FOUR-STAR 40

SIGRC44

BUILDING and FLYING INSTRUCTIONS

SIG

SIG

Design Philosophy

When developing the Four-Star 40, two design considerations were at the top of the list in importance:

- **Impeccable Flight Performance** - Like all Sig kits, it had to have smooth, reliable flight performance with no surprises. It had to fly through maneuvers, not just be pulled through by brute force of the engine. Gentle slow speed and stall characteristics were equally important.
- **Easy Construction** - Most modelers want to get in the air quickly, and who can blame them? Low parts count and minimal sanding/shaping were deemed necessary to help reduce building time and effort. It also had to be easy to cover with iron-on coverings with little painting required.

The following paragraphs are meant to give you a bit of insight on the aircraft's design by discussing individual parts and the thought process behind them. Several prototypes have been built and flown to test the ideas and we believe the final design presented in this kit represents the finest blend of building and flying characteristics from those tests.

Fuselage Construction - Lite-Ply fuselage construction has become very popular in the last few years and with good reason. It's fast, strong, and lightweight (with proper attention to lightening holes, etc.). The plywood fuselage doubler sets the thrust line, reinforces the wing saddle, and provides locations for the tank floor and wing hold-down blocks. A shapeless box doesn't look good, so three stringers and a slightly curved top deck were added to give it some shape without adding much work. A plastic cowl would have looked nice, but would have added complexity and weight, as well as required painting, so simple "cheeks" were used instead.

Canopy - A nicely rounded canopy adds even more shape to the airplane, and it's already made for you! It doesn't require painting because the frame is highlighted with striping tape. Setting the canopy relatively far back on the fuselage gives the model an aerobatic/fighterish look.

Landing Gear - Aluminum landing gear is durable and easy to install. Mounting it on the fuselage instead of the wing simplifies wing construction and lowers the parts count. The tailwheel is a bit unique in that it's attached directly to the rudder without the usual plastic tailwheel bearing. We've tested this installation quite extensively without any problems. The amazing strength of EASY HINGES and cyanoacrylate adhesive make this simple, effective tailwheel installation possible.

Tail Surfaces - What could be easier than totally pre-cut tail surfaces that come out of the box ready to sand? There's a small weight penalty over built-up surfaces, but the time saved during construction is worth it.

Wing Construction - No leading edge sheeting saves considerable building time. The strength of the wing is derived primarily from the spruce main spars and shear webbing. The leading edge uses a large radius for superior slow speed handling and stall resistance. The flat wingtips are actually very efficient and don't require carving and sanding like rounded tips made from balsa blocks.

Airfoil - The airfoil is nearly symmetrical for great aerobatic performance, but is flat aft of the bottom main spar so it can be built flat on the table.

Ailerons - Like the tail surfaces, the ailerons are pre-cut from sheet balsa. The taper gives the illusion of a tapered wing, but it is also good from the standpoint of flutter resistance. Many designs taper just the outer few inches of each aileron at the tip, because that's where flutter usually first develops. On this design, the taper simply extends the full length of the aileron. The aileron torque rods have been specially bent to provide a small amount of differential movement which improves the roll characteristics.

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 (heavier) two-part epoxy glues such as SIG KWIK-SET (5-min 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.

Engines Propellers, and Mufflers

There is a tremendous variety of engines available in the size range specified for the FOUR-STAR 40. Both 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. If this is your first low-wing model, engine sizes from the bottom of the range may suit you better. Engines at the bottom of the range will still pull the FOUR-STAR 40 through most aerobatic maneuvers.

RECOMMENDED ENGINE RANGE	
.30 - .40	2-Stroke
- 40 - .50	4-Stroke

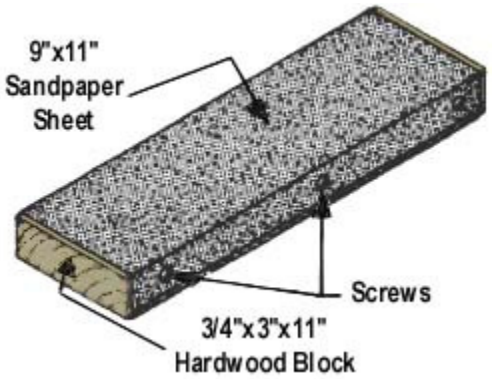
Use only those propellers recommended in the instructions supplied with your engine. If you use a very high-power engine in your model (such as a schneurle-ported 2-stroke .40), it's recommended that you opt for a propeller with a relatively large diameter and low-pitch. This will give you loads of pulling power during maneuvers without a lot of excess speed.

There is no one type of muffler that is best suited to the FOUR-STAR 40. It all depends on the particular engine that you have selected. If you have a 2-stroke engine, use the muffler that was supplied with it or one of the many aftermarket mufflers that are available. Most 4-stroke engines don't require a muffler because of their low noise production.

Radio Requirements

A four-channel radio system is required for the FOUR-STAR 40 to operate the ailerons, elevator, rudder, and throttle. The fuselage is spacious enough that any common brand of radio equipment with standard size servos and battery pack can be used. Be certain that your radio system's frequency is approved for use in RIC model aircraft.

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 these instructions 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 the instruction booklet 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 40. It also contains very important information on preparing the model for flight. Modelers of all experience levels are encouraged to read this book and follow its guidelines for success.

COMPLETE KIT PARTS LIST							
Laser-Cut Balsa Sheets							
3	3/32"x3"x9" W-I Wing Ribs	4	3/32"x3"x18" W-2 Wing Ribs	I	3/32"x4"x18" Fuselage Top Deck, BP		
Sheet Balsa							
2	1/16"x1-1/4"x30" Top Trailing Edge Sheeting	2	1/16"x1-1/2"x30" Bottom Trailing Edge Sheeting	2	1/16"x3"x30" Wing Center Sheeting, Top and Bottom	18	3/32"x3"x1-3/16" Shear Webs (3 bundles of 6)
Stick Balsa							
6	3/16"x3/16"x30" Front Spars, Rear Spars	3	3/16"x1/4"x18" Fuselage Stringers	2	1/4"x1/4"x30" Trailing Edges	2	5/16"x5/16"x30" Leading Edges
1	1/2"x24" triangle- Braces for F-I, Wing Hold-Down Blocks, and Fin						
Special Shaped Balsa							
1	3/16"x3"x9" Pre-Cut Rudder	1	3/16"x5"x6" Pre-Cut Fin	2	1/4"x1-5/8"x27-3/4" Pre-Cut Ailerons	2	1/4"x2"x9" Pre-Cut Elevators
1	1/4"x5"x18" Pre-Cut Stabilizer						
Laser-Cut Poplar Plywood (Lite-Ply)							
2	1/8"x6"x48" Fuselage Side, Fuselage Doubler	1	1/8"x4"x36" HR, Cockpit Floor, FBR	1	1/8"x4"x24" F-2 thru F-6, APG, Stab Support, F-3S, F-4S, and IP	1	1/8"x4"x24" FBF, Tank Floor, ASCG, Dual Tool, and Wing Tips
Laser-Cut Birch Plywood							
1	3/32"x5-1/4"x9" Firewall, Dihedral Brace						

Sawn Birch Plywood							
2	1/16"x3/4"x1-5/8" Wing Hold Down Plates	1	1/4"x1-1/2"x3" Landing Gear Mount				
Hardwood							
l	1/4" dia.x2" BIRCH; Wing Hold Down Dowel	2	1/4"x1/4"x2" BASSWOOD; Grooved Torque Rod Blocks	2	1/4"x3/4"x1" BASSWOOD; Wing Hold Down Blocks	4	3/16"x3/8"x30" SPRUCE; Main Wing Spars
Formed Wire Parts							
1	1/16" dia. Tailwheel Wire	1	3/32" dia. Elevator Joiner	1	4-40x5" Threaded Rod- L.H. Aileron Torque Rod (with 1/8"o.d. x1-1/2" Brass Bearing)	1l	4-40x5" Threaded Rod- R.H. Aileron Torque Rod (with 1/8"o.d. x1-1/2" Brass Bearing)
Formed Plastic							
1	.03 Clear Plastic; Canopy						
Miscellaneous Parts							
2	Glass Filled Engine Mounts	1	.090 Aluminum Landing Gear	1	1" x 24" Fiberglass Tape (for wing center and tailwheel wire)	1	6-3/4"x20" Decal
1l	10"x27" Decal	1	38"x50" Full-Size Plan	1	16 page Photo-Illustrated Instruction Booklet	1	"The Basics of Radio Control" Booklet
Hardware							
4	#2x1/2" Sheet Metal Screws (for control horns)	3	6-32x1/2" Mounting Bolts (for landing gear)	4	6-32x3/4" Mounting Bolts (for engine mounts)	2	8-32x1-3/8" Mounting Bolts (for wheel axles)
7	6-32 Blind Nuts (4/engine mounts, 3/1anding gears)	4	8-32 Hex Nuts (2 per axle)	2	1/4-20x -1/2" Nylon Wing Bolts	2	4-40 Nylon Aileron Connectors
5	2-56 R/C Links (2/ailerons, l/elevator, l/rudder, l/throttle)	1	Small Nylon Control Horn (for rudder)	1	Medium Nylon Control Horn (for elevator	2	.190"o.d.x24" Nylon Outer Tubing (pushrods for elevator and rudder)
1	.130"o.d.x30" Nylon Inner Tubing (for throttle pushrod)	1	1/16"x15" Steel Cable (for throttle pushrod)	1	Solder Link (for throttle push rod)	1	2-56 Threaded Coupler (for throttle pushrod)
4	2-56x10" Threaded Rods (2/ailerons, l/elevator, l/rudder)	15	Easy Hinges				

Notes Before Beginning Construction

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

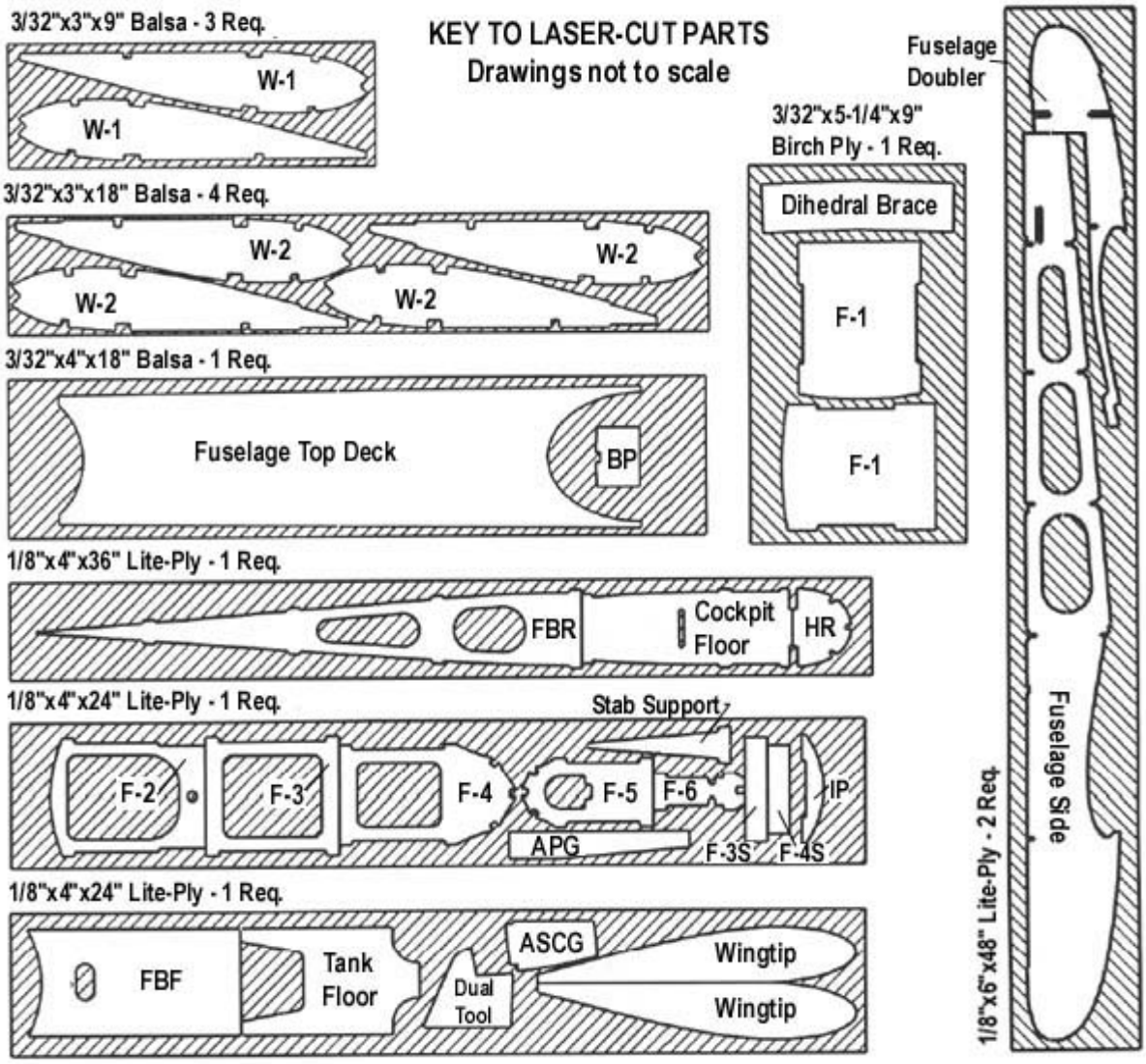
To build good flying models, you need a good straight building board. Crooked models don't fly well. The building board can be a table, a workbench, a reject "door core" from the lumber yard, or whatever - as long as it is perfectly flat and untwisted. Cover the top surface of the building board with 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 laser-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 laser-cut balsa and plywood parts can be identified using the plans and the "KEY TO LASER-CUT PARTS" below. Mark the identification numbers on the corresponding parts before removing them from the laser-cut sheets. All of the other parts can be identified by the "COMPLETE KIT PARTS LIST" above. Sort the different sizes of sticks and sheets into individual piles to avoid confusion during building.

SPECIAL NOTE: Any future references to die-cut parts will actually be refering to laser-cut parts.

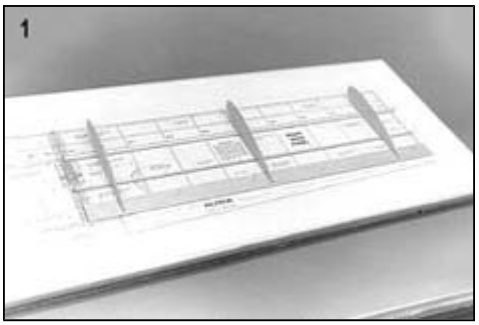


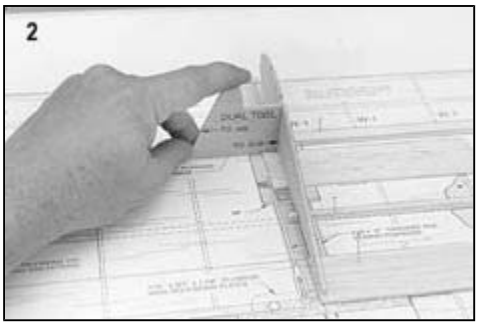
WING CONSTRUCTION

Building The Wing Panels

Before beginning wing construction, carefully splice together the Left Wing Panel plans so that the "X" and "Y" indicators meet. Use a straightedge to double check the alignment of the plans before taping them at the seam. Tape or pin the plans to your building board and protect them with a layer of waxed paper. Build each wing half separately.

1. a. Pin the 3/16"x3/8"x30" spruce main wing spar in place on the plan. Be careful not to place pins where they will interfere with wing ribs which will be added later.
   b. Pin the 1/16"x1-1/2"x30" balsa bottom trailing edge sheeting in place.
   c. Use about three wing ribs to accurately position the 3/16"sq. x30" balsa rear spar, then pin the spar in place.
2. a. Glue eight W-2 wing ribs to the spars and trailing edge sheeting.
   b. Place scraps of 1/16" 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 to be added later.)
   c. Use the dihedral guage side of the die-cut Dual Tool to set the root W-1 rib at the proper dihedral angle before gluing it in place. Add the two remaining W-1 ribs.
3. a. Glue the 1/4"sq.x30" balsa trailing edge to the top of the L.E. sheeting and the ends of the wing ribs.
   b. Remove the pins in the bottom L.E. sheeting and re-pin the back of the wing through the trailing edge stick that you just installed.
   c. Add the 1/16"x1-1/4"x30" top trailing edge sheeting. For this step it is recommended that you use Sig-Bond (aliphatic resin) along the back edge of the sheeting that glues to the trailing edge. That will make the joint easier to sand when you reach Step 11. Use thin CA to tack the front edge of the sheeting to the wing ribs.





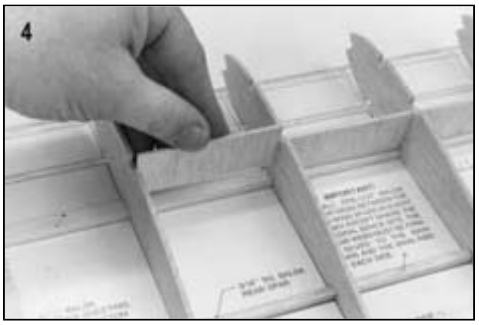
4. Install a pre-cut 3/32"x3"x1-3/16" balsa shear web in each rib bay except the one between the two most inboard W-1 ribs (where the dihedral brace will be installed later). Notice that the wood grain is vertical for maximum strength. Trial fit each web before gluing, sanding the ends as necessary to make them fit snugly between the ribs on either side. The bottom of the shear webs should be centered on the bottom main wing spar; the top of the shear webs should be centered on the notch for the top main wing spar.

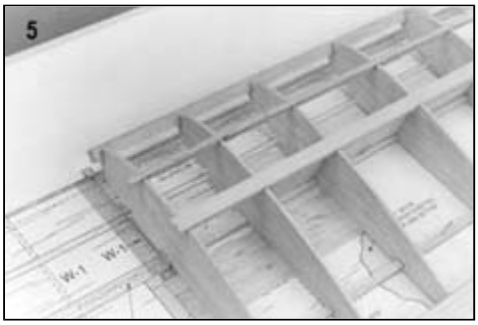
   NOTE: The shear web to be installed between the second and third W-1 wing ribs will need to be shortened significantly to fit.

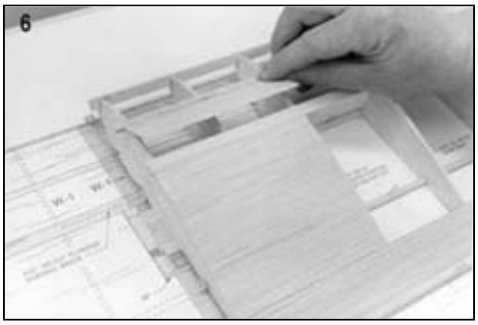
5.
   a. Trial fit the 3/16"x3/8"x30" spruce top main wing spar. If any of the shear webs are too tall, they should be trimmed to allow the spar to sit all the way down in the rib notches. When satisfied with the fit, glue the spar in place. Check the inboard W-1 rib again with the Dual Tool to be sure it is still at the correct angle.
   b. Glue the 5/16"sq.x30" balsa leading edge to the front of the ribs.
   c. Glue the 3/16"sq.x30" balsa top forward spar in the rib notches.

   NOTE: Remove any pins from tbe structure that are located under the area where the top center sheeting will be installed (in the next step). Otherwise, you may find it difficulf to remove your wing from the board later!

6. Pieces for the top center sheeting should be cut from the 1/16"x3"x30" balsa provided in the kit. Again, Sig-Bond is recommended for the front and rear edges of the sheeting to make it easier to sand the joints smooth. Also use Sig-Bond on the center W-1 rib. The sheeting can be glued to the ribs on each end using CA.







7. When the glue has dried, unpin the wing half from the board and install the 3/16"sq.x30" balsa bottom forward spar.

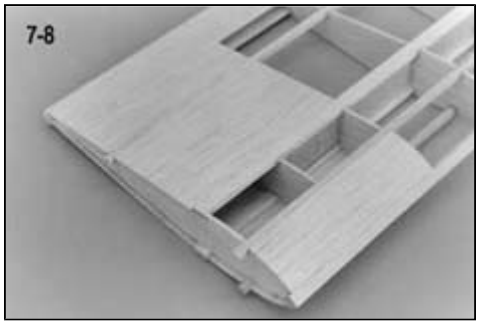
   IMPORTANT: If you have been using thin or medium CA glue during construction, now is the time to go back over every joint using medium or thick CA. Don't be stingy here - the integrity of your wing depends upon strong glue joints. Glue each side of each joint. Make certain the shear webs are bonded to the spars AND the wing ribs on each side. Double check the L.E. stick and the T.E. sheeting for complete bonding to the ribs.

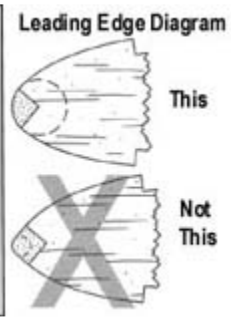
8. Install the bottom center sheeting except in the area between the bottom forward spar and the bottom main wing spar. Cut pieces for the sheeting from the 1/16"x3" balsa that you used earlier.

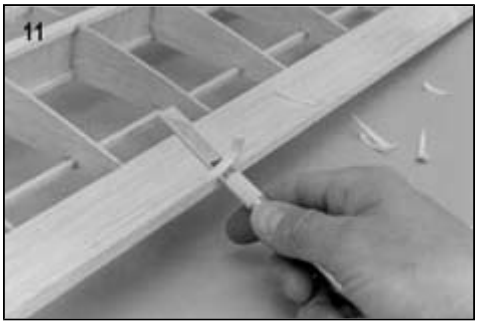
9. Cut oft and sand the spars, L.E., T.E., and sheeting at both ends of the wing flush with the end ribs.

10. Sand the leading edge to a round crosssection as shown in the diagram below.
    NOTE: The L.E. notches in the ribs were intentionally made slightly oversize so the ribs could be sanded down to the leading edge.

11. Carefully carve the top of the trailing edge to match the slope of the top T.E. sheeting using an X-Acto #26 whittling blade. Wrap the top of the blade with masking tape (to protect the sheeting), leaving about 1/2" exposed at the base. Use the masked portion to guide the blade at the corred angle. Final sand the T.E. so that the back edge of the wing is about 1/4" thick (same as the ailerons).



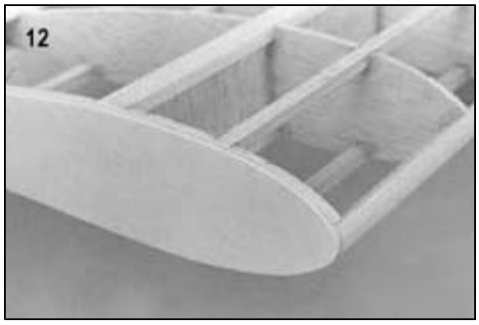


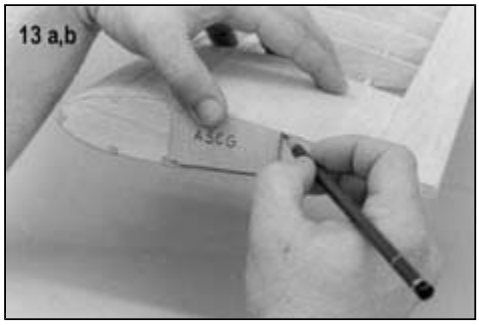


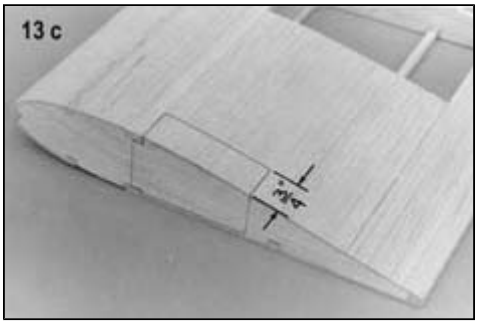
12. Glue the die-cut Lite-Ply wingtip to the outboard end of the wing panel. (Don't be tempted to omit the wingtip to save weight. The plywood is necessary to keep the covering material from "sucking in" the end rib.)

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

13.
   a. Sand the top center sheeting smooth. (The bottom center sheeting is sanded in step 21.)
   b. Position the die-cut Lite-Ply Aileron Servo Cutout Guide (ASCG) on the inboard W-1 wing rib. The top of the ASCG should be flush with the top of the center sheeting, and the notches on the ASCG should fit around the main wing spars. Trace around the ASCG with a sharp pencil.
   c. Remove the guide, then measure and mark the cutout area on the top center sheeting using the dimension shown in the photo. Using a modeling knife, carefully cut out the outlined area. This step accomplishes two things. First, it clears an area for the aileron servo, and second, it provides an open area between the main wing spars for the dihedral brace.







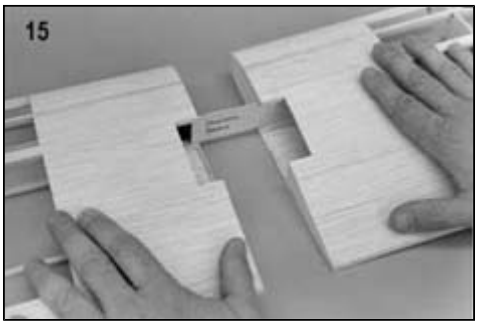
14. Repeat steps 1 through 13 to build the opposite wing half.

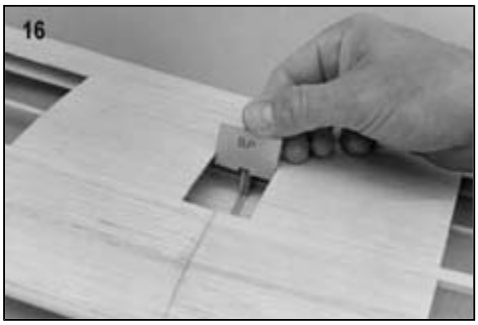
Joining The Wing Panels

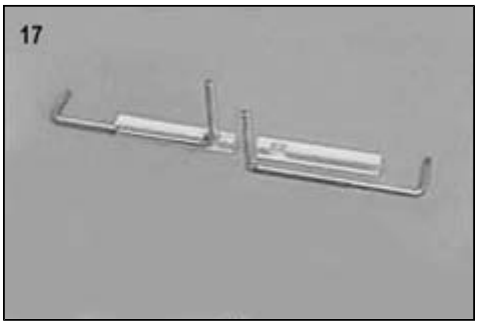
15.
   a. Trial fit the two wing halves with the dihedral brace installed between the main wing spars. Be certain that the dihedral brace is not preventing the panels from making solid contact with each other at the center. If necessary, trim or sand the dihedral brace for a snug fit.
   b. Glue the dihedral brace into ONE of the wing.panels. Make certain that it is positioned accurately between the main wing spars.
   c. Use slow CA or epoxy (either 5-minute or slow-dry) to join the two wing panels. Apply glue to the end ribs and the exposed edges of the dihedral brace, then carefully slide the other wing panel into place.
   Before the glue dries, make certain that the L.E. and T.E. of each panel are aligned. 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 2", but a variation of up to 1/4" either way is acceptable. The most important thing is to have a solid joint at the wing center with no gaps.

16. a. When dry, double check through the servo opening on top and the center sheeting opening on the bottom that the dihedral brace is glued solidly to the main wing spars and the W-1 wing ribs.
    b. Glue the die-cut balsa piece BP into the aft end of the servo opening. When dry, trim BP flush with the top center sheeting.

17. a. The aileron torque rods have been pre-bent so that the threaded portion leans forward slightly inside the fuselage (see the W-1 wing rib crosssection on the plans). That small angle will provide your Four-Star 40 with a bit of differential movement (more up than down) in the ailerons, which makes for smoother rolling characteristics. Prepare the torque rods for installation by roughening the brass bearings with sandpaper, then wiping them·clean.
    b. Locate the 1/4"sq.x2" basswood grooved torque rod blocks and cut a notch in each of them as shown in the photo.
    c. Glue the torque rods into the blocks being very careful not to get any glue in the brass bearings. The outer end of the bearings should be even with the outer end of the blocks.



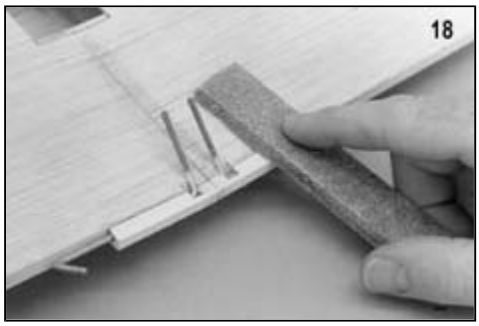


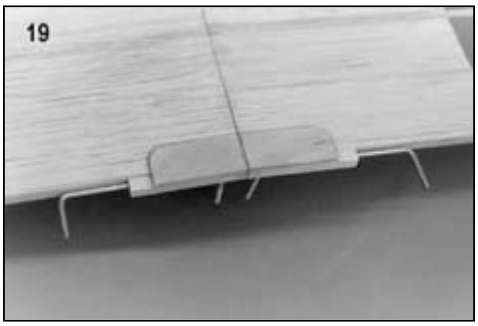


18. a. Glue the torque rod/block assemblies in place on the wing T.E., again being very careful not to get any glue in the bearings.
    b. Notch the balsa trailing edge just forward of the notches in the torque rod blocks to allow full movement of the torque rods.
    c. Sand the top of the basswood blocks to match the slope of the trailing edge sheeting. A small sanding block is handy for this step.

19. The 1/16"x3/4"x1-5/8" plywood wing hold-down plates can be sanded to a more pleasing shape as shown in the photo. Glue them in place on the bottom of the wing, even with the back of the torque rod blocks.

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



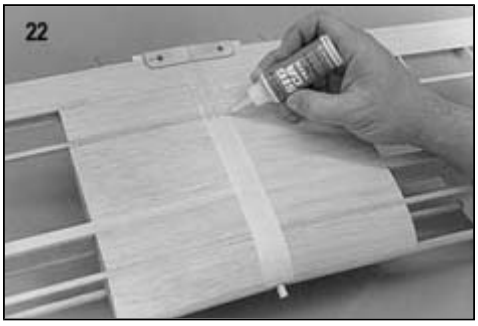


Finishing The Wing

20. Finish off the bottom center sheeting, again using 1/16" balsa.

21. 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.

22. The 1" wide fiberglass tape can be applied to the wing center joint (top and bottom) using one of the two methods listed.

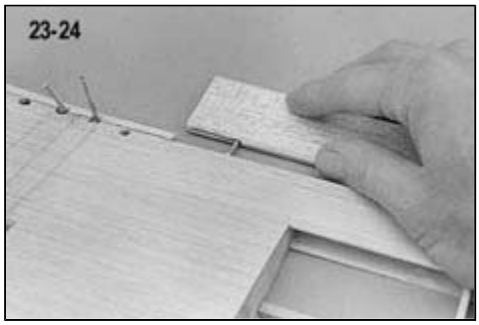


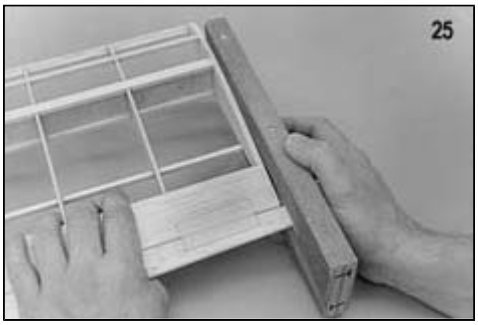
METHOD 1:	METHOD 2: (Shown in the photo)
1. Coat the wing center joint with slow-drying epoxy glue. 2. Lay the tape on top of the glue. 3. Holding one end of the tape so it won't slip, "squeegee" the glue through the tape with a small paddle of scrap balsa. Scrape over the tape several times with the 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

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

24. Position the aileron on the back of the wing, leaving a 1/32" gap between the inboard end of the aileron and the outboard end of the torque rod block. Mark the location for the torque rod installation. Slot and drill the aileron leading edge to receive the torque rod wire.





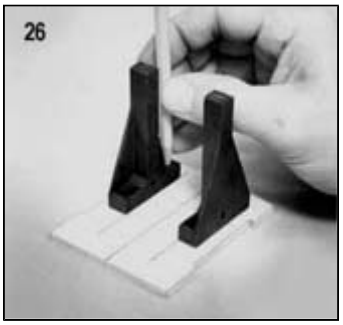
25. Trial fit the aileron to the torque rod. Once it fits, temporarily tape the aileron in place and sand the outboard end flush with the wingtip.

FUSELAGE CONSTRUCTION

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.

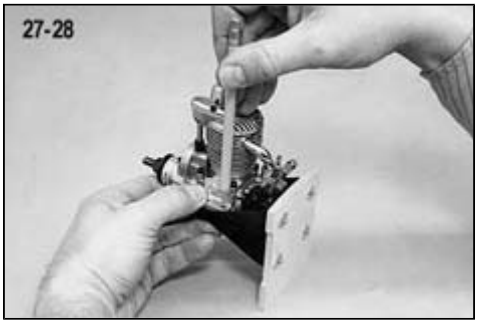
Fuselage Subassemblies

26.
a. Glue together the two die-cut plywood F-1 pieces using KwikSet Epoxy or slow CA. Use a heavy weight of some kind to hold the two pieces perfectly flat while drying.
b. Mark the vertical centerline and thrust line on the F-1 assembly using the cross-section on the plan as a guide.
c. Determine the spacing that will be necessary between the two glass filled engine mounts to fit your engine, then position the mounts on F-1 accordingly. Mark the location of the four mounting holes and drill them out with a 3/16" drill bit.



27. Lightly hammer four 6-32 blind nuts into the back of F-1. Bolt the engine mounts to the front of F-1 using 6-32x3/4" mounting bolts to align the blind nuts (see note below). 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.

NOTE: The shank of the 6-32 blind nuts may extend too far through F-1 and interfere with the back of the engine mounts. To avoid any conflict, drill a 1/4" dia. relief partially through the back of the mounts at each hole.

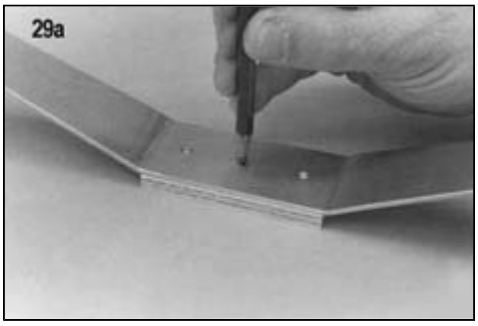


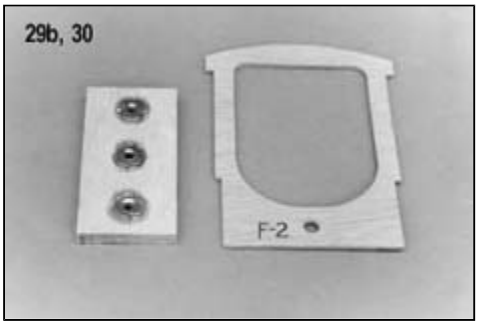
28. Position your engine on the mounts far enough forward for the propeller to clear the fuselage "cheeks" and mark the engine mounting holes. Remove the mounts, then drill at the marks with a bit that's just large enough to clear your engine mounting bolts. When the time comes to fasten the engine to the mounts, use 3/4" long bolts (4-40 or 6-32, depending on the engine) and matching aircraft lock nuts (engine mounting bolts and nuts are not included in the kit).

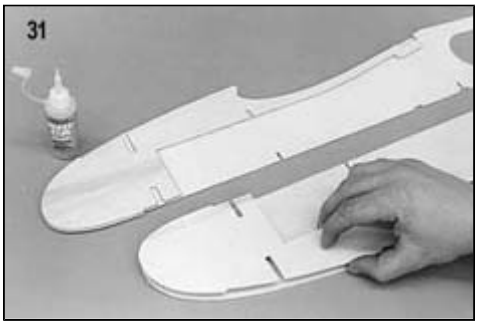
29.
a. Carefully center the aluminum landing gear over the 1/4"x1-1/2"x3" plywood landing gear mount and mark the location of the three mounting holes through the holes in the landing gear. Remove the mount and drill at the marks with a 3/16" drill bit.
b. Lightly hammer three 6-32 blind nuts into the holes and secure them with medium or slow CA.

30. The die-cut Lite-Ply former F-2 has a dimple at the bottom to mark the correct position of the hole for the wing hold-down dowel. Carefully drill at the dimple with a 1/4" drill bit. Use a chunk of hardwood behind the former to keep the wood from splintering as you drill through.

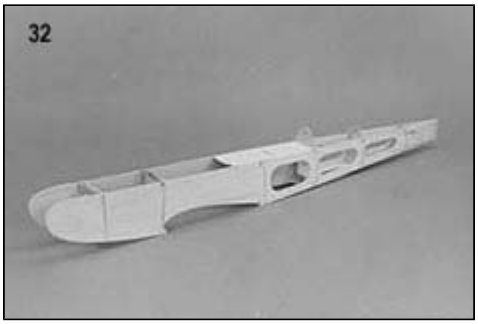
31. Glue the die-cut fuselage doublers to the die-cut fuselage sides using slow CA or Kwik-Set epoxy, and allow to dry. Be sure to make one left side and one right side!







Basic Fuselage Construction



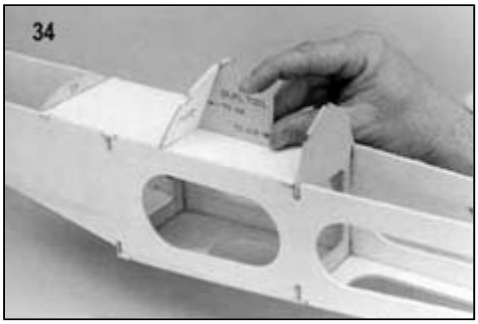
32.
a. Tape or rubber band the fuselage sides together at the rear.
b. Working from the rear forward, slip all the fuselage formers (F-6 thru F-1) into place. Put a rubber band around the fuselage at each former location to hold it tightly together.
c. Slide the die-cut Lite-Ply part FBR (fuselage bottom, rear) under the rubber bands until it snaps into its proper location between the fuselage sides.
d. Slide the cockpit floor into place under the rubber bands.

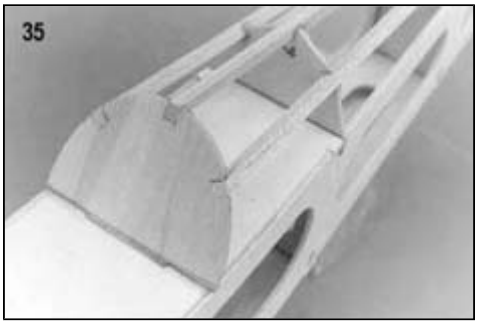
NOTE: The "Tee-Lock" tabs on the formers, FBR, and the cockpit floor are made oversized to protrude past the fuselage sides. These will be sanded off after the fuselage has been completely assembled.

33.
a. Place the fuselage over the top view on the plans to check its alignment. Correct if necessary by twisting gently before proceeding. Be certain that the joint where the fuselage sides meet at the rear is square with the fuselage bottom.
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.

34.
a. Glue the die-cut Lite-Ply instrument panel IP to the tab on the front of the cockpit floor.
b. Glue the die-cut Lite-Ply headrest HR into the slot in the cockpit floor. Use the 250 side of the Dual Tool to get the correct angle.

35.
a. Glue the three 3/16"x1/4"x18" balsa fuselage stringers in place.
b. When dry, trim off the front of the stringers flush with the front of HR.



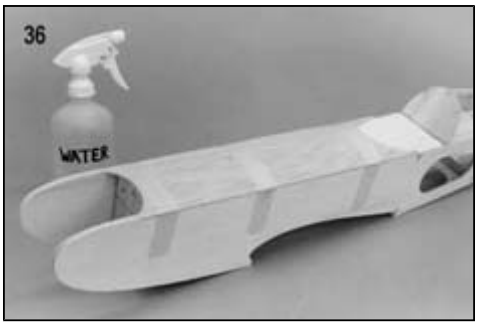


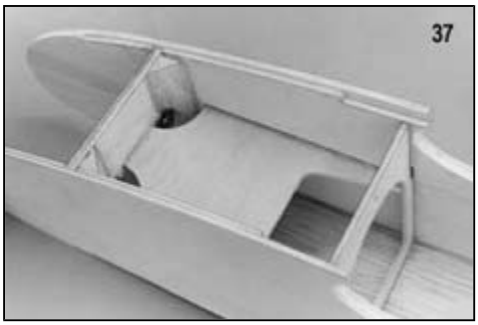
36.
a. Bevel the top edge of the fuselage sides with a sanding block to provide a firm seat for the fuselage top deck when it is installed. Notice that the angle between the top deck and the fuselage sides varies along the entire length. Don't worry about perfection - a few swipes with a sanding block on each side should do the trick.
b. Tape the die-cut balsa fuselage top deck in place. You may need to apply some water to the outer surface of the dop deck to make it easier to bend into position and prevent it from cracking. Once again, check the alignment of the fuselage over the plans.
c. Working from the inside, glue the top deck in place.
d. When dry, remove the tape.

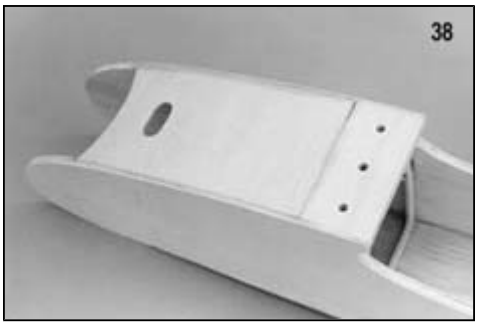
37.
a. Cut two braces for F-1 from the 1/2"x24" balsa triangle stock and notch them as necessary to clear the blind nuts on the back of F-1. Apply slow CA to the braces and press them firmly in place.
b. Install the die-cut Lite-Ply tank floor in the fuselage. Be certain it is seated on the fuselage doublers and against the back of F-1, then glue it in place.

38.
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. Tape FBF (fuselage bottom, front) in place then glue it using medium CA. Be sure to firmly glue the joint between FBF and the landing gear mount from the inside of tne 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.







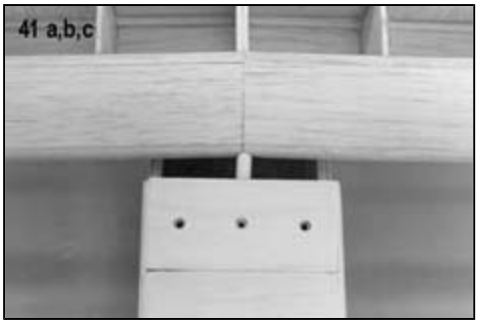
39. The fuselage is now ready for final sanding. Sand off all "Tee-Lock" tabs then round the bottom edges of the fuselage and the corners of the balsa top deck. Use a sanding block, starting with 80-grit sandpaper. Switch to 150-grit or 220-grit sandpaper for the final sanding.

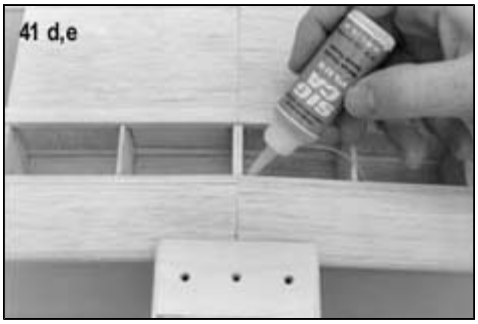
Mounting The Wing To The Fuselage

NOTE: The wing must be finished through step 19 before proceeding.

40. Locate the 1/4"dia.x2" wing hold-down dowel and sharpen one end to a point - keep the point symmetrical and centered. Push the dowel into the hole in F-2 so that only the point remains 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 a small indentation in the L.E. (If not, try using a drop-of paint un the pointed dowel, which will transfer to the wing L.E.)

41.
    a. Drill a 1/4" dia. hole about 2" deep at the indentation (or paint mark)
    b. Remove the dowel from F-2, then reinsert it about 1/4", leaving most of its length exposed.
    c. Trial fit the wing in position, sliding it onto the dowel. Check to see that the wing seats properly on the fuselage. If not, slowly enlarge the hole in the L.E. until it does seat properly. If necessary, sand the back edge of the basswood torque rod blocks to allow the wing to seat firmly on the fuselage.
    d. With the wing still in position, apply glue (thick CA or epoxy) to the wing dowel and W-1 wing ribs by working through the opening in the bottom of the wing. Be careful not to allow the glue to run down and bond the dowel to F-2.
    e. When dry, remove the wing and fill any gaps around the dowel with another application of glue.

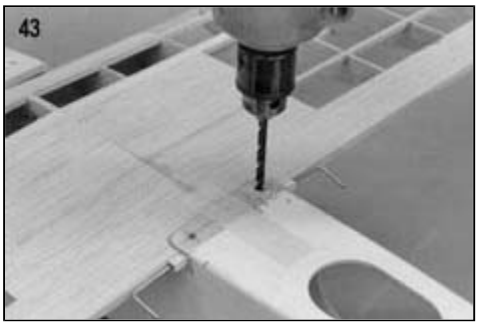




42.
    a. The 1/4"x3/4"x1" basswood wing hold-down blocks key into the notches in the fuselage doubler. To accurately fit them, temporarily tape or pin the wing in place on the fuselage.
    b. Working through the lightening holes in the fuselage, install the wing hold-down blocks in the notches, making certain they are in full contact with the wing upper surface. Tack glue the blocks to the fuselage to hold them in position, then remove the wing. Finish gluing the blocks in place using medium CA
    c. Cut two 1" lengths of 1/2" triangle stock to brace the wing hold down blocks. Glue the triangle braces firmly to the hold-down blocks and the fuselage doublers.

43.
    a. Fit the wing in place on the fuselage and check its alignment (see the General Alignment Diagram on page 20 of "The Basics of Radio Control"). 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 hold-down 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 the wing and the wing hold-down blocks at the same time 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 bolts will seat flush against the plywood plates.

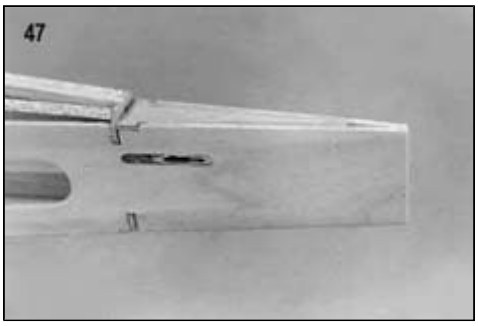
44. a. Remove the wing and tap the wing hold-down blocks with a 1/4-20 tap. You can apply a few drops of thin CA to the holes to strengthen the threads.
    b. Redrill the holes in the wing with a 1/4" drill bit to pass the nylon wing bolts.



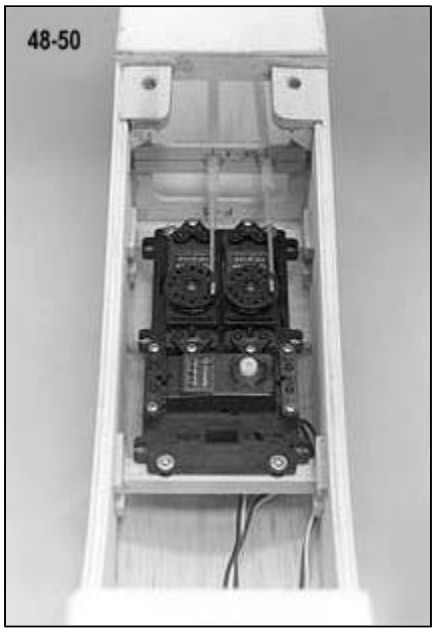
Servo And Pushrod Installation

45. Now is a good time to plan your servo installation. 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. It's important to have the servos in position so that the nylon pushrods can be routed properly, with the least amount of curvature.

46. a. Locate the two .190 o.d.x24" nylon outer pushrod tubes, and roughen the last 3" of each with sandpaper to aid glue adhesion.
    b. Slide the outer push rod tubes forward through the pushrod exit slots in the fuselge sides and the notches in F-6. Continue sliding the tubes until only about an inch of the roughened end sticks out of the slots.
    c. The outer pushrod tubes should meet (but not cross) at the notch in F-5. Glue a scrap of balsa above the tubes to hold them in place.
    d. Apply glue liberally (either slow CA or epoxy) to the outer tubes at the pushrod exit slots, from both the inside and the outside of the fuselage.



47. a. Use a single-edge razor blade to trim the outer pushrod tubing flush with the outside of the fuselage.
    b. Install the die-cut Lite-Ply stab support so that it is flush with the top of the fuselage sides.
    c. When dry, sand the "Tee-Lock" tabs on the stab support flush with the fuselage sides.



48. a. The nylon pushrods 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 pushrods. Notice that the pushrod straps haven't been marked for pushrod location because the routing of the pushrods will vary with different servo installations. Ideally, you want to have the pushrods to come through F-3S pointed directly at the servo arms of the rudder and elevator servos. Carefully mark drill locations on the pushrod straps for the two nylon pushrods. Drill at the marks with a 3/16" drill bit.
    b. Slide F-4S then F-3S into position on the pushrods, but don't glue them yet.
    c. Cut off the front ends of the outer pushrod tubes about 2-1/2" short of the servo arms

49. a. Cut two 2-56x10" threaded rods to an overall length of 2-1/2", measuring from the threaded end. Put a "Z" bend in the non-threaded end of the rods. Of course, another type of servo connector may be used if you prefer (see page 7 of "The Basics of Radio Control").
    b. Screw the threaded end of the rods completely into the two .130"o.d.x30" nylon inner pushrod tubes.
    c. Slide the inner pushrod tubes into the outer tubes from the servo end. Install the "Z" bends (or your alternate servo connectors) on the servo arms and hook them up to the servos.

50. With the pushrods 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 to keep the bends at a minimum.

51. This is a good time to install the nylon outer tubing for the throttle pushrod. Temporarily mount your engine to help locate where the throttle pushrod will come through F-1. Follow the guidelines given in "The Basics of Radio Control" (page 8), but stop before attaching the solder clevis (servo connector). Now is also a good time to plan your fuel tank installation and routing of the fuel lines through F-1. Remove the throttle cable, engine, fuel tank, and the inner nylon push rods before proceeding with covering.

Tail Surfaces

52. Sand the pre-cut 1/4" balsa stabilizer leading edges round except for the short length in the center, which should be left flat to fit against the back of F-6.

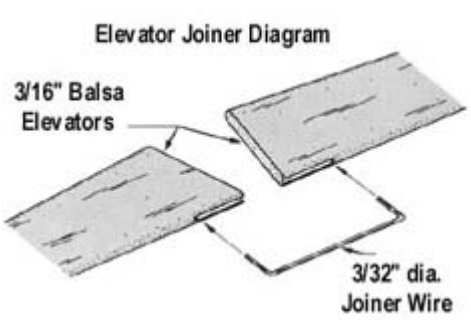
53.
    a. Locate the two pre-cut 1/4" balsa elevators and sand their trailing edges round.
    b. Draw a hinge line centered on the leading edge of each elevator. Use a sanding block to bevel the front of the elevators using the hinge line as a guide.
    c. Temporarily pin the elevators to the plans and mark where the 3/32" dia. music wire elevator joiner will attach. Remove the elevators, then drill and groove their 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 aligned as the glue dries.

54. 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.

55.
    a. Sand the pre-cut 3/16" balsa fin leading edge round.
    b. Sand the trailing edge of the pre-cut 3/16" balsa rudder round.
    c. Draw a hinge line centered on the leading edge of the rudder. Bevel the L.E. using the hinge line as a guide.
    d. Sand a notch in the rudder leading edge to clear the elevator joiner wire as shown on the plans.

56.
    a. Notch and drill the bottom of the rudder to accept the tailwheel wire.
    b. Sand and wipe the tailwheel wire clean, then install it (without glue) on the rudder. Apply thin CA first (to penetrate) and follow up with slow CA to completely fill around the wire .
    c. Reinforce the tailwheel area with a 1-1/2" length of fiberglass tape wrapped around the bottom of the rudder. Use thin CA to completely saturate the tape and surrounding wood. A second coat of thin CA will help fill the weave of the fiberglass.

NOTE: Epoxy may be used in this step, but CA is faster and penetrates the entire tailwheel area, making it rock hard.



57. The top of the fin or rudder may need sanding so that they line-up when installed. Temporarily pin or tape the stabilizer and fin on the back of the fuselage, then tape the rudder to the fin so that its bottom edge is aligned with the fuselage bottom. Remove the fin and rudder (which are still taped together) and sand the top edge until they match.

COVERING

General Instructions

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 40 wing relies partially on the covering to aid in torsional stiffness, so it is very important that you use an approved covering material.

All of the Four-Star 40 prototypes were covered with Sig Supercoat Iron-On Plastic Covering. Supercoat is ideal for sport models because it's lightweight and easy to apply. You will need two rolls of Supercoat (color of your choice) to cover the model. In addition, you'll need some 1/4" wide striping tape for the canopy frame.

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.

The following instructions provide advice and procedures specific to the Four-Star 40. If this is your first attempt at covering, be certain to read the two pages of step-by-step, photo-illustrated instructions included with each roll of Sig Supercoat. 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 (we used silver Supercoat covering). The front of the head rest (HR) shouldn't be covered until after the fuselage stringer area has been covered, so you can overlap and hide the seam. Cut the instrument panel from the decal sheet and apply it to IP to finish off the cockpit.

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.

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 the top edge of HR at the front and F-6 at the back. Trim the excess at each end leavingan overhang of about 1/8" to iron around the corners. Seal down the 1/8" overhang to the front of HR and back of F-6 (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 materialover 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. Once the ailerons have been covered, cut away the material to expose the slot and hole for the torque rods. Also remove the material over the notch in the leading edge of the rudder (fuel-proof the exposed wood in the rudder notch with CA or epoxy).

Decals

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 soapywater (use dishwashing detergent). Place the decal on the model and squeegee the water from underneath with a balsa paddle. This procedureallowstime for repositioning and prevents air from being trapped under the decal. Allow several hours to dry.

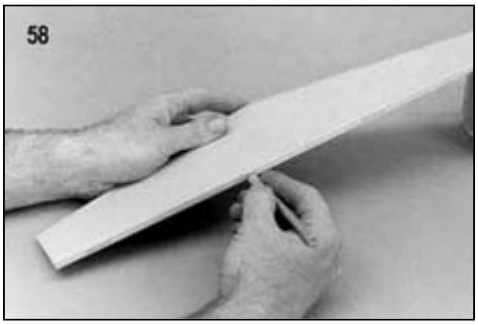
INSTALLING EASY HINGES

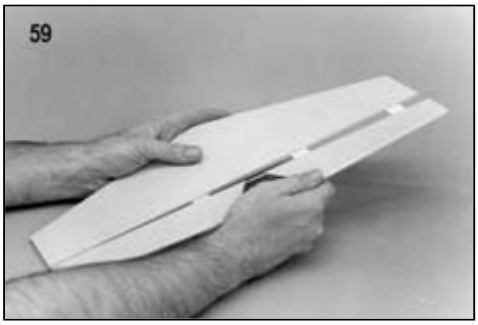
Sig's famous EASY HINGES have been included with your kit to hinge all of the control surfaces. Each ultra-thin hinge is actually a three-part laminate - a tough plastic inner core sandwiched by an absorbant wicking material. They have been chemically treated to slow down the reaction of thin CA (which 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.

58. 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.

59. 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.

60.
    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.





61. After the glue has cured (3 to 5 minutes) the joint should be flexed to full deflection in each direction a couple of dozen times to reduce the stiffness. Don't worry about shortening the life of the hinges, as they are almost indestructible.

62. The rudder is hinged in the same manner as above, but it is easier to install AFTER the fin has been glued to the fuselage. Cut slots for three hinges now (3 slots in the rudder, two in the fin, and one in the back of the fuselage).
NOTE: The fuselage slot may be difficult to cut, but don't be tempted to omit it. The bottom hinge is vital to the integrity of the rudder because it absorbs loads from both the servo and the tailwheeL Jab the knife straight into the joint at the rear of the fuselage, pull it straight out, reposition it slightly, and repeat the procedure until you have a slot that's long enough for the hinge.

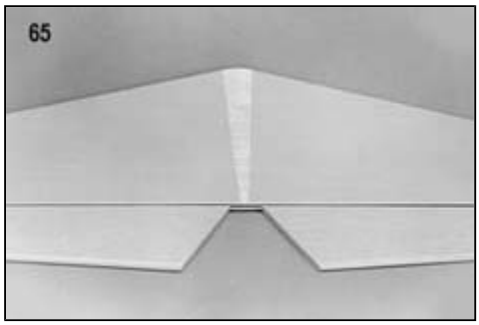
63. The ailerons are hinged exactly like the tail surfaces, but the torque rods must be glued as well. Start by cutting the slots in the wing and the ailerons (four per aileron) and install EASY HINGES halfway into the ailerons.

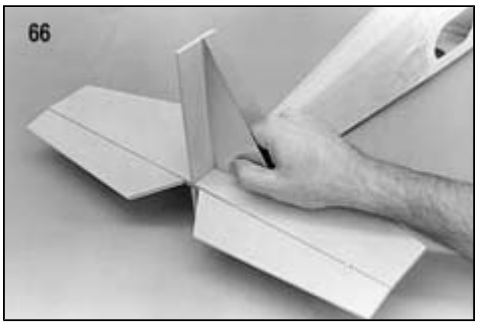
64.
   a. Slide a small piece of wax paper between the torque rods and the wing. Working with one aileron at a time, apply Kwik-Set epoxy to the slot and hole in the aileron leading edge and slide it onto the torque rod, working the EASY HINGES into the wing slots at the same time. Try not to get any epoxy on the brass tubing! Before the glue sets, be sure to deflect the aileron back and forth to set the proper hinge gap.
   b. Once the epoxy has dried, remove the wax paper and apply thin CA to the hinges as you did earlier.

FINAL ASSEMBLY

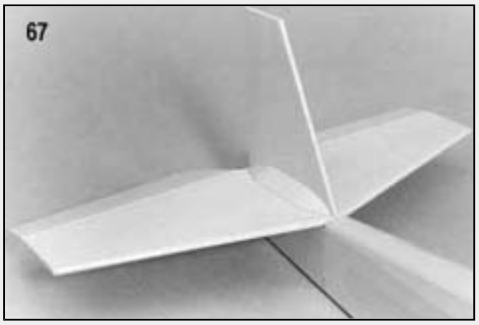
65.
   a. Temporarily position the stabilizer on the stab support at the back of the fuselage. Again refer to the General Alignment Diagram on page 20 of "The Basics of Radio Control". When satisfied with the alignment, draw cut lines on the bottom of the stabilizer at the fuselage sides. Remove the stabilizer and cut away the covering on the bottom where it will be glued to the fuselage using a sharp knife.
   b. Glue the stabilizer to the fuselage using Kwik-Set epoxy. Recheck its alignment and adjust as necessary before the glue dries.

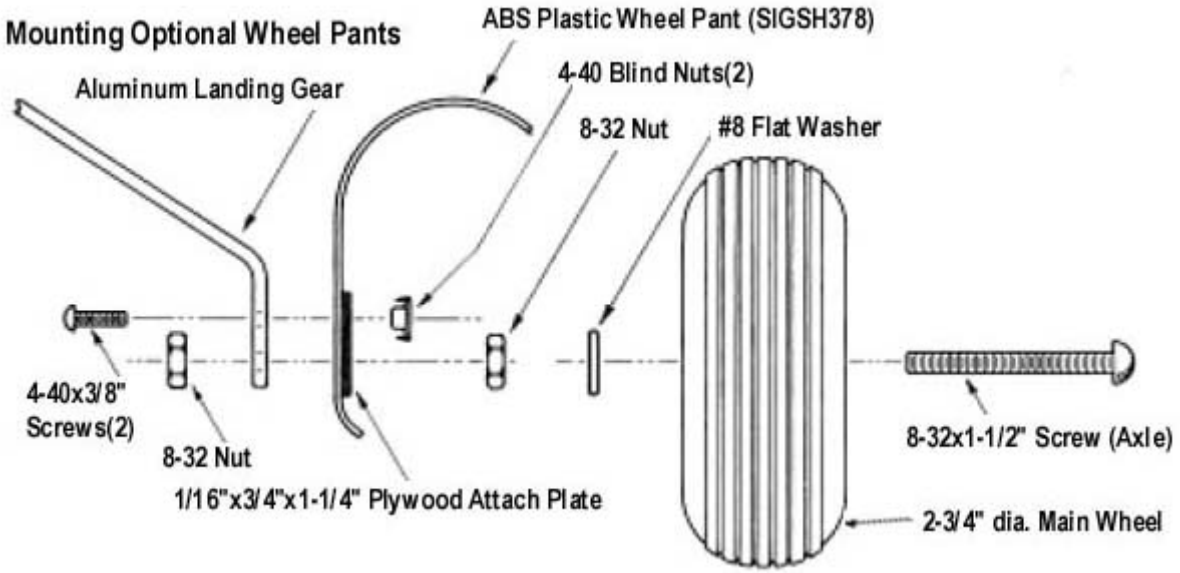
66.
   a. Cut away a 3/16" wide strip of material from the center of the stabilizer where the fin is to be glued. Epoxy the fin to the top of the stabilizer, using a triangle to check its alignment as it dries. Make certain that the back edge of the fin is lined-up with the back edge of the fuselage sides.
   b. Hinge the rudder to the fin and fuselage using three EASY HINGES.





67. (OPTIONAL) Although the fin attachment method in the previous step has proven to be more than adequate on our test models, some modelers may want some extra strength in that area, particularly if they fly on a rough field where models have a tendency to flip over on their back. Then again, there are some of us who tend to flip our models over even on smooth fields! The optional fin braces shown in the photo aren't exactly pretty, but they do add a tremendous amount of strength to the area and are recommended for any Four-Star 40 pilot who is more concerned with day-to-day hardknocks flying than with looks.
The fin braces can be cut from the 1/2" triangle stock provided in the kit and shaped as shown in the picture. Cover the outside face of the braces, and cut away the covering material on the fin and stabilizer before gluing the braces in place on each side of the fin.



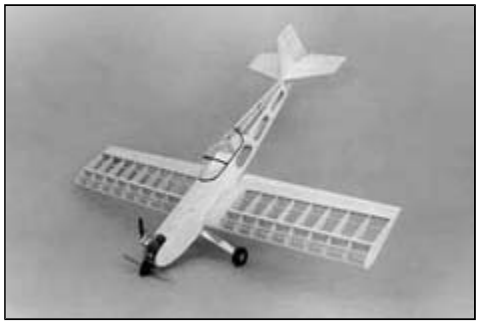


68. Install 2-3/4" main wheels on the aluminum landing gear using the hardware as shown on the plans. A drop of CA on the inner nut will help keep the assembly from vibrating loose. Once the wheels have been attached, the landing gear assembly can be bolted to the fuselage using three 6-32x1/2" mounting bolts.

NOTE: Optional wheel pants can be installed as shown in the diagram to help spruce up the appearance of your model. Use SIGSH378 plastic wheel pants (not included in kit) painted to match your color scheme.

69.
a. If you wish to install a pilot, now is the time to do it. 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 to scratch the clear plastic.
c. Trial fit the canopy to the fuselage and trim if 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. Our canopies have all been attached just using 1/4" striping tape applied half to the canopy and half to the covering material around the canopy, with good results. This allows you to easily remove and replace the canopy if ever necessary. Finish off the canopy with 1/4" striping tape applied to the raised frame and at the back edge.

NOTE: The back edge of the canopy should only touch the three fuselage stringers when installed properly. However, we have found that after many flights, the back edge will begin to cut through the covering material at those spots, due to vibration. To avoid this chafing problem, apply a spot of CA or silicone rubber sealant (available at hardware stores) at each of the stringers where the canopy makes contact.



The remaining sections of these instructions concern engine and fuel tank installation, radio installation, pre-flight checkout, and flying provide information that is specific to the FOUR-STAR 40. For a more indepth 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 40 is simply a matter of bolting the engine mounts that were prepared in step 28 to F-1, then bolting your engine to the mounts. Finish installing the throttle cable (which was partially prepared in step 51) by soldering the connector in place on the servo end of the cable.

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. Besides, modern plastic fuel tanks are virtually fMestructible under normal use when installed properly, so they seldom need to be removed for maintenance.

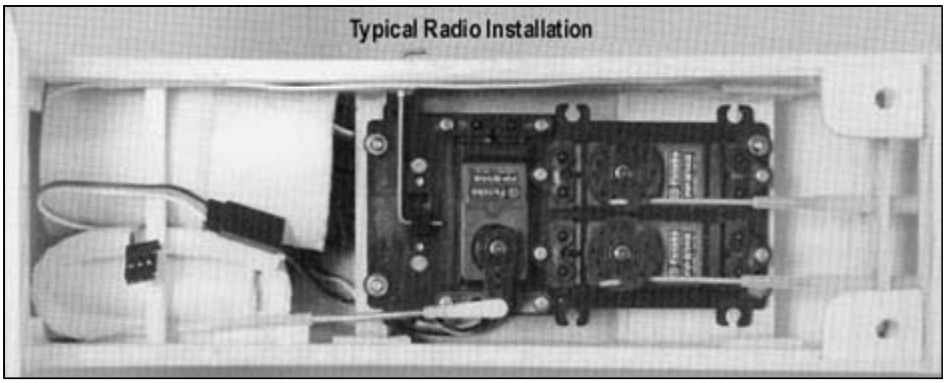
An 8 ounce fuel tank is recommended for the FOUR-STAR 40, although most tanks from 6 oz. to 10 oz. will work. A Sullivan Products 8 oz. Slant Type, RST Type, or Round Type will fit easily, as will an 8 oz. Du-Bro tank. A 10 oz. Sullivan tank (RST, Slant, or Round Type) or a 10 oz. Du-Bro tank will require some modifications (widening) to the opening in F-2. Most engines will require the tank to mounted as high as possible in the fuselage. Use foam rubber under the fuel tank as necessary to position it properly.

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 49. Snap an R/C link on 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 2-56x10" threaded rod to an overall length of 3-1/4", measuring from the threaded end. Install the threaded rod in the nylon tubing, smooth end first, so that approximately 1/2" of the threaded portion remains exposed. (The metal rod will help prevent the nylon tubing from buckling under flight loads.) Thread the R/C link onto the end of the push rod until the rudder is neutral, then repeat the procedure for the elevator.

The aileron servo can be mounted to short lengths of hardwood as can be seen on the W-1 cross section on the plans.

The nylon aileron connectors can be moved up or down the torque rods to adjust the amount of aileron throw. Tape the servo wire to the wing to keep it from getting tangled with the aileron servo, as well as the servos in the fuselage.



A typical radio installation is shown in the photo above. The receiver and battery on this model are wrapped in foam rubber and positioned just forward of the servos. A scrap balsa stick keeps them from moving around during flight. If you use a lightweight engine, you may need to install the battery under the fuel tank to achieve proper balance. 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 antenna has been routed away from all other wiring and out the fuselage bottom.

Pre-Flight Checkout

Be certain to range check your radio equipment according to the manufacturer's instructions before attempting test flights. 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. Use the die-cut Lite-Ply Aileron Positioning Guide to set the ailerons in neutral, as shown on the plans. 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 push rod tubes to expand or contract slightly. Use the trim levers on the transmitter to reneutralize the control surfaces, and do the final trimming in the air.

The control surface movements listed are recommended for the first flight of your FOUR-STAR 40. 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.

For first flights, make certain that the model balances somewhere on the main spar. If it balances further 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. Always balance the model with an empty fuel tank.

RECOMMENDED CONTROL SURFACE MOVEMENTS	
For test flying, the following are suggested:	
ELEVATOR	1/2" UP and 1/2" DOWN
RUDDER	1" LEFT and 1" RIGHT
AILERON	5/8" UP and 1/2" DOWN

FLYING

Like it said in the first paragraph of these instructions, the FOUR-STAR 40 was designed with flight performance as one of its top priorities - and we weren't disappointed! It's a very maneuverable and aerobatic model, but it still slows down for soft, gentle landings. It can be flown off pavement or grass, and it handles the wind well for such a light model.

The FOUR-STAR 40 is a fun aircraft to fly, but it is not a basic trainer. If you have no previous R/C flying experience, we suggest that you not attempt to fly this model without the assistance of an experienced pilot. Contact your local club or ask your hobby dealer for the names of good fliers in your area and a suitable location for flying.

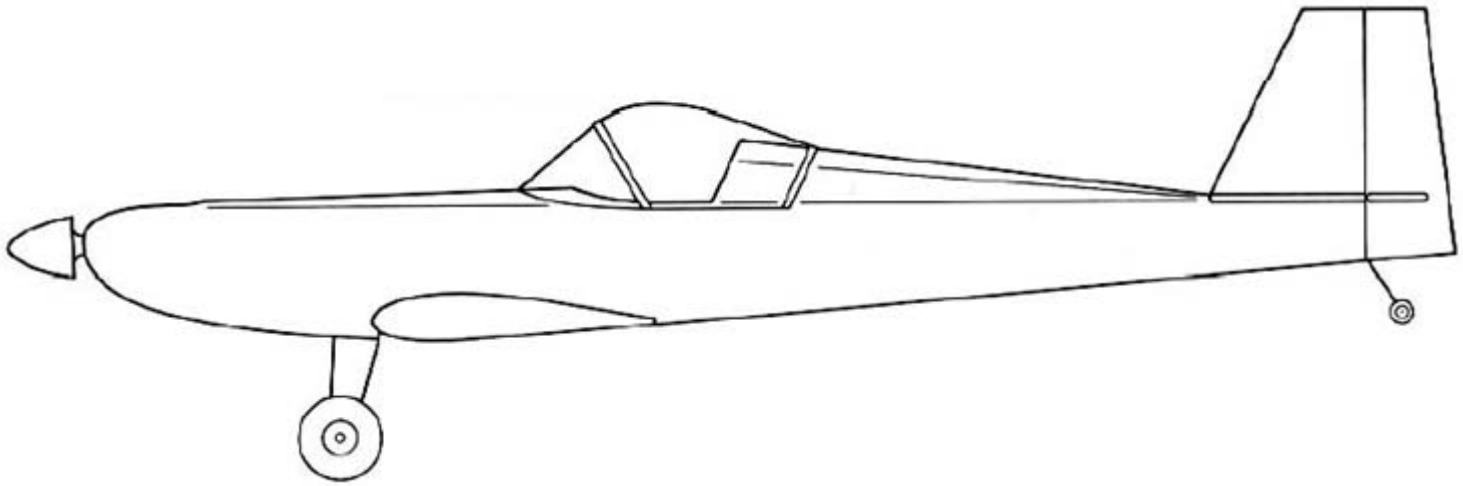
Practice taxiing the model while holding "up" elevator to avoid nose-overs. When you are ready for takeoff, point it into the wind and apply throttle. Release the "up" elevator as it accelerates. You'll probably need a touch of right rudder to keep it going straight because engine torque will try to make it drift to the left. When you reach flying speed, pull back slightly on the elevator stick for a gentle liftoff.

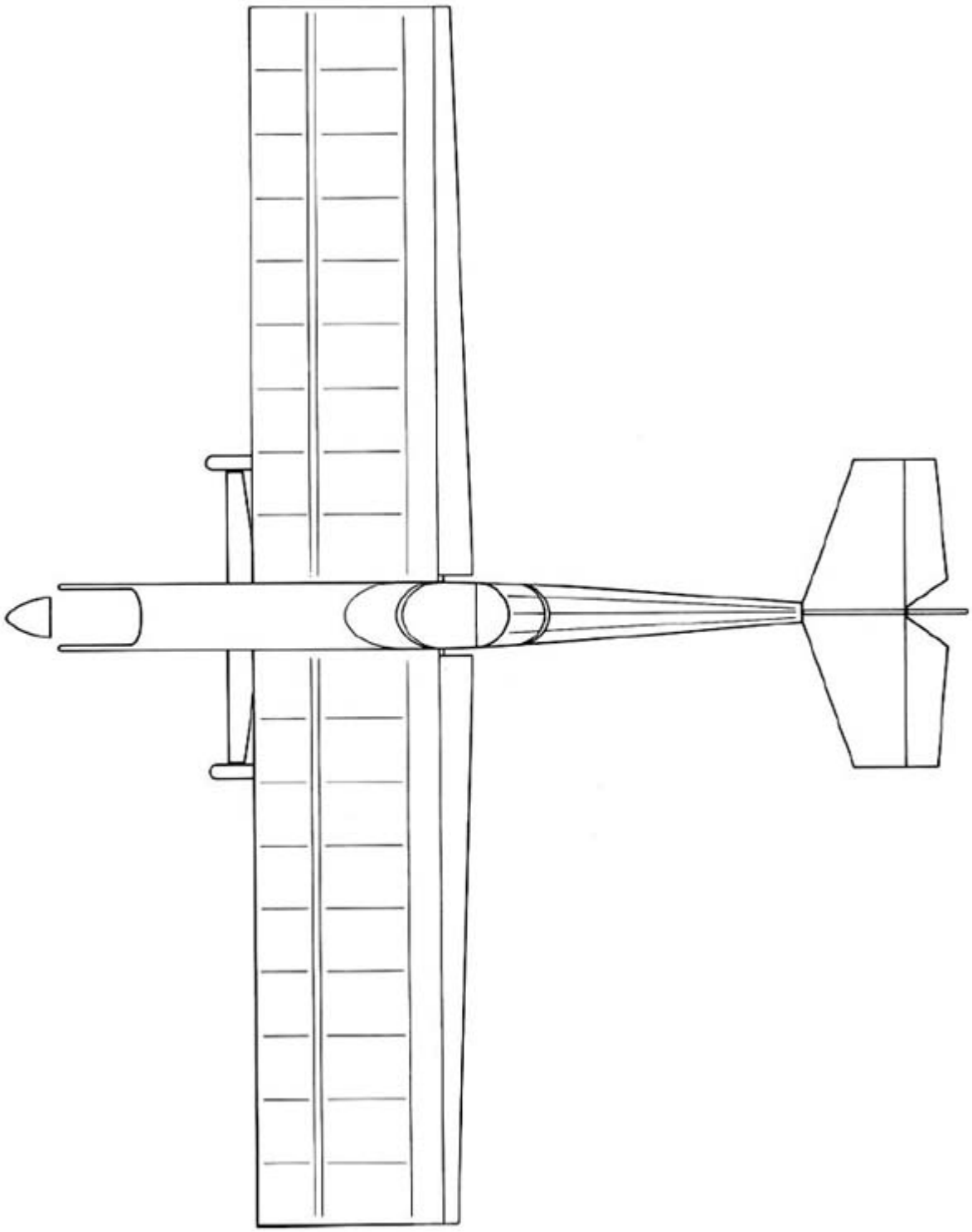
If you are using a relatively large engine, don't expect the takeoff roll to last very long! With its big wing, the FOURSTAR 40 likes to jump into the air and get down to business! You will find the model capable of almost any trick "in the book". Experiment With different control throws and balance points until the model 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 1/8" 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.

When landing, the FOUR-STAR 40 may tend to "float" a bit more than other models you have flown in the past, so be ready to go around if it looks like you're going to overshoot the runway. It will 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 40 should settle in for a perfect "threepoint" landing with a short rollout. Oh, and when you taxi back to the flight line, don't be surprised if there's already a line of R/C pilots wanting to fly your new SIG airplane!

The top view and side view drawings are provided for modelers who wish to to develop their own personalized color and trim scheme for the FOUR-STAR 40. Make several copies of this page so you can draw out a few different ideas before deciding which one you like best.





If you have any technical questions or comments about this kit, or any other SIG product, please call us.

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