BUILDING INSTRUCTIONS FOR THE BTE

SUPER FLYIN' KING

Written by Bruce Tharpe June 2013

Wingspan: 132 inches
Wing Area: 3380 square inches
Length: 96 inches
Weight: 36 pounds (approximate)
Engine Range: 60cc - 80cc Gas

Manufactured by

BRUCE THARPE ENGINEERING
8622 E EVANS CREEK ROAD, ROGUE RIVER, OR 97537

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INTRODUCTION

Thank you for selecting the Super Flyin' King from BTE.

I hope you like to build! The Super Flyin' King is a traditional kit in the sense that even though a lot of the parts are cut and ready to glue, there's still a lot expected of the builder. I've done my best to provide a sturdy design and quality materials. It's up to you now to make the best of it. It has always been a goal of BTE to make kits that are just as enjoyable to build as they are to fly. That's important when you take on a project as large as the Super Flyin' King. So enjoy the process and we'll see you on the flight line...

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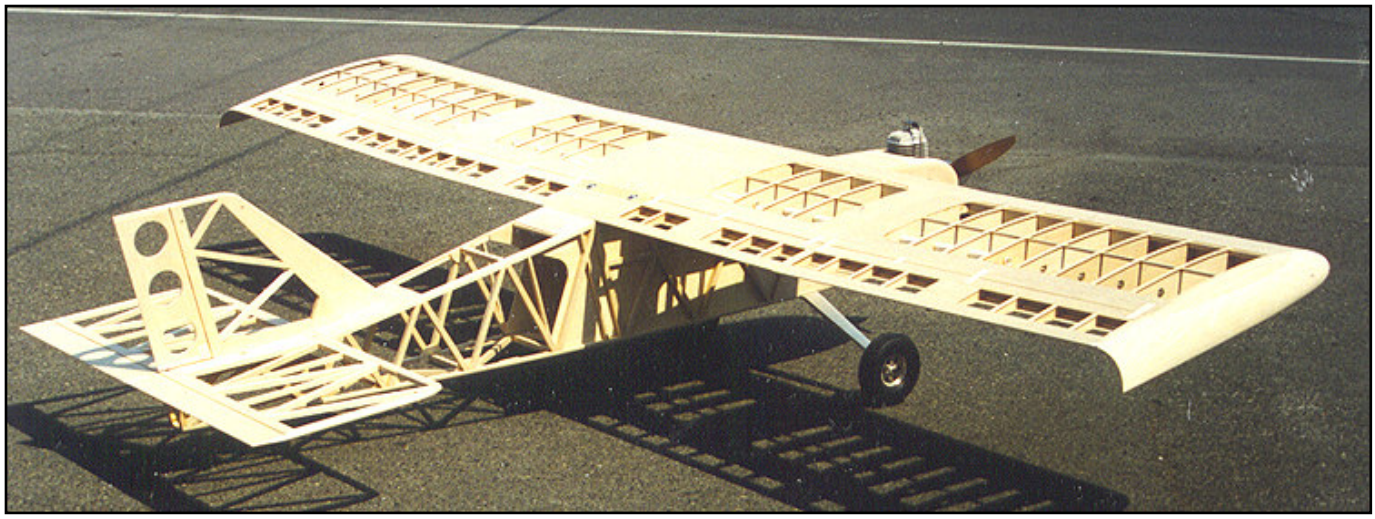
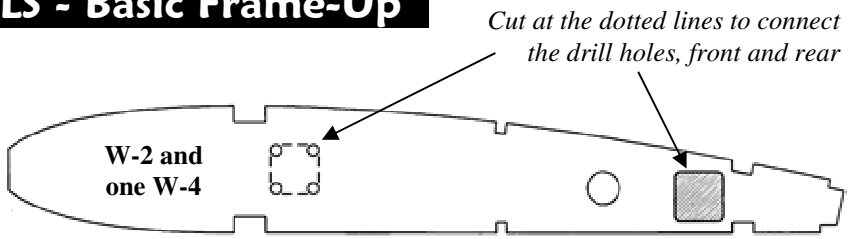


1 OUTER WING PANELS - Basic Frame-Up



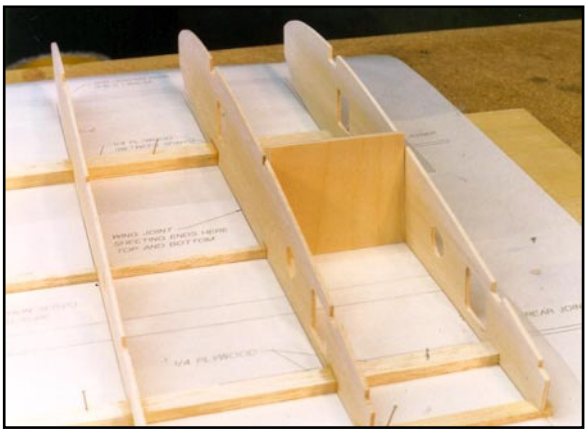
❑❑ Make the two cutouts for the wing joiners in the W-2 rib and one W-4 rib. Use the W-2 rib as a guide for the W-4.

❑❑ Pin the 3/8" x 3/4" balsa main spar over the plan. Using several of the ribs as spacers, position the 1/4" sq. spar, rear spar, and trailing edge spar and pin them all in place.

❑❑ Glue all nine of the W-4 ribs in place. Be sure to position the balsa rib with the cutouts at the inboard end, so it will be next to the W-2 rib. Use a 90° triangle to make sure the ribs are square to the building board.

❑❑ Add the W-2 rib, using 5/32" plywood shear web E as a dihedral gauge. This is a critical step, because it will ultimately determine the quality of the fit between the center wing panel and the outer panel. The lite-ply W-2 rib must be straight from front to rear, and tilted 2°.

❑❑ Add the four top spars, again checking the end rib for proper dihedral before gluing. Notice the top rear spar is beveled along one edge - be sure to align it properly in the ribs.

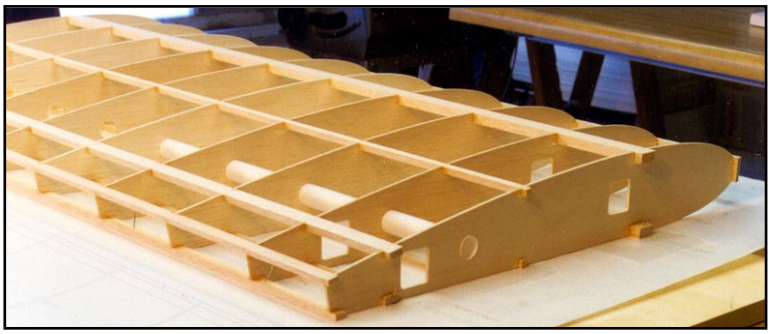


Left Outer Wing Panel, Inboard End - *Plywood W-2 rib is set at the proper dihedral angle using the 5/32" ply shear web E as a guide. The angle is 2°; move the web all along the rib to be sure it is straight along its entire length, front to back.*

❑❑ Glue a 3/16" x 15/16" x 36” balsa sub leading edge in place on the front of the ribs.

❑❑ Slide your servo lead tube into place. You will find patterns for the tubes on the plans – simply cut them out and roll them up. Some of you may prefer to substitute commercially available cardboard tubes.

❑❑ Add shear webs to the FRONT ONLY of the main spars and rear spars in all of the rib bays except for the two on the inboard end. Make it easy on yourself and trim the 3/32" x 4" balsa sheets to a width of 3-29/32". Now you can slice webs off this sheet that should fit perfectly between the ribs.



Left Outer Wing Panel *with all spars, sub LE, and servo lead tube in place. Shear webs have yet to be added.*

❑❑ When everything is dry, remove the wing panel from the table and go over all the joints with medium CA glue. That means every joint on both sides, if possible. I like to use just enough glue so you can see a small fillet formed between the parts. Use accelerator sparingly; it weakens the cured strength of CA.

❑❑ Trim and sand the spar stubs flush with the ribs at each end of the wing panel. I made up a long, wide sanding block (sanding surface: 6" x 18") with 80-grit paper to handle this job. This block came in handy several times during the course of this project, so take the time now to make a big sanding block or two.

❑❑ Repeat this section for the opposite outer wing panel, then set them aside. **-SFK**

2 CENTER WING PANEL - Basic Frame-Up

❑ The center wing panel is about 57" span, so all of the balsa spars will have to be spliced. My general rule of thumb on splices is to make them diagonal (no butt joints!) with a length that is at least four times their width. For example, the rear spar is 1/2"-wide, so the length of the splice should be at least 2". Start construction by making all your balsa spar splices in the rear spars (remember, the top one is beveled), 1/4" sq. spars, trailing edge spars, sub leading edge, and leading edge cap. As you build, make an effort to stagger the splices throughout the structure so they aren't all lined up with each other

❑ Finish the wing-joiner cutouts in two lite-ply W-2 ribs.

❑ The hardwood main wing spar is too hard to pin; I used screws on each side of the spar at several places. Fasten the main spar over the plan, then pin the bottom balsa spars in place using several ribs for proper placement.

❑ Glue the five W-1 ribs and four W-3 ribs in place.

❑ Add the flap servo lead tube on each side.

❑ Glue the remaining W-4s and W-2s in place. The W-2 ribs at each end of the center wing panel must be 90° to the table. Use the 1/16" ply web F as a temporary tool to make sure the W-2 ribs are straight from front to rear.

❑ Glue the four top spars in place. Watch those W-2s!

❑ Add the sub LE to the front of the ribs.

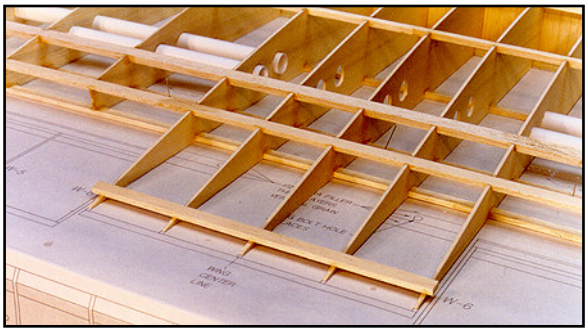
❑ Add the aileron servo lead tubes on each side.

❑ Glue shear webs to the FRONT ONLY of the main wing spars, except for the outer rib bays on each end. You will need to remove some of the screws holding the bottom main spar to the table.

❑ Add a temporary sheet of 3/32" balsa to the loose ends of the W-1 ribs to hold them in alignment.

❑ Remove the panel, re-glue all the joints with medium CA, sand off the spar stubs, and set it aside. **-SFK**

Center Wing Panel - *Notice the screws holding the bottom main spar to the table. The front screw needs to be removed before the shear web can be added. Note the grain of every shear web must be vertical!*



W-1 Wing Ribs - *I used a scrap stick to hold the ends of the W-1 ribs, but found out later it would have been smarter to use a sheet of 3/32" balsa, maybe one or two inches wide. Use only a few spots of glue so it can be removed later. Also notice in the photo the position of the aileron and flap servo lead tubes. I moved the aileron tubes forward in the production models to make room for the large flap servos used in the prototype.*

3 WING JOINER INSTALLATION

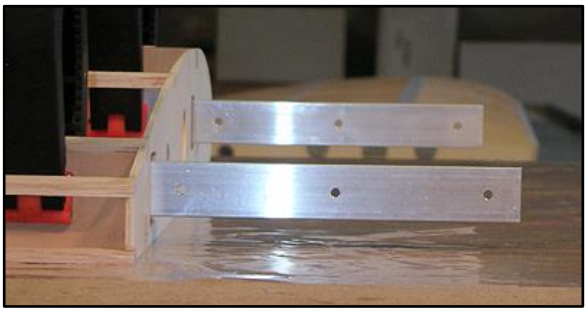
❑❑ Prepare the wing joiners exactly as described in the Sig directions. Okay, maybe one exception: If you don't have numbered drill bits (like me), you can use a 7/64" drill for the 4-40 bolts (the mounting bolts, not the set screws) and a 9/64" drill for the 6-32 bolts. Slide the joiners into the C-channels, tighten the set screws, and set aside.

❑❑ Use the Shear Web Identification drawings (on the plans) to locate the internal shear webs A, B, and C. Trial fit these internal webs between the main spars. Trim as necessary; try for a snug fit.

❑❑ Trial fit the external shear webs D, E, and F against the aft faces of the main spar. Actually, webs E and F should fit perfectly because you used these earlier to position the W-2 ribs. Hold the webs in place and mark the spar locations using a pencil from the front side. Now you can glue the internal webs to the external webs using the pencil lines for proper alignment. Web A glues to web D, B glues to E, and C glues to F.

❑❑ Trial fit the three rear shear webs G, H, and J against the rear spars; trim to fit as necessary.

❑❑ Working with the center wing panel only, position the shear webs for the C-channels, front and rear. No glue yet! You might have to use tape to hold the rear web in place against the rear spars. Now position your joiner assemblies on the webs. I positioned my set screws heads-down, so they can be tightened through holes in the bottom of the wing. They may be positioned on top, if you prefer. Visually inspect the aluminum joiners to be certain they are parallel, then mark the webs (mechanical pencil) through the four mounting holes in each C-channel.



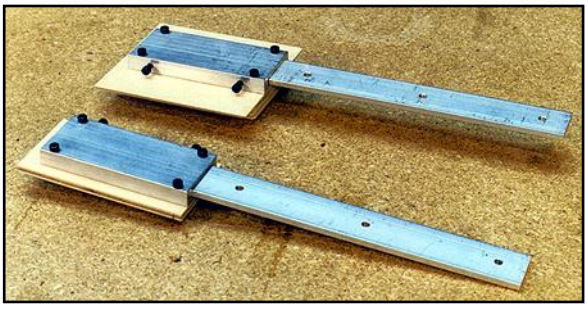
With the center panel flat on the table *and the assemblies clamped in place, make certain the joiners are parallel to each other and the table.*

❑❑ Remove the joiner assemblies and the webs from the center panel, then carefully drill the webs (3/32" drill bit) at the marks. Bolt the C-channels to the webs using the high-quality hardware supplied with the kit:

Each Front C-channel: Four 4-40 x 1" Socket-Head Bolts, #4 Washers, and 4-40 Hex Nuts
Each Rear C-channel: Four 4-40 x 3/4" Socket-Head Bolts, #4 Washers, and 4-40 Hex Nuts

❑❑ You will have to notch the rear spars to clear the mounting hardware used on the rear joiner. Try to make the notches as small as possible in order to maintain spar strength.

❑❑ Temporarily fit the shear webs in the outer wing panel, front and rear. Again, you may have to tape the rear webs to the rear spars.



Top: Front Joiner Assembly. Bottom: Rear Joiner Assembly *- At this point, the joiners have been fastened to the center section shear webs. Notice the "open" side of the C-channel is positioned against the face of the plywood web.*

❑❑ Position the webs with the joiner assemblies in the center section, again without glue. With the center section firm on your table (I used beanbags filled with lead shot), slide the outer panel into position. Prop up the wingtip end of the outer panel 1-1/4" off the table for proper dihedral. The W-2 ribs should fit against each other pretty well at this point, and the aluminum joiners should be resting against the faces of the plywood webs in the outer panel. Carefully mark the webs through the joiner mounting holes.

WING JOINER INSTALLATION, CONTINUED...

❑❑ Remove the outer panel and the webs. Drill at the marks (9/64'), put the webs back in the outer panel, then slide the outer panel into its final position against the center panel. Bolt the joiners to the webs with this hardware:

Each Front Joiner - Three 6-32 x 1" Socket-Head Bolts, Six #6 Washers, and Three 6-32 Hex Nuts

Each Rear Joiner - Three 6-32 x 3/4" Socket-Head Bolts, Six #6 Washers, and Three 6-32 Hex Nuts

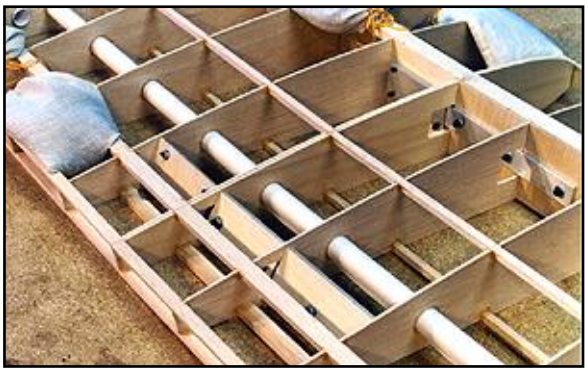
Notice I used a washer under the bolt heads to keep the bolts from digging into the aluminum.

❑❑ Now the webs are ready to be glued into place. Without disturbing the position of the wing panels, work the webs away from their spars. Apply slow-drying epoxy to both the webs and the spars, reposition the webs, and clamp them in place. CAUTION! Be careful not to get any glue in the joint between the wing panels. The whole idea here is for the wing panels to come apart!

❑❑ When dry, remove the wing from the board, loosen the set screws and separate the wing panels. Mix another batch of epoxy and use a disposable brush to coat the area thoroughly between the top and bottom spars, including the internal webs, spars, and mounting hardware. This is not the place to be stingy with the epoxy!

❑❑ For extra strength, glue scrap pieces of hard plywood (3/32 or 1/8) along the top and bottom edges of all the joiners and C-channels. This is a very important step because there will be a lot of stress and pressure on the channels trying to twist them out of position, especially when flying aerobatics.

❑❑ Having fun? Good! Repeat these steps for the other side.... **-SFK**



Both Joiner Assemblies *are now bolted in place, but the webs have not been glued yet. The front joiner/web assembly is still in position, but the rear joiner/web assembly has been pulled away from the spars so that glue can be applied.*

Joiner/Web Assemblies *are glued and clamped firmly. Temporary pieces of plywood are used on the opposite side of the spars for clamping purposes. Use epoxy, but keep it away from the actual wing joint between the two lite-ply W-2 wing ribs.*

Plywood Scraps *are glued above and below the C-channels for extra strength. Rear channel too!*

Plywood Scraps *are glued above and below the joiners for extra strength. Rear joiners too!*

4 WING SUBASSEMBLIES

Time for a bit of tedium here. Once these time-consuming tasks are done, you will be ready to take on the final assembly of the wing panels with minimal delay. Let's roll...

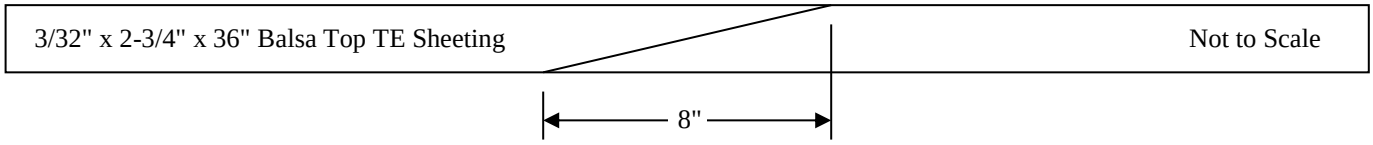
❑ **Sort the Balsa Sheets** - Go through the 3/32" x 3" x 36" sheets provided and sort them as follows:

16 Leading Edge Sheeting - *Look for medium weight, long grained pieces that bend uniformly*
8 Center/Wing Joint Sheeting - *This can be slightly heavier than the leading edge sheeting*
8 Trailing Edge Sheeting - *Use the heaviest, stiffest sheets here.*
12 Aileron/Flap Sheeting - *Light to medium wood is okay, you want to keep the control surfaces light*
2 Leftover - *You'll need some for the Fuselage, but mainly these are extras (you know, just in case)*

❑ **Flap Sheeting** - Select six 3/32" x 3" sheets to use as flap sheeting. Cut all six sheets to a length of 24" and save the 12" cutoffs for later. Take four of the 24" sheets and slice them down the middle, lengthwise. Now you should have eight pieces, 1-1/2" x 24". These will be used as the top and bottom sheeting for the flaps (two on top, two on bottom of each flap). If the edges are slightly bowed, you can trim them again to a width of 1-3/8"; it's not critical. Take the two remaining sheets and slice each slightly off-center so that you end up with a piece that's 1-5/8" and another that's 1-3/8". The 1-5/8" x 24" strips are for the front face of the flaps and the 1-3/8" x 24" strips are for the rear face of the wing. Mark the sheeting as you go so you'll remember their uses later on.

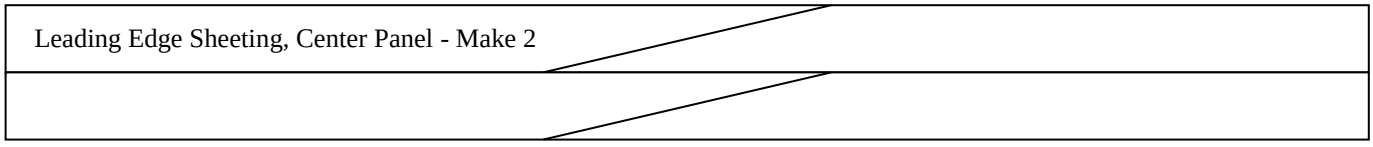
❑ **Aileron sheeting** - Select another six sheets and slice four of them in half along their full length. These eight 1-1/2" x 36" pieces will be used for aileron sheeting. Cut the remaining two sheets to 1-5/8" and 1-3/8". Like the flaps, the 1-5/8" x 36" strips are for the front face of the ailerons and the 1-3/8" x 36" strips are for the wing rear face.

❑ **Trailing Edge Sheeting** - These need to be trimmed slightly. Trim four sheets to a width of 2-3/4"; these will be used on the top surface of the wing panels. Trim four pieces to 2-1/2" to use on the wing bottom. The top and bottom sheets for the center panel will need to be spliced. Make the splices in all sheeting at least 8" long.



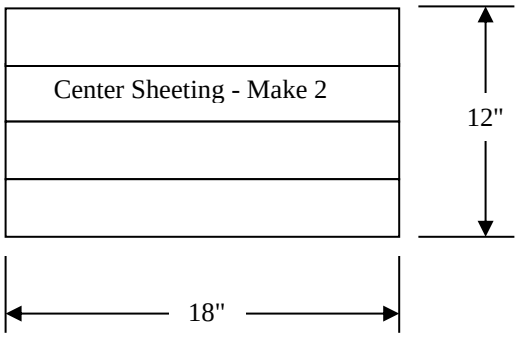
❑ **Leading Edge Sheeting, Outer Panels** - Make four sets of LE sheeting. Each set is made from two pieces of balsa, edge glued along their entire length. The tricky part here is that the final width of the LE sheet MUST be as close to 6" as possible, which means there is very little room for trimming. Fortunately, most sheets are slightly oversize, so it may be possible to trim them if necessary. Try to find sheets that match without trimming.

❑ **Leading Edge Sheeting, Center Panel** - Make two sets. This one is the trickiest. If I can do it, so can you. Start with the splices, then do the long edge joint. Again, keep the overall width as close to 6" as possible.

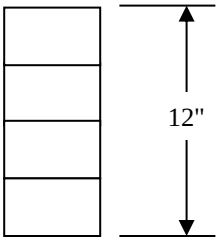


WING SUBASSEMBLIES, CONTINUED...

❑ **Center Sheeting** - You'll need four 36" sheets to make two center sheets (one top, one bottom) for the wing center panel. If you look ahead, you will see that I got a little fancy with my center and wing joint sheeting, adding curved edges to the corners. This is totally unnecessary; I just think it looks cool and may help avoid those nagging little covering wrinkles that often occur where sheeting meets at 90°. If you want to try this on yours, plan ahead now and use extra balsa as necessary. This is where those leftover sheets may come in handy.



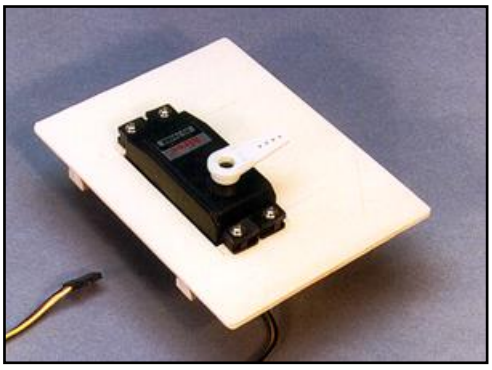
❑ **Wing Joint Sheeting** - Make eight sets of these, all identical. Again, you may want to add extra wood for trimming curved corners later.



❑ **Center TE Sheeting** - (no diagram) This is to sheet the small wing section between the flaps in the center wing panel. The final piece for the top should be 4-1/2" x 10-1/8" and the piece for the bottom should be 6" x 10-1/8".

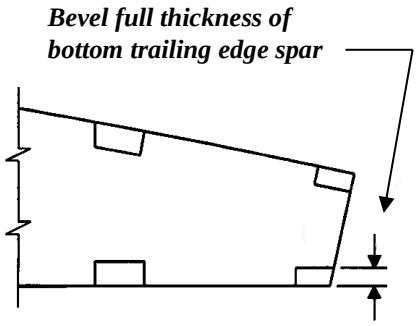
❑ **Wing Filler** - (no diagram) Six pieces of 1/2" x 2-3/8" x 4" balsa are provided in the kit to be used for beefing up the areas in the wing where the dowels attach and where the wing bolts pass through. Glue three of the balsa pieces together to form a single block that measures 1-1/2" x 2-3/8" x 4". Repeat for the other three pieces. Later, you will cut filler pieces from these blocks to fit the wing structure.

❑ **Servo Mounts** - Make four servo mounts for the ailerons and flaps. The mounts consist of a lite-ply plate and rails cut from 1/4" x 3/8" basswood. First, make a cutout in the plate to fit your servo. Leave about 1/16" clearance all around the servo case. Next, cut rails the full width of the plate and glue them to the back of the plate. Position the rails so the servo screws will bite into them. **-SFK**



Servo Mount *- Lite-ply with bass rails. This servo is a Hitec HS-700BB. It's physically a very large servo with lots of torque and a surprisingly low price. Note the heavy-duty Du-Bro servo arm.*

5 FINISH OUTER WING PANELS



❑❑ Sand the back edge of the panel as shown in the diagram. Use a long sanding block and straightedge to be sure the trailing edge is straight along its entire length.

❑❑ Pin or weight down the panel over the plans. Make certain 1) the main spar is straight, 2) the trailing edge is hanging off the edge of the table, and 3) the trailing edge isn't bowed up or down. Use shims if necessary to force the TE of the panel to be absolutely straight.

❑❑ Glue on the 1-3/8" strip to the back edge of the wing. There should be a little overhang, top and bottom.

❑❑ When dry, trim the overhang (top only). Add shear webs (vertical grain) to the rear spar, four places.

❑❑ Add the top TE sheeting (3/32" x 2-3/4" x 36"). Note that the sheeting covers only half (1/4") of the rear spar.

❑❑ Add the final six shear webs to the main spars, two in front of the main spar and four in the back.

❑❑ Sand the top edge of the sub LE to match the airfoil contour in preparation for the leading edge sheeting.

Right-hand Outer Wing Panel *- There is still some "give" in the structure at this point, so the plans are necessary to ensure that the main spar is perfectly straight. The TE is positioned off the edge of the table so that the balsa sheet can overhang above and below. Each piece of sheeting that is added will help lock the panel into its final shape.*

❑❑ Glue the top LE sheeting in place. Again notice the sheeting should cover only half the width (3/8") of the main wing spar. I like to apply yellow glue to the ribs first, then glue the sheeting to the sub LE with CA, and finish the sheeting with more CA along the spar. It's important, after gluing the LE, to "massage" the sheeting towards the spar by wiping it with your hands from front to rear. This will keep the sheeting in firm contact with the ribs, although you may still want to add some weights to the sheeting until the yellow glue dries.

❑❑ Glue your top wing joint sheeting in place. It will have to be trimmed to fit between the LE and TE sheeting.

❑❑ Add the top capstrips, eight places.

❑❑ Remove from the table, trim the trailing edge sheeting, and re-glue your new joints with medium CA.

❑❑ Decide what type of hinges you're going to use. I used Sig's large pinned hinges, and didn't feel the need to add any "beef" to the wing structure to accomodate them. If you plan on using something different, like Robart's large hinge points, you should definitely add some balsa blocks to the top TE spar at each hinge location.
See "About the Hinges" on page 24.

❑❑ Flip upside down, pin the top TE sheeting flat to your table, and support the LE with wood (photo next page).

❑❑ Add the bottom TE sheeting (3/32" x 2-1/2" x 36").

FINISH OUTER WING PANELS, Continued...

❑❑ Unpin the TE, then pin or weight the panel down on the table, this time with the top spar against the table. Support the TE with a stick, then take a long careful look at the panel from all angles to be certain it is warp-free. This is your last chance to build a flat wing panel; once the remaining sheeting is glued in place, your wing panel will be locked into its final state. In case you're wondering, the SFK doesn't have or need washout. Try for zero warps!

❑❑ Bevel the sub LE to match the rib contour, then glue the bottom LE sheeting in place.

❑❑ Trim the bottom wing joint sheeting to fit, then glue it in place. Add eight capstrips and allow to dry.

❑❑ Unpin, trim the LE and TE sheeting. Add the LE cap. When dry, carve and sand the leading edge cap to the airfoil contour. Take your time with this step and try for a consistent shape along the entire length of the wing panel.

❑❑ Trim all the sheeting at each end, flush with the ribs.

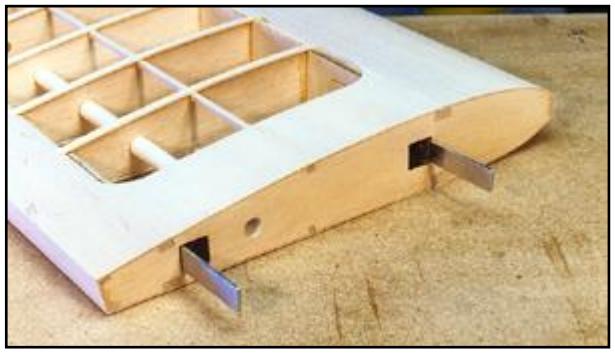
❑❑ Glue the assembled aileron servo mount in place. The sides of the lite-ply mount should fit snug between the ribs and spars. You may have to round off the corners a bit to clear glue fillets in the wing structure.

❑❑ Sheet the surface of the mount with 3/32" balsa. The edges of the sheeting will fit between the capstrips. Be sure to make the cutout in the balsa oversize at the front and rear so the servo flanges will seat against the lite-ply mount.

❑❑ Add the 3/8" wingtip support followed by the balsa wingtip. I'm sure you've noticed by now that my prototype features the optional STOL wingtips. To me, they just look "right" on a model like this, but they do represent a lot of extra sanding and shaping. Like so many things with this model, it's your choice! **-SFK**

Wing Panel, Upside Down *- The idea here is to position the top TE sheeting flat against the table. This requires a support at the front; I used a piece of lumber that was lying around. Worked well! You can see the TE sheeting overhangs at the rear. It will be trimmed later.*

Aileron Servo Mount *- with balsa sheeting ready to be glued in place. Note the extra-long cutout in the balsa. The servo flanges should sit flat against the lite-ply, not the balsa.*



Finished Outer Wing Panel *- The leading edge cap has been carved and sanded, and all of the sheeting has been carefully trimmed. Note the fillets in the corners of the wing joint sheeting. Not necessary, but it adds a touch of class*

High-Tech Sanding Tool *for sanding the fillets to a uniform curve. This is the cardboard core of a roll of shipping tape. Simply glue sandpaper to one half of it, and use the other half as a template for drawing the curves on your sheeting. Draw the curve, cut, and sand!*

6 FINISH CENTER WING PANEL

❑ Check for excess epoxy near the aluminum channels and sand it away so it won't interfere with sheeting.

❑ Sand the back edge of the panel on each side of the long ribs, just like in the figure in Section 5.

❑ Sand the bottom trailing edge spar, just like the previous step, in the two outermost rib bays between the W-1 ribs. This is where the laminated balsa filler blocks will go later - they need to make good contact with the spars.

❑ Once again, plan ahead for your hinge installation and add any reinforcing blocks if necessary.

❑ Pin or weight down the panel over the plans. Make certain 1) the main spar is straight, 2) the trailing edge is hanging off the edge of the table, and 3) the trailing edge isn't bowed up or down. Use shims if necessary to force the TE of the panel to be absolutely straight.

❑ Glue on the 1-3/8" strips to the back edge of the wing.

❑ When dry, trim the overhang (top only). Add shear webs (vertical grain) to the front face of the rear spars, 14 places.

❑ Add the two 1/4" x 1/2" x 5" spruce reinforcement sticks to the W-1 ribs as shown on the plans and in the photo.

❑ Add the 3/32" plywood wing bolt plate. The front edge of the plate should overlap 1/8" onto the top trailing edge spar. CAUTION! I had to sand nearly a full ply off to make the plate match the thickness of the balsa sheeting. Check yours before gluing and take steps to be sure it will be flush with the trailing edge sheeting to be installed next.

Center Wing Panel, Right-Side Up *- with the shear webs and spruce reinforcing sticks in place. Be careful working around those ribs hanging off the table - they're easy to bump into.*

❑ Add the top TE sheeting (3/32" x 2-3/4"). You will have to notch the sheeting to fit around the wing bolt plate.

❑ Add the final 16 shear webs to the main spars, two in front of the main spar and 14 in the back.

❑ Sand the top edge of the sub LE to match the airfoil contour in preparation for the leading edge sheeting.

❑ Trim and fit the 1/2" balsa laminates to fit between the W-1 ribs at the leading edge, two places. It's important that these fit well and match the contour of the ribs so that they will bond securely to the wing sheeting. These blocks will take the brunt of the load from the wing dowels holding the wing to the fuselage. Glue the blocks firmly in place.

❑ Glue the top LE sheeting in place using the same technique as before. This is a big sheet of wood and it could be easy to get it misaligned from one end to the other. Tack glue it at a few spots along the leading edge to hold it in position. Once you are satisfied that it's positioned properly, go ahead and finish gluing it with CA along the leading edge. Smooth the sheeting down and glue it to the main spar starting at the center and work your way outboard.

❑ Glue on your top wing joint sheeting (two places), the top center sheeting (not the portion aft of the wing bolt plate), and the top capstrips (six places).

❑ Remove from the table, trim the trailing edge sheeting, and re-glue your new joints with medium CA.

FINISH CENTER WING PANEL, Continued...

Above: *A laminated balsa block trimmed to fit at the LE.*
Below: *This is a view of the center wing panel, upside-down, with the top LE sheeting, shear webs, and the two wing dowel blocks in place.*

❑ Flip upside down, pin the top TE sheeting flat to your table, and support the LE with wood.

❑ Cut and fit two more chunks of balsa laminate to fit between the W-1 ribs at the trailing edge spar. The blocks should fit firmly against the spars and the wing bolt plate. Epoxy these blocks in place.

❑ Add the bottom TE sheeting (3/32" x 2-1/2").

❑ Add the bottom center TE sheeting (3/32" x 6"x 10-1/8") to W-1 ribs. Notice that the rear edge of this sheet actually extends well beyond the ends of the ribs. Use the plans as a guide for the proper placement.

❑ Remove the wing from the table, flip it over, pin it down right-side up, and remove the temporary stick from the top of the W-1 ribs.

❑ The rear edge of the bottom center TE sheeting must be beveled to match the slope of the top of the ribs. The best tool for this is to mask off most of your sanding block, leaving a small strip of sandpaper exposed to sand the balsa. Now you can add the top center TE sheeting (3/32" x 4-1/2" x 10-1/8").

❑ When dry, flip the wing over upside-down and pin it down, this time with the top spar against the table. Support the TE with a stick, then take a long careful look at the panel from all angles to be certain it is warp-free.

❑ Bevel the sub LE to match the rib contour, then glue the bottom LE sheeting in place.

❑ Add the bottom wing joint sheeting, the center sheeting, six capstrips, and allow to dry. Cut holes in the wing joint sheeting for access to the setscrews in the channels. Some builders may want to add guide tubes to help guide your balldriver to the setscrews.

❑ Unpin, trim the LE and TE sheeting. Add the LE cap.

❑ When dry, carve and sand the LE cap to the airfoil contour.

❑ Trim all sheeting and sticks at each end, flush with the ribs.

Center Wing Panel, Top View *- You can see the bottom center TE sheeting has been beveled to match the rib contour. When the top sheeting is glued on, the glue joint formed between the two sheets will help toughen the wing trailing edge.*

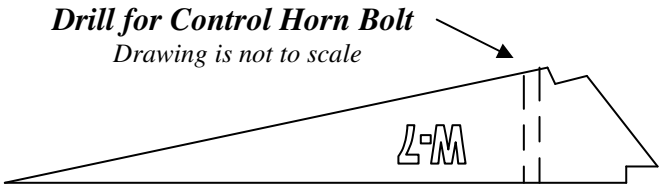
❑ Glue the flap servo mounts in place and sheet them with balsa as you did for the aileron servo mounts. You will also need to cut two holes in the bottom center sheeting for the servo leads to pass through.

❑ Now is a good time to trial fit the wing panels together. Go ahead, stand back and marvel at all that wing area! If you've been careful with your construction and sanding, you may have a nice, tight fit at the wing joints. If not, it's time to reach for the filler of your choice. I'll leave the final sanding of the wing panels up to you. You might want to build the ailerons and flaps first so you can take your time later and make everything fit as best you can. Eventually, you will have to spend some quality time with your sanding blocks in preparation for covering. Try to avoid sanding the big areas of sheeting any more than necessary. **-SFK**

7 AILERONS AND FLAPS

Two of each! The following instructions apply to both the ailerons and flaps; the main difference is that you use 24" wood for the flaps, 36" wood for the ailerons.

❑❑ Locate the four 3/8" plywood W-7 ribs. Depending on your choice of control horn, you may want to drill your ribs before assembly. I used Sullivan Super Horns which use a long 8-32 bolt that thread through the control surface. I wanted the flat head of the bolt to be flush with the tops of the ailerons/flaps, so I flipped the ribs upside down as shown in the diagram and used a drill press to drill a 9/64" hole located just aft of the notch for the bottom spar.



❑❑ Start by pinning the bottom LE and TE sheeting over the plan. Line up the LE sheet with the front of the bottom spar.

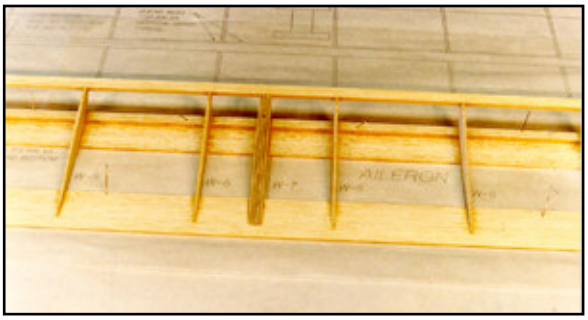
❑❑ Glue the 3/16" x 3/8" bottom spar in place so that its front edge is even with the front edge of the LE sheet.

❑❑ Add the balsa W-5 ribs, the lite-ply W-6 ribs, and the thick plywood W-7 rib. You may want to adjust the position of your W-7 from what is shown on the plan so that it lines up properly with your intended servo linkage.

❑❑ Glue on the 3/16" x 3/8" balsa top spar.

❑❑ Sand the TE sheet to match the slope of the ribs.

❑❑ Add the top sheets to the LE and TE. Note the LE sheet should overhang the front of the spar by about 1/8".



Aileron - *with the the bottom sheeting, spars, and ribs glued in place. Trailing edge still needs to be beveled to match the slope of the ribs. Remember to make right and left ailerons and flaps.*

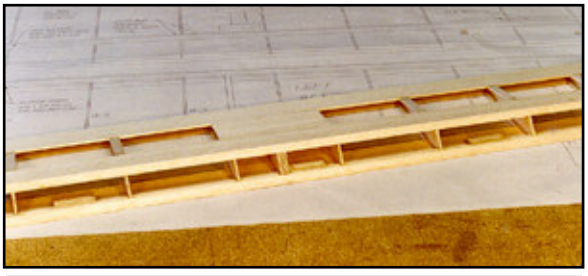
❑❑ Sheet over the rib bay containing the W-7 rib, then add 3/32" x 3/8" capstrips to the remaining ribs.

❑❑ Remove the control surface from the building board and go over all the glue joints with medium CA.

❑❑ Punch through the balsa sheeting at the hole in W-7, top and bottom. You may have to locate it by feeling around with a straight pin. Flip the control surface upside-down and pin it flat to the table. Add the balsa sheeting over the W-7 rib bay, then glue capstrips onto the remaining ribs.

❑❑ Once again, think about your hinging method and add "beef" to the top spar as needed.

❑❑ Unpin, then sand the front face until both spars are completely beveled and the sanding block is beginning to touch the front edge of the ribs.



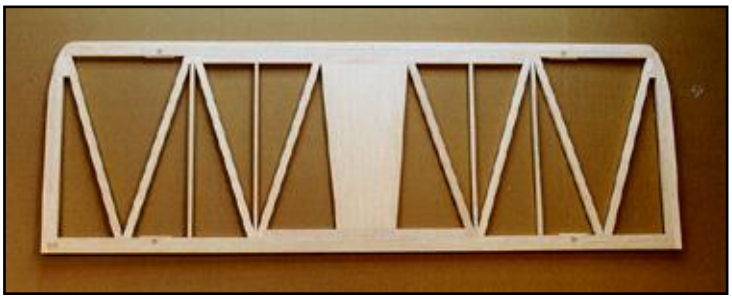
Aileron, Upside-Down - *After sanding the front face of the aileron, I decided that my hinges would need more material for strong mounting, so I added balsa pads at each hinge location. Be sure to position a hinge very close to W-7.*

❑❑ Finish off the front of the control surface by gluing on the 3/32" x 1-5/8" balsa sheet. Be careful not to cause a twist during this step. Pin the control surface upside-down on your table, apply slow CA to all of the front edges, then press your sheet in place. When dry, trim and sand all of the excess sheeting. **-SFK**

8 STABILIZER, ELEVATOR, FIN, AND RUDDER

Decide early if you want the tail unit to be removable from the fuselage for easy transportation. I made mine removable, but it took extra time and added some weight. It doesn't really change the construction of the tail, except for adding some hard points in the stabilizer.

❑ Start with the stabilizer. Notice that the outer framework is laminated 1/2" square sticks. I chose to laminate rather than use 1/2" x 1" balsa for several reasons. The main reason is that two sticks, even if they are slightly warped, will stay straight when glued together and the glue joint adds to the overall strength of the structure. Take your time and strive for tight joints with lots of wood-to-wood contact. I started out trying to use a miter saw, but ended up marking the sticks as accurately as possible then cutting them on the bandsaw. Use thin or medium CA for initial gluing, then lift the structure from the table and build up a small fillet of medium CA at every joint.



***Complete Stabilizer** ready for final sanding. The thin vertical sticks are 1/4" x 1/2" balsa added to help during the covering - that's where the green stripes overlap the other colors*

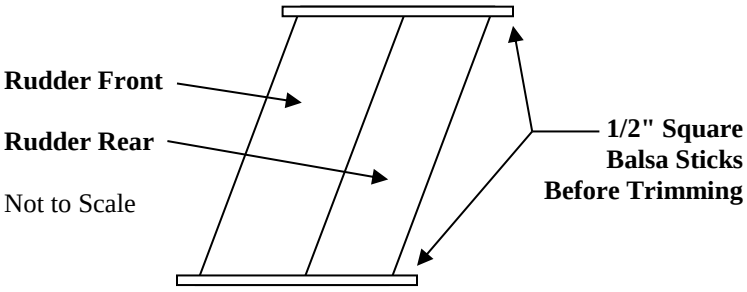
❑ Drill 3/8" holes for the tail brace hard points as shown on the plans. Add the dowels and the lite-ply reinforcements. When dry, use your big sanding block to sand both sides of the stabilizer flat.

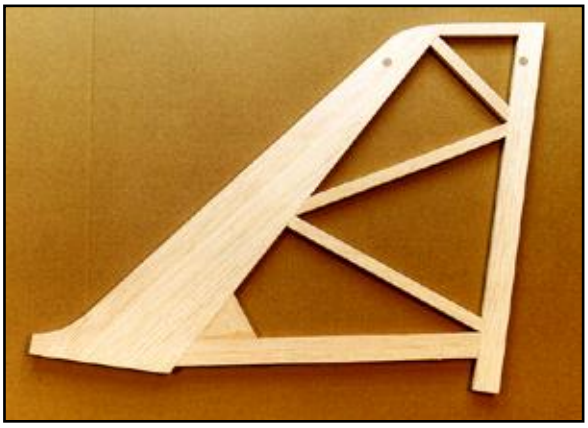
❑ The elevator is supplied in two pieces. You can splice those together if you plan to use a single servo and pushrod, or you can go with a split elevator with a servo on each half.

***This Stabilizer Close-up** shows the hard point and lite-ply reinforcement. Also notice the staggered joint at the corner of the stab*

❑ Now you can build the fin over the plan. Laminate 1/2" square sticks for the fin bottom and TE, just like the stab. Add the two hard points and sand the sides smooth.

❑ Glue the front and rear rudder pieces together. To make the rudder stiffer and more warp resistant, add a 1/2" square stick to the top and bottom edges as shown in the diagram. You might want to do this to the tips of the elevator as well. I cut three lightening holes in my rudder only because the balsa was extra hard and heavy.





***Fin** ready for final sanding. Note the hard points. Tail bracing is required on the Super Flyin' King.*

❑ Add hard points to the elevator and rudder in accordance with the type of control horn you plan to install. I glued in short lengths of 1/2" dowel for my Sullivan Super Horns. **-SFK**

9 FUSELAGE DECISIONS

No construction here, but this deserves its own section because I literally spent days thinking about these items before starting on the fuselage. I'm the type that likes to plan way ahead when it comes to the engine and radio installation. I can pass along info about the equipment in my prototype, but I don't have first-hand experience with all the engines and accessories on the market. As an experienced builder, you probably have your own ideas on how to approach these items. Use your best judgment...

❑ **Engine Installation -** I used a 3W-75i, a single-cylinder, rear-induction, electronic-ignition engine in the prototype. For a long time I was stuck on the idea of mounting it inverted and trying to somehow hide the muffler in the cowl or fuselage. Finally, I wondered, "Who am I trying to fool? This isn't a scale model; it's just a big model airplane." With that, I went with an upright cylinder and a muffler hanging out in the breeze.

❑ **Muffler Position -** This goes hand-in-hand with your engine installation. The muffler on my engine is a large canister type manufactured by 3W. The engine could have been mounted with the cylinder at a downward angle and the canister hidden in the fuselage. However, that would have taken up cabin area that may come in handy later, and even though the muffler would be hidden, the engine would have to stick out of the fuselage near the bottom on one side - ugly.

❑ **Side Thrust -** I've never been a big fan of right thrust, but decided to try it on this model because of the high power expected from the 3W-75i. I settled on two degrees of right thrust, and angled my firewall accordingly. Flight testing has shown this to be TOO MUCH! My model definitely pulls to the right with the application of full throttle. For that reason, I suggest using zero side thrust or perhaps a degree at the most. If you do add right thrust, simply expand the front edge of the F-1 notches in the left-hand doubler. You should also offset the engine from the model's centerline so that the prop shaft ends up centered at the front of the model.

❑ **Cowling and Spinner -** This is where builders will need to do their greatest amount of innovating, because of all the possible engine/muffler choices and their positioning. Even though the model is very big, the firewall and cheek cowl area is somewhat tight for a gas engine. You have to balance appearance with ease-of-access. Would a wider firewall make things easier for you? Feel free to call and maybe I can cut a special one for your engine.

❑ **Fuel Tank Installation -** With the pumped carbs on most gas engines, fuel tank position is not critical. But you need to be able to get it in and out, and it must be held securely when installed. Think about how you are going to fuel and de-fuel. I used a fuel "tee" in the feed line (actually, it was an aquarium air line "tee" that I found at Wal-mart for under a buck). The tee'd line is used for fueling; it ends at a fuel dot on the side of the model. Large tanks are available from Sullivan and Du-Bro. My model uses a 40 oz. Du-Bro tank, although 32 oz. would have been plenty. I also replaced the plastic cap with a machined aluminum cap from SWB Manufacturing. It's not necessary, but it's a nice touch and gives a feeling of security. Fasten all of your fuel line connections with clamps or safety wire!
SWB Mfg., 1237 Hwy NN, West Bend, WI 53095. Phone: 262-0675-2848. www.swbmfg.com/

❑ **Ignition System -** If your engine has electronic ignition, you have to plan on the positions of your ignition module, battery, kill switch, and charging jack. I bolted my module to the front of F-1, below the engine. The switch and charge jack are on the left side of the model, opposite the muffler. It's very important to keep your radio receiver, battery, and servos as far away from the ignition as possible to avoid glitches from the engine's ignition system.

❑ **Throttle Pushrod -** A wire or steel cable can carry ignition noise back to your throttle servo. You can avoid that problem by using a plastic tube-in-tube pushrod for your throttle. Some gas engines with side-mounted carbs need bellcranks to transfer the pushrod movement to the throttle arm on the carburetor.

FUSELAGE DECISIONS, Continued...

❑ **Landing Gear Mount -** The aluminum landing gear is designed to simply bolt to the bottom of the fuselage. That's fine, but I got fancy and inset the mount 3/8" so the bottom of the gear would be flush with the bottom of the fuselage. It's a little extra work and you lose a bit of prop clearance, but it looks good to my eye. You also need to decide on mounting hardware. I bolted my gear in place using six 10-32 x 1" button-head socket screws threaded into blind nuts. ***Note:*** *Mounting hardware and axle bolts are included with the optional Main Wheel Package.*

❑ **Wheels and Axles -** Du-Bro 6" wheels will probably work okay, but I sure like the looks of the Sullivan 7" wheels on the prototype. The axle holes in the aluminum gear are 5/16". I used hardened-steel 5/16"-18 x 2-1/2" socket-head cap screw for axles. The nice part about these axles is that the wheels actually ride on the smooth part of the shank, and the socket head fits neatly into a recess in the wheel. Simple and strong. I've had a tendency to design landing gear a little light in the past - this one's not going to have that problem!

❑ **Tailwheel -** There are several good tailwheel assemblies on the market. My prototype uses a Sig extra-large tailwheel assembly with a 1-3/4" Du-Bro tailwheel. The Graph Tech #304 assembly is a high-quality alternative (available from BTE). If you choose something else, be sure it's rated for at least a 35 lb. model.

❑ **Tailwheel and Rudder Cables -** I used Du-Bro 4-40 pull-pull cables on both the rudder and the tailwheel. Both sets of cables are attached to a Sig tiller bar, which in turn is driven by a single servo. Give some thought to the routing of any cables, including the installation of guide tubes.

❑ **Servo Positioning -** Lots of room to play with! My elevator servos are in the rear fuselage, under the stabilizer, to keep the pushrods short and stiff. I used Hitec 700BB servos on all of the control surfaces. These are big and heavy, but they have a lot of torque (133 oz.-in. @ 4.8V, 161 oz.-in. @ 6.0V) and they are inexpensive. You will need a variety of servo extension wires, Y-harnesses, and possibly servo reversers. I've had real good luck with the products from Electrodynamics; they use heavy-gauge wire on all their extensions. They also offer connectors in different colors, which is great for color-coding those aileron and flap leads with the connectors from the receiver.
Electrodynamics, 31091 Schoolcraft, Livonia, MI 48150. Phone: 734-422-5420. www.electrodynam.com

❑ **Radio System -** This is a catch-all category, but you need to think about things like where you want to mount your switch or switches, how many batteries you're going to install, and how to route your antenna. Actually, much of this can wait until the model is framed up, because you might want to position your battery (or batteries) to help with balance. After reading several articles on large model radio installations, I decided to go with two receivers, two batteries, and two switches. The batteries are each 4-cell, 1400mAh and the switches are Super Switches from Cermark (they have a built-in charge jack). The dual Hitec Supreme receivers aren't so much for redundancy, but more to split up the servo load. The left receiver controls the left-hand aileron, flap, and elevator, while the right receiver runs the right-hand aileron, flap, and elevator. My throttle servo is on the left receiver, rudder on the right. At the very least, I recommend using dual batteries and switches for redundancy. If you go with one receiver, you should probably use a servo isolator, like the Pow'R Bus Pro from Electrodynamics.

❑ **Color Scheme -** Think about it now because if you plan to use a plastic film covering, you may want to add support sticks where the colors meet and overlap. Also consider that you will probably want to paint the inside of the cabin area to match your trim scheme. It took nearly ten rolls of Monokote to cover the BTE prototype.

❑ **Structural Modifications and Additions -** The Super Flyin' King is a natural for hauling cargo, dropping candy, or towing gliders. Maybe you're thinking about adding floats later. Plan ahead for these things and install hard points or whatever equipment you may need during construction. **-SFK**

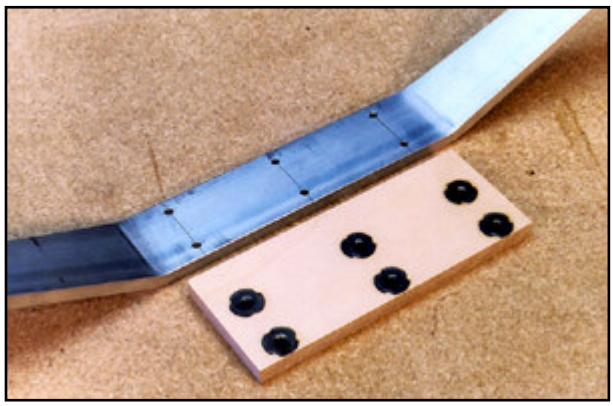
10 FUSELAGE SUBASSEMBLIES

❑ Fuselage bulkhead F-1 requires preparation for engine mounting. Depending on your engine, you may have to build a plywood spacer or engine box onto the front of F-1 to position your prop flange ahead of the fuselage cheeks. Smaller, lighter engines will probably need a thick box to move the engine forward. Large, heavy engines may bolt directly to F-1, which is probably good for balance. The 3W-75i needed to be spaced forward about an inch, and the balance came out good when the prototype was finished. This step overlaps a bit with the previous section - your engine mounting position needs to be planned and F-1 should be prepared as much as possible before it is glued in place.

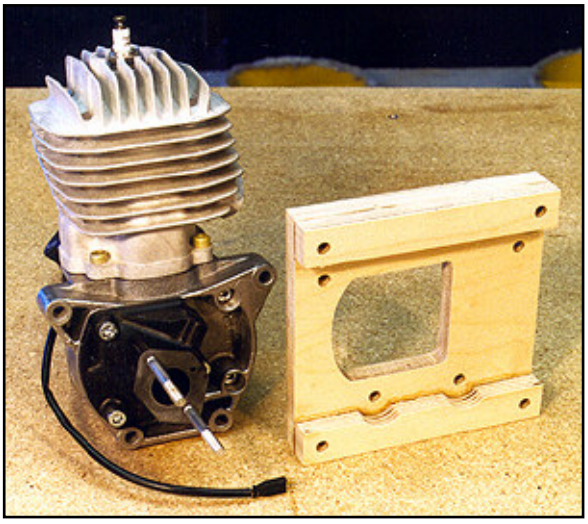
The photos show the 3W-75i installation. If you have a different engine, it will most likely require a custom installation. If you do have a 3W-75 (or 60 or 70, same case) you can contact me for more details on the installation.

❑ Glue F-2D to the front of bulkhead F-2, being careful to line up the beveled edges. When dry, drill the guide holes with a 3/8" drill bit to prepare it for the wing dowels.

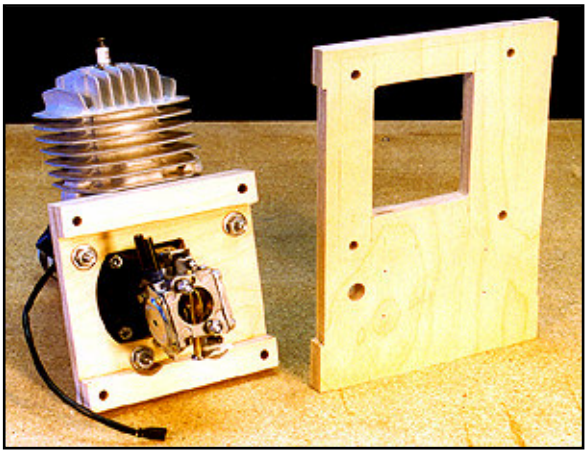
❑ Prepare your landing gear mount. Drill your aluminum landing gear and the 1/2" plywood landing gear mount to accept the hardware of your choice. (If you purchased the optional main wheel kit, your gear should already be drilled). **-SFK**



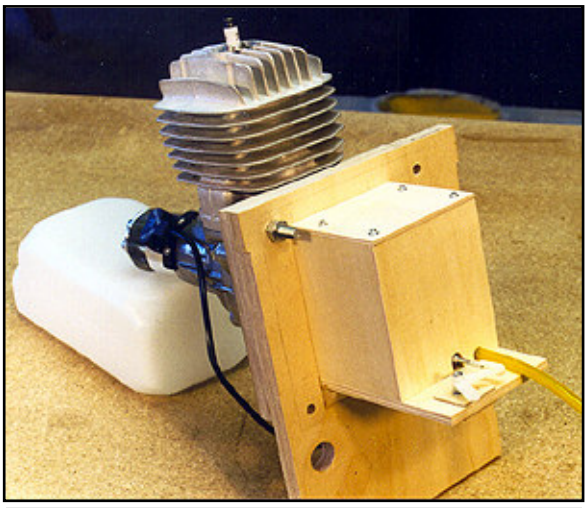
Landing Gear and Mount *have been drilled for six 10-32 x 1" mounting bolts. Blind nuts in the mount allow the gear to be removed easily for transport.*



Engine Spacer *built from 1/2" plywood. Total thickness is one inch. Carb must be installed after engine is bolted to spacer.*



F-1 *shows carb cutout and four mounting holes for spacer. Bottom hole is for ignition wire.*



Carb Box *as recommended by Cactus Aviation. Only bottom of carb box is attached to F-1, the top and sides are removable. Bottom of box has large hole for air intake. Bellcrank is linked to choke. Opening still needed for throttle linkage.*

11 FUSELAGE - Basic Frame-up

The fuselage plan for the Super Flyin' King is really only needed for building the fuselage side frames. After that, the top view will be handy for reference while joining the two sides.

❑❑ Build two fuselage sides in the order shown in the "Fuselage Frame Assembly Diagram" on the fuselage plan. Use the hardest, heaviest 1/2" square sticks for the longerons.

❑❑ Sand the sides then trim SIDE-5 to create the front part of the wing saddle. You can make a template by cutting the plans or tracing them onto another piece of paper.

***Fuselage Sides with Doublers** shown here.*

❑❑ Glue the lite-ply doublers onto the fuselage sides. Be sure to line up the rear edge of the notch for F-2 with the back edge of SIDE-4. Extra slow CA works well for this step. Notice that there should be a 1/8" gap between the doubler and side along MOST of the bottom edge and along the top edge in the nose area. There should also be a 1/8" gap along the rear edge of the rear window where the cabin rear will be installed later.

❑ Spot glue F-2 and F-3 onto one of the fuselage doublers. Use a square to make sure both bulkheads are 90° to the fuselage side. Then spot glue the other fuselage side to the bulkheads. When you are sure the sides are aligned with each other, firmly glue the bulkheads to the sides with medium CA.

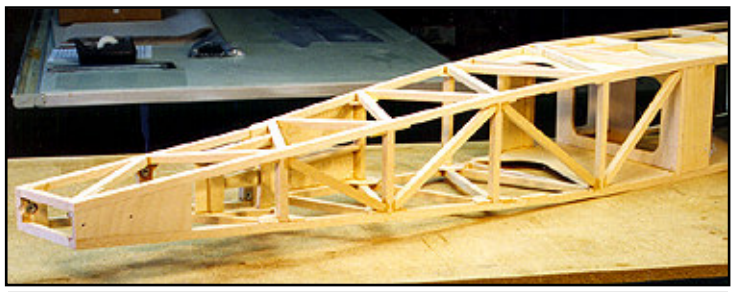
❑ Add four 1/2" sq. balsa crossbraces in the cabin area between F-2 and F-3 (two near windows, two on bottom).

❑ Pin the fuselage over the top view on the plans. Only pin the area between F-2 and F-3, leaving the aft portions of the sides free to move.

❑ Pull the sides together at the rear and glue them to the 1/4" plywood tailwheel mount. CAUTION: There will be quite a bit of pressure trying to spring the sides apart. Add 1/2" sq. balsa crossbraces along the top (7 places) and bottom (4 places) of the framework.

❑ Lift the fuselage from the board and add ten lite-ply gussets to the crossbraces - six places on the bottom, four places on the top.

❑ Unlike the Flyin' King, I decided to add some diagonal sticks (four places) to the bottom of the fuselage to give it some extra torsional stiffness. No diagonal sticks are needed on the top because the sheeting to be installed later will serve the same purpose.



***Fuselage, Bottom View -** In this picture you can see all of the crossbraces, the lite-ply gussets, the tailwheel mount, and the diagonal sticks on the bottom of the fuselage. This picture is a little out of order because some upcoming steps are already done here. The plywood plate in front of F-3 is one I added to serve as a rear mount for floats sometime in the future.*

❑ Trial fit F-1 in place. Use a couple of hardwood sticks and a bunch of rubber bands to pull the front end of the fuselage together, as shown in the photo on the next page. The bottom edge of F-1 will need to be trimmed to match the angle of the fuselage bottom. If you are building in right thrust, you may find that one side of F-1 needs more trimming than the other. When you are satisfied with the fit, epoxy F-1 in place.

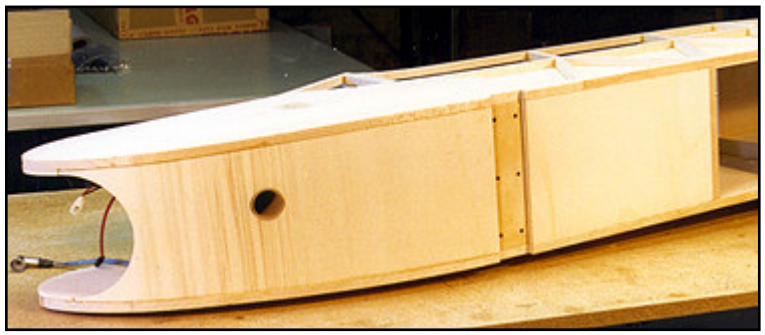
FUSELAGE - Basic Frame-Up, Continued...

❑ The fuselage doublers end about 1-1/2" forward of F-1. Add the lite-ply internal cheeks that butt up against the forward edge of the doublers. When dry, add the external cheeks. The external cheeks not only finish off the inside surface of the engine area, they serve to reinforce the joint where F-1 meets the fuselage sides.

❑ Use two of the 1/4" x 3/8" x 12" basswood sticks that are included in the kit to reinforce the backside of the F-1/fuselage joint on each side. Trim the sticks to fit and glue them in place.

❑ Epoxy the landing gear mount in place. Two large 1/2" plywood triangles are included to brace the landing gear mount to F-2. You may have to notch the bottom edges of the braces to clear the blind nuts for the landing gear.

❑ Now glue the lite-ply bottom pieces in place. **-SFK**

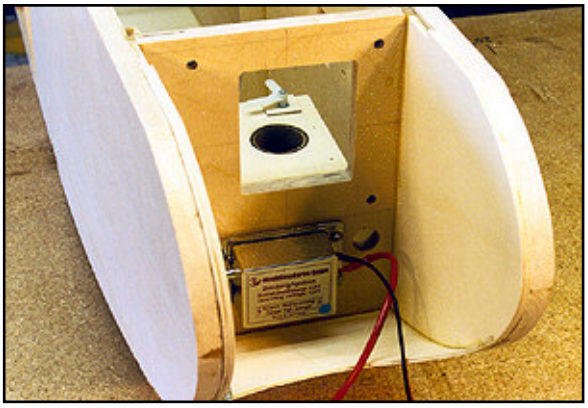


Fuselage Bottom - *The front piece may need slight trimming to fit your model perfectly. The rear piece of bottom sheeting is provided extra long to overlap the landing gear mount if you choose to recess it into the fuselage as shown here. If not, the length of the rear mount will have to be trimmed.*

The half-moon cut at the front of the bottom sheet is optional - it's purely for looks.

The big hole is the air intake for the rear-mounted carb of the 3W. I've installed a cardboard tube that goes from the bottom sheet up to the bottom of the carb box.

Fuselage Front End *shows the stick and rubber band squeezing tool. I used a straight channel of aluminum taped to each side in the cabin area to help visualize and measure that the front end of each side was pulled in equally.*



F-1 with Ignition Module *temporarily installed. The internal and external cheeks help lock F-1 in place. The bass sticks are barely visible behind F-1 at the fuselage joints. You can clearly see the bottom of the carburetor box with the air intake tube and bellcrank for the choke.*

12 MOUNTING THE WING

Wing Saddle *reinforced with 1/32" ply, indicated by arrow. Also note the balsa triangle stock at the front, sanded to conform to the shape of the wing saddle.*

The hardwood rails inside the cabin area below the windows were added to my model to support false floors which, of course, I've yet to finish....

❑ The wing saddle area aft of F-2 is pretty fragile at this point. Reinforce the wing saddle between F-2 and the crossbrace with 1/32" plywood applied to the interior surface. Mark the plywood material using the wing saddle as a guide, cut it with a knife or scissors, then glue it in place. Reinforce the joint where the saddle meets F-2 with a scrap of 1/2" balsa triangle stock.

❑ Glue the lite-ply cabin rear piece into place. It fits between the balsa sides at the rear edge of the rear side windows. This piece gives the cabin a more finished look and strengthens the hold down area.

❑ To make the wing mounting blocks, cut each of the 3/8" x 3/4" x 12" poplar sticks into three 4"-long pieces. Glue the three pieces together to make two blocks, each 3/4" x 1-1/8" x 4". From these, cut two wing mounting blocks. The shape of the blocks should match the upper portion of the lite-ply wing block supports. The blocks should fit tightly between F-3 and the cabin rear, and the tops of the blocks should be flush with the top of the fuselage. Trim the blocks to fit as necessary, then epoxy them firmly in place.

Cabin Rear

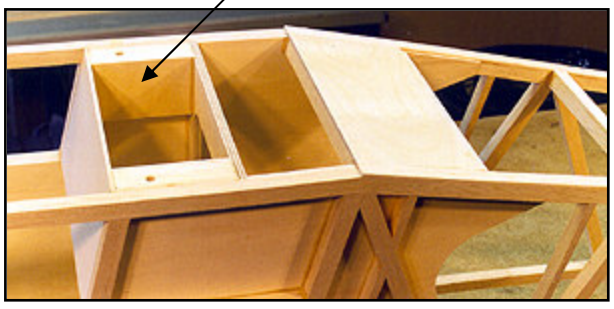
Fuselage Top *showing the cabin rear and laminated wing blocks glued in place.*

❑ Add the two lite-ply wing block supports.

❑ Trial fit the wing center panel to the fuselage and trim the wing saddle area if necessary for a perfect fit. Align the wing carefully, making sure it is centered and square to the fuselage when viewed from above, then tape and pin it firmly in place. Drill the two wing dowel holes through the wing leading edge, the filler blocks, and the shear webs using the holes in F-2 as a guide. You will need an extra-long 3/8" drill bit for this operation.

❑ Remove the wing, then epoxy the 3/8" x 8" wing dowels into their holes, leaving them extended in front of the wing leading edge about 3/4". Use lots of epoxy!

Wing Block Support



Fuselage Top *showing the position of the wing block supports. The wing bolt holes have been drilled and tapped. This photo is a little out of sequence because it shows the plywood fuselage top aft of the wing and the 3/32" balsa caps on the rear fuselage (to be installed in the next section).*

❑ Put the wing back on the fuselage, check for proper alignment, and tape it firmly to the fuselage at the trailing edge. Drill all the way through the wing and the wing blocks with a 13/64" drill bit. Keep the drill perpendicular to the wing so that the heads of the wing bolts will sit flush on the plywood wing bolt plate.

❑ Tap the wing blocks with a 1/4-20 tap, and harden the threads with thin CA. Redrill the holes in the wing with a 1/4" drill bit. Steel 1/4-20 x 2-1/2" screws and large washers are provided in the kit for wing bolts. **-SFK**

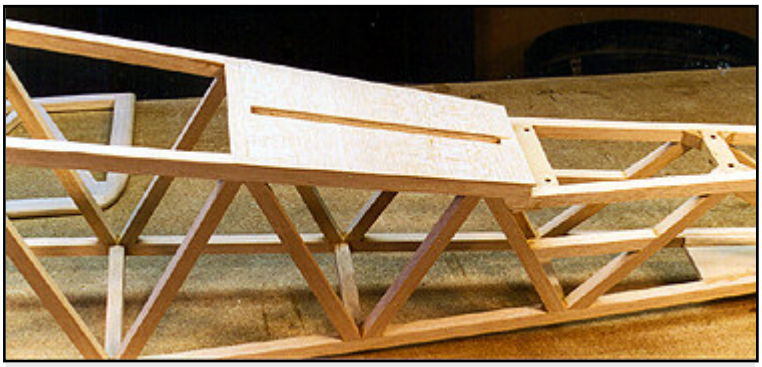
13 FINISH THE FUSELAGE

❑ Pin the stabilizer in its proper position on the fuselage, then trial fit the fin on top of the stab. The stab center needs a small slot to accept the fin post. Double check the general alignment of the fin and stab, then pin the front of the fin fillet to the crossbrace so it cannot move. Look ahead to page 22 for more photos of this area.

❑ Trim 1/4" x 1/2" balsa sticks to fit along each side of the fin front. Do not glue the sticks to the fin; just glue them at the ends to the crossbraces. The idea is to create a pocket for the fin front to sit in. This is necessary whether you plan on making the tail removable or not.

❑ Remove the fin, then sheet over that area of the fuselage with 3/32" balsa. When dry, cut out the fin slot.

❑ Temporarily bolt the wing to the fuselage. Glue on the 3/32" plywood fuselage top, aft of the wing. The plywood does not extend all the way to the sides so that it won't interfere with rounding off the corners of the fuselage later.



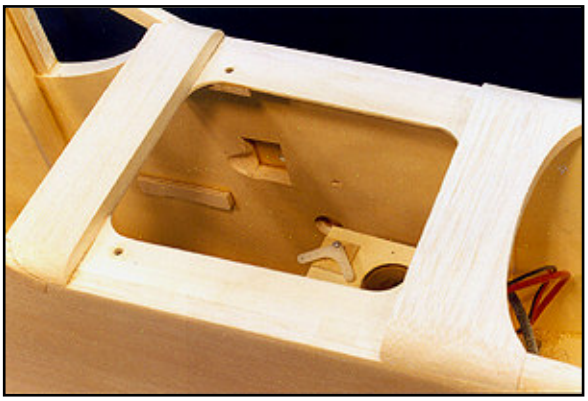
Fuselage Rear *- I know, the gussets and diagonals are missing in this photo. The prototype wasn't built in exactly the same order as the instructions. This photo does show the final result of the fin front "pocket". Notice the sheeting extends rearward slightly to overlap the front of the stabilizer. Also notice that I added some balsa triangle stock to reinforce the tailwheel mount.*

❑ Finish off the top of the fuselage aft of the wing by adding 3/32" x 1/2" balsa strips to the tops of the longerons and crossbrace. Cut the strips from the supplied 3"-wide sheets.

❑ Moving to the nose area now, glue in the lite-ply fuselage top. It should sit on top of the doublers, between the fuselage sides. The lite-ply extends forward of F-1 about 1-1/2". You may need to trim it back to clear your engine.

❑ The top of the fuselage nose is finished off with 1/2" balsa, crossgrain. It's up to you whether you wish to create a hatch in this area. Solid sheeting glued in place would make for a stronger nose, but a lot of gas engines will require access to the rear-mounted carb or ignition components. I made the hatch on the prototype about 6-1/2" long. That left a portion of balsa sheeting over the top of F-1 in the front and under the windshield in the rear. The sheeting under the windshield must be notched carefully to fit between the windshield frames.

❑ The basic fuselage structure is now done and is ready for final sanding. Don't be bashful with the sanding block - there's a lot of wood there to work with! You can see in the photo that the balsa sheeting on the nose extends forward of F-1 and can be trimmed back for engine clearance. **-SFK**



Above - *Hatch removed. The hatch is held down at the back using two 10-32 nylon bolts threaded into plywood blocks under the lite-ply. A lite-ply tongue holds the hatch at the front.* ***Below -*** *1/16" ply hardpoints are imbedded in top of hatch. The fuselage corners have all been sanded round.*

14 ENGINE INSTALLATION

The remainder of this booklet is less like instructions and more like a show-and-tell. Even though you may use a different engine, radio, and accessories than I used on the prototype, you might find the descriptions to be helpful.

Photo 1 shows my Du-Bro 40-oz. fuel tank secured in place. I started by building a little foam-padded tray for the tank to sit in so it couldn't slide forward or sideways. The 1/4" plywood retaining bar keys into a couple of notched plywood pads at each end. The retaining bar has a piece of foam rubber glued to it. To remove the tank, I must push the bar down (which squeezes the foam) to disengage it from the notches, then slide it back. No screws, no hassle. Also notice in this photo the triangle-shaped brace for the landing gear mount just behind the F-2 bulkhead.


PHOTO 1

Photo 2 shows the right side of the fuselage and the large hole for the exhaust system. I cut this slowly, starting with a sanding drum in a Dremel tool. Also notice the two plywood hardpoints for the muffler mounts that were inset into the balsa sides. The square-ish balsa structure aft of the rear mount is to support the aluminum heat shield to be installed later.


PHOTO 2

Photo 3 is a view of the completed model with the engine and canister muffler in place. I used the header that came with the engine, but cut it shorter and bent it forward (using lots of heat) from its original shape. A flexible tube was used to connect the header to the muffler. Everything related to the engine on this model, including the 4" spinner, 24 x 10 3W propeller, flex tubing, kill switch, battery, and muffler were purchased from Cactus Aviation in Tucson, AZ.

Also notice the windows in this model were installed using Fourmost Medium Window Flange material (available from BTE). It takes some time to do a neat job, but it sure looks professional when you're through.

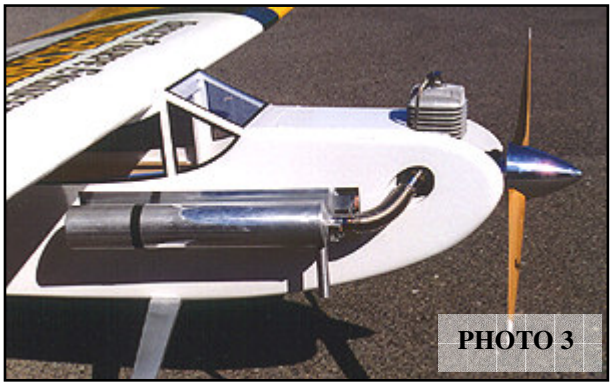


PHOTO 3

Photo 4 is a close up of the front end of the muffler. The flex tube is fastened at both ends with hose clamps. The muffler is held to a bolt in the front mount with safety wire. The mounts were bent from .090 aluminum. The rear of the muffler is held with a strap made from some steel strapping material that was lying around in the shop. The heat shield on the side of the model is cut from printer's lithoplate (thin aluminum). The edges are finished off neatly with 1/2"-wide metal tape from the hardware store. The small tube at the front of the muffler is for smoke (not installed). The exhaust actually comes out of the downward-pointed tube. Very quiet! **-SFK**

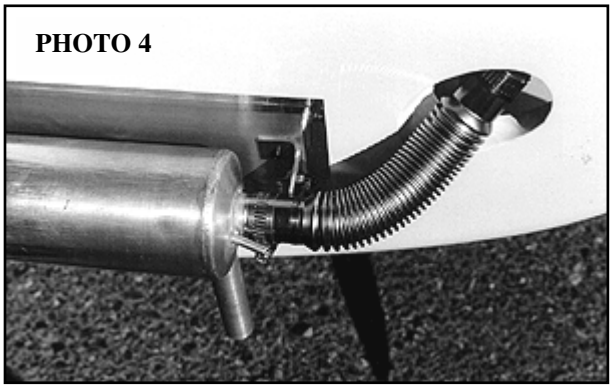


PHOTO 4

15 RADIO AND CONTROL LINKAGE INSTALLATIONS

Photo 1 is a view of the fuselage, upside down, looking at the sheeting located at the base of the fin front. Two lite-ply pads were added for extra beef before drilling through the sheeting for the two rudder cable guides. The guides are short lengths of inner pushrod material, about 4" long. You can also see two red tubes that were added to the top fuselage corners, for the receiver antennas.


PHOTO 1

Photo 2 is the stabilizer area of the fuselage. Below the stab location is a lite-ply servo tray that was special cut to fit my two elevator servos. You can't see from this angle, but there are a couple of thicker plywood pads at the front and rear of the servo tray, under the lite-ply. The pads add some extra meat for the servo screws to bite into.


PHOTO 2

My removable stabilizer is held on with five bolts that thread into blind nuts under the crossbraces you see in the photo. The crossbraces were cut from 1/2" x 3/4" bass and they were firmly attached to the fuselage structure with various bits of triangle stock and plywood gussets. The servos were positioned where they would fit side-by-side and still be accessible underneath the stabilizer.

Photo 3 shows the HS-700BB elevator servos mounted in the completed fuselage. I used heavy-duty Du-Bro servo arms on all of the flight control servos. The pushrods are 12" long 4-40 threaded rods. I was afraid the rods by themselves weren't stiff enough, so tight-fitting brass tubes were soldered onto them, full length. The clevises at the servo end are 4-40 Du-Bro solder clevises.


PHOTO 3

Photo 4 shows the aft end of the elevator pushrods threaded into Du-Bro 4-40 clevises. These are their new molded nylon clevises with a slider that locks the removeable clevis pin in place. The control horns are Sullivan Super Horns, which are basically 8-32 bolts with a special aluminum base and molded nylon connectors. **Note:** If you make the stab removable, you must also make it easy to disconnect the elevator pushrods, the rudder cables, and the tail braces.

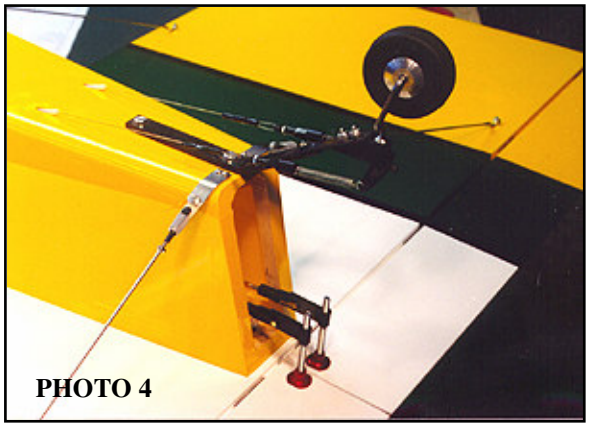


PHOTO 4

The tailwheel assembly is a Sig extra-large unit with a Du-Bro 1-3/4" tailwheel. A set of Du-Bro 4-40 pull-pull cables was used to control the tailwheel. The cables are guided through the tailwheel mount with two nylon tubes, just like the rudder cables. Notice my original tail braces made from 2-56 rods and clevises, which broke early in engine testing.

RADIO AND CONTROL LINKAGE INSTALLATIONS, Continued...

Photo 5 is the fuselage and my "high tech" servo wire guides made from paper towel rolls. Cheap and light - works for me! The servo lead in the foreground is not in the tube in order to show you the connection to the long servo extension wire. All of my extensions came from Cermark. They feature heavy-gauge wire and you can get them with different color connectors. Always tape or tie all of your connections for security.

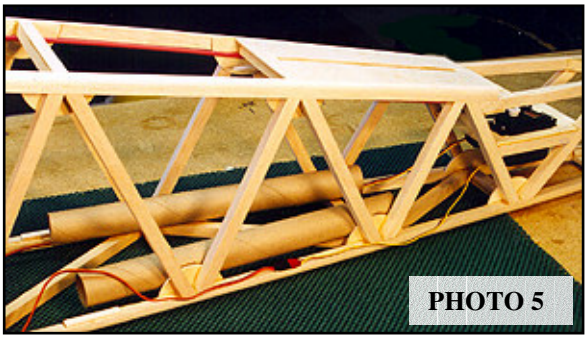


PHOTO 5

Photo 6 is the left side of the fuselage, at the rear of the cabin. I used my Rout-A-Bit tool in a Dremel to cut the groove all around the framework aft of the widow opening. The 1/8" plywood part lying on the fuse side was cut to fit perfectly in the groove and was glued in place. The cutouts in the ply are for the two radio switches. I used Cermark's Super Switches, which feature a built-in charging jack. A hole was cut in the doubler to make room for the switches.


PHOTO 6

Photo 7 is the lite-ply radio tray that I came up with to mount the bulk of my radio system. One thing about having a model this big, you can't just wrap your radio components with foam and stuff them in the fuse. You need to plan where everything goes, then provide a means to secure it. The four 1/4" x 1/2" bass wood sticks underneath stiffen the tray and help to anchor the numerous J-bolts that I used to strap rubber bands to.

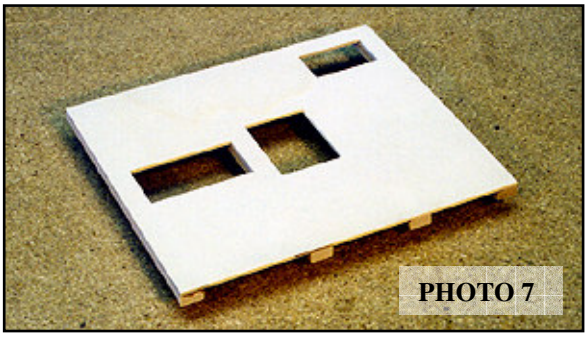


PHOTO 7

Photo 8 is the same tray, this time with the radio lashed in place. I left the foam rubber off the receivers and batteries just for clarity in the photo. The big hole in the center is just that - a hole for wires to pass through.

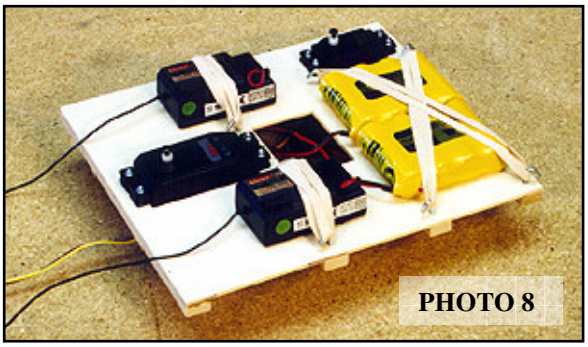


PHOTO 8

Photo 9 is a view looking straight down into the fuselage of the prototype. The tray is mounted to rails along each side using many little socket head wood screws. I didn't glue it in because I wanted to be able to change it later, if needed. The receivers are wrapped in red foam pads that were supplied with them from Hitec. Tucked under the rubber bands holding the receivers are servo reversers, which were needed for one of the flap servos and one of the elevator servos. The batteries are also wrapped in foam rubber. Tucked under the rubber bands holding the batteries are voltage indicators that use little lights to give you a quick idea of the battery voltage (also available from Cermark). The rudder servo is linked with a 4-40 rod to a Sig Tiller Bar which handles the tension of the pull-pull cables going to the rudder (outer cables) and tailwheel (inner cables). The throttle servo is at the bottom left. The throttle pushrod is a Sullivan Nyrod. Also notice the four plug extensions - two for the ailerons (blue) and two for the flaps (yellow). The forward cabin area is completely open and available for a payload.

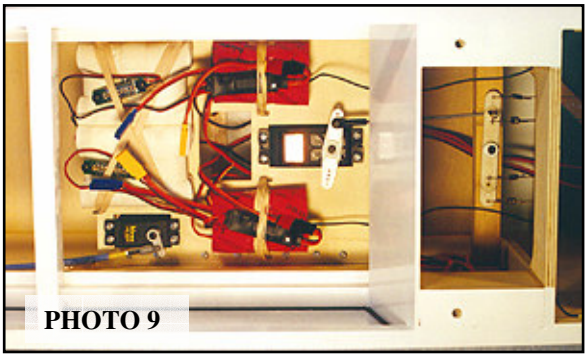


PHOTO 9

RADIO AND CONTROL LINKAGE INSTALLATIONS, Continued...

Photo 10 shows the base of the fin and rudder. The rudder control horn is a Sullivan Double Super Horn. Here you can see the heads of the stabilizer hold-down bolts. They are flat-head socket bolts, so they don't stick up above the stabilizer. You can also see the two heads of the Sullivan Super Horns in the top of the elevators.

PHOTO 10

Photo 11 is a closeup of an aileron servo. It's a 4-40 threaded rod with a solder clevis at the servo end. Notice the fuel tubing keeper. The aileron end has a 4-40 Sullivan clevis with a jam nut to take out any possible play in the threads. The Sullivan clevises have a little clip that locks onto the pin, so a fuel tubing keeper isn't needed.

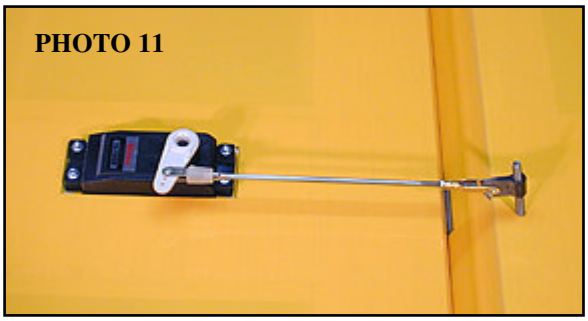


PHOTO 11

The nylon connectors that come with the Super Horns were trimmed down in length for the ailerons and flaps. This looks better and helps provide a bit of natural differential movement in the ailerons. Notice the servo arm sweeps forward slightly - that also contributes to differential, which is good. The ailerons should move "up" more than they move "down" for smoothest aileron response.

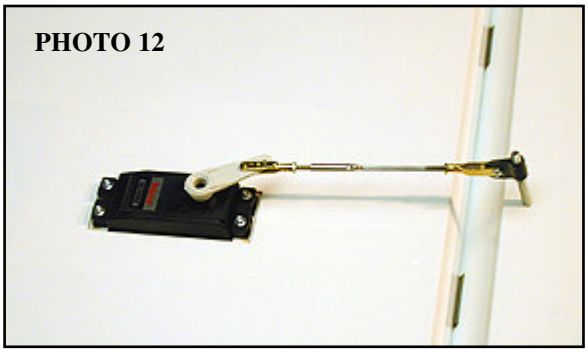


PHOTO 12

Photo 12 is a flap servo. As shown, the flap is up, as it would be during normal flight. The servo arm sweeps way back, but it swings forward when the flap is deflected. I didn't use a solder clevis because the required fuel line keeper would interfere with the servo arm (okay, found that out the hard way!). Instead, I soldered a 4-40 coupler to the servo end of the pushrod and used a Sullivan clevis at both ends.

About the Hinges: I used Sig Brand "XX" hinges on all of the control surfaces of the prototype. These flat, pinned hinges use a large straight pin as the pivot pin. Push the pin through the nylon hinge halves and clip off the excess leaving about 1/8" sticking out. Then flatten the end of the pin slightly by squeezing it with a pair of pliers. Before gluing, treat the center of the hinge with a little oil or vaseline. I also like to score the nylon tabs with a knife, which raises little burrs that really grip in the hinge slots. Epoxy these carefully. You want to use plenty of epoxy, but not so much that you get a lot of excess on the center of the hinge. Tiny globs of excess glue can be cracked away after it dries. Of course, you can substitute your favorite brand of hinges if you like. The large Robart pinned hinges or Du-Bro's big hinges with the cotter pin will work fine for the Super Flyin' King.

The prototype has four hinges in each elevator half, three hinges in the rudder, four hinges in each flap, and five hinges in each aileron. I consider those the minimum amount; you may install more, if you wish. **-SFK**

16 TAIL BRACE WIRES

Tail braces of some sort are required for the Super Flyin' King, primarily to strengthen the attachment of the fin and to resist flexing of the stabilizer. No braces are included with the basic kit, because there are several options available for builders to choose from. What's shown here is the cable-style braces that are now on the prototype. They do the job and are holding up well. Still, I might replace them in the future with sturdier (and more expensive!) steel flying wires, particularly if I get to the point of wanting to do some aerotowing.

Photo 1 shows the bottom of the stabilizer where the fin post comes through. Balsa triangle braces were added to each side of the fin post. The fin should be firmly glued to the top of the stabilizer. If the tail on your SFK is not removable, the fin front should also be glued into the fuselage slot. Still, that's not a lot of gluing area for the fin on a bird this size, so the tail braces add tremendously to the strength of the fin.

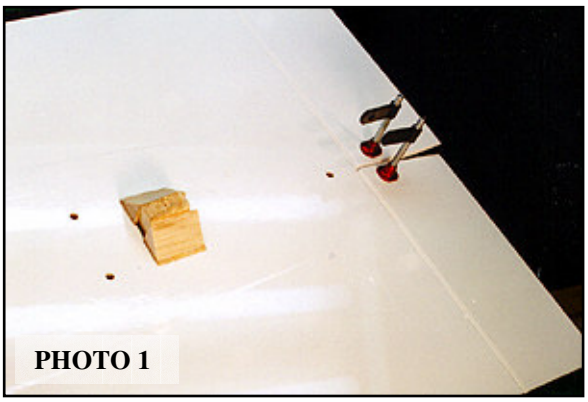


PHOTO 1

Photo 2 is the top of the fin. Metal landing gear straps are used as the attachment at every end of the wires. The metal straps are bent to the proper angle and bolted to the fin and stabilizer with 3-48 screws and nylon insert lock nuts. The nylon-coated cables are looped through the straps and the crimp tubes were squeezed with pliers to hold the wires. It's hard to see, but the cables actually pass through the crimps three times because I also looped the cable around the outside of the crimp and back through. The wires don't need to be "banjo" tight - just tight enough so there's no slack.


PHOTO 2

Photo 3 is the bottom of the fuselage, where the forward wires attach. I made special aluminum tabs for my fuselage, although the landing gear straps would have worked just fine. The tabs are screwed into hardwood pads that were built into the fuselage. Since my tail is removable, the cables must be able to disconnect. The cable ends at the fuselage use a 2-56 threaded cable connector and a clevis. I isolated the metal clevis from the metal tab with a short nylon strap. Maybe a nylon clevis would have accomplished the same thing, but I wasn't sure the nylon clevis pin would hold up over time. **-SFK**

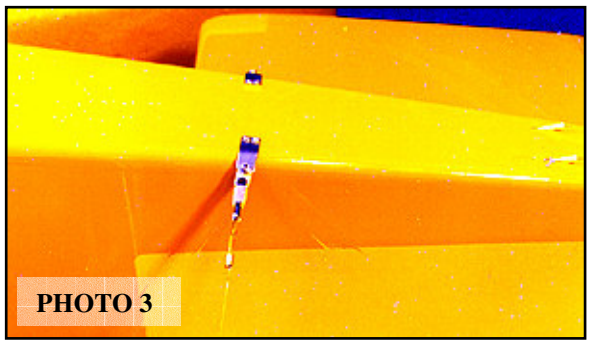
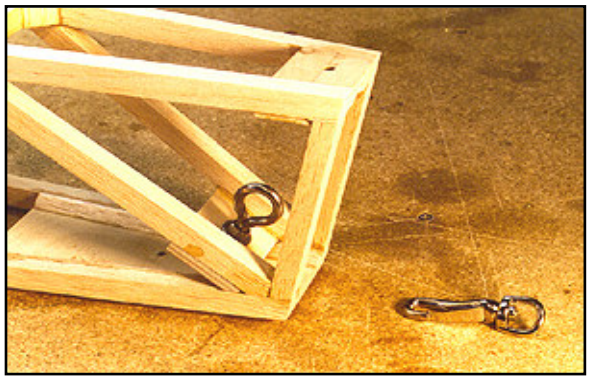


PHOTO 3



Speaking of "Tail Braces"
*Here's a little safety feature that was built into the prototype. The eyelet isn't for towing banners, it's an attachment point for a rope to hold the model during starting. Normally, I would prefer to have someone hold the model, but there may be times in the future when nobody is available. Of course, some would argue that flying alone is unsafe too, but I'll leave that up to you. The eyelet is bolted to a 1/4" plywood plate and is accessible through the opening in the rear of the fuselage. The metal clip on the table is tied to the rope, making rope removal a "snap." **Note:** Chock the main wheels so the model can't roll backwards while flipping the prop to start.*

17 PRE-FLIGHT SETUP

BALANCE

Your Super Flyin' King must balance between 7" to 8" behind the leading edge. Checking the balance takes two people, one at each wingtip. Oh, and they need strong fingers! With each person lifting with one finger at each wingtip, you should be able to determine the balance point within a 1/4" or so. The prototype balanced at the 8" mark without the addition of any weight. After flying it some, I'm glad it's at the rearmost position. There is still plenty of stability, it does effortless aerobatics, and it flares nicely when landing with full flaps. With the CG at the forward end of the range, you had better have some extra elevator deflection available for full-flap landings.

CONTROL THROWS

Adjust the amount of control surface deflection to the amounts shown below. These are mild settings - most pilots will probably want to increase the throws after the first few flights to improve the model's aerobatic capability.

RECOMMENDED CONTROL THROWS

AILERONS: 1-5/8" UP, 1" DOWN
ELEVATOR: 1" UP, 1" DOWN
RUDDER: 1-1/2" LEFT, 1-1/2" RIGHT
RUDDER DEFLECTION WITH FULL AILERON: 3/4"
FLAP DEFLECTION: FULL MOVEMENT (40°)
DOWN ELEVATOR WITH FULL FLAPS: 7/16"

Notice the ailerons should move UP more than DOWN. This aileron differential helps combat adverse yaw, which is strong in aircraft like this. Notice also that rudder coupling with aileron is recommended, for the same reason. Make sure the rudder is slaved to the aileron so they move in the same direction (for example, left aileron input also gives some left rudder).

Automatic DOWN elevator compensation must be used to counteract the nose-up tendency of the model when the flaps are deployed. This is a common feature found on many modern radios.

For the prototype, I selected a Futaba 6DA transmitter. The 6DA is not a computer radio, but it has several features that make it suitable for the SFK. First, the flap knob is positioned on the top (not on the face) of the transmitter, where it is easy to reach with my right index finger without taking my thumb off the stick. It also has switches to turn on CAR (coupled aileron/rudder) and elevator compensation. Finally, there's a sixth channel that may come in handy for a bomb drop or something like that in the future.

PRE-FLIGHT INSPECTION

Be sure to perform radio range checks, both with the engine off AND with it running. If there is a significant decrease in the range with the engine running, you may need to reposition your components, re-route the antenna, or add some shielding to the ignition system. You also need a positive way of shutting off the engine from the transmitter, either using full idle trim or a separate channel to switch off the ignition or pull the choke on.

Keep in mind that even though this is a big airplane, it's the little things that will "getcha". Double check all of your servo arm screws, clevises, pushrods, nuts, bolts, hinges, cables, and fuel tank connections. Triple check that your flight controls are all moving in the proper direction. **-SFK**

18 FLYING TIPS

There is really nothing tricky about flying the Super Flyin' King. If you've flown its smaller brother, then you already have a good idea what it's going to fly like. Compared to the Flyin' King, The Super FK is more stately and realistic in the air. There really is something to the old saying, "bigger flies better". Another type of plane it could be compared to is a J-3 Cub. The SFK is similar, but not exactly like a Cub in flight. The SFK is more comfortable with aerobatics, probably because of its semi-symmetrical airfoil and lower wing aspect ratio. Like a Cub, turns should be coordinated with rudder using either your thumb or the coupling feature in your radio.

To me, the part of the flight that requires the most concentration and skill is the takeoff roll. The SFK, like most high-wing taildraggers can have a tendency to wander, particularly on a hard surface. I've never come close to a ground loop, but holding the runway heading requires a light touch on the rudder. It will take a few takeoffs to get used to the feel. One nice thing about the takeoff roll, at least with a 3W-75 in the nose, it's ready to liftoff in less than fifty feet. With the flaps half down, it's more like twenty feet!

On your maiden flight, you should take her up fairly high and try some stalls with the flaps up and with the flaps down. The stalls should be "non-events", but it's good practice and it will show you how slow the SFK will actually fly. It's pretty amazing! If you're anything like me, you'll spend considerable portions of your flights just loafing around at 1/4-throttle, just watching it chug around effortlessly. There is something very serene and satisfying about watching your creation casually float past with airframe, engine, and radio all working in unison. Ahhhh, but I digress...

Of course, there are other times when you'll want to pour the coals to it and see what it can do. Understandable for sure, but as the designer I must issue the standard warning to fly with common sense. This is not an unlimited aerobatic machine and proper throttle management is a necessity. Full throttle should be reserved for takeoffs, climbing, and the nose-up portions of maneuvers. If the nose is pointed down, throttle back. The prototype has lots of power and I've pushed it pretty hard during testing, but not as hard as possible. Following full-scale practice, you should probably refrain from aerobatics if you add weight to your SFK with a payload. Having said all that, there is no reason why you can't enjoy typical stunts like loops, rolls, Cuban Eights, inverted flight, and stall turns. It's even been known to do a fairly decent tailslide.

Landing the SFK is a treat. I suggest using your flaps just as they do with full-scale aircraft. Reduce throttle and slow the model down on the downwind leg of the approach, then deploy the flaps about halfway. Go to full flaps on the base or final leg, depending on your altitude. Remember, putting the flaps down halfway adds lots of lift, but the second half of flap deployment primarily adds drag. With full flaps, you can point the nose down fairly steep at the runway without building up excess speed. As you near the end of the runway, begin your flare. You will find with full flaps that you'll need to use almost full UP elevator to flare out for a three-point landing. If your CG is at the forward limit, you may need to increase the elevator throw (or use high rate) to allow full-stall landings. If you do a touch-and-go, be sure to raise the flaps before takeoff.

Well, that's it. I sincerely hope you enjoy the Super Flyin' King, both at the building board and in the air. Please send me a photo of your bird and let me know if you have any questions, comments, or suggestions along the way. Thank you!

Bruce Tharpe

19 OPTIONAL ACCESSORIES, UPGRADES, AND TOOLS

All of the following items are available directly from BTE.

Main Wheel Package - This includes two 7" Sullivan wheels, two hardened steel 5/16" axle bolts, and various mounting hardware for the wheels and landing gear. I know, nobody likes to use bolts for axles, but these ones have a smooth shoulder where the wheel rides. In addition, if you order this package, I will drill your aluminum landing gear for the six mounting bolts that are included with this package. Normally, the gear is supplied undrilled. **BTE Price. $69.95**

Composite Tailwheel Assembly - The Graph Tech #304 Tailwheel Assembly features a molded carbon fiber leafspring and comes fully assembled with a 1-1/2" Du-Bro Tailwheel. The unit only weighs 2.2 ounces, but is rated for models up to 40 pounds. **BTE Price. . . . . $49.95** Optional SWB Wire Tensioners **BTE Price. $17.95**

Tailwheel Package - This less-expensive alternative includes a Sig Extra-Large Leafspring Tailwheel Assembly, a Du-Bro 1-3/4" Tailwheel, a wheel collar and mounting hardware, just like I used on my prototype. So far it's held up fine and seems to be up to the task. These items together retail $26.14. **BTE Price. $22.95**

STOL Wingtips, Rough Cut - Love those wingtips but don't want to spend about a day carving and sanding? I can rough cut the tips for you. They will still need a final sanding once you attach them to your wing, but they'll be pretty close. It's a dirty job, but somebody's gotta do it. **BTE Price. . . . $124.95**

Tail Brace Wire Kit - I've decided that tail brace wires are required for this model. Actually, it's a tough call. It might be okay without them, but I didn't want to find out the hard way that I was wrong. I added wires to mine which have held up well, but there are sturdier and more expensive alternatives out there. This tail brace wire kit includes all the nylon-coated steel cable, steel attach straps, crimps, and hardware you need. **BTE Price. $9.95**

4-40 Pull-Pull Cable Kit - Recommended for rudder and tailwheel. Includes two complete Du-Bro 4-40 Pull-Pull systems, a Sig tiller bar, and nylon guide tubes. **BTE Price. $19.95**

Sullivan Super Horn Set - This package contains all the heavy-duty control horns you will need; the same horns as used on the BTE prototype and shown throughout this book. Includes six Super Horns (for ailerons, flaps, and split elevators), one Double Super Horn (for the rudder), and Sullivan 4-40 Gold-N-Clevises. **BTE Price. $34.95**

Carbon Fiber Pushrod Kit - From Abell RC, the kit provides two 3/16" x 36" carbon fiber tubes and 16 machined steel rod ends with 4-40 threads. That's plenty of material for your SFK aileron, elevator, and flap linkages with some left over for your next project. **BTE Price. $44.95**

Sig XX-Brand Hinges - I used 29 of these on my prototype. Price includes 30 hinges. **BTE Price. $17.95**

Fourmost Medium Window Flange Material - This is a special package made specifically for the Super Flyin' King. Includes 16 feet of material, which is plenty for the windows with a couple of feet leftover - you know, just in case! It takes some patience to make the corners fit nice and tight, but it sure looks professional. **BTE Price. $15.00**

Handibond Package – High-quality cyanoacrylate adhesive package, tailored specifically for the SFK. Includes ten bottles of CA (3 thin, 4 medium, 3 thick), accelerator spray, accelerator refill, and glue tips. **BTE Price. $79.95**

SUPER FLYIN' KING PARTS LIST

Some parts may be stuck together with a spray adhesive used during manufacturing. They should be easy to pry apart. Sand them lightly to remove any residue.

BALSA STICKS

20	3/32 x 3/8 x 36	Balsa	Capstrips
16	3/16 x 3/8 x 36	Balsa	TE Spars, Flap/Aileron Spars
8	3/16 x 15/16 x 36	Balsa	Sub LE, LE Caps
8	1/4 x 1/4 x 36	Balsa	Wing Spars
4	1/4 x 1/2 x 36	Balsa	Top Rear Wing Spars (beveled edge)
6	1/4 x 1/2 x 36	Balsa	4 Bottom Rear Wing Spars, 2 Fuselage
4	3/8 x 3/4 x 36	Balsa	Main Wing Spars for Outer Wing Panels
45	1/2 x 1/2 x 36	Balsa	Fuselage, Fin, and Stabilizer Framework

BALSA SHEETS

46	3/32 x 3 x 36	Balsa	Wing Sheeting
6	3/32 x 4 x 36	Balsa	Shear Webs
3	1/2 x 4 x 8-1/2	Balsa	Fuselage Top, Hatch

MACHINED BALSA PARTS

4	3/32 x 3 x 20	Balsa	W-3 Wing Ribs
24	3/32 x 3 x 20	Balsa	W-4 Wing Ribs
2	3/8 x 2 x 26	Balsa	Wingtips
1	1/2 x 2 x 18	Balsa	Rudder, Rear Piece (tapered)
1	1/2 x 3 x 18	Balsa	Rudder, Front Piece (tapered & beveled)
2	1/2 x 3 x 24	Balsa	Elevator (tapered & beveled)
2	1/2 x 3 x 12	Balsa	Stabilizer Center
2	1/2 x 4 x 18	Balsa	Fuselage SIDE-1
2	1/2 x 4 x 23	Balsa	Fuselage SIDE-2
2	1/2 x 4 x 22	Balsa	Fuselage SIDE-3
1	1/2 x 4 x 21	Balsa	Fin Front

LITE-PLY PARTS

5	1/8 x 3 x 25	Lite-Ply	W-1 Wing Ribs
4	1/8 x 3 x 20	Lite-Ply	W-2 Wing Ribs
2	1/8 x 12 x 48	Lite-Ply	Fuselage Doublers
1	1/8 x 7-1/4 x 21	Lite-Ply	Fuselage Bottom, Front
1	1/8 x 7-1/4 x 12.5	Lite-Ply	Fuselage Bottom, Rear
1	1/8 x 7 x 10-1/2	Lite-Ply	Fuselage Top (optional access hole drawn)
2	1/8 x 6 x 9	Lite-Ply	Cheeks, Internal (butts against doublers)
2	1/8 x 7 x 9	Lite-Ply	Cheeks, External (butts against F-1)
1	1/8 x 8 x 11	Lite-Ply	Extra Sheet (for cabin floor, radio tray, etc.)
2	1/8 x 8 x 12	Lite-Ply	Extra Sheets (for cabin floor, radio tray, etc.)

AIRCRAFT PLY PARTS

1	1/32 x 3 x 12	AC Ply	Material to Reinforce Wing Saddle
1	3/32 x 1-1/2 x 10	AC Ply	Wing Bolt Plate
1	1/4 x 2-1/2 x 6	AC Ply	Tailwheel Mount
1	1/4 x 7-1/4 x 14	AC Ply	Fuselage Bulkhead F-2
1	1/4 x 7-1/4 x 11	AC Ply	Fuselage Bulkhead F-3
1	1/4 x 1-5/8 x 7-1/4	AC Ply	Bulkhead Doubler F-2D
1	1/2 x 6-1/2 x 9	AC Ply	Firewall F-1
1	1/2 x 7-1/4 x 3	AC Ply	Landing Gear Mount

HARDWOOD

5	1/4 x 3/8 x 12	Poplar	3 for Servo Mount Rails, 2 for F-1 Braces
2	3/8 x 3/4 x 12	Poplar	Fuselage Nose Clamp, Wing Mount Blocks
2	3/8 x 3/4 x 57	Poplar	Main Spars for Center Wing Panel

BOLT PACKAGE

2	10-32 x 1"	Nylon	Fuel Tank Hatch Bolts
2	1/4-20 x 2-1/2"	Steel	Wing Hold-Down Bolts
2	1/4" i.d. x 1" o.d.	Steel	Fender Washers for Wing Bolts

WING JOINER SHEAR WEBS

2	1/4 x 2-1/4 x 4	AC Ply	(A) Front Internal Joiner Web, Outboard
2	1/4 x 2-1/4 x 3-1/2	AC Ply	(B) Front Internal Joiner Web, Inboard
2	1/4 x 2-1/4 x 3-1/2	AC Ply	(C) Front Internal Channel Web
2	5/32 x 3 x 4	AC Ply	(D) Front External Joiner Web, Outboard
2	5/32 x 3 x 3-1/2	AC Ply	(E) Front External Joiner Web, Inboard
2	1/16 x 3 x 3-1/2	AC Ply	(F) Front External Channel Web
2	1/4 x 1-3/4 x 4	AC Ply	(G) Rear Joiner Web, Outboard
2	1/4 x 1-3/4 x 3-1/2	AC Ply	(H) Rear Joiner Web, Inboard
2	5/32 x 1-3/4 x 3-1/2	AC Ply	(J) Rear Channel Web

AILERON/FLAP RIBS

28	3/32 x 1 x 5	Balsa	W-5 Flap/Aileron Ribs
8	1/8 x 1 x 5	Lite-Ply	W-6 Flap/Aileron Ribs
4	3/8 x 1 x 5	AC Ply	W-7 Flap/Aileron Ribs

SMALL BALSA PARTS BAG

2	3/8 x 1-1/2 x 5	Balsa	Wingtip Supports
1	1/2 x 1 x 2	Balsa	Fin Fillet
1	1/2 x 2 x 2	Balsa	Fin Gussett
6	1/2 x 2-3/8 x 4	Balsa	Wing Filler Block Material
2	1/2 x 3/4 x 7	Balsa	Fuselage SIDE-4
2	1/2 x 1-1/2 x 7	Balsa	Fuselage SIDE-5

SMALL PLY/HARDWOOD PARTS BAG

10	1/16 x 1 x 1	AC Ply	Pads for Hardpoints
4	3/16 x 1 x 1	AC Ply	Pads for Hardpoints
2	1/4 x 1/2 x 5-1/2	Spruce	Reinforcements for W-1 Wing Ribs
6	3/8 dia. x 1/2"	Birch	Dowel Hardpoints for Fin and Stabilizer
2	3/8 dia. x 8	Birch	Wing Dowels
1	3/32 x 4 x 7-1/4	AC Ply	Fuselage Top (aft of wing)
1	1/8 x 4 x 7-1/4	Lite-Ply	Cabin Rear
4	1/8 x 4 x 5-1/8	Lite-Ply	Flap/Aileron Servo Mounts
2	1/8 x 2 x 3-1/2	Lite-Ply	Wing Block Supports
10	1/8 x 1-1/2 x 3	Lite-Ply	Fuselage Gussets
10	1/8 x 3/8 x 2	Lite-Ply	Reinforcements
2	1/2 x 3 x 3	AC Ply	Landing Gear Mount Braces (triangles)

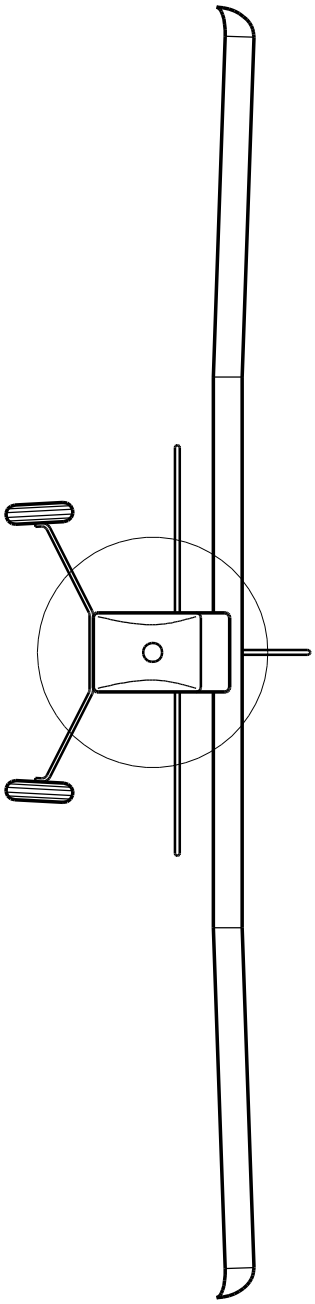
WING JOINER KIT

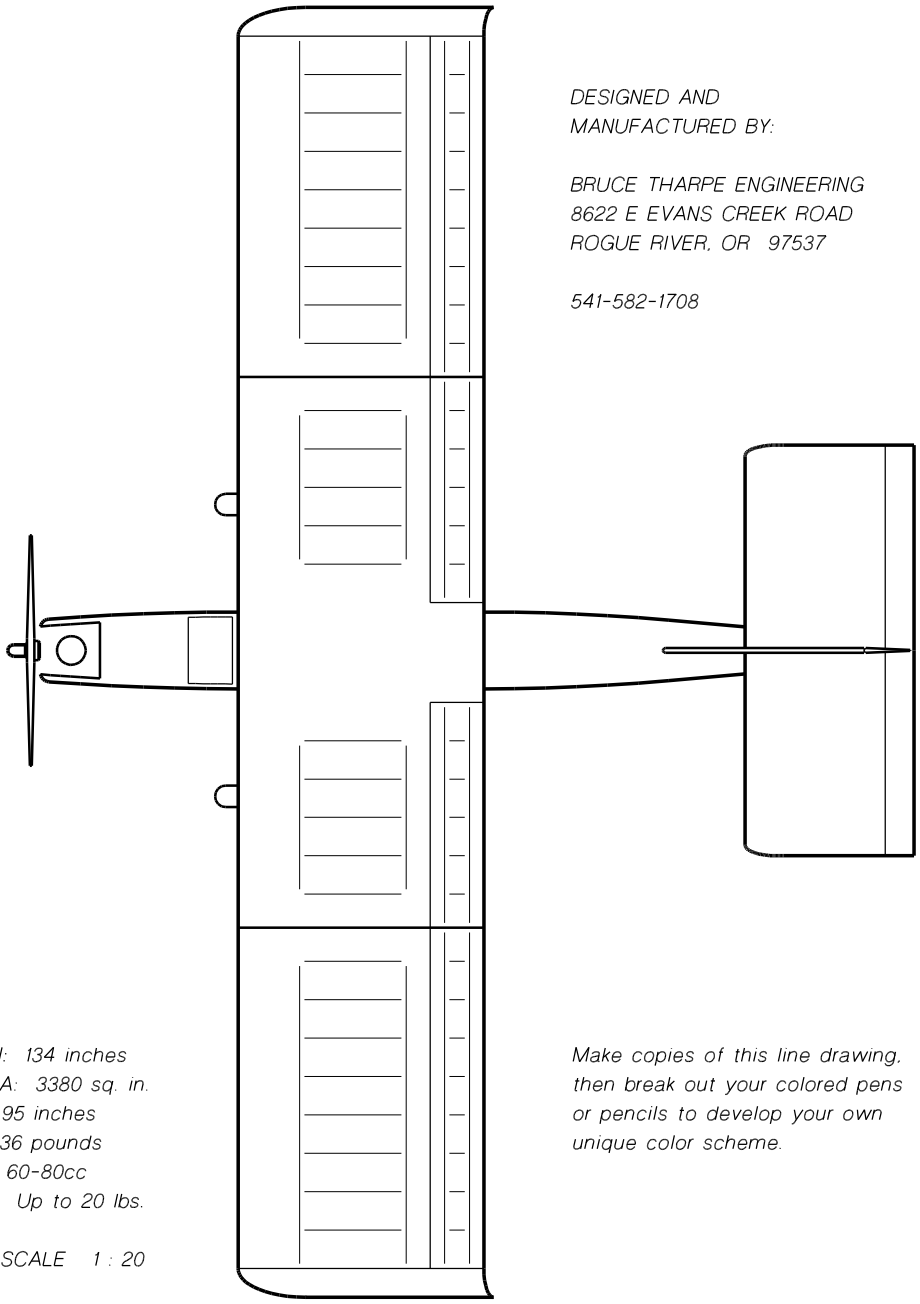
4	3/8 x 1-1/4 x 3	Alum.	Wing Channels
4	1/8 x 7/8 x 9	Alum.	Wing Joiners
8	4-40 x 3/8	Steel	Socket-Head Cap Screws (set screws)
8	4-40 x 3/4	Steel	Socket-Head Cap Screws (mounting screws)
8	4-40 x 1	Steel	Socket-Head Cap Screws (mounting screws)
6	6-32 x 3/4	Steel	Socket-Head Cap Screws (mounting screws)
6	6/32 x 1	Steel	Socket-Head Cap Screws (mounting screws)
16	4-40	Steel	Hex Nuts
12	6-32	Steel	Hex Nuts
16	#4	Steel	Flat Washers
24	#6	Steel	Flat Washers
1	5-1/2" x 8-1/2"	Paper	Wing Joiner Instruction Sheet

MISCELLANEOUS

6	Sheets, Full-Size	Paper	Plan Set (1 Fuselage, 1 Stabilizer, 4 Wing,)
1	29 Pages	Paper	Instruction Book with Color Photos
1	.030 x 6 x 8	PETG	Clear Plastic Material for Windshield
1	.030 x 10 x 24	PETG	Clear Plastic Material for Side Windows
1	3/8 x 27	Alum.	Main Landing Gear

BTE SUPER FLYIN' KING WITH OPTIONAL STOL WINGTIPS





DESIGNED AND
MANUFACTURED BY:

BRUCE THARPE ENGINEERING
8622 E EVANS CREEK ROAD
ROGUE RIVER, OR 97537

541-582-1708

WINGSPAN: 134 inches
WING AREA: 3380 sq. in.
LENGTH: 95 inches
WEIGHT: 36 pounds
ENGINES: 60-80cc
PAYLOAD: Up to 20 lbs.

DRAWING SCALE 1 : 20

Make copies of this line drawing, then break out your colored pens or pencils to develop your own unique color scheme.