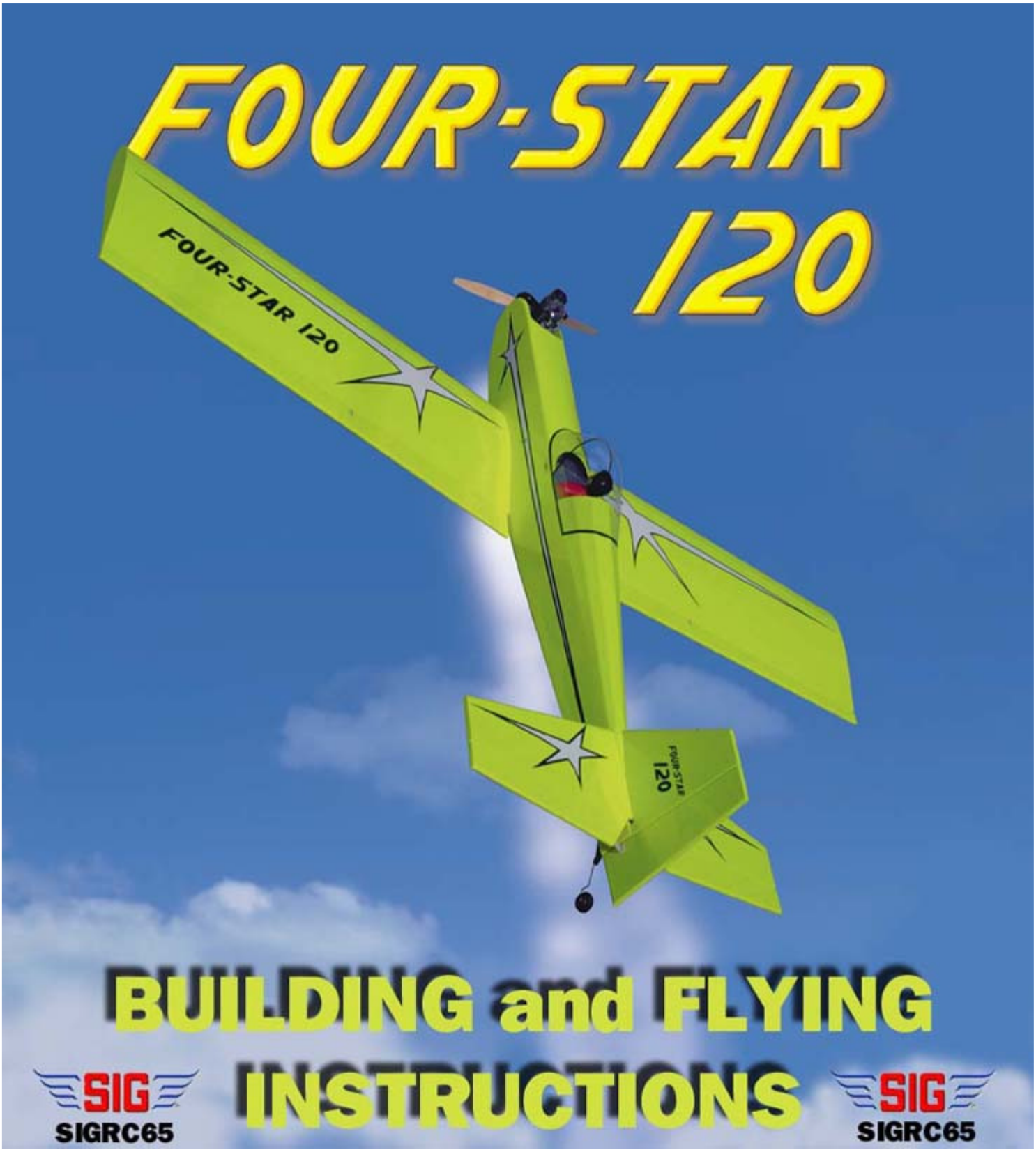


Introduction

First, some history. In June of 1989, SIG Mfg. introduced the FourStar 40 to the modeling world. No, it wasn't an overnight success, but its reputation quickly spread. Novice flyers suddenly looked like pros and experts couldn't believe how slow it could land without stalling. Instructors began calling us with stories about training people to fly R/C with the FourStar 40, even though it's never been promoted as a trainer. Clubs even began using it for one-design pylon races!

Modelers were also amazed at how fast and easy it was to build. A couple of weeks of spare time was sufficient for most builders. We've heard from people who can frame one up in twelve, ten, even six hours. Another group of modelers actually built and flew a Four-Star 40 in a day! The design has become so popular in some clubs that it's practically the official "club plane".

It became fairly obvious that the Four-Star 40 was like a good movie it deserved a sequel. The reason that it was enlarged to a 1.20-sized airplane was simple - that's what we wanted for ourselves, so that's what we built! Besides, large sport models have become very popular the last few years and SIG needed an airplane that could introduce sport modelers to the world of "big birds". With its 81" wing span, the Four-Star 120 is big enough to qualify for I.M.A.A. fly-ins, but is still fairly easy to transport.

The Four-Star 120 isn't a simple blow-up of the "40"-size. Some elements of aircraft design don't conform well to enlargement. For instance, the engines for this design are proportionally heavier than those for the smaller Four-Star, which meant a shorter nose moment was necessary for the "120". In effect, the "120" is an entirely new design, but it still incorporates the aerodynamic and structural features that made the Four-Star 40 such a success. What are they? There's no secret to it, really - the simple answer is "lightness and wing area".

The two main goals driving the design of the Four-Star 120 were the same as for the "40". First, it had to have outstanding flight performance which includes smooth aerobatic capabilities and solid slow-speed handling characteristics. You won't believe how this airplane goes from a rip-snortin' aerobatic dynamo in the sky to a smooth-as-silk floater in the landing pattern! Second, it had to be very easy to build, allowing the modeler to whip through construction without a bunch of sanding and shaping. Several prototypes were built and flown to make sure the design lived up to the goals just described. We believe the final design presented in this kit represents the finest blend of building and flying characteristics to be found in a sport model of this size.

Personally, I've had more fun with the Four-Star 120 than any model I can remember. There's no doubt in my mind that you'll enjoy it just as much!

Engines, Propellers, and Mufflers

RECOMMENDED ENGINE RANGE	
.90 - 1.20	2-Stroke
- 1.20 - 1.60	4-Stroke

There is a tremendous variety of engines available in the size range specified for the Four-Star 120. A good 1.20-size 4-stroke will TRULY fly this airplane well - that'swhat it was designed for! However, 2-stroke and 4-stroke engines work equally well in this model, so choose your favorite type, keeping in mind the type of performance that you wish the model to have. If you want maximum aerobatic capability and vertical performance, use an engine towards the upper end of the recommended size range. Engines at the bottom of the range will still allow for exciting flights with slightly reduced vertical performance. Remember, this is an airplane that likes to fly through aerobatic maneuvers with its wing rather than by the brute force of its engine.

Use only those propellers recommended in the instructions supplied with your engine. If you use a very high-powered engine in your model, we recommend using a prop with a relatively large diameter and low pitch. This will give you loads of pulling power during maneuvers without a lot of excess speed. An 18" diameter propeller is about as big as you can use on this model and still have adequate ground clearance. Paint the tips of your propeller with a bright-colored paint so that you can easily see the prop arc when the engine is running. Be sure to balance your propellers to keep vibration to a minimum.

Use a muffler! A loud engine may cost you (and possibly your club) the use of your flying field if it annoys a non-flying neighbor. Use the muffler that came with your engine or one of the many after-market mufflers that are available.

Radio Requirements

A four-channel radio system is required for the Four-Star 120 to operate the ailerons, elevator, throttle, and rudder. Each aileron uses its own servo, so you'll need a total of five servos. For positive control (and peace-of-mind) we recommend using heavy-duty servos with at least 55 oz.lin. of torque for all of the flight controls.

A standard servo may be used for the throttle. A "Y" harness is necessary to plug the two aileron servos into the receiver. We also recommend using at least a 1000 mAH battery pack in the model. Be certain that your radio system frequency is approved for use in R/C model aircraft.

Glues

There are many different glues available today for model construction that it can be confusing to even the experienced modeler. To simplify matters, most glues can be classified as one of four basic types:

1. Fast cyanoacrylate adhesives (abbreviated in this book as "CA") such as SIG CA, Hot Stuff, Jet, etc ...
2. Easy-to-use water-based glues such as SIG-BOND (yellow) and SIG SUPER-WELD (white).
3. Super strong (but heavier) two-part epoxy glues such as SIG KWIK-SET (5-minute cure) and SIG EPOXY (3-hour cure).
4. Traditional solvent-based model cements such as SIG-MENT.

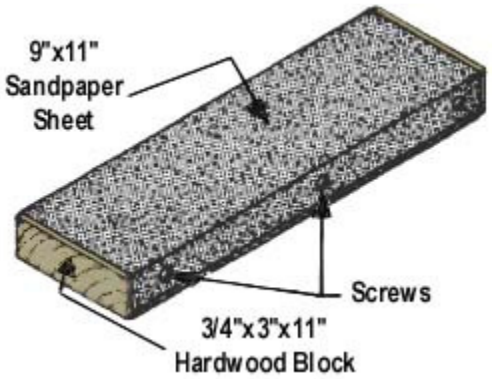
Each of these types has different characteristics and advantages. Often times, the choice of which type to use is strictly a matter of personal preference based on your experience with a previous model. However, because of the vast use of Lite-Ply and hardwoods in the FOUR-STAR 120, we have found that the CA glues seem to work the best for general construction. In fact, the construction sequence of the fuselage is designed with the use of CA glue in mind. Other glues could be used, but CA is recommended as our first choice because of its ability to penetrate an already assembled joint. In other words, the fuse parts can first be assembled dry (without glue), the alignment checked and adjusted, and then the glue can be applied to the joints. You should also have on hand some epoxy (both 5-minute and slow dry) and SIG-BOND because these glues are called out in several of the steps in these instructions.

SIG CA, like most brands of cyanoacrylates, comes in three viscosities thin, medium, and thick. Odorless CA's are also available from several manufacturers. Odorless CA is generally more expensive, but is ideal for people who can't tolerate the fumes of normal CA. An accelerator spray and debonder are also available and are described below.

- **Sig CA Thin** - Watery in consistency, thin CA should only be used when the two parts to be joined are in perfect contact with zero gap. Capillary action pulls this glue deep into the wood resulting in a very strong bond and it dries in just a few seconds. Thin CA can be used to tack assemblies together, but these joints should be glued again later with medium or thick CA. Thin CA is also necessary for installing EASY HINGES.
- **Sig CA Medium** - Our medium thickness CA is excellent for almost any step during construction, and is particularly recommended for gluing the plywood fuselage parts. The extra thickness allows the glue to fill small gaps, but it dries a little slower than thin CA. If you want only one type of CA, use medium thickness.
- **Sig CA Slow** - This thickest formula is good for filling large gaps and building up strong fillets at joints requiring extra strength. It also dries slow enough to allow you to apply it to one part and position it on another before it dries. (With the thin and medium CA's, the parts must be in contact and positioned correctly before glue application.) This feature is useful when laminating large sheeted areas like a fuselage side and a fuselage doubler.
- **Sig Kwik-Shot Accelerator** - Spraying accelerator on CA (any thickness) will cure it almost instantly. Although CA is fast, it's sometimes nice to speed it up even more.
- **Debonder** - This can be used to separate parts, but you'll probably use it for unsticking your fingers more than anything else!

> CAUTION: Some people have experienced allergic reactions when exposed to epoxy or cyanoacrylate glues. This is very rare. However, it is always important that such glues, and also paints, thinners and solvents, be used with adequate ventilation to carry fumes away.

You'll Need a Good Sanding Block



An assortment of different size sanding blocks are indispensable tools for model construction. A good general purpose block can be made by wrapping a 9"x11" sheet of sandpaper around a piece of hardwood or plywood. Use three screws along one edge to hold the overlapped ends of the sandpaper. Put 80-grit paper on the block during general construction. Switch to 220-grit paper for final finish sanding just before covering.

In addition to the large block, there are places where a smaller one is handy. Also, a sandpaper "file" can be made by gluing sandpaper to a flat spruce stick or around a hardwood dowel for working in tight places.

About The Building Sequence

The quickest and most efficient way to complete a model is to work on several pieces at the same time. While the glue is drying on one section, you can start on or proceed with another part. Keep in mind that the number, sequence used in this book was chosen as the best way to explain the building of each major component and is not intended to be followed in exact one-two-three fashion. Start on the wing at No.1 and after doing as many steps as is convenient, flip over to "FUSELAGE CONSTRUCTION" and do a step or two there, then back to "WING CONSTRUCTION" and so forth. You will arrive at points where you can go no farther until another component is available. Plan ahead! Read the book completely and study the full size plans before beginning construction.

Refer to "The Basics of Radio Control"

In addition to these instructions you are reading now, the booklet "The Basics of Radio Control" has been included with this kit as a reference for installing the engine, fuel tank, and radio in the Four-Star 120. It also contains very important information for preparing your model for flight. Modelers of all experience levels are encouraged to read this book and follow its guidelines for success. Highly experienced modelers may want to pass the booklet on to their club or student RIC pilots so that they can benefit from the information as well.

Notes Before Beginning Construction

Any references to right or left refers to your right or left as if you were seated in the cockpit.

To build good flying models, you need a good straight building board. Crooked models don't fly well! The building board can be a table, a workbench, a reject "door core" from the lumber yard, or whatever - as long as it is perfectly flat and untwisted. Cover the top surface of the building board with a piece of celotex-type wall board or foam board, into which pins can be easily pushed. Don't hesitate to use plenty of pins during assembly to hold drying parts in their correct position.

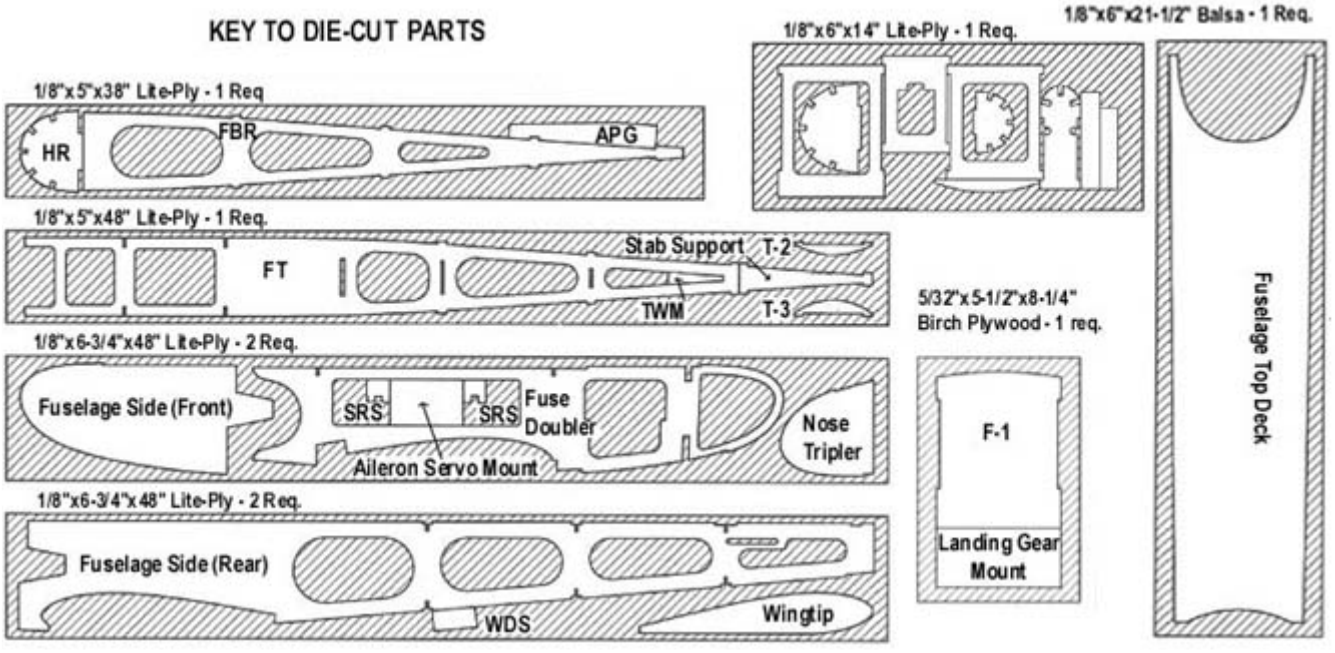
When pinning and gluing parts directly over the full-size plans, cover the plan with wax paper to prevent gluing the parts to the plans.

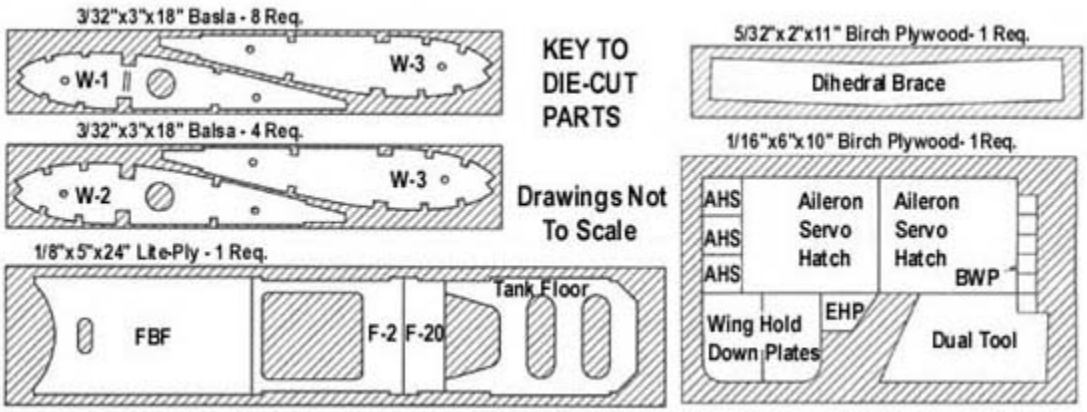
Don't use a ball point pen for making marks on the model during construction. If not sanded off, these ink marks will show through the model's final finish. Use a pencil instead of a pen.

Leave all die-cut parts in the sheets until needed in construction. Then remove the pieces from the sheets carefully. If difficulty is encountered, do not force the part from the sheet - use a modeling knife to cut it free. The die-cut balsa and plywood parts can be identified using the plans and the "KEY TO DIE-CUT PARTS". Mark the identification numbers on the corresponding parts before removing them from the die-cut sheets. All of the other parts can be identified by the "COMPLETE KIT PARTS LIST". Sort the different sizes of sticks and sheets into individual piles to avoid confusion during building.

COMPLETE KIT PARTS LIST							
Die-Cut Balsa							
8	3/32"x3"x 8" W-1 and W-3 Wing Ribs	4	3/32"x3"x18" W-2 and W-3 Wing Ribs	1	1/8"x6"x21-1/2" Fuselage Top Deck		
Sheet Balsa							
4	1/16"x4"x30" Stabilizer and Fin Sheeting	4	3/32"x2-1/2"x42" Trailing Edge Sheeting	1	3/32"x3"x36" Wing Center Sheeting	2	3/32"x4"x36" Wing Center Sheeting
1	1/4"x2"x12" Stabilizer Center Block, Fin Base						
Balsa Shear Webs							
12	3/32"x4"x1-11/16" SW-1 Shear Webs (2 packs of 6)	6	3/32"x4"x1-3/16" SW-2 Shear Webs (1 pack of 6)	22	1/16"x4"x11/16" SW-3 Shear Webs (2 packs of 11)		
Stick Balsa							
5	3/16"x3/8"x24" Fuselage Stringers, Fin Spacer	14	1/4"x1/4"x42" Wing Spars (12), Stabilizer/Fin Frames (2)	3	1/4"x3/4"x30" Stabilizer/Fin Frame	1	3/8"x3/4"x2" Spacer for Tail Fairing Blocks
1	1/2"x3/4"x5" Trailing Edge Fill-In	1	3/4"x30" Triangle - Braces, Tail Fairing Blocks				
Special-Cut Balsa							
2	5/16"x1/2"x42" Trailing Edge (tapered)	2	3/8"x3/8"x42" Leading Edge (quarter round)	2	3/8"x2-3/4"x38" Pre-Cut Ailerons	2	3/8"x3"x14" Pre-Cut Elevators
1	3/8"x4"x12" Pre-Cut Rudder						

Die-Cut poplar Plywood (Lite-Ply)							
2	1/8"x6-3/4"x48" Rear Fuselage Side, Wingtip, Wing Dowel Support	2	1/8"x6-3/4"x48" Front Fuselage Side, Fuselage Doubler, Nose Tripier, Aileron Servo Mount, SRS	1	1/8"x5"x48" FT, TWM, T-2, T-3, Stab Support	1	1/8"x5"x38" FBR, HR, APG
1	1/8"x5"x24" FBF, Tank Floor, F-2, F-2D	1	1/8"x6"x24" F-3 thru F-6, F-3S, F-4S, F-4T, F-5T, T-1				
Hardwood							
1	1/4"x1/4"x9" SPRUCE: Stab Brace	4	1/4"x1/2"x16" SPRUCE: Spar Doublers	4	1/4"x1/2"x42" SPRUCE: Main Wing Spars	1	1/4"x1/2"x12" BASSWOOD: Grooved Hatch Rails
1	3/8"x3/8"x27" BASSWOOD: Servo Rail Material	2	3/4"x3/4"x1-1/2" BASSWOOD: Wing Hold-Down Blocks	2	5/16"dia.x2" BIRCH: Wing Dowels		
Die-Cut Birch Plywood							
1	1/16"x6"x10" Hatches, Hold-Down Plates, EHS, RHS, AHS, BWP	1	5/32"x2"x11" Dihedral Brace	2	5/32"x5-1/2"x8-1/4" F-1; Landing Gear Mount		
Formed Wire							
1	3/32" dia.x7" Tailwheel Wire with Molded Nylon Tailwheel Bracket	1	1/8" dia.x7" Elevator Joiner Wire				
Miscellaneous							
1	Clear Plastic Canopy	1	Pre-Bent Aluminum Landing Gear	1	2"x30" Fiberglass Tape (Wing Center and Tailwheel Wire)	1	1.20 4-stroke size Reinforced Nylon Engine Mount
2	8-1/2"x14" White Paper (for Aileron Servo Lead Tubes)	2	Full Size Printed Plans	1	Photo Illustrated Instruction Booklet	1	"The Basics of Radio Control" Booklet
3	10"x27" Color Decals						
Hardware							
2	#2 Flat Washers; (for tailwheel wire)	10	#2x3/8" Sheet Metal Screws (8 for hatches, 2 for tail brace wires)	8	#2x3/4" Sheet Metal Screws (for control horns)	2	#4x1/2" Sheet Metal Screws (for tailwheel bracket)
4	#8x1" Sheet Metal Screws (for engine)	3	2-56x1/2" Mounting Bolts (for tail brace wires)	3	8-32x3/4" Mounting Bolts (for landing gear)	4	6-32x3/4" Socket Head Bolts (for engine mount)
2	1/4-20x2-1/4" Steel Bolts (for wheel axles)	7	2-56 Hex Nuts (for tail brace wires)	4	4-40 Hex Nuts (for jam nuts)	4	1/4-20 Hex Nuts (2 per axle)
4	6-32 Blind Nuts (for engine mount)	3	8-32 Blind Nuts (for landing gear)	2	1/4-20x1-1/2" Nylon Wing Bolts	4	Molded Nylon Control Horns
2	.200" o.d.x36" Nylon Inner Push rod Tubing (yellow)	2	.270" o.d.x36" Nylon Outer Push rod Tubing (black)	1	.130" o.d.x20" Nylon Tubing (throttle pushrod housing)	1	1/16" dia.x20" Flexible Steel Cable (throttle push rod)
4	2-56x10" Threaded Rods (tail brace wire material)	4	2-56 Metal Threaded R/C links (for tail brace wires)	4	2-56 Solder Clevis (for tail brace wires)	6	4-40x8" Threaded Rods (2/ailerons, 2/rudder, 2/elevator)
4	4-40 Metal Threaded R/C Links (2/ailerons, 1/rudder, 1/elevator)	4	4-40 Solder Clevis (2/ailerons, 1/rudder, 1/elevator)	24	Easy Hinges	1	Push rod Connector Assembly

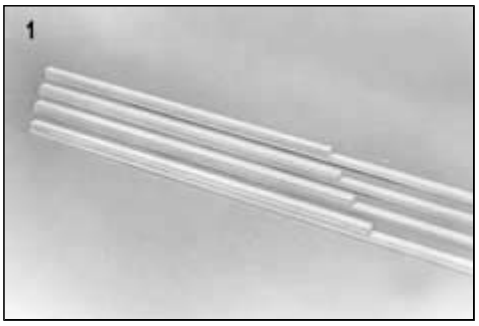




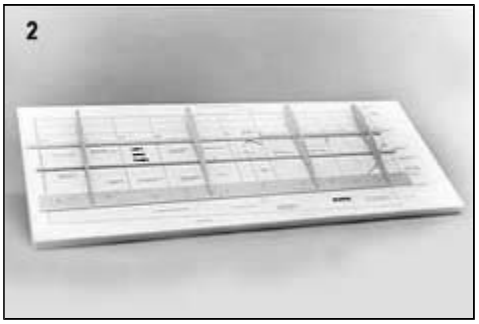
WING CONSTRUCTION

Building The Wing Panels

1. Construct four main spar assemblies by gluing the four 1/4"x1/2"x16" hardwood spar doublers to the four 1/4"x1/2"x42" hardwood main spars. Use epoxy for this step, and make sure the spars are kept straight while drying. Any bends or twists built in now are there to stay!



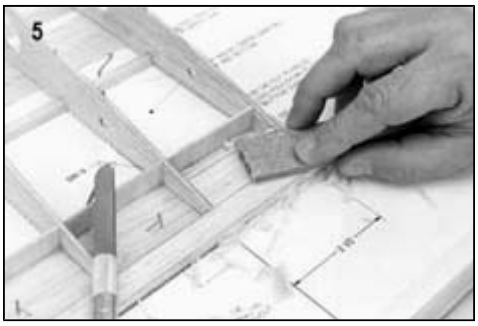
2.
   a. Pin one.of the main spar assemblies in place on the plan, being certain that the outboard end of the spar doubler is positioned correctly.
   b. The 3/32" balsa trailing edge sheeting is provided extra wide so that the forward edge can be cut perfectly straight (use a long straightedge). Pin the bottom T.E. sheeting in place, aligning the front edge with the plans.
   c. Use three or four wing ribs to accurately position the 1/4"x1/4"x42" balsa bottom rear spar, then pin the spar in place.



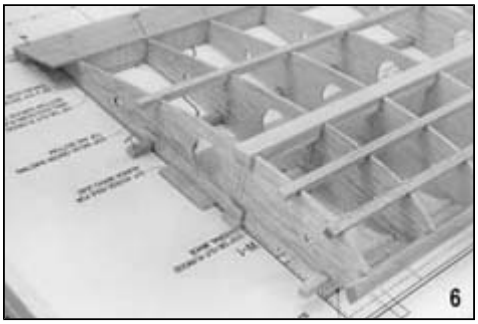
3.
   a. Place a scrap of 3/32" balsa near the main spar to accurately space the W-1 wing ribs up from the building board. (The spacing is required for the center sheeting which will be added later.)
   b. Use the dihedral gauge side of the die-cut plywood Dual Tool to set the root W-1 wing rib at the proper dihedral angle (20),then glue it to the spars and the trailing edge sheeting.
   c. Add the remaining wing ribs (three W-1, two W-2, and six W-3) to the wing panel.

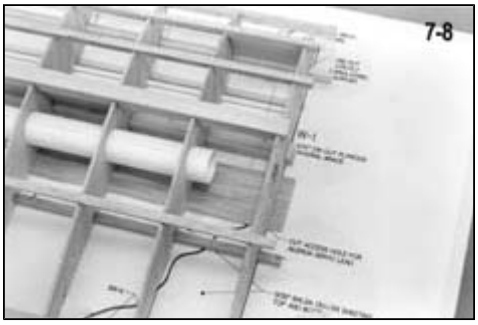
4.
   a. Use the "SHEAR WEB IDENTIFICATION" diagram on sheet two of the plans to identify the three types of pre-cut balsa shear webs (SW-1, SW-2, SW-3) that are used in the wing panel. The vertical wood grain is important for maximum wing strength, but it makes the webs somewhat fragile before installation. If one should break, simply glue it back together and install it normally.
   b. Install six SW-1 and three SW-2 shear webs as shown on the plan. Trial fit each web before gluing, sanding the ends as necessary to make them fit snugly between the ribs on either side. The bottom of the shear webs should be centered on the bottom main wirig spar; the top of the shear webs should be centered on the notch for the top main wing spar. The two inboard rib bays do not receive shear webs because that is where the dihedral brace will be installed later.
   c. Install an SW-3shear web in each rib bay (11 total), at the front edge of the trailing edge sheeting. These webs provide support for the sheeting and help stiffen the wing torsionally.
   NOTE: The shear webs between the W-1 wing ribs will need to be shortened significantly to fit.

5. a. Glue the pre-shaped 5/16"x1/2"x42" balsa trailing edge to the top of the trailing edge sheeting and the ends of the wing ribs.
   b. Cut a trailing edge fill-in block from the 1/2"x3/4"x5" piece of balsa included in the kit, and glue it in place. Carve and sand the top of the fill-in block to match the W-1 wing ribs.



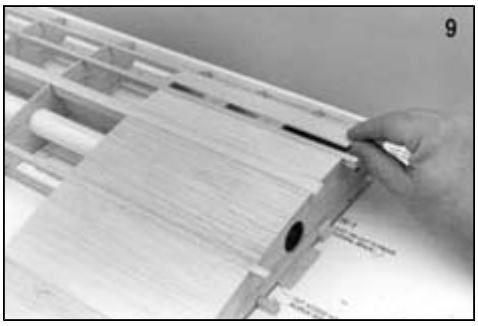
6. a. Temporarily remove any pins in the bottom trailing edge sheeting, then add the 3/32" balsa top trailing edge sheeting (trim the front edge straight before gluing). For this step it is recommended that you apply Sig-Bond (aliphatic resin) to the top of the trailing edge, the ribs, and the SW-3 shear webs before setting the top sheeting in place. Re-pin the trailing edge to the building board to keep it straight while it dries.
   b. Trial fit a main spar assembly in the upper rib notches. If any of the shear webs are too tall, they should be trimmed to allow the spar assembly to sit all the way down in the rib notches. When satisfied with the fit, glue the spar assembly in place. Check the root W-1 rib again with the Dual Tool to be sure it is still at the correct angle.
   c. Glue the pre-shaped 3/8"x3/8"x42" balsa leading edge to the front of the ribs.
   d. Glue the two 1/4" sq. x42" balsa top forward spars in place.
   e. Glue the forward-most 1/4" sq. x42" balsa bottom forward spar in place. (The final forward spar will be added later.)
   f. Add the 1/4" sq. x42" balsa top rear spar.



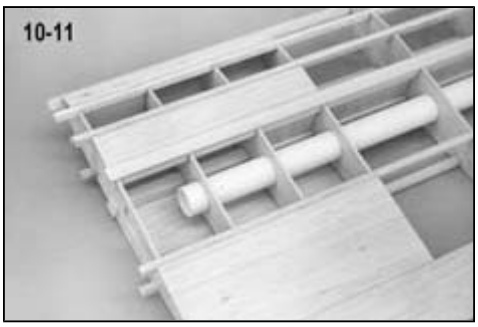


7. Install a die-cut lite-ply wing dowel support (WDS) in the innermost rib bay between the two 1/4" sq. spars behind the leading edge. Notice that one end of the support is pre-cut to match the dihedral angle of the inboard W-1 rib.

8. Form a 14" long aileron servo lead tube by wrapping one of the supplied pieces of 8-1/2" x14" plain white paper around a broom handle. Temporarily tape the tube together, slide it off the broom handle and into the 1" holes in the wing panel. Position the outboard end of the tube flush with the outer W-2 wing rib. Remove .the tape and allow the tube to unwind, then glue it to the ribs.
NOTE: Remove any pins from the structure that are located under the area where the top center sheeting will be installed (in the next step). Otherwise, you may find it difficult to remove your wing from the board later!



9. a. Cut the top center sheeting piece that fits between the main spar and the rear spar from the 3/32"x3" balsa sheet provided in the kit. Trim and sand the sheet to fit, then glue it in place. Sig-Bond is recommended for gluing all of the center sheeting to the ribs and spars because it will be easier to sand the joints smooth later.
   b. The rest of the top center sheeting should be cut from 3/32"x4" balsa, and glued in place.

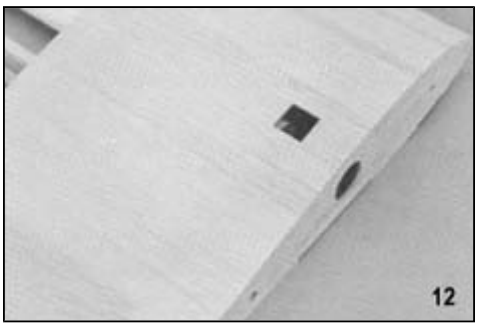


10. When the glue has dried, unpin the wing half from the board and install the remaining 1/4" sq. x42" balsa bottom forward spar.

IMPORTANT! If you have been using thin or medium CA glue, now is the time to go back over every joint using medium or thick CA. Don't be stingy here - the integrity of your wing depends upon strong glue joints. Glue BOTH sides of EVERY joint, even the aileron servo lead tube. Make certain the shear webs are bonded to the spars AND the wing ribs on each side. Double check the leading edge stick and all of the 1/4" sq. spars for complete bonding to the ribs.

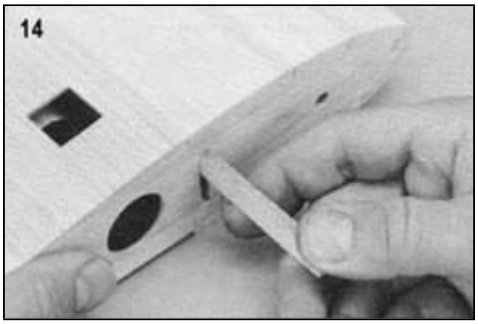
11. Install the bottom center sheeting except for the two areas shown in the photo. Cut pieces from the 3/32" x 4" balsa that you used earlier.

12.
    a. Cut off and sand the spars, leading edge, trailing edge, and sheeting at both ends of the wing, flush with the end ribs.
    b. Although the leading edge is pre-shaped, it should be smoothed now with a long sanding block. Also, trim and sand the overhanging portion of the trailing edge sheeting flush with the trailing edge.
    c. Sand the top center sheeting smooth. (The bottom center sheeting is sanded later, in step 19.) Cut a 3/4" sq. access hole in the top center sheeting as shown on the plan.

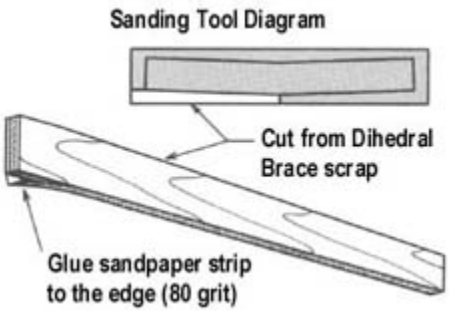


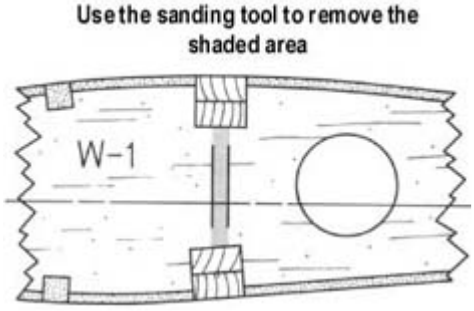
13. Glue the die-cut lite-ply wingtip to the outboard end of the wing panel.

OPTIONAL: If you prefer rounded wingtips over the square ones, simply add a soft balsa block to the wingtip (instead of the lite-ply part), then carve and shape it as desired.



14. The two center W-1 wing ribs have two vertical slits between the main spar notches to help locate the dihedral brace. Carefully remove the material between the slits, then extend the openings to the spars as shown in the diagram. A small sanding stick made from scrap 5/32" ply with sandpaper glued to the edge is a handy tool for this step.



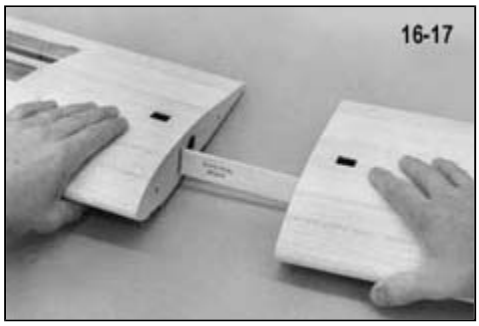


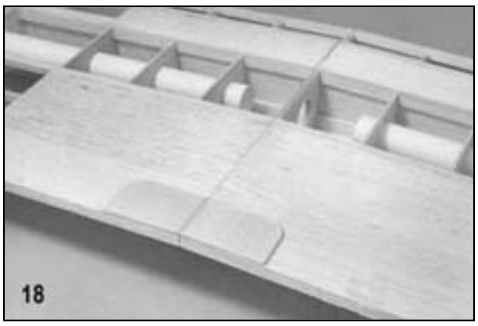
15. Repeat steps 2 through 14 to build the opposite wing half.

Joining The Wing Panels

16.
    a. Trial fit the two wing panelswith the die-cut 5/32" plywood dihedral brace installed between the main wing spars. Be certain that the dihedral brace is not preventing the panelsfrom making solid contact with each other at the center. If necessary, trim or sand the dihedral brace for a snug fit. The dihedral angle of 20 per wing panel will be automatically built-in by the dihedral brace. If you want to check the angle, place the wing on a table so that one side sits flat, and the other side is raised. The distance from the table to the bottom of the wingtip should be about 2-3/4", but a variation of up to 1/2" either way is acceptable and will not affect the flight performance. The most important thing is to have a tight joint at the wing center with no gaps.
    b. Epoxy glue the dihedral brace into ONE of the wing panels, and allow to dry.

17. Use epoxy (either 5-minute or slow-dry) to join the two wing panels. Generously apply glue to end ribs and the exposed edges of the dihedral brace, then carefully slide the other wing panel into place. Wipe away any excess epoxy that oozes from the center joint (a rag dampened with alcohol works well). Before the glue dries, make sure that the leading and trailing edges of both panels are perfectly aligned.





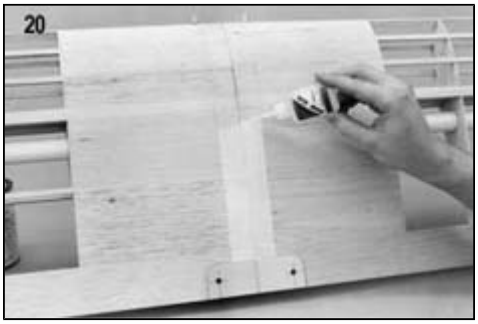
18. Glue the die-cut 1/16" plywood wing hold-down plates to the bottom of the wing, flush with the trailing edge.

Finishing The Wing

NOTE: Complete the steps in "Mounting The Wing To The Fuselage" before proceeding.

19.

a. While you still have access through the bottom of the wing, check the glue joints around the wing hold-down dowels and the dihedral brace. If necessary, apply another coating of epoxy to the joints.
b. Finish off the bottom center sheeting, again using 3/32" balsa.
c. If you haven't done so already, give the wing a final sanding. Sand just enough to take off any prominent high spots or bumps. Excessive sanding may distort the airfoil shape.



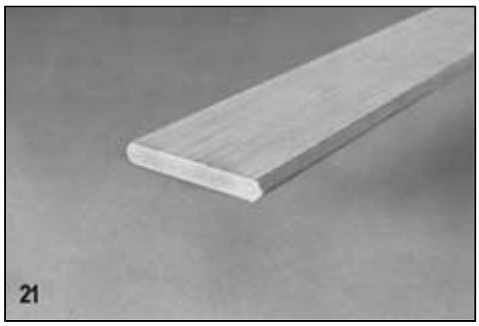
20. The 2" wide fiberglass tape can be applied to the wing center joint (top and bottom) using one of the following two methods:

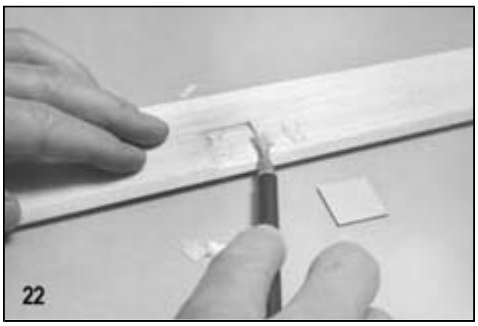
METHOD 1:	METHOD 2:
1. Coat the wing center joint with slow-drying epoxy glue. 2. Lay the tape on top of the glue. 3. Holding one end of the tape so it won't slip, "squeegee" the glue through the tape with a small paddle of scrap balsa. Scrape over the tape several times with the paddle to smooth the tape and remove any excess glue. 4. When dry, sand lightly to remove any rough spots. Try not to sand into the fiberglass tape itself.	1. Cut the tape to length, then lightly spray one side with a spray adhesive (such as 3M "77"). 2. Position the tape on the wing center joint. 3. Soak the tape with thin CA. The spray adhesive simply holds the tape in place - it won't affect the strength of the CA. A second coat of CA will help fill in the weave of the fiberglass, resulting in a smoother surface. Rub the second coat with your finger (protected with plastic wrap - keep it moving!) to smooth out the glue. Use a fan to keep the CA fumes away from your face. 4. When dry, sand lightly to remove any rough spots. Try not to sand into the fiberglass tape itself.

Ailerons

21. Sand the trailing edge of the aileron round and bevel the front using a sanding block. A pencil line drawn down the center will help keep the bevel symmetrical.

22. Imbed the die-cut 1/16" plywood horn support in the bottom surface of the aileron by carefully cutting a 1/16" deep relief as shown in the diagram below and the "Control Horn Assembly" diagram on Sheet 2 of the plans. Firmly glue the support into the relief.

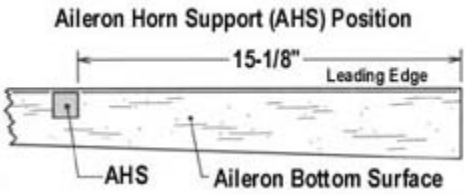


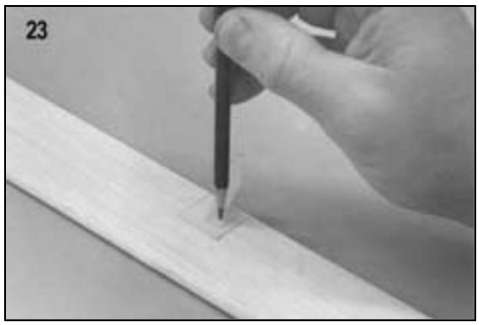


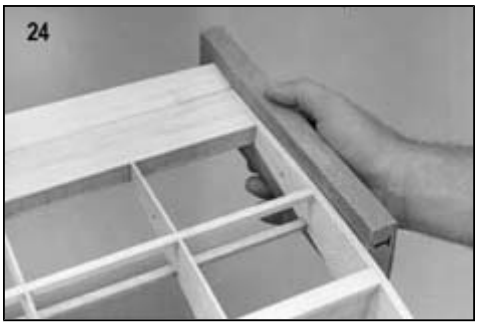
23.

a. Center a nylon control horn on the plywood support with the five horn holes lined-up vertically with the point of the leading edge bevel. Mark the position of the two flange holes, then drill at the marks with a 3/32" drill bit.
b. Reinforce the control horn area by soaking the wood around the two holes with thin CA.This will help keep the nylon horn plate from crushing the balsa when the control horn is installed later.

24. Temporarily tape the aileron to the back of the wing with its inboard end spaced 2-1/2" from the wing center joint. Sand the outboard end of the aileron flush with the wingtip. Leave the aileron taped in place and temporarily mount the nylon control horn to aid in the next section.

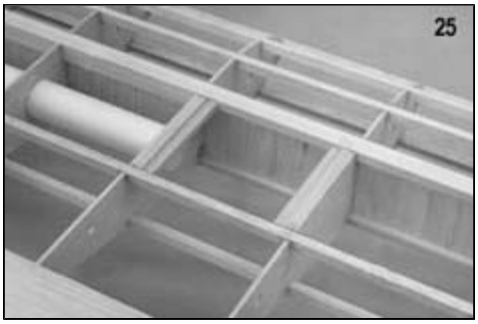






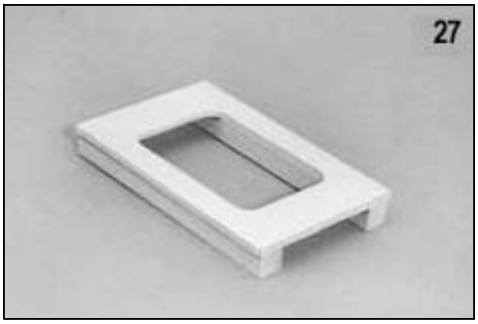
Aileron Servo Installation

The ailerons on the Four-Star 120 are operated by two servos mounted separately in each wing panel (see "RADIO REQUIREMENTS" earlier on in these instructions).



25. Cut two hatch rails from the special-cut 1/4"x1/2"x12" basswood stick provided in the kit. Glue the hatch rails in place, flush with the bottom edge of the W-2 and W-3 wing ribs. The hatch rails provide a seat for the aileron hatch and a flat surface for attaching the covering material.

26.
   a. The die-cut 1/16" plywood hatch may require some trimming or sanding for a perfect fit on the hatch rails. With the hatch in place, drill four holes through both the hatch and the hatch rails (at each corner of the hatch) with a 1/16" drill bit.
   b. Remove the hatch, then redrill the four holes in the hatch with a 3/32" drill bit. The hatch is held in place with four #2 x 3/8" sheet metal screws. Be sure to mark each hatch so you can tell later which hatch goes with which wing panel!



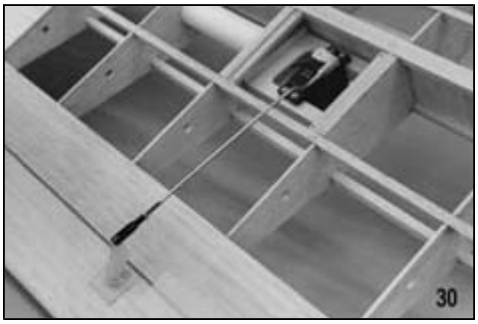
27.
   a. Since servos come in many sizes, you need to make a custom servo tray from lite-ply and basswood to fit your particular servo. Cut a hole in the die-cut lite-ply aileron servo mount to fit your particular servo. The forelaft dimension of the hole should be about 1/16" larger than the length of your aileron servo.
   b. Cut two 3/8" sq. x4" basswood servo rails (from tile 27" long piece provided in the kit) and glue them to the aileron servo mount flush with the front and rear edges of the hole.
   c. If necessary, trim or sand the edges of the servo mount until it fits snugly in position between the ribs. Trial fit the mount, but don't glue it in yet.

28. Carefully position the servo on the mount so that the outer hole of the servo arm is lined-up with the control horn on the aileron. The goal here is to keep the aileron push rod wire parallel to the wing ribs (and the airflow). Mark the 4 servo mounting holes, then fas.ten the servo to the aileron servo mount using either the screws provided with the servo or long wood screws (#2 x3/4", not provided in kit).

29.

a. Make an aileron pushrod as shown on the plan from a 4-40 x8" threaded rod, a 4-40 solder clevis, and a 4-40 R/C link.
The actual length of your pushrod may have to be altered slightly depending on the shape of your aileron servo.

b. Temporarily connect the aileron pushrod to the servo arm (with the solder clevis) and the aileron control horn (with the R/C link). Adjust the position of the servo mount in the wing as necessary to keep the pushrod from hitting the bottom spar and the servo arm from hitting the hatch.
Also make certain that the covering material on the top of the wing won't make contact with the servo.

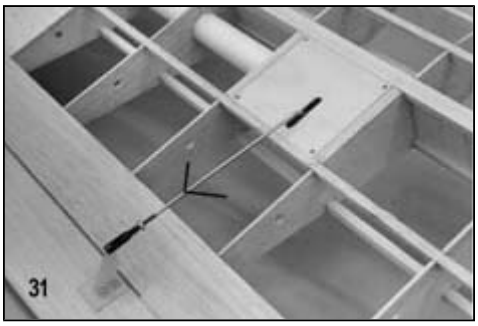


30. When satisfied with its position, glue the servo mount assembly to the wing ribs.

Reinforce the joints at the servo mount and the ribs with a couple of scrap pieces of stick balsa.

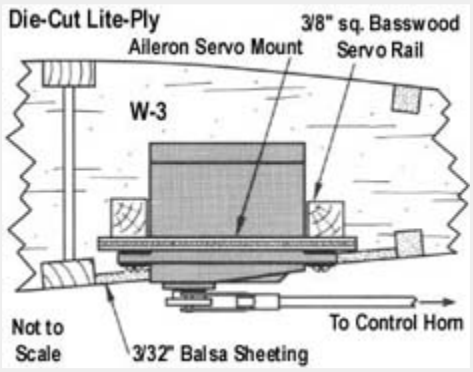
31. The plywood hatch will need an opening cut into it for the aileron pushrod. Again, the exact-size and shape of this opening will depend on the shape and position of your pushrod. You can make a nice-looking slot by drilling two holes, then connecting the edges with knife cuts.

When you are done with the hatch, remove the aileron, the aileron control horn, and the aileron pushrod; The servo can be left in place since it won't interfere with covering.



ALTERNATE AILERON SERVO INSTALLATION

You may prefer to install your aileron servo as shown in the diagram below. The advantages are that the push rod can be run directly to the control horn with no bends, it's lighter, less complex, and provides easier servo access. The disadvantages are a slight increase in drag and a less "finished" look to the bottom of the wing. Simply replace the hatch rails and plywood hatch with some 3/32" balsa sheet (trim the bottom of the ribs to fit), and cut an opening that's just large enough to install and remove the servo.



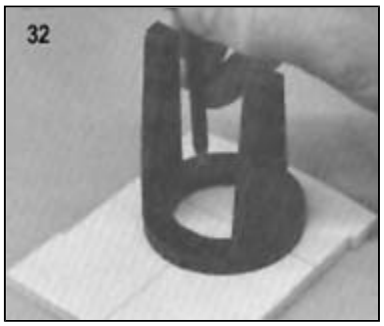
FUSELAGE CONSTRUCTION

Fuselage Subassemblies

Before starting fuselage construction, there are a few subassemblies that should be built and set aside until needed. This is done to avoid interruptions during the flow of fuselage construction.

32.

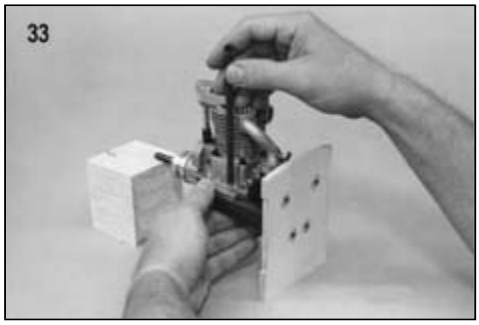
a. Glue together the two die-cut 5/32" plywood F-1 pieces using Kwik-Set epoxy or slow CA. Use a heavy weight of some kind to hold the two pieces perfectly flat while drying.
b. Mark the vertical center line and thrust line on the F-1 assembly using the cross-section on the plan as a guide.
c. The engine mount included in the kit will fit most of the 1.20-size four-stroke engines on the market. Positon the engine mount (or another mount of your choice) on F-1, mark the location of the mounting holes, then drill them out with a 3/16" drill bit.

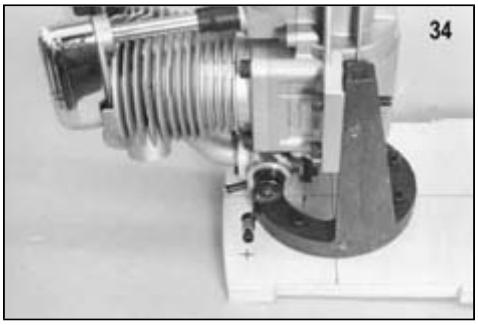


33.

a. Lightly hammer four 6-32 blind nuts into the back of F-1. Pull the blind nuts into their final position by bolting the engine mount to the front of F-1 using four 6-32 x3/4" socket head bolts. Apply medium or slow CA around the edges of the blind nuts to hold them in place. Be careful not to get any glue in the threads!
b. Position your engine on the mount far enough forward for the propeller to clear the fuselage "cheeks", mark the engine mounting holes, then drill at each of the marks. If you plan on using the four #8 x1" sheet metal screws provided in the kit, use a 9/64" dia. drill bit. The sheet metal screws are self-tapping and won't loosen from engine vibration. If you prefer, machine screws can be substituted, but you'll have to drill and tap the mount.

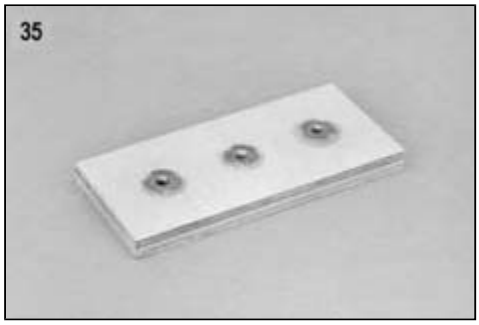
34. Temporarily bolt the engine to the mount so you can locate the best spot on F-1 for the throttle pushrod to exit and line up with your engine's carburetor control arm. A 2-56 solder clevis is provided in the kit to attach the flexible cable pushrod to the engine's carburetor. The solder clevis should work well for 2-stroke engines, but most 4-stroke engines may require a different type of connector. Remove the engine and engine mount, and drill at the mark with a 9/64" dia. drill bit.

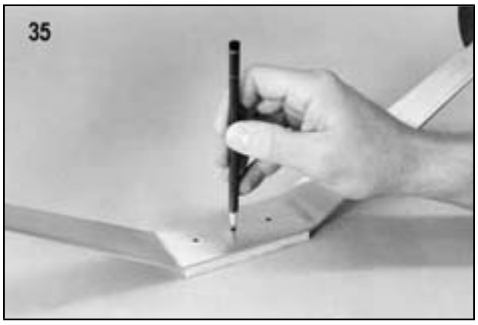


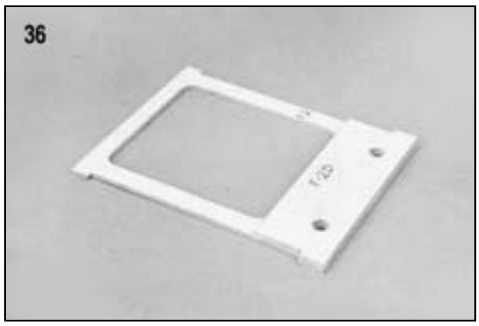


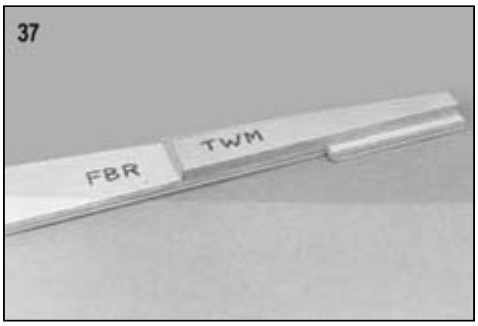
35.

a. Glue the two die-cut 5/32" plywood landing gear mounts together with epoxy or slow CA. Again, weight the assembly down until dry.
b. Carefully center the aluminum landing gear over the landing gear mount and mark the location of the mounting holes through the three holes in the landing gear. Remove the mount and drill at the marks with a 13/64" drill bit.
c. Lightly hammer three 8-32 blind nuts into the holes and secure them with medium or slow CA.









36.
a. Notice that the die-cut lite-ply former F-2 has two dimple marks which are used to locate the holes for the wing hold-down dowels. Glue F-2D to the die-cut lite- ply former F-2 so that the dimples remain showing.
b. Drill at the dimples in F-2, first with a 1/8" drill bit, then with a 1/4" drill bit, and finally with a 5/16" drill bit. Use a chunk of hardwood behind the formers to keep the plywood from splintering as you drill through.

37. Glue the die-cut lite-ply tailwheel mount (TWM) to aft end of FBR (Fuselage Bottom, Rear).

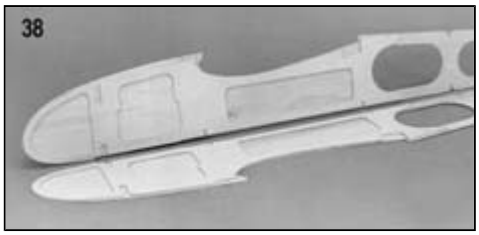
Basic Fuselage Construction

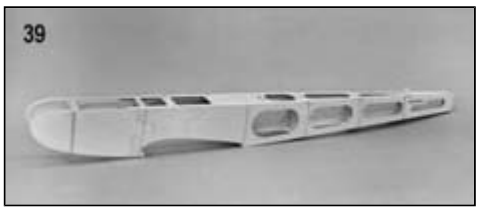
38.
a. The fuselage sides are spliced from two die-cut pieces. Align the pieces directly over the plan (protected with wax paper), then apply medium CA to the splice joint.
b. Glue the die-cut fuselage doublers to the fuselage sides using slow CA or Kwik-Set epoxy, and allow to dry. Be sure to make one left side and one right side!

39.
a. Carefully slip all the fuselage formers (F-1 through F-G) into place between the fuselage sides. Put a rubber band around the fuselage at each former location to hold it tightly together.
b. Slide the die-cut lite-ply part FBR (Fuselage Bottom, Rear) under the rubber bands until it snaps into its proper location between the fuselage sides. Do the same thing for the die-cut lite-ply part FT (Fuselage Top) and the die-cut lite-ply Stab Support.

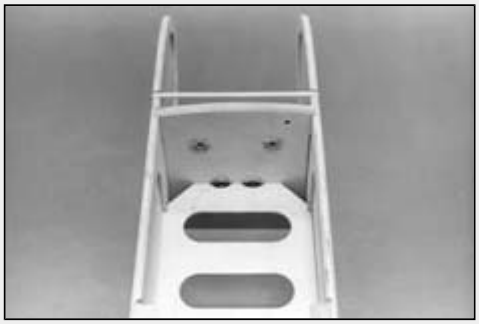
NOTE: The "Tee-Lock" tabs on the formers, FBR, and FT are made oversized to protrude past the fuselage sides. These will be sanded off after the fuselage has been completely assembled.

40.
a. Place the fuselage over the top view on the plans to check its alignment. Even if some of the plywood is badly warped, the interlocking parts are designed to be self-aligning. If there are any persistent warps or twists, now is the time to fix it! Once the fuselage is glued, it can't be re-aligned. Double check that the opening at the back end of the fuselage is square with the fuselage top. If necessary, gently twist or push the parts in the desired direction and use masking tape to hold them there.
b. Carefully glue all of the parts permanently in place, preferably working from inside of the fuselage, using medium CA. Start with small patches of glue in the corners, checking the fuselage alignment as you go. Then go back and glue all of the joints on both sides. Leave the rubber bands and tape in place until all of the glue has dried completely.





BUILDER'S TIP:



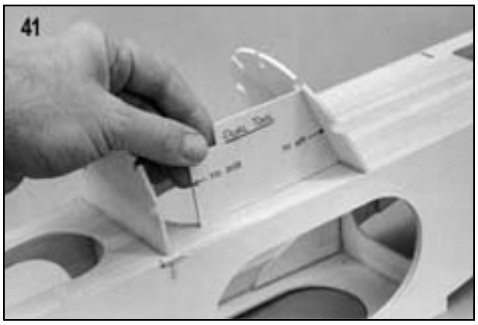
To assist in keeping the nose section of the fuselage straight, you can install the die-cut lite-ply tank floor at this point, but it is very important not to glue it in place during part "b" of this step. The tank floor should not be glued in until step 45. Notice that if you use the provided engine mount, you will need to cut some clearance notches at the front of the tank floor to clear the two bottom blind nuts and mounting bolts.

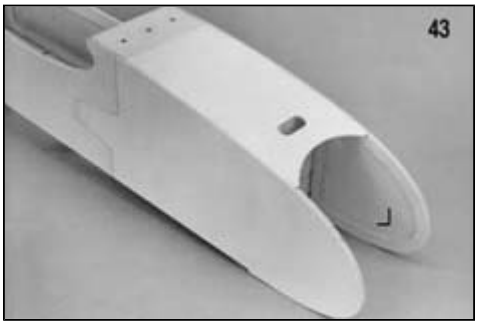
41.
a. Glue F-4T and F-5T to their slots in FT.
b. Add the die-cut lite-ply headrest HR to the top of FT. Use the 25 deg. side of the Dual Tool to get the correct angle.

42.
a. Glue the five 3/16"x3/8"x24" balsa fuselage stringers in place. Notice that the top stringer and the two bottom stringers sit in notches in F-G, while the two middle stringers butt against the front face of F-G.
b. When dry, trim off the front of the stringers flush with the front of HR and the back of F-G. Save the scrap stringer material for later.

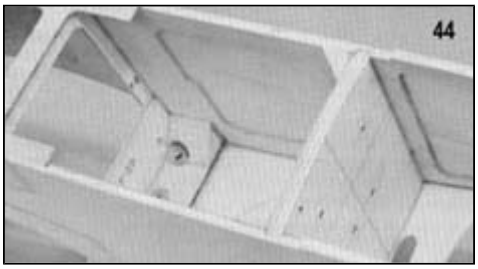
43. a. Install the landing gear mount to the fuselage by gluing it firmly to the sides, the doublers, and the bottom of F-2.
    b. Bevel the bottom edge of F-1 as necessary to allow FBF (Fuselage Bottom, Front) to seat properly in its grooves on the bottom of the fuselage.
    c. Tape FBF in place, then glue it using medium CA. Be sure to firmly glue the joint between FBF and the landing gear mount from inside the fuselage.

NOTE: The hole in FBF is provided to serve as an oil drain hole, as well as a convenient place to route the vent line from the fuel tank and/or the breather line from the crankcase of a four-stroke engine.





44. a. If the tank floor was installed earlier for alignment reasons, remove it now. Cut two 1-3/8" lengths from the 3/4"x30" balsa triangle stock to serve as braces for the landing gear mount. Notch both braces to clear the blind nuts, then glue them in place.
    b. Cut two braces for F-1 from the 3/4" balsa triangle stock and notch them as necessary to clear the blind nuts on the back of F-1. Apply slow CA to the braces and press them firmly in place.

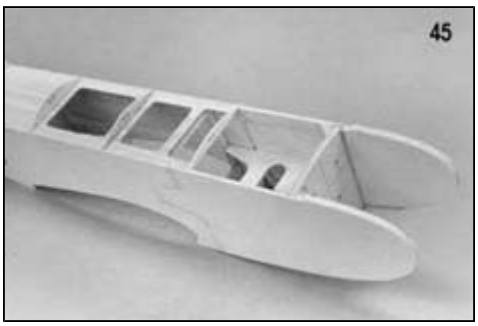


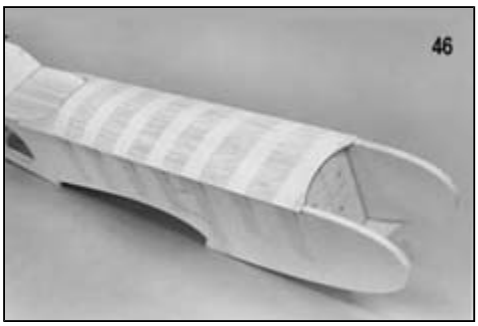
45. a. Now you can permanently install the tank floor. Make sure it is seated on the fuselage doublers and against the back of F-1, then glue it in place.
    b. Trim the die-cut lite-ply nose triplers as necessary to fit, then glue them firmly to the fuselage doublers and F-1.
    c. Glue the small top deck formers T-1 , T-2, and T-3 into their notches in FT.

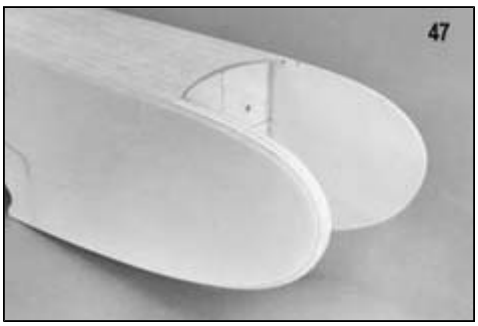
46. a. Bevel the top edge of the fuselage sides with a sanding block to provide a firm seat for the fuselage top deck when it is installed. Notice that the angle between the top deck and the fuselage sides varies along the entire length. Use the top deck formers as a guide to the sanding angle. Don't worry about perfection - a few swipes with a sanding block on each side should do the trick.
    b. Tape the die-cut balsa top deck in place. You will probably need to apply some warm water to the upper surface of the top deck to make it easier to bend into position and prevent it from cracking. Apply medium CA from inside the fuselage as much as possible. When dry, remove the tape.

47. Check the fuselage for joints that could use another application of medium or slow CA. Fill any gaps at the Tee-Lock tabs and slots with CA.

The fuselage should now be ready for final sanding. Sand off all of the Tee-Lock tabs, then round the bottom edges of the fuselage and the corners of the balsa top deck. Use a sanding block, starting with 80-grit sandpaper. Switch to 150-grit, then 220-grit or 360-grit for the final sanding.



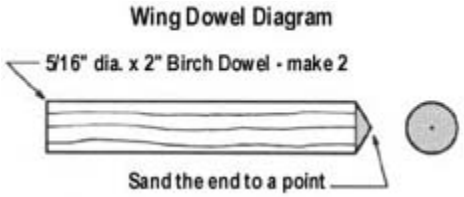




Mounting The Wing To The Fuselage

NOTE: The wing must be completed through step 18 before proceeding.

48.



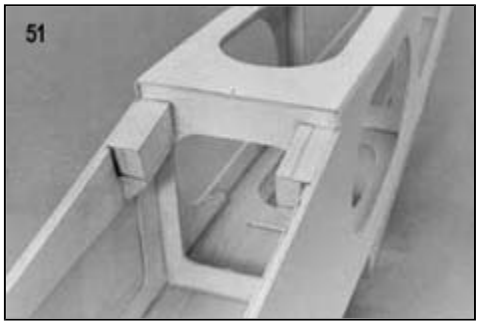
a. Trial fit the wing to the fuselage. Align the wing (see the General Alignment Diagram on page 20 of "The Basics of Radio Control") and make accurate pencil marks on both the wing and fuselage so that the wing can be returned to the same position later.
b. Locate the two 5/16" dia. x2" wing dowels and sharpen one end of each to a point - keep the point symmetrical and centered. Push the dowels into the holes in F-2 so that only the points remain sticking out into the wing opening. Slide the wing into position, making sure it is centered on the fuselage. When you remove the wing, there should be two small indentations in the leading edge.

49.

a. Drill 1/8" holes through the leading edge at the indentations. Re-drill the holes, this time with a 5/16" drill bit, and continue drilling straight through the lite-ply wing dowel supports that are already installed in the wing. Keep the drill aligned as best you can with the wing center line.
b. Remove the wing dowels from F-2. Put a piece of wax paper over the face of F-2 and reinsert the dowels, forcing them through the wax paper. Push the dowels in only 3/8", leaving most of their length exposed.
c. Trial fit the wing in position, sliding it onto the dowels. Check to see that the wing seats properly on the fuselage. If not, slowly enlarge the holes in the leading edge until it does seat properly.

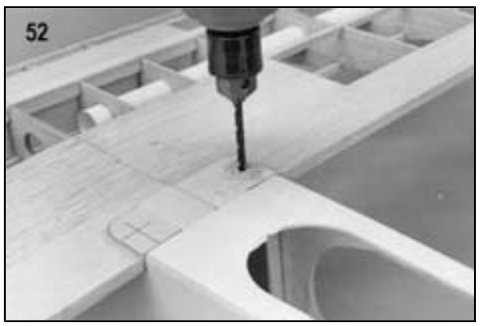
50. When satisfied with the fit of the wing and the wing dowels, coat the inside of the holes in the leading edge with epoxy. Slide the wing back into position on the dowels. Also apply epoxy to the aft end of the wing dowels and the wing dowel supports by working through the openings in the bottom center sheeting. Hold the wing in place until dry, then remove the wing and fill any gaps around the dowels with another application of glue.

51.



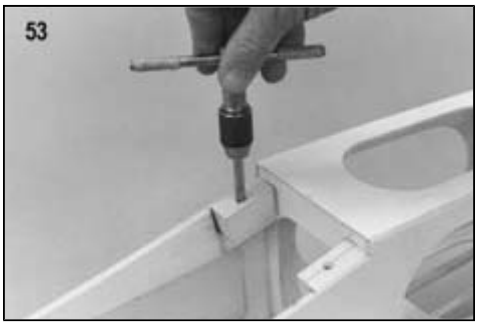
a. The two 3/4"x3/4"x1-1/2" basswood wing hold-down blocks key into pre-cut notches in the -fuselage doubler. For an accurate fit, the side of each block that contacts the fuselage needs to be beveled slightly to match the aihedral angle of the wing. Temporarily tape the wing in place on the fuselage, then check the fit of the blocks by working through the lightening holes. The blocks should seat firmly against both the fuselage side and the top surface of the wing.
b. Again working through the lightening holes, install the wing holddown blocks in the notches, making certain they are in full contact with the wing upper surface. Tack glue the blocks to the fuselage with slow CA, then remove the wing. Finish gluing the blocks in place using medium CA.
c. Cut two 1-1/2" lengths of 3/4" balsa triangle stock to brace the wing hold-down blocks. Glue the triangle braces firmly to the top of the holddown blocks and the fuselage doublers.

52.



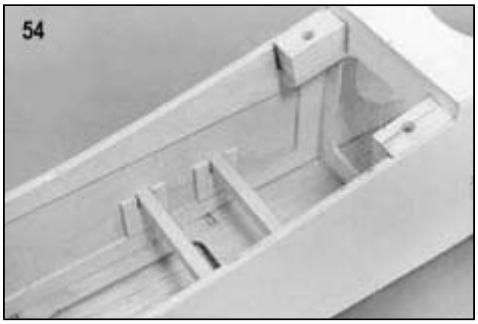
a. Fit the wing in place on the fuselage and check its alignment one last time. When you are satisfied that it is aligned correctly, tape it so that it can't move.
b. Carefully mark the drill locations for the wing bolts. Visually confirm that a hole drilled at the marks will pass through the approximate center of the basswood hold-down blocks.
c. Drill through both the wing and the wing hold-down blocks with a #7 (or 13/64") drill bit. Keep the drill perpendicular to the bottom surface of the wing so the heads of the nylon wing bolts will seat flush against the plywood plates.

53. a. Remove the wing and tap the wing hold-down blocks with a 1/4-20 tap. Apply a few drops of thin CA to the holes to strengthen the threads. When you are absolutely certain that the CA has cured, clean up the threads by re-tapping the holes.
b. Redrill the holes in the wing with a 1/4" drill bit to pass the nylon wing bolts.

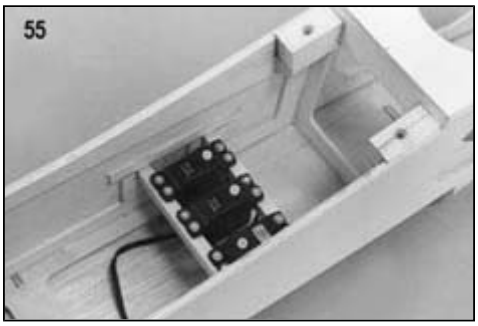


Servo And Pushrod Installation

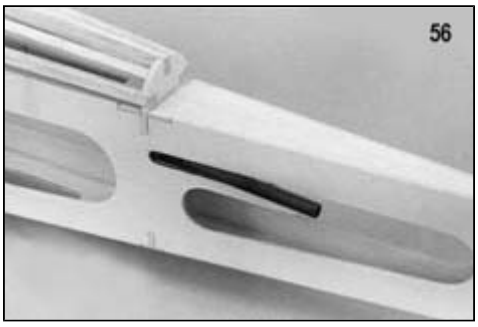
54. The servos need to be mounted in the fuselage so that the nylon push rods can be routed properly, with the least amount of curvature. Refer to Chapter 2 of "The Basics of Radio Control" and the plans for information on where and how to mount the servos in the fuselage. Start by cutting two 4-1/4" long servo rails from the supplied 3/8" sq. basswood stick. The ends of the servo rails searin the die-cut lite-ply servo rail supports (SRS), which in turn slide against the "flat" inner edge of the fuselage doubler. Use your servos (or servo tray if you plan on using one) to properly space the servo rails. When satisfied with their position, glue the servo rails and servo rail supports in place.



55. a. Lock the rails in place by gluing a scrap piece of lite-ply or balsa at each end of both rails.
b. Mount your rudder, elevator, and throttle servos to the rails.

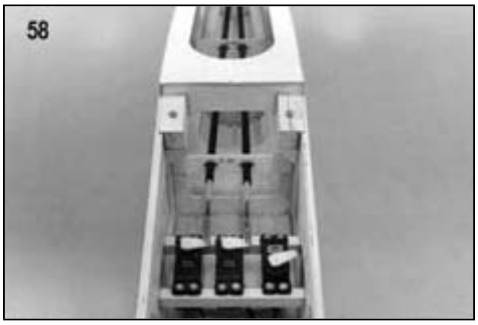


56. a. Locate the two .270 o.d. x36" nylon outer pushrod tubes (black), and roughen the last 4" of each with sandpaper to aid glue adhesion.
b. Slide the outer pushrod tubes forward through the pushrod exit slots in the fuselage sides and the notches in F-6. Continue sliding the tubes until only about an inch sticks out past the slots.
c. The outer pushrod tubes should nearly meet (but not cross) at the notch in F-5. Glue a scrap of balsa below the tubes to hold them in place.
d. Apply glue (either slow CA or epoxy) to the outer tubes at the push rod exit slots, from both the inside and the outside of the fuselage.
e. Use a single-edge razor blade to trim the outer pushrod tubing flush with the outside surface of the fuselage.



57. a. The nylon push rods must be supported at each former to keep them from flexing under load. Use the die-cut lite-ply pushrod straps, F-3S and F-4S, to support the push rods. Notice that the pushrod straps haven't been marked for push rod location because the routing of the pushrods will vary with different servo installations. Ideally, you want to have the push rods to come through F-3S pointed directly at fhe servo arms of the rudder and elevator servos. Carefully mark the pushrod locations on the plywood straps, then drill at the marks with a 9/32" drill bit.
b. Cut off the front ends of the outer push rod tubes about an inch forward of F-3. Slide F-4S then F-3S into position on the push rods, but don't glue them in yet.

58. a. Cut two 4-40 x 8" threaded rods to an overall length that is equal to the distance from your servo arm to the end of the black tube (this distance will vary depending on your servo placement). Solder a 4-40 solder clevis to the smooth end of each rod.
b. Screw the threaded end of the rods completely into the two .200 o.d. x36" nylon inner pushrod tubes (yellow).
c. Slide the inner pushrod tubes into the outer tubes from the servo end. Attach the solder clevises to the servo arms and hook them up to the servos.
d. With the push rods hooked up to the servos, you can now glue F-3S and F-4S to the front of F-3 and F-4, respectively, in such a way as to keep the bends in the push rods to a minimum.



59. Now is a good time to install the .130 o.d. nylon outer tubing (clear) for the throttle pushrod. Route the tubing with as little curvature as possible, and support the aft end with a scrap balsa standoff. A SIG pushrod connector is supplied in the kit to hookup the cable to the throttle servo arm.

60. Now is also a good time to plan your fuel tank installation and routing of fuel lines through F-1 (see "Engine and Fuel Tank Installation" for more information on fuel tanks for the FOUR-STAR 120). Mark the locations of the fuel lines on F-1, then drill holes through F-1 at the marks with a drill bit that is the same diameter as your fuel tubing. If you haven't done so already, remove the engine, fuel tank, throttle cable, and inner nylon pushrods before proceeding.

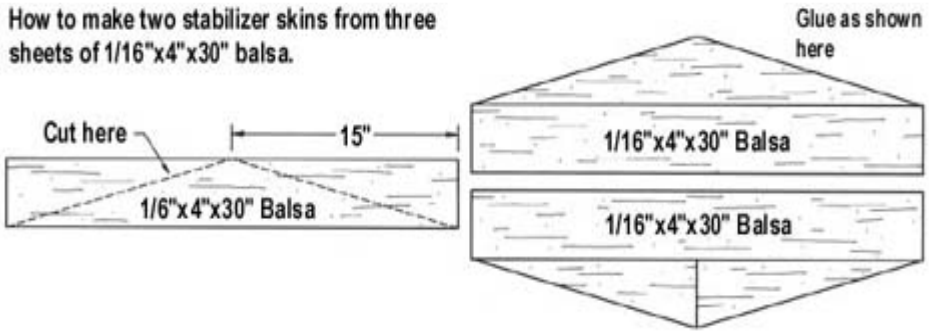
    NOTE: The final step in the fuselage assembly is to attach the tail fairing blocks and shape them on the fuselage. Since this requires a completed stabilizer and fin, the instructions for this step are included under the next section, "TAIL CONSTRUCTION".

TAIL CONSTRUCTION

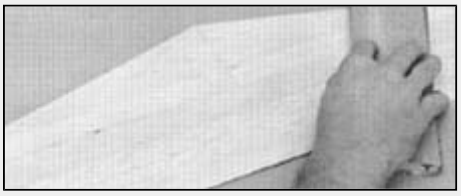
Stabilizer and Elevator

61.
a. Cut the 1/4"x3/4" balsa stabilizer trailing edge to length and pin it in place over the plan.
b. Glue the 1/4" sq. x9" spruce stab brace to the balsa trailing edge.
c. The 1/4"x2"x12" balsa sheet provided in the kit must be used for both the stabilizer center block and the fin base. There is very little excess, so cut these parts carefully. First, cut out the stabilizer center block, using the plans as a guide, then glue it firmly to the stab brace and pin it to the plans.
d. Add the 1/4"x3/4" balsa leading edges and tip pieces.
e. Add the 1/4" sq. balsa diagonals to complete the stabilizer frame.

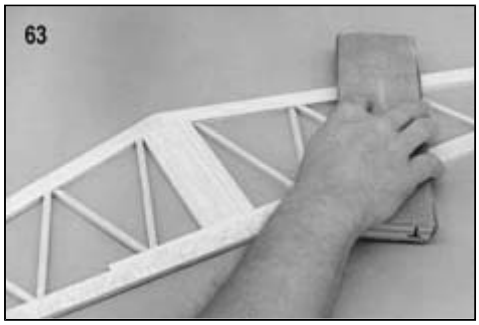
62. The stabilizer is sheeted on both sides with 1/16" balsa. Cut two pieces of 1/16"x4"x30" balsa as shown in the diagram, and glue the parts together to make two stab skins.



BUILDER'S TIP: Use Sig-Bond for gluing the sheets, and sand the joints smooth BEFORE attaching them to the stabilizer frame. Sanding the skins after attaching them to the framework can result in a "ripple effect" due to the underlying structure.



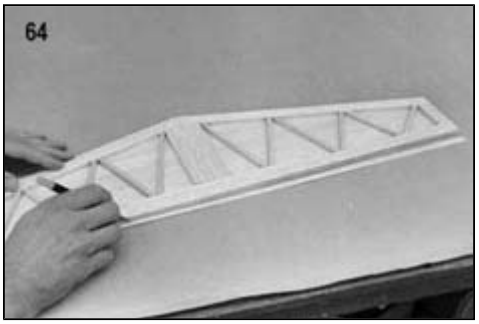
63. Sand the top and bottom of the stabilizer frame to smooth out the glue joints. Also sand the ends of the leading and trailing edges to match the tip pieces.

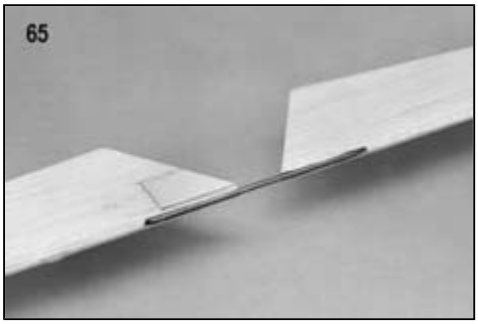


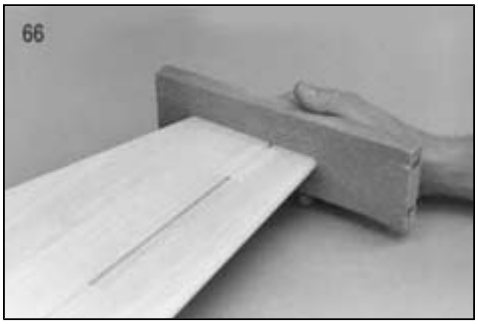
64.
a. Apply slow CA or Sig-Bond to cine entire side of the stabilizer frame, then immediately press it onto one of the stabilizer skins. Trim the first skin with a modeling knife, then repeat for the opposite skin and allow to dry.
b. Sand the sheeting flush with the stabilizer frame, then round the leading edges with a sanding block. Sand a small flat spot at the center "point" of the stabilizer so that it will seat against former F-6.

65.
a. Locate the two pre-cut 3/8" balsa elevators and sand their trailing edges round. Draw a hinge line centered on the leading edge of each elevator, then use a sanding block to bevel the front of the elevators using the hinge line as a guide.
b. Imbed the die-cut 1/16" plywood elevator horn support (EHS) in the bottom of the left elevator. Drill two mounting holes for the elevator control horn, and reinforce the balsa around the holes with thin CA.
c. Use the plans to mark the elevators where the 1/8" dia. music wire elevator joiner will attach. Drill and groove the leading edges to accept the elevator joiner. Sand the joiner wire and wipe it clean before gluing it to the elevators with Kwik-Set Epoxy. Be certain to keep the leading edges of both elevators aligned as the glue dries.

66. Temporarily tape the elevators to the back of the stabilizer, then use a sanding block to sand both of them at the tips until they match perfectly. The tips can be left square or sanded round if you prefer.

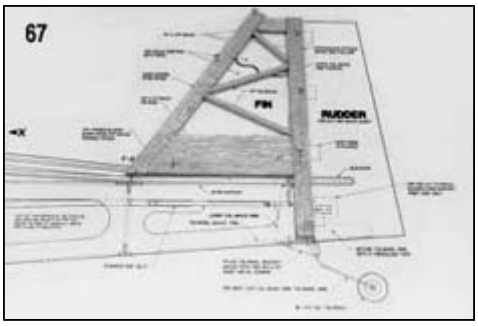




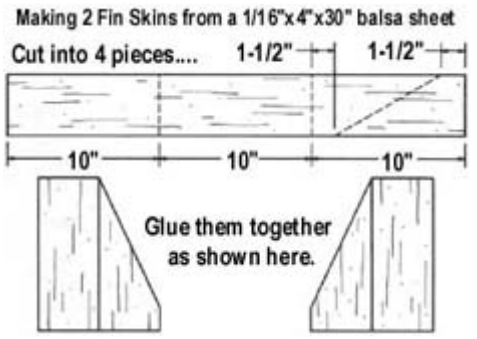


Fin and Rudder

67.
a. Cut the 1/4"x3/4" balsa fin trailing edge to length and pin it in place over the plan. Notice that the fin trailing edge extends to the bottom of the fuselage.
b. Cut the fin base from the remaining piece of 1/4"x2" balsa sheet. and then pin it in place over the plan.
c. Add the 1/4"x3/4" balsa leading edge and top piece.
d. Add the 1/4" sq. balsa diagonals to complete the fin frame.

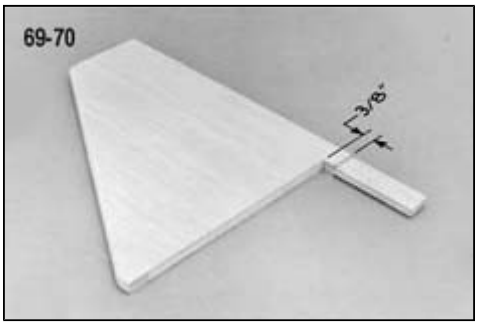


68. Cut a piece of 1/16"x4"x30" balsa as shown in the diagram, and glue the parts together to make two fin skins. Use Sig-Bond for gluing the sheets, and sand the joints smooth BEFORE attaching them to the fin frame.

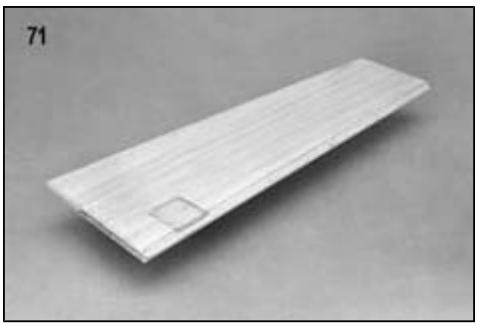


69.
a. Sand both sides of the fin frame smooth with a large sanding block. Trim the ends of the fin leading and trailing edges to their final shape.
b. Draw a line on both sides of the fin trailing edge 3/8" below the fin base.
c. Apply slow CA or Sig-Bond to one entire side of the fin frame except for the area below the line that you have just drawn.
d. Repeat the above step for the other side of the fin.

70. When dry, trim the sheeting flush with the fin frame. Use a sanding block to sand the fin leading edge round. Finish the fin by sanding a small flat spot at the bottom of the leading edge to fit against former F-6. Temporarily pin or tape the stabilizer to the fuselage, then trial fit the fin in place. You may have to trim the length of the fin trailing edge to allow the fin base to seat firmly on top of the stabilizer. Leave the fin in place until after the tailwheel has been fitted.

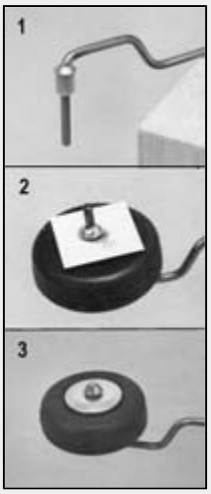


71.
a. Round off the trailing edge and bottom of the pre-cut 3/8" balsa rudder, and bevel the leading edge.
b. Imbed the die-cut 1/16" plywood rudder horn support (RHS) in the right side of the rudder. Drill the two mounting holes for the rudder control horn, and reinforce the balsa around the holes with thin CA.
c. Cut a slot in the bottom edge of the rudder to accept the tailwheel wire.



72.
a. Tape the rudder to the fin so that its bottom edge is aligned with the fuselage bottom.
b. Sand the top of the fin or rudder as necessary so that they will line-up when installed later.
c. With the rudder still taped in place on the fuselage, trial fit the tailwheel assembly. Adjust the bends in the wire as necessary until the nylon bracket seats properly on the fuselage bottom and the tailwheel itself is aligned with the rudder.
d. When satisfied with the fit, sand and wipe clean the top of the tailwheel wire, then glue it into the slot in the bottom of the rudder with epoxy. Tape the nylon tailwheel bracket to hold it in position on the fuselage until the glue dries.
e. Allow the epoxy to dry, then reinforce the tailwheel area with a 2-1/2" long piece of 2" wide fiberglass tape applied with another batch of epoxy. When dry, remove the rudder along with the entire tailwheel assembly from the fin.
NOTE: The tailwheel bracket will be attached to the fuselage during final assembly.

BUILDER'S TIP:
Two #2 flat washers are included in the kit to act as retainers for the tailwheel. Of course, you can use 3/32" wheel collars (not included in kit), but the soldered washers give a more "finished" look.

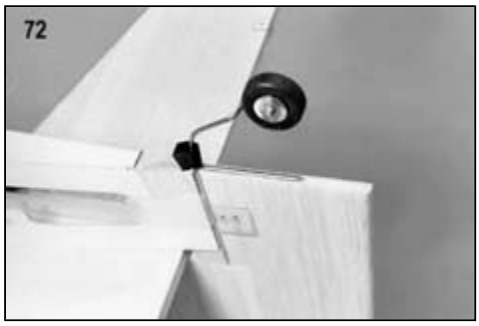


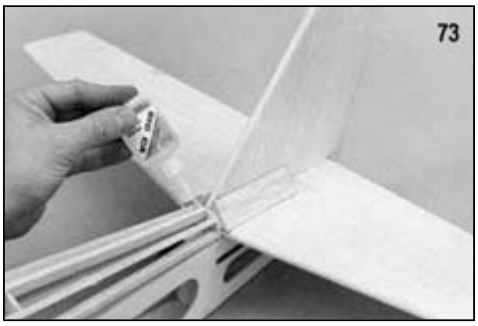
1. The secret to successful soldering is cleanliness. Sand the wire and the washers, then wipe them clean with alcohol. Begin the job by soldering the inner washer, which can be held in place with a temporary piece of heat-proof silicone fuel tubing.

2. When cool, install the tailwheel followed by a thin cardboard spacer and the outer washer.

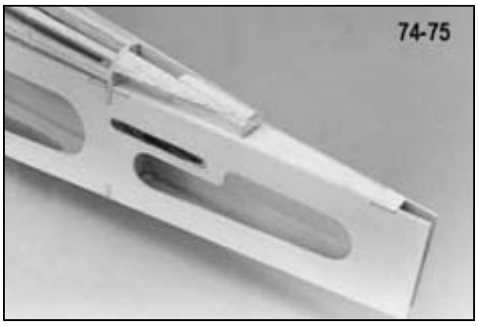
3. Solder the washer, allow to cool, then remove the cardboard spacer. Grind off the excess wire and file the end smooth.

Done properly, this installation should be completely trouble-free.





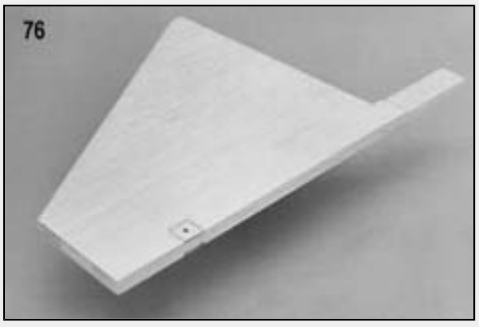
73. The balsa tail fairing blocks can now be glued to the fuselage using the stabilizer and fin to position them accurately. Cut two 4" lengths of 3/4" balsa triangle stock to serve as tail fairing blocks. Make sure your fin is centered on the fuselage (as viewed from above), then carefully glue the fairing blocks to the back of F-6 (not the tail surfaces!) Gently slide the fin and stabilizer off the fuselage and apply a second coat of glue to the front of the fairing blocks.



74. Temporary spacers are used to support the fairing blocks during shaping. Spot glue the 3/8"x3/4"x2" balsa spacer to the stab support centered under the fairing blocks. Glue a scrap piece of 3/16"x3/8" balsa to the top of the spacer between the fairing blocks. Finally, spot glue the fairing blocks to the spacers.

75. Carve and sand the fairing blocks to blend in smoothly with F-6 and the fuselage stringers. Usea sanding block with one end wrapped with paper to protect the stringers from the sandpaper. When done, carefully cut away the glue spots holding the spacers to the fuselage and the fairing blocks. You can remove the spacers now; just be careful of the fragile fairing blocks during covering.

76. OPTIONAL:
If you plan on installing the optional tail brace wires (see "Final Assembly" for more information), you need to reinforce the attach points on the fin and stabilizer. Use the six die-cut 1/16" plywood brace wire pads (BWP) for hard points. Use a sharp knife to carefully cut away the balsa sheeting in the positions shown on the plans (four places on the stabilizer, two on the fin). Glue in the plywood pads, then drill three attach holes with a 3/32" drill bit, right at the center of the plywood pads. Harden the balsa between the pads by applying a few drops of thin CA directly into the holes.



COVERING

General Instructions

We recommend that you cover the wing, fuselage, tail surfaces, and control surfaces all separately before hinging and final assembly. This way, the parts are much easier to handle. Before choosing the covering for your model, please refer to the list of approved covering materials that has been included with this kit. The open structure design of the Four-Star 120 wing relies partially on the covering to aid in torsional stiffness, so it is very important that you use an approved covering material.

Our Four-Star 120 prototypes were covered with either Sig Supercoat iron-on plastic film or Sig Koverall fabric. Sig Supercoat is ideal for sport models because it's lightweight and easy to apply. Sig Koverall is extremely durable and adds tremendous strength to the structure with only a slight weight penalty over plastic films. Use Supercoat film if you're looking for maximum performance with a 1.20 four-stroke or .90 two-stroke engine. If you plan on using a gas engine or an engine in the upper end of the recommended engine range, Koverall would be your best choice.

The following instructions provide advice and procedures specific to covering the Four-Star 120 with either Sig Supercoat or Sig Koverall. If you choose another brand of covering material, be sure to read the manufacturer's directions (supplied with the covering) and follow them carefully.

Surface Preparation

A good covering job starts with good surface preparation. Regardless of what type of covering you choose, it won't hide poor workmanship. Fill any small surface gaps or dents with a lightweight filler or spackling paste. Sand the entire model, including the ailerons and tail surfaces, with 220-grit sandpaper, then again with 360 or 400-grit sandpaper.

Two areas of the fuselage require further preparation before covering the engine compartment and the cockpit. Since it's too difficult to apply covering material to the engine compartment, it must be fuel-proofed using several coats of clear dope or two coats of polyester (glass) resin, sanded between coats. Finish off the engine area with a few coats of colored Sig Supercoat Dope. (Most of the Supercoat plastic iron-on films have a matching Sig Supercoat Dope color.)

The cockpit floor can be painted or covered with plastic film. The front of the headrest (HR) shouldn't be covered or painted until after the fuselage stringer area has been covered, to help hide the seam. Cut the instrument panel from the decal sheet and apply it to former T-3 to finish off the cockpit.

Covering with Sig Supercoat Iron-On Plastic Film

You will need four rolls of Supercoat (color of your choice) to cover the FourStar 120. You will need one big piece from each roll (about 14-1/2"x42") to cover the wing. Use the rest of the film to cover all of the remaining parts.

Covering The Wing

Begin the wing by covering the wingtips and plywood hold-down plates. On the wingtips, run the covering material "around the corner" about 1/8". Later, when the main top and bottom covering pieces are applied, they will overlap the wingtip covering and can be trimmed at the wingtip corners, leaving a virtually invisible seam. Extend the covering material about 1/8" past the outside edges of the hold-down plates, again to provide an area for overlap.

Cover the main portion of the wing starting with the bottom and then the top so that the seams will be on the bottom where they will be less visible. The top covering should overlap the full width of the leading & trailing edges. Wait until both the top and bottom pieces of covering material have been sealed completely around their edges before shrinking the large open areas between the ribs. Alternate between the top and bottom surface to avoid uneven shrinking which could cause a warp. Your sealing iron or a special "heat gun" can be used (household blow dryers don't provide enough heat). Keep the heat gun moving at all times or you may burn a hole in the covering. If you notice the covering material "ballooning up", put a small pin hole in the bottom of each rib bay to allow the expanding air to escape. To maximize the torsional stiffness of the wing, be sure to firmly bond the covering material to all of the spars and ribs by going over them again with your sealing iron.

Cut an "X" pattern at the hatch openings on the bottom of the wing, then iron the excess material to the spars and hatch rails. Don't forget to cover the outer surface of the plywood hatches, wrapping the covering around the edges about 1/8".

Covering The Fuselage

The fuselage should be covered with six pieces in the order described here:

- Fuselage Bottom - 2 pieces, front and rear
- Fuselage Sides - 2 pieces, left and right
- Fuselage Top - 2 pieces, top deck and stringers

All seams should overlap about 3/16". When covering solid wood surfaces like the front of the fuselage sides, better results can be obtained by starting at the center and working toward the outer edges, allowing air to escape as you iron.

The trickiest part of covering the fuselage is the stringer area. Start by applying one edge of the covering to one of the fuselage sides, overlapping 3/16" onto the side covering. Drape the material over the stringers, pulling out any major wrinkles. Carefully tack the material to the other fuselage side,then trim off the excess, again leaving a 3/16" overlap. To avoid slicing into the material underneath, slide a piece of thin cardboard under the excess stringer covering before cutting it with a knife. Use a straight edge to make a nice, straight cut.

Go back over the side seams with your iron, then seal the material to HR at the front as well as F-6 and the tail fairing blocks at the rear. Trim away the excess covering at the rear flush with the edges of the fairing blocks and F-6. At the front, leave a 1/8" overhang forward of the headrest (HR) to iron around the corner. Seal down the overhang to the front of HR (you may find that slits in the overhang every 1/4" or so will help during this step). Now you can use a heat gun or iron to shrink the rest of the material over the stringers.

Covering The Tail Sufaces And Ailerons

The stabilizer, elevators, fin, rudder, and ailerons should each be covered with two pieces of material - bottom first, then the top. Iron the material from the center out to avoid trapping air bubbles. Be sure to cover the back edge of the fin trailing edge all the way to the bottom.

Covering with Sig Koverall And Dope

Koverall is a polyester-base, heat-shrinkable, synthetic fabric much like the covering used on full-scale aircraft, only lighter. Its toughness and relatively low cost make it ideally suited to giant scale and giant sport models. One large package of Koverall (SIGKV003, 48" x 5 yds.) is plenty of material to cover the Four-Star 120. It can be applied to the structure using dope or Sig Stix-It, and heat-activated adhesive.

Surface Preparation

Whichever application method is used, you should first brush two coats of clear dope onto the framework wherever the covering material makes contact (even the edges of the wing ribs). If you plan to use dope for the entire finish, use Sig Lite-Coat (low-shrink butyrate dope) for the first two coats. If you plan to use enamels or epoxy colors, use Sig Nitrate dope. Lightly sand after each coat to remove any raised grain or fuzz.

Applying Koverall With Dope

The bottom of an outer wing panel is a good place to start covering. Cut a piece of material about an inch larger all around the panel, with the grain running spanwise. (The grain of woven materials runs parallel to the finished bias edge.) Lay the Koverall on the wing, pulling out any major wrinkles. Koverall shrinks up considerably under heat - there's no need to worry about such things as packaging fold creases because they will come out easily with the iron. Brush clear dope around all the edges. This will soak through the fabric and adhere it to the dope already dried into the framework. Allow the dope to dry before trimming off the excess material with a sharp razor blade. Check for any rough edges or places that are not stuck down properly and apply more dope. Let dry.

Applying Koverall With Stix-It

Directions for using Stix-It are on the can. The basic procedure is to apply Stix-It around the edges of the framework where you want the covering to attach. When dry, the fabric can be ironed-on around the edges where the Stix-It was applied.

Shrinking And Sealing Koverall

After both sides of a surface are covered, shrink the Koverall evenly with an iron or heat gun (be sure to read the Koverall package instructions). The fabric. is now ready to be sealed with clear dope. The dope that you apply to the top of the fabric will soak through and bond with the dope underneath, firmly cementing the Koverall in place.

Thin the dope until it brushes on easily and flows out smooth (about 25% to 30% thinner). The first coat should be applied sparingly to avoid puddles underneath the fabric. The second coat will seal most of the pores of the Kove rail , and from then on running. through will not be a problem. Sand the model VERY LIGHTLY with FINE sandpaper after the second coat is dry. You may need three to five coats of clear dope on the Koverall before going to color, depending on how heavy the coats are. Use your own judgement about when you've applied enough clear dope. Keep in mind that weight can build up fast when you're painting! Don't bother trying to completely fill the weave and avoid using heavy sanding sealer or primers. The goal is to hide the seams and provide "an even base for the color paint.

Finishing With Supercoat Dope

(Complete the model through step 83 of "FINAL ASSEMBLY" before applying the color dope to your model.) The best results can usually be obtained by spraying the color coats of dope with spray equipment. Thin the dope for spraying by mixing in an equal amount of Sig Supercoat Dope Thinner. Apply two or three coats, starting with the lighter colors, followed by darker trim colors. Mask off your trim scheme with low-tack drafting tape, then seal the edges of the tape with clear dope (applied with a small brush) before applying the trim color. A final coat or two of clear dope over the color dope will add a nice gloss to the finish. Stick with Sig products from the start and you'll be rewarded with a classy finish that is rugged and easy to repair.

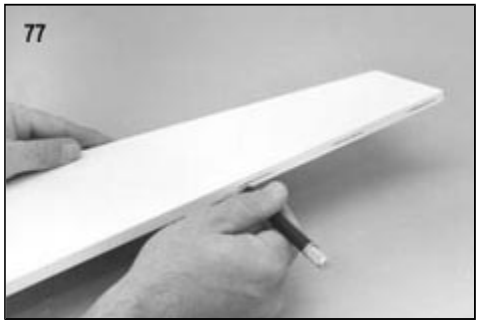
Applying Decals

The supplied decals can be used over any type of finish as long as the surface is clean. If needed, replacement decals are available from SIG (order SIGDKM265A, SIGDKM265B, and SIGDKM265C).

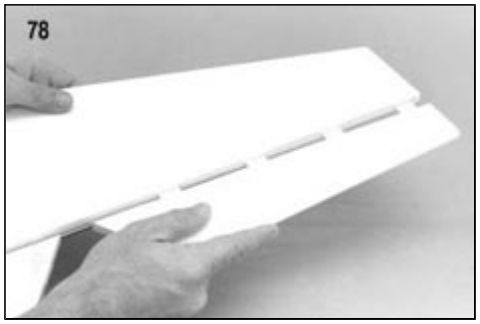
Cut out the decals with sharp scissors, leaving about 1/32" to 1/16" of clear at all edges and rounding the corners as you cut. Wet the surface on which the decal will be placed with soapy water (use dishwashing detergent). Place the decal on the model and squeegee the water from underneath with a balsa paddle. This procedure allows time for repositioning and prevents air from being trapped under the decal. Allow several hours to dry.

INSTALLING EASY HINGES

Sig's famous EASY HINGES have been included with your kit to hinge all of the control surfaces. Each ultra-thin hinge is actually a three-part laminate - a tough plastic inner core sandwiched by an absorbant wicking material. They have been chemically treated to slow down the reaction of thin CA (which is normally instant), to allow the glue time to soakall the way to the ends of the hinge and into the wood surrounding it. Once the glue has dried, the hinge cannot be pulled from the structure without tearing wood out with it! We recommend that all surfaces be covered before hinging.



77. Using a No. 11 X-Acto blade (or similar), cut slots approximately 1/2" in depth and slightly wider than the hinges. Cut eight slots in the stabilizer and eight matching slots in the elevators at the locations shown on the plans.



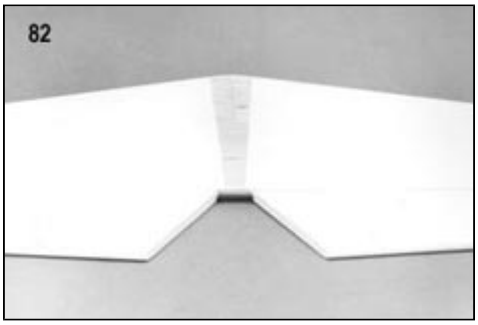
78. After all of the slots have been cut, insert EASY HINGES halfway into the stabilizer slots. DO NOT GLUE THE HINGES YET! Next, carefully slide the elevators onto the hinges. You'll find it easiest to slide the elevators onto the hinges at an angle, one at a time, instead of trying to push it straight onto all of the hinges at once. Don't be concerned if the hinges aren't perfectly straight or centered in the slots - they'll work regardless of their final position.

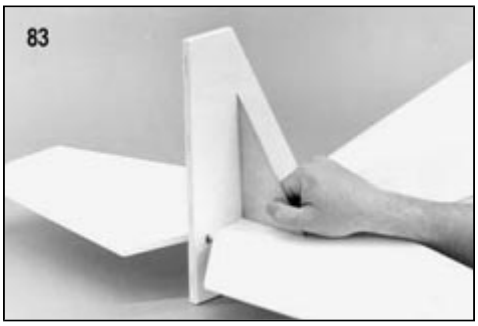
79. a. To set the hinge gap, deflect the elevators to the maximum amount needed. For best control response, the gap should be as small as possible but big enough to allow full movement of the control surface without binding.
b. EASY HINGES were designed to use THIN CA (any brand) for maximum glue penetration. Place three or four large drops of thin CA directly onto the hinges in the gap. The glue will wick into the slot as it penetrates both the wood and the hinge. Continue this process, gluing the same side of all of the hinges, then turn the stabilizer over and repeat the gluing process on the other side of each hinge.

80. a. Attach the ailerons to the wing using six EASY HINGES on each aileron. Be sure the plywood control horn supports are on the bottom surface of the ailerons! After the glue has cured (3 to 5 minutes) flex all the joints in each direction a couple of dozen times to reduce any stiffness.
b. The rudder is hinged in the same manner as above, but it's easier to install the rudder hinges AFTER the fin has been glued to the fuselage. Cut slots for four hinges now while the fin and rudder are easy to handle.

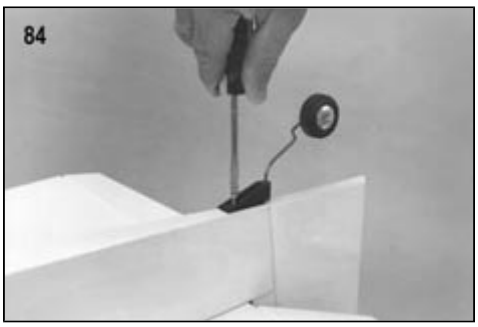
FINAL ASSEMBLY

82. a. Temporarily position the stabilizer on the stab support at the back of the fuselage. Again refer to the General Alignment Diagram on page 20 of "The Basics of Radio Control".
When satisfied with the alignment, draw cut lines on the bottom of the stabilizer at the fuselage sides, and on the top of the stabilizer at the tail fairing blocks. Remove the stabilizer and cut away the covering between the lines, exposing the bare wood underneath. Use a sharp knife to cut the covering material - try not to cut into the balsa sheeting.
Use the same method to expose the area under the tail fairing blocks.
b. Permanently glue the stabilizer to the fuselage using Kwik-Set epoxy. Recheck its alignment and adjust as necessary before the glue dries.





83. a. Cut away a 3/8" wide strip of covering from the center of the stabilizer where the fin is to be glued.
Also, remove the covering material from the front of the fin where the tail fairing blocks make contact.
b. Epoxy the fin to the top of the stabilzer, using a triangle to check its alignment as it dries.
Be certain that the fin trailing edge is firmly glued between the fuselage sides.

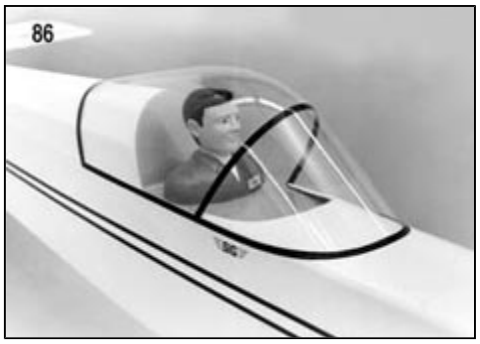


84. a. Hinge the rudder to the fin 84 trailing edge using four EASY HINGES.
b. Swivel the nylon tail wheel bracket into position on the bottom of the fuselage, and mark the two mounting holes. Drill at the marks with a 5/64" drill, then bolt the bracket to the fuselage with two #4 x 1/2" sheet metal screws.

85. Install two 4" main wheels on the aluminum landing gear using the hardware as shown on the plans. Use a drop of CA or thread locking compound on the inner nut to keep the assembly from vibrating apart. Once the wheels have been attached, the landing gear assembly can be bolted to the fuselage using three 8-32 x 3/4" mounting bolts.

86.

a. If you wish to install a pilot, now is the time to do it. (A Williams Brothers 3" scale Sportsman pilot was used in our prototype models.) Be sure to glue it firmly so it won't come loose in flight.
b. Cut the excess plastic away from the canopy using scissors. Cut to the mold line around the front and at the sharp corner around the back. Sand the rough edges smooth being careful not scratch the clear plastic.
c. Trial fit the canopy to the fuselage and trim it as necessary for a good fit. Position it so that the raised frame ends at the rear tips of the top deck and tape it down at a couple of spots.
d. Draw a line on the fuselage along the bottom edge of the canopy. Remove the canopy, then carefully cut away a 1/16" wide strip of covering using the line as your guide. The idea here is to expose a strip of bare wood where the canopy makes contact so that it can be firmly glued to the fuselage. Apply a flexible white glue like Wilhold RG-56 all along the bottom edge of the canopy, then strap it to the fuselage with masking tape until the glue dries.
e. Dress up the bottom edge of the canopy by applying 1/4" striping tape (like Sig Super Stripe), half on the canopy and half on the fuselage. Finish off the canopy with more 1/4" striping tape applied to the raised frame and at the back edge.



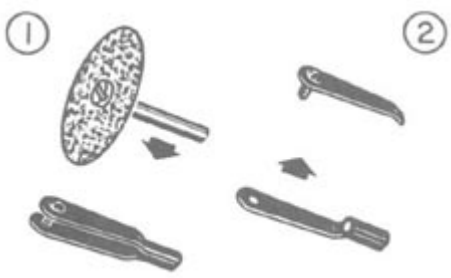
Optional Tail Brace Wires

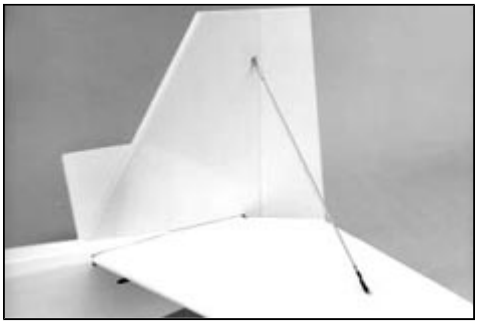
We've flown our prototypes extensively without tail brace wires and have never had any problems. However, tail bracing is such a common feature on large sport models that it seemed appropriate to include them as part of this kit. If you plan on using a typical 1.20 4-stroke engine (or .90 2-stroke), you don't really need the braces. If you're leaning towards bigger engines with more power and vibration, the tail brace wires are probably a good idea. For just a small increase in weight, complexity, and drag, the tail brace wires will provide enough extra strength to put your mind at ease while you're wrapping the model around the sky!

Four 2-56 x10" threaded rods are provided to serve as tail brace wires. Four standard RIC links (2-56 thread inside) and four solder clevises (unthreaded) are also provided for the ends of the tail brace wires. Take each link and cut off the side that has the pin in it (a Dremel tool with an abrasive cutoff wheel works best). Enlarge a hole in the remaining half with a 3/32" drill bit. Use a vise to hold the clevis while you drill - not your hand!

Assemble two upper tail brace wires and two lower tail brace wires as shown on Sheet 2 of the plans (see the full-size "Tail Brace Wire Assembly" diagram).

Fit the wires to the model by bending the end of each link to sit flat against the model sUrfaces. Adjust the threaded links and jam nuts until the wires are snug, but not pulling the tail surfaces out of shape. Use three 2-56 x1/2" machine screws and three 2-56 hex nuts to fasten the links to the fin and stabilizer. Attach the bottom ends of the lower brace wires to the bottom of the fuselage, just ahead of the tailwheel bracket, using two #2 x 3/8" sheet metal screws.





NOTE: The remaining sections of these instructions concerning engine and fuel tank installation, radio installation, pre-flight checkout, and flying, provide information that is specific to the FOUR-STAR 120. For a more in-depth look at any of these subjects, please refer to "The Basics of Radio Control" booklet also included with this kit. In particular, it is strongly recommended that you go through the "Pre-Flight Checklist" in Chapter 7 carefully before attempting to fly.

Engine And Fuel Tank Installation

Engine installation on the FOUR-STAR 120 is simply a matter of bolting the engine and engine mount in place on F-1. Install the throttle cable on the carburetor arm and assemble the push rod connector on the throttle servo arm. The exact position of the cable in the push rod connector will have to be adjusted after the rest of the radio has been installed.

Like most SIG kits, the fuel tank in this model is installed from the rear of the fuel tank compartment rather than through a removable hatch. This choice was made for several reasons. A hatch opening makes the nose weaker and it's very difficult to keep oil from leaking in around a hatch.

A method of fastening the hatch must be built into the fuselage, adding to the complexity and construction time of the model. Besides, modern plastic fuel tanks are virtually indestructible under normal use when installed properly, so they seldom need to be removed for maintenance.

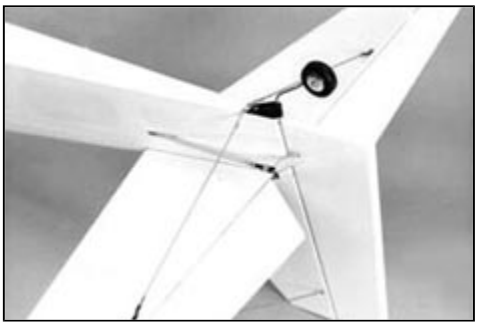
A 16 oz. to 20 oz. fuel tank is recommended for the FOUR-STAR 120. The Sullivan 16 oz. slant tank fits well, as do the DuBro 16 oz. and 20 oz. tanks. Most engines will require the tank to be mounted as high as possible in the fuselage. Use foam rubber under the fuel tank as necessary to position it properly.

BUILDER'S TIP:

Here's a handy trick that you can use on any model without a fuel tank hatch. Make a "pull tab" on the back of the tank using fiber-reinforced strapping tape. Now you'll have something to grab if you ever need to remove the tank.

Radio Installation

Screw the nylon control horns onto the rudder and elevator as shown on the plans, then re-install the inner nylon push rods that you prepared in step 58. Snap a 4-40 R/C link onto the rudder horn, then cut off the excess nylon tubing, leaving a 1/8" gap between the end of the tubing and the R/C link. Cut a 4-40 x 8" threaded rod to an overall length of 5-1/2", measuring from the threaded end. Install the threaded rod in the nylon tubing, smooth end first, so that approximately 5/8" of the threaded portion remains exposed. (The metal rod will help prevent the nylon tubing from buckling under flight loads.) Thread a 4-40 hex nut and the R/C link onto the end of the pushrod until the rudder is in neutral. Tighten the hex nut against the clevis to help reduce any "slop" in the linkage. Repeat this procedure for the elevator push rod, this time cutting the threaded rod to an overall length of 4-1/2".

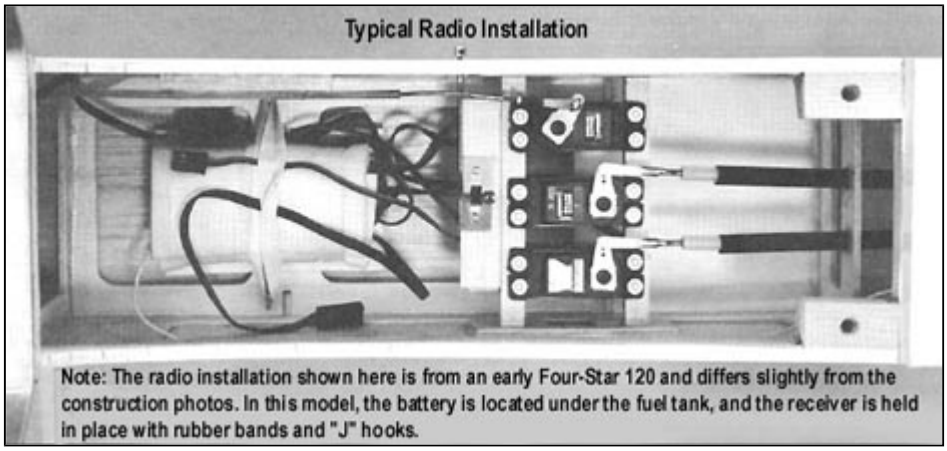


If you look closely at the photo, you should be able to see that a short length of fuel tubing has been slipped over the R/C link. The purpose of this is to keep the link from popping open during flight, which could cause a loss of control. For safety, install fuel tubing "keepers" on ALL of your R/C links and solder clevises. Without them, your model probably won't pass the standard safety inspection performed at most fly-ins.

Hook up the ailerons by installing control horns and the aileron push rods. The servo leads will probably require short extensions to reach the center "V" harness which is required to connect the servos to the receiver. Radio manufacturers generally have these items available as stock equipment. It's best to keep the extensions as short as possible since excessively long wires have been known to cause radio "glitches" under certain conditions.

Use the die-cut lite-ply Aileron Positioning Guide (APG) to set the ailerons at neutral. Adjust the R/C link on each aileron push rod until the APG seats perfectly against the bottom of both the wing and aileron.

A typical radio installation is shown in the photo. Always wrap your receiver and battery in foam rubber and position them forward of the servos. If you use a lightweight engine, you may need to install the batfery under the fuel tank to achieve proper balance. Use a scrap balsa stick or rubber bands to keep them from moving around during flight.



Notice that the aileron connector wire and the charging jack are left accessable, but are tucked away enough so that they can't interfere with the servo arms and linkages. The switch is mounted internally on a scrap piece of plywood and actuated by a piece of music wire that extends through the fuselage side. The antenna has been routed away from all other wiring and out the fuselage bottom.

Pre-Flight Checkout

IMPORTANT! For first flights, make certain that the model balances with an empty fuel tank somewhere between 3-7/8" and 4-1/2" aft of the wing leading edge. If it balances too far back, add weight to the nose as necessary. Trying to fly with the balance point too far aft is much more dangerous than the slight increase in wing loading caused by adding lead to the nose. To balance the Four-Star 120, you may find it easiest to support it upside down with your fingertips on the inboard section of the wing.

Be certain to range check your radio equipment according to the manufacturer's instructions before attempting the first flight. A lot of problems can also be avoided if your engine has been well broken-in and the idle adjustments perfected on a test stand or in another airplane before installation in the new model.

Before flying, you should adjust all of your push rod linkages so that the control surfaces are in their neutral position when the transmitter sticks and trim levers are centered. When you get to the field, don't be surprised if the elevator and rudder are .suddenly misaligned. Temperature and humidity changes can cause the nylon pushrod tubes to expand or contract slightly. Use the trim levers on the transmitter to return the control surfaces to neutral, and do the final trimming in the air.

The control surface movements listed here are recommended for the first flight of your FOUR-STAR 120. These movements will provide the model with a fair degree of aerobatic capability if it's balanced correctly. Test flights may indicate a need for slightly more or less movement, depending on individual model performance and personal preference.

Remember the Golden Rule of Success in R/C: "A model, engine, or radio that is not prepared and working properly on the ground before takeoff will not improve in the air - it will get worse! There is no point in attempting to fly until everything is 100% correct."

RECOMMENDED CONTROL SURFACE MOVEMENTS For test flying, the following are suggested:	
ELEVATOR	1" UP and 1" DOWN
RUDDER	1-1/4" LEFT and 1-1/4" RIGHT
AILERON	5/8" UP and 5/8" DOWN

FLYING

Like it said at the beginning, the Four-Star 120 was designed with flight performance as one of its top priorities - and we weren't disappointed! If you've never flown a plane that is this large, you are definitely in for an eye-opener. Lots of modelers will tell you that "bigger flies better" and in many ways, we would have to agree! Compared to smaller sport models, like the Four-Star 40, the "120" is every bit as capable aerobatically. The main difference is that maneuvers with a bigger model are larger, slower, and smoother than those performed by a typical AO-size model. The slower maneuvering speeds not only make for more impressive aerobatics, they give you more time to think and make corrections. These are the kind of advantages that can make any pilot look terrific!

The Four-Star 120 is a fun aircraft to fly, but it is not a basic trainer. If you have little or no R/C flying experience, we strongly suggest that you get an experienced pilot to help you fly your model until you're comfortable with the controls. Contact your local club or ask your hobby dealer for the names of good fliers in your area and suitable flying locations.

When all of your equipment is working properly, it's time to fly! First, you may want to practice taxiing the model while holding "up" elevator to avoid nose-overs. If you've never flown a taildragger, this kind of practice is time well spent. The Four-Star 120 handles much better on the ground than most taildraggers. You would really have to be "behind the stick" to do a ground loop with this model!

When you're ready for takeoff, point it into the wind and apply throttle. Release the "up" elevator as it accelerates. Like with any model, you'll probably need a touch of right rudder to keep it going straight because engine torque will try to make it drift to the left. When you reach flying speed, pull back slightly on the elevator stick for a gentle liftoff.

If you're using a relatively large engine, don't expect the takeoff roll to last very long! With its big wing, the Four-Star 120 will lift off quickly and reliably.

The control surface movements listed on page 22 are fairly tame - most modelers will want to increase the movements as they become more familiar with the flying characteristics of the model. Experiment with different control throws and balance points until the plane flies exactly the way you want. Make any changes, especially to the balance point, gradually. We recommend that you shift the balance point no more than 1/4" at a time. In general, moving the balance point forward will make the model more stable, slowing down snap rolls and spins. Moving the balance point back increases its sensitivity to control inputs; but if carried too far, the model can become completely unstable and uncontrollable. The balance range shown on the plans is a safe area to use for test flights. Don't exceed the rearward limit unless you are a very experienced pilot.

Aerobatically, the Four-Star 120 can do any trick in the book. The primary aerobatic maneuvers listed on the back of "The Basics of Radio Control" are no problem for this model. Here's how the Four-Star 120 handles some of the more advanced maneuvers:

INVERTED FLIGHT

You'll need to hold just a touch of "down" elevator to keep the model flying level while inverted. Climb to altitude and try some slow-speed inverted flight with your Four-Star. It truly flies as well upside down as it does right-side up!

SPINS

A proper spin begins with a stall. Just as the model stalls, chop the throttle, hold full "up" elevator, and deflect both the rudder and ailerons either left or right. Once spinning, the "120" can easily be thrown from a left spin into a right spin and back again. To recover, simply release the controls, then gently pull out of the ensuing dive.

FLAT SPIN

A flat spin can be fatal for most models, but the "120" actually does them fairly well. It does, however, require a balance point near the rearward limit, a lot of control throw, a lot of power, and a lot of altitude! The exact setup will vary from model to model, so you'll need to experiment. To do a flat spin you must first enter a normal spin, throttle up to full power, then slowly move the aileron stick to the opposite side. To recover, chop the throttle, neutralize the ailerons, apply opposite rudder and down elevator, and wait! A fully developed flat spin may take two to five rotations to recover, so don't start the recovery procedure too late! This maneuver is very difficult and is definitely only recommended for highly skilled pilots.

KNIFE EDGE

Knife edge flight is achieved by rolling the model 90 deg. so that the wing is vertical, then holding the nose up with rudder. Since the Four-Star 120 doesn't have the neutral stability of a pattern ship, it requires a modest amount of "up" elevator to maintain heading during knife edge flight. With enough rudder deflection and power, the Four-Star will actually climb in knife-edge, using only the side of the fuselage for lift.

FLAT TURNS

The Four-Star will actually "yaw" through a 360 deg. turn without ever banking the wing. From level flight, simply hold full rudder and some "up" elevator to keep the nose up. Some aileron correction may be necessary during the turn to keep the wings level.

Needless to say (but we will anyway), when you attempt a stunt for the first time, give yourself plenty of altitude and clearance from other people. Fly safe! You may need the room to recover from a messed up maneuver.

When landing, the Four-Star 120 may tend to "float" a bit more than models you have flown in the past, so be ready to go around if it looks like you're going to overshoot the runway. As with any new airplane, it may take a few flights to get a feel for the correct approach and landing speed. Remember to keep your control inputs smooth and gentle to avoid overcontrolling. When you are certain the model will make it to the runway (even if the engine quits), bring the throttle to full idle and concentrate on keeping the wings level during final approach.

Slow the model down during the entire approach by slowly feeding in "up" elevator. Just before the model touches, flare the landing by carefully feeding in more "up" elevator. Hold the model just inches off the ground until your elevator stick is pulled all the way back. The Four-Star 120 should settle in for a perfect "three-point" landing with a short rollout.

If your model always seems to make a nice landing approach but bounces when you touch the ground, you are simply trying to land too fast. If you're concerned about stalling during the approach, try doing some fake landing approaches about 50 to 80 feet high to build your confidence. You might be surprised at how slow the "120" will actually fly without stalling.

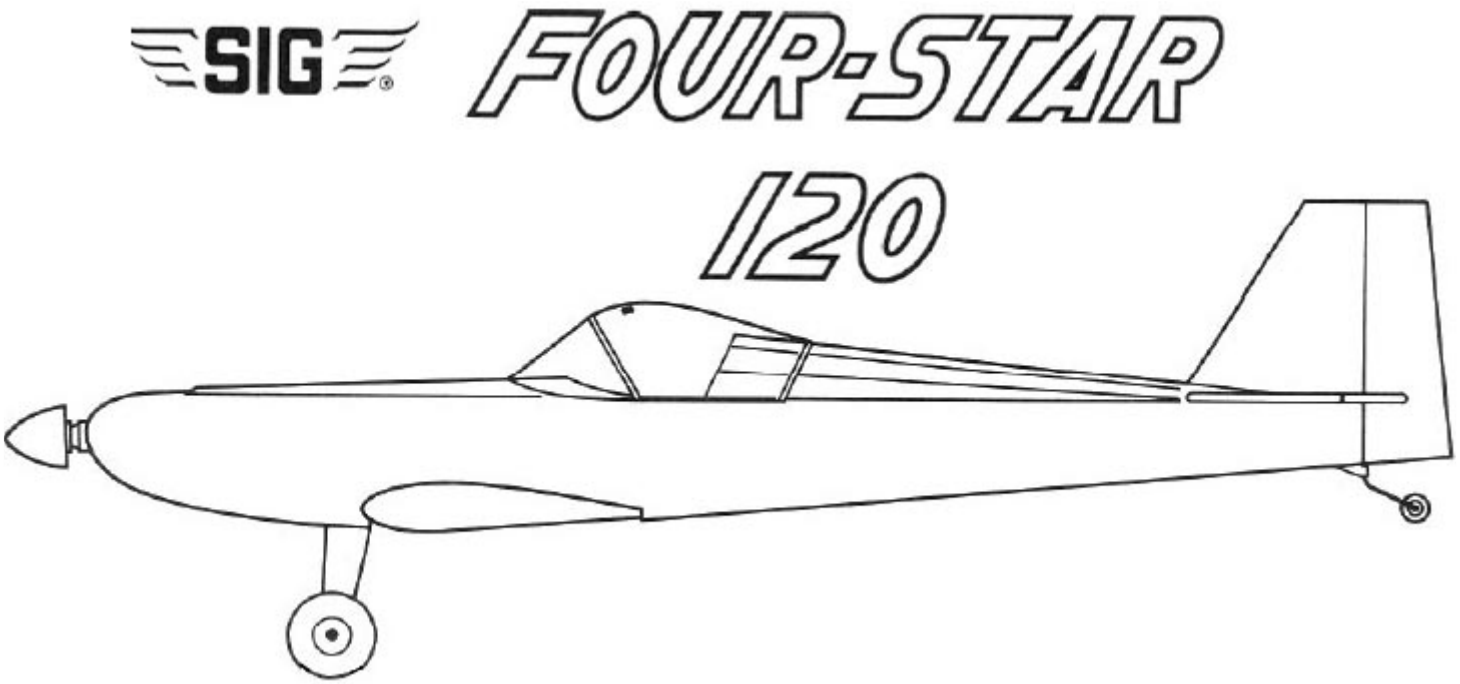
One caution about flying your Four-Star in front of other active R/C pilots. Unless they have one of their own, they will very likely want you to share!

WARNING - DANGER Important: Read These Warnings:

A model airplane motor gets very hot and can cause serious bums. Do not touch the motor during or after operation. Keep clear of the propeller, it can cut off a finger or put out an eye. Make sure the propeller is securely fastened in place and is not cracked. Model airplane fuel is flammable and poisonous. Take the same precautions while transporting and using it that you would with a can of gasoline or a bottle of poison.

Remember that it is possible to lose control of a model airplane. Do not fly in locations where the model may hit people or damage property if loss of control occurs. Check your model and equipment regularly to insure it is in safe operating condition.

The top view and side view drawings are provided for modelers who wish to develp their own personalized color and trim scheme for the FOUR-STAR 120. Make several copies of this drawing so you can draw out a few different ideas before deciding which one you like the best. This drawing is 1/10th actual size.



FOUR-STAR 120

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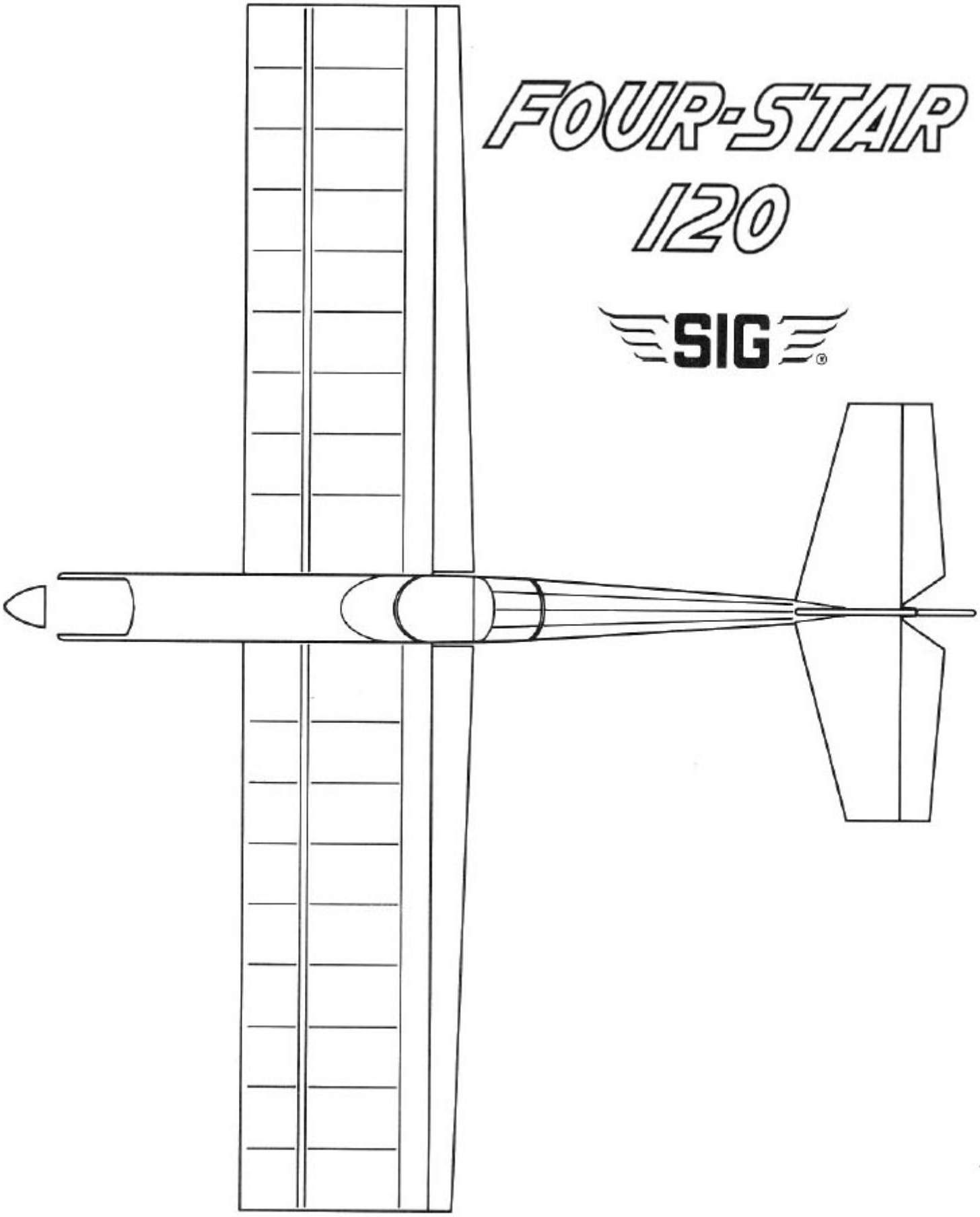

We sincerely hope that you enjoy building and flying your SIG Four-Star 120. If you have any questions, comments, or problems with this kit or any other SIG product, please call us.

SIG MODELER'S HOTLINE
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Weekdays, 7:00am - 4.30pm Central

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