RETURN OF THE TIGERKITTEN LASER-CUT SHORT KIT

Fly RC Staff July 13, 2012 Master's Workshop

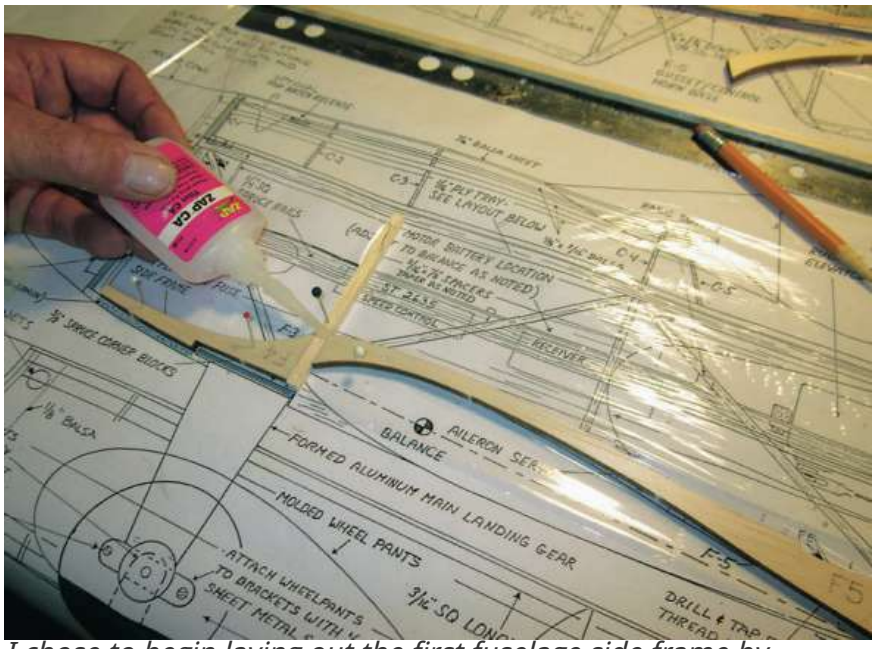
We have made a few changes in the way I'll be presenting A Master's Workshop from now on. Perhaps the most important of these are intended to make it easier for you to relate the material we include in Fly RC's print column with my original stuff as prepared for my on-going blog on www.rcmodel.com. (Bob Benjamin's Old Time Model Airplane Workshop) One of the perpetual problems facing magazine editors and their contributing writers is that it's almost impossible to present all the material relating to a particular topic in the page space available. Trust me, I've been writing for one model airplane magazine or another for thir- ty years and I know all about how one more photo the editor didn't have space for would have answered a bazillion questions that we didn't anticipate.

Not anymore! What you'll see here in my column will be just the opening pages of a continuing story. When you're done reading your nice new fresh-smelling copy of Fly RC , turn on the computer and go to www.rcmodel.com. Right in the mid- dle of my homepage you'll see the latest blog entry with links to every earlier entry as well as all the other blogs I've posted on other models. It will never be possible to include all of it here in the print pages…there will always be more to see.

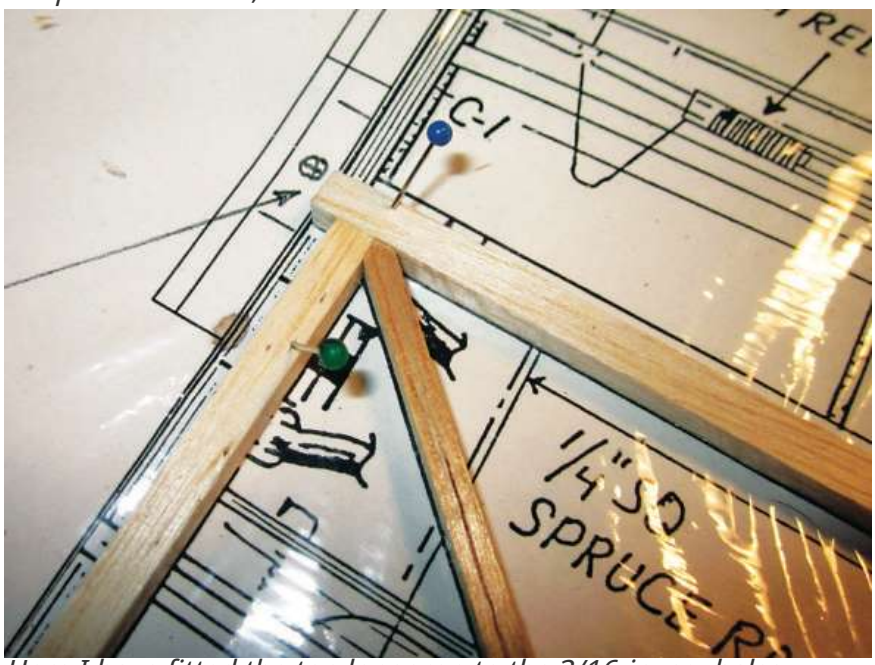
This month, I'm getting deeper into the Return of the TigerKitten story featured in the May 2012 issue of Fly RC. My old design is back in the form of a laser cut short kit from Premier Balsa Kits (www.premierbalsa kits.com) and I'm building a new one from one of their pre-release samples. Let's head into the shop and pick up where I left off last time.

CONSTRUCTION

The TigerKitten fuselage construction is about as traditional as it gets—two identical side frames built up from balsa strips with a few shaped pieces in critical areas, but we get to combine state of the art stuff because those shaped pieces are laser-cut. We could also use a more traditional adhesive like aliphatic resin glue that is applied to each joining surface before the part is assembled in position, but again I've chosen to go with the newer approach and use ZAP cyanoacrylate products which permit "dry" assembly to ensure that everything is aligned perfectly before I stick any of it together.



I chose to begin laying out the first fuselage side frame by positioning the laser-cut balsa wing saddle and landing gear mount reinforcement. These two parts are positioned in reference to a 3/16-in. sq. balsa upright which I have fitted in place here. Thin (instant) ZAP is the adhesive of choice here as it allows me to locate and pin each of the parts involved in exactly the position I want, then add adhesive.

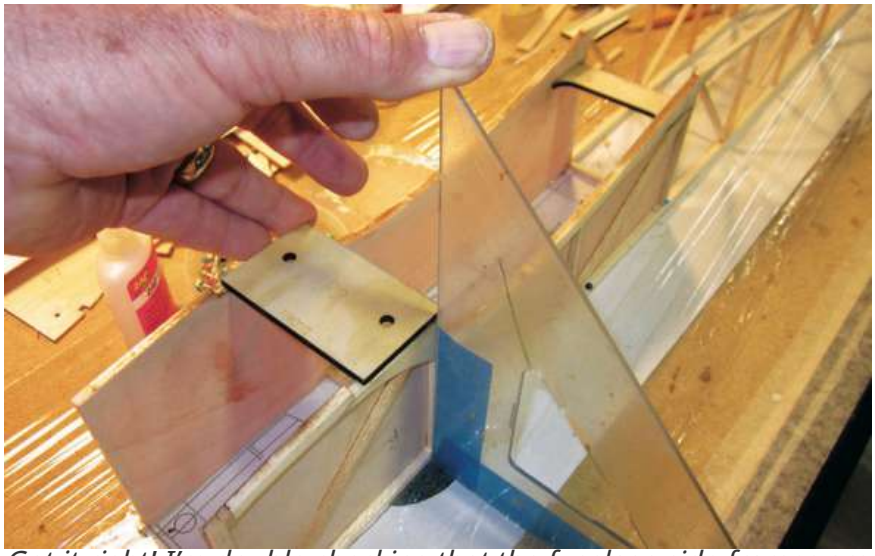


Here I have fitted the top longeron to the 3/16-in. sq. balsa upright that supports F-1, as well as the 1/8-in. x 3/16-in. balsa diagonal brace that lies directly behind it. This is an example of the way you should make all the joints in a model structure fit. It doesn't make sense to have the advantage of precision laser cut shaped parts and not have the joints you fit yourself match that level of accuracy.

I have all the longerons, uprights, and diagonal braces in place along with the laser cut components… this defines the structure of the side frame.

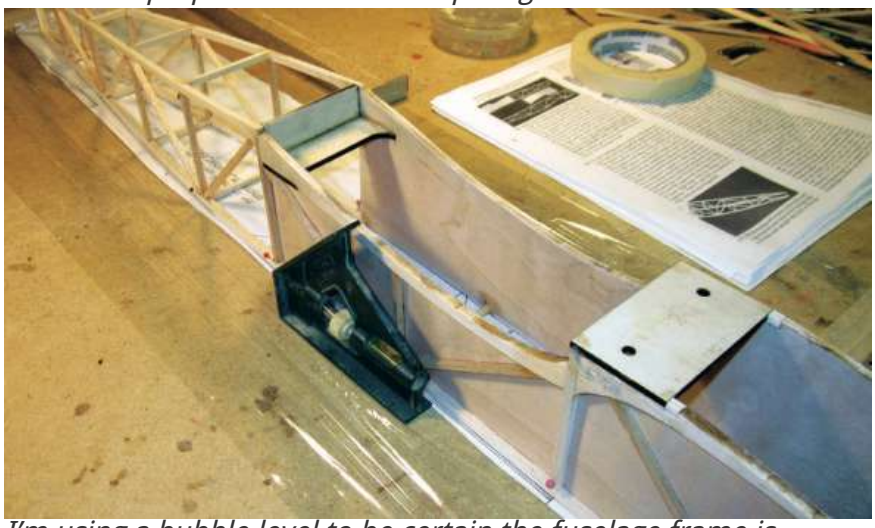
The trick to building really accurate fuselage side frames is to block sand them aggressively while they are still pinned to the building board. Here I am using 80-grit production paper, which is coarse enough to neatly cut through all the hard spots of glue without compressing the balsa. The important thing here is to sand off enough material to get a flat, true surface. Don't leave ridges or low spots. I'm sanding the second side, still in place. When it's done I'll remove it along with the top sheet of plastic wrap and repeat the operation with the first side.

I added the laser cut plywood landing gear mounting plate and the rear wing mounting bolt plate (F-2 and F-6) as well as the 3/16-in. sq. balsa crossmembers that correspond to their positions between the top longerons. This is probably the most critical part of the fuselage construction where correct alignment is concerned.



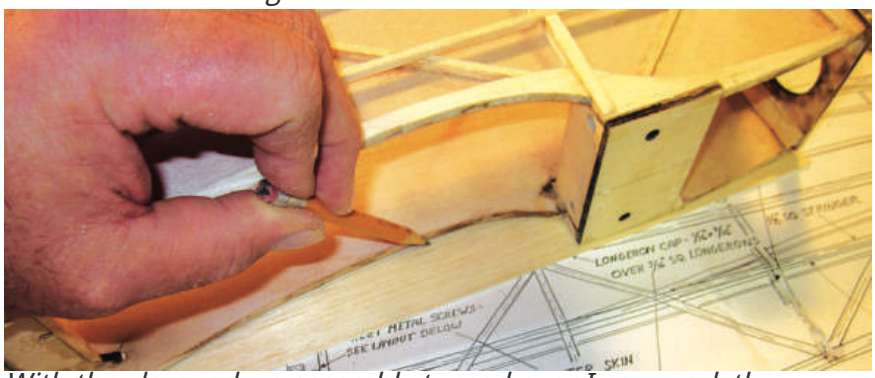
Got it right! I'm double checking that the fuselage side frames are assembled square to each other and the building board (which is my reference for all alignment) before I move to the tail.

The formers that create the raised portion of the rear fuselage (the "turtleback") are added now. I am using a square to make sure F-7 is perpendicular to the top longerons.



I'm using a bubble level to be certain the fuselage frame is squared off before I go on to work on the wing attachment structure.

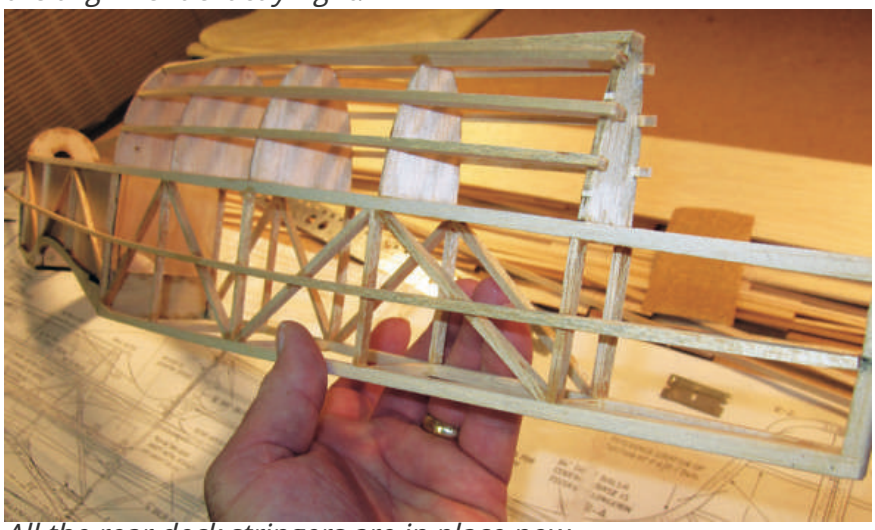
I'm using an older model Robart incidence meter to check that the wing is set at an angle of three degrees positive. Remember that the entire airplane is assembled upside down, so the meter will read out at a negative value.



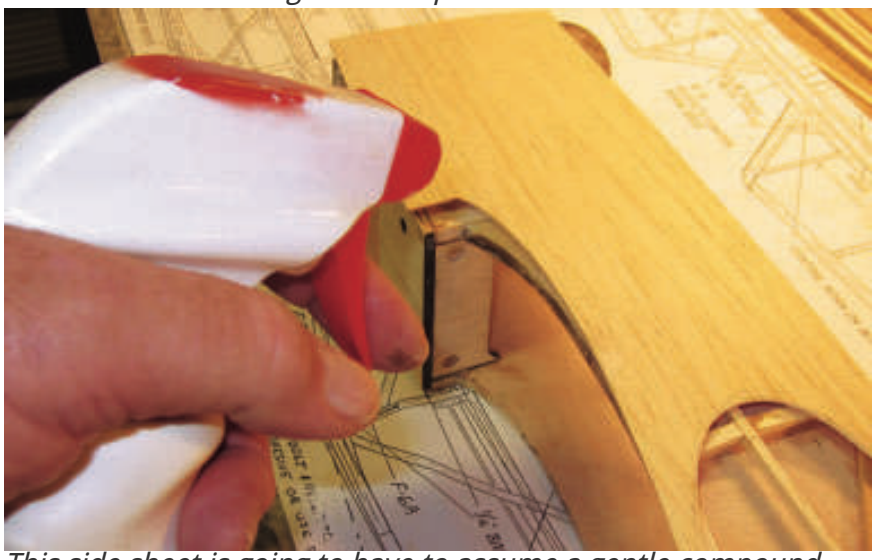
With the clamped-up assembly turned over I can mark the cutting line along the wing saddle and the rest of the bottom edge of the fuselage onto the side sheet blank.

The top center rear deck stringer is 3/16-in. sq. balsa. All those on the sides are 1/8-x 3/16-in. balsa, and it's best to add them one at a time, alternating from one side to the other to minimize the

chance of pulling a twist into the structure. I used fast ZAP here, holding the stringers in contact with each former in turn to get the alignment exactly right.



All the rear deck stringers are in place now.



This side sheet is going to have to assume a gentle compound curve to fit tightly against all the underlying structure. The easiest way to get a sheet of balsa to do this is to wet it with a light spray of water only on what you want to be the outside surface of the bend. The sheet will automatically curl away from the wetness and become more pliable at the same time.

SUMMARY

The fun doesn't end here. Go to www.rcmodel. com to see what I did next. As for next time, I'm going to speed up the action on the TigerKitten story. Over a year ago I made a good start at building a big (100-inch span) Stinson Reliant from the Top Flite Gold Edition kit as an electric power conversion, then stopped working on it to finish other projects. With all the good stuff going on in my shop, my builds got ahead of my blogs. In fact, the TigerKitten you see here is already finished and flying. In my next column I'll give you a look at the finished airplane, you can catch up on all the rest of my building blogs on-line and we'll

clear the bench for the big Stinson.

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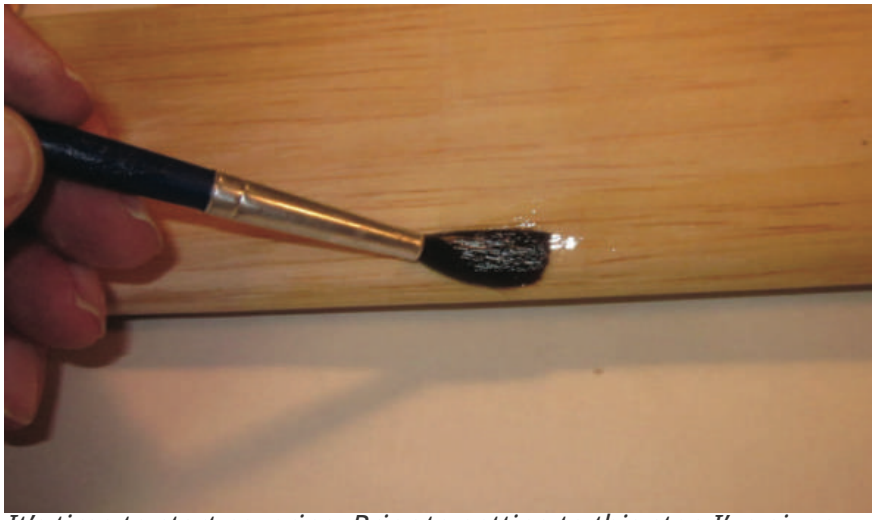
COVERING THE TIGERKITTEN

Fly RC Staff October 13, 2012 Master's Workshop

When do we get to the good part? For me that's a hard call, because they're all the good parts. Covering, however, is kind of special because that's the step that really transforms a bunch of subassemblies and frameworks into what is clearly going to be a flying machine. If you've been reading my stuff for long, you already know that I'm not going to use a film covering for this airplane. That stuff works as advertised, and your TigerKitten will fly fine with it, but I prefer the esthetic finesse and improved structural integrity that come with using fabric-and-paint covering and finishing products. On this model I'm going to use Polyspan, finished with clear nitrate dope and a variety of Stits Lite paint products. We'll get into that part later. I'm also going to pass on explaining a lot about what Polyspan is here…I did that during the presentation of my Great Lakes Trainer project and you can check back there whenever you like for details. http://www.rcmodel.com/2011/07/building-the-oldflyline- great-lakes-2t-1a-kit-20/ This link will take you to Great Lakes blog 20, which introduces Polyspan. Blogs 21 through 23 offer more information on covering and doping that may be of interest as a supplement to what I'm offering you here in the TigerKitten story.



It's time to start covering. Prior to getting to this step I've given the entire structure a heavy, wet coat of non-tautening clear nitrate dope. When that was thoroughly dry I sanded every surface that will come into contact with the covering with 320-grit production paper to get rid of all the little bumps and fuzzies that could cause snags. The other reason for this pre-doping is to seal the balsa so that the covering adhesive won't soak in, but rather stay on the surface where it's going to be needed as the heat activated stuff that grabs and holds the covering. Here I'm using a soft, round brush to put a generous bead around the entire outline of the wing…everywhere that the Polyspan must be adhered. I'm using fabric formula Balsarite, but there are other brush-on, heat activated fabric adhesive products that will work

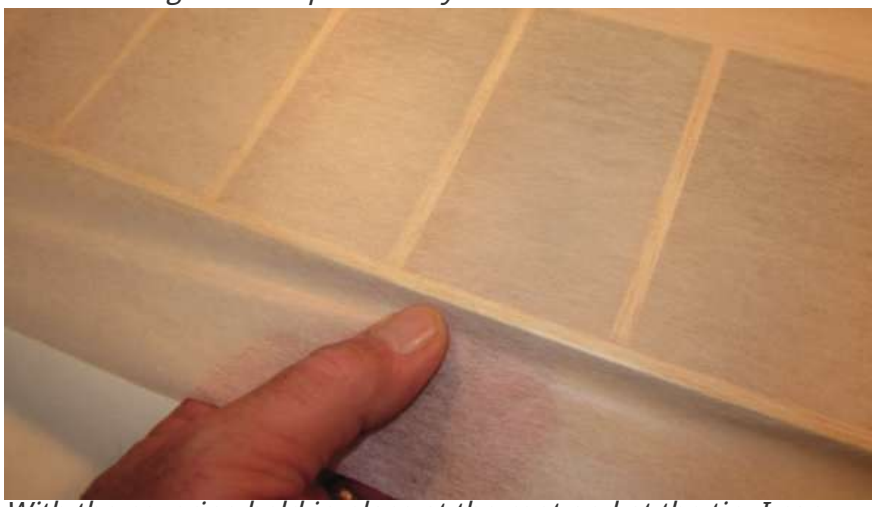
just as well.

I'm starting with a single piece of Polyspan cut to cover the entire bottom surface of the right wing. Since there is a severe concave compound curve formed by the lower leading edge fairing, I cut out a relief section to permit the main sheet of covering to lie flat around it. The Polyspan is cut exactly to the dimension I want it at the centerline of the wing but left with plenty of overhang (for now) everywhere else.

Stick it! I'm using an old reliable covering iron from Hangar 9, set to about 250 degrees, to activate the adhesive without causing any significant shrinkage of the Polyspan. I'll work back and forth along this line, varying the pressure of the iron as necessary. The goal is to get the covering stuck firmly in place without any wrinkles, folds, or loose spots.

With the Polyspan stuck down along the wing centerline we have something to pull against to begin stretching the sheet smooth across the entire panel. Here I'm using the iron to adhere the covering at the inboard end of the leading edge securely down and around the front of the structure.

Next I pull the sheet of covering taut spanwise and adhere it at the outer edge of the tip assembly.



With the covering held in place at the root and at the tip, I can work along the leading and trailing edges in between and pull out on the covering just hard enough to make it lie smooth.

This is the center section with the edges of the covering adhered all around the perimeter. You can just see where the activated adhesive has turned the covering nearly clear in appearance where it's wrapped around the leading edge.

I left the lower leading edge fairing uncovered until now. I cut a separate piece of Polyspan that can be worked over and down around the edges of the fairing.

Activating the adhesive on the small piece of Polyspan over this deeply curved fairing demands care. In a place like this you have to make the necessary extra effort to press and pull and push with the tip of the iron to avoid leaving any small patches of

covering unadhered to bridge across tight curves and corners. Any such bridges will come back to haunt you as persistent flaws in your covering job if you ignore them now.

Now we're working on the top surface of the wing. I've repeated all the steps I did on the bottom and now I have to deal with something new…the aileron horns. The trick to this part of the job is to make a small cutout that allows the covering to lie flat around whatever protruding part you're dealing with and iron the material down tight around it.

This is the top surface of the right wing tip. I'm pulling and stretching the covering out, down and around the outer radius of the wingtip. Be sure to go over-center in places like this to guarantee that you'll get a double overlap of the covering.

Here the covering has been pulled tight around most of the tip and lies flat across the trailing edge…actually the aileron well on this airplane.

I've made a diagonal cut in the covering and ironed the small triangular tab down and around the inner surface of the tip structure.

Now that last little end of loose covering around the rear end of the tip is stuck in place…and…I've wrapped the main expanse of Polyspan around the front of the aileron well. There's a good overlap created here since the bottom surface covering already extended around that same edge.

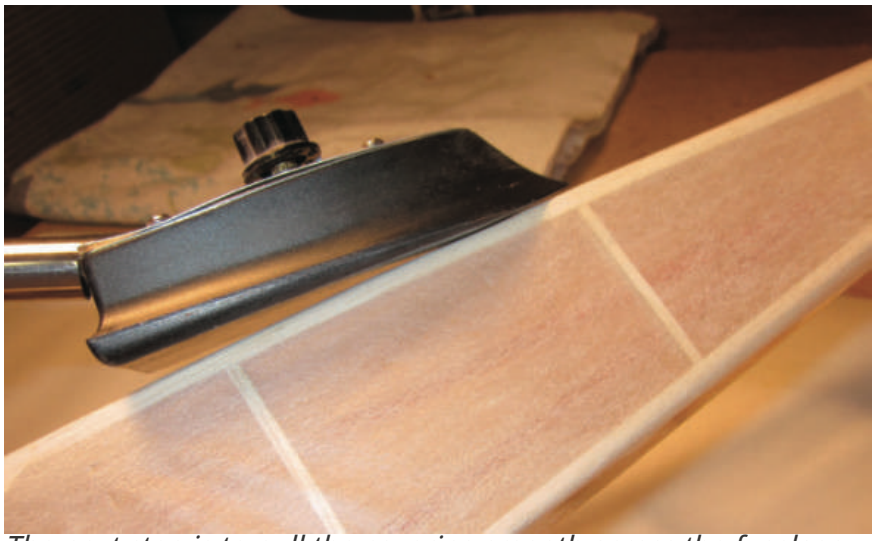
I treated all the free edges of the covering around the trailing edge/aileron well the same way. With the entire wing panel…top and bottom… covered, I can begin shrinking the Polyspan tight. NEVER shrink the covering before both the top and bottom are covered. That's a good way to introduce uneven stresses and create warps. Just to the right of the iron you can see a few shallow sags that have yet to be shrunk tight.

This is what freshly applied Polyspan should look like after being ironed at 275 – 300 degrees. There should be no bubbles around the edges and no puckers or wrinkles anywhere.

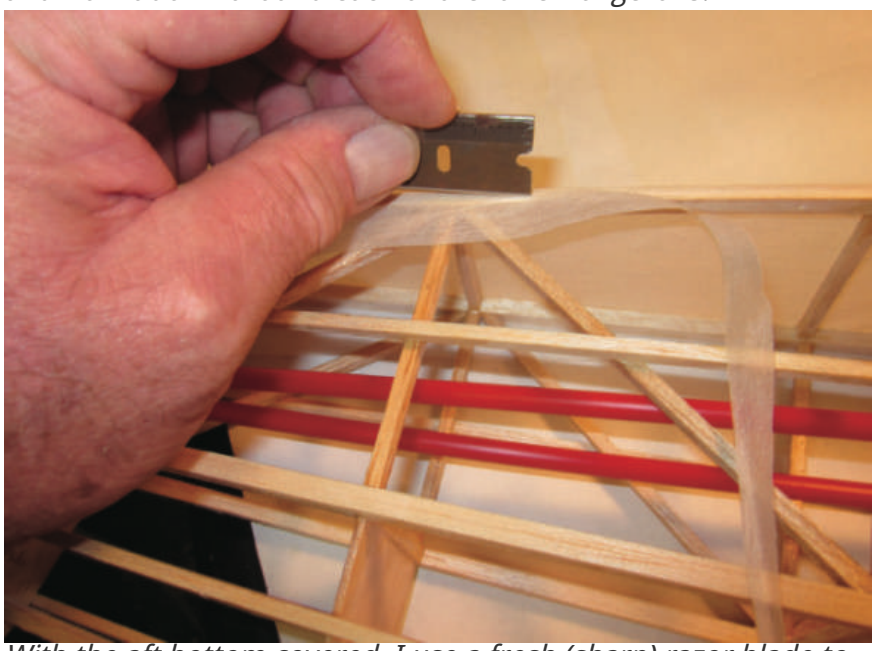
I covered the control surfaces and the fixed horizontal stabilizer

just the same as I did the wing. Now it's time for my favorite part…covering the fuselage. On this airplane we're going to incorporate a classic feature, the fabric fairing between the vertical tail and the rear portion of the fuselage. This is a characteristic of many of the old time fabric covered airplanes you might want to model. You can't fake it…but it's not that hard to do right if you know how. Here I'm starting by covering the bottom of the fuselage from the wing cut-out to the tailpost. I started by adhering the covering along the front of the area…just as with the wing, I want something to pull the rest of the job tight against.

Next I pull the covering taut along the length of the fuselage and iron it down over the tail wheel mounting plate.



The next step is to pull the covering smooth across the fuselage and iron it down around each of the lower longerons.



With the aft bottom covered, I use a fresh (sharp) razor blade to trim off the overhang along the upper (inside) edge of each longeron.

Here comes the fun part! I have cut a sheet of Polyspan that reaches from the tailpost (the vertical fin trailing edge) all the way past F-1, and far enough up and down to provide a generous margin around the bottom longeron and the top centerline of the fuselage…including the entire vertical fin. I have cut a slot as precisely as possible to permit that sheet of covering to slip around the base of the fixed horizontal stabilizer (which I have already covered.) Watch what happens next.

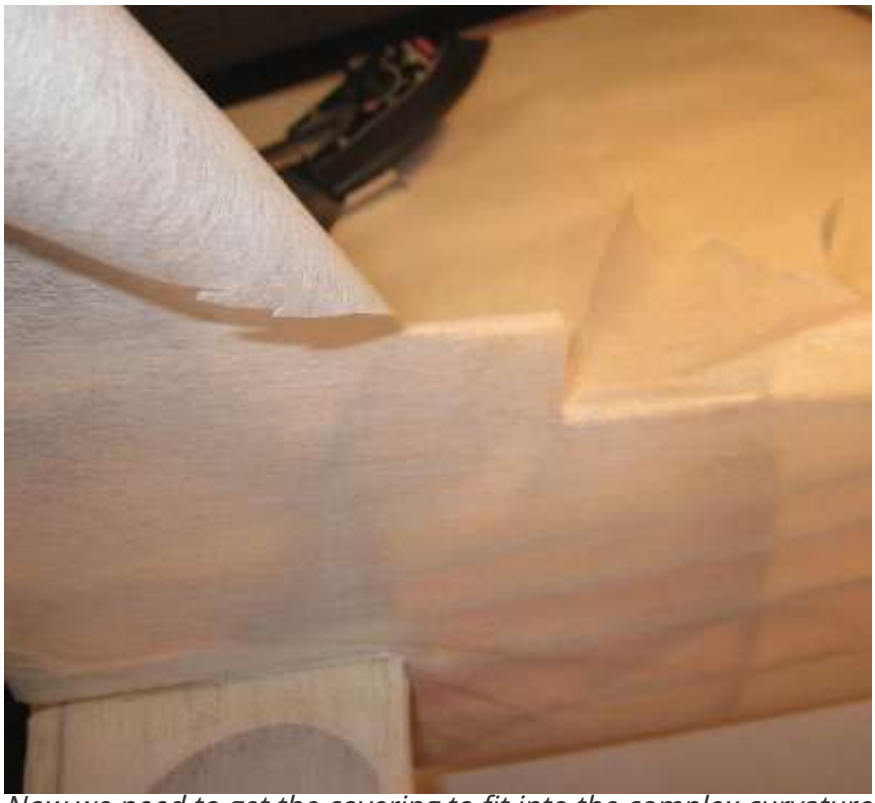
I pulled the sheet back so that the front of the cutout fits snugly around the leading edge of the stabilizer and then adhered the covering all around the base…top and bottom.

Just to be sure I have everything under control, the next step is to adhere the covering along the front of F-1 (at the nose). I don't want to get through the next few steps and then discover that the

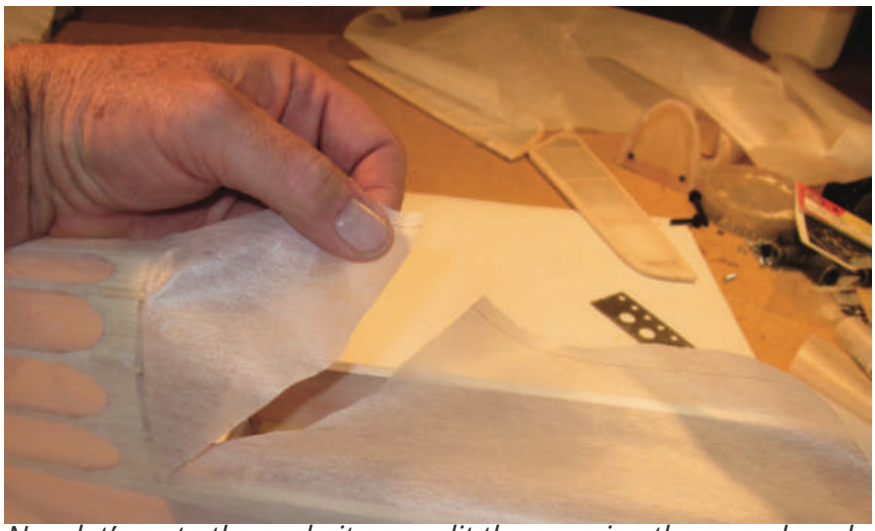
covering for the front part of the fuselage is out of line.

Now it gets interesting. I have adhered the Polyspan all along the tailpost/fin trailing edge. You can see where I have pulled it taut vertically…from the stabilizer toward the fin tip.

The next step is to adhere the Polyspan all along the lower edge of the fuselage including the rear longeron, the outline of the wing cutout, and the bottom edge of the nose. Again, the covering must be taut and smooth at this point, with no folds or deep wrinkles. We'll get it TIGHT later.



Now we need to get the covering to fit into the complex curvature created by the fin leading edge and top rear of the fuselage. I start by slitting the covering down as close as possible to where it's going to lie against the top center stringer and the fin leading edge AFTER I've pulled it tight. This requires good judgment..take your time. If you cut past the top stringer you'll have a hole to deal with.



Now let's go to the cockpit area, slit the covering there, and work it around the rear fuselage top and back along the dorsal (center) stringer.

Here comes the big secret to advanced fabric covering technique…pull, stretch and pull some more. The next thing I'm going to do is iron down the covering along the several inches right next to my thumb.

Now I do the same thing all the way around the fin leading edge. If you like, you can do some testing on scrap to determine how

much you can pull on the covering material before it will tear. Usually that's more than you expect.

All in place. Every edge is stuck down with plenty of structural overlap. The covering won't be smooth at this point, but it must be free of puckers and creases.

This happens to be the opposite side of the fuselage. I covered it just the same as the first.

Here it is again from the other side, with the first coat of clear nitrate dope applied.

SUMMARY

The fun doesn't end here. Go to www.rcmodel.com to see what I did next. This installment of A Master's Workshop is based on TigerKitten blog No. 11 …here's the direct link: http://www.rcmodel.com/2012/05/the-return-of-the-tigerkitten-11/

As for next time, I'm going to speed up the action on the TigerKitten story. Last time I talked about building a BIG (100" span) Stinson Reliant from the Top Flite Gold Edition kit as an electric power conversion, and explained that I had stopped working on it to finish other projects. We were going to get back to that next time around. With all the good stuff going on in my shop, my builds got ahead of my blogs. In fact, the TigerKitten you see here is already finished and flying. Next month I'll give you a look at the finished airplane…you can catch up on all the rest of my building blogs on-line…and after that we really will clear the bench for the big Stinson.

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FINISHING THE TIGERKITTEN

Fly RC Staff January 13, 2013 Master's Workshop

It's time to fire up the air compressor, set up the airbrush, and lay down some color on this airplane. Depending on the size of the model I am working on, I will use either my Paasche airbrush or DeVilbiss automotive touch-up spray gun. The gun covers large areas much faster, but the airbrush wastes less paint during set-up and cleaning. I've learned to adjust my airbrush for a wide, even pattern that will cover something like a TigerKitten wing with eight or ten fully-controlled passes, so that's the tool I'm using for this job.

I'm not going to offer a mini-course in spray painting model airplanes here. There are plenty of books and on-line articles around that can do a better job of that than I could. However, it's something you really ought to make an effort to learn to do. For over forty years, since I first had my own place, I never brushed a top/color finish onto a model airplane. The result of doing it that way doesn't even come close to the quality of a sprayed finish. You need a dedicated work area which could be a curtainedoff portion of the spare bedroom or one end of a garage. You also need ventilation which can be as simple as a portable exhaust fan in a window and you need respiratory protection such as a carbon filter mask from the paint store. It's nothing you can't set up at the cost of a couple hours of time and maybe less than a hundred dollars, in addition to whatever you want to spend on your spray equipment itself. Let's paint a model airplane!

Never pass up a chance to check your work one more time

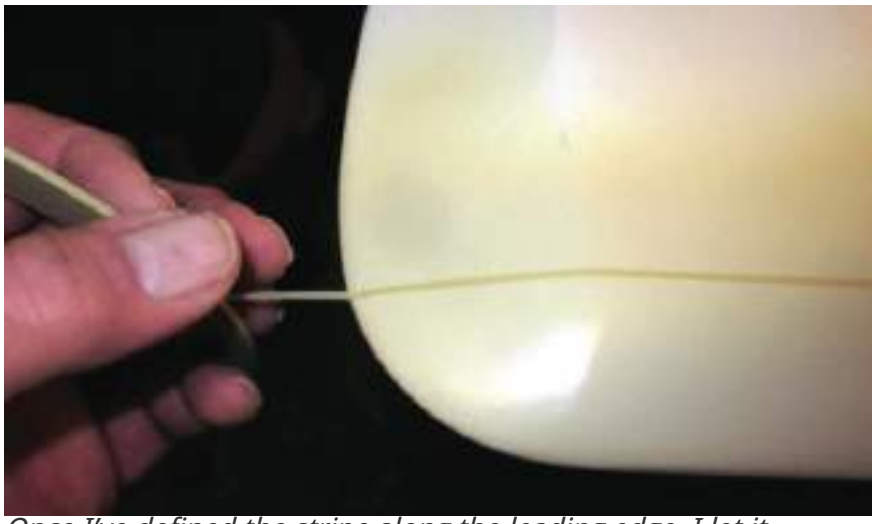
before the opportunity goes away. This is the top of the left wing with its final light spray coat of Stits Lite Coat primer. I've already sanded out any stubborn little bumps or dust flecks I could find and I'm using the calibrated fingertip system to make one last search for "ugly seeds".

Gotcha! There were a few little rough spots along the rear fuselage (turtleback) stringers. They disappeared at the first touch of more 320-grit production paper.

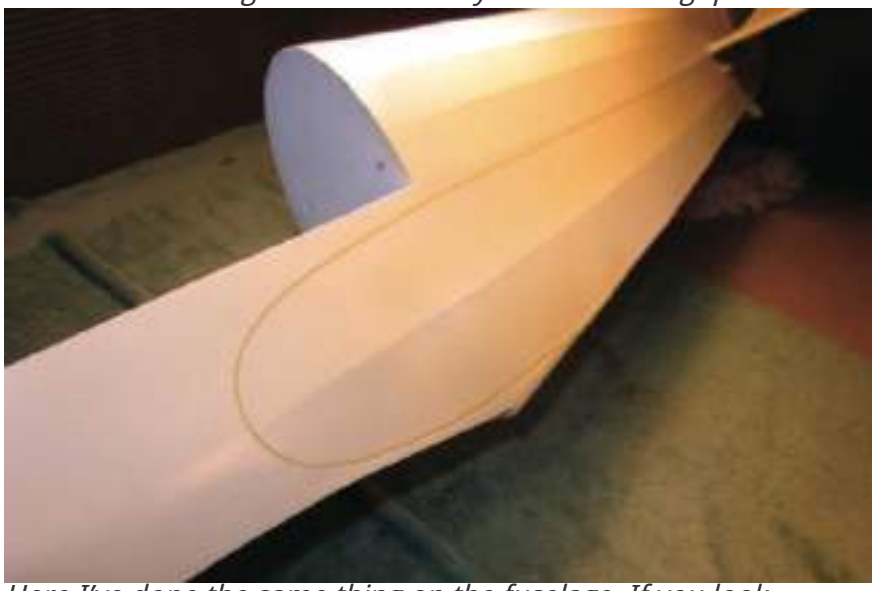
Now we get to play with the colored paint! This airplane uses

what I have adopted as my "standard" color scheme for TigerKittens and derivative designs like the TigerCat. The airplane is going to be orange overall, with blue trim on the front end of every component and an off-white pinstripe separating the colors wherever they come together. Since the pinstripes define the design, they need to be located first. The pinstripe color, in this case, Stits Polytone Daytona White, goes on first and becomes the base color of the paint job. I sprayed a solid color base (a tack coat followed by a double wet coat) everywhere close to where the pinstripes will go. (I could have traced these out as light pencil lines, but I'm familiar enough with this design that I didn't need to do that this time.) It's standard practice always to apply lighter colors first in the interest of better coverage (opacity) by later coats using the least amount of paint. This way you can define each stripe using fine-line masking tape, 1/16-inch in this case. The tape covers the base color wherever you want a stripe to be. Even if the trim color is darker (like black setting off red and yellow) don't try to define a stripe by masking up to each edge with separate strips of tape on top of the other colors. I've never met anyone who could lay out consistent stripe widths that way. With a dark stripe design, either accept that you'll have to spray some extra top color to cover the base or use colored trim tape on top of the painted finish. You'll notice that I have used a strip of ordinary masking tape here to mark the distance back from the leading edge that I want the pinstripe to be located.

Here's the beginning of the color design. The 1/16 inch tape creates and defines the curve I want the color separation line to follow around the inboard end of the left wing. I temporarily mounted the wing in order to see exactly where the separation line will lie in relation to the fuselage.

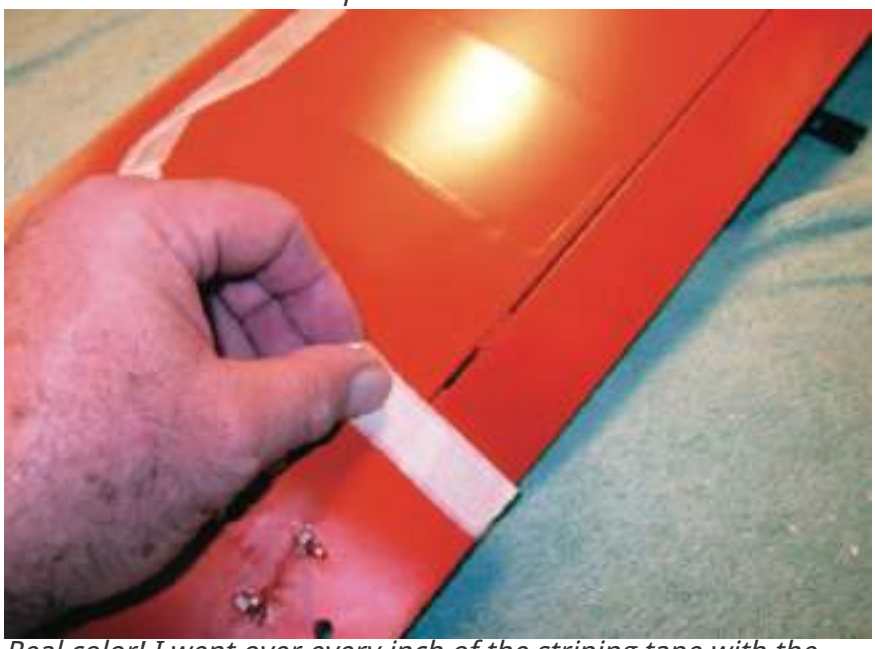


Once I've defined the stripe along the leading edge, I let it continue in a straight line all the way out to the wingtip.



Here I've done the same thing on the fuselage. If you look carefully you can see where my wide pass with Daytona White in the airbrush blends into the white primer way beyond where the color needs to be for the striping. Below and to the right of the tape will be orange; on the other side will be blue.

Same deal on the horizontal tail. I repeated the pattern you see here on the rest of the airplane.



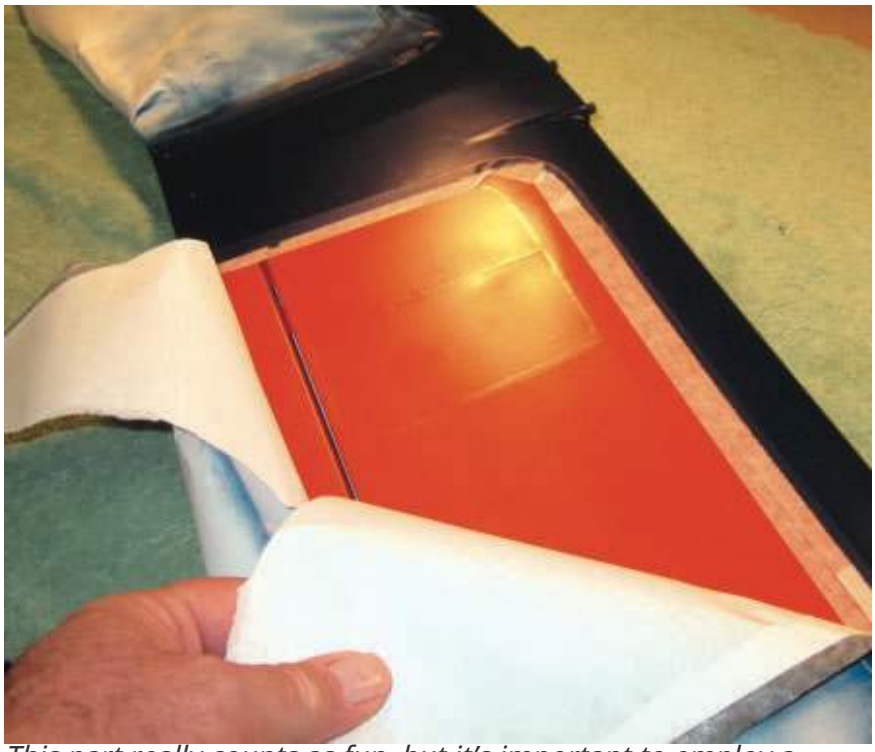
Real color! I went over every inch of the striping tape with the back of my thumbnail to be sure it was sealed tight to the base color paint, then sprayed Stits Polytone Cruiser Orange onto every portion of the airplane that is to become that color. Again, I used a heavy mist (tack) coat, followed by a flowed (wet) coat. As soon as the wet coat "flashed off" (became dry enough on the surface not to run) I added a second coat, just wet enough to flow. Because I created a uniform white base with Stits primer and used a light pinstripe color, this was all I needed to get solid, even coverage. Any more color would simply have added weight and used up more paint. With all that dry, I'm beginning to mask off the orange by adding a line of ordinary masking tape along and over the edge of the striping tape.

I defined the white pinstripe portion of the design all over the airplane with 1/16-inch tape, and then sprayed the orange color everywhere that it needs to be. I made sure to add a generous overlap of the orange color into the areas that are going to be blue to make sure I don't leave any thin or bare spots by mistake. Now I'm going cover the entire orange portion of the airplane with masking paper (I use leftover white drafting paper) to protect those areas from blue paint. In the last image I added a strip of wide masking tape that serves as a base for the masking paper. It's too difficult to get a reliable cover-up of the fine line tape edge AND seal down the edge of a big floppy sheet of paper at the same time, so I am using a separate piece of tape to do that.

Here I finished masking the entire wing, top and bottom, folding and taping all the edges of the masking paper to keep out every last trace of overspray.

Same deal on the rest of the airplane. Here I'm laying down the first strip of wide tape over the pinstripe on the fuselage.

Everything that is supposed to remain white is under the fine line tape; everything that I want orange is under the wide tape and the masking paper. What's not masked off got sprayed with Stits Polytone Insignia Blue, which I applied with the airbrush just as I did the orange. My cats clear out of the shop when they hear the air compressor start up, but once the last shot of paint has had a chance to dry (and no longer seems as smelly) one or another of them comes in to make sure I know they're still around.



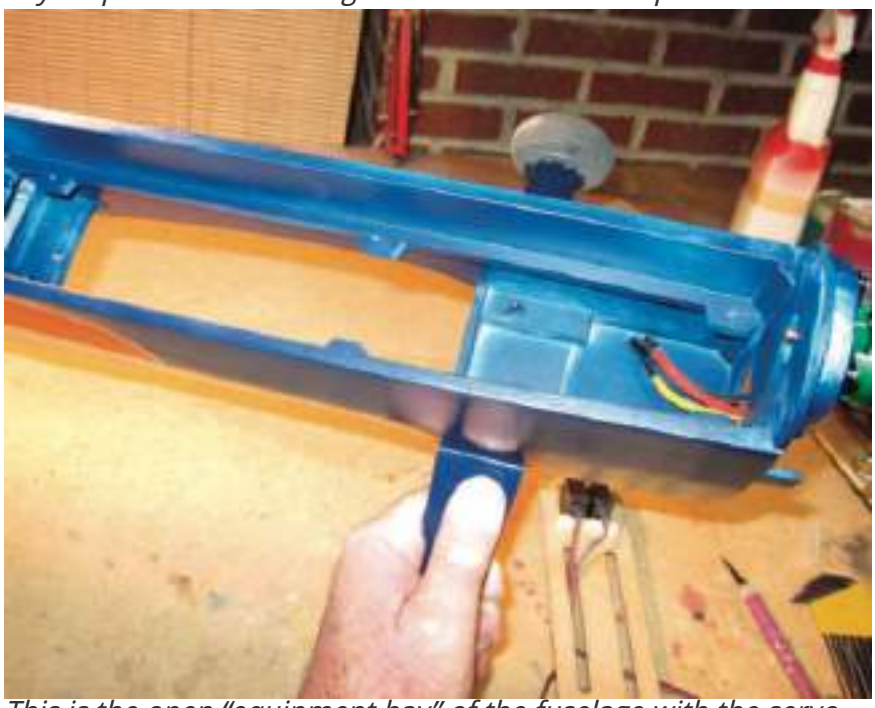
This part really counts as fun, but it's important to employ a delicate touch and plenty of patience. If you have used quality finishing products, like Stits, and good quality masking tape there's no need to fear lifting off paint along with the masking. However, always pull tape slowly and sharply back over itself to minimize lifting loads on the fresh finish. I follow the Stits Polytone manual and wait overnight before pulling a mask.

In this case the pinstripe tape remained stuck to the wider stuff and came off with it. This is where you finally get to appreciate the result of all the effort you've put into a traditional covering and painted finish.

On the bottom of the wing, the fine line tape wasn't as anxious to let go, so I'm pulling it off separately.

Here's a look at the underside of the tail assembly. All the paintwork is done, but the push-pull tube to the rudder isn't installed yet.

The paint is all sprayed and dry, and after removing all the masking I've given the entire airplane a double spray coat of Stits Polytone Clear. This adds gloss and richness to the color and smooths over the subtle lines left by the masking tape edges. Now it's time to start installing and hooking up equipment. I test-fitted the Cobra 2826/10 brushless motor from Innov8tive Designs when I built up the cowl, so I know it will fit now without any surprises. This time I get to leave it on the airplane.



This is the open "equipment bay" of the fuselage with the servo tray rails in place, ready to go to work.

The servo/equipment tray is included as a laser-cut plywood part in the Premier kit. I left the rudder and elevator servos attached after testfitting them and now the whole assembly drops neatly into place. I'm using 1/2-inch sheet metal screws for this job.

Here's a closer look at the rudder and elevator servos with the push-pull rods and DuBro links installed.

I'm using one of my many Airtronics RX-600 6-channel 2.4GHz FHSS receivers along with an Innov8tive Designs Cobra 60A ESC that includes a 6-amp switching BEC permitting reliable operation without a separate receiver/servo battery WITHOUT concern about the ESC's ability to handle the necessary current loads. The ESC is going to mount to the bottom of the tray using hook and-loop tape.

The ESC is placed where it will get good cooling airflow from the vent holes in the cowl and F-1. The leads to the motor are out of sight inside the nose. The power lead to the Deans connector and the LiPo pack go up through the tray along with the receiver cable. The two "open" cables are for the aileron servos.

The bottom of the tail again, this time with the elevator controls connected.

Same game on the other side with the rudder hooked up. Notice that I've used a stop nut and a plastic sleeve safety collar on those linkages.

These are DuBro No. 250SL (2.5-inch) lightweight wheels. I previously installed the DuBro axle assembly and used a cutoff wheel in my Dremel tool to grind a squared-off flat onto the axle so the set screw in the DuBro wheel collar will not slip off under side loads and spoil my day when I least expect it.

All the work I did earlier to make the wheel pants fit right is going to pay off now. I know this one is going to slip into place without my having to scuff up that nice new paint job.

I installed those two little 2-56 screws into the previously cut threads, tightened them up and the whole deal locked into place just the way it was supposed to.

I'm using the dual aileron channel function of my Airtronics RDS8000 2.4GHz transmitter to get fully independent differential aileron control, so I will need two aileron servos. You have to look hard to see them, but the DuBro strip aileron linkage assemblies are in place at the bottom of the picture. The servos will slip neatly into the two cutouts I've made for them.

A 1/32-inch drill bit in the Dremel tool and the mounting screws that are included with the servos finish the job. I have cut the outer portions of the servo output arms off to clear the sides of the fuselage when everything is assembled.

There's not much more to say! My good friend Gary Ritchie took this portrait image, as well as the flight shots, at our club field in Olympia, WA. Gary, by the way, finished building his own TigerKitten. I'd like to believe that my white beard is a sign that I've gained a little bit of wisdom over the years that I've been doing model airplanes. Being able to share it with you via rcmodel.com and Fly RC magazine makes all the hard parts I'd rather forget worthwhile.

SUMMARY

That's it. The Return of the TigerKitten is complete. Next time around I'll get back with the Stinson SR-9 project I put off working on a year ago to help get the Premier Balsa Kits TigerKitten project off the ground.

The fun doesn't end here. Go to rcmodel.com to see all the rest of the details of getting this TigerKitten into the air.

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