus' .049 ducted fan sport flier for 2-channel. Balsa wings, tail, fuse structure	$ 2.75
No. 310	**1930 Fleet Biplane:** RC Sport Scale for .35-.40, 4-channel. Wingspan 56 in. ⅛ scale. Two sheets	$ 6.25
No. 314	**Drake II:** RC Ken Willard's flying boat for 3-channel, .15-power. Fly from land with removable gear	$ 3.75
No. 326	**Taylor Cub:** RC Don Srull's Schoolyard-Scale for .049s, 2-3 channel. Spans 50 in.	$ 3.50
No. 332	**Zephyr:** RC Small, 2-channel glider for hand-launch or tow, thermal, or slope soaring	$ 2.00
No. 386	**Laser 200:** RC Sport Scale replica of championship Aerobatic flier. Uses .40 power, 4-5 channel. Two sheets	$10.75
No. 414	**Electric Sparky:** RC electric-powered fun flier for 05 motor, 3-channel RC is scaled up 1939 rubber-power favorite	$ 8.50
No. 422	**Scooter:** RC Two-Meter Sailplane has won Nats event in 1982, 1983, plus many other contests	$ 5.50
No. 430	**Ironside:** RC Zippy little sportster for .10-.15 power and 3-channel RC	$ 4.00
No. 433	**Watts Up:** RC Electric-powered glider for 2-3 channels, 035 motor spans 52 in.	$ 4.50
No. 438	**Cruiser:** FF Embryo Endurance rubber-power fun ship has big-model characteristics	$ 2.00
No. 440	**Cavalier:** RC Old-Timer-like new design has a huge wing for slow, easy flights. For .35 power, 3 channels. Two sheets	$17.25
No. 444	**Fireball:** RC pusher canard sport/pattern uses .40 pusher engine and 4-channel. Has swept-forward foam wings	$ 6.50
No. 447	**½A Miss America:** RC Old-Timer ½A Texaco model for .049 glow, 2-channels	$ 6.50
No. 452	**Gee Bee Z:** RC Quarter-scale spans 71½ in., uses .90 power. Four sheets	$16.00
No. 454	**Sweet P-30:** FF Neat, stick-and-tissue Outdoor Rubber P-30-class model is a contest-winner	$ 2.00
No. 457	**Spectra:** RC Electric-power for 05-size motor uses 3 different wings for sport, soaring, or aerobatics	$ 7.00
No. 460	**4-40:** RC Shoulder-wing sport flier for 4-cycle, .40-size engine, 4 channels	$ 6.50
No. 463	**Platyhelminthes VI:** RC ½A Pylon racer uses lots of lite ply in built-up structure for strength, lightness	$ 4.75
No. 465	**Blue Max II:** RC Fun-fly sportster for .40-size engines spans 52 in. Lightweight structure	$ 7.00
No. 468	**Smoother:** CL Stunter for .29/.35 power. Design is based on hybrid Smoothie/Nobler	$ 6.75
No. 470	**Stroker:** RC Mid-wing sportster uses .40/.45 four-stroke engine, spans 50½ in., tail-dragger	$ 6.50
No. 478	**Buttercup:** RC Cute, elfin sportster uses micro 2-ch. RC or pulse-rudder. Spans 27 in., for .020-.035 power	$ 3.00
No. 479	**Four-Stroke Rooster:** RC Sport/Aerobatics ship has 1920s styling, uses .90 4-stroke engine, spans 85 in. 2 sheets	$11.00
No. 482	**Golden-Ager:** RC Sport/Aerobatic model looks like a Golden Age sportster. For .60 engines, spans 62 in.	$ 7.50
No. 483	**CGS Hawk Ultralight:** FF Outdoor "Gas" Scale plane uses CO-2 power, spans 29 in.	$ 3.00
No. 487	**Cap 21:** RC Scale Aerobatic plane for .40-size engine spans 62 in. Two sheets.	$10.00
No. 488	**MB-7:** FF Jumbo Rubber Scale of 1920-era Thomas Morse Scout biplane spans 37 in.	$ 5.00
No. 490	**Weekender:** RC Low-wing sport flier for .20-size 4-stroke engine spans 47½ in.	$ 5.75
No. 495	**FW-190:** RC Hand-launched, all-balsa scalelike sportster for .10-.15 engines and two RC channels. Spans 39 in.	$ 4.25
No. 496	**P-47 Thunderbelt:** RC Other half of Dogfight Duo has similar characteristics to FW-190	$ 4.25
No. 497	**Manhattan Pieces:** FF Indoor rubber cabin model is ideal for beginners. Spans 20½ in.	$ 2.00
No. 499	**4-60:** RC Doc Mathews' great sport flier for .60-size four-stroker engine spans 70 in. Two sheets	$12.75
No. 500	**Fokker D.VII:** RC Sport scale model of WW I monoplane uses .90 four-stroke engine, spans 83½ in. Two sheets	$16.00
No. 501	**Eindecker:** CL Sport scale model of early WW I monoplane for ½A power spans 23¼ in.	$ 2.00
No. 502	**Bill Winter's Vagabond:** FF Sport flier is down-sized, .02-powered version of 1940s cabin plane. Spans 33½ in.	$ 2.25
No. 503	**Buzzbat:** RC Slope-soarer spans 60 in., uses 2 RC channels	$ 7.50
No. 504	**Turbo Lance II:** FF Rubber-powered scale model spans 19½ in.	$ 1.50
No. 505	**P-38 Lightning:** CL Sport Scale fighter spans 65½ in., weighs 10 lb., uses twin .35s. Two sheets	$11.75
No. 506	**Playmate:** RC Sport flier for 3 RC channels, .15-.25 engines spans 50 in.	$ 6.50
No. 507	**Hummin'bird:** FF Hot class A/B Gas competition plane won at the '85 Nats	$ 7.50
No. 508	**B-25B:** CL Profile scale WW II bomber for twin ½A engines spans 30½ in.	$ 4.00
No. 509	**Roscoe 18:** FF Hand-Launched Glider features curved, 18-in. wing, DT	$ 1.50
No. 510	**Stomper:** FF Hand-Launched Glider has angular, 18-in. wing, DT	$ 1.50
No. 511	**F-16:** CL ½A profile scale fighter spans 17 in., has tricycle landing gear	$ 2.00
No. 512	**Extra 230:** RC Giant Scale acrobatic plane spans 6 ft., uses Quadra engine. Two plan sheets	$16.50
No. 513	**Black Beauty:** RC Slope-soaring racer has foam wing, 3-ch. RC, spans 114 in.	$ 7.50
No. 514	**Henry T:** RC Sportster for ½A, 2-3 channel RC spans 52 in., has adjustable flaps	$ 4.75
No. 515	**Westland Whirlwind:** RC Sport Scale WW II twin-engine British fighter for .10-size engines spans 55 in. Two sheets	$11.50
No. 516	**Envoy:** CL Stunter for .40/46 power spans 58 in.	$ 6.75

Full-size Plan List Available. A complete listing of all plans previously published in this magazine, through No. 489, may be obtained free of charge by writing (enclose stamped, pre-addressed envelope) *Model Aviation*, 1810 Samuel Morse Dr., Reston, VA 22090.

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440	444	447	452	454	457	460
463	465	468	470	478	479	482
483	487	488	490	495	496	497
499	500	501	502	503	504	505
506	507	508	509	510	511	512
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steady, smooth curves. One can carefully draw the outlines without it, however. The bottom surfaces can then be traced using the upper outline as a guide.

Sig Stripe Rite tape in 3/32-in. or ⅛-in. widths will flex well around the curves and can be widened afterward with electrician's tape. The edges should be sealed with some sort of clear material; we prefer Sig Skybrite applied along the seam with a small brush (this prevents seepage of the color coats).

Use paper and masking tape to cover the areas not to be painted. Then lightly score the MonoKote with #400 steel wool just enough to remove some of the gloss. Clean the surfaces to be painted with acetone, and avoid touching with fingers afterward.

Poly-U, Super Poxy, and Skybrite can be sprayed onto MonoKote and will adhere well. We used Poly-U on this particular model. After shaking the spray can, a light mist coat was applied with the can 12 in. or more away from the surface. We made no effort to completely apply a heavy layer of paint. The light coating produced a semi-transparent color of real beauty.

The paper, masking tape, electrician's tape, and Stripe Rite were then removed, and a fresh line of Stripe Rite in a contrasting color was applied for trim. The engine compartment and removable cowl front were primed with Skybrite primer and sprayed separately.

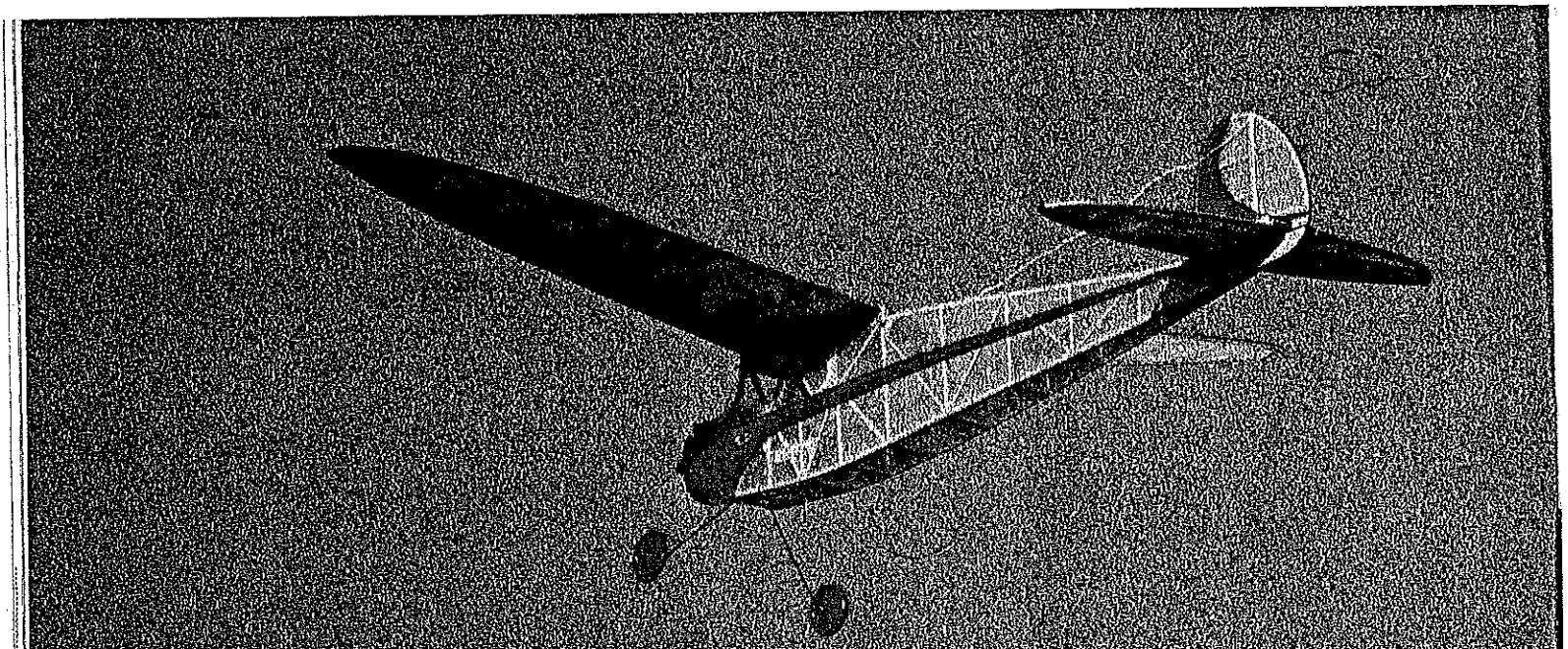
Flying. A problem with many models of this type is inadequate wind penetration. Some models just won't turn when downwind and must be kept upwind at all times. Others will climb nearly straight up without moving forward at all. Still others will handle windy conditions well but will glide like lead sleds in calm air.

We conclude that such variables as wing loading and CG placement need to be selected according to the wind velocity. In other words, if you often fly in windy weather, it may be better to ballast the model for the wind even if some of the glide duration will be lost. The CG point shown on the plan is for windy conditions; move it rearward ½ in. to ¾ in. for light winds.

For some reason the Jr. Clipper +35% behaves better in the wind than any other ½A of this general type that I've flown. Perhaps the wide fuselage profile helps . . . or the tapered flat-bottom airfoil . . . or the longer-than-average tail moment. Whatever the reason, the model penetrates well, will turn upwind or downwind with ease, and will float in the lightest of lift. I wouldn't mind taking the credit for this, but I honestly feel it is the genius of Carl Goldberg.

Hand launches with this model are well-controlled with little tendency to veer off to one side or drop like a stone. The Jr. Clipper +35% tends to climb on its wing rather than the prop. This gives a straight out and up climb rather than a corkscrew.

Slow-speed characteristics are excellent. Gentle and well-placed landings are easy even in the wind. All in all, this is just a very nice little airplane.



For those who remember this model from the early days when it was rubber-powered, we don't need to tell you how well it flew. For those of you newer to modeling, this scaled-up ½A RC-assist version is your chance to discover a truly amazing little design. ■Dr. D.B. Mathews

Comet Jr. Clipper +35%

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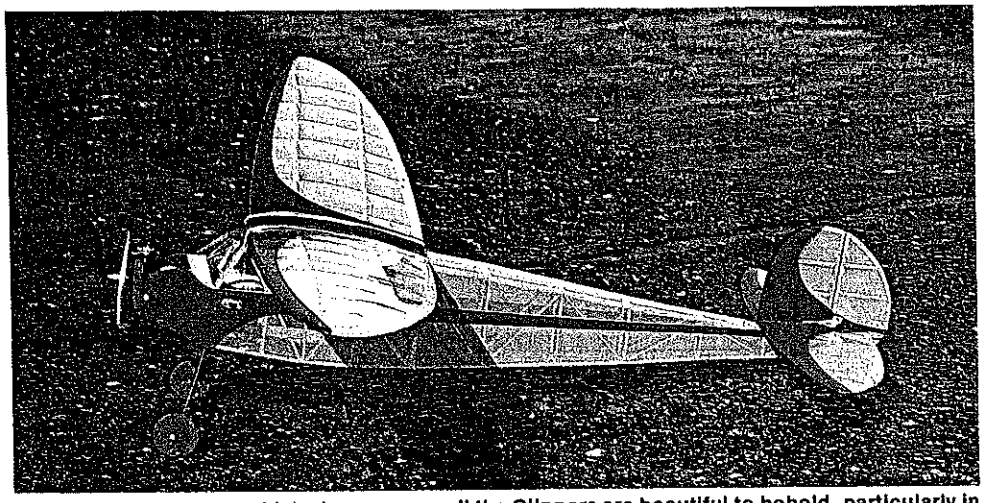

Top: No matter which size you see, all the Clippers are beautiful to behold, particularly in flight. This classic gem is almost irresistible as it gently cruises across the sky. Above: Carl Goldberg reduced his immortal 6-ft. Clipper Mk I gas design to a 36-in. rubber-powered sport model. Now Doc has enlarged it slightly into a contemporary ½A radio-assist design.

The original kit was introduced in 1938 as one of a series directed to those who lacked funds to buy engines but who were attracted to the larger gas-type models. They all featured some sort of device to produce a hum as the rubber motor unwound. Usually a ratchet was attached to the propeller which then vibrated a strip of metal. The resulting sound was much like that which today's kids produce by sticking playing cards into the spokes of a bicycle.

Several manufacturers produced kits with such devices, including Scientific Models' Flea, the Berkeley Buccaneer 30, and Cleveland Models' Polish Valor. Comet also had a similar rubber-powered Zipper, but the Jr. Clipper remained in the company's line well into the 1950s—seeming to indicate that it was the more popular.

Placing the Jr. Clipper drawings alongside those of the classic 6-ft. Clipper Mk. I shows the rubber-powered version to be an almost exact half-size reduction of the big one. Although the Jr. Clipper plans do not

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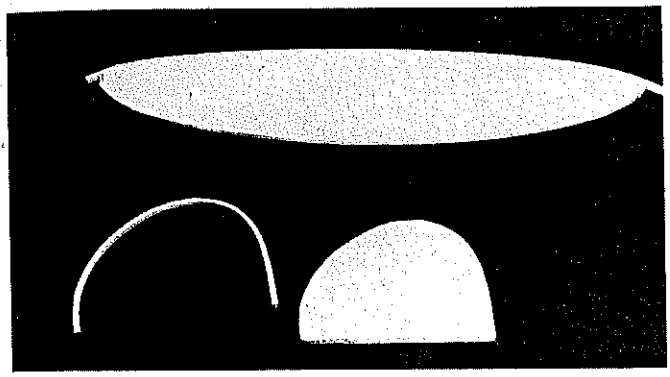
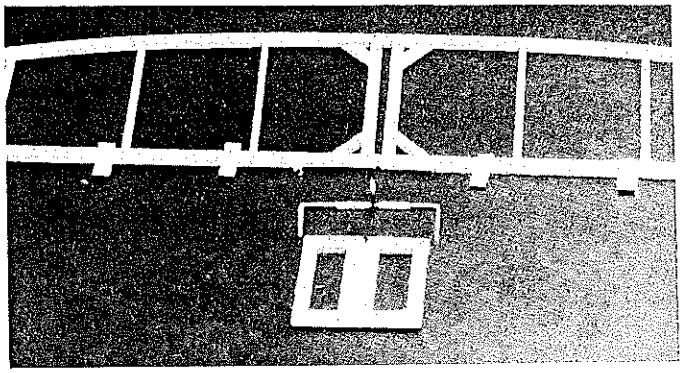
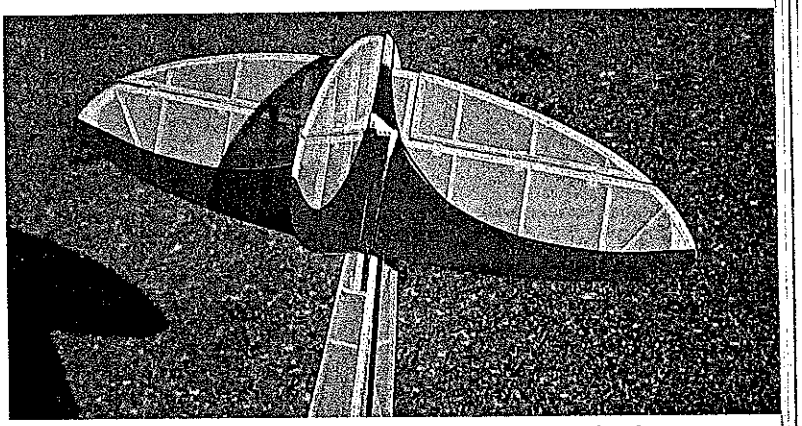




Left: Elliptical shapes are formed by soaking balsa strips in ammonia water and laminating them around foam board outlines. Allow the glue to dry overnight to make sure they retain their shape. Right: The simple-to- fabricate elevator horn and filler piece make a neat and efficient system. Note the very thin hinges possible with Mylar sheet material. These are almost essential to hinge the thin strip that makes up the tail.



Left: Simple removable cowl permits easy engine access and maintenance while retaining original rubber-powered nose outline. The kit had a "dummy" balsa and hardwood engine cylinder combined with a clicker to make engine-like noise. Above: Elevator and rudder are hinged with small sections of Rocket City Mylar hinge material. Lightweight connector system is described in text.

list a designer, the genius of Carl Goldberg is obviously present.

Structures of the Jr. Clipper are much simpler than the Clipper Mk. I, and these simplifications are retained in the ½A version. The flat-bottom wing airfoil with spars on the outer surfaces and the flat stabilizer are fast to work with as compared to the big gas-powered version. Nonetheless, the enlarged Jr. Clipper has all the aesthetic beauty of the big one with its lovely elliptical planform and lines.

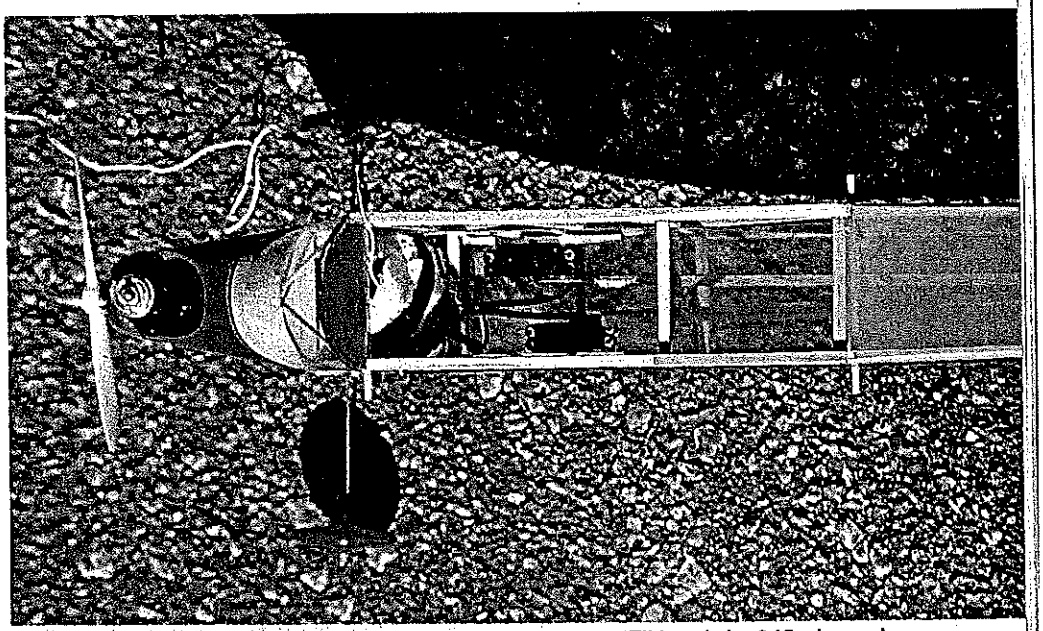
The Jr. Clipper +35% possesses better than average wind penetration for models of this size and type. It thermals even with light lift. This may be just the model for anyone who wanted a small-size Clipper but was put off by the need to cut out all those ribs, etc.

Construction. Wood sizes are close to the minimum for adequate structural integrity. No doubt the fuselage could have been built with ⅛-in.-sq. balsa, but the specified 3/16 in. weighs very little more, especially when the corners are sanded round. The larger size also provides more rigidity to aid in the boxing step.

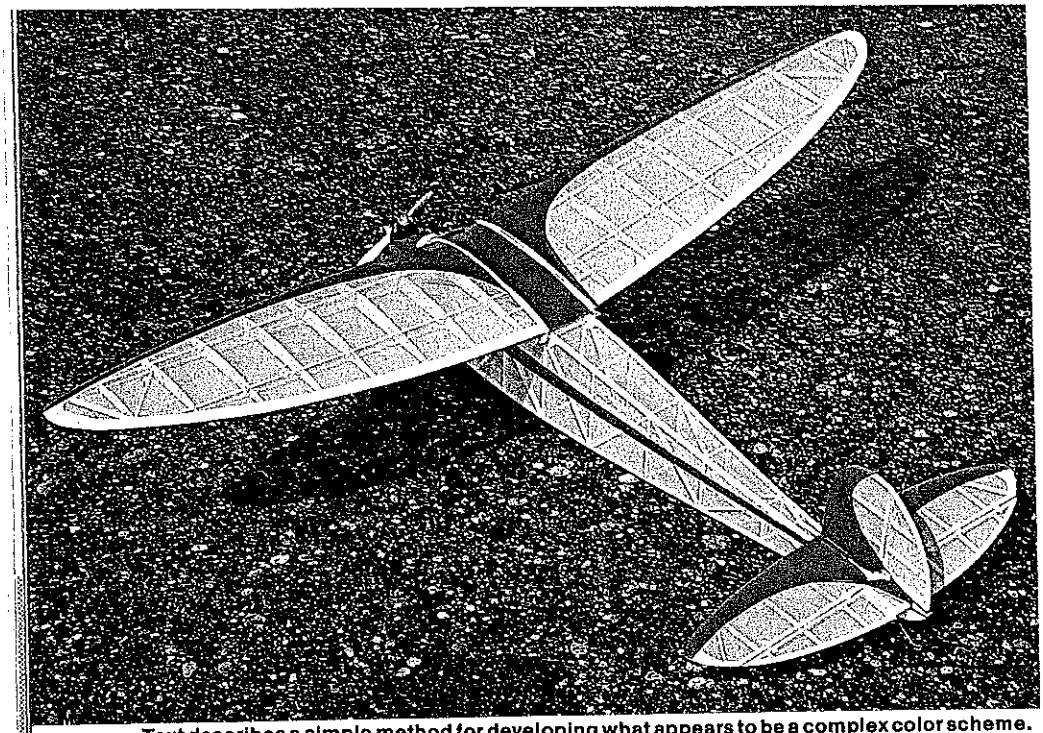
The laminated outlines of the stabilizer/elevator and fin/rudder are made with flexible balsa strips which have been moistened with ammonia diluted with water. A form of the inside outline shape is first cut from some rigid material such as foam board (trace the plan shapes onto the form material with the aid of carbon paper). The moistened balsa strips are coated with aliphatic resin (such as Sig Bond) and then pulled over the form and held with masking tape. Allow overnight for drying or place in an oven set at 125°F for a few hours.

A cyanoacrylate glue (CyA) can be used for nearly all the construction steps; which will greatly speed up completion of the project while keeping weight to a minimum. Use 5-min. epoxy to join the wing halves and install the firewall.

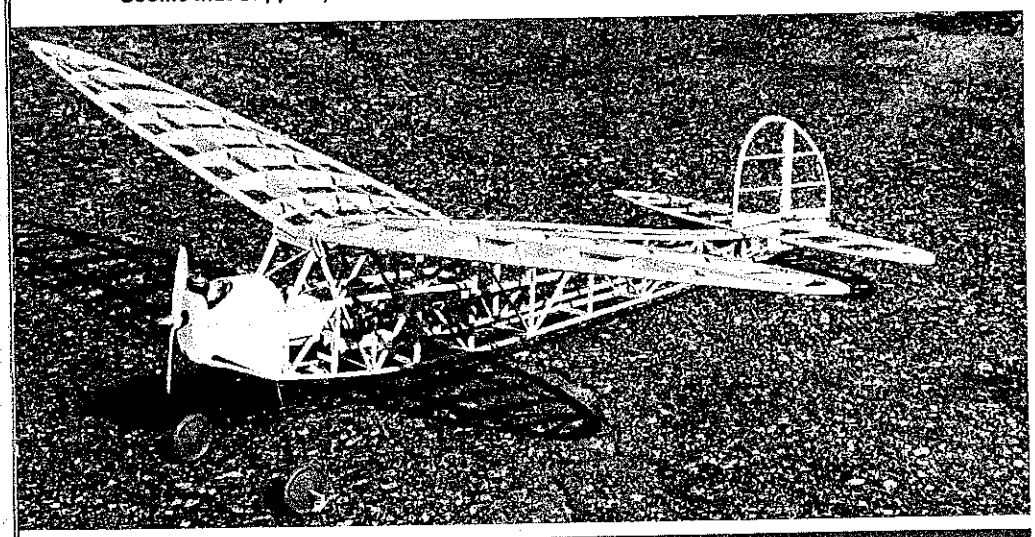
Wing. Cut the trailing edge (TE) sections from very lightweight balsa. Trace the plan shapes onto the balsa with carbon paper. Laminate the leading edge (LE) directly over the drawing; hold with pins placed



Ultra-simple servo mounting is done with tape. Linkages are "Z" bends in .045 wire ends. Balsa stick pushrods work well, and there is ample room for servos and 225 mAh battery.



Text describes a simple method for developing what appears to be a complex color scheme. Seems that Clippers, no matter what size, always look best done in yellow and something.



It would be almost sinful to cover such a beautiful structure with an opaque material. No doubt our Jr. Clipper would make a delightful rubber-powered model if the engine and RC gear were left out and a sizable braid of rubber and a big prop were substituted.

Shelly Lorance shows off her dad's latest pride and joy, an enlarged Comet Jr. Clipper.

outside the strips.

The easiest method for making the ribs is to first make a Xerox copy from the plan, cut out each rib pattern from the copy with scissors, and affix each pattern to the appropriate-size sheet of C-grain balsa with rubber cement. Cut the ribs in pairs, then carefully remove the paper and cement and sand them.

The wing is constructed completely flat on your building board. The top spars are pulled down at the tips; no tapering of the spars is required. Add the shear webs to the front spars while the wing is still on the building board to prevent warping.

Using the pre-tilted center section ribs (after both wing halves have been built), block up each tip to dihedral height and block-sand the proper bevel with the aid of a square edge on your building board. The two halves are then joined with 5-min. epoxy; clamp the center ribs together with clothespins.

Add the center section strips and a 1/32 ply dihedral gusset if you feel uncomfortable without one. (Our model did not have a dihedral gusset, and it has been spun without any damage occurring.)

Sand the LE and TE to the contour shown on the plans either before or after putting in the dihedral. When covering the wing, shrink both sides of a panel equally as you go along; this helps to prevent warps.

Tail surfaces. Use the lamination technique to make the outlines, then place the outlines over the drawing, and add the internal structures. Cut the sections apart, and trial-fit the hinges and horns. We prefer to cover the sections before installing the hinges.

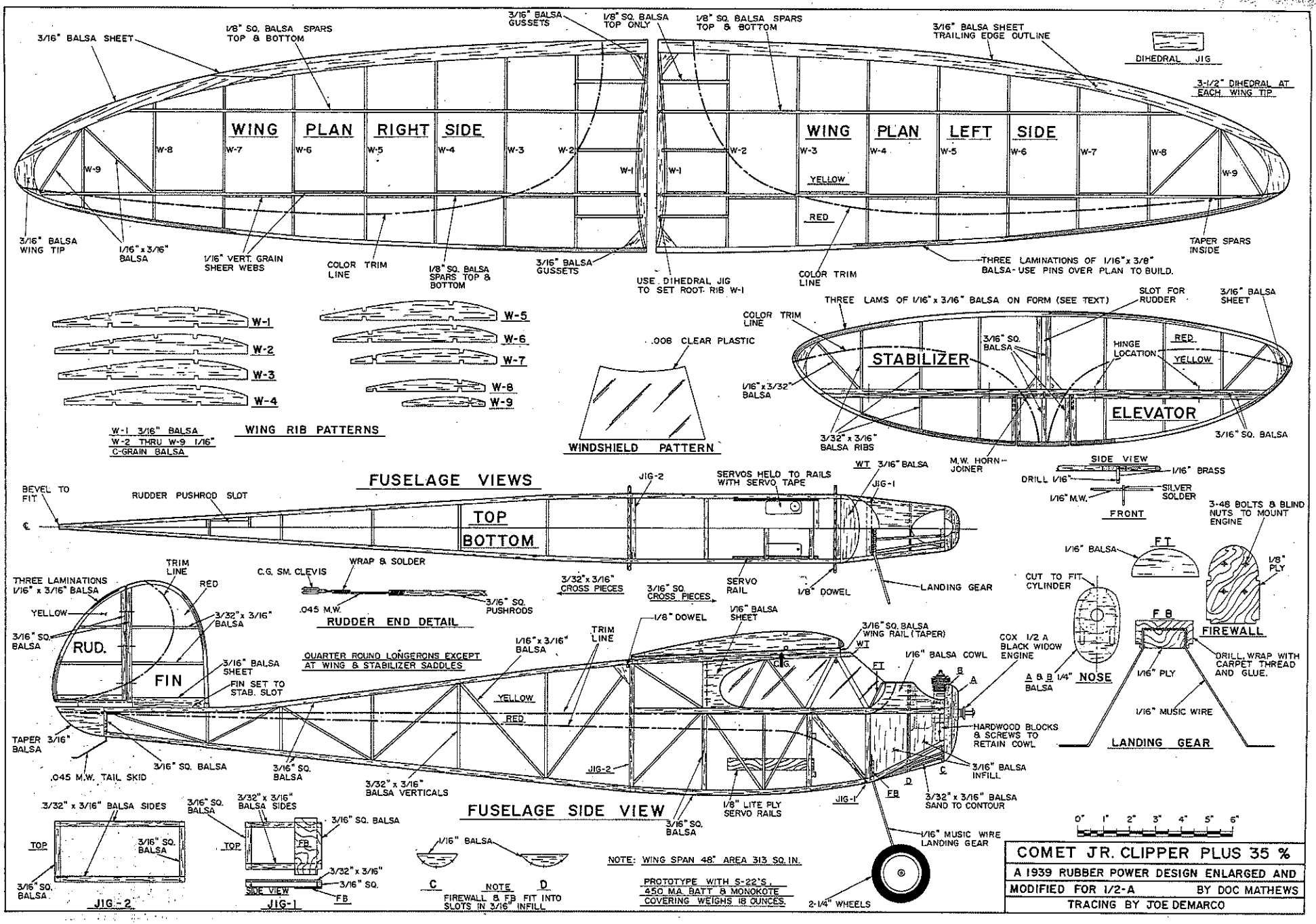
The elevator "tiller" is not required for performance reasons, but using it makes the model look nice. It is fabricated of music wire and K&S brass strip silver-soldered together (StaBrite solder works well with an electric soldering gun). Obviously, an external horn could be used with a wire joiner to connect the two elevator halves.

We used section of Radio South Mylar-fiber-coated hinge material CyA-glued into slots and anchored with small sections of toothpick. Other choices would include Ace RC nylon hinge material and Mono-Kote hinges.

Fuselage. Construction is the classic two-sides-built-one-over-the-other using scraps of masking tape to prevent sticking. The sides are then popped apart with a table knife and assembled into a box.

Cut and drill the firewall for 3-48 bolts

Continued on page 162



Full-Size Plans Available . . . See Page 164

Apply the first coat of polyurethane varnish, and let it dry thoroughly. Finish-sand the polyurethane with 320-grit paper, and apply a second coat. When the box is dry, install all the hardware and covers. To ensure that the small hinge screws will hold, squirt some Zap-A-Gap into the screw holes before assembly.

Cut and slit the pipe insulation material for the airplane support slots in the cover. Cut and Zap-glue the foam rubber into the transmitter and fuel can cavities. Mount the handle, axle, and wheels to ensure that they fit properly. You may have to trim excessive polyurethane from the mounting holes.

The first time you use your Flight Assistant at the flying field, be prepared to endure the jealous remarks of your fellow modelers. You will find, however, that after the first barrage of snide remarks (referring to your laziness and lack of strength to carry your own flight box wherever you go), your friends will start asking such questions as: "Where did you get the plans?" "How long did it take you to build it?" "How about building me one?"

Jr. Clipper/Mathews

Continued from page 90

and blind nuts. *Do not mount the engine with screws!* Fabricate Jigs 1 and 2 directly over the drawing. Part FB is 1/16 ply and should be drilled to accept the already-bent landing gear unit.

Place the left frame over the plan, and weight it down. Install the two jigs in their appropriate slots, checking for absolute squareness in both planes. A carpenter's square or a 90° triangle should be used to check for squareness in each step of the assembly.

CyA-glue the jigs to the left side, then place the right side over them. Again check the alignment. When satisfied, CyA-glue the right side to the jigs.

Pull the tail posts together and hold with clothespins while again checking for squareness, then CyA-glue them together. Cut the cross braces in pairs using the top view as a guide. Install them, working from the front to the back. This technique will produce a well-aligned fuselage box every time.

Remove the box from the building board, and install the firewall with the aid of the top view as a guide. The landing gear must now be installed, followed by Bulkheads C and D. Finish the fuselage by adding the front sheeting and nose blocks; sand the unit to a nice contour.

Radio installation. The prototype model came out slightly under 18 oz. with a 100 mAh battery, indicating that use of micro servos is not a must. Our servos were mounted to the Lite Ply rails with servo tape. If the wood is first hardened with an application of CyA, the tape will stick without pulling loose from the wood grain.

The plan details a simple, lightweight pushrod system. (Unfortunately, available flex-rods are not light enough for use with this type of model.) With the elevator horn buried, one needs to be very careful to set the servo end Z-bend for neutral before placing it permanently. Some adjustment, of course, is available by positioning the servo.

We placed the 225 mAh battery against the firewall, the Royal Vanguard receiver wrapped in foam immediately behind it, and the servos almost directly under the center of gravity (CG). No ballast was required with this setup.

Control surface throws on a model such as this with a wide speed differential from power on to power off are mostly a matter of pilot skill. Should you have a dual-rate system for elevator and rudder, use minimal throws in power, then switch to much higher throws for the glide. Ours is set up

with 1 in. total for the rudder and ¾ in. total on the elevator, measured at the widest point. We don't have dual rates on this particular system, but we use a gentle thumb during the powered portion of the flight.

Another variable lies in the particular approach you like for Old-Timer-like RC-assist flying. Some prefer using two head gaskets in the engine in conjunction with 5% nitro fuel and an 8-3 prop for a long, low-powered engine run. Others like to use 30% nitro and a 6-3 prop to get way up in a hurry. Which you choose, of course, will affect the desirable amount of control throw.

Covering and decorating. The prototype Jr. Clipper +35% was covered with Mono-Kote. It would have been lighter if covered with Japanese tissue and clear dope, and this would be a viable choice if larger radio equipment is used. My wife is violently allergic to dope fumes, so I usually choose a heat-shrink covering material to avoid having to dope outdoors.

The decoration outlines of the original kit model are shown on the plans. By placing the covered sections over the plans, one can trace the decoration outlines through the transparent covering with a pencil designed for use on Mylar overhead projection plates. Ours is a Dixon Vis-aid 38, but most school supply firms carry equivalents.

An adjustable French curve (one of those rubber-covered wire things sold in drafting supply sections) is useful in developing

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steady, smooth curves. One can carefully draw the outlines without it, however. The bottom surfaces can then be traced using the upper outline as a guide.

Sig Stripe Rite tape in 3/32-in. or ⅛-in. widths will flex well around the curves and can be widened afterward with electrician's tape. The edges should be sealed with some sort of clear material; we prefer Sig Skybrite applied along the seam with a small brush (this prevents seepage of the color coats).

Use paper and masking tape to cover the areas not to be painted. Then lightly score the MonoKote with #400 steel wool just enough to remove some of the gloss. Clean the surfaces to be painted with acetone, and avoid touching with fingers afterward.

Poly-U, Super Poxy, and Skybrite can be sprayed onto MonoKote and will adhere well. We used Poly-U on this particular model. After shaking the spray can, a light mist coat was applied with the can 12 in. or more away from the surface. We made no effort to completely apply a heavy layer of paint. The light coating produced a semi-transparent color of real beauty.

The paper, masking tape, electrician's tape, and Stripe Rite were then removed, and a fresh line of Stripe Rite in a contrasting color was applied for trim. The engine compartment and removable cowl front were primed with Skybrite primer and sprayed separately.

Flying. A problem with many models of this type is inadequate wind penetration. Some models just won't turn when downwind and must be kept upwind at all times. Others will climb nearly straight up without moving forward at all. Still others will handle windy conditions well but will glide like lead sleds in calm air.

We conclude that such variables as wing loading and CG placement need to be selected according to the wind velocity. In other words, if you often fly in windy weather, it may be better to ballast the model for the wind even if some of the glide duration will be lost. The CG point shown on the plan is for windy conditions; move it rearward ½ in. to ¾ in. for light winds.

For some reason the Jr. Clipper +35% behaves better in the wind than any other ½A of this general type that I've flown. Perhaps the wide fuselage profile helps . . . or the tapered flat-bottom airfoil . . . or the longer-than-average tail moment. Whatever the reason, the model penetrates well, will turn upwind or downwind with ease, and will float in the lightest of lift. I wouldn't mind taking the credit for this, but I honestly feel it is the genius of Carl Goldberg.

Hand launches with this model are well-controlled with little tendency to veer off to one side or drop like a stone. The Jr. Clipper +35% tends to climb on its wing rather than the prop. This gives a straight out and up climb rather than a corkscrew.

Slow-speed characteristics are excellent. Gentle and well-placed landings are easy even in the wind. All in all, this is just a very nice little airplane.