



Elder 40

Product Support
(Do Not Remove From Department)

RC-33 INSTRUCTION MANUAL

Cg 4" from front edge of wing
Mark

INTRODUCTION

TOP FLITE MODELS, INC. is proud to introduce the new Elder 40. This design is a direct result of popular demand after the great little Elder 20 was introduced. Modelers loved the design, still do, but wanted something "larger" and "while you're at it, give it ailerons." So, here it is and does it ever fly nice'.

The Elder 40 was designed and sized expressly for .40 engines and this includes the popular .40-.45 and .49 engines. The design turns in great performance with the four-stroke power plants and there is plenty of power margin left over for the aerobatic-minded pilot. However, the real "kick" of this design, like its smaller brother, is the realistic, slow-speed flights that allow you to actually see the airplane instead of just a blur.

The design lends itself to all kinds of detailing, if you're so inclined. For the beginner, nothing fancy is needed; go out and fly it. The Elder 40 makes a remarkably good training aircraft with gentle and totally honest flying characteristics. A big bonus here is that your trainer is just not going to look like everyone else's high-wing, trike-gear, slab-sided beginner's airplane. In terms of strength, the Elder 40 is a lightly-loaded design that does not tend to build-up inertia with excess flight speed. This means that fairly rough handling does not necessarily mean destruction. While nothing is "crash-proof", the Elder 40 is a rugged aircraft that will keep coming back for more.

While we touched on power earlier, a little more should be said. This design simply does not need a lot of excess power to fly the way it was intended to. Our experience has shown us that normal 2-cycle .40's work great as well as the 4-cycle engine sizes mentioned earlier. With a wing area of just under 800 sq. in., the Elder 40 gets its tail up quickly and is airborne in just a few feet. Flying



the design with 4-cycle engines is an absolute delight. Give it a try in your Elder 40. Note that the motor mount we have provided in the kit may not fit some 4-cycle engines and it may be necessary to visit your local retail hobby shop to get the right one for your engine.

IMPORTANT NOTE:

TOP FLITE MODELS, INC. would certainly recommend the Elder 40 as a first R/C powered aircraft. However, if you are a beginner to the sport of R/C flying, we would urge you to seek and use experienced assistance in constructing and flying this airplane. Again, if you are new to this hobby, consider this:

Flying this or any other radio-controlled model aircraft is a PRIVILEGE and not a RIGHT and this privilege begins with the utmost safety considerations to others and yourself as well. An R/C model airplane in inexperienced hands has the potential of doing serious personal or property damage. These safety considerations start at the building board by following instructions, seeking competent help when you are confused and avoiding shortcuts. These considerations have to be carried over to the flying field where safety must come first and limitations



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cannot be exceeded. We urge you to:

1. Send for and obtain your AMA (Academy of Model Aeronautics) membership which will provide insurance for your R/C activities — DO NOT RELY ON HOMEOWNERS INSURANCE.
2. Join an AMA sanctioned R/C flying club in your area where you can obtain competent, professional instruction in trimming and learning how to fly this model.

Check with your favorite local hobby shop for the required AMA forms or the address where they can be obtained.

WARNING!!!

A radio controlled model is not a "toy." Care and caution must be taken in properly building the model, as well as in the installation and use of the radio control device. It is important to follow all directions as to the construction of this kit as well as installation and use of the engine and radio gear. The advice and assistance of a well experienced builder and pilot is highly recommended. Don't take chances! Improper building, operation, or flying of this model could result in serious bodily injury to others, yourself, or property damage.

PRE-CONSTRUCTION NOTES

The Elder 40, like other Top Flite kits employs the use of die-cut wood to ease the task of construction, parts fit and identification. The dies used for this kit have been rigorously checked for absolute accuracy and should provide you with excellent fit. Die-cut parts should be carefully removed from their sheets by first lightly sanding the *back* of each sheet of parts and then carefully removing each part. Use a light garnet paper for the sanding and keep a sharp hobby knife with an X-acto #11 blade, or equivalent, handy for assistance in removing any parts that might not have completely cut-through by the dies. Parts which oppose one another and must be precisely uniform—such as fuselage sides, ribs, etc.—should be carefully "matched" after their removal from the part sheets. Matching is the process of holding the opposing pieces together with either pins, tape or spot gluing and lightly sanding the edges of the parts until they are identical. A sanding block with light garnet paper is most useful for this and other phases of construction.

Your building surface should be at least large enough to accommodate the wing panels. This surface should be as absolutely flat as possible and yet be able to accept pins easily. We have found that a product such as Celotex fiber board works quite well for this purpose. Another good surface can be found in most well-stocked hardware stores—a 2' x 4' fiberboard ceiling tile. These are quite inexpensive and can be used for several airplanes before needing replacement.

As with most R/C kits that are constructed from wood, a selection of tools—most of which can be found in the

average workshop—are a must to do the job correctly:

- Hobby knife and sharp #11 blades
- Single-edge razor blades
- T-pins
- Sanding blocks in assorted sizes
- Sandpaper in various grits
- Hand-held hobby saw, such as an X-acto
- Dremel tool or power drill and assorted drill bits
- Straight-edge, preferably metal, at least 36" long
- 90" triangle
- Soldering iron, flux (silver) and solder
- Carbide cut-off wheel for wire cutting
- Small power jig-saw, such as a Moto-Saw
- Razor plane
- Tapes, such as masking and cellophane

Our Elders were constructed using a variety of common hobby adhesives including 5-minute epoxy, Cyanoacrylates, aliphatic resin (such as Titebond) and 1-hour epoxy. Since all of us have our own construction techniques and favorite adhesives, stick with the ones that you are familiar with and prefer. However, in certain areas there will be callouts for certain types of adhesives, and we urge you to try not to substitute since doing so could possibly cause problems structurally.

The last thing we should touch on before we begin actual construction is the sequence in which the Elder is assembled. The sequence given to you in this booklet has been proven to be the most straight-forward and provides the finished components in the order that you will need them to progress to the next assembly phase. Try to stick with the building order presented here to avoid mistakes.

Spread the plans out on your work surface, cover them with a clear plastic material, such as the backing from a roll of Monokote or plastic wrap and commence construction.

WING ASSEMBLY

Wing construction for the Elder consists of building three separate pieces; the two wing panels and the center section. These will be joined in the Final Assembly section of this manual. You will need the center section, with its top unsheeted, during the Fuselage Assembly section. In this sequence, be certain that you are working on a *flat* work surface. Carefully join the two wing plan sheets, 3 of 4 and 4 of 4, at the center section and secure with tape. This provides the full wing plan on which to work. The wing is built directly over the plans, so cover them with Monokote backing or clear food wrap.

1. Start with the center section first. Locate the die-cut sheets containing parts W-11 (2, ply), W-12 (2, ply), W-13, two of the W-1A's and W-1B (4, balsa). Remove these parts from their sheets and clean up any rough edges before assembly.
2. Using the plans as a guide; measure, cut and butt-glue the 1/4" x 1-1/2" lower leading edge, 3/32" balsa sheet and the 3/32" x 1" trailing edge that makes up the bottom center section. Note desired grain direction of these pieces. Measure, cut and glue in place

the 3/8" x 1/2" upper leading edge. Glue one of the W-11 ply dihedral braces in place against the inside surface of the leading edge—be sure that it's centered. Glue the outer W-1A half-ribs in place against the rear face of the dihedral brace, lined-up with the edges of the bottom sheeting at right angles to your work surface. Now glue in place two more W-1A's, 1" inboard of the two outer ones.

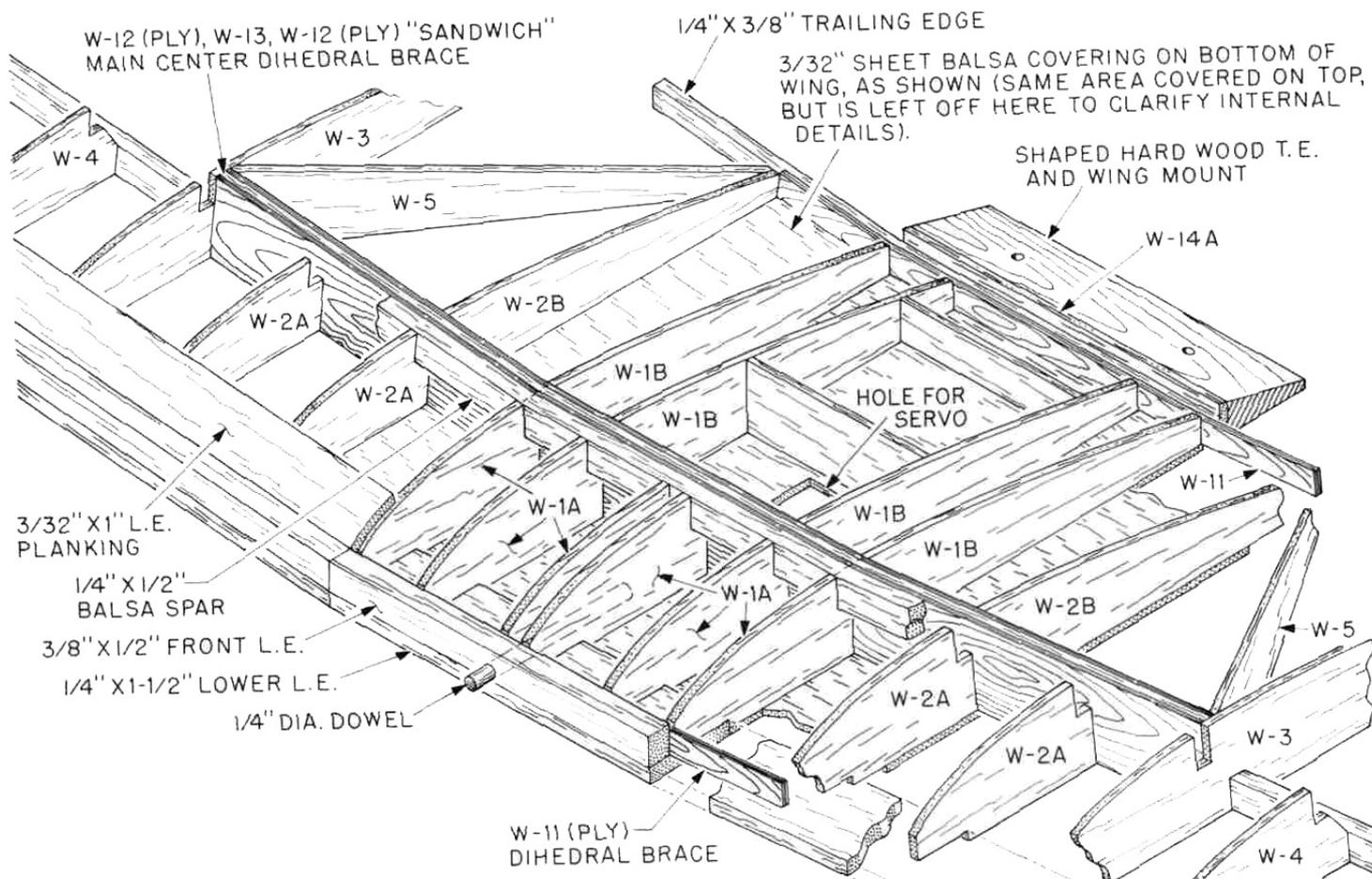
3 As shown on the plans, the center dihedral brace is a composite made by laminating the two W-12's (ply) to each side of W-13, which results in a 1/4" thick part—do this now. Glue the completed composite dihedral brace in place to the bottom sheeting and up against the rear edges of the four W-1A's. Be sure this part is centered.

4 Locate two of your 1/4" x 1/2" pieces of spar stock. From each, cut one 5" length. Glue one of these

pieces in the top rear slots in the W-1A's and against the top forward face of the center dihedral brace. Glue the other on bottom sheeting against the bottom rear face of the center dihedral brace.

5 Now glue the four W-1 B rear half-ribs in place behind the main dihedral brace. Glue the remaining W-11 (ply) dihedral brace in place on the bottom sheeting against the rear edges of the four W-1B's. Locate the 1/4" x 3/8" trailing edge material and cut a 5" length. This is now glued in place against the rear face of the rear W-11 brace and to the bottom sheeting.

NOTE: For now this completes the center section construction. You will finish it after it has been used in the construction of the fuselage. Set it aside for now and build the two wing panels. Both panels are built directly over the plans at the same time.



6. In this step we want to prepare each of the required components—the top and bottom spars, the 3/8" x 1/2" front LE. and the rear 1/4" x 3/8" T.E.—with the proper dihedral angle at their inboard ends. The cross-section of the wing that is shown on the plans is ideal for this purpose. Simply lay, for instance, the bottom 1/4" x 1/2" balsa spar in place over this drawing. Note that the outboard end is cut at 90 degs.; but that the inboard end must be cut at an angle to achieve the required 3/4" per panel dihedral angle. Make two of these bottom spars. Now repeat this process with the top spars, the leading edges and the trailing edges (note that the length of the leading edges is developed from the top view of the wing plan). The inboard edges of the 1/4" x 1 1/2" lower leading edges should be first cut at 90 degs. and then slightly chamfered to match the needed dihedral angle.
7. Start construction by first pinning the 1/4" x 1-1/2" lower leading edges in place, directly over the plans. Note that the inboard edges of these two parts terminate at the outer edges of the two outboard W-1A's. Next, pin the 3/32" x 1" bottom trailing edge planking in place. Now glue the 1/4" x 3/8" trailing edges in place on the top, rear of the 3/32" trailing edge bottom sheet. Now cut, fit and glue each of the 3/32" x 1/4" bottom cap strips which sit beneath each of the W-2A's, W-3's and W-4's—pin these in place over the plan to keep them from shifting. Using the 3/32" sheet balsa provided, measure, cut and glue the inboard bottom wing sheeting in place—note grain direction. Glue the W-6 wingtips in place. Now glue and pin the bottom spar in place (angled end inboard) on the bottom wing sheet and the cap strips. Now glue all W-2A, W-3 and W-4 wing ribs in place. Make sure that these are at right angles to your work surface—pin and allow to dry.
8. Glue all of the W-5 angled ribs in place. NOTE: To obtain a flush fit, use your sanding block to chamfer the forward ends of the W-5 ribs where they contact the W-3 rib sides.
9. Glue all of the wingtip braces (W-7, W-8, W-9, W-10 and W-15) in place on the W-6 wingtip sheet. Note that W-7, W-9 and W-10 need to have their inboard ends chamfered with a sanding block to fit flush to the outer face of W-3.
10. Now take the center section which was assembled earlier and fit it to one of the wing panels. Tilt it until the two arms of the W-11 ply dihedral braces fit flush to the front and rear bottom sheeting and the center brace is correctly positioned against the bottom spar. Check this fit to be sure all components fit nicely. Trim as needed to get proper fit. Prop and/or pin this center section in this position as you will use it as a guide for the remaining wing panel parts. *Remember not to glue anything to the center section yet; it's only in place for spacing purposes.*
11. Glue the front 3/8" x 1/2" leading edge in place on top of the lower 1/4" x 1-1/2" leading edge and against the front of each full and half rib (angled end inboard to fit against tilted center section). Glue the top 1/4" x 1/2" spar in place (angled end inboard). Cut, fit and glue the 3/32" x 1" leading and trailing edge planking in place—pin or tape to hold. Remove the center section from the wing panel and repeat the above steps on the remaining panel.
12. Cut, fit and glue all of the remaining top 3/32" x 1/4" cap strips in place on all of the ribs and half ribs.
13. Remove the wing panels from the work surface. Inspect them for any dried globs of glue, remove these with a #11 X-acto knife. Tape or hold the two wing panels together with the bottoms of each facing the other—align carefully. Use your sanding block to now shape the forward wingtips identically with each other and the curves shown on the plans. With the exception of the inboard ends, use your sanding block to carefully "match" the wing panels, leading edges, tips and trailing edges. Separate the panels and use a sanding block with light paper over all of the panels' surfaces to smooth them for covering later (after final assembly).
14. Note on the plans, the points shown for the 1/4" sq. spruce flying wire anchor points. These are full rib depth. If it is your intention to use these optional wires on your model, cut and glue these anchor points in place at this time. Set aside the completed wing panels for final assembly later.

TAIL GROUP

The tail group of your Elder is built directly over the plans in a quite straight-forward manner. Note there are options open to you with these parts in terms of shape. The stab's gentle curves which terminate in sharp points at the trailing edge of the elevators give a certain "look," which can be changed by rounding the outboard trailing edges of the elevators. This "softens" the look of these shapes. The same thing can be done to the fin and rudder, top and bottom—looks nice. As shown, you can also scallop the trailing edges of the rudder and elevators to give yet another different look.

1. Start with the stab. Build it directly over the plans which have been covered with the clear backing from Monokote or food wrap. Position the two S-1 tips in place and the center S-2 as well; pin. From the 1/4" x 1/2" balsa stock provided, cut, fit and glue in place the two leading edges and the trailing edge. Using the same material, cut and glue in place the "cap" in front of S-2, thus completing the stab outline.
2. Cut, fit carefully and glue the 1/4" sq. balsa ribs (three per side) in place. Use short lengths of 1/4" x 1/2" stock to make the fillets—note grain direction.
3. From the 1/4" x 1-3/4" balsa stock provided, measure and cut the two elevators. Notch them as shown to accept the 1/4" dia. dowel elevator joiner. With the stab still in position on the work surface, pin the elevator halves in place. Protect the trailing edge of the stab with a strip of waxed paper and epoxy the dowel joiner in place in the notches—allow to set completely.

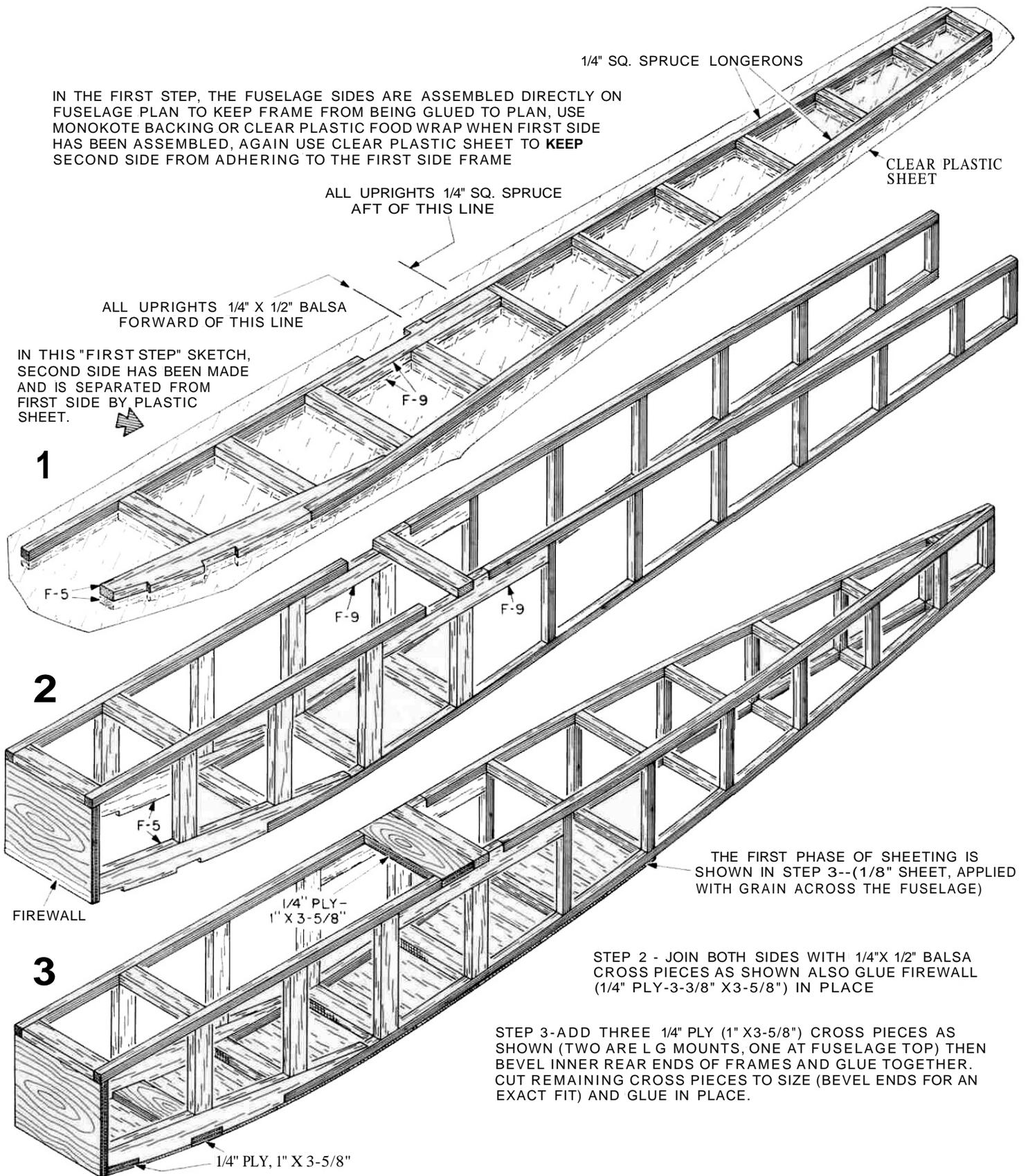
4. Remove the stab and elevators from the plans. Build the fin next in the same manner using the R-1 and R-2 die-cut pieces with 1/4" sq. and 1/4" x 1/2" balsa frames shown. Cut the rudder to shape from the remainder of the 1/4" x 1-3/4" balsa stock used for the elevators. Position the rudder in place to the back of the fin and glue R-3 in place to the leading edge of the rudder. Remove the parts from your building board.
5. Using the 3/32" x 1/4" balsa provided, cap strip both sides of the fin and stab assemblies as shown on the plans. Be sure, when capping the lower edge of the fin, to leave a distance of 3/32" from the bottom to allow the fin to fit into the slot between the two top S-3 caps. Glue the two S-3 caps to the upper surface of S-2, leaving a 1/4" gap at the centerline for the fin. Test-fit the fin in place on top of the stab. With the fin still in place, cut, fit and glue the forward 3/32" x 1/4" cap strip in place forward of the fin. Remove the fin.
6. The elevators, stab, fin and rudder are now finished to shape. Start by using masking tape to mount the elevators to the stab. Use a sanding block to go over all of the outside surfaces to carefully match them. Lay the stab on a flat working surface, masking tape down, and use the sanding block to sand it flat. Use the sanding block to taper the elevators as shown on one side. Tape the stab/elevator hinge line, turn the stab over, remove the tape from this side, and repeat the process. The same method is used for the fin and rudder. Once complete, use sandpaper to round the leading edges. Set these parts aside for covering and assembly to the fuselage.

FUSELAGE ASSEMBLY

Before starting construction, study the plans and drawings to familiarize yourself with how the fuselage is assembled. Note that it really is nothing more than a basic "box" fuselage with semi-formers in the nose area to create the rounded cowling effect. This simple and effective way of making a fuselage can only be ruined in one way; building it crooked. This can be done by not making the fuselage side frames identical and/or mis-sizing the top and bottom cross braces. Another common error is to make improper joints. The Elder relies a great deal on the strength of its frame—make those joints fit correctly! Note also that the uprights and cross braces are a mix of both spruce and balsa. These are noted.

1. Locate and remove die-cut parts F-5 and F-9, two of each. Securely pin F-5 in place directly over your covered fuselage plan. Note that the bottom aft spruce longeron terminates in the rear notch in part F-5. Disregard the curve of this longeron for now.
2. Pin F-9 in place directly over the plans. Measure and cut the top rear spruce longeron that fits in place from the back of the "tab" on F-9 aft to the tail post. (A tool such as an X-acto mitre box and razor saw is quite good for cutting spruce.) Glue the top rear longeron in place to F-9.

3. As you can see from the plans and building sketches, the top 1/4" sq. spruce longeron fits in place from the front edge of the 1/4" x 1" x 3-5/8" ply wing hold-down former. Eventually, when it is installed, this ply former will be backed-up with a 3³/₈" length of 1/4" x 1/2" balsa. Hold this former on edge with a piece of 1/4" x 1/2" behind it and mark its forward location on F-9. Cut a length of 1/4" sq. spruce to fit from this mark forward to the front face of the firewall—glue in place to F-9.
4. Cut, fit and glue the four required 1/4" x 1/2" balsa uprights from Cross-Section B-B back to and including the one beneath the "tab" on part F-9—note that the bottom, rear longeron will need to be blocked in place as the bottom, rear curve starts. As shown on the plans, a 1/4" balsa doubler is made to fit inside of the fuselage frame, at the nose, between F-5 and the top longeron and against the front of the 1/4" x 1/2" upright at Section B-B. This doubler is cut to fit 1/4" behind the top longeron in order to accept the firewall. Glue this doubler in place.
5. Cut, fit and glue in place the rearmost 1/4" sq. spruce tailpost upright—be sure that the correct angle is also trimmed into its lower end for the bottom longeron. With the frame firmly secured to the building board, bend the bottom longeron up to meet the rearmost upright that was just installed. Glue and securely block this longeron in place.
6. Cut, fit and glue in place all remaining spruce uprights while bending and block-pinning the bottom, rear longeron in place as you go. This completes the basic fuselage side frame. Now make a second, identical frame. Be absolutely sure that they're identical by building the second frame directly on top of the first, carefully covering the first frame with Monokote backing or food wrap.
7. Hold or tape the two completed frames together and use your sanding block to make sure they are identical. Separate them and sand their sides smooth (both sides) with the sanding block.
8. Note on the side view of the plans for the fuselage that there are six 1/4" x 1/2" balsa cross-brace locations shown (numbered 1 through 6). All of these cross-braces, with the exception of #3 (directly beneath the wing's trailing edge) are 3-1/8" long. Carefully cut all five to length. #3 is 3-5/8" long, cut this one as well. Carefully position the two fuselage frames upside down, over the top view of the plans. Block or pin as needed to hold them in place at right angles to your work surface. (NOTE: Due to the slight incidence angle in these frames, they will not fit flat to the surface. This is not important at this time.) Locate two of the 1/4" x 1" x 3-5/8" ply formers. Epoxy these in place in the notches located on the bottoms of the F-5's. Glue bottom cross-braces 4, 5 and 6 in place between the two fuselage frames and allow to set. Remove the frame from the work surface, turn it over and install the three remaining cross-braces, 1, 2 and 3 in place. Now epoxy the remaining 1/4" x 1" x 3-5/8" ply wing hold-down former in place on top of F-9.



IN THE FIRST STEP, THE FUSELAGE SIDES ARE ASSEMBLED DIRECTLY ON FUSELAGE PLAN TO KEEP FRAME FROM BEING GLUED TO PLAN, USE MONOKOTE BACKING OR CLEAR PLASTIC FOOD WRAP WHEN FIRST SIDE HAS BEEN ASSEMBLED, AGAIN USE CLEAR PLASTIC SHEET TO **KEEP** SECOND SIDE FROM ADHERING TO THE FIRST SIDE FRAME

ALL UPRIGHTS 1/4" SQ. SPRUCE AFT OF THIS LINE

ALL UPRIGHTS 1/4" X 1/2" Balsa FORWARD OF THIS LINE

IN THIS "FIRST STEP" SKETCH, SECOND SIDE HAS BEEN MADE AND IS SEPARATED FROM FIRST SIDE BY PLASTIC SHEET.

1

2

3

1/4" SQ. SPRUCE LONGERONS

CLEAR PLASTIC SHEET

F-9

F-9

F-9

F-5

F-5

1/4" PLY-1" X 3-5/8"

THE FIRST PHASE OF SHEETING IS SHOWN IN STEP 3--(1/8" SHEET, APPLIED WITH GRAIN ACROSS THE FUSELAGE)

STEP 2 - JOIN BOTH SIDES WITH 1/4" X 1/2" Balsa CROSS PIECES AS SHOWN ALSO GLUE FIREWALL (1/4" PLY-3-3/8" X 3-5/8") IN PLACE

STEP 3-ADD THREE 1/4" PLY (1" X 3-5/8") CROSS PIECES AS SHOWN (TWO ARE LG MOUNTS, ONE AT FUSELAGE TOP) THEN BEVEL INNER REAR ENDS OF FRAMES AND GLUE TOGETHER. CUT REMAINING CROSS PIECES TO SIZE (BEVEL ENDS FOR AN EXACT FIT) AND GLUE IN PLACE.

1/4" PLY, 1" X 3-5/8"

FIREWALL

9. Locate the 1/4" ply firewall. You must now use the plans to locate the position of your motor mount on the firewall. This mount is installed inverted. Mark the location of the four mounting holes onto the firewall. Use a drill to drill the holes through the firewall with a 1/8" dia. bit. Epoxy the four 4-40 blind

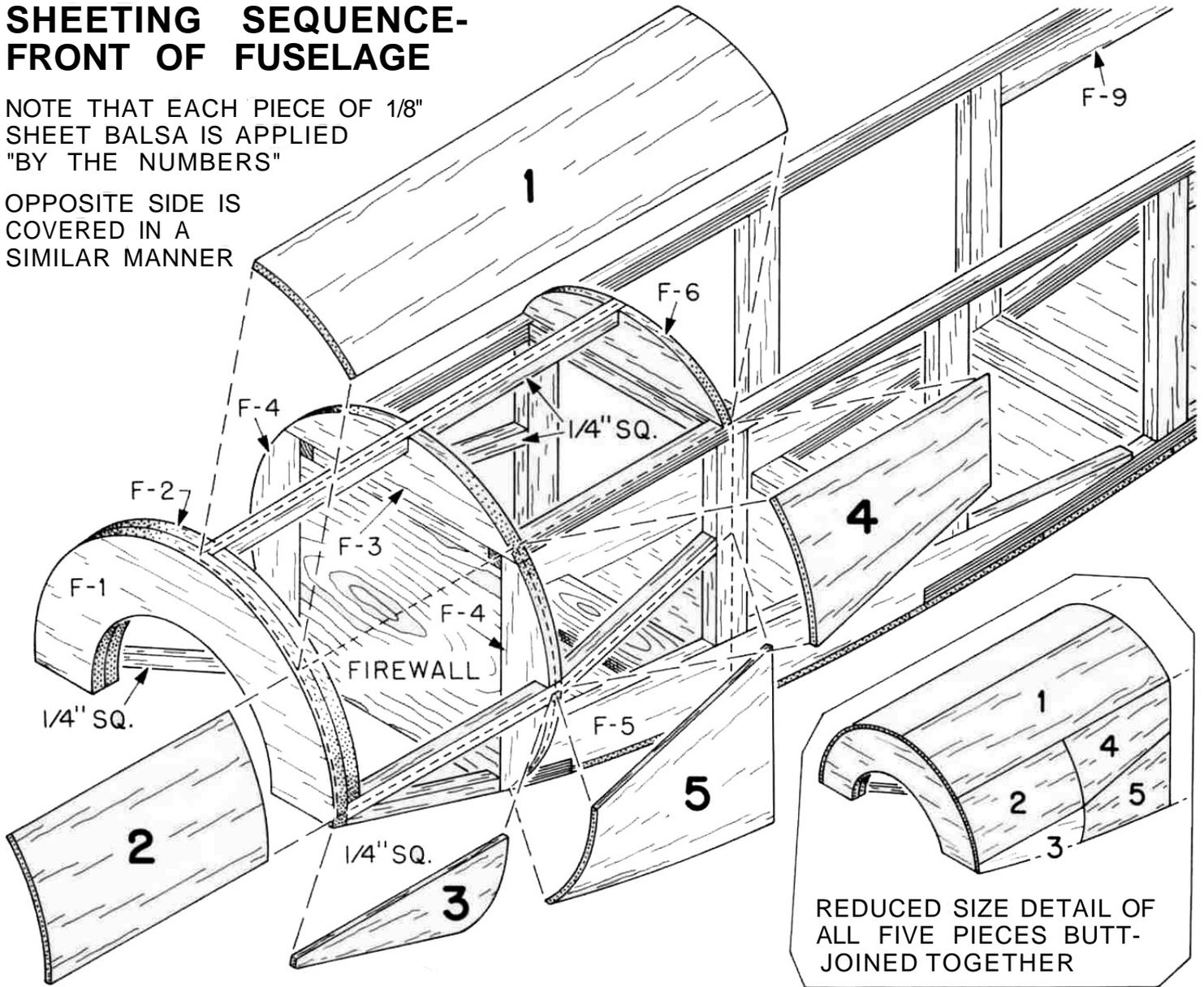
mounting nuts in place to the back of the firewall into the holes just drilled—keeping adhesive out of the threads. Test mount the motor mount with the 4-40 x 7/8" bolts provided. Remove the mount and epoxy the firewall to the front of the fuselage frame. Align it carefully and allow to cure.

10. Use your sanding block and medium sandpaper to now go over the frame. Make sure the edges are all square and clean.
11. Locate and assemble, if needed, the fuel tank that you plan to use. This airplane can use either 8, 10 or 12 oz. fuel tanks. (We show the Du-Bro 12 oz. fuel tank mounted upright in the nose.) Fit your tank into the nose-of the fuselage frame. Use short (3") lengths of scrap balsa stock to make "support" for it. With the fuselage open at this time, it's easy to see if the tank will sit level—adjust as needed. In this way, when the fuselage is done, your tank can be inserted from the wing opening into the nose and removed, if needed, with assurance that it is mounted correctly. Now use a 3/16" drill bit to drill the two required holes for the fuel tank (one for fuel feed and filling and the other for the pressure tap and overflow). Remove the tank.
12. Drill and tap the holes necessary in the motor mount to attach your engine (we like to use 4-40 Allen-head bolts for this purpose). Attach the motor mount to the firewall and the engine to the mount. By viewing from the front, determine the location of the throttle tube housing exit hole. This should be lined-up with the carb's throttle arm. Drill a 3/16" dia. hole through the firewall for this tube. Rough-up the outer surface of the outer throttle tube housing and glue it in place in the firewall—about 3/16" of it should protrude out from the face of the firewall, the rest of it runs into the radio compartment. Be sure your tank still fits nicely.
13. The servos shown on the plans are of average configuration; however, yours may be different (taller, wider, etc.). The Elder will accept almost any radio system. Lay the fuselage frame over the side view of the plans and lay one of the servos in place. Remember that these servos will be mounted on the 1/8" ply servo tray. Observe if your servos will fit. Cut, notch, fit and glue the 1/4" x 1/2" balsa servo tray bearers in place between the two uprights in the radio (servo) compartment. Their outer edges should be flush with the rest of the fuselage frame.
14. You can now sheet the bottom of the fuselage from the nose (between the two landing gear formers) back to the 2nd bottom 1/4" x 1/4" cross brace—don't sheet any further back. Note this sheet is applied cross grain. Use your sanding block to sand the edges flush with the frame sides. Sand the landing gear mounts and sheeting to a smooth curve when viewed from the side.
15. Use the 1/8" x 6" x 21" balsa to now make the primary fuselage sides. Lay the fuselage frame on the sheet with the forward edge of it lined up with the vertical line at Section B-B. Use a pencil to trace the fuselage side outline onto the sheeting. Cut out the fuselage side and glue it in place, repeating the process for the other side. Use your sanding block to again true-up edges and generally tidy the fuselage.
16. Stand the fuselage on its nose, firewall flat to the work surface. Locate and glue in place the two side F-4 formers to the firewall sides and flush with its front face.
17. Locate and glue half-formers F-6 and F-7 together (note that the bottoms of these formers are flush with one another thus providing a 1/8" shelf around the outside for the nose sheeting). Now accurately glue the F-6/7 former in place across the fuselage at Section B-B.
18. Locate and accurately pin in place the wing center section to the top of the fuselage—take your time and locate it as accurately as possible. Use a 1/4" dia. bit to drill through F-6/7, the leading edge and dihedral brace of the center section (backing up the dihedral brace with a piece of scrap wood avoids splintering as the drill bit pass through). Remove the center section and set aside for now. Once again, stand the fuselage on its nose, flat on the work surface and glue the top F-3 former in place on top of the firewall and flush with its front face.
19. Measure, cut and glue in place the top 1/4" sq. balsa cowl longeron, which fits from the notch in F-6, through F-3 and out to the F-2 location. Cut, fit and glue the two side 1/4" sq. balsa cowl longerons which fit in the notches provided in the F-4's. Temporarily install cowl former F-2 in place on the three ends of the cowl longerons. Observe how this former is sitting in place. Viewed from the side and top, it should be parallel with the firewall. Use a ruler to be sure and trim the ends of the longerons to achieve this goal. Once satisfied, glue F-2 in place to the ends of these longerons. Now cut, fit and glue the 1/4" sq. balsa sheeting support pieces (2) that fit from the rear face of the F-4 back to the uprights at Section B-B. Note these are angled and must be beveled to fit. Now glue the forward cowl former F-1 in place to F-2, leaving a 1/8" shelf" around its perimeter for the cowl sheet. Lastly, glue the two required lengths of 1/4" sq. balsa in place from the bottom, outside corners of F-1 down to the bottom, outside corners of the F-4's. Bevel the ends of these to fit correctly.
20. The sheeting sequence diagram illustrates exactly how and in what sequence the nose and cowl is covered. Wetting the 1/8" balsa sheeting helps it to conform to the required curves. Take your time to achieve an accurate, gap-free fit before glueing these pieces in place. CA adhesives work very well in this area, eliminating the need for pins. If you have taken your time and fitted these pieces in place with a minimum of gaps, all that remains is sanding to shape.
21. Use a sanding block to bevel the inside ends of the spruce fuselage framework at the tailpost—see plans. Once satisfied, glue these ends accurately together providing equal bends to each side of the fuselage when viewed from the top. Accurately cut six (6) pairs of top and bottom 1/4" sq. spruce cross-braces which will fit from Section C-C back to the tailpost. We suggest cutting the top and bottom braces at the same time to ensure equal length. Glue these in place, working from the front to the back.

SHEETING SEQUENCE- FRONT OF FUSELAGE

NOTE THAT EACH PIECE OF 1/8" SHEET Balsa IS APPLIED "BY THE NUMBERS"

OPPOSITE SIDE IS COVERED IN A SIMILAR MANNER



Again, accurately position the wing center section assembly in place on the fuselage, its leading edge against F-7. Locate the tapered hardwood center section's trailing edge and part W-14A. Hold these two parts in place against the center section's trailing edge and, with a pencil, draw a line across the 14" x 1/2" balsa cross-brace to indicate where the top, rear fuselage sheeting begins. Remove and set-aside the center section and the other parts for now. Finish sheeting the fuselage with cross-grained 1/8" balsa, from the line just drawn to where the fuselage sides end.

With the exception of final sanding and rounding as shown on the plans, the fuselage is now complete.

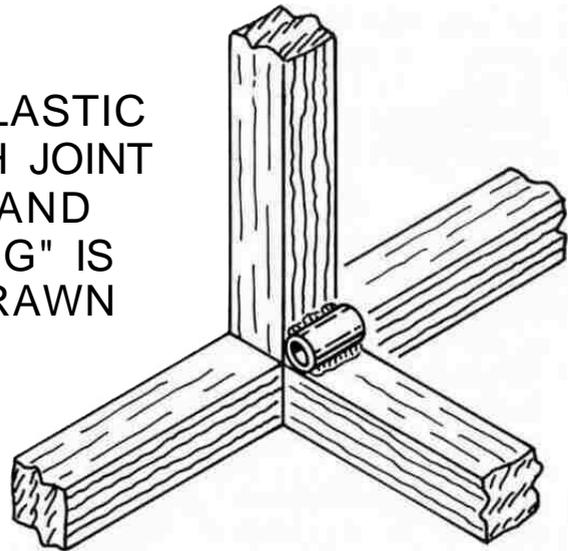
LANDING GEAR AND TAILSKID ASSEMBLY

The pre-bent front and rear 1/8" dia. M.W. landing gear (L/G) forms must be joined together at the bottom, towards the wheels. We recommend soft copper wire for firmly wrapping the two pieces together prior to soldering. We would highly recommend the use of HARRIS'S

STAY-CLEAN FLUX and their silver solder for this operation. Although a soldering iron will work, with patience, these joints can be quickly and permanently made with the use of a small hobby-type gas torch.

1. Locate the position of the rear "cross-axle" wire to the bottom rear ply L/G plate on the fuselage bottom. While holding the wire in place, slip the two formed metal clips onto the wire. Use a pencil to mark the hole locations of these clips onto the ply base, then remove the wire and clips. Drill shallow, small-diameter "guide holes" for the clip's screws. Now attach the landing gear wire to the fuselage with the clips and the #2 x 3/8" screws provided—no need to overtighten. Repeat this process with the forward landing gear wire.
2. Pull the two components together until they touch. The two short bent "arms" on the forward leg should line-up with the legs of the rear L/G wire. If needed, use pliers to adjust these arms until they fit neatly.
3. Use soft copper wire to neatly wrap the forward short

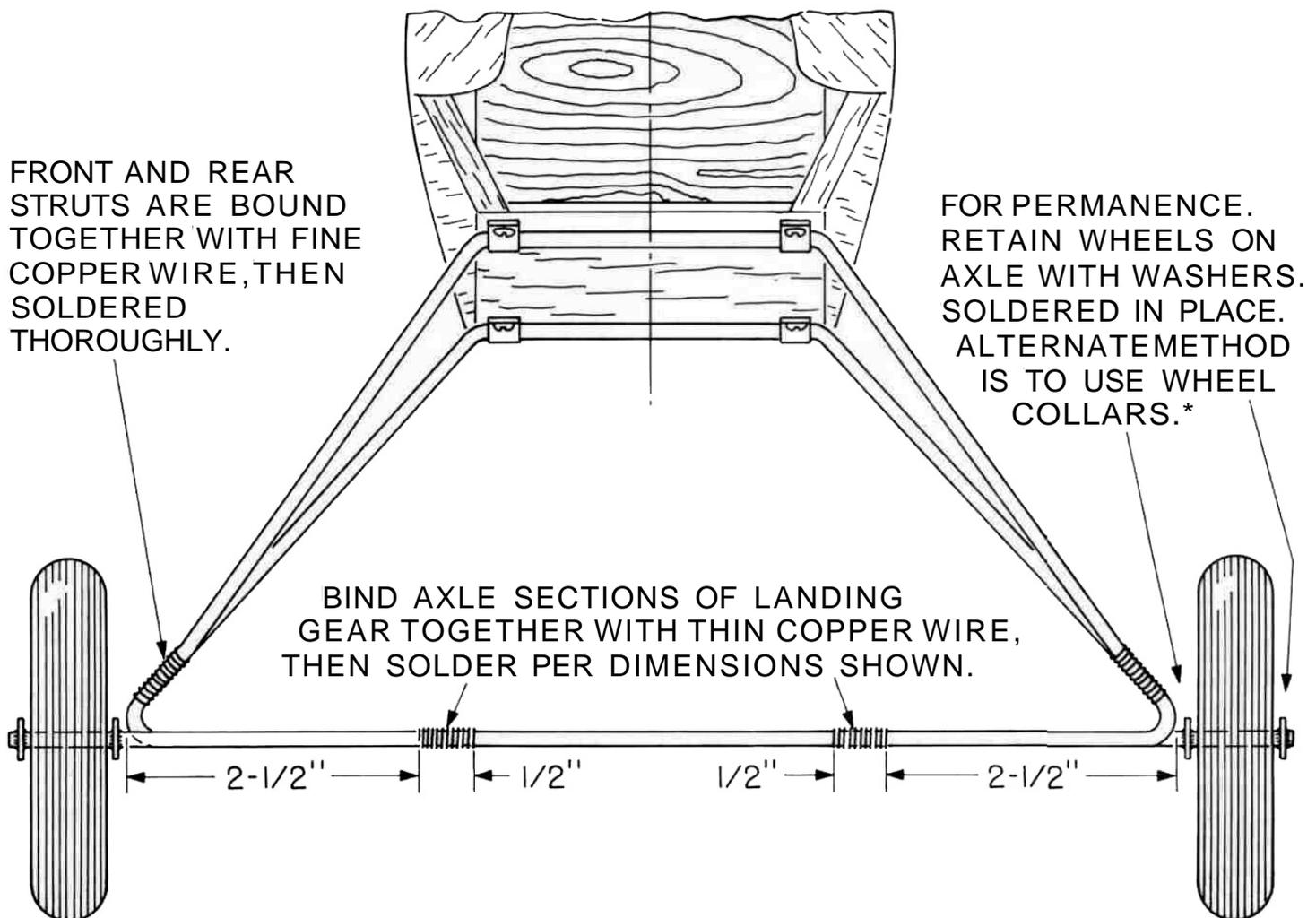
OPTIONAL DECORATION DETAIL-
 1/4" LENGTHS OF 3/32" OR 1/8" DIA. PLASTIC
 TUBING CAN BE EPOXIED INTO EACH JOINT
 BETWEEN A SPRUCE CROSS BRACE AND
 UPRIGHT (16 PLACES). LATER, "RIGGING"
 IS THREADED THROUGH EACH TUBE,
 DRAWN TIGHT AND EPOXIED IN PLACE.



arms to the rear L/G wire as shown on the plans. Apply some STAY-CLEAN flux to the joint and solder. Repeat the process on the other side. Be neat and try to be sure that the joint is solid without a lot of excess solder. Once satisfied, completely clean the solder joints of any flux.

derives its ability to accept landing loads and shock from the two (2) independent axle legs. These need to be joined at two points, each 2-1/2" in from the wheels. This distance has shown very good shock-absorbing ability for Elder's weighing 4 to 6 lbs. Join these axles by first measuring the 2-1/2" distance required, wrapping with soft wire (about 1/2") and soldering. Again, clean the solder joints completely.

4. As shown, the crossed-axle landing gear system



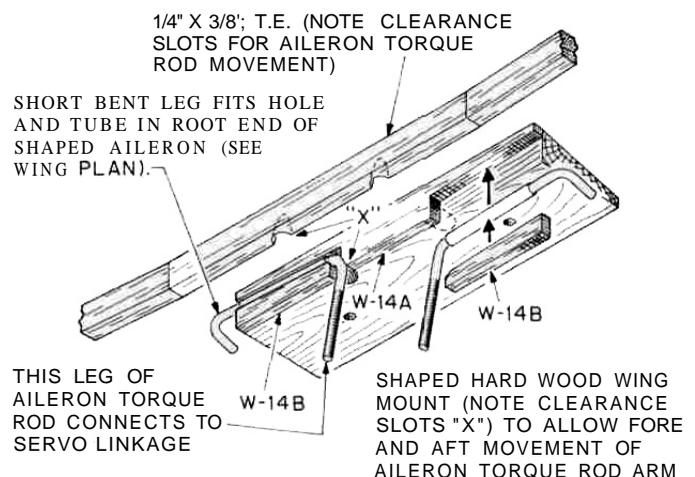
- The same process is now used to make the rear tailskid assembly. First bend the 1/16" dia. M.W. provided to the shape shown using pliers. Wrap the tip of the skid with soft copper wire and solder. Now tap the main skid wire in place to the bottom rear of the fuselage. Locate the pre-bent tailskid support wire and wrap it in place to the tailskid with soft wire. Solder it in place to the skid. Remove the assembly from the fuselage and again, clean the solder joints completely.
- Remove the main landing gear from the fuselage. The landing gear and tailskid are now complete and can be used as is or painted flat black or aluminum (we use epoxy paints for this as well as other painting needs on this airplane). As we did on some of our prototypes, you may wish to add wood backing to the wires. Sand these to airfoil shape and paint them a wood color—looks great! We used 1/8" x 1/4" hard balsa with a 1/8" dia. "groove" sanded into one edge, carefully fitting the piece in place. We glued the wood to the metal with thick CA adhesive and sanded the whole affair smooth. Then we used clear, paintable Monokote to cover the "wooded" parts of the landing gear to provide a one-piece look and air-brushed wood-colored epoxy paint on the whole thing.

FINAL ASSEMBLY

- Locate one of the 1/4" dia. x 36" dowels provided in your kit and cut a 3" length, this to be used for the forward wing hold-down. Insert this dowel into the wing center-section, leaving 1/4"-3/8" of it exposed in front of the leading edge to engage the F-6/F-7 former assembly with the previously drilled hole. Now install the center section in place on the fuselage with the dowel engaging the hole in F-6/F-7, again being sure that it is squarely in place. Liberally apply epoxy around and beneath this dowel, in the wing center section area. Next, position and glue in place the two remaining W-1A half ribs into position on each side of the dowel. Fill the resulting cavity above the dowel with more epoxy and allow the structure to cure.
- Remove the center section from the fuselage. Carve and sand the short leading edge section to shape, matching the two leading edges of the wing panels.
- The two wing panels can now be permanently attached to the wing center section. We recommend that you use epoxy for this operation. With the center section flat on your building surface, slide the two panels in position onto the exposed arms of the front, center and rear dihedral braces. The fit should be accurate; the front brace fits against the back face of the panel's leading edge, the center brace is in contact with both the top and bottom spars and the rear brace is inside of the top and bottom rear trailing edge sheet strips. The panel's spars, leading edges and trailing edges should also be cleanly contacting the outside surface of the center section's sides. Take time here to ensure that this is the case

before committing to actual attachment. Locate or make a couple of 3/4" high supports for the wingtips to provide the required dihedral angle. Now epoxy the panels in place to the center section—don't use so much glue that it runs or drips but enough to provide a good glue joint. One-hour epoxy is best for this step. Allow the structure to cure completely.

- As shown on the plans, a forward and rear "cockpit" former was made from 3/32" sheet, placed in-between the two inboard W-1 B's, full-depth to these two ribs. Be sure that the forward cockpit former is far enough back to allow insertion of your aileron servo.
- The two inboard panel rib bays (between W-2B and W-1 B) and the center section can now be completely sheeted, cross-grain, as shown. We have found that it is helpful, when glueing this sheeting in place, to "share" the width of the center section's outboard W-1A and B ribs with both the wing panel and center section's sheeting edges, thus providing a glueing surface for both. When dry, use sandpaper to smooth the wood and to match the sheeting with the leading edges.
- In this step you are going to assemble the hardwood trailing edge and aileron torque tubes and wires to the wing center section—please refer to the detail drawing provided to understand the parts relationship. Glue the two W-14B's in place to the forward face of the hardwood trailing edge, their outboard ends flush with the outboard ends of the trailing edge. Note that there is a *right* and *left* aileron drive assembly. As shown, the trailing edge must be grooved a little to allow aft movement of the threaded linkage arms. Do this now with either a rat-tail file or a Moto-tool and router bit. Now glue W-14A in place, thus providing a "nest" for each of the torque rod assemblies. As shown, knock-off the corners of W-14A to allow torque rod movement. Rough-up the brass sleeves on each of the torque rod assemblies and carefully glue them in place with one-hour epoxy—do not get adhesive on the torque rod arms.



DETAIL OF WING CENTER SECTION AT TRAILING EDGE
(AS SEEN FROM BELOW)

Now position the trailing edge/torque rod assembly against the trailing edge of the wing's center section—lightly use a sanding block to "true-up" this joint as needed. While holding this assembly in place, move each threaded linkage arm forward to dent the balsa on the bottom of the center section. Remove the trailing edge assembly and use a file or Moto-tool to groove the wing's center section at the two dents just made to allow forward movement of the linkage arms. Once satisfied with the movement of these arms, the hardwood trailing edge assembly can be epoxied to the trailing edge of the wing. Again, be careful to avoid adhesive getting into the area of the linkage arms; you want them to move freely.

7. Once again, accurately pin and/or tape the wing in place to the fuselage. Use the plans for reference to now drill two $1/8"$ dia. wing bolt holes through the top rear of the center section and through the $1/4"$ ply former directly beneath it—note the angle that these two holes are drilled at to take into account the slope of the top airfoil at that point. Remove the wing from the fuselage. Tap the two holes in the ply former with either an 8-32 tap or an 8-32 metal bolt. Once the threads have been established use a little *thin* CA adhesive to "coat" them and then run the tap into the holes once again; this toughens-up the threads. It may be necessary to run the tap or bolt through these threads several times to allow the nylon 8-32 bolts to clear. Use a $3/16"$ drill bit to now "clear-out" the two $1/8"$ holes in the wing center section for clear passage of the wing bolts. Now bolt the wing in place on the fuselage.
8. Locate die-cut former F-8 (balsa). As you can see from the plans, this former is trimmed at the bottom (sanding block) to fit onto the top of the center section's leading edge where it becomes the "shelf" for the $3/32" \times 1/4"$ fuselage fairing strips. Apply glue to the bottom of this part and position it accurately in place on the center section, flat against the rear face of F-7—don't get glue on F-7. Start making the fuselage/wing fairing by first cutting to length the top center $3/32" \times 1/4"$ balsa strip, the center one when viewed from the top. Sand its rear bottom edge to match the contour of the center section's sheeting. Once satisfied, carefully glue in place to the top of F-8 and the center section sheeting. Repeat this process to the left and right of this center strip until the rough fairing is complete. With the center section still in place, use your sanding block and sandpaper to now smooth the fuselage/wing joint to a one-piece look. Any small gaps or rough edges can be filled with a filler such as DAP White Vinyl Spackling compound and sanded smooth again. Remove the wing from the fuselage.
9. Now make the cockpit cut-out in the wing center section. The pattern, provided on the plans, can either be traced or the pattern itself cut-out of the plans to serve as a cutting guide. Use a #11 X-acto knife for this purpose and try to be as neat as possible.
10. Note the aileron detail drawing directly beneath the

left wing panel plan. The ailerons will need their leading edges sanded in this manner to facilitate non-binding movement (do this now). Next locate and drill the $1/8"$ dia. hole in the inboard leading edge of each aileron that will engage the exposed torque rod ends. These holes are now sleeved with the two lengths of $1/8"$ O.D. brass tubing in your parts bag. These should be roughed-up and epoxied carefully into the holes in the ailerons. Now use a Moto-tool to make a groove from these holes inboard to the aileron ends. These grooves will hold the torque rod arms and allow the ailerons to fit up to the wing's trailing edge.

Using a #11 X-acto blade, carefully locate and **cut** each of the nylon hinge slots in both the aileron and wing trailing edge—5 hinges per aileron. Trial-fit the ailerons to the wing panels and torque rod arms. Do any trimming necessary to facilitate free, non-binding movement. With the ailerons temporarily hinged to the wing, use your sanding block to now sand the entire assembly to final shape. Remove ailerons and hinges, set aside for covering.

11. Cut four $4 \frac{1}{2}"$ lengths of $1/4"$ dia. dowel (two from each of the two $36"$ lengths provided). These are now used to make the "king post" that fits to the wing center section. This assembly is most easily made by first constructing two separate triangular pieces and then joining the two pieces at the top. Chamfer the top ends to fit as shown on the plans and epoxy. The bottom ends must also be chamfered to sit squarely on the top surface of the center section, just ahead of the cockpit. Do not attach the finished structure yet, it will be assembled to the wing after covering.
12. Locate the two required rear fuselage pushrod exits (die-cut ply). Clean their edges with a sanding block. Note their location on the plans—directly beneath the stab. Glue in place.
13. A $1/16" \times 1/2" \times 12"$ ply strip is provided for the fuselage frame "joint caps". The drawing on the fuselage plan depicts how these are to be cut using scissors or shears. These are now carefully glued in place to each of the exposed fuselage upright and cross brace joints as shown on the plans. Once these are in place, use sandpaper to lightly smooth their edges.
14. Use a #11 X-acto blade to now make the hinge slots (six total) in the elevators and stab—note their location on the plans. Temporarily install the elevators in place. Now cut the two required hinge slots in the fin and rudder. Note on the plans that you will now have to clear-out a semi-circular opening at the leading edge of the rudder to allow it movement around the elevator joiner. This allows the rudder to fit in place against the fin when hinged. Once satisfied that all movement is free and non-binding, disassemble these parts and set aside for covering.
15. As shown on the plans, we used short lengths of inner throttle pushrod tubing to make the stab and fin flying wire brace points. These should now be glued

in place in pre-drilled holes.

16. Although we have been instructing you to sand the various components of your Elder as you were constructing them, take the time to now re-check everything that may require final touch-up and/or filling. The difference between a good covering job and a great one tends to be about \$2.00 worth of sandpaper and the willingness to use it.

COVERING & FINISH

Now that all of the various components of your Elder are completely assembled and sanded to their final shapes, you can turn your attention to covering. This is the point that can separate your model from anyone else's. You must decide what you want the finished airplane to look like. We have finished our prototypes in a wide variety of color schemes representing everything from an R.A.F. WWI fighter (in cream Monokote with red, white and blue Roundels and tail treatment) or a German WWI fighter (all red Monokote with black Iron Cross's on a white background) to civilian-type versions (dove gray fuselages, transparent blue wings and tail-group and chrome Monokote "cowls")! Interestingly, no matter what color scheme we used, there was always a group of people at the flying site who would stand there looking at the Elder, arguing about what real, full-scale aircraft it represented. Just remember that the Elder is not a scale model, you're free to cover it in any configuration that strikes your fancy—it will look great!

Before covering, it is suggested that the final finish be applied to the open spruce fuselage structure. This can be done several ways. There is a very good product on the market called Varathane that is sold through most well-stocked hardware and lumber supply outlets. This material is essentially clear and will leave the spruce about its same color, maybe a little darker, and somewhat shiny. It is resistant to spent fuel and quite durable in actual use. Epoxy paint, mixed to achieve a woodish brown color and brushed or sprayed, also works well. Take your time here, use light sandpaper to go over the framework, smoothing it for the finish of your choice. When applying the finish, be sure that all of the exposed wood, *except* the top, rear stab glueing area, receives paint. We then used flat black paint (again, epoxy is great) to paint each of the ply "joint-caps." This really makes the structure come to life!

Now for the covering itself. Use the directions that are supplied with each roll of Monokote and cover each of the various components separately; fuselage, wings, stab, elevators, fin and rudder. Some of you might have a problem with the wingtips of the Elder, if this is your first venture into the use of Monokote or your first R/C airplane. Here's a method that works quite well. First, cover the wing panels totally, starting with the bottoms first, including the wingtips. Then cover the tops of the wing panels out to and including the last outboard W-3 wing rib, but not the wingtips themselves. Next, cut an elongated triangular piece of Monokote to fit over the space between the forward W-3 rib and the forward W-7 wingtip former—keep the edges straight, allow about

1/8" overlap and iron this piece in place. Move now to the next exposed triangular area between W-7 and W-8 and repeat the process. This method will provide a much easier covering situation for the newcomer and, if done carefully, gives you a nice looking, wrinkle-free wingtip.

When covering the fuselage be sure that the bottom covering—the piece that you should apply first—overlaps into and on the firewall by about 1/4" at least.

Assuming that the airplane is now covered, turn your attention to fuel-proofing the engine compartment. We like to use and highly recommend a liberal coat of polyester resin. Coat inside the cowl and fuel tank areas and over all of

the Monokote seams that terminate in the cowl itself. This seals the wood as well as the Monokote seams and avoids "fuel creep" later on. Be sure to keep the resin out of the bolt holes in the firewall.

Use your X-acto knife to now clear-out all of the hinge slots in the ailerons, wing and tail group. Do the same thing for the wing hold-down bolt holes, the cockpit, the landing gear screw holes, etc.

Mount the wing to the fuselage with the nylon bolts. Place the stab in position on the top rear of the fuselage and sight down the front of the model to observe if the stab is sitting flat in relationship to the wing, without any tilt. Once satisfied, hold the stab firmly in place in the position that it is meant to be; square with the fuselage and aligned correctly with the wing when viewed from the top—make sure that it is exactly where you want it. Use a sharp pencil and, while holding the stab in place, trace the outline of the framework that is in contact with the bottom of the stab onto the stab itself. Remove the stab from the fuselage. Use your X-acto knife to now lightly cut-out the frame outline from the bottom of the stab's Monokote to expose the wood—this will be your glueing surface. The stab can now be mounted to the fuselage; we used a "thick" CA adhesive for this.

Next, prepare the fin for mounting to the stab by making sure that all covering is removed from the bottom of it, leaving exposed wood. Be sure that the covering on the top of the stab is well-adhered to the center S-3's because you will be removing some of it, at the center, to accommodate the fin. Use your X-acto knife to remove the covering from the fin slot location, exposing the wood. Before glueing the fin to the stab, use a pin to make lots of small holes in the exposed wood of both the stab and fin bottom, these need not be deep. Use a slower drying adhesive (Titebond, 1-hour epoxy, etc.) to now glue the fin in place on the stab. Use a length of light tape over the top of the fin and on each tip of the stab to hold the fin in place, at right angles, and allow to dry. Check periodically while this structure is drying to be sure that the fin has not shifted and is in place at right angles to the stab and on the centerline of the fuselage; we want everything "square." When this structure is dry, remove the tape. Thread a length of 20# fishing line (used for rigging thru-out, if desired) through the hole at the top of the fin and glue each end of the line into the holes at each tip of the stab—carefully applied "thick" CA

adhesive will work well. The fin should now be quite immobile on the stab.

Use 1-hour epoxy to now glue the hinges required into the trailing edges of the wings, stabilizer and rudder. Next, mount the elevators to their hinges followed by the rudder and ailerons. A little acetone or CA debonder on a clean paper towel can be used to clean-off any glue that has oozed out of the hinge slots.

Mount the landing gear assembly to the fuselage with the screws and clips provided. Mount the clips securely but do not over-tighten.

Now install the motor mount to the firewall. Use one or two washers behind the top two motor mount bolts to give about 2 to 3 degrees of down-thrust. Mount your engine to the motor mount; we suggest 4-40 Allen-head bolts into pre-tapped holes. Cut two lengths of fuel tubing with sharp angles at one end. Insert the angled ends into their holes in the firewall and use a pair of long-nose pliers to reach into the fuselage and pull them almost through the tank compartment. Trim the ends of the tubing and connect them to the appropriate tubes on your tank. Now pull the tubes back through the firewall while moving the tank into the fuselage. Trim the tubing to length and make the connections to your engine and pressure tap.

The triangular-shaped "flying-wire post" that is shown sitting in front of the cockpit can now be glued (epoxy) in place by first positioning it on the top of the wing to determine its final position. Once satisfied, press on the top of it, indenting the covering slightly. Remove the covering material within these indentations, exposing wood and glue the post in place. If you have decided to add the optional flying wires (20#-test fishing line), drill small holes (1/32" dia.) into the tops of the spruce upright posts that you installed during wing construction. We used very small cotter pins for the flying wire anchor points, these can now be epoxied into the holes. Before adding the flying wires, apply any decoration or markings to the wings, then add these wires.

As shown on plans, the exposed framework of the aft fuselage is shown with bracing wires and tubes in each joint corner for their attachment. If you have decided on this as an option, now is the time to add them.

The 1-3/8" x 2-3/4" windscreen is now trimmed to shape using the outline provided on your plans and glued in place just ahead of the cockpit opening. Position the bottom edge of the windscreen in place on the wing center section and press down to leave an indentation. Use an X-acto knife to cut through the indentation and wood beneath it. The windscreen can now be inserted into this "slot" and held in place with a small amount of adhesive. If you are using a "pilot," he should now be epoxied in place in the cockpit (assuming that he's all painted and ready to fly).

At this point you might well be considering detailing your Elder with a few "goodies." We have used a few items that were "off-the-shelf" in most well-stocked hobby shops. Williams Bros. makes some nice 2-1/2" scale machine guns, WW I type, both German and British. We used one of their Vicker's guns on the model shown on your box label. Simply glue a couple of dowels

into the bottom of the gun and it can then be glued right into the center section of the wing, beneath the "king post." As shown on the plans, we also used a Williams Bros. "vintage" pilot (the one with the leather flying cap & goggles) as well as their wheels. On a couple of the prototypes we detailed the cockpits with instruments from Lou Proctor and a genuine hardwood, stained instrument panel (veneer). All kinds of neat looking flying wire clips and little metal parts can be easily made from light aluminum. Detailing the Elder is up to you. No matter what you choose, it'll look great.

With the possible exception of additional final detailing such as outlined above, your Elder is now essentially finished, needing only the installation of the radio.

RADIO INSTALLATION

The method of installing your radio in the Elder is shown on the plans. Note that we have provided you with a 1/8" x 2-7/8" x 4-7/8" ply servo tray. Use a pencil and straight edge to lay-out the positions of your servos on this tray. Note that we show the rudder and elevator servos at the rear, side-by-side with the throttle servo just ahead, mounted sideways. Drill a 1/4" dia. hole into each of the servo pencil marks and use a Dremel saw or a jig-saw to remove the servo cut-out's required (3). Test-fit the servos into the tray and the tray into the fuselage—it is meant to rest atop the two 1/4" x 1/2" balsa bearers that were built into the fuselage frame earlier. Note that the tray can be slid fore and aft a little to provide some C.G. change, if needed, later when it is permanently glued in place.

The receiver and battery pack are meant to be installed forward of the servo tray, as shown. These components should be installed using foam rubber. The receiver antenna on our prototypes was simply routed out through the fuselage, internally, and tied-off at the tail post of the rear fuselage framework. The switch harness may be attached directly to the fuselage side, away from engine exhaust.

Next, make the rudder and elevator pushrods using the remaining lengths of the 1/4" dia. dowel provided. These will be cut to about 22" lengths. Locate the two 12" threaded on one-end, wire pushrods supplied in your kit. Cut 5" off of each of these pushrods; leaving two 7" threaded one-end pieces. Save the 5" pieces and, as shown on the plans, attach the non-threaded ends of the 7" pieces to the ends of each dowel with epoxy and tightly-wrapped thread. Now attach the two remaining 5" wire lengths to the opposite ends of the dowels. From the inside of the fuselage, slip the pushrods in place through the rear of the frame and out the pushrod exit guides. Some *small* amount of bending of these control wires may be needed to provide free, unbinding movement. Avoid hard or abrupt bends.

Locate the two nylon horns provided for the elevator and rudder. Mark the locations of these on the rudder and elevator and drill the two required holes for each. Mount the horns. Thread two clevises onto each end of each pushrod and attach the clevises to the nylon horns. Now test the movement and action of the rudder and elevator by moving the pushrods by hand. It is essential that the

movement be smooth, non-binding but not sloppy. Once you are satisfied, make the required "Z"-bends at the servo-end of the pushrods and make the connection to the rudder and elevator output arms.

Adjust the whole system for neutral and test the movement of the surfaces when actuated by your radio. The plans show the recommended movement of the rudder and elevator and this can be adjusted by moving the clevises in or out on the horns; "in" would be more movement or throw and "out" would be less.

Make the connection from the throttle servo to the engine by screwing at least 1/4" of one of the 6" threaded one-end pushrods (three provided) into one end of the inner plastic tube provided. As shown on the plans, trim the length of this wire to suit your engine's requirements and give it a "Z"-bend to attach to the servo output arm. At the engine-end of this pushrod, thread at least 1/4" of the 1" threaded stud into the inner pushrod tube and complete the connection with one of the clevises provided. As before, test the movement of the throttle pushrod by radio to ensure free movement.

The aileron servo is now installed in the wing center section. As shown on the plans, you need to make a cut-out in the bottom of the center section, just ahead of the cockpit area, to fit your servo. Use the length of 1/4" x 3/8" basswood provided to make two servo mounting rails—about 1-1/4" long. Clear away the Monokote ahead and behind the servo cut-out and glue these rails in place. Mount your aileron servo with wood screws. Again, as shown on the plans, the connection between the servo and the aileron torque rods is made by using the two remaining 6" threaded one-end pushrods. Thread the nylon torque rod fittings in place on the exposed arms, thread the clevises onto the pushrods and connect them to the nylon fittings. Make the required "Z"-bends to engage the servo's output arm and attach. Now adjust the clevises for neutral aileron with the radio on and the servo plugged in to the receiver. Test the ailerons for free, non-binding movement.

Everyone tends to set-up the surface throws of a model to suit their particular style of flying. This is fine as long as you have a place to start. We recommend that you start with the surface throws that we indicate below and then adjust to suit. These movements are based on our prototype which weighed 5-1/4 lbs. with a Saito .45 and average-weight radio gear;

RUDDER: 5/8" per side, 1-1/4" total
ELEVATOR: 1/2" up and down, 1" total
AILERONS: 5/16" up, 1/4" down

CAUTION: After adjustment of your servos, be sure to reinstall the retaining screws that hold the output arms in place on your servos.

PRE-FLIGHT INSTRUCTIONS

This section assumes that your Elder is completely done, covered, painted as needed, etc. We are now going to establish the correct C.G. (Center of Gravity). Start by completely assembling the airplane. Note on the plans that the mark shown for the C.G. point is directly over the

spars and directly beneath the top mating point of the "king-post." Slip a length of string under the kingpost and lift the airplane off your bench. The airplane, ideally, should hang suspended either level or slightly nose-down. This would mean that the C.G. is where it should be to provide you with a stable flying airplane. If, while hanging suspended the nose or tail hangs quite low then you have to do some equipment shifting to get it balanced.

For instance, if the tail hangs low, then you know that some of the equipment has to be moved forward. Remember, this balance is always achieved *without* fuel in the tank—that's burn-off weight and cannot be counted. The easiest component to move is the battery pack. Depending on the pack's configuration, it can be installed beneath the fuel tank. If you still need more weight forward, slide the servo tray all the way forward as far as it will go. If more weight is needed (highly unlikely) then you will have to add lead weight in the nose, beneath the tank. If you have to add lead, don't worry, the Elder will still fly quite well.

If the airplane is nose-heavy, then try moving the servo tray back as far as it will go, etc... Once the airplane hangs suspended as it should, you will have to now glue the servo tray permanently in place against the 1/4" x 1/2" balsa bearers that it rests on.

Prior to flying this model, get in the habit of making a complete check of the airframe. Is the prop tight? Batteries in both the airplane and transmitter fully charged? Engine bolts tight? All components firmly attached to each other? Fuel lines clear? Wheels roll easily? Make a radio system check as well—up is up, down is down, throttle moves freely and the ailerons move in the right direction—let's fly!

FLYING INSTRUCTIONS

Once again, if this is your first R/C aircraft DO NOT ATTEMPT TO FLY IT YOURSELF. Go to your local hobby shop and get information about any local flying clubs in your area. It is within such groups that knowledgeable, experienced individuals can be found to assist you.

Assuming that the radio system (airborne and transmitter) are fully charged and that your engine is completely broken-in and reliable, let's head for the flying field. Fill the tank and turn the radio system on. With the engine running at idle, point the airplane directly into the wind and advance the throttle smoothly. With most "tail-draggers" a small amount of right rudder will be needed to keep the airplane on a straight heading. With a little experience you will be able to keep the take-off roll quite straight. As the speed picks-up, the tail will lift and in a short time the plane will be airborne. Keep it headed straight into the wind in a shallow climb; don't "horse" it up with excess elevator.

Once sufficient altitude is reached, try some turns to get used to the handling characteristics. With the throws that we called out earlier, the ailerons should be positive but not jumpy. Once you have the airplane trimmed out for straight and level, try the throttle, at altitude and get

3 7/8" aft of C.E.

used to the slow-speed characteristics. At lower speeds, the rudder is quite effective. Like most aircraft that have flat-bottom airfoils, the Elder will naturally want to climb at full power and settle at low throttle. A point somewhere in-between these two throttle settings will provide the "cruise" speed. This setting will vary with engine size, weight and wind conditions.

With flying time experience you will find that the Elder is quite aerobatic and fun to fly; loops from level flight, left and right snap rolls, left and right spins, military-type rolls and inverted flight, with practice. Touch and go's are super with this design.

Landings can be as slow and predictable as you'd like, just maintain your heading into the wind all the way through touch-down and roll-out to a stop. We have found that the Elder steers well on the ground with deflected rudder and short bursts of power.

We sincerely hope that this has been a good project for you and that the time spent on the building board will be rewarded with many, many enjoyable flights.

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