Blue Angel build from http://www.rcuniverse.com/forum/m_3973867/mpage_1/key_/tm.htm

Builder: 8178 (3/1/2006)

In the late 80s one of my fellow RC club members built and flew a FK SBA Speeda in pattern competition. He offered to let me fly it a few times and I really liked its flying characteristics. It was powered by an OS 61SF LS pumper with a 12X10W APC prop and pipe and had Spring Air retracts. It was super fast and so graceful, with incredibly large loops and it could do a slow roll from horizon to horizon. I loved the design but try as I may I could not get a kit from the US distributor, Mutchler's hobbies located in Corydon, Indiana. I had one on back order for many months and finally in mid 1992 gave up and ordered a Great Planes Tiporare. You can see my Tiporare build thread at
http://www.rcuniverse.com/forum/m_2827386/tm.htm

I love my Tiporare but the awesome beauty and flight of the SBA Speeda kept pulling me back and after some research here on RCU I discovered that the SBA was actually a fiberglass knock off of the MK Blue Angel kit. MK no longer makes the Blue Angel but one of the RCU forum members generously agreed to send me a set of plans so I can scratch build one. The plans are on their way and I'll be documenting the build on this thread.

I haven't seen the plans yet but I understand the FK kit design is pretty complicated so depending how detailed they are I plan on paying for the setup cost to have a foam wing cores custom cut and build the fuse from the typical balsa and plywood. The foam wing should simplify the construction and be lighter than the built up wing used in the kit. I'll build the fuselage light and glass the outside for strength. MonoKote will be used for the wing and horizontal stab and MonoKote paint for the fuselage.

I'll be using one of my OS 61SF LS pumpers for power with a 12X10W APC prop and of course the requisite tuned pipe slung under the wing. Tri-gear Spring Air retracts will be used for the undercarriage to keep the tail up where it belongs on one of the great classics from the rocket ship era.

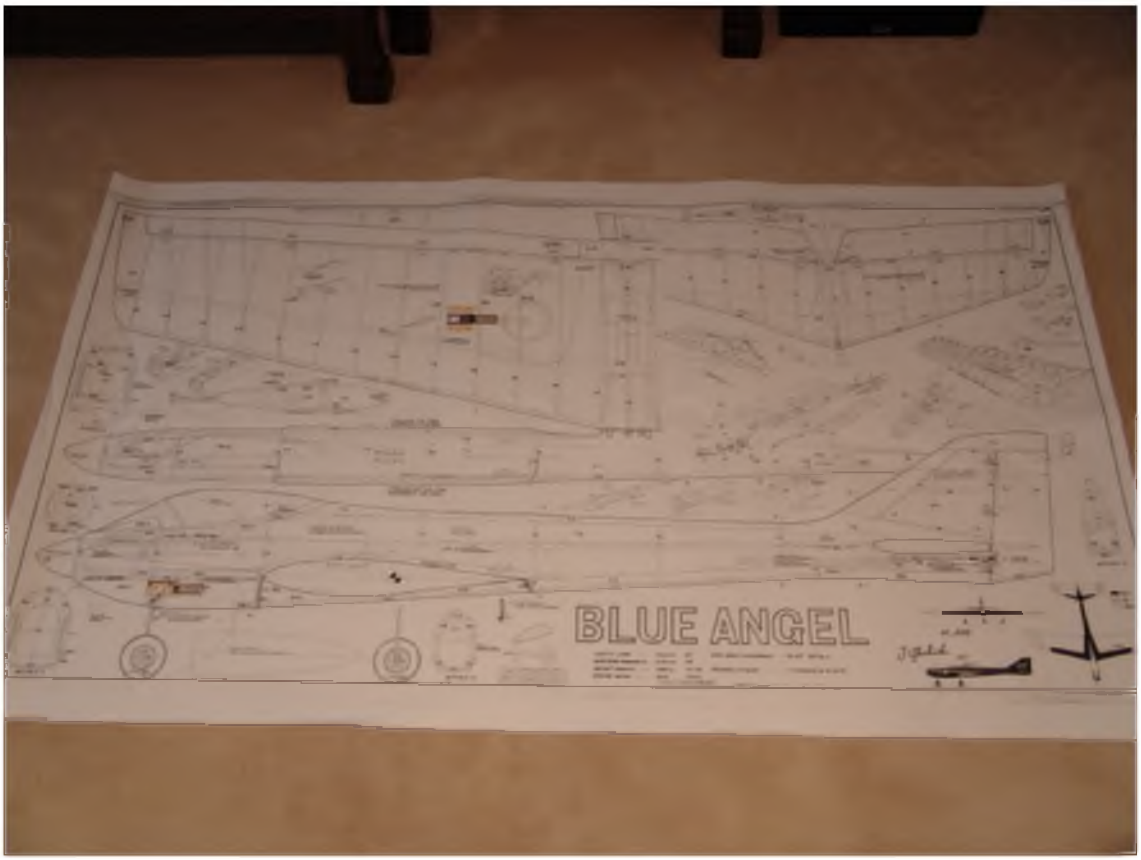
The image on the left is the MK Blue Angel and the one on the right is the FK SBA Speeda on a page from a 90s vintage Mutchler's hobbies sales brochure. T.Yoshioka won the 1973 world championship in 1973 flying the Blue Angel.

This will be my fourth build thread (Blog) on RCU. You can see my Kwik Fli III taper wing build at http://www.rcuniverse.com/forum/m_2434444/tm.htm and my Cold Duck build at http://www.rcuniverse.com/forum/m_3092876/tm.htm

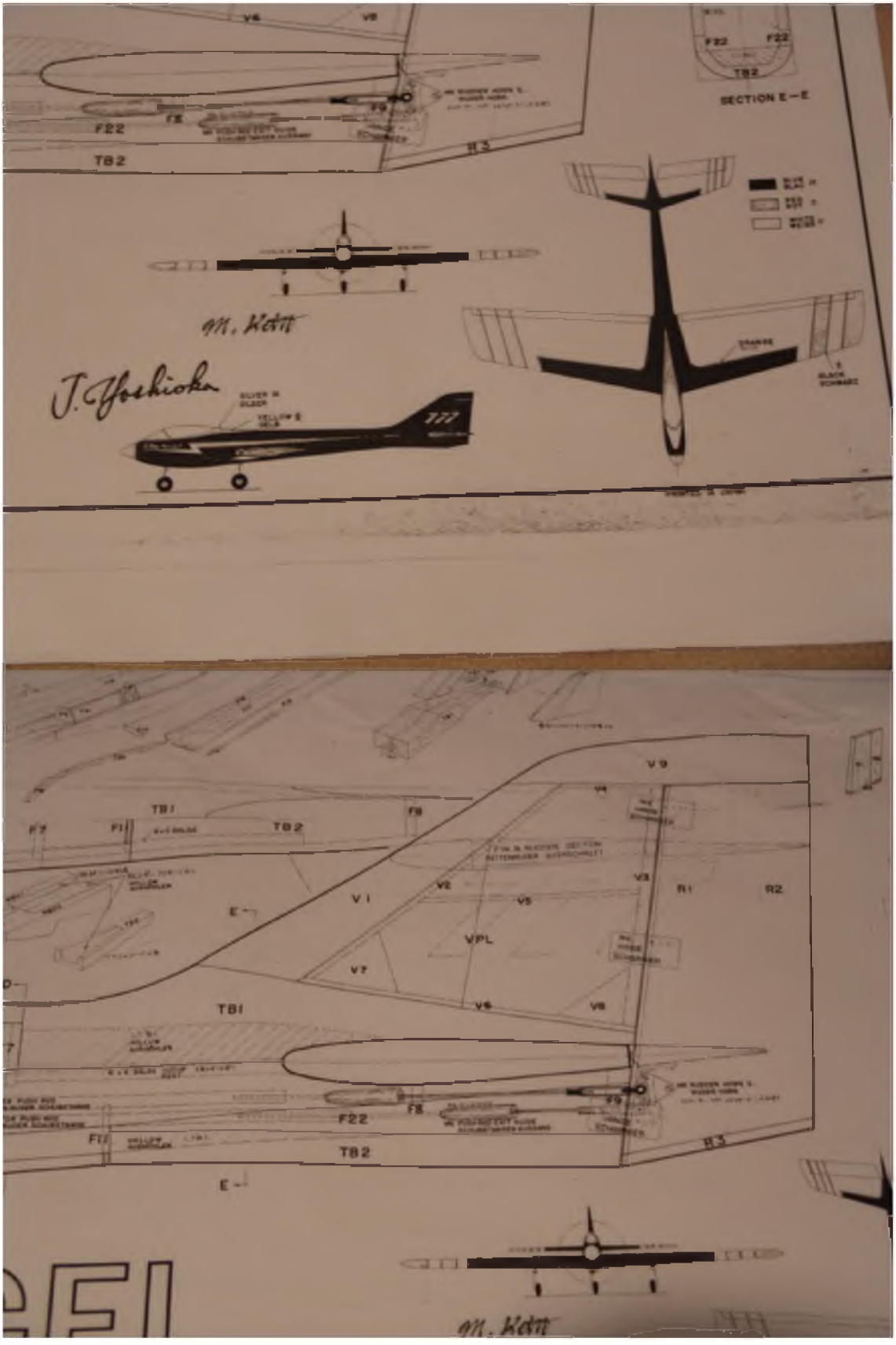
To be continued…

My benefactor with the MK plans sent me the plans. The good news is that the plans arrived in great shape but the bad news is that they do not have drawings of the root and tip airfoil for the wing and horizontal stab needed to make the foam wing templates. So I've contacted him and I'm waiting to see if he will be willing to trace the ribs I need.

View of the plans. Because the fuselage has so many compound curves the construction is very complicated but the beauty of the design is stunning.


BLUE ANGEL


BLUE ANGEL
LENGTH 1400mm 55"
WING 1630mm 64"
WEIGHT 3350g 7¼ LB
ENGINE 60cc 10ccm
WING AREA 45 dm² 697 sq in.
DESIGNED T.YOSHIOKA & M.KATO


V4
V5
F22
F8
F9
TB2
R3
F22
F22
TB2
SECTION E—E
M. Kett
J. Yoshioka
777
TB1
TB2
F7
F1
F8
V9
V1
V2
V3
V5
R1
R2
VPL
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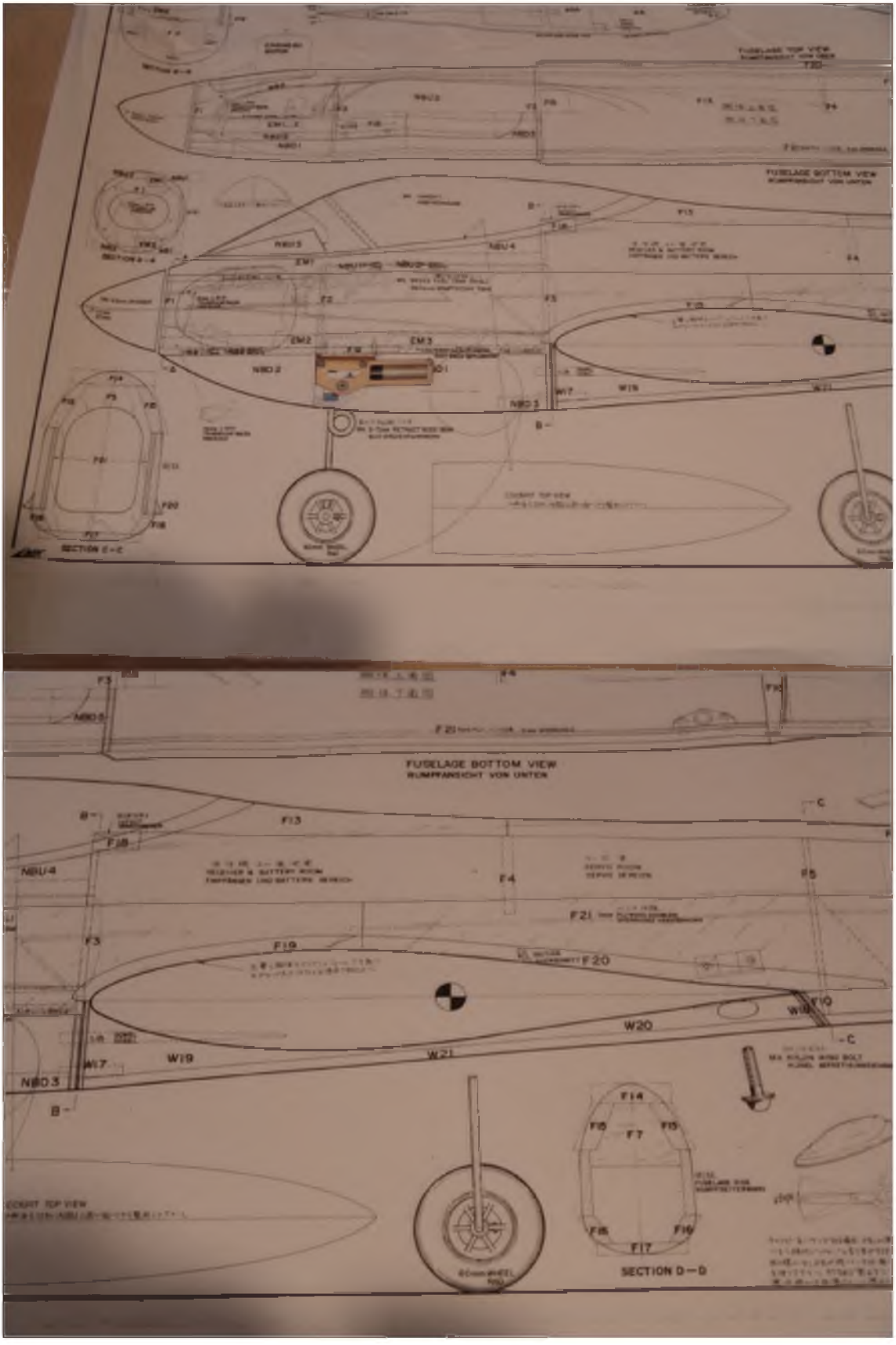
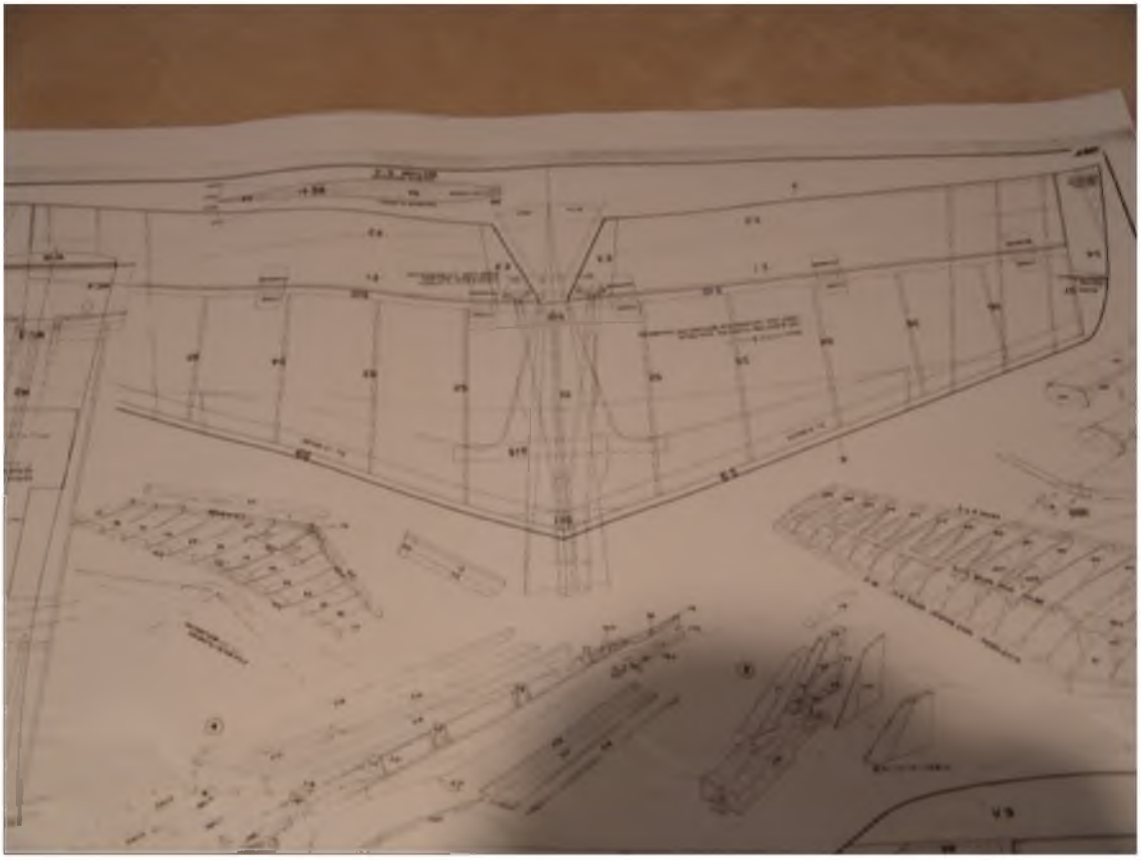
R3
E
E
M. Kett

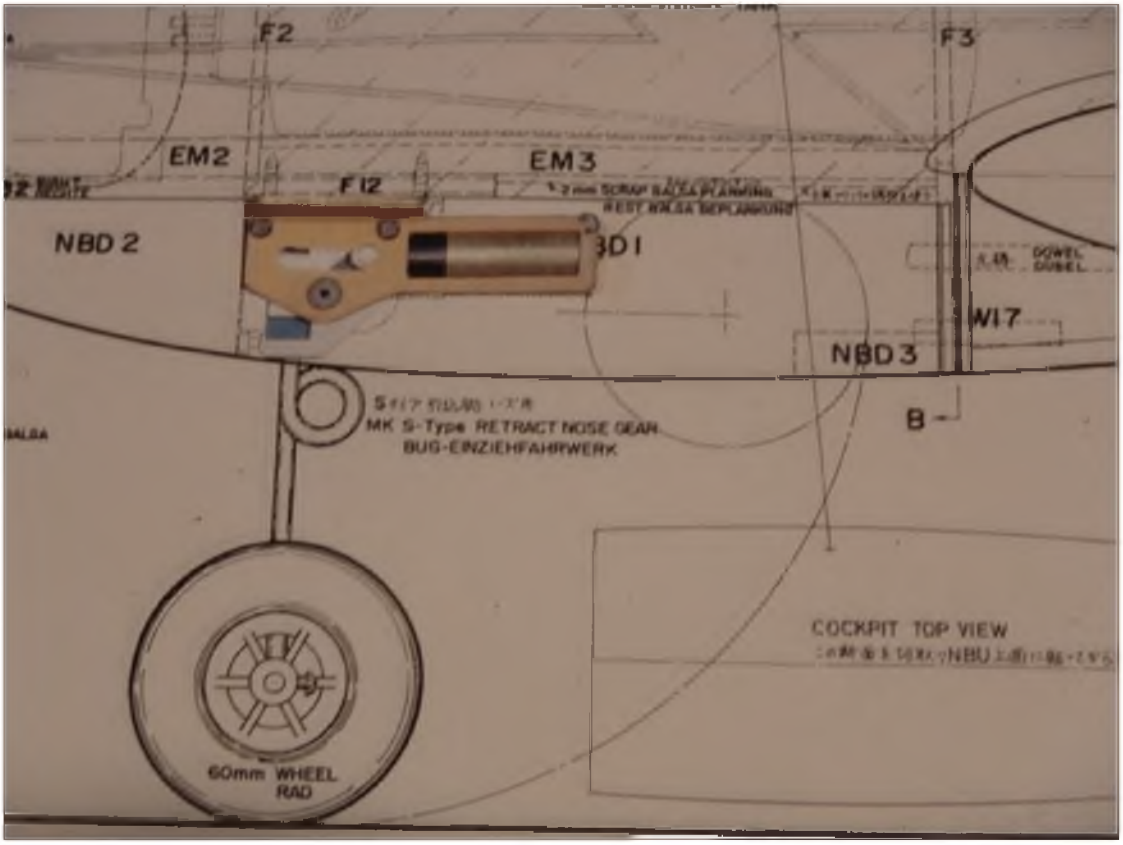

FUSELAGE BOTTOM VIEW
RUMPFANSICHT VON UNTEN
SECTION D—D

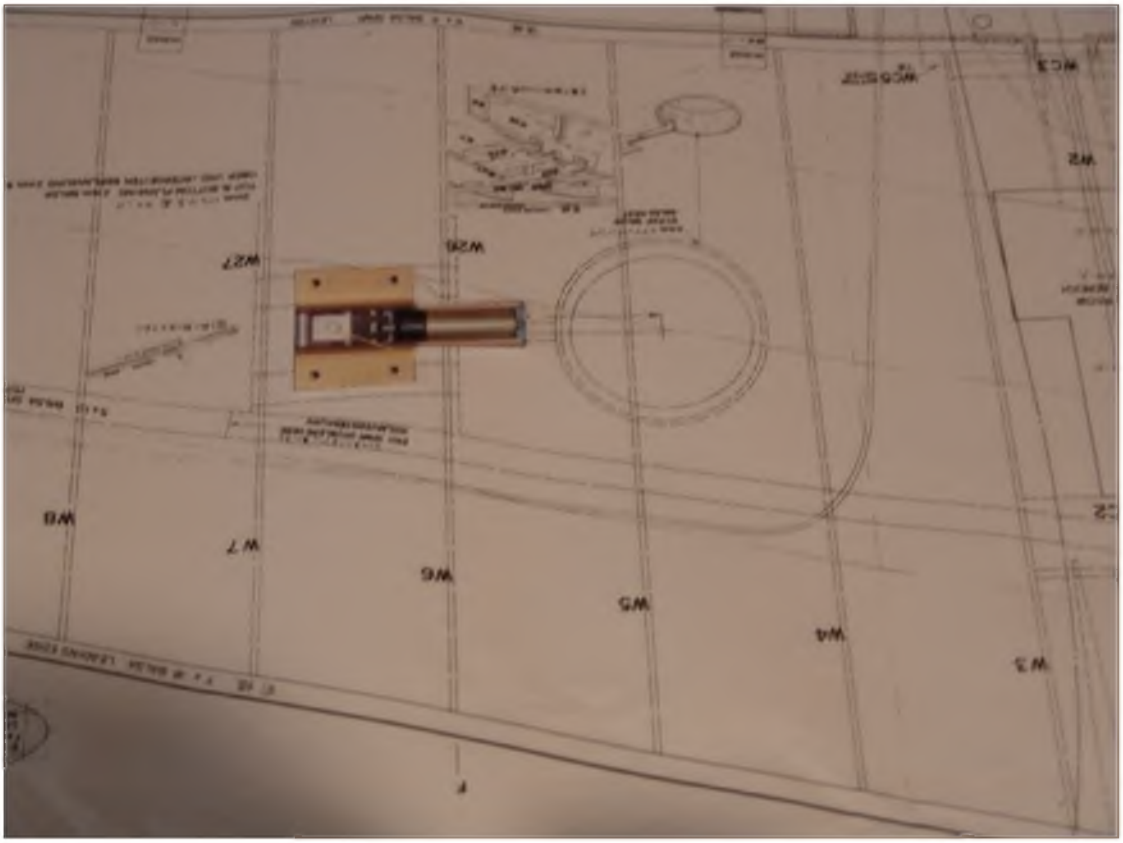


TBC …

I pulled some images of the Spring Air retracts from their website then scaled them and printed them to use as templates to check their fit. I want to make sure I order correct type for the Blue Angel. I'm going to use the Spring Airs because they are the best quality and their service is absolutely super. I'll get my Spring Air order in on Monday.

I will need to use a slightly smaller nose wheel to clear the back of the retract unit.


F2
F3
EM2
EM3
F12
NBD 2
NBD3
W17
MK S-Type RETRACT NOSE GEAR
BUG-EINZIEHFAHRWERK
COCKPIT TOP VIEW
60mm WHEEL
RAD



TBC …

My benefactor on the forum, Ron Ellis (grotto2) came through with the rib template tracings along with the measurements I need to have the foam wing and stab made. Thank you very much Ron.

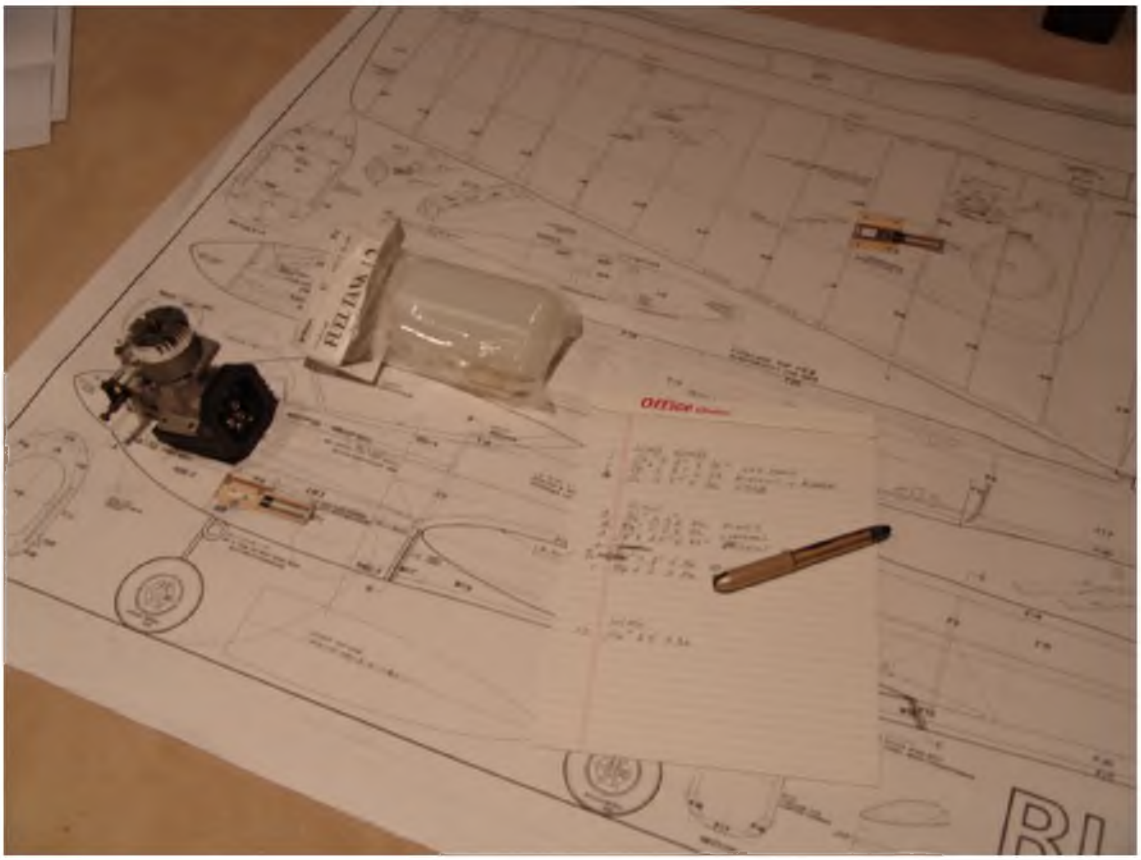
Dan Hines, frequent contributor to this forum and owner of Carolina Custom Aircraft carolinaaircraft@earthlink.net has generously agreed to setup to make my foam wing and stabs. After he gets the templates made for my wing they will be available as part of his kits and parts line up. Thank you very much Dan.

TBC …

My plans and templates left in the Fedex truck on their way to Dan for the foam wing and stab construction. I'm very grateful that Dan decided he would use his time to build the templates and cut the foam for me. I'm anxious to see the wing cores because Dan is known for excellent work.

I ordered the Spring Air retracts today. I'll be using the tri gear set #202 that have 5/32" struts and the nose gear that flat mounts on a cross member behind the firewall. The folks at Spring Air are wonderful to deal with and are a bright spot in our hobby.

I've been spending time looking over the plans and started my wood and hardware parts list. I group my list by aircraft area, wing, stab, fuselage, etc. to make sure I do not miss anything. Most of the metric sizes cross over to inches, e.g. 2mm = 1/16" for wing sheeting. The fuselage construction is pretty complex but once I get started I'm sure it will look awesome!



Completed my Tower Hobbies order today:

Macs Long Tuned Pipe Adapter O.S. .61 SF/FX/FP 1 26.29
Sullivan R-12 Standard Round Tank 12 oz. 1 4.99
Dubro Treaded Lite Wheels 2-1/4" (2) 1 6.99
Great Planes Axle for Wire 1-1/4x5/32" (2) 1 3.49
Top Flite MonoKote Jet White 6' 1 10.99
Top Flite MonoKote Missile Red 6' 1 10.99
Top Flite LustreKote 10 oz. Spray Paint Primer White 1 6.99
Top Flite LustreKote 10 oz. Spray Jet White 1 6.99
Dubro Heavy Duty Strip Aileron Horn Set 1 3.89
Sullivan Gold-N-Clevis 4-40 (2) 1 1.59
Goldberg Wheel Collars 5/32" (4) 1 2.49
Goldberg Link Rods (6) 1 1.99
Tower Hobbies Plywood 1/4x6x12" (1) 1 1.79
Tower Hobbies Plywood 1/8x6x12" 5-Ply (1) 1 1.79
Dave Brown Spinner 2-1/2" Standard 2-Blade Aluminum 1 21.99
Dave Brown Adapter Nut Short 5/16-24 1 5.69
Dave Brown .60 Hush Clamp Vibration Mount 1 7.59
$20 Promotional Discount 1 -20.00
SHIPPING AND PAYMENT
In-Stock Items: $106.53
Standard Shipping: $7.99
Total $114.52

I have a lot of stuff on hand, hinges, glue, MonoKote, paint, etc. so the list does not reflect all the parts that will be used. Because of the limited space in the nose I decided to use the fiber impregnated motor mount that came with my Tiporare GP kit rather than the Sullivan flex mount like I used in the Tiporare. Because the fuselage is balsa and plywood it should absorb some of the engine shock.

I'm still working on the Dynamic Balsa order.

To be continued…

Dan Hines at Carolina Custom Aircraft carolinaaircraft@earthlink.net received my Blue Angel plans, wing rib tracings and some other drawings yesterday. He is considering doing a build thread on this forum to show how the Blue Angel wing and stab is made from the plans and tracings. I'm looking forward to Dan's thread and to see my wing during the template construction and cutting.

To be continued…

I completed my Dynamic Balsa order http://www.dbalsa.com/ order today. Dynamic Balsa does a great job and I like the quality of their balsa.

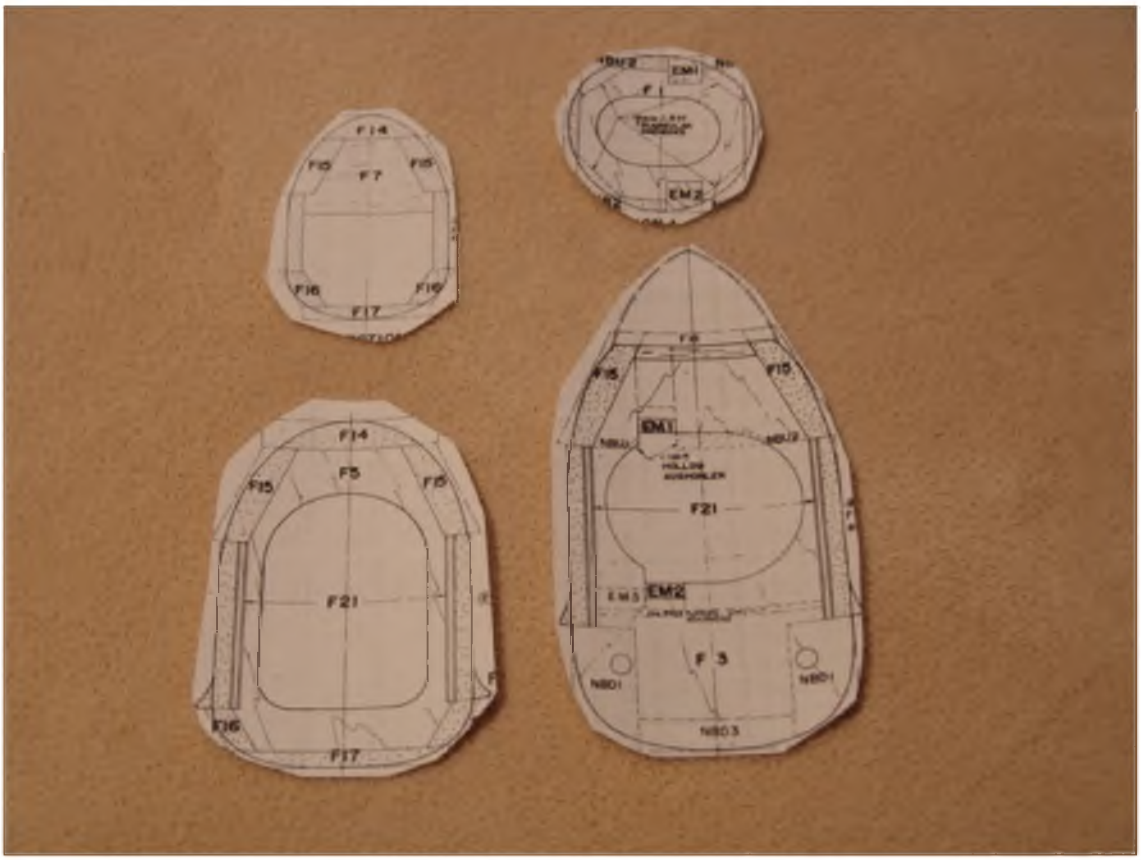
I have a few 1/16" balsa sheets left over from another project to help cover the stab. The shipping on this order could be around $20.

Quant'	Size	Type	Use	Cost
3	¼"x 2"x 36"	Balsa	Stab and wing edges	$4.65
1	½" x 3"x 36"	Balsa	Elev & Rud	$1.98
2	1/16" x 3" x 36"	Balsa	Stab sheeting	$1.58
3	1"x 2"x 24"	Balsa	Fin front, top & stab tips	$8.70
12	1/16" x 4"x 36"	Balsa	Wing sheeting	$15.00
1	2"x 2" x 24"	Balsa	Wing tips	$4.05
3	3/16" x 3" x 36"	Balsa	Fuse sides	$5.01
3	3/8" x 2" x 36"	Balsa	Fuse corners	$4.98
1	1/8" x 12" x 24"	Light Ply	Fuse sides	$4.00
1	3/16" x 3" x 36"	Balsa	Fuse bottom	$1.67
1	3/8" x 2" x 36"	Balsa	Fuse top	$1.66
1	2" x 4" x 12"	Balsa	Fuse lower front	$4.73
1	2" x 2" x 12"	Balsa	Fuse top back	$4.05

Total Cost $62.06

To be continued…

I made a spare copy of the plans to cut up for templates. These will be rubber glued to the plywood and balsa stock and then cut out with my Dremel Moto-Shop jig saw. The firewall is not shown on the plans but I'll create a template from the top and side views.



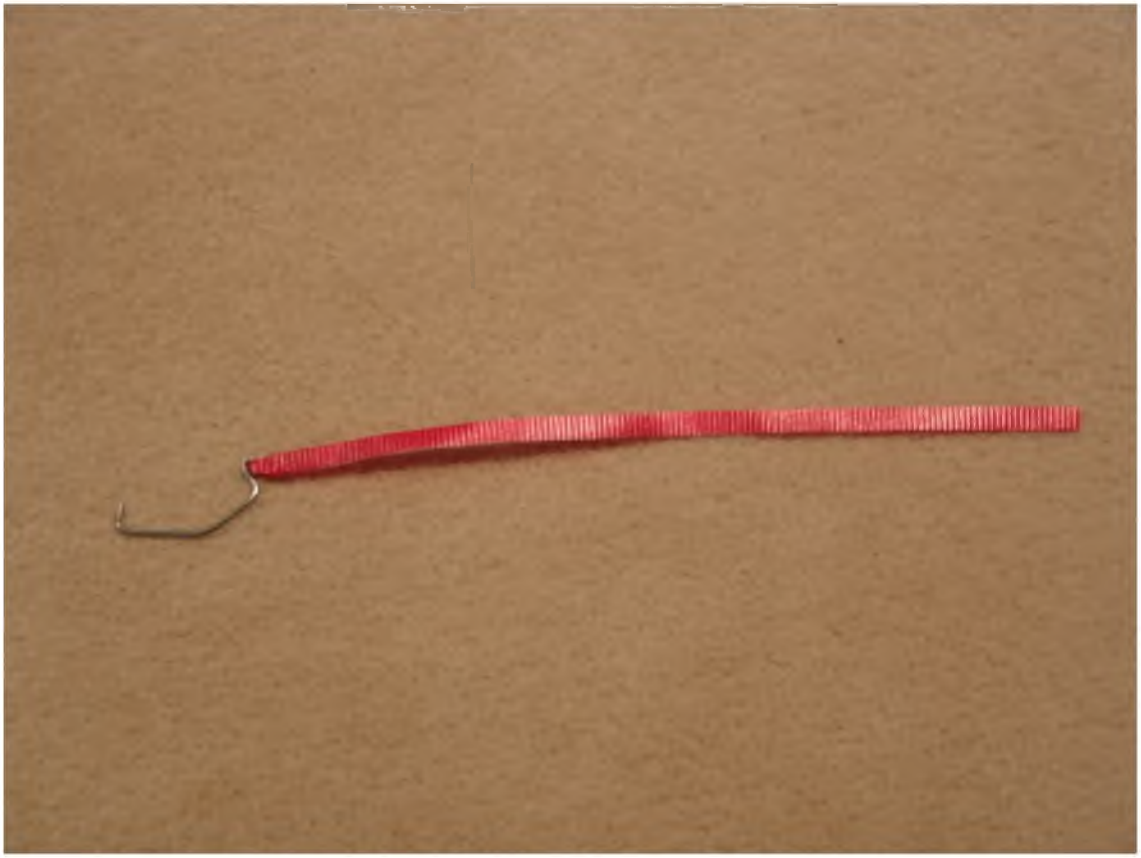
To be continued…

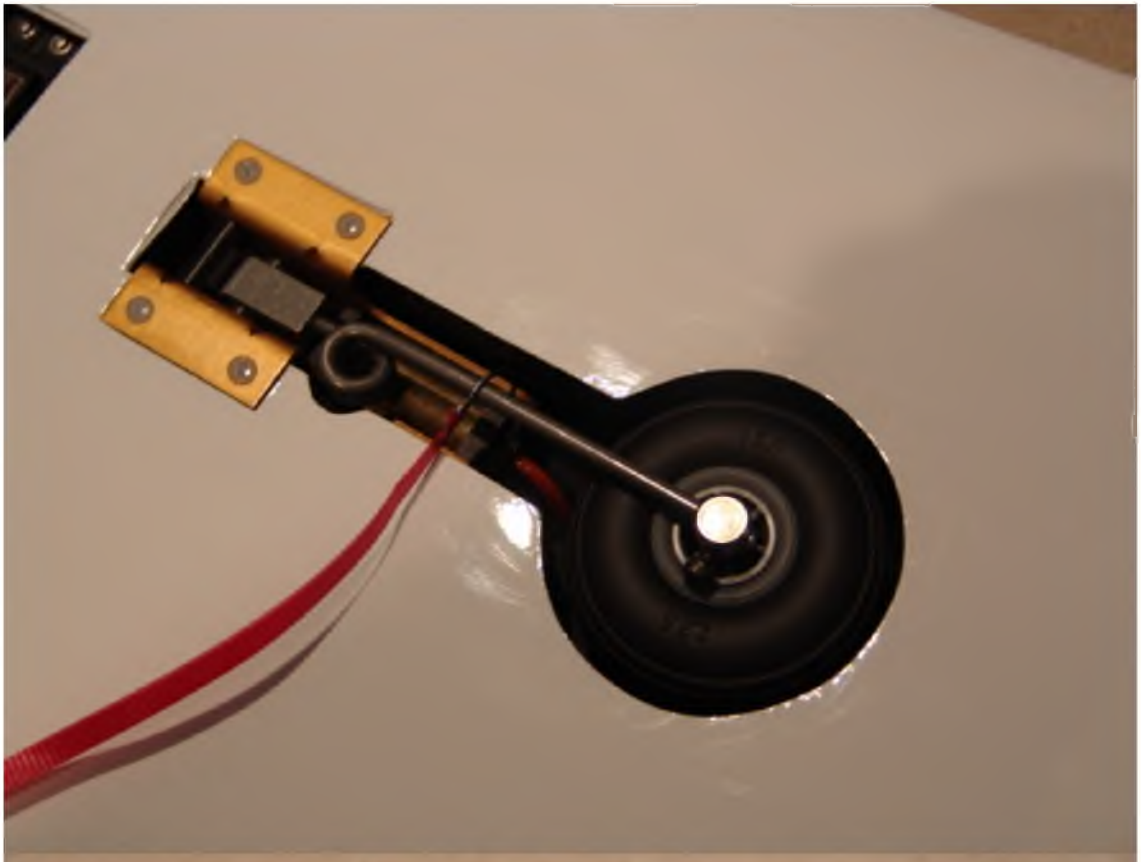
The Spring Air retract order arrived today. What super great quality! I see that the units are a little different than my 1991 vintage units that I'm using in the Tiporare. The new units have an improved aluminum pivot block that is the full width of the retract frame providing more bearing surface for the locking pin and a improved locking system. The frame is thicker as well.

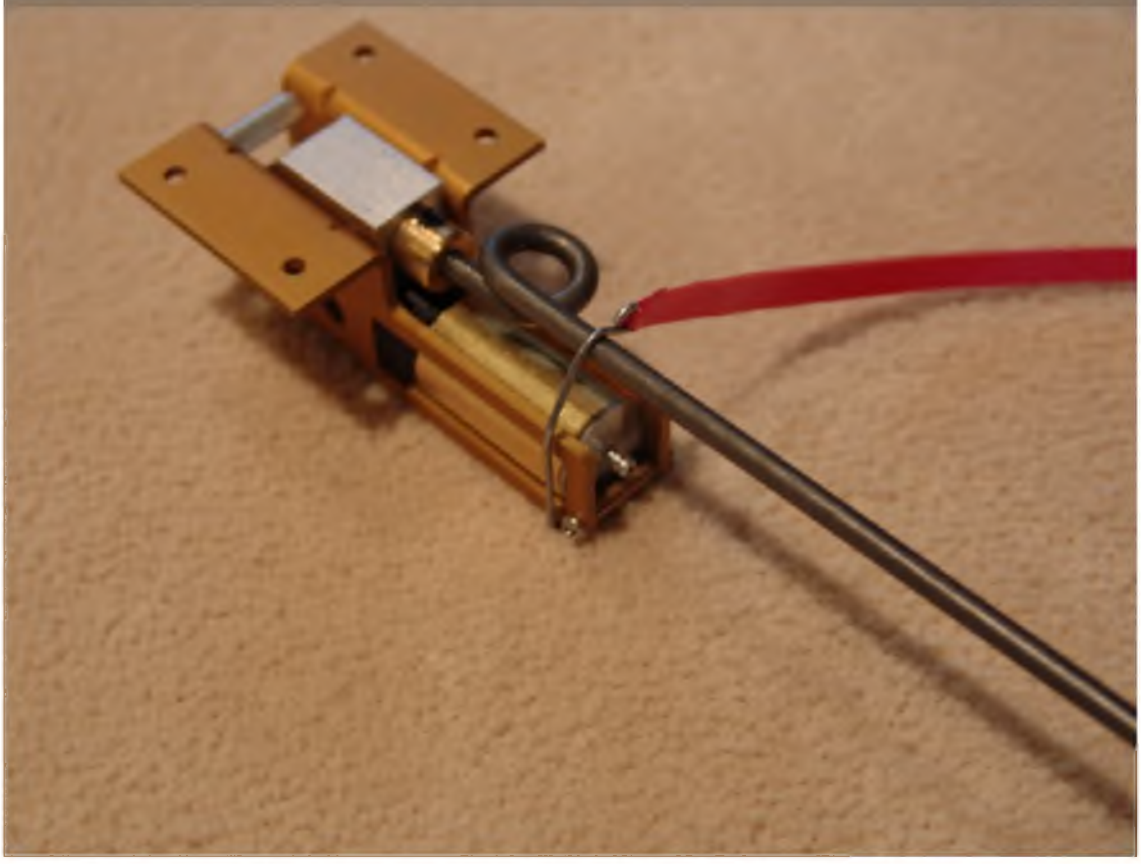
With the special 25% discount Spring Air is offering the cost was $150 plus $6 shipping.

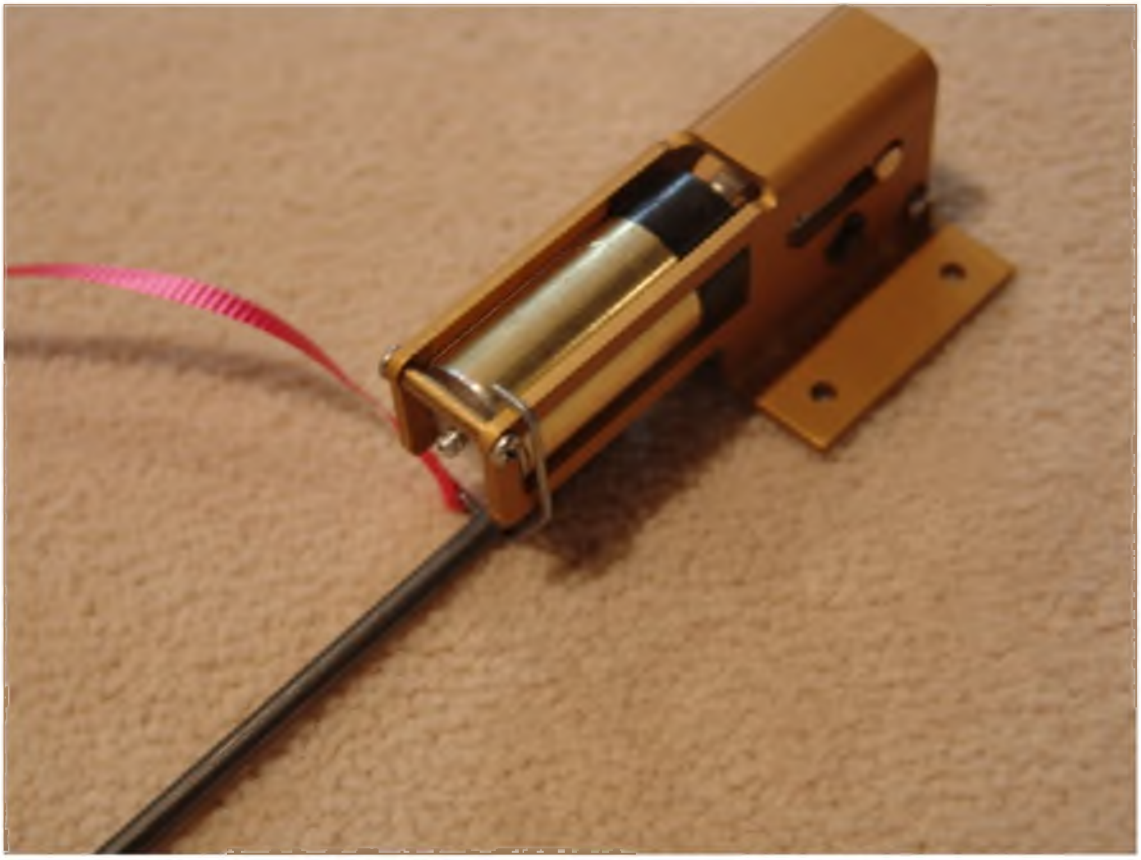
TBC …

One of the things I always liked about the old Rom-Air retracts is that they would stay retracted for transporting and aircraft storage. While I was ordering my new Spring Airs they suggested a simple solution to keep the Spring Airs retracted. I just made a small wire retainer with a ribbon attached to it so it would not get lost. Pretty slick!









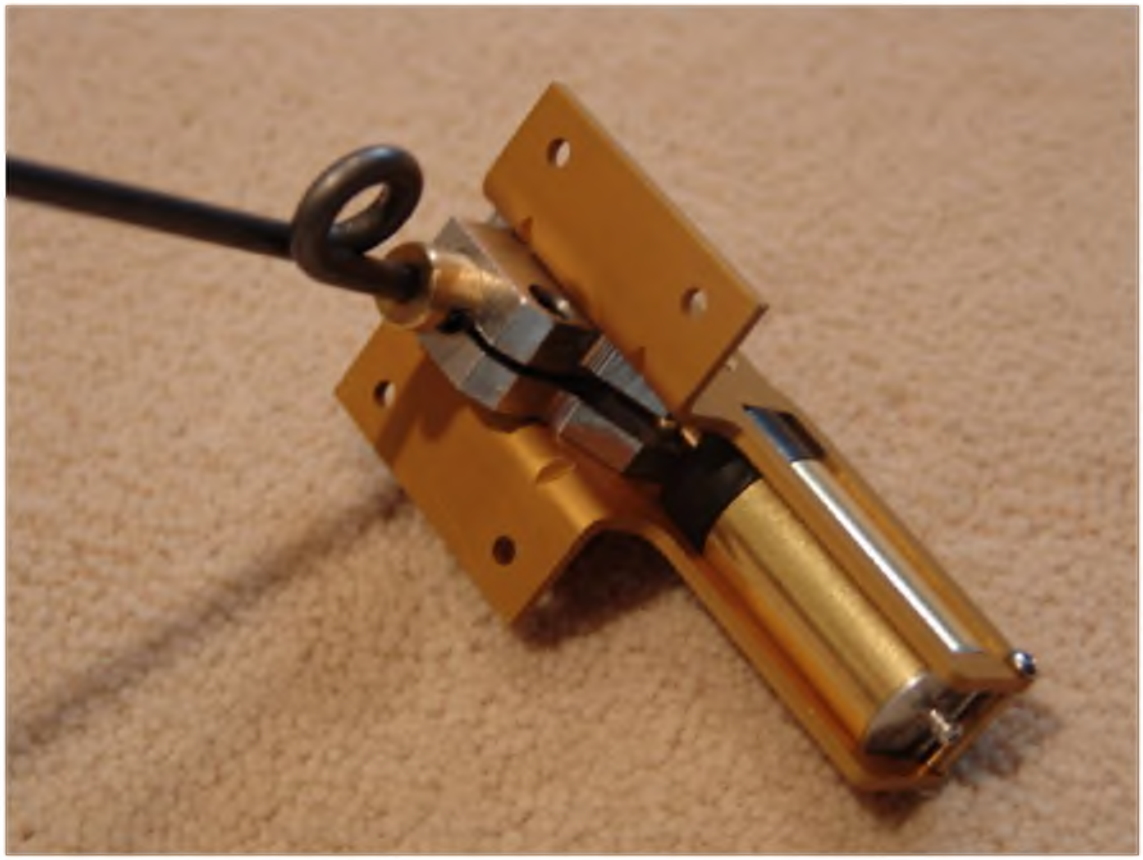
To be continued…

I've been on the road for a few days and when I returned my Tower order was waiting. My Dynamic Balsa order should be next.

To be continued…

Close ups of the improved design of the Spring Air retracts compared to the older units. The pivot block is wider providing a better locking surface with the locking pin, stronger support with the frame sides and a larger bore for the strut attachment. The strut adapter can be

adjusted and clamped AFTER the flats are ground on the strut to fine tune the strut alignment. They have changed the slots in the side frame so that the locking pin drops into a dwell to improve the locking force and the frames are thicker with strengthening webs on the mounting flanges. A larger piston is also used to lift heaver gear with less air pressure. And the best part is that they are engineered, manufactured and assembled right here in the good old USA.



To be continued…

Dan at Carolina Custom Aircraft has started the process for cutting my foam wing and stab and you can follow his RCU thread here
http://www.rcuniverse.com/forum/m_4039073/tm.htm

TBC …

After further inspection of the Dave Brown spinner I found a nick in one side of the blade cutout, so I sent it back with the adapter to have Tower replace it with a Tru Turn FAI 2 1/2" spinner LXKD68 and Tru Turn adapter. Tower is super great about returns and pay the return postage as well.

I'm still waiting for my Dynamic Balsa order and they say I should have it next Wednesday. I'm getting impatient to get the balsa dust flying!

I found a NIB OS 61 SF ABC-P #17712 for my Blue Angel on ebay that one of my fellow ebay bidders let me have for only $183.51 and only $2.50 more than he wanted to pay! Thank you fellow ebayer, it's for a good cause and for a world class "classic"! I paid about $25 more than the last one I got on ebay last year, but they don't come up for auction often and I need it now. That gives me one new one running in the Tiporare, one for the Blue Angel and one NIB for back up. Not sure why I end up have three engines of each type, three Webra 61s, three RJL K.61s, three OS 61 SFs, etc.

TBC ...
---
quote:

ORIGINAL: grotto2

Nice engine, Mike!

Are you planning on going with beams per the plans, or try to work in a radial mount?

The latter would be my preference.
BTW, I recently picked up a NIB YS60SE in an Orlando hobby shop for $131 for my BA. I have an OS muffler adapted to fit it.
-Ron

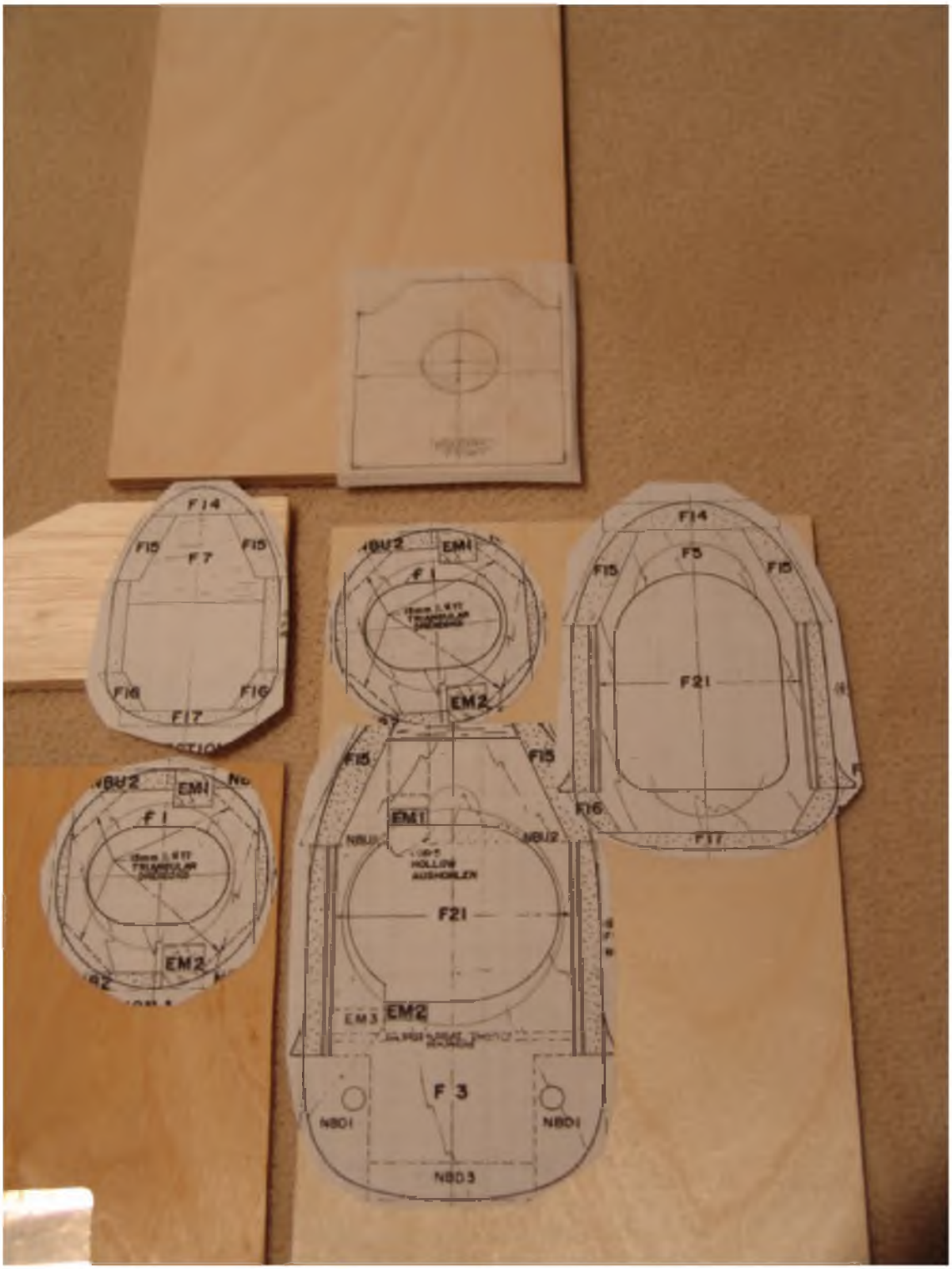
Ron,

Funny you should mention the engine mounting and eliminating the beam mounts! This evening I've been working on the layout of the firewall and will be using the radial mount that was left over from my Great Planes Tiporare kit. I considered the Sullivan flex mount like I used in the Tiporare but the firewall surface space is too small. As you know there is no firewall former plan view shown on the plans so I created a layout from the side and top view. The firewall with be ¼" plywood and will tie into the light ply fuselage side doublers.

Great buy on the YS60SE1.

TBC …

I rubber glued the paper templates that I cutout from the copy of the plans to the plywood and balsa parts. Then I cut them out on my Dremel Moto-Shop jig saw. I'm not sure that I'll use the odd shaped plywood part that was used in the kit for the nose ring. I made a new round nose ring that I typically use.


F14
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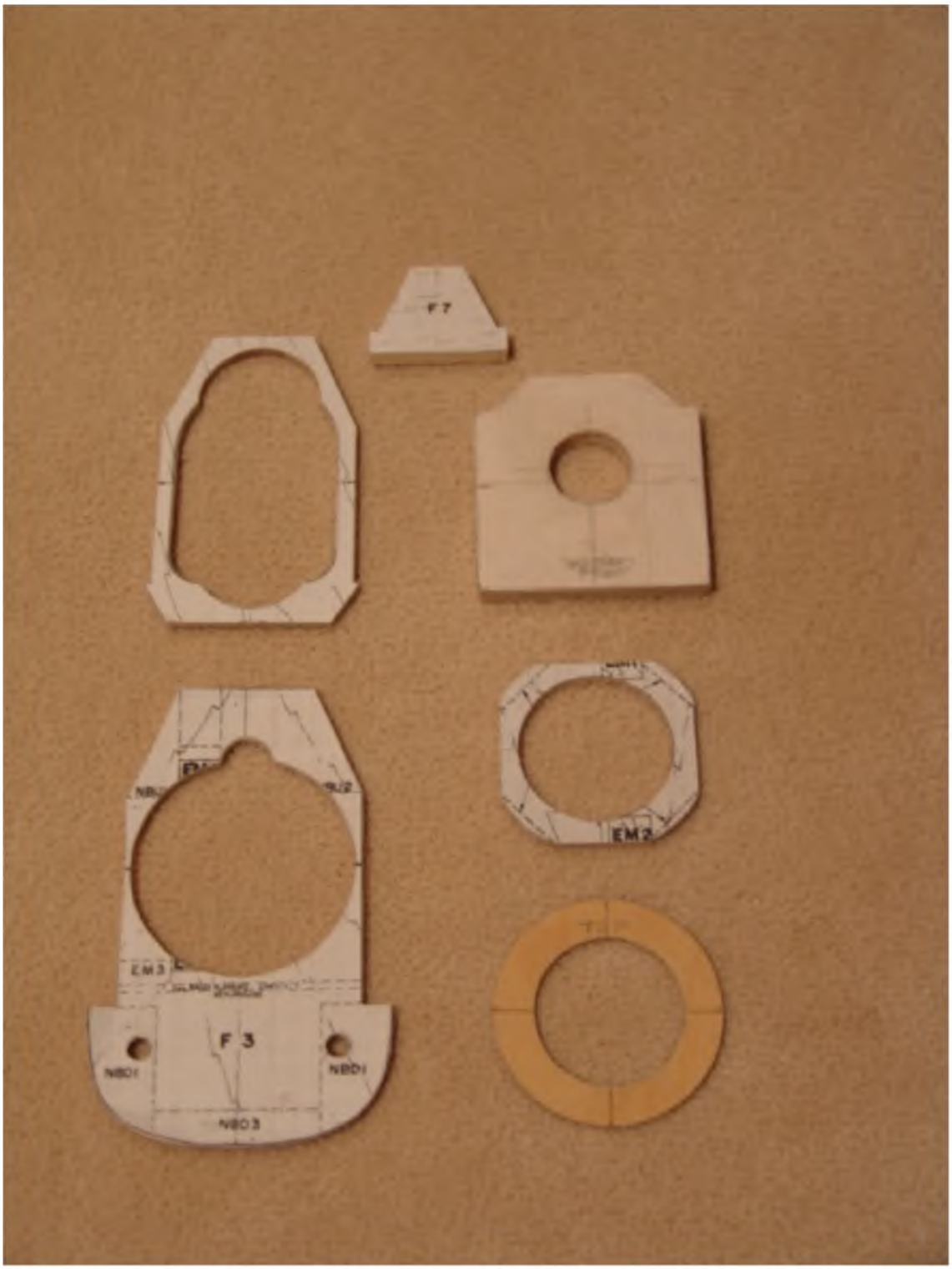
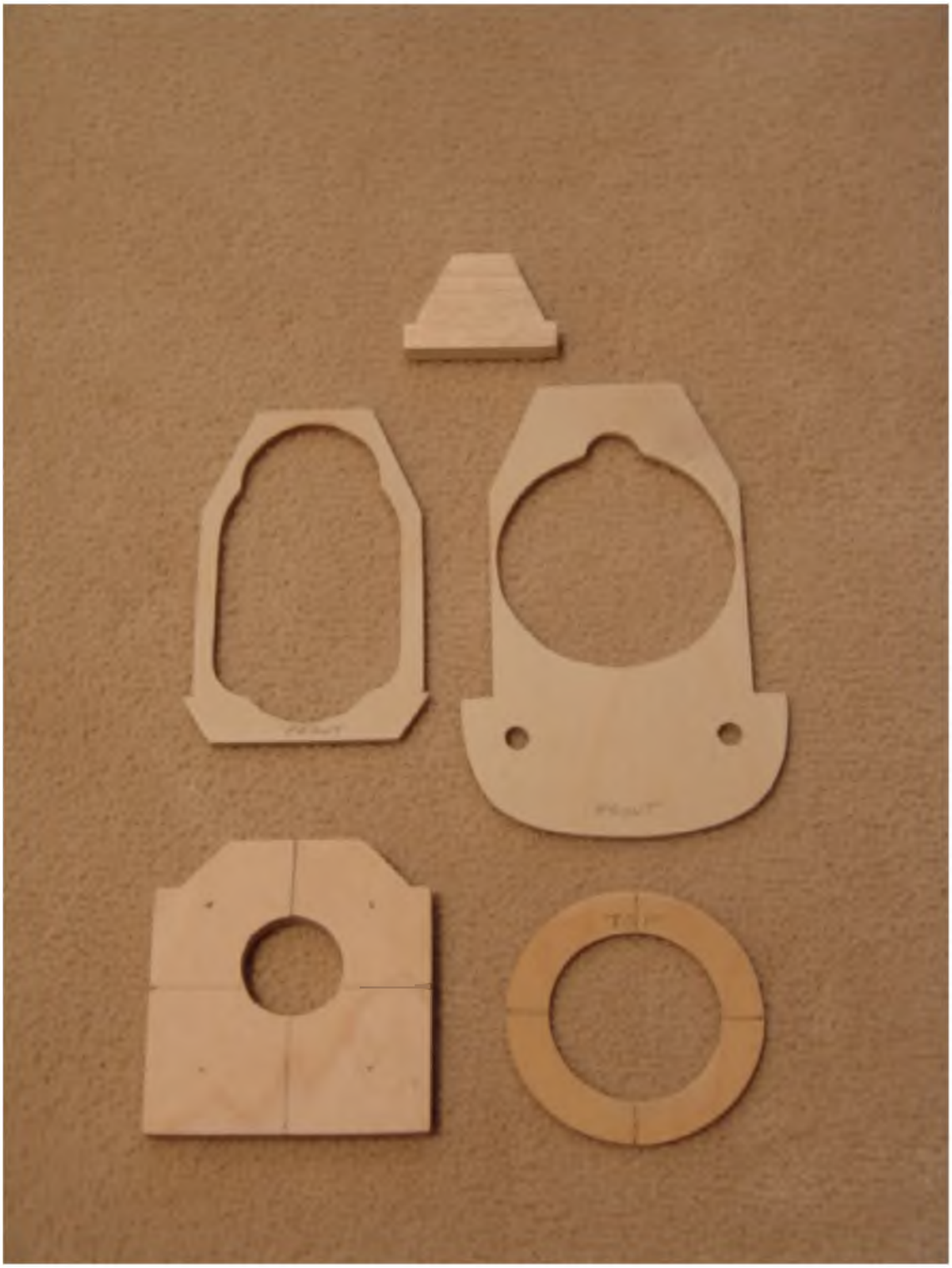


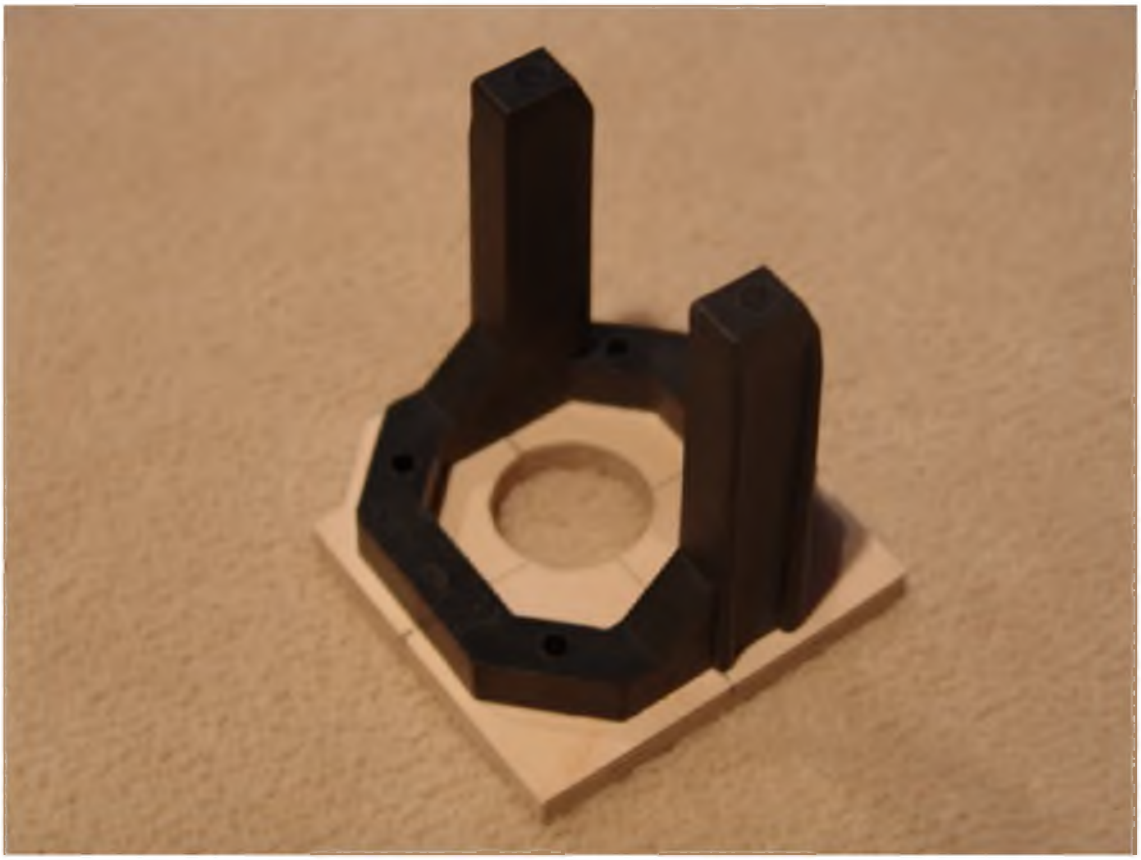
To be continued…

View of the parts with the template paper removed.



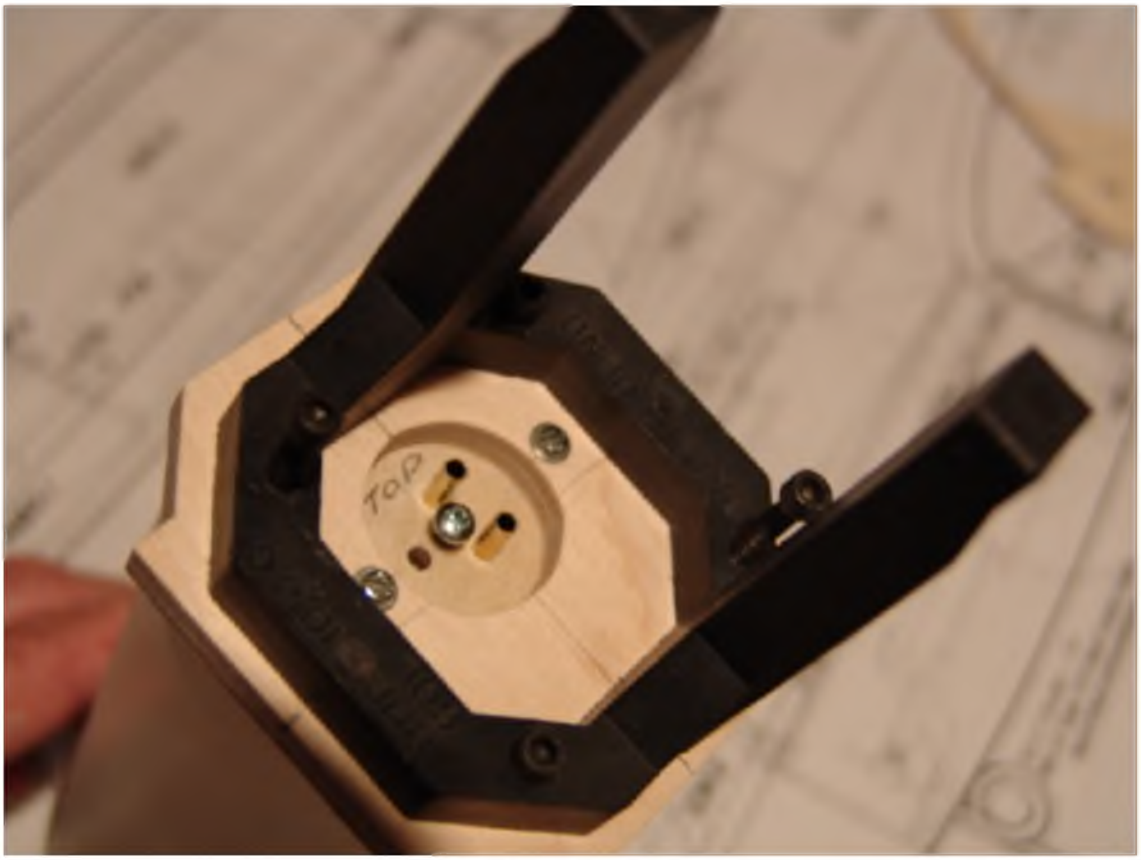
TBC …

After cutting out the firewall I test fitted the motor mount, then clamped it in place and drilled the mounting holes for the 6-32 bolts. After drilling the holes I counter sank the back side of the holes slightly for the blind nuts. I make the blind nuts a tight fit and pull them in place buy using a large washer on a 6-32 bolt from the front. After they are pulled in place I soak CA in around the outside edge of the blind nut flange to strengthen the plywood around the nut area.

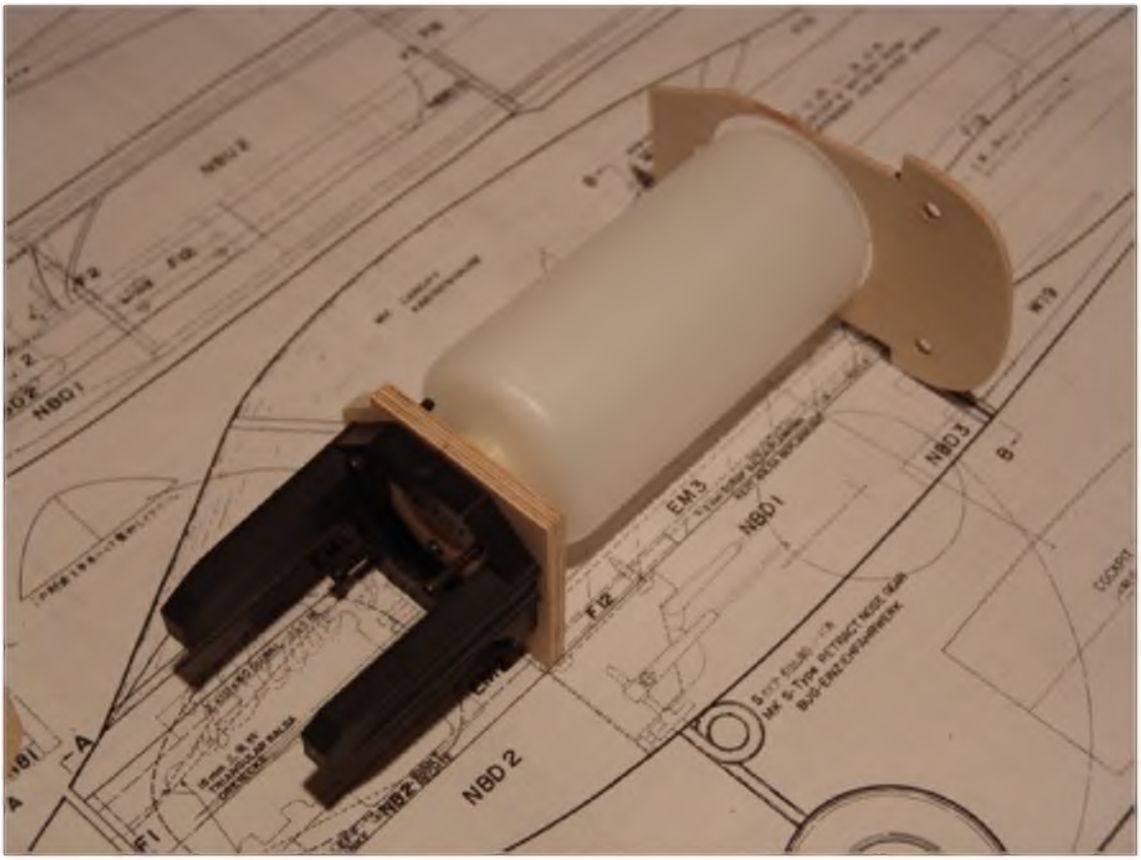


To be continued…

The fuel tank mounting system idea I'm using is borrowed from Howard Engineering kits. I've used it for decades on a number of different Howard Engineering kits, two Kwik Fli IIIs, two P-51 Mustangs, Hawk and a Flying Boat. It works very well and I've adapted to all the aircraft I build. In these images the third fuel tank line has not been installed yet. The pump on the OS 61 SF ABC-P uses the third line to return fuel back to the tank kind of like fuel injection systems do. I'd like to use a 16oz tank but there is not enough room.


Top


EM3
NBD1
E12



Let me get this straight. You replaced the cap on the fuel tank stopper with a 1/4" plywood plate consisting of two blind nuts for two bolts through the firewall. Is this correct? You get a complete sealed fit between the tank and the firewall.

Jim

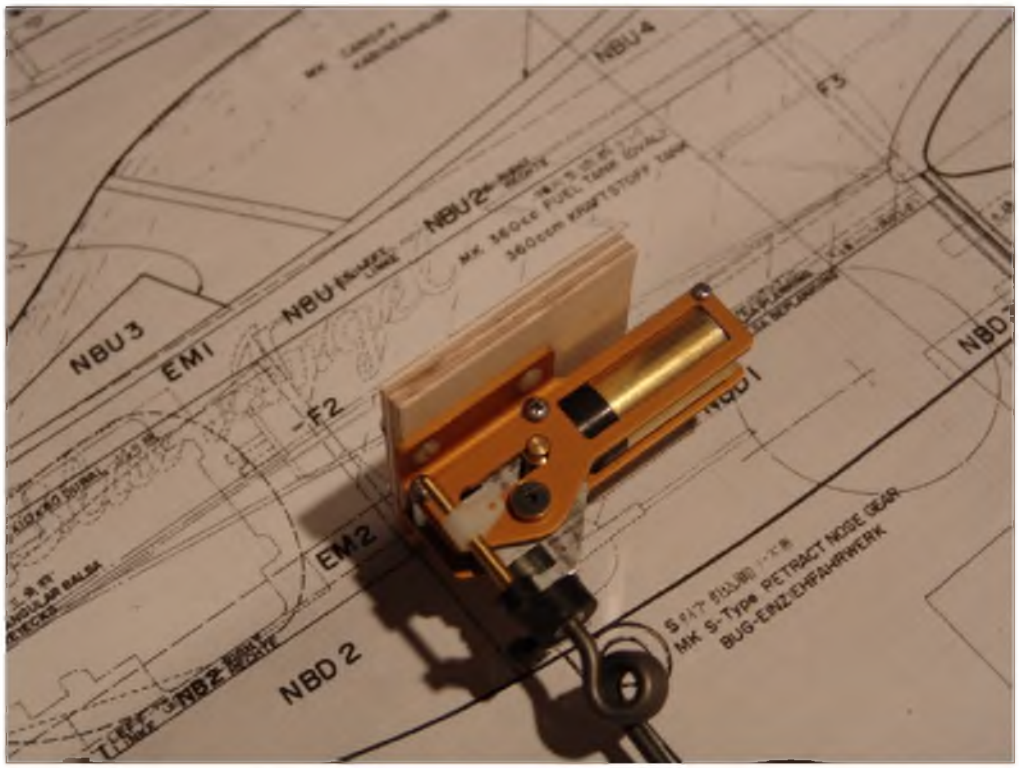
--

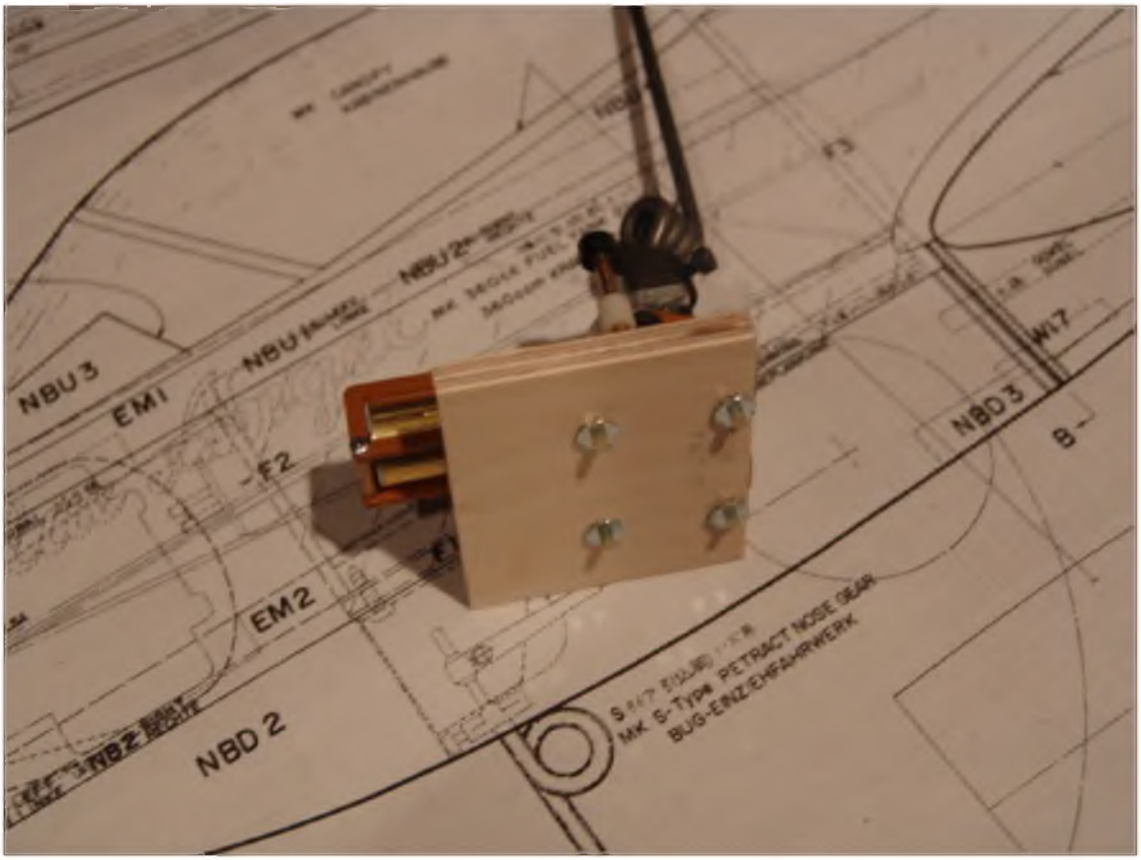
Jim,

Before Sullivan made the cover that wrapped around the front lip of the tank we removed the front piece and replaced it with the plywood. When they added the new wraparound front piece I just added the plywood part in front of the plastic wraparound piece. Tony used a fiberglass disk in the later Howard Engineering kits. Works great!

TBC …

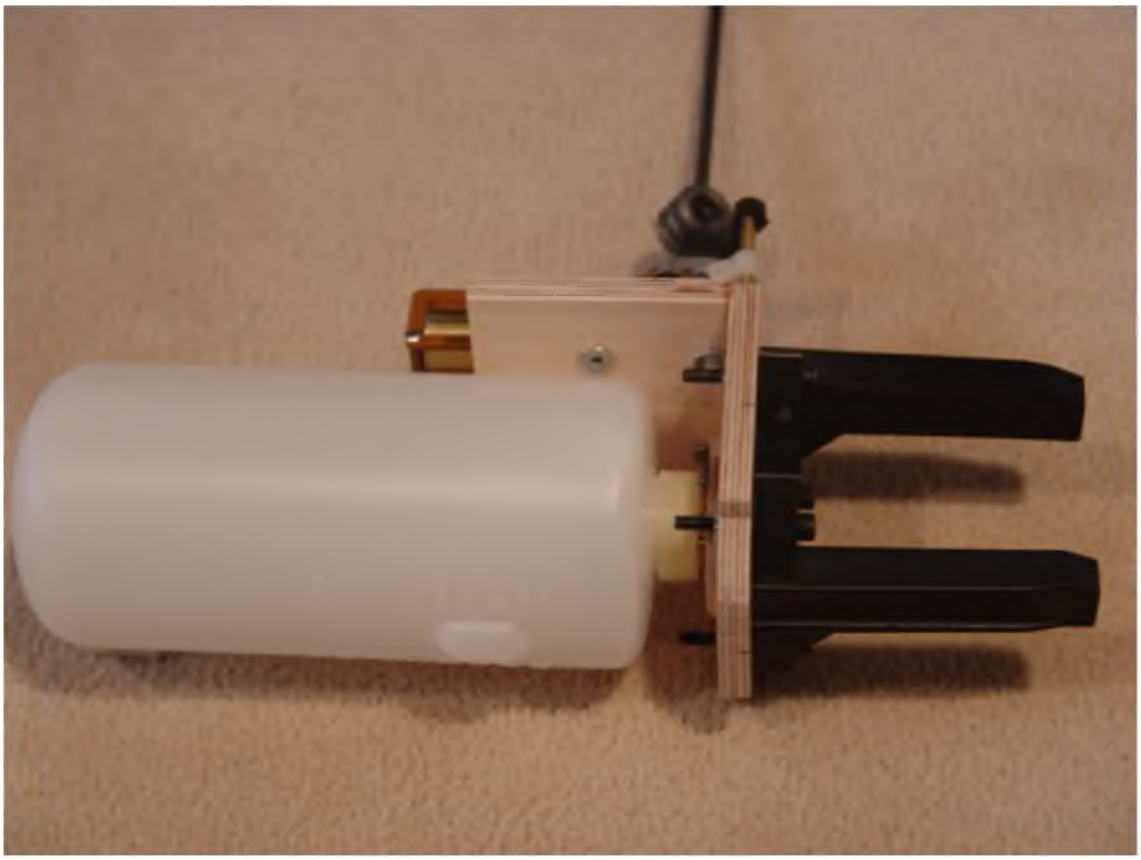
The nose gear on the Blue Angel is a belly mount and mounts to a ¼” piece of plywood.





To be continued…

The nose gear mount is glued to the back lower edge of the firewall with 30 min epoxy. I used a square to keep it aligned while the epoxy set. I like to build the firewall, nose gear mount and tank mount as a unit before it is installed in the fuselage so there is easy access for drilling holes and installing all the blind nuts, etc.



To be continued…

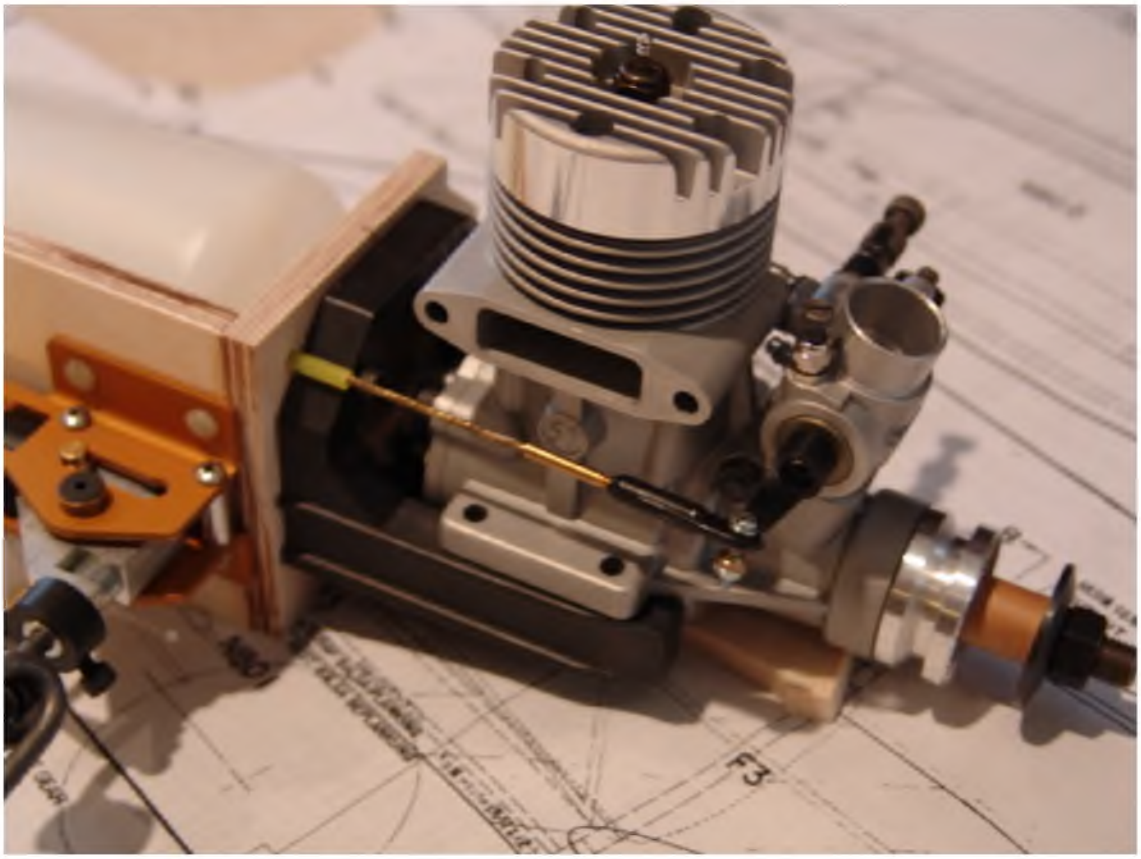
8178,

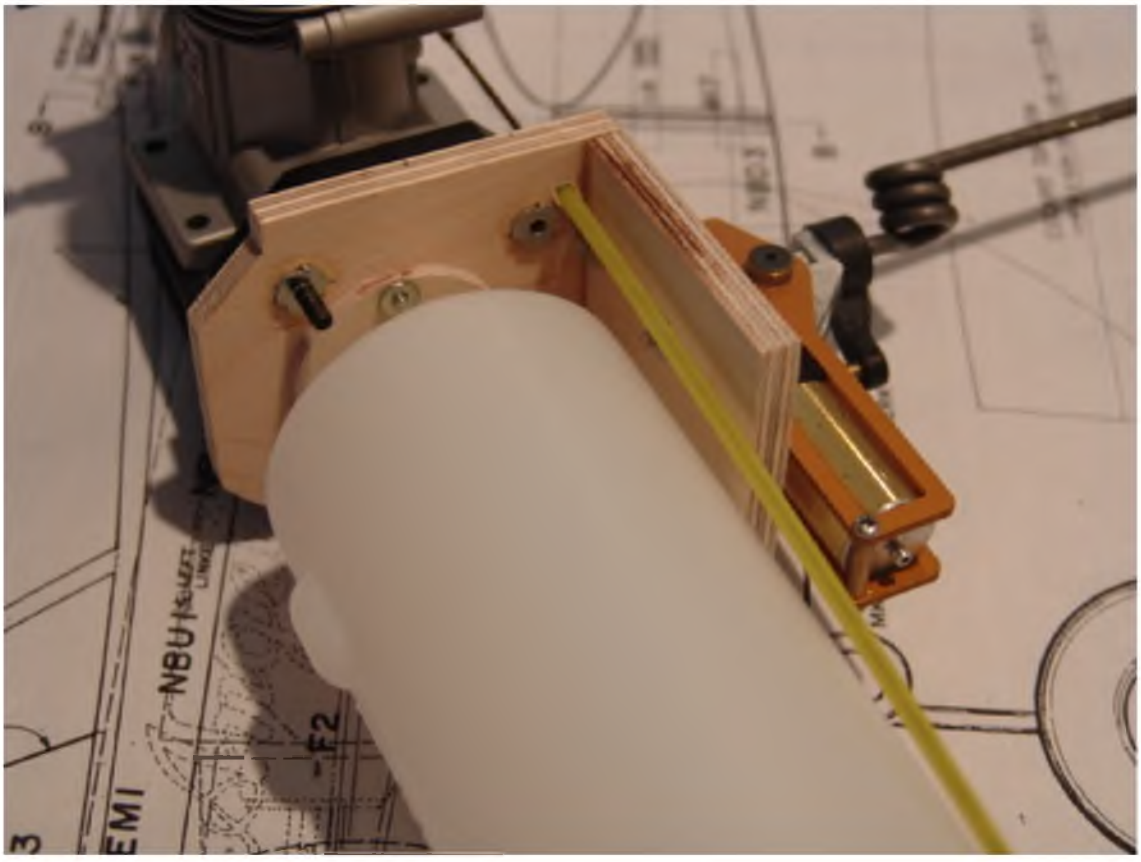
Does your steering arm extend out beyond the edge of the firewall, or is it just the angle of the pic? Just wondering how you were going to overcome that if it does extend out too far. Tim

--

The original Blue Angel used beam mounts and only had a thin firewall, so I've modified it by designing the firewall to hold the radial mount. The area from the bottom of the firewall to the front of the aircraft and the bottom of the nose is a balsa block. I'm not sure that the arm will need to go forward beyond the firewall line for steering movement but if so I'll hollow out space for it in the balsa blocks. I'm flying a little blind because I'm building from plans that are designed to build a kit with pre cut wood and from my memory of my friend's FK speeda.

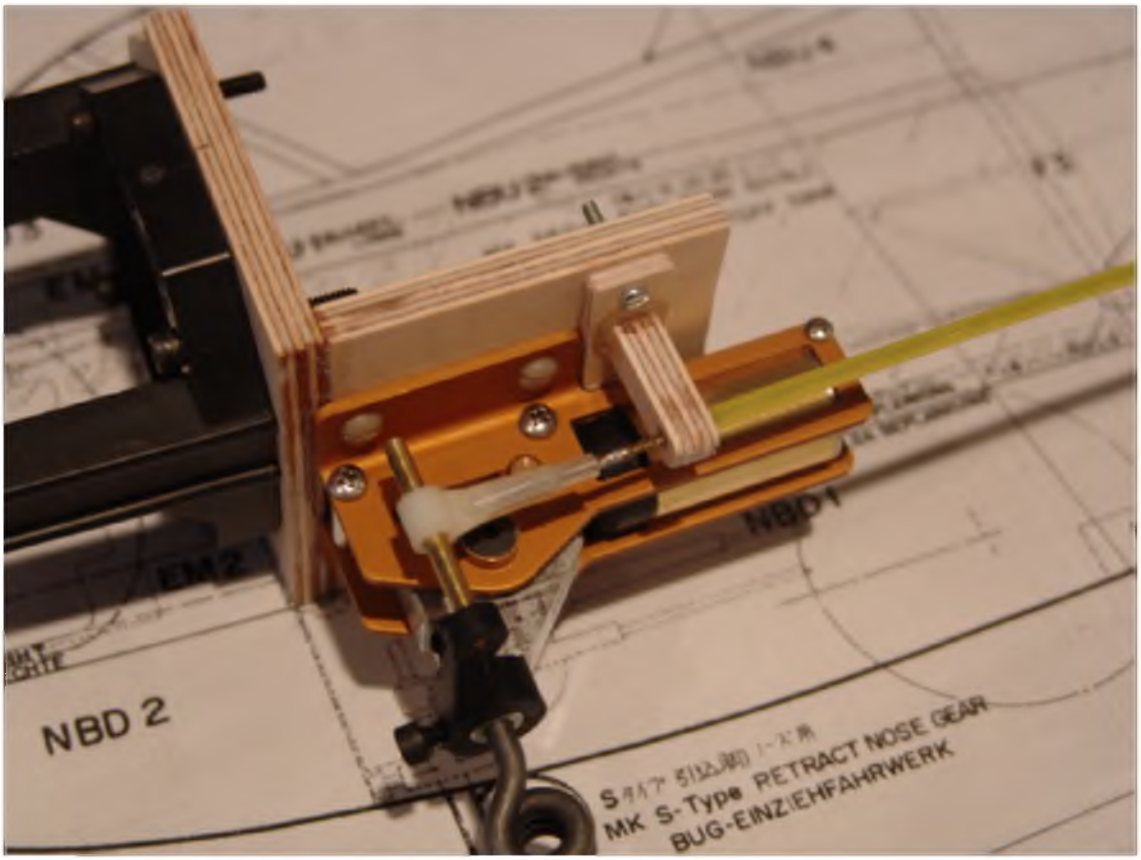
Continuing my theme of completing all the firewall stuff before installing it in the fuselage I drilled the hole for the throttle cable and test fit the configuration.

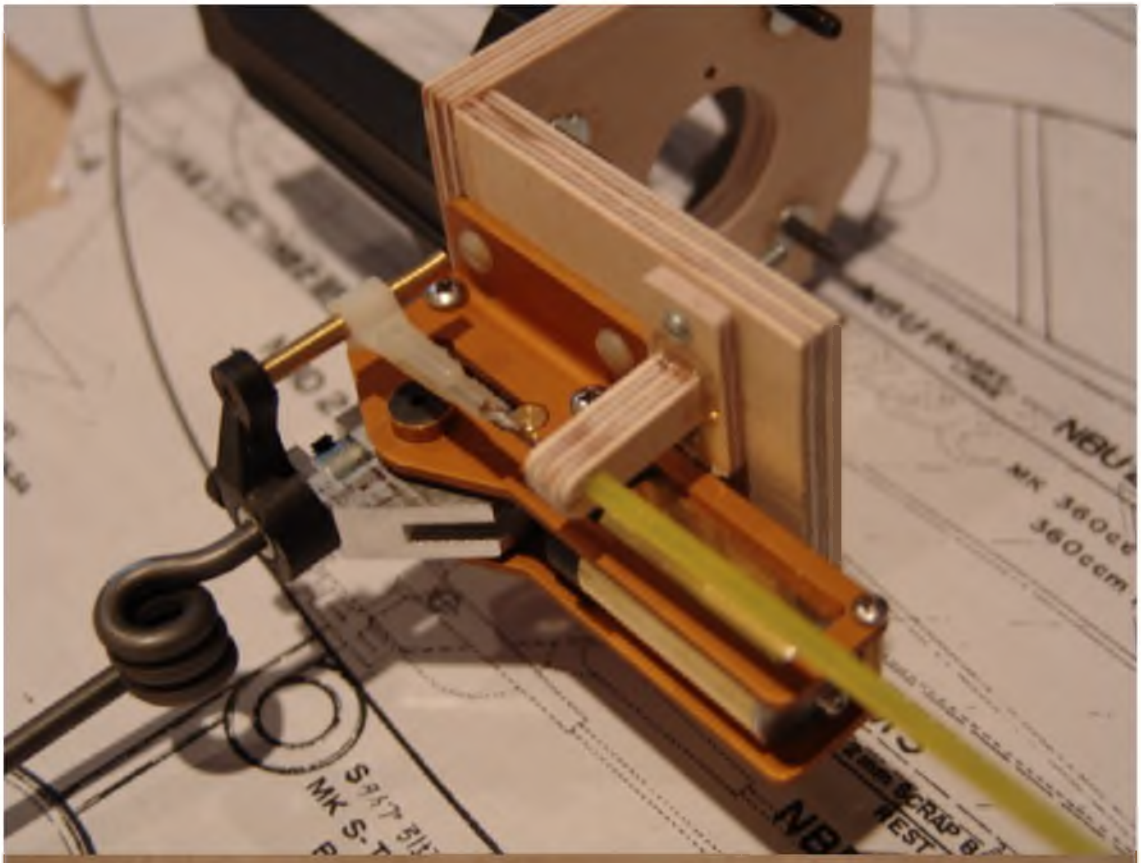

F3

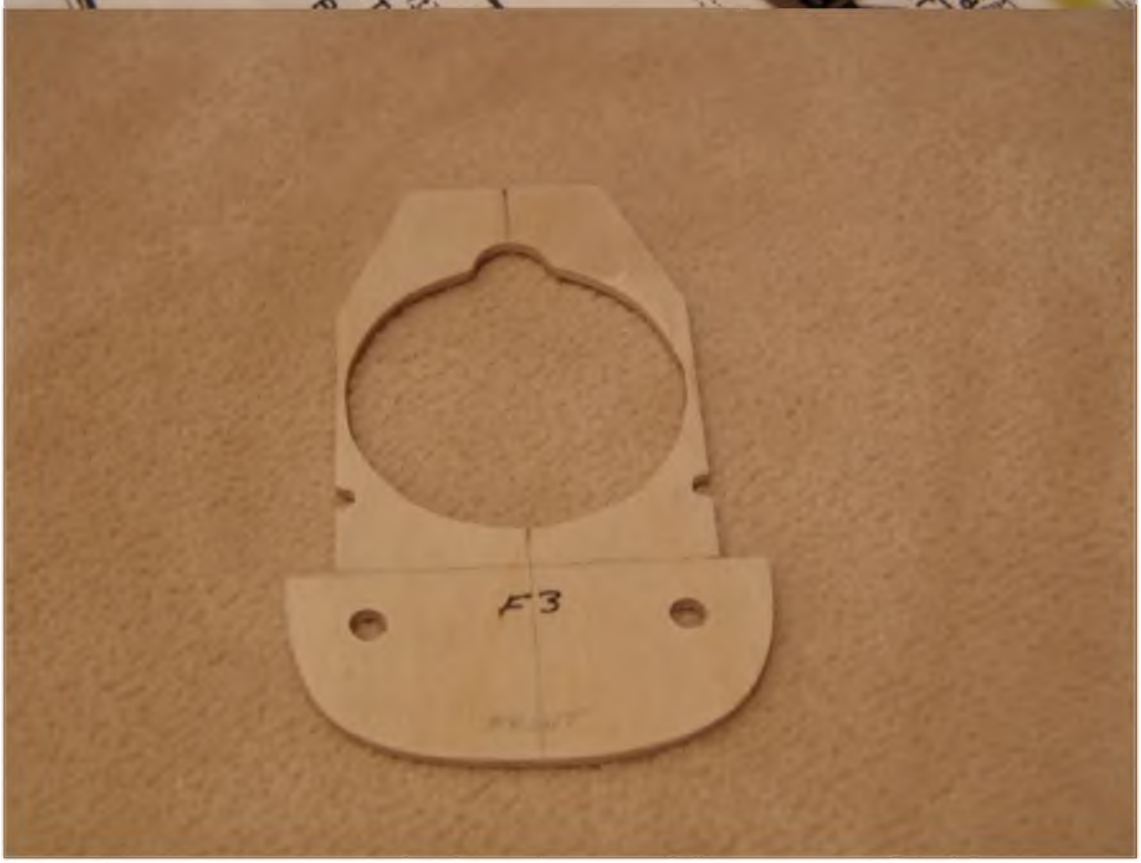

NBU
F2

8178, I can't quite make out the type of throttle linkage you're using. Is it a ball link? The work so far looks extremely neat!
--
Thanks rainedav! I find it easer to plan all this stuff out when there is plenty of room to drill holes, etc. Yes it is a ball link but the ball has not been attached to the arm yet. The engine has a plastic arm so there is no worry of the plastic yoke on the ball assembly having problems from heat. Using the ball link gives the cable more freedom to change angles throughout the total movement of the throttle.

The Spring Air nose gear requires that the steering cable to be mounted so the control arm linkage is held at the center of the retract pivot point. My solution to this is a removable mount on the front of the cable sheath so it can be moved out of the way to install or remove the retract unit. If I make a removable clamp at the servo end the complete linkage can be removed. The mount bolts screw into blind nuts on the top of the retract gear mount. The steering cable control on the Blue Angel is tricky because of the low position of the retract steering arm and routing the cable over the top of the wing. I've cut dwells in the side of the F3 former in front of the wing for the steering cable and throttle cable.






F3

TBC …

8178, since I've never installed a nose gear retract before, what exactly happens to the steering linkage when the gear is retracted? Does it disengage somehow or does the cable go slack as the wheel is raised? Or is it set up so the steering arm doesn't move laterally? in that case does the arm rotate on a shaft? Since I'll be using a nose retract in my UFO I'm really curious and equally confused. Thanks.

On the Spring Air system the steering linkage on the retract steering arm just slides back and fourth on the arm shaft when rudder is used with the gear retracted. That's why you need a mount for the front of the cable to hold it in the correct position.

We've got wood! Lots and lots of it! The order from Dynamic Balsa arrived yesterday and it looks like a big kit that just needs to have the parts cut. What fun!

To be continued…

The engine for the Blue Angel arrived today and looks perfect!


O.S. MAX
61SF
ABC-P
AND WARNINGS
O.S. ENGINE
POWERED BY


O.S. MAX
61SF
ABC-P
AND WARNINGS
POWERED BY

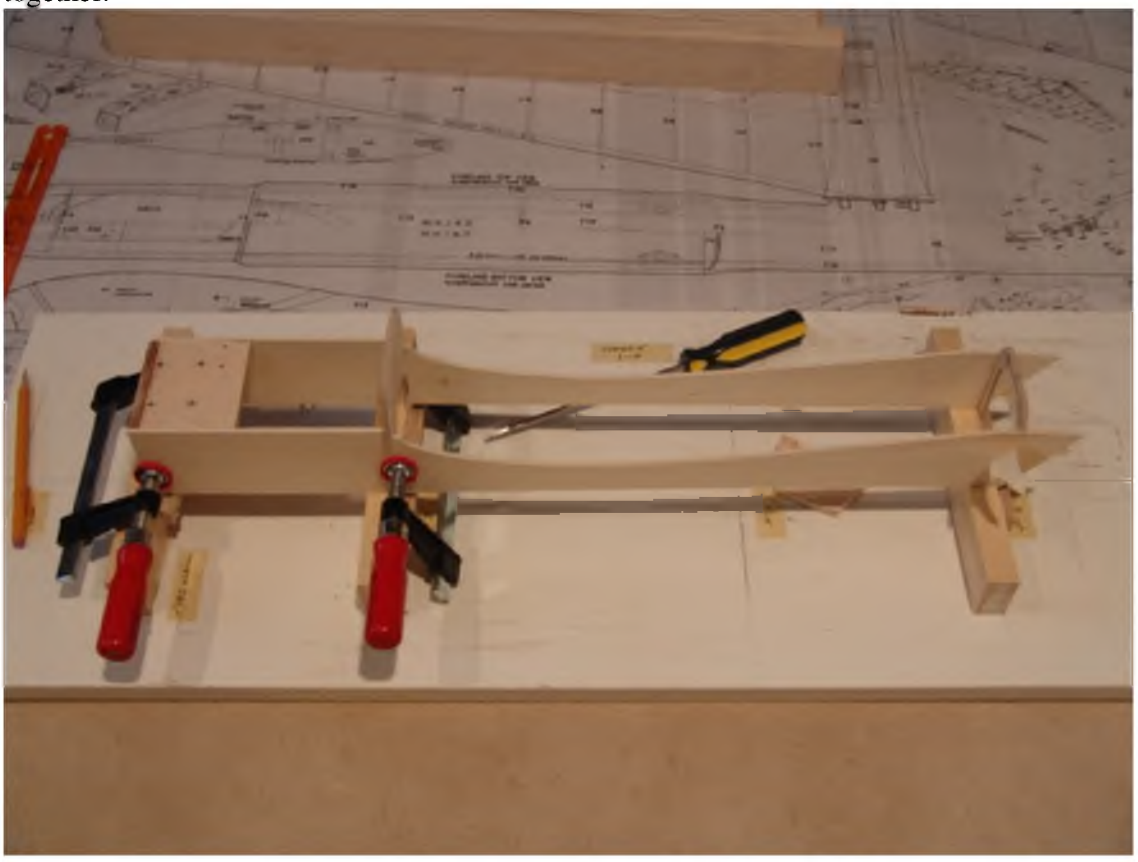
TBC …

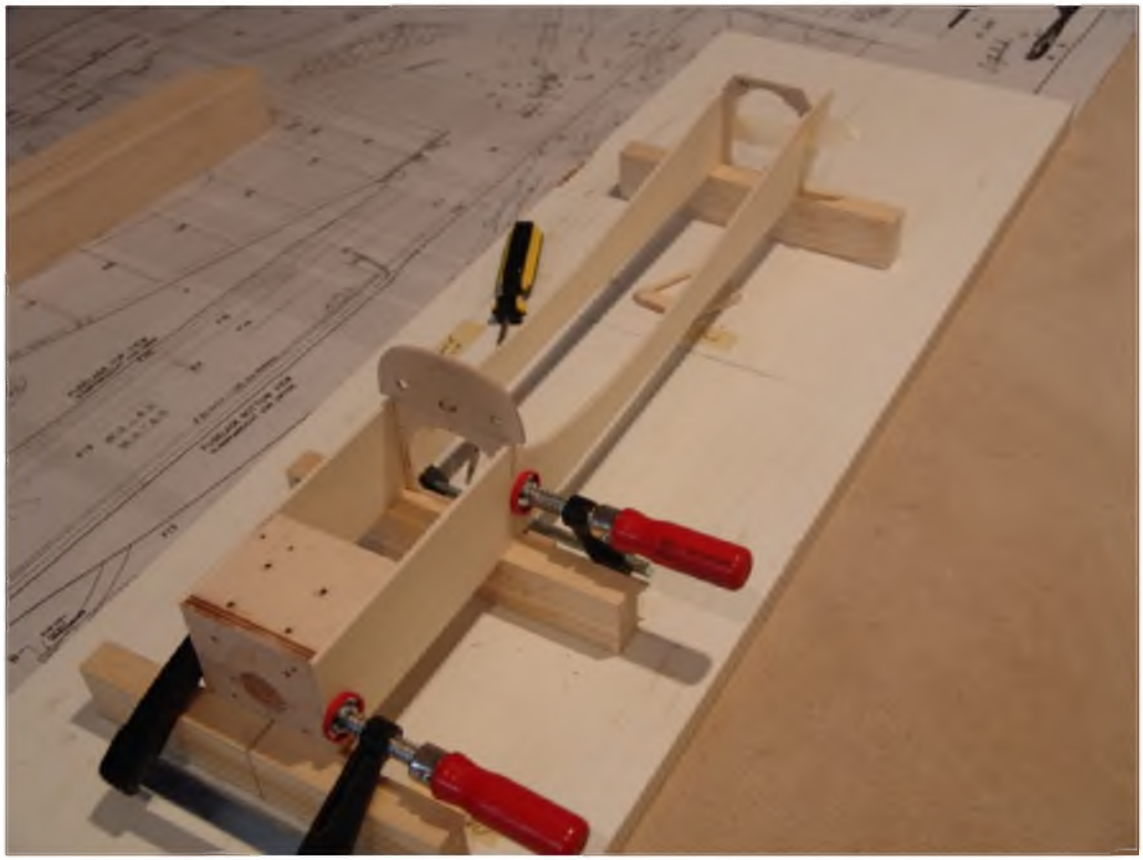
Now that I have the wood from Dynamic Balsa, I moved ahead with the fuselage construction by transferring the shape of the fuselage side doublers on to 1/8" light plywood and cutting them out with my Dremel Moto-Shop jig saw.

As discussed before the fuselage has very complex shapes and I decided that the only way to assemble it would be some sort of fuselage jig to hold it in alignment. I used an old building board (plastic covered shelving) that I was about to throwaway as the jig base. I drew a center line down the board using a straight edge and a lead pencil. I then transferred the former positions from the plans along the center line. Using a square I projected the lines so they were about 4" out from either side of the center line making sure they were precisely square with the center line. I picked up some 3/4" X 1 1/2" smooth cut wood at the hardware store and then cut it into three 8" long pieces. Vertical center lines were scribed on the blocks. I cut three ¼" X ½" X 4" plywood pieces for clamps and drilled the ends for wood screws so they could be screwed to the 3/4" X 1 1/2" blocks to make the clamp. They are set down a little from the top of the 3/4" X 1 1/2" for clearance with the fuselage sides. The next task was to epoxy the 3/4" X 1 1/2"s to the base after checking that the vertical surface was absolutely square with the base. The 3/4" X 1 1/2"s were glued down to the base and lined up with the center line and the former lines. The firewall 3/4" X 1 1/2" block was glued down with a 1 degree right thrust (the aircrafts right not the jig) as defined on the plans.

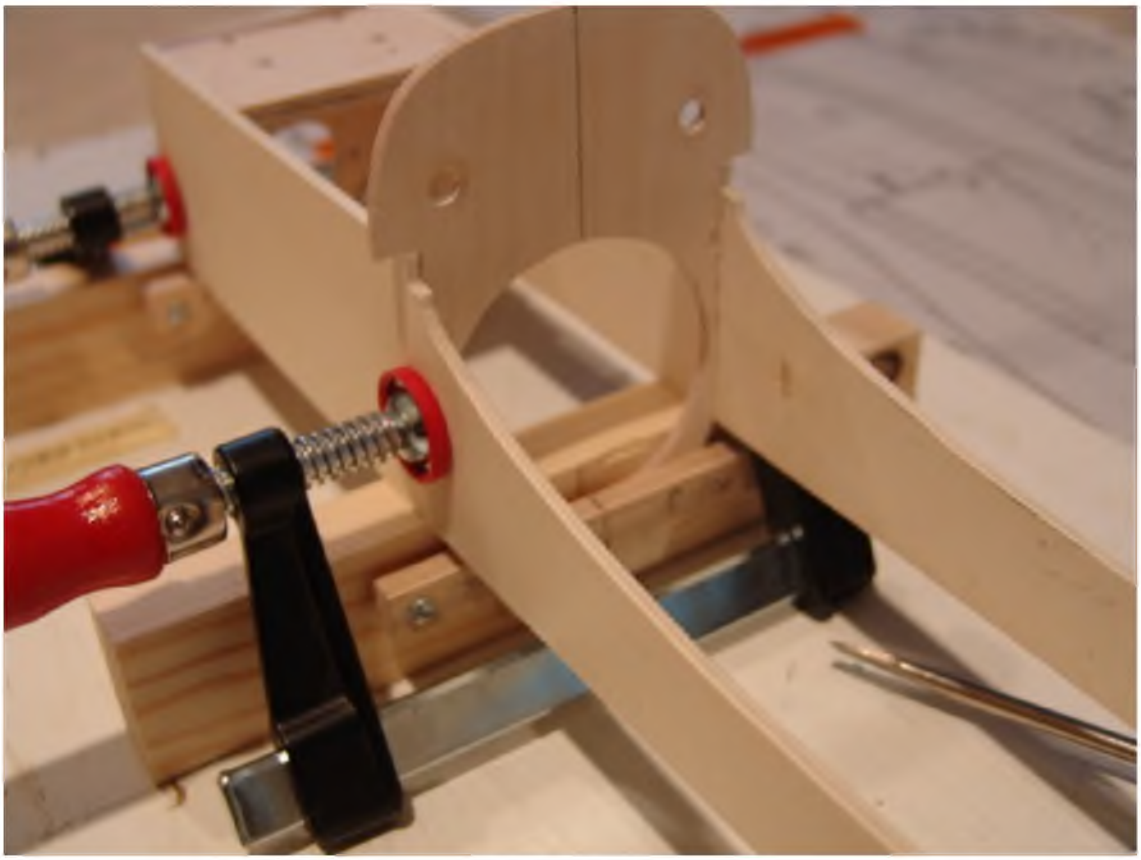
So far the jig looks like it might work out pretty well. To test the alignment you can view the former alignment marks through the fuel tank hole in the firewall and see all the way back to the former behind the wing and on to the very back of the tail when the balsa sides are ready to be pulled together in the tail.

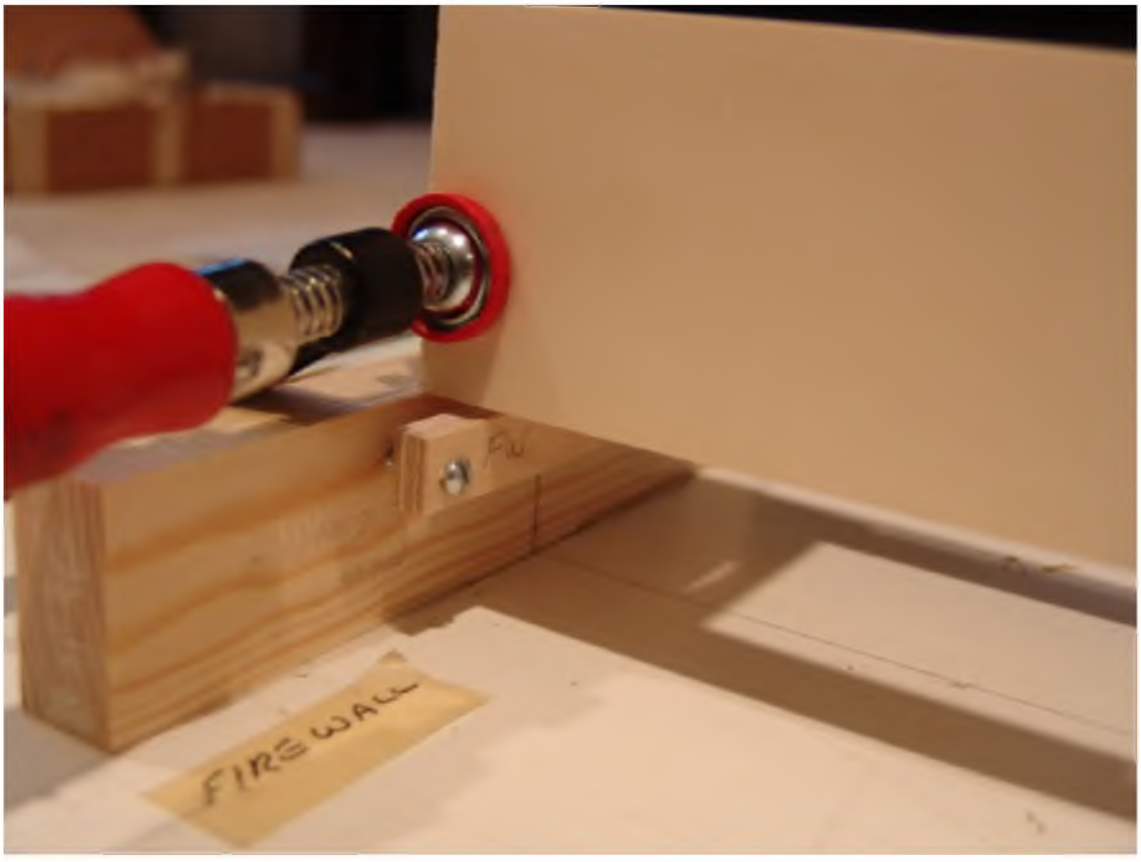
Some images of the jig while I was testing the aliment using the fuselage side doublers. I'll glue the balsa fuselage sides to the doublers before gluing the assembly together.

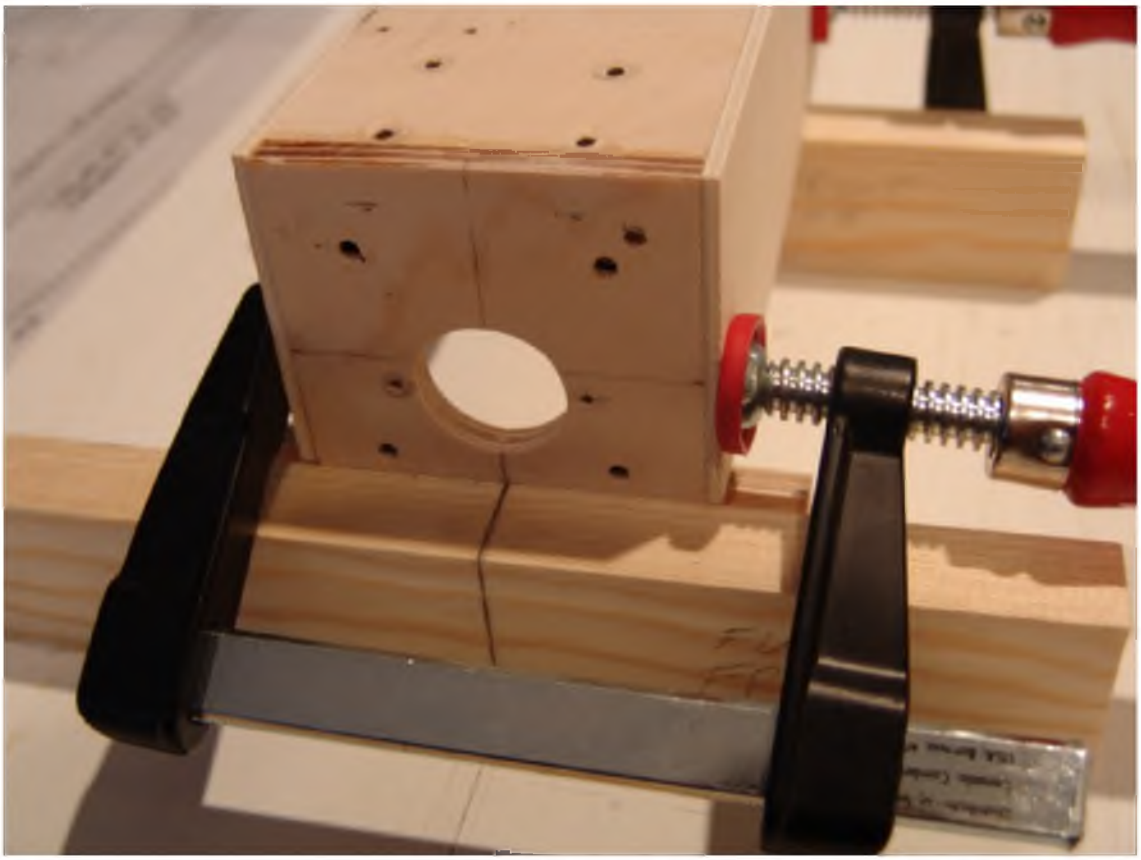





F5
F5



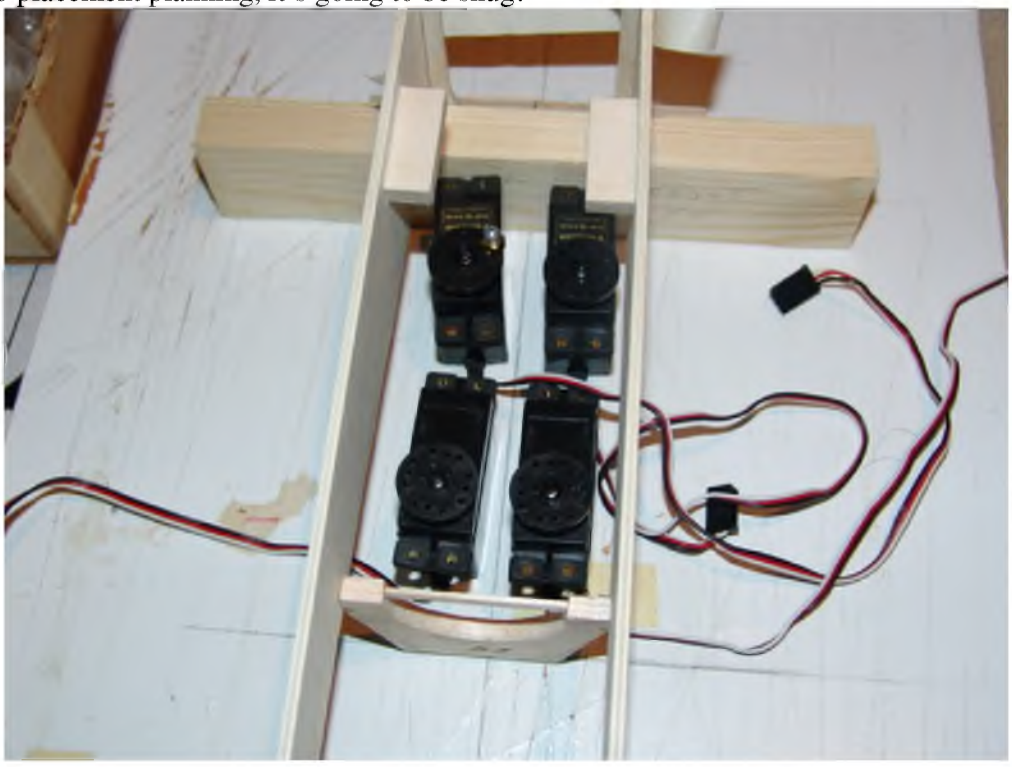

FIREWALL



I forgot to mention that after the sides are glued to the formers I'll flip the fuselage over and put it back in the jig to hold everything in place as I add the multi piece fuselage top.

To be continued…

Servo placement planning, it's going to be snug!



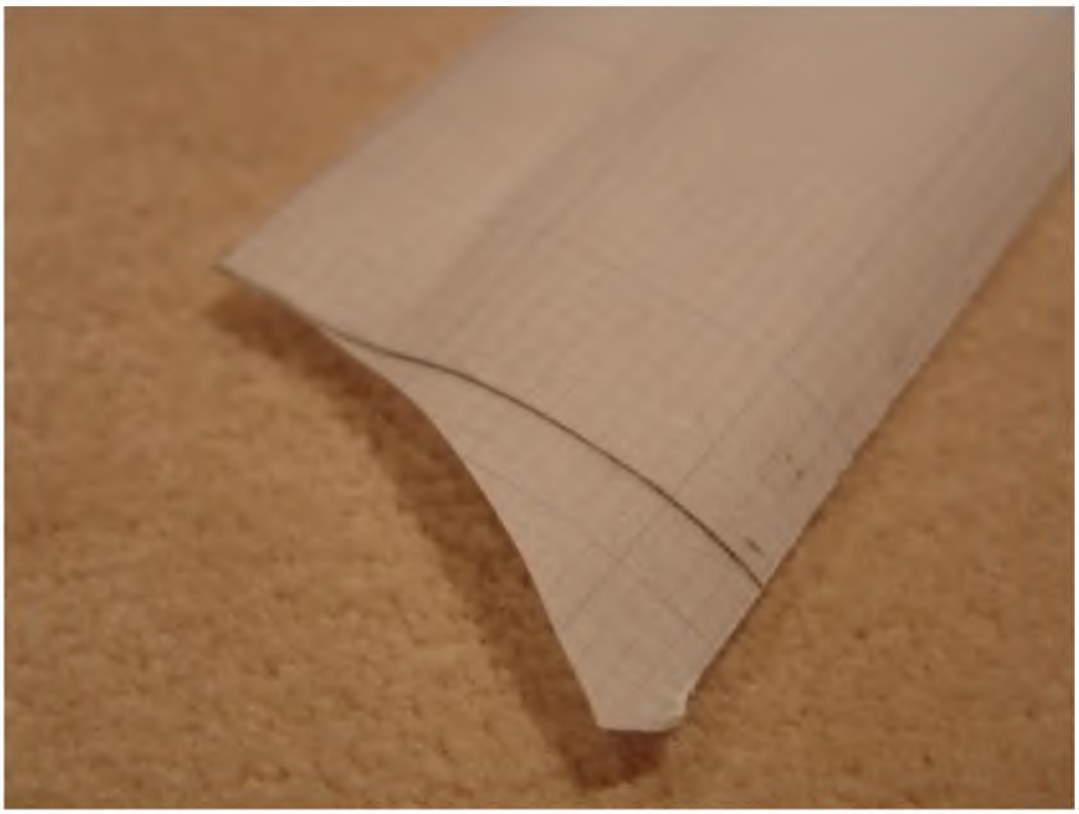
To be continued…

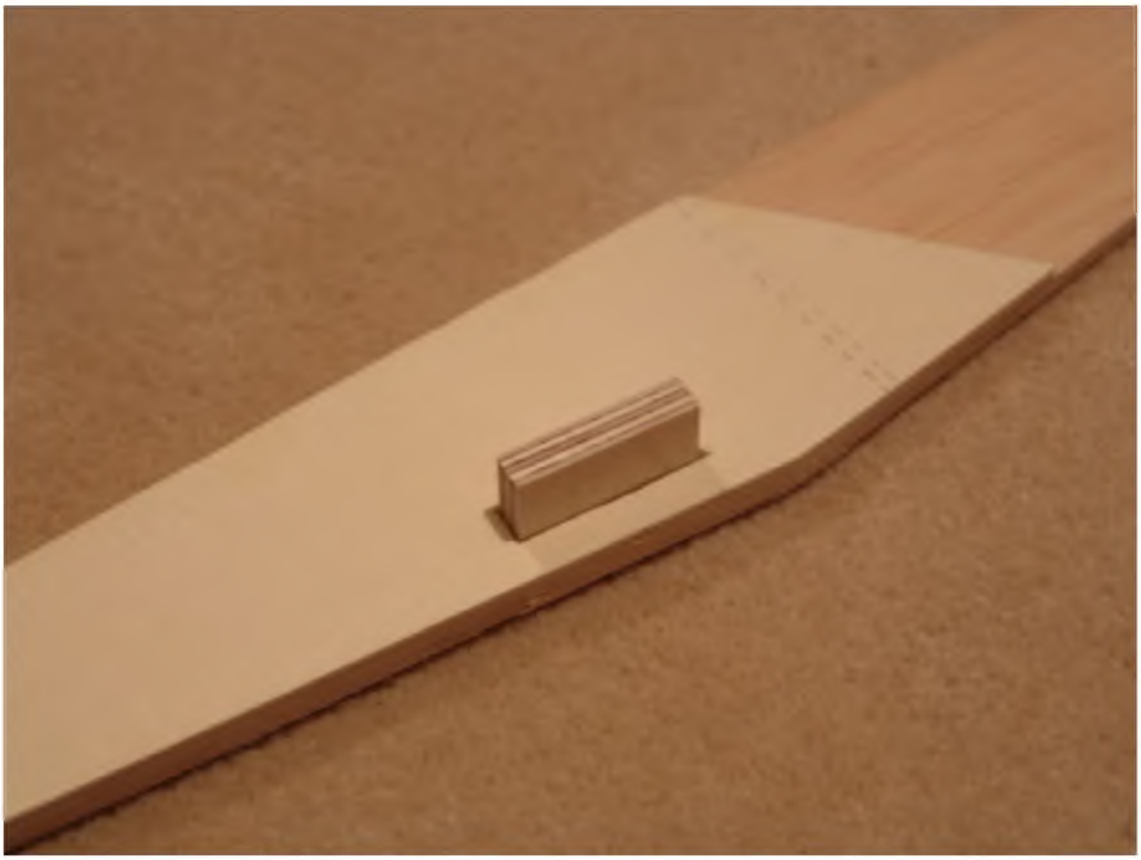
The 3/16” balsa sides on the Blue Angel have a front and back section that join mid wing. I used my usual method of tracing the parts onto blue lined translucent drafting paper. Not sure if they still make it because my stock is from my RC aircraft designing days back in the 70s. The paper has a grid of 1/10”squares and a darker line every square inch. The grid helps line up the paper to one of the long straight lines like along the top part of the side pieces. I rubber glued two 36’X3”X3/16” side pieces together for the back fuselage sides and then rubber glued the tracing on top of the pieces. I made sure that I had two pieces that had straight edges on one side for the top part of the side. I had to do a little sanding and checking with a straight edge to make them perfect. Next, I doubled checked that the Dremel Moto-Shop jig saw blade was square with its table top and then cut them out. I did the same for the front side pieces. Then I taped a straight edge down the center of my new building board to use for alignment of the top of the side pieces. The butt joint between the front and back part took a little sanding to mate the parts with 0 gaps. I put the parts on both sides of the straight edge, glued the butt joint and then taped them down to the board.

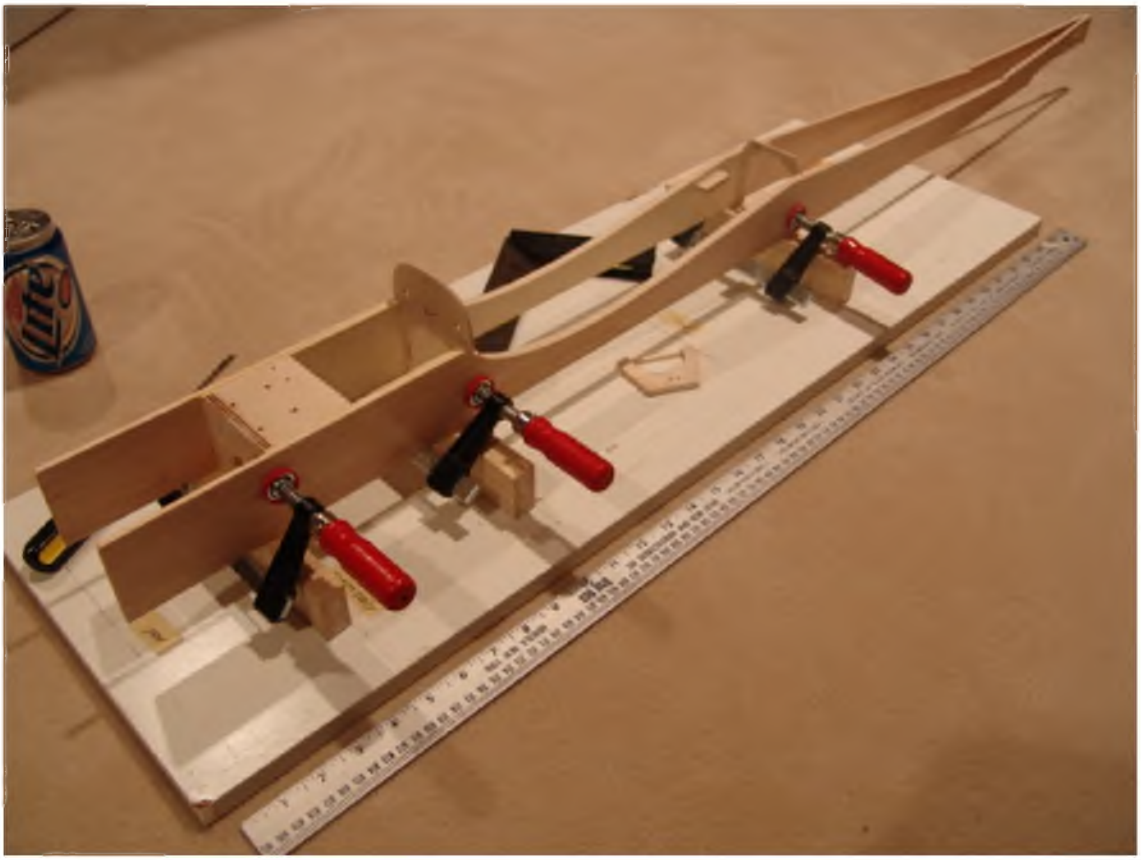
After the glue dried I glued on the doublers and weighted them down for the glue to dry.

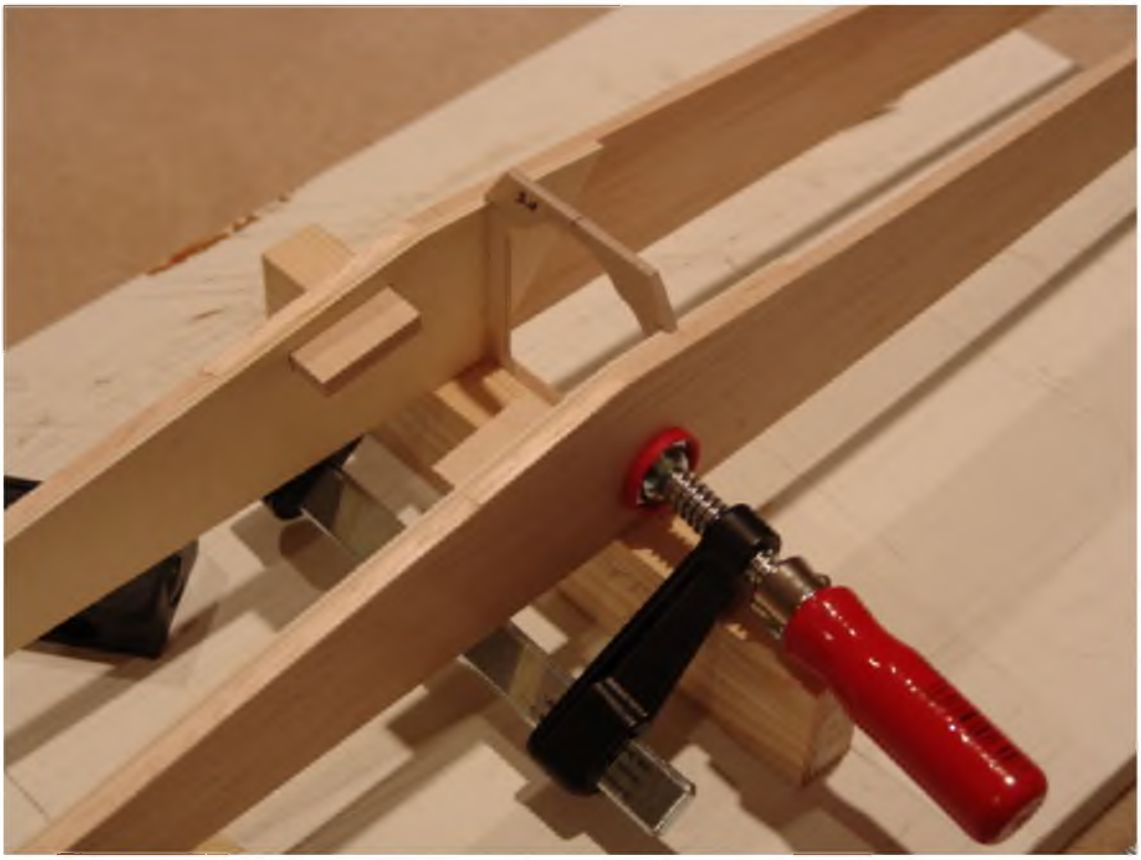
From looking a at the side pieces you can see why I needed the jig! So far everything lines up perfectly.

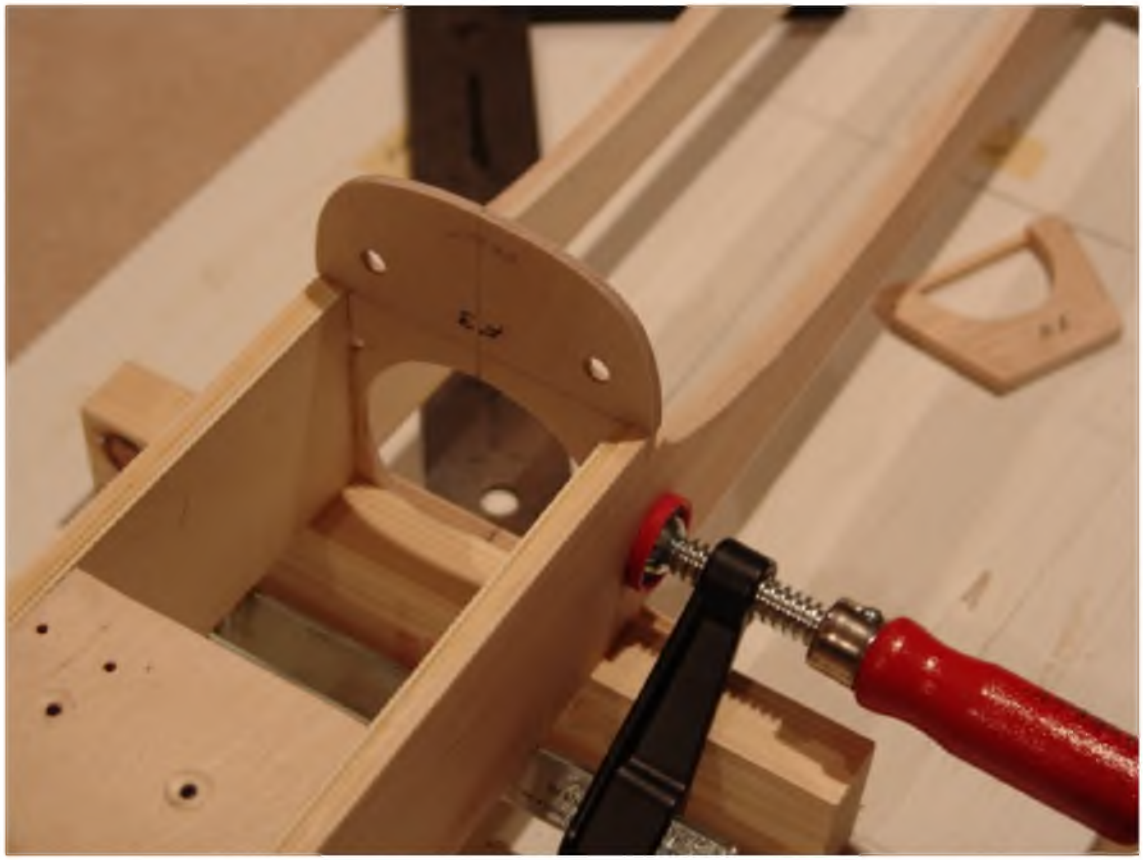
The images below show the drafting paper I use, the completed sides and test fitting them in the jig. The plan shows some kind of MK threaded block bolted to the fuselage doublers for the wing bolts. I’ve cut slots in the light ply sides for ¼” plywood blocks to be drilled and threaded for the wing bolts.

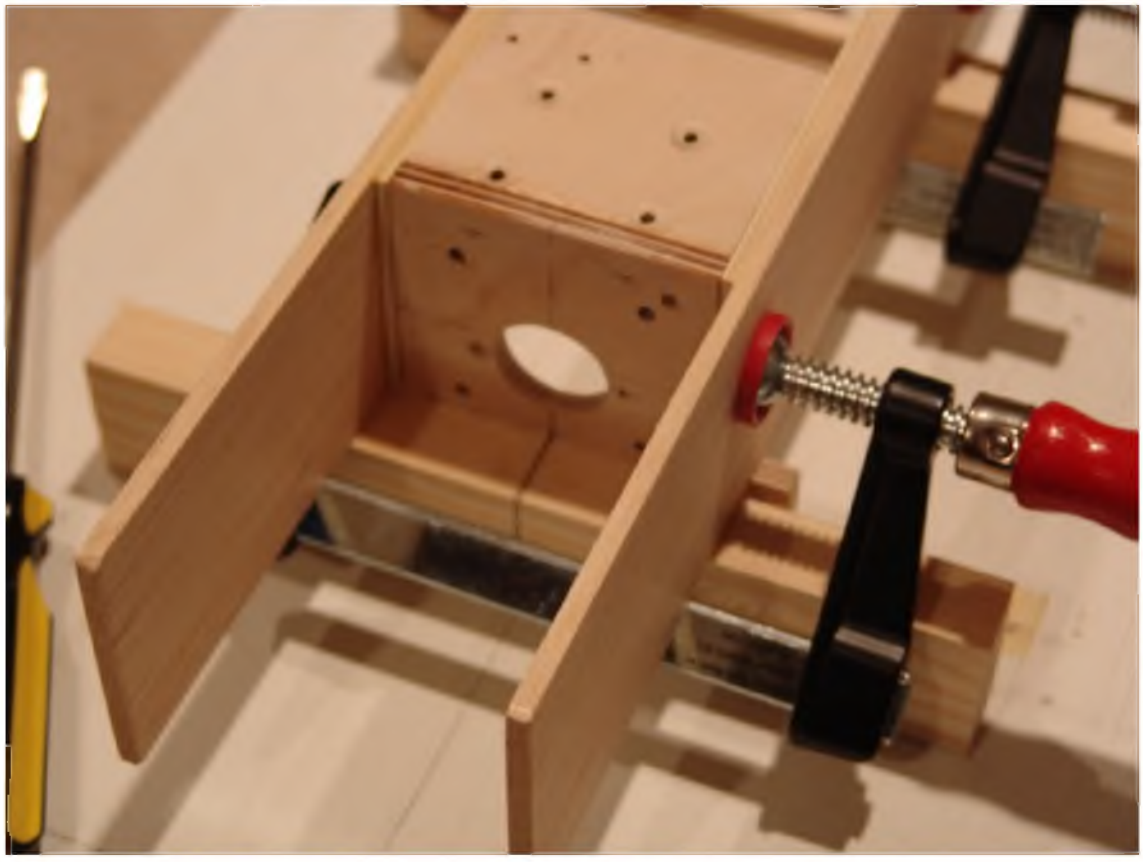












To be continued…

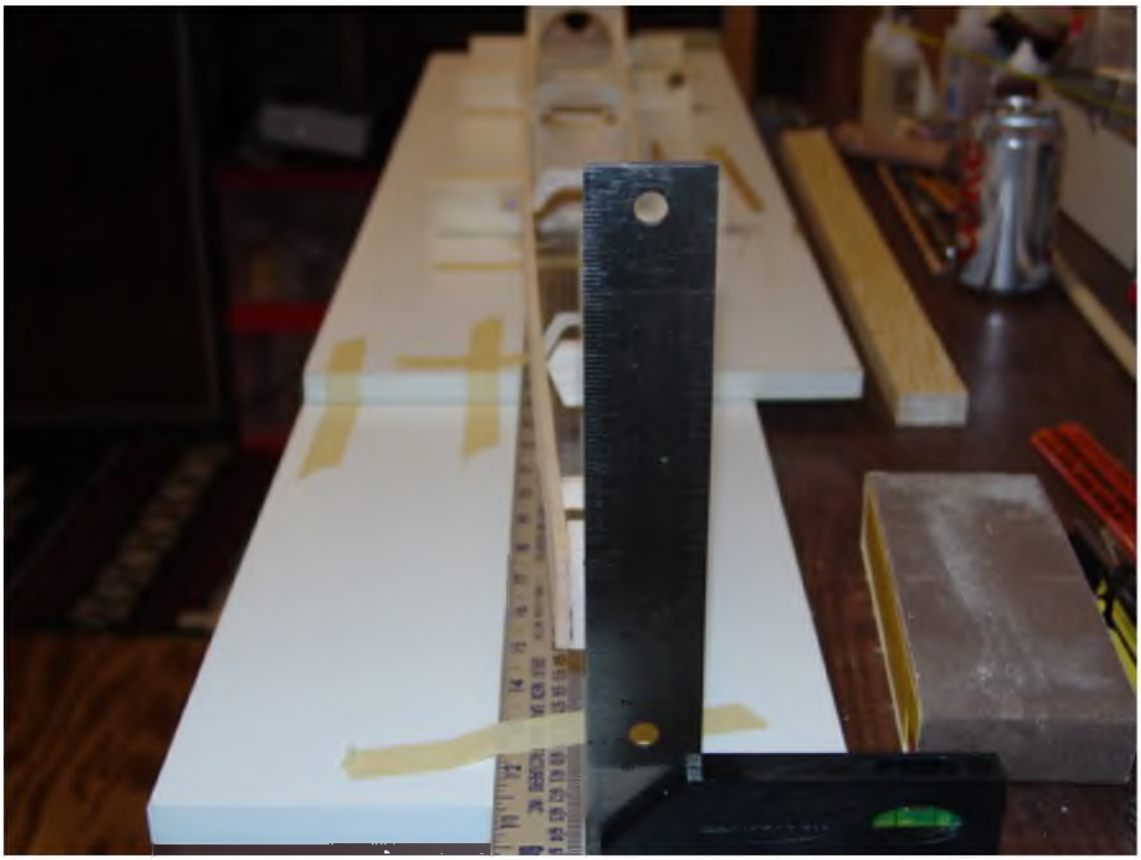
Last night I rechecked the fuselage alignment with the fuselage mounted in the jig. I tightened the former clamps and then rechecked everything again. I removed the fuselage sides and put some small pieces of very thin plastic at the bottom corners of the formers where they contacted the jig cross pieces to keep the glue from running down the formers. I wanted to make sure that I didn't glue all this work to my jig!!!!

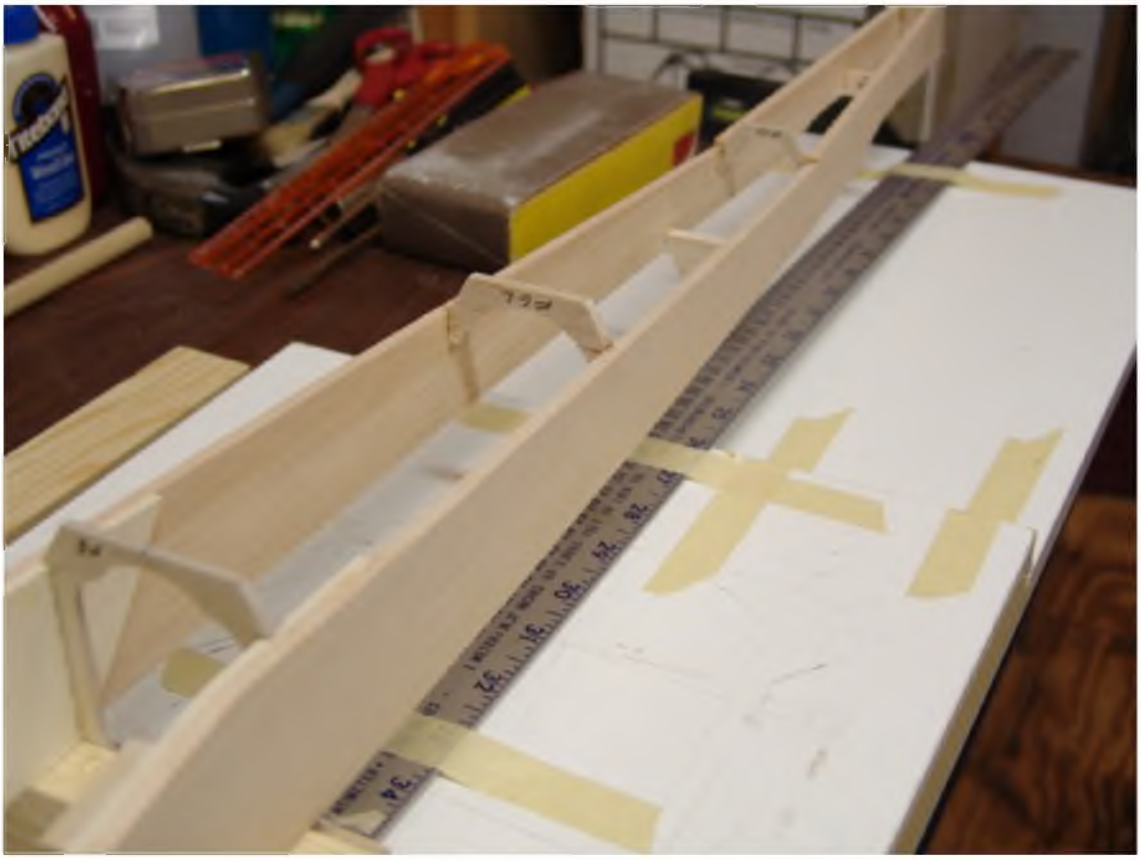
I used 30 minute epoxy on the sides of the firewall, gear mount, the first former in front of the wing and the former behind the wing. I put the fuselage sides back on the formers and carefully checked the alignment. The fuselage sides must be absolutely parallel front to back and the upper non-clamped part of the formers square with the center line. The three C clamps shown in the test fittings were used to clamp the fuselage to the formers using small pieces of ¼" plywood under the C clamp jaws to spread the load across total height of the fuselage sides. Before doing anymore work I let the epoxy set overnight so that the fuselage would become very rigid.

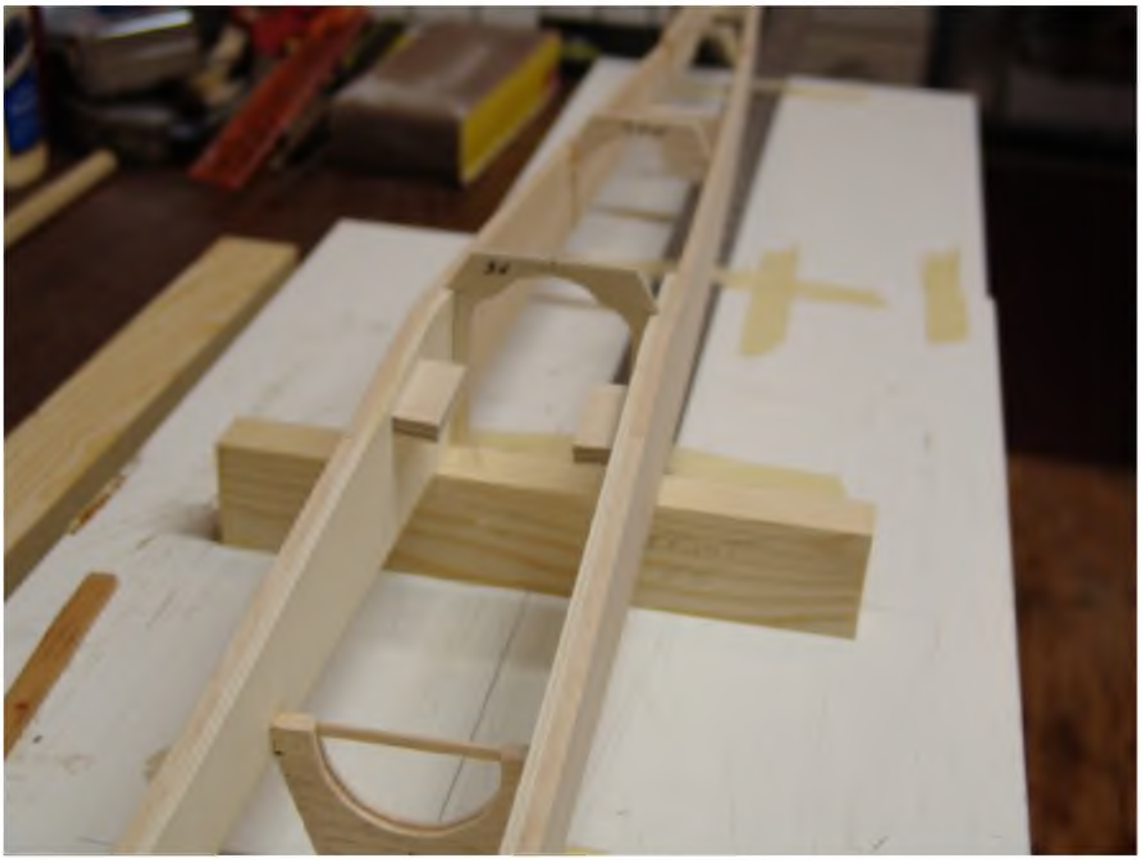
This morning I removed the C clamps and started work pulling the tail together and installing the tail formers. To make sure the tip of the tail stayed in alignment I extended the center line of my jig with a straightedge and used a square to check the tail position. Before gluing the tail tip block in I taped it together to check the alignment with the square but also did a sanity check by sighting down the inside of the fuselage to the tail viewing through the fuel tank hole and general re-checking to make sure it looked right from different angles. The tail alignment must be dead on or the aircraft will never fly right. After I was sure it was good to go I glued the tail block to one side of the fuselage tail and let it setup. After it was set I rechecked the alignment and glued and taped the other side together.

After the tail block glue was well set I started the installation of the other formers moving from the back to the front making sure the tail stayed in absolute alignment. Four of the formers had to be projected from the plan drawings because they were not shown on the plan. I installed the formers that I could easily install with the fuselage in the jig in the upside down position.

View of the fuselage with some of the tail formers installed and using the square to check the alignment.







To be continued…

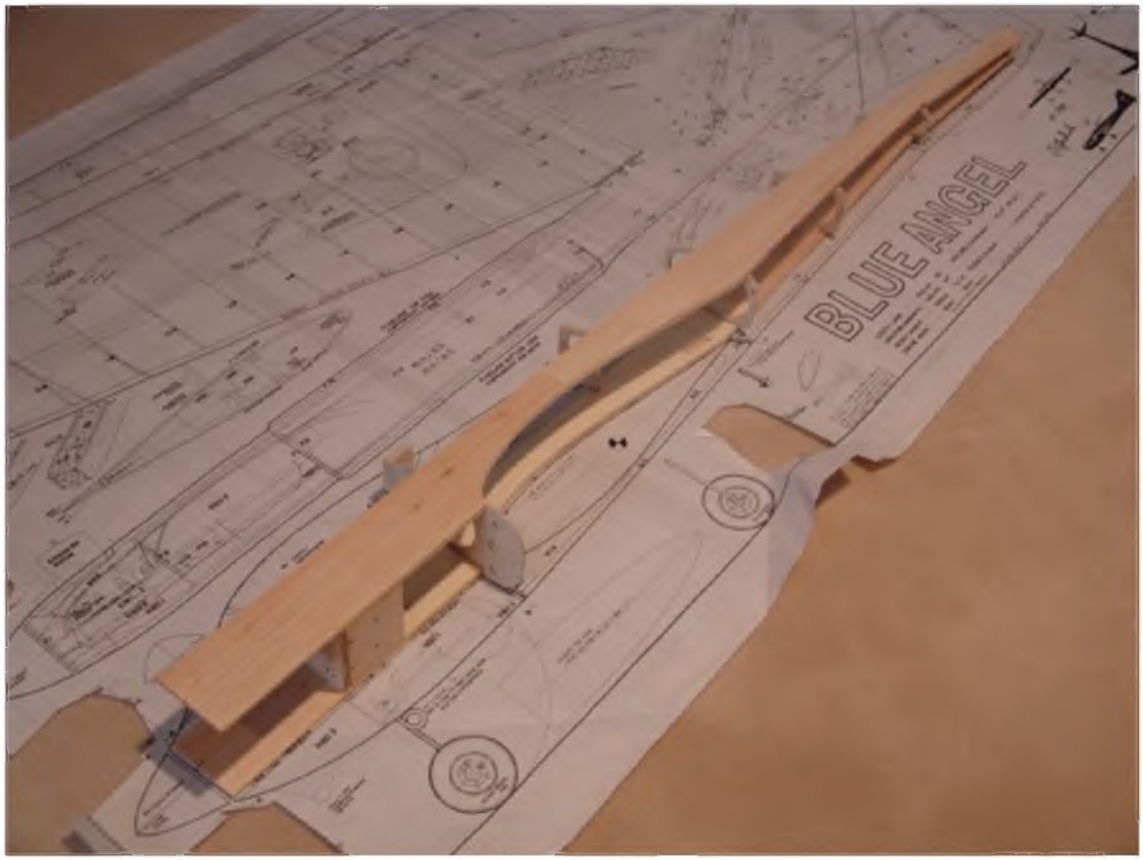
After the former glue was set I loosened the former clamps so I could remove the fuselage from the jig. It was stuck slightly by some of the epoxy but popped out. Then the moment of truth, I flipped the fuselage over and slid it back in the jig and aligned the former center lines with the jig center line and then checked the tip of the tail alignment. Dead on!!! Any error would be magnified by checking it from the other side but it was fine! The horizontal stab cutout was checked and surface is square as well.

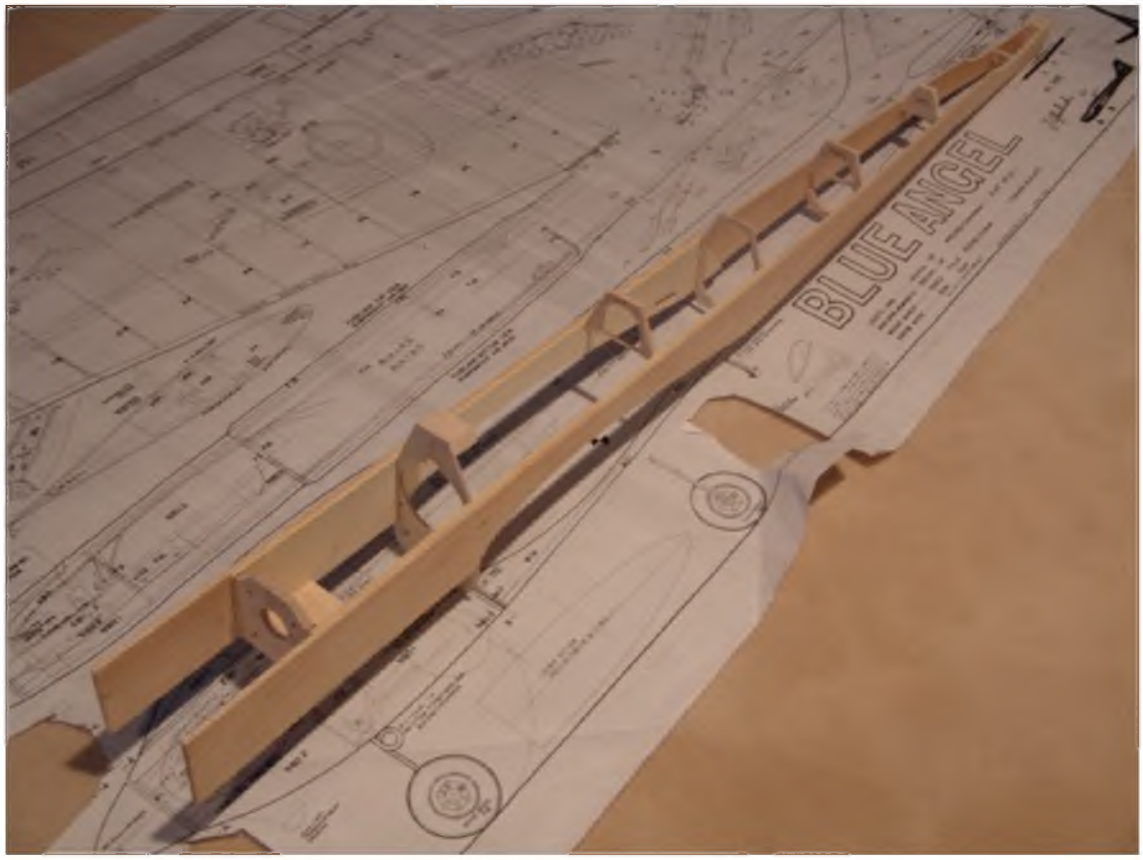
I continued to install the other formers and the odd block that goes on the top of the former in front of the wing. After I installed the other formers I discovered that the former that goes over the center of the wing apparently was not projected correctly and I removed it and made a new one. It is much easer to check the formers now that the fuselage is out of the jig and I can put a straightedge along the edges of the formers. The small cross pieces used in F4 and F6 are there to keep them from distorting until I put the upper side pieces on.

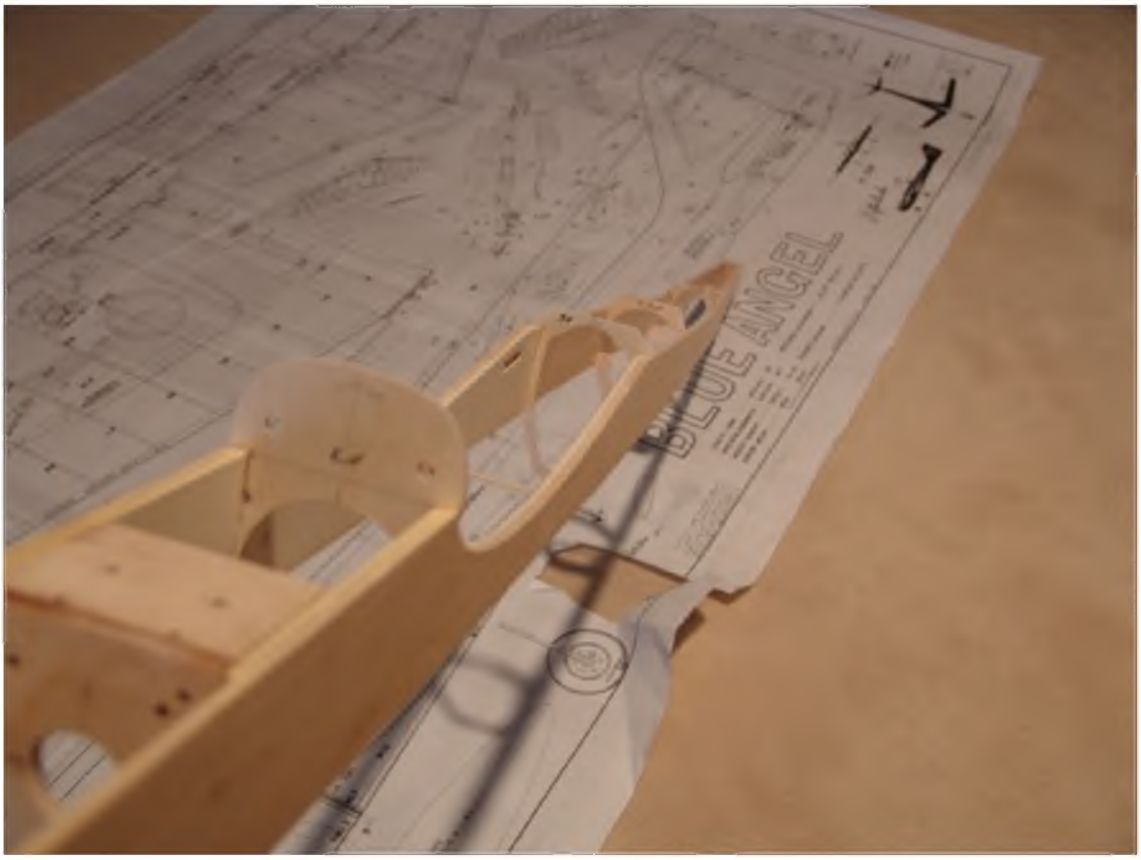
I'll put it back in the jig to hold the alignment while I put the top pieces on.

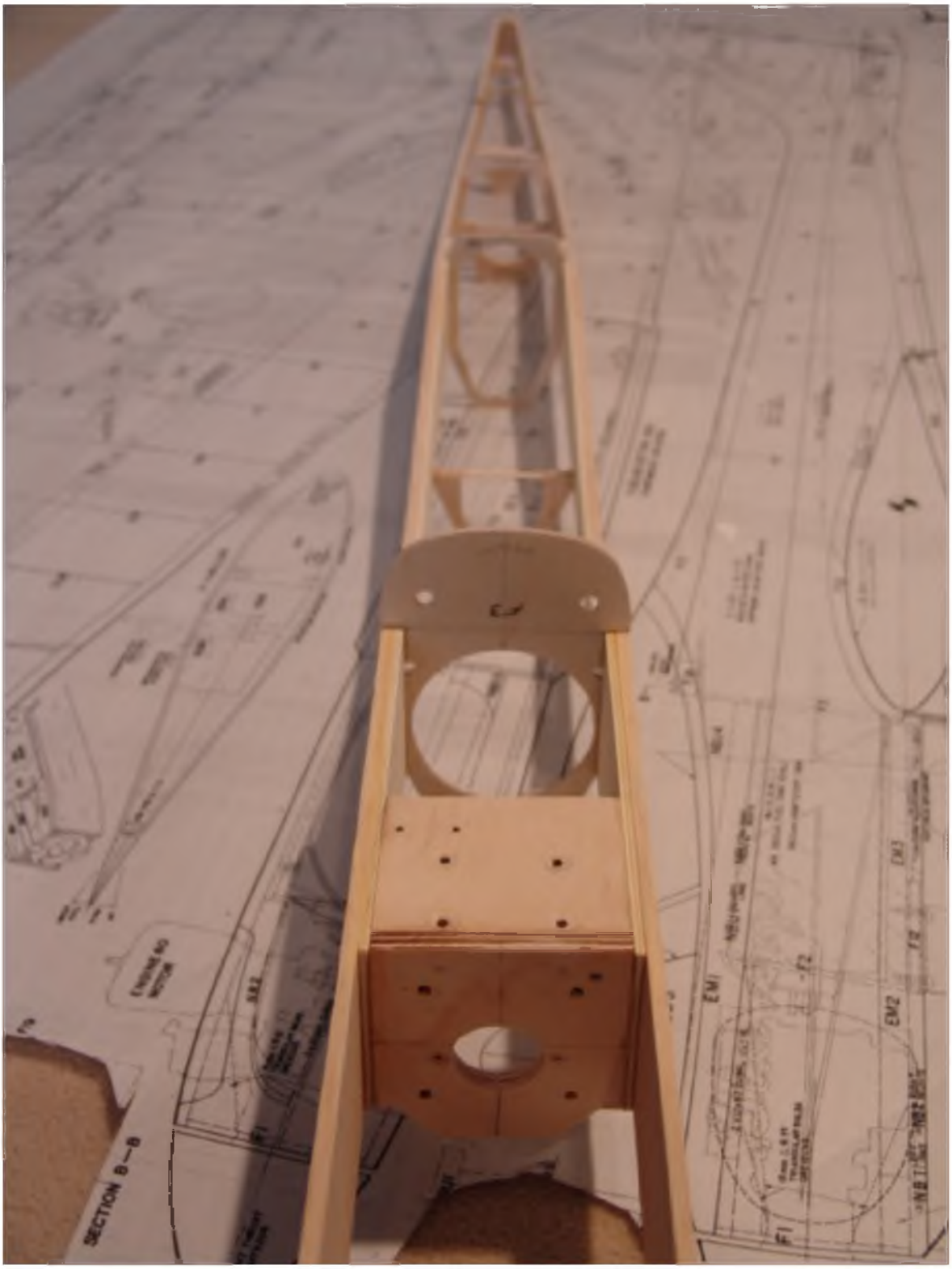
So far so good, not hard to build at all! With this easy snap together construction ARFs well soon become obsolete!

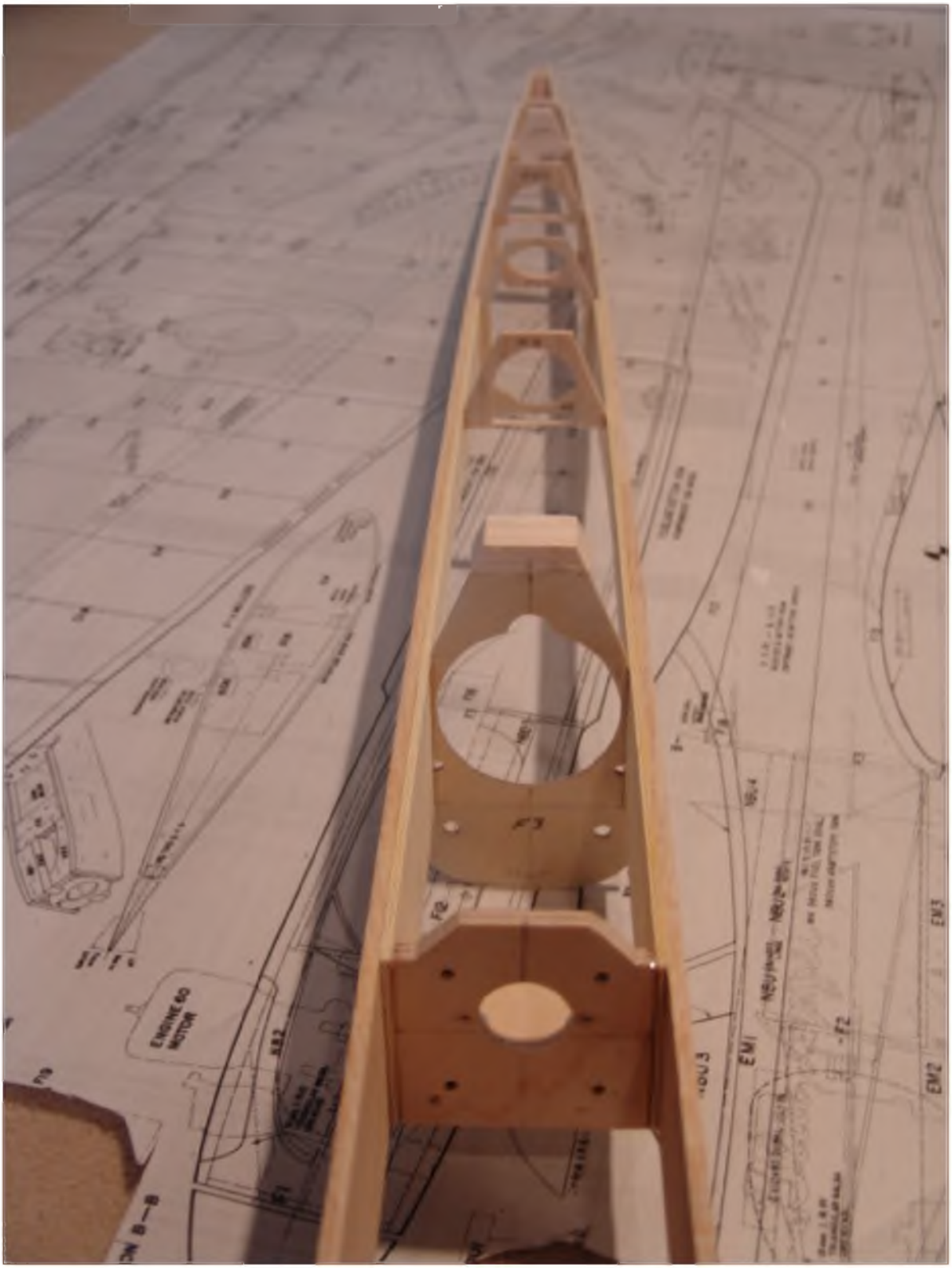
View of the fuselage with all of the formers installed and sanded lightly for trueness.


BLUE ANGEL


BLUE ANGEL


BLUE ANGEL

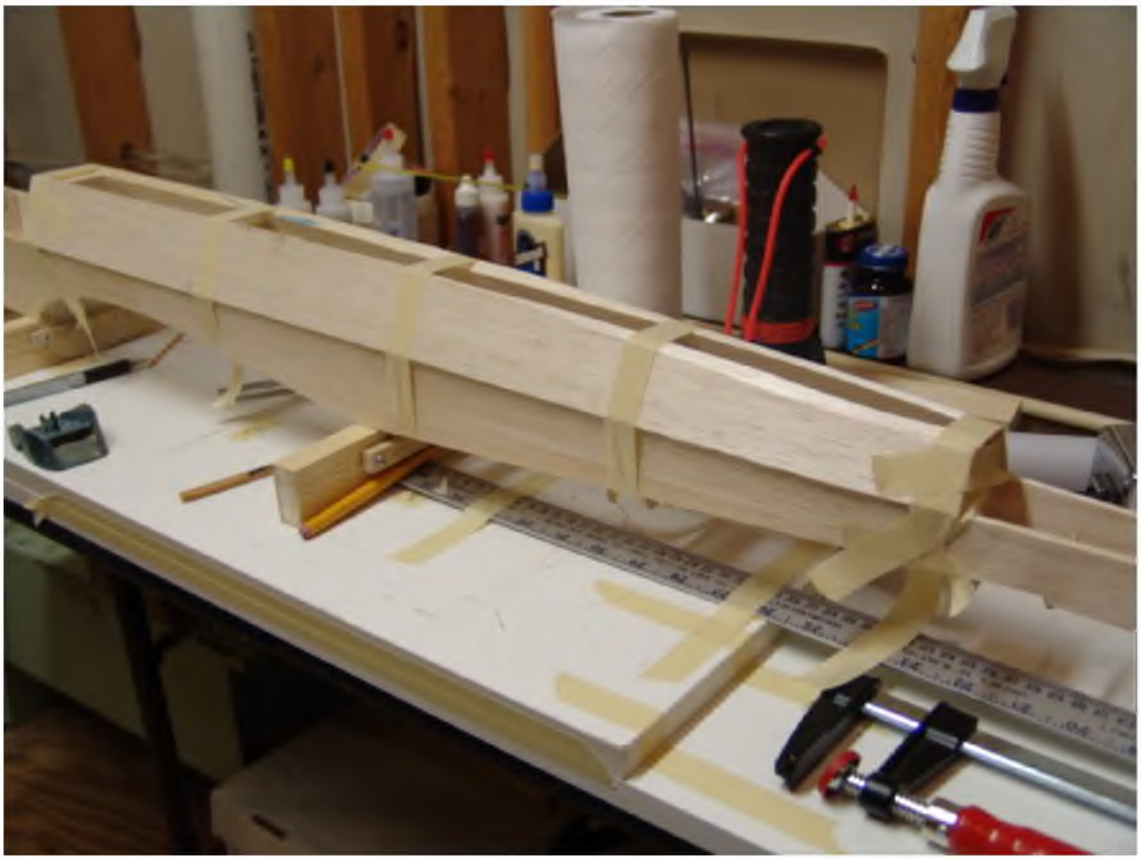

SECTION B—B

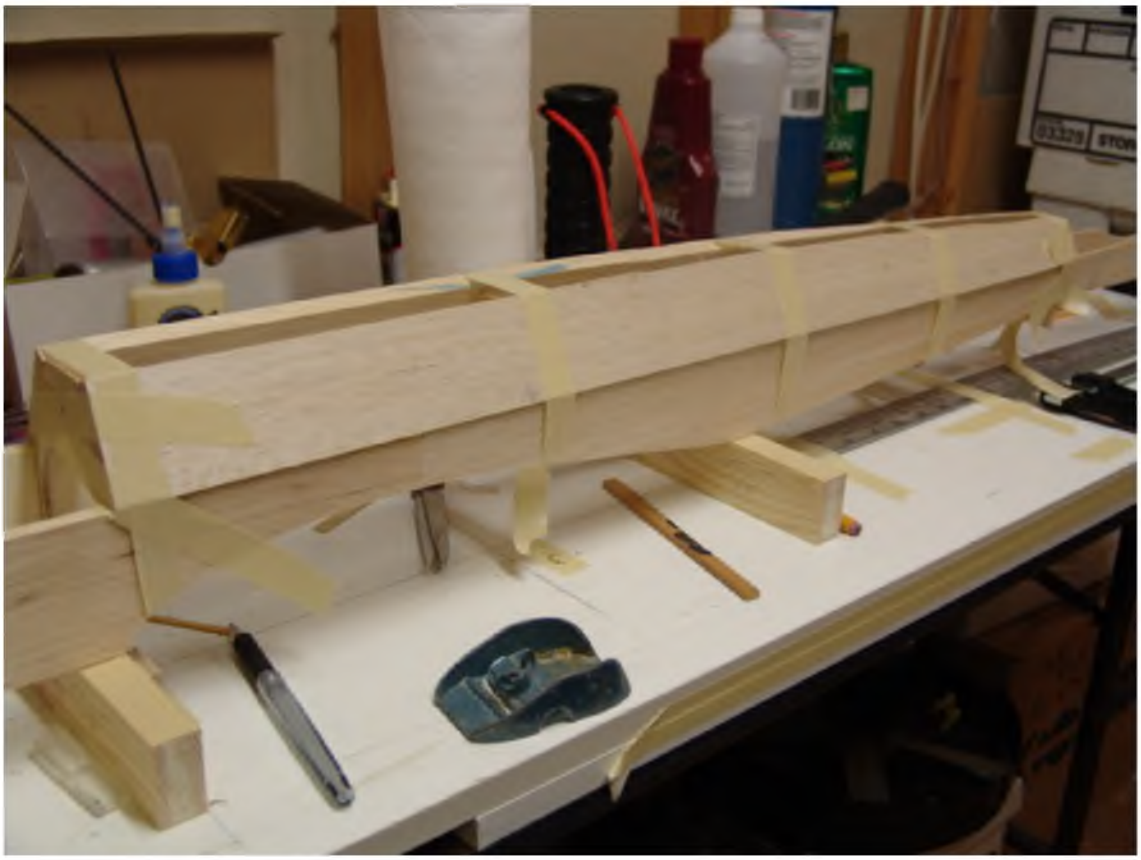


To be continued…

The next step was shaping the 3/8" upper side fuselage pieces. I used the two lightest pieces in the shipment of wood that looked like they would be the easiest to bend to the fuselage shape. The first step was rough shaping the upper edge to reduce the total amount of wood that needed bending. After rough cutting the sides to length the next task was using my Little Giant razor plane to cut a bevel on the lower edge and then sanding the edge. The sides have a compound shape with a twist and bend to follow the side shape of the fuselage. Using a little water, a clamp and a hair dryer I bent the back section of the piece to the compound shape. I glued the pieces on and held them in place with masking tape. During this process I re-checked that the tip of the tail was in correct alignment.

View of the fuselage in the jig and the upper side pieces installed.





To be continued…

After the glue was setup well, I used my Little Giant razor plane to rough shape the sides and rough down the top edges so they were just above the top of the formers. I used my long sanding block to take the top edges down even with the formers.

I think Kato stayed up all night figuring out the shape of this fuselage and it is going to be a beauty.

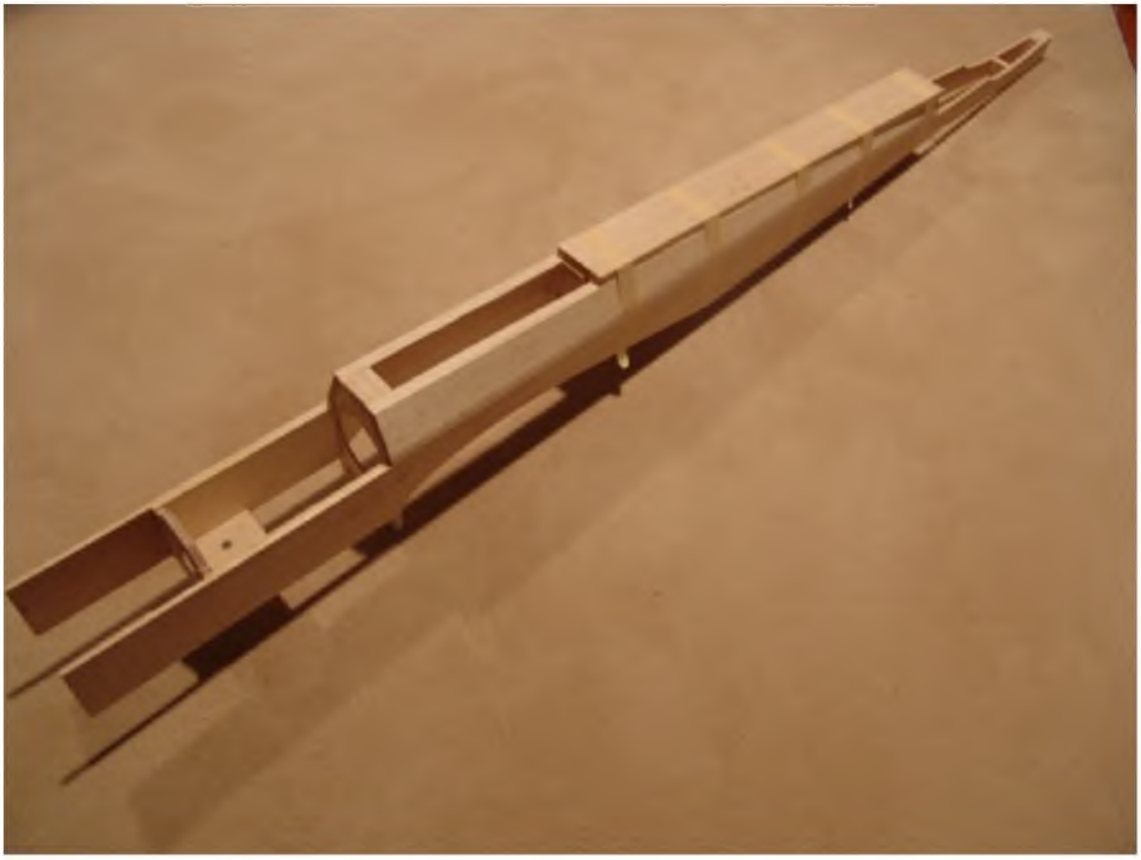
In this view there is a facet on the side that will be removed to create the beautiful rounded shape of the Blue Angel

To be continued…

After the fuselage top was sanded true with the formers I glued on the 3/8" aft top section. The top piece that goes on the front part is thicker and will curve up into the canopy to create the classic top shape of the Blue Angel.

View of the aft top glued on.

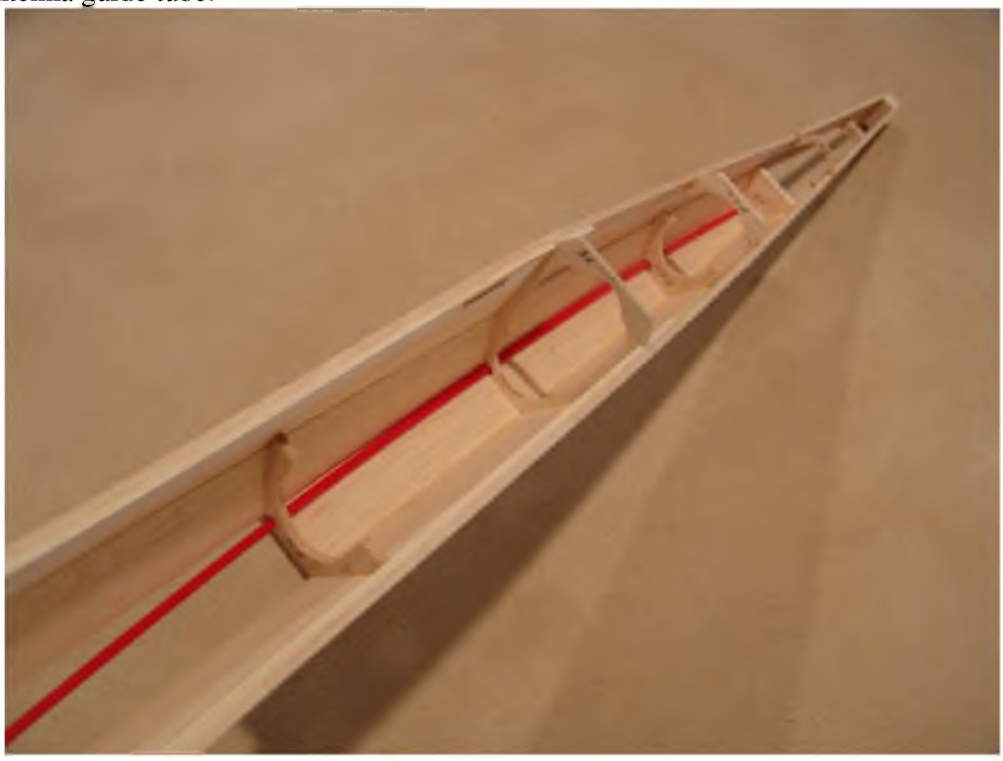
Going flying!



To be continued…

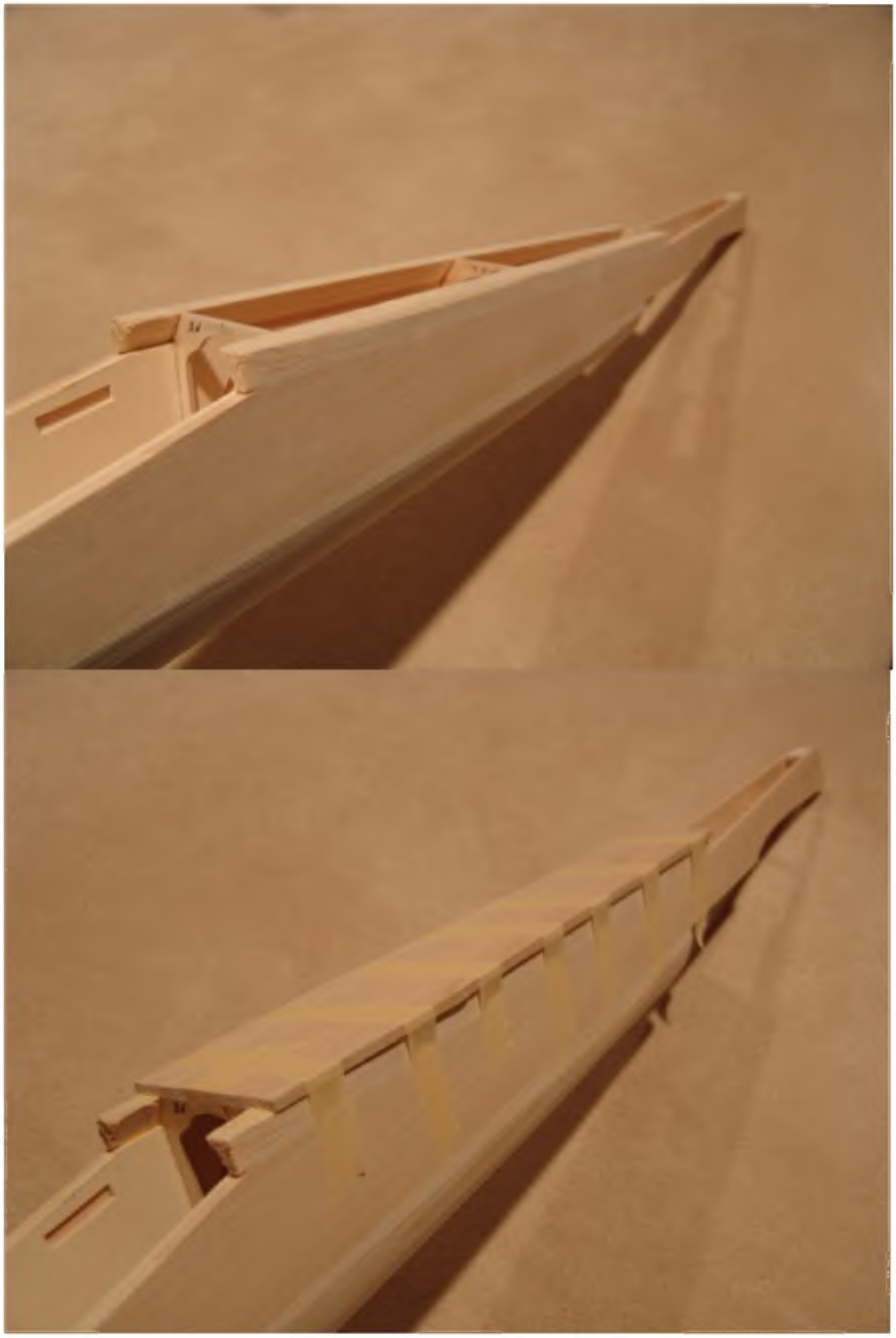
After the glue on the top piece set, I did some rough shaping with the razor plane. There is a lot more balsa to plane off to achieve the oval shape for the fuselage. The image below shows how much more balsa needs to be removed.

To be continued…
Before I glued the top piece on I sanded dwells in the top of the formers to provide a path for the antenna guide tube.



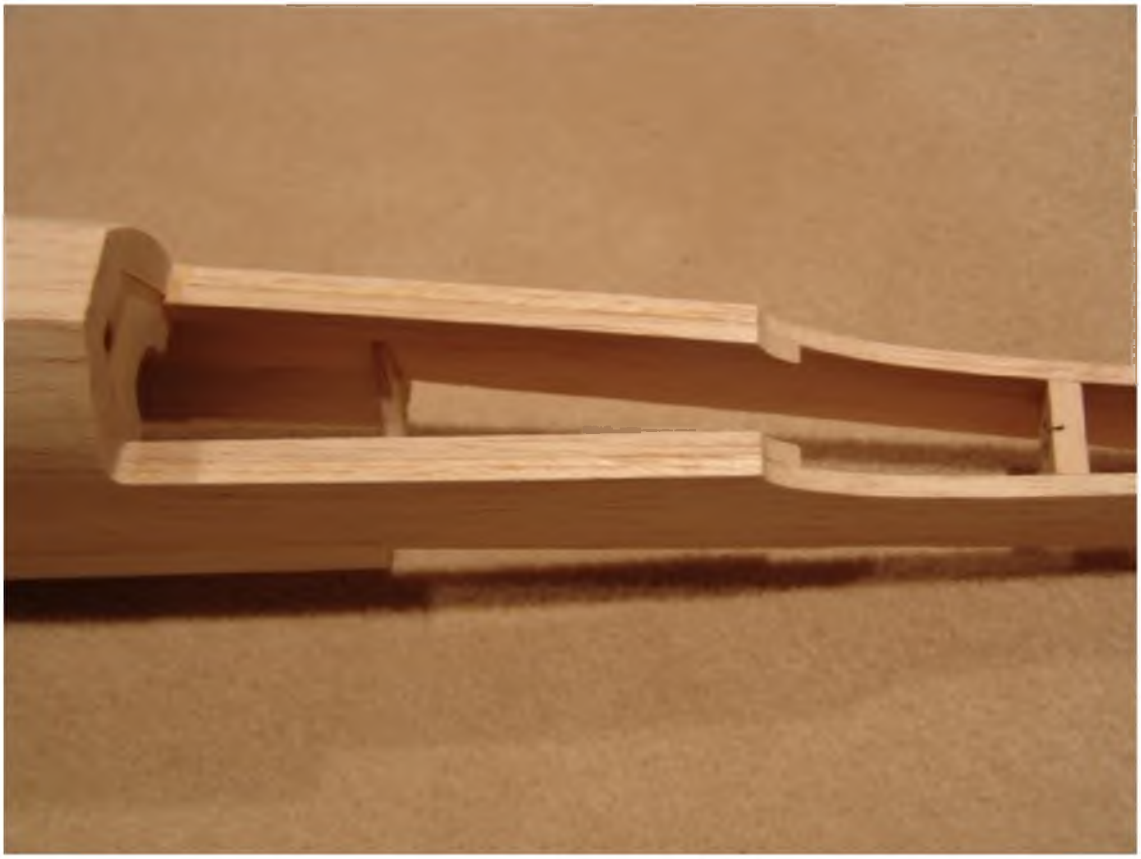
To be continued…

The bottom back of the fuselage is sheeted the same way as the top with three pieces.



To be continued…

View of the area in front of the stab with the doublers installed to support the large balsa block that goes in this area and over the top of the horizontal stab. This large piece becomes the base for the vertical stab.



To be continued…

Not sure how well this will show up, but this image shows how the three top pieces and the bottom side pieces seamlessly join the fuselage side pieces (and each other). On a fuselage like this one it is important for the seams to fit tightly because of all the razor plane work needed to achieve the oval shape. Hope they will all look that good!

To be continued…

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quote:

ORIGINAL: bigton
How do your methods to transferring the shape of the fuselage on to Balsa?

bigton

Take a look at Post # 75 on this thread (page 42-44?).

Some images of the tracings I used for the fuselage sides are below. Of course these were peeled of the parts after cutting.

TBC …

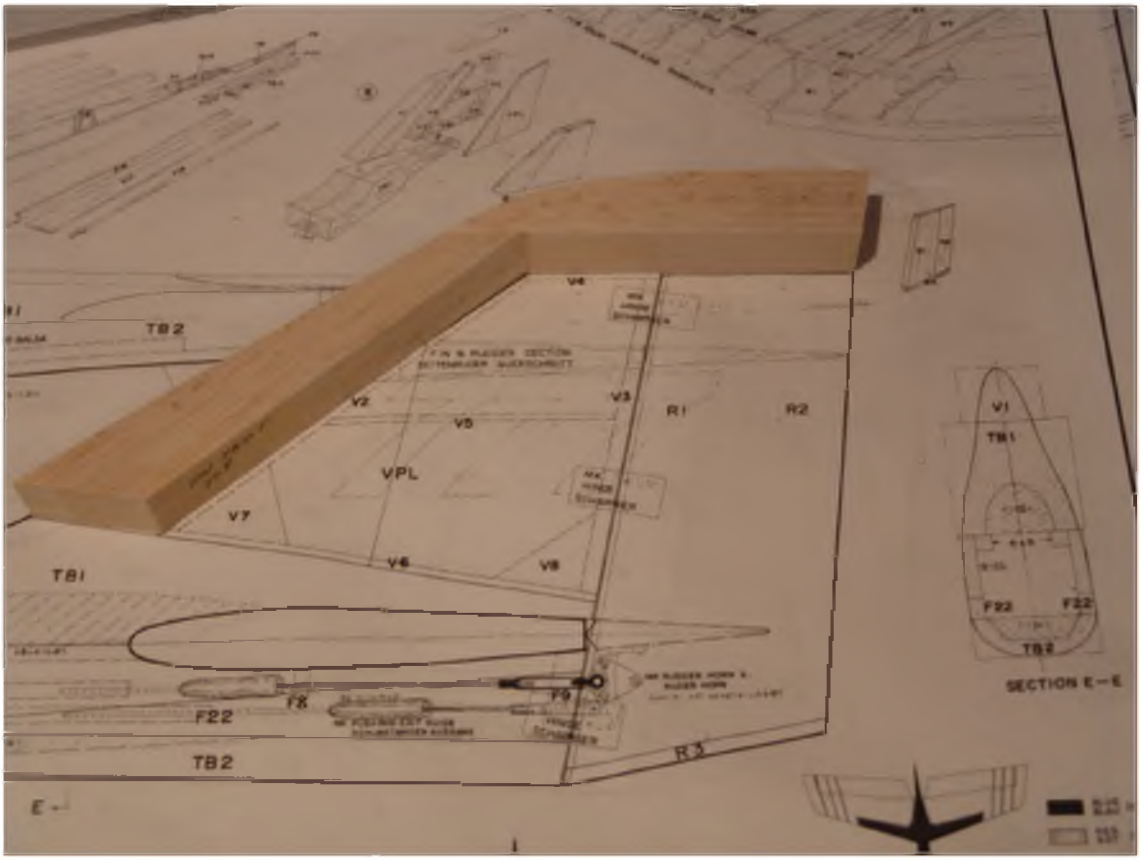
More shaping work on the fuselage. It is starting to look pretty awesome!

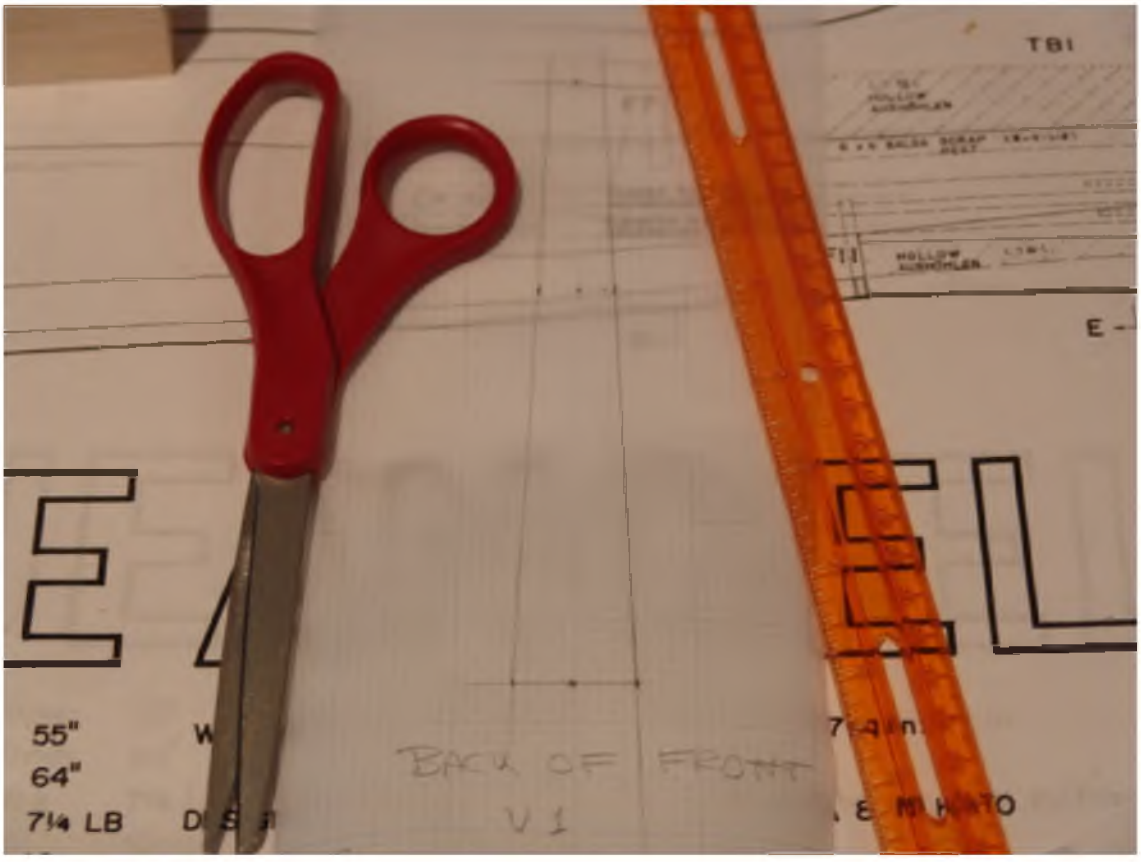
To be continued…

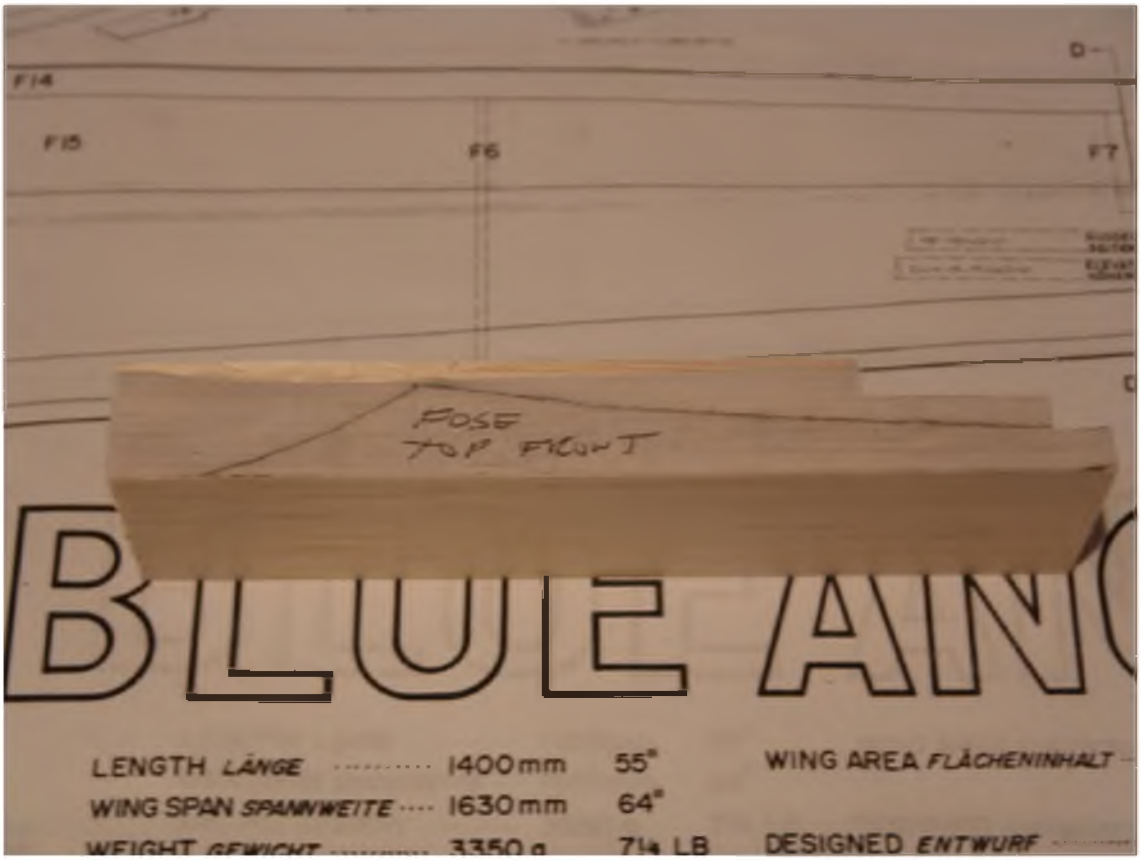
While I'm waiting on my foam wing and stab cores from Dan (that might have shipped today), I continued work on the fuselage. I did the tracings templates for the front and top of the vertical stab and then cut out the parts. Using the plan views I projected the shape of the back edge of the front part of the vertical stab to use later.

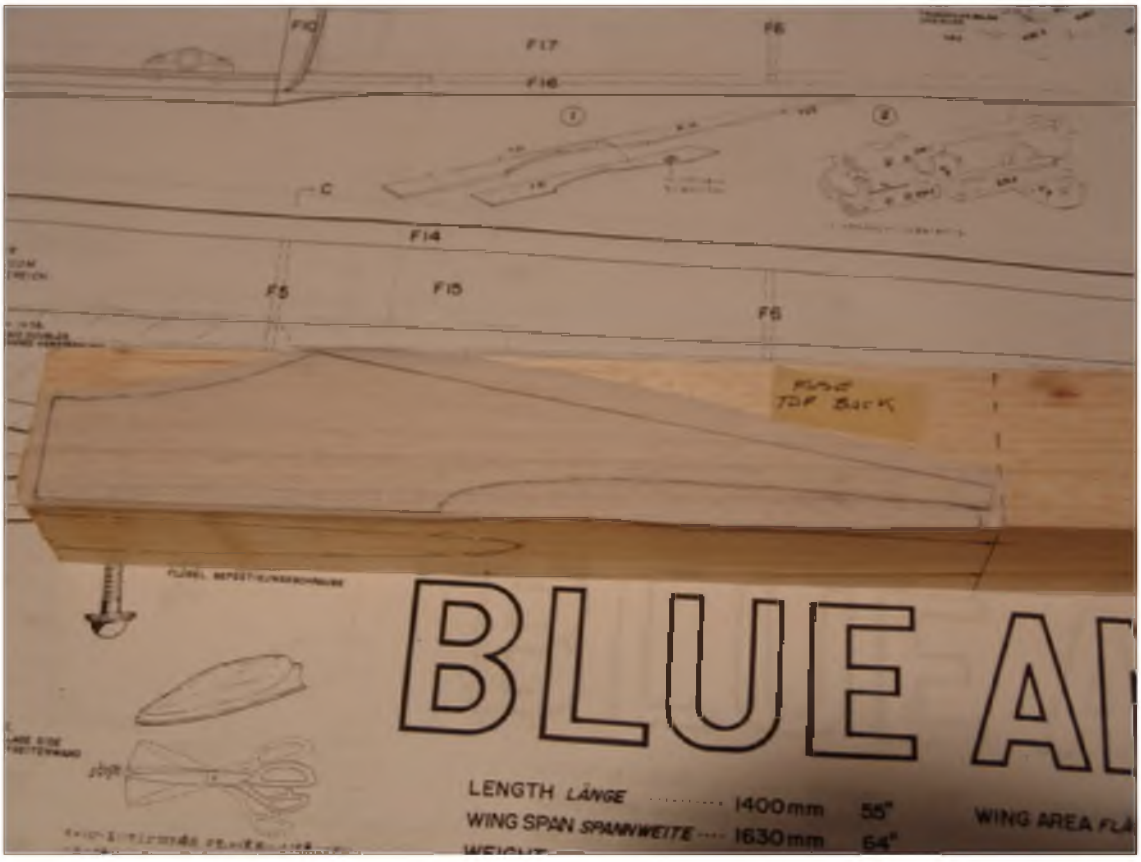
The front top of the fuselage, the top back of the fuselage under the vertical stab, and the bottom back of the fuselage are too thick for my jig saw so I hope that I'll be able to use my neighbor's band saw to cut them out.

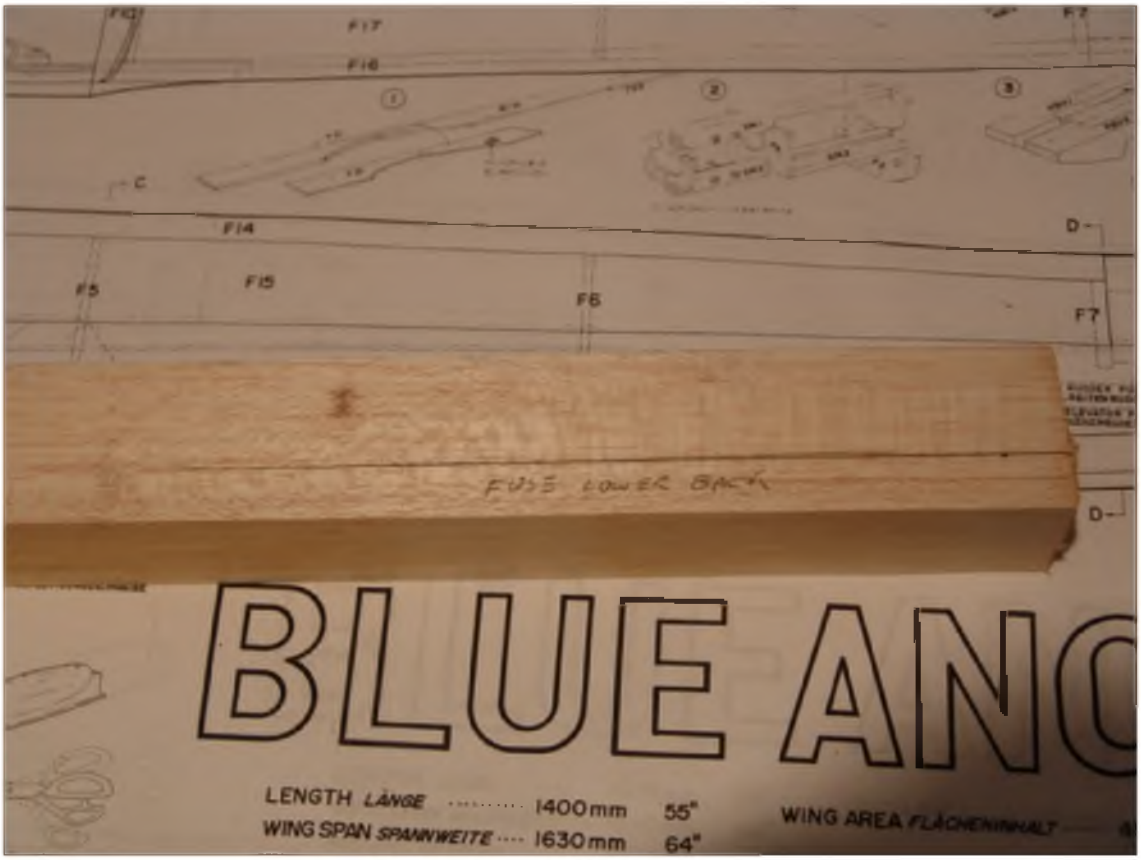
The replacement spinner should be here soon and then I'll be able to mount the OS 61 SF ABC-P engine and work on the front of the fuselage.


TB2
V4
V2
V3
R1
R2
V5
VPL
V7
V6
V8
TB1
F22
F8
F9
TB2
R3
V1
TB1
F22
F22
TB2
SECTION E-E


TB1
HOLLOW
55"
64"
7¼ LB
BACK OF FRONT
V1


F14
F15
F6
F7
FUSE
TOP FRONT
BLUE AN
LENGTH LÄNGE ..... 1400mm 55"
WING SPAN SPANNWEITE .... 1630mm 64"
WEIGHT GEWICHT ..... 3350 g 7¼ LB
WING AREA FLÄCHENINHALT
DESIGNED ENTWURF


F17
F16
F14
F5
F15
F6
FUSE
TOP BACK
BLUE A
LENGTH LÄNGE ..... 1400mm 55"
WING SPAN SPANNWEITE .... 1630mm 64"
WING AREA FL



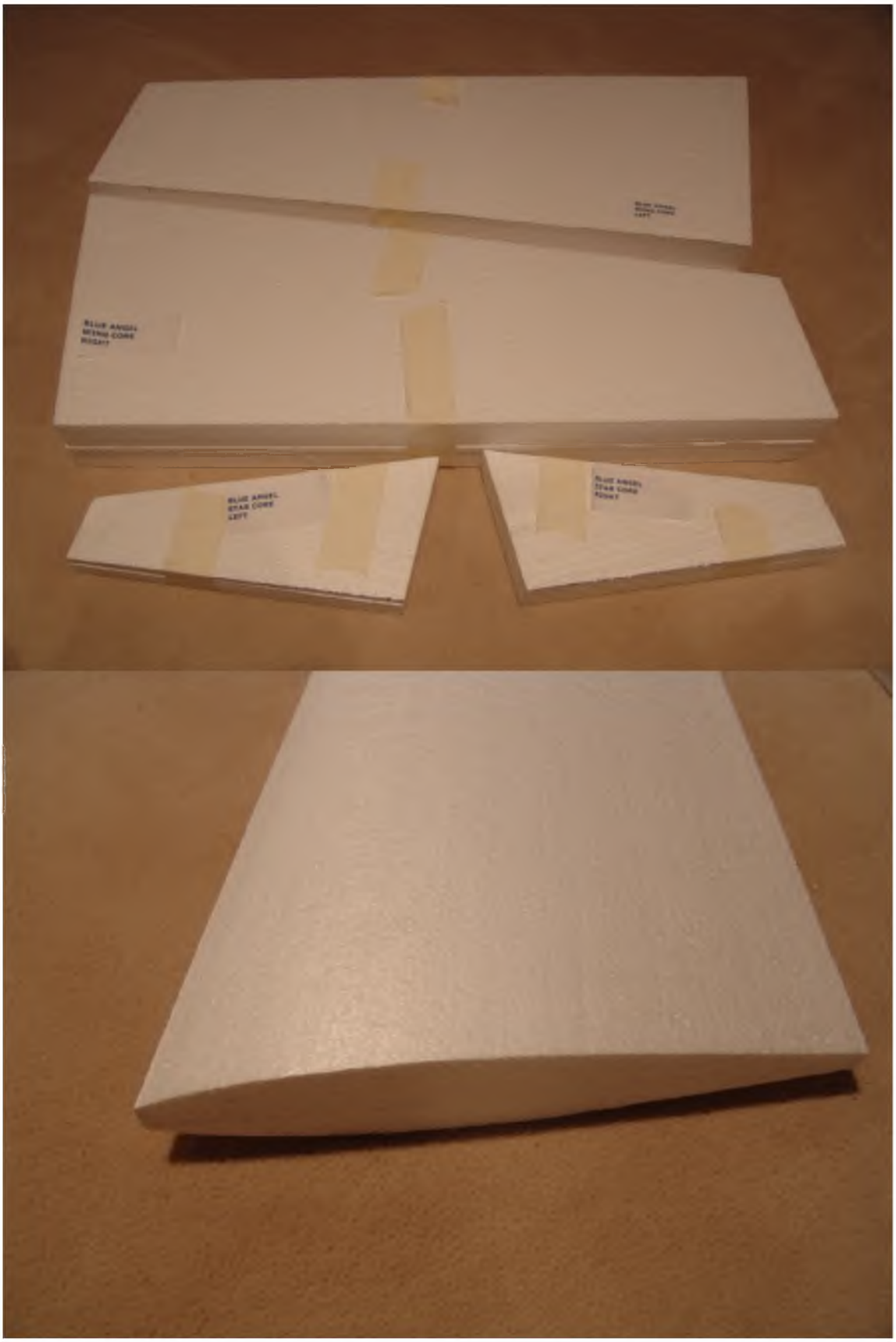
To be continued…

The canopy is under way http://www.rcuniverse.com/forum/m_4107817/tm.htm

I've been on the road for a few days and when I returned home I was greeted by a big box sitting on my front porch with my foam wing cores from Dan Hines at Carolina Custom Aircraft carolinaaircraft@earthlink.net

The core cutting and foam quality is fantastic. Dan will be updating the foam core template design and cutting thread at http://www.rcuniverse.com/forum/m_4039073/tm.htm soon. Dan's work is especially impressive because the Blue Angel wings require very specialized cutting equipment and are super difficult to cut.

I cannot thank Dan enough for all the work he did to make the cores available to me for this project. Thank you very much Dan!



To be continued…

While I'm waiting for access to a band saw to cutout the fuselage parts I started work on the horizontal stab. The first step was sanding the foam stab cores and making sure the root and tip airfoil were the same on the top and bottom. Next I glued on the ¼" balsa trailing edge and shaped it to the back edge of the foam cores. The 1/16" sheeting was butt jointed together and the sheets rough cut to the stab outline.

View of the cores and sheeting.

To be continued…

I use Dave Brown Southern' Sorghum contact cement for gluing wing skins that will be MonoKoted and have had good experience with it. I use a throw away cheap brush and brush it on as thin as possible but making sure I do not miss any areas. After the sheeting was on I trimmed and sanded the leading edge and glued on the ¼" leading edge.

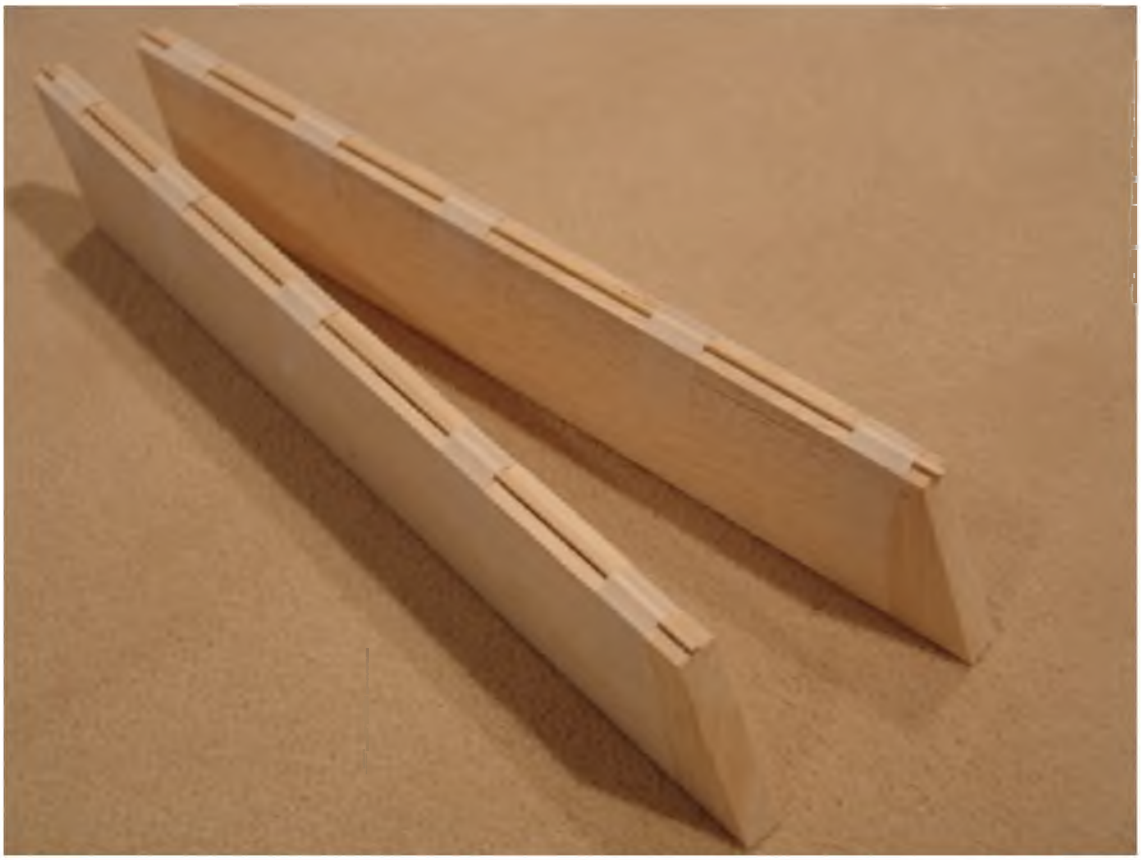
View of the covered stabs.

To be continued…

More progress on the stab. The leading edges are glued on and roughed in. The trailing outside edge of the stab tip blocks must be cut to insert plywood plates to keep the edge sharp. As usual I'll be adding hardwood to the trailing edges of the elevators so they can be sanded to a sharp edge.

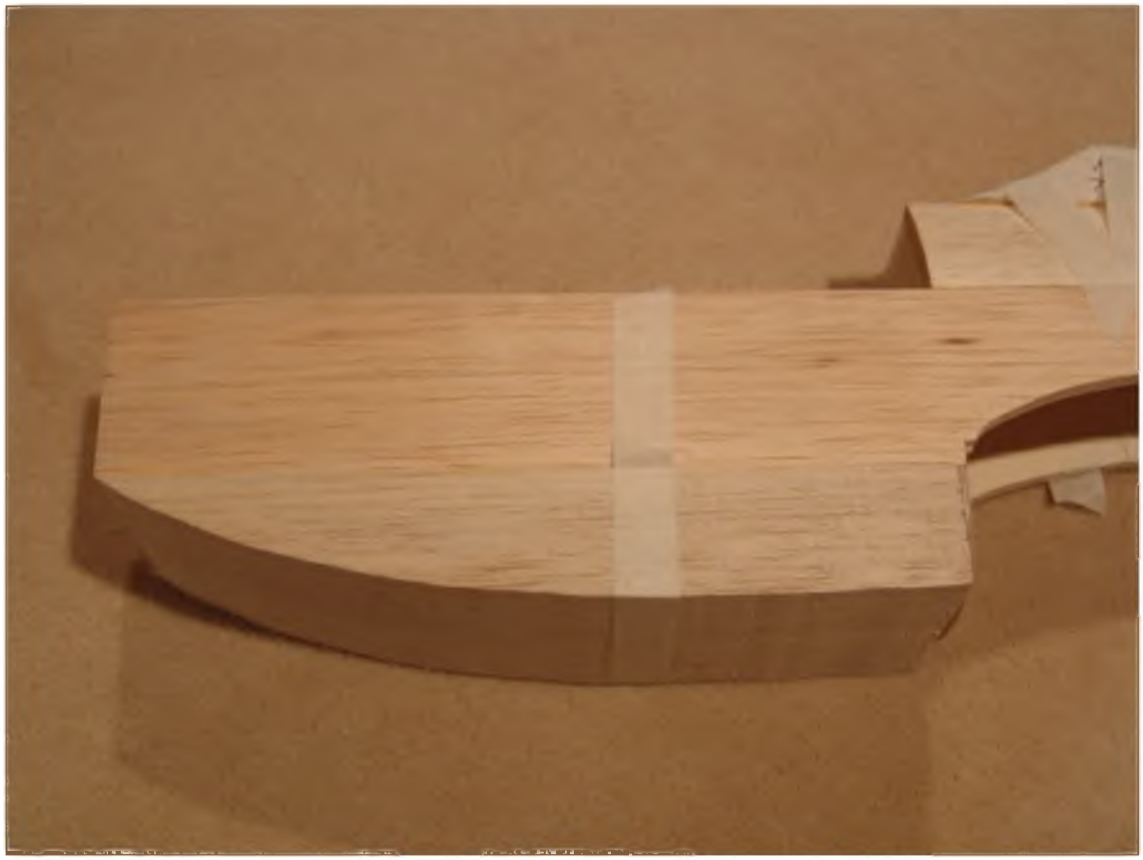
To be continued…

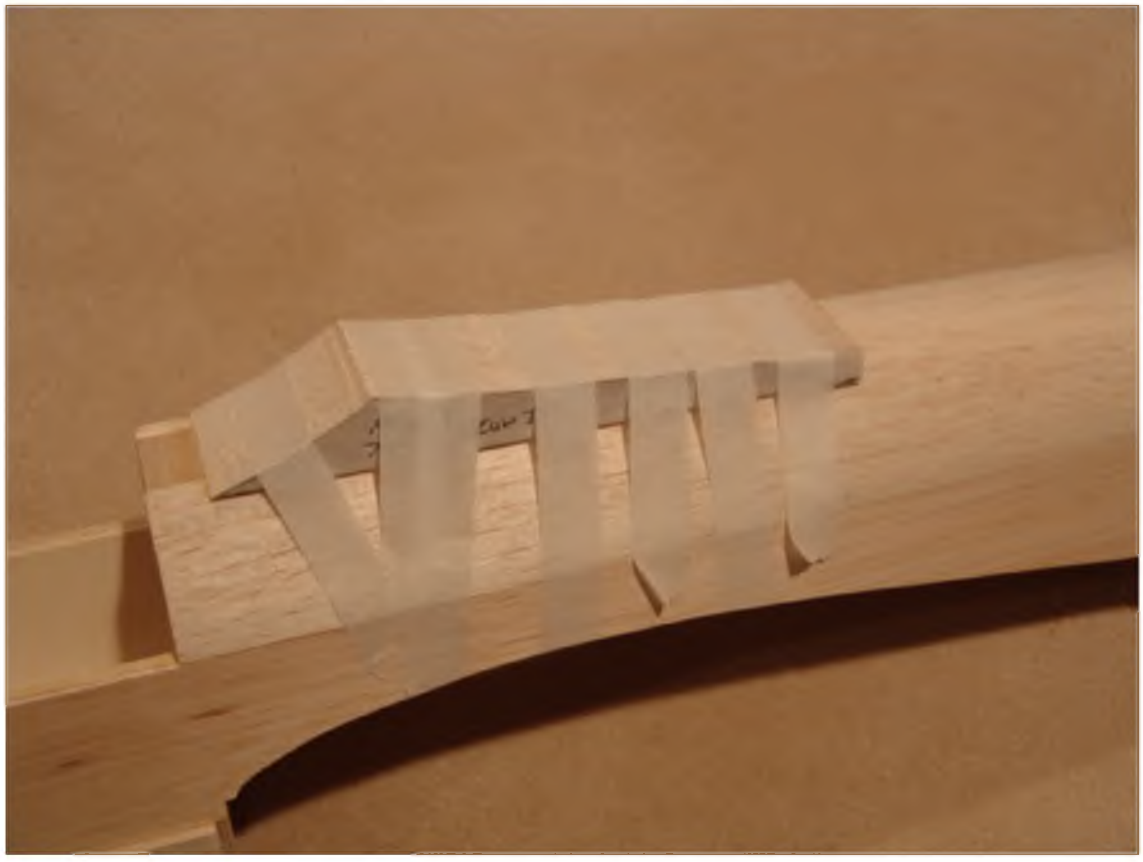
Because the elevators are thick I'm using 3/32" hardwood for the trailing edges that I will plane down to a sharp edge as I shape the elevators.



To be continued…

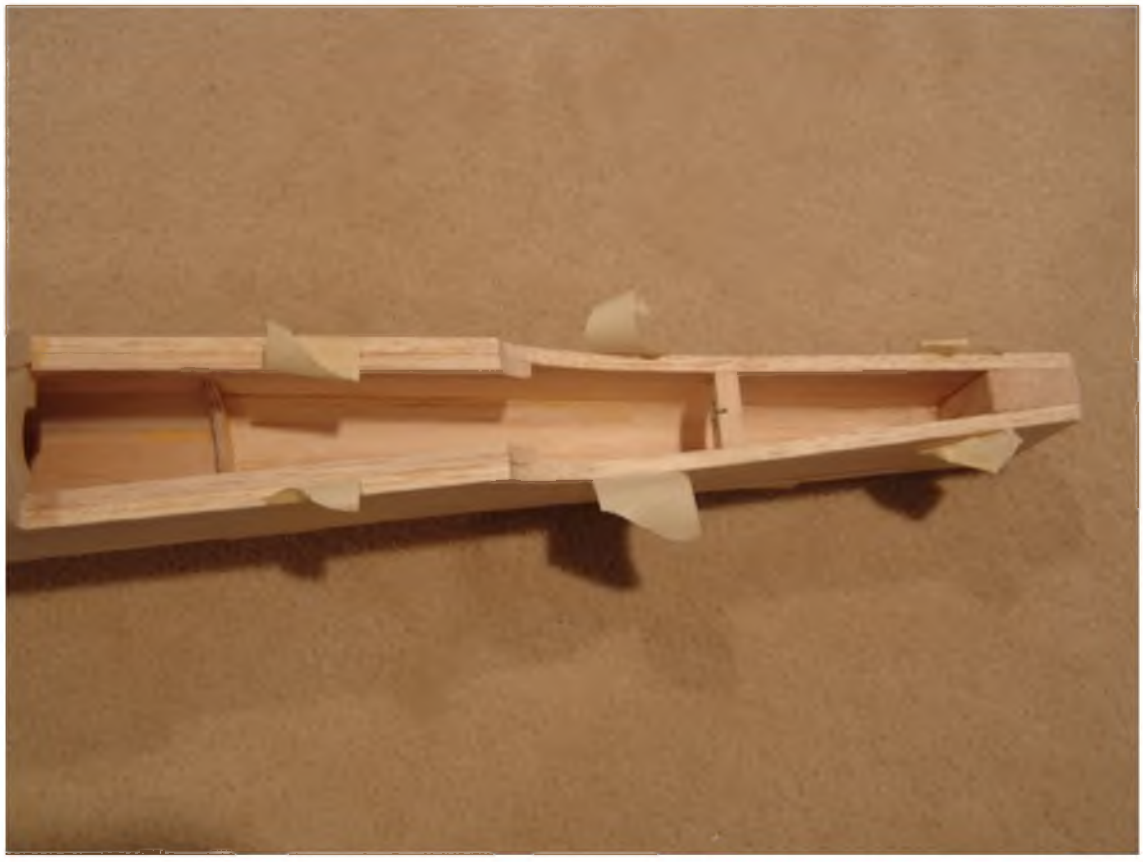
I finally got access to a band saw and table saw to cutout the big balsa parts. I cut out the lower front and then cut it into a right and left side to make it easer to shape the inside for the nose gear and retract unit. The top front of the fuselage that is behind the canopy is cutout and glued on. The top above the stab is cutout and taped on to see how much shaping work will be needed. The lower back of the fuselage is cutout and is taped on for test fitting. Lots of carving work will be needed inside and outside the big balsa blocks!





To be continued…

Started work on the first block shaping on the block that is located under the tail end of the fuselage. I roughed in the outside first and then marked the fuselage sides on the top of the block for a carving line for the hollowing out the inside. I used a router carving tip to hollow out the inside and then sanded it smooth. I could have just left the router marks but because you all are watching I decided to make it more finished looking. The calipers were used to check the thickness to make sure that it was consistent, about 3/16". After the glue sets I'll finish sanding the outside to blend it into the fuselage sides and bottom. It went very fast and was easy to do!



To be continued…

Completed shaping.

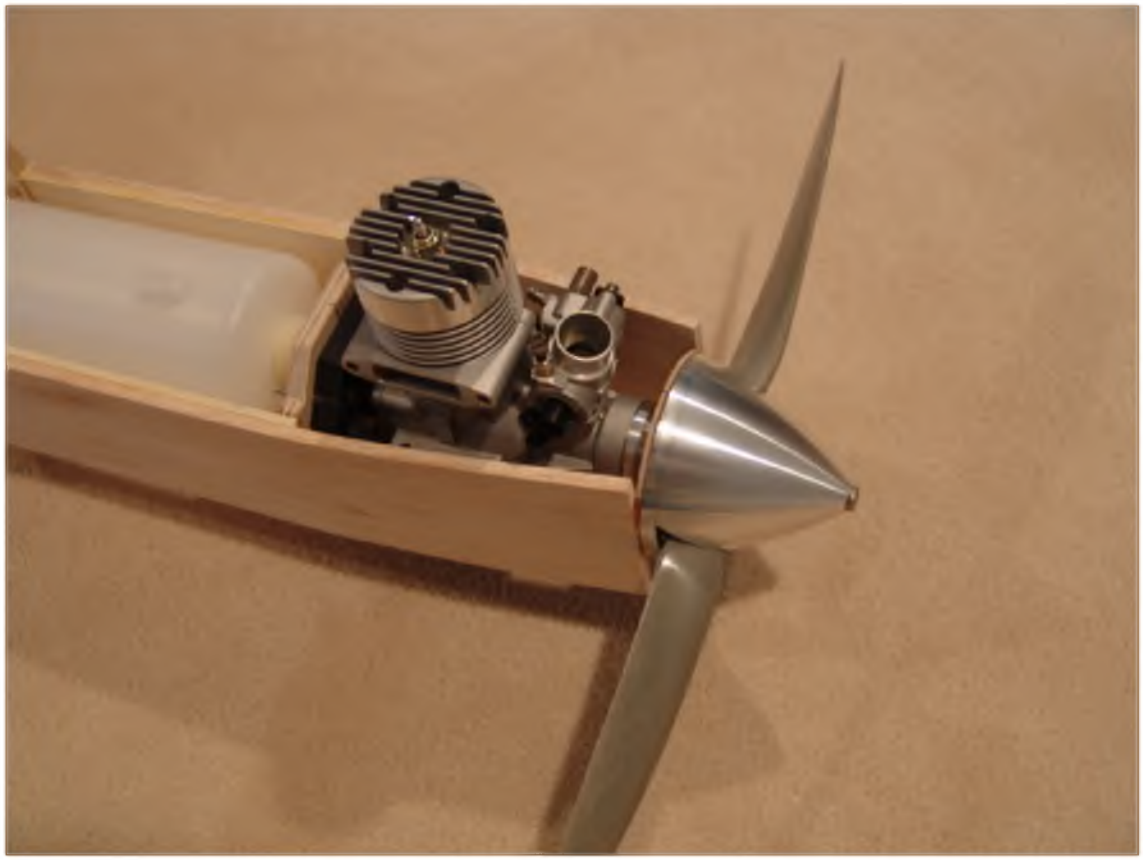
TBC …
More shaping work on the top tail of the fuselage. I use rubber glue to hold the part in place to shape the outside and then it can be easily pulled apart to cutout the inside.

To be continued…

More fuselage rough shaping work on the area behind the canopy. I will not be able to complete the exact shape until the canopy arrives.

TBC …

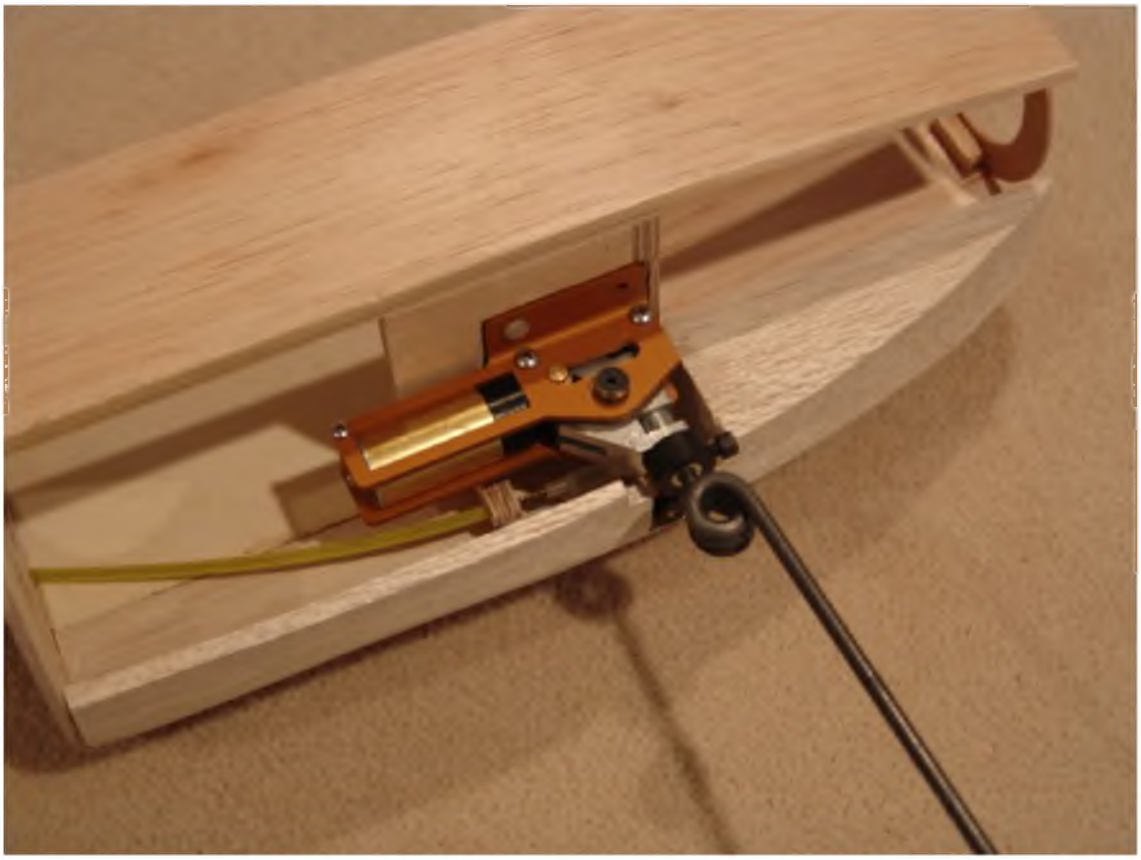
My spinner finally arrived so I could pull the front together. To do this I installed the mount in the vertical position temporarily so I could glue on the nose ring with the engine installed without cutting the fuselage side.

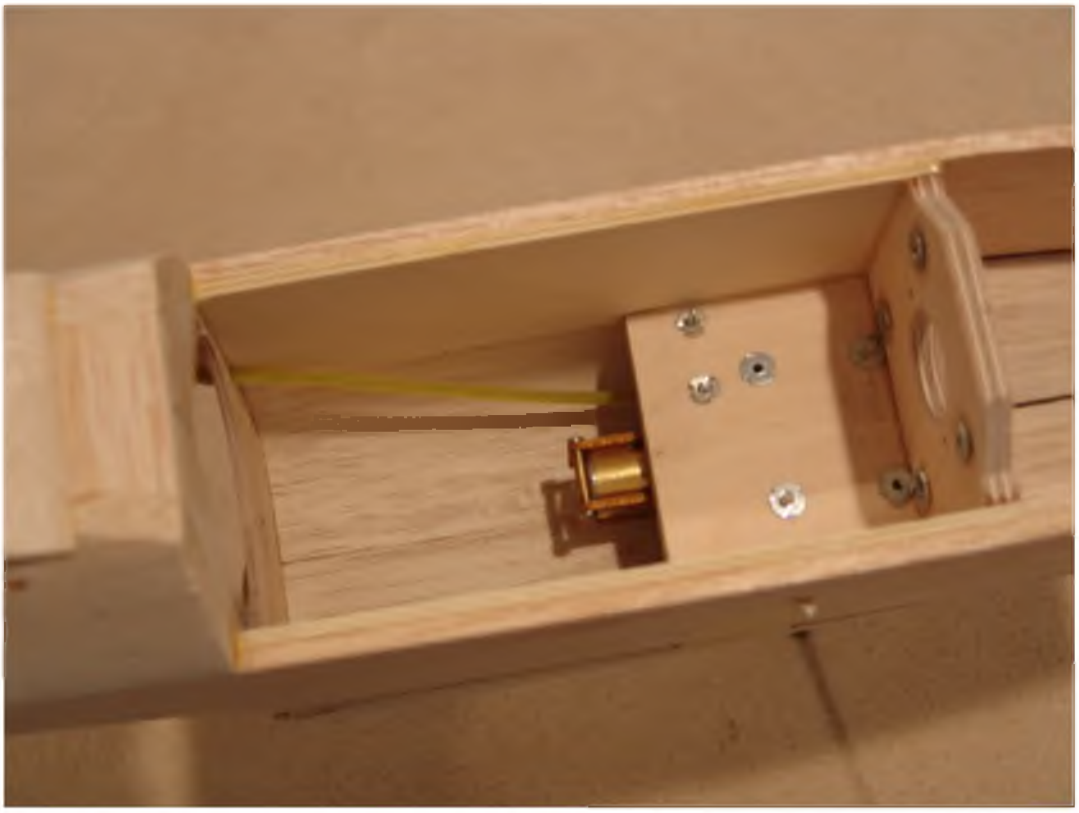


Because the engine is positioned far back on the mount and has a pump on the back I decided to space the fuel tank back ¼" with a plywood spacer ring. This will provide more clearance for the fuel lines.

TBC …

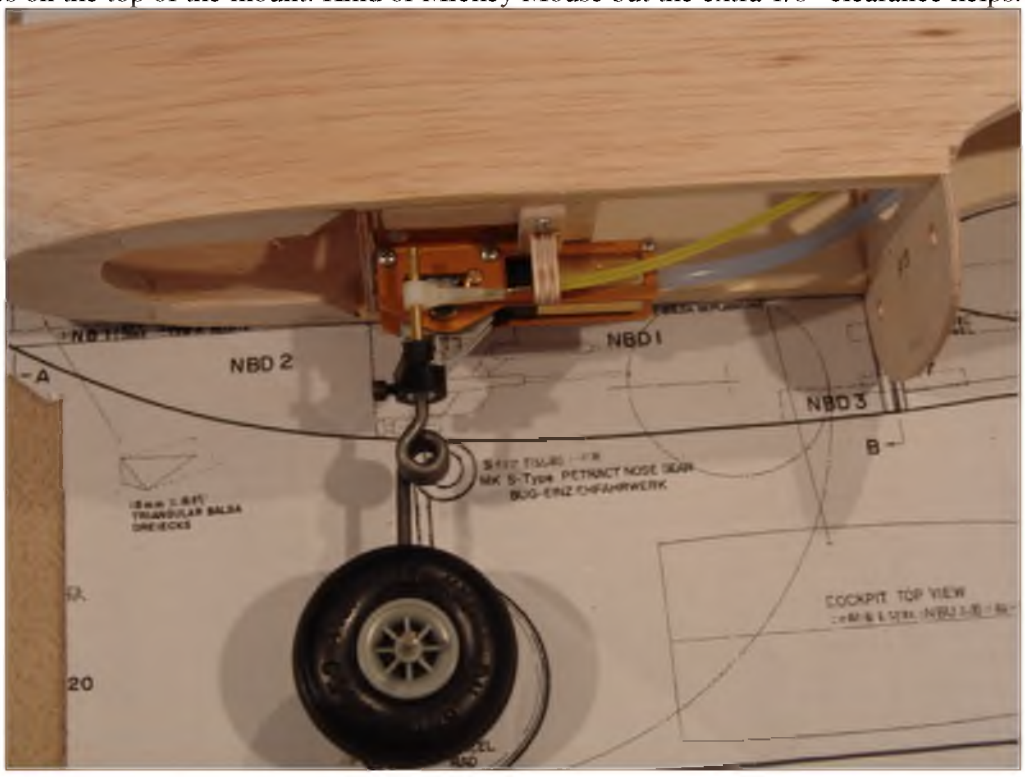
Next, I positioned the front lower nose blocks on the fuselage with rubber glue and rough shaped the outside. I then hollowed out the inside of the blocks with the router blade to make space for the nose gear. The front of the block will need more shaping after I add more blocks under the engine mount near the nose ring.

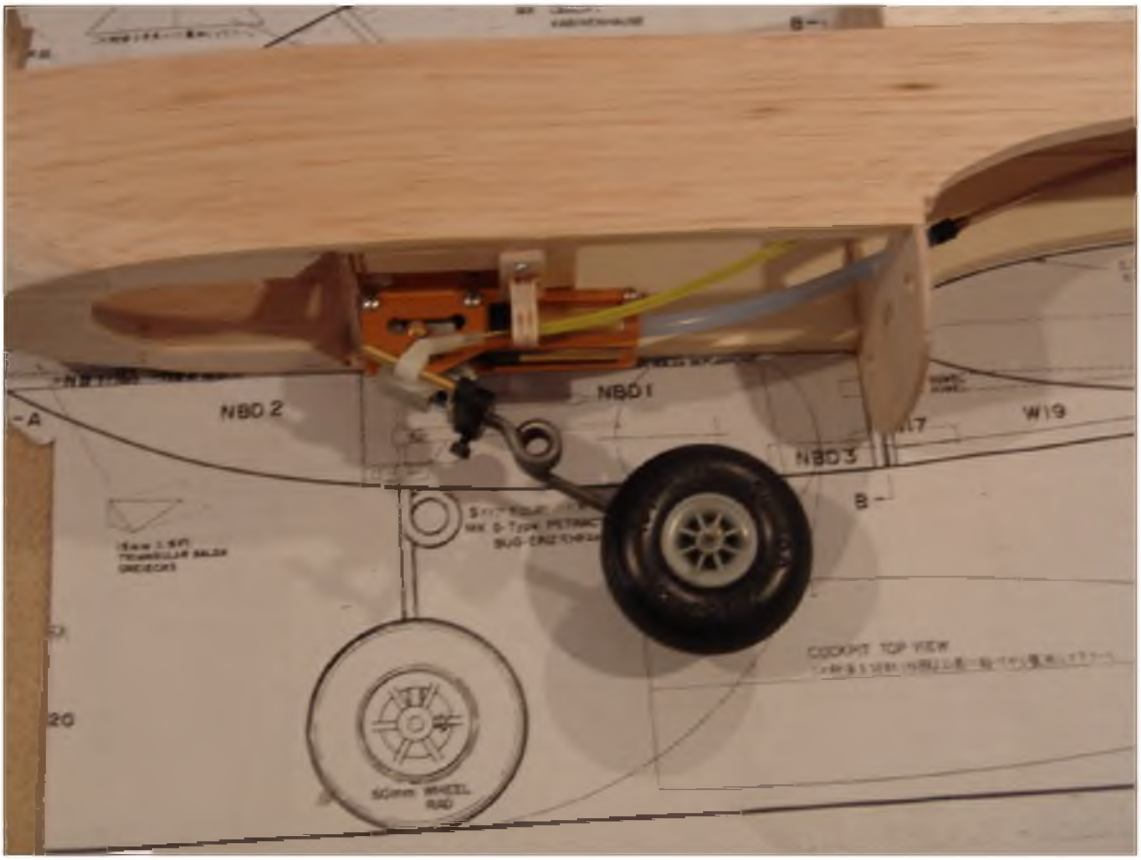


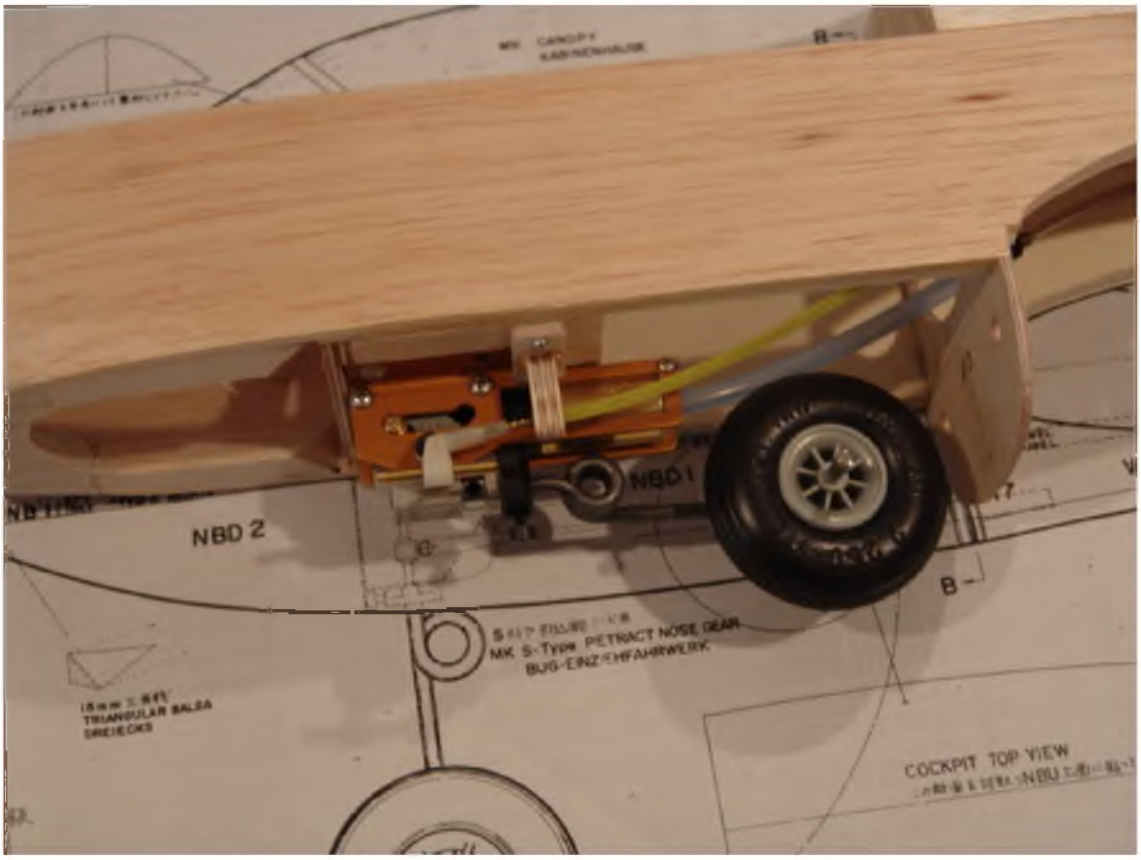


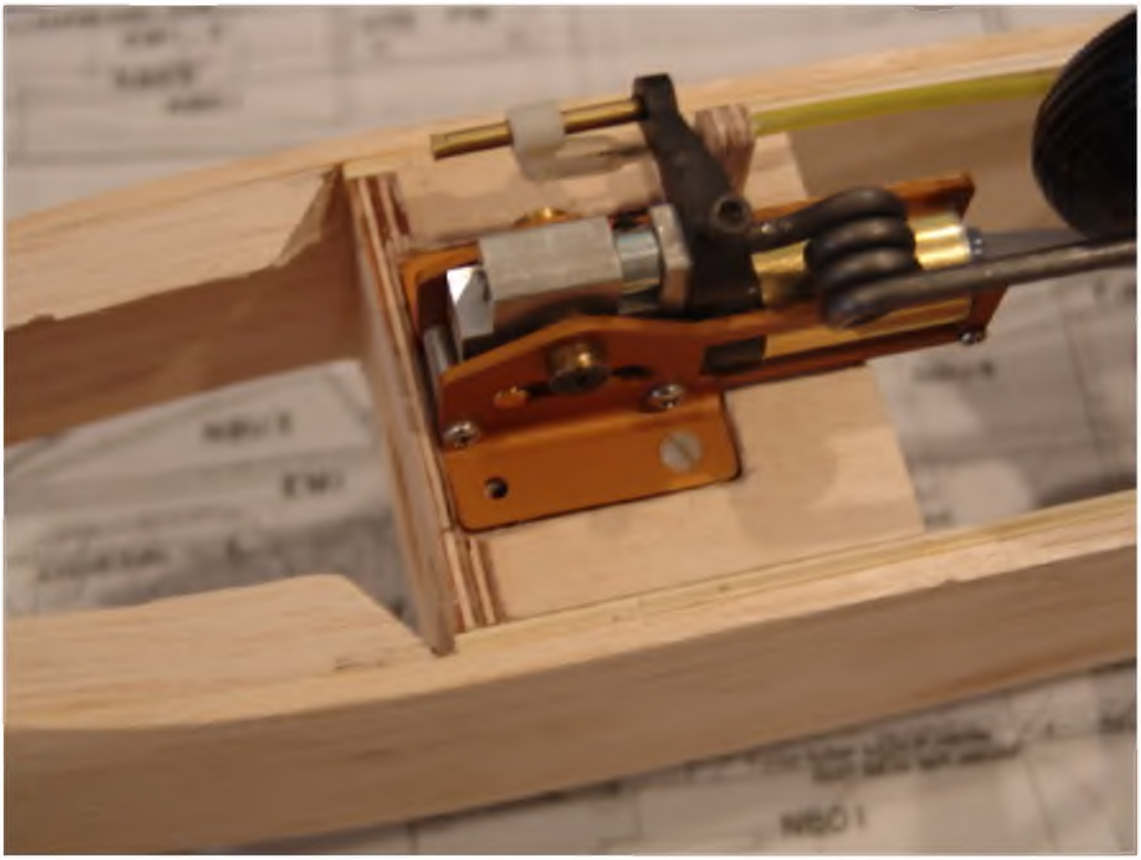
To be continued…

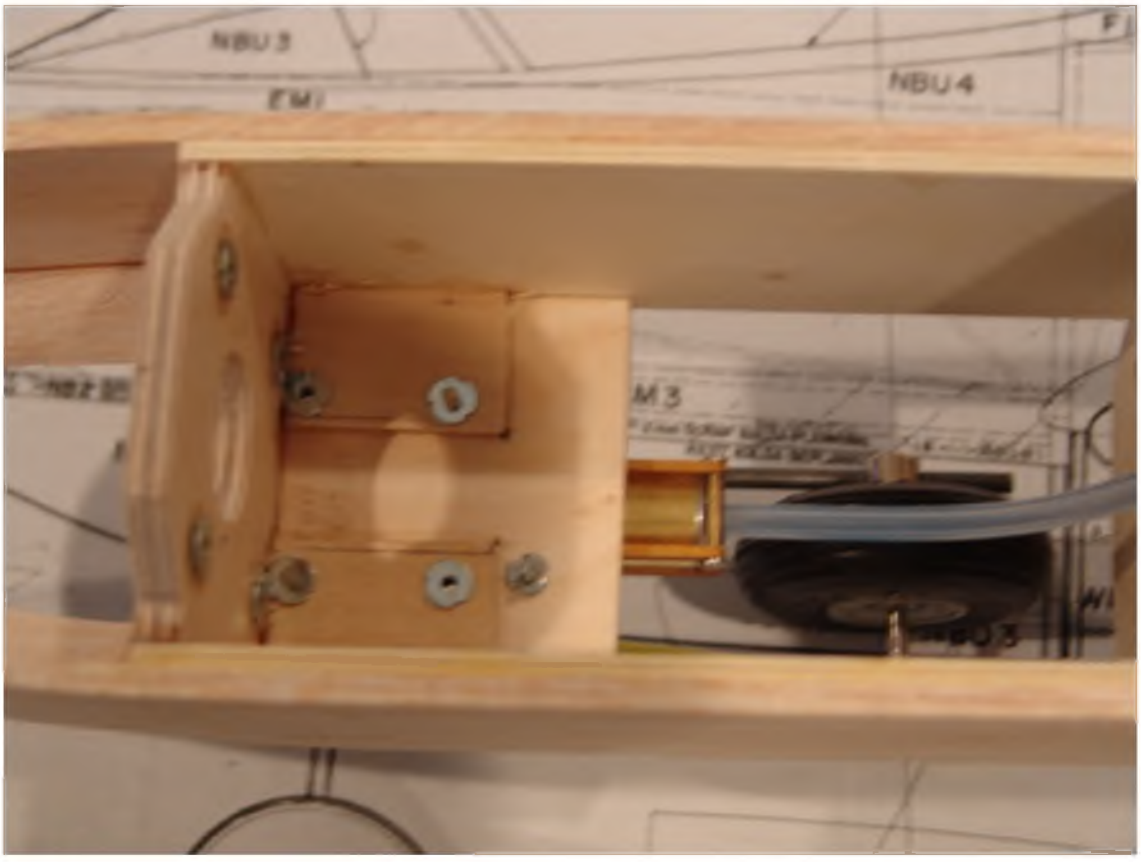
The space between the bottom of the fuel tank and the nose gear mount is very tight and I ran into a clearance problem with the nose gear steering arm and the bottom of the fuselage opening. I decided to countersink the nose gear up into the mount 1/8" and add extra plywood plates on the top of the mount. Kind of Mickey Mouse but the extra 1/8" clearance helps.




NBD 2
NBD1
NBD3
W19
B-
COCKPIT TOP VIEW

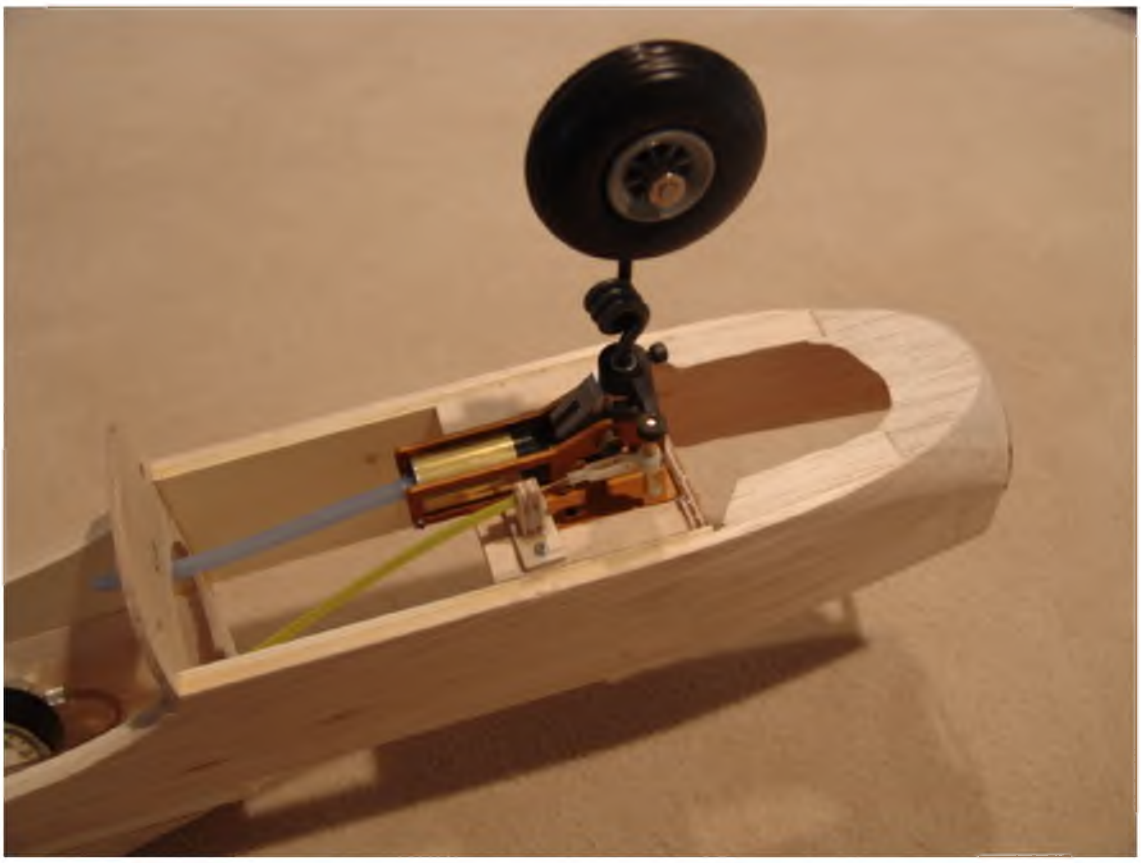

NBD 2
NBD1
B-
MK S-Type RETRACT NOSE GEAR
BUG-ERZ'HFAHRWERK
TRIANGULAR BALSA
COCKPIT TOP VIEW

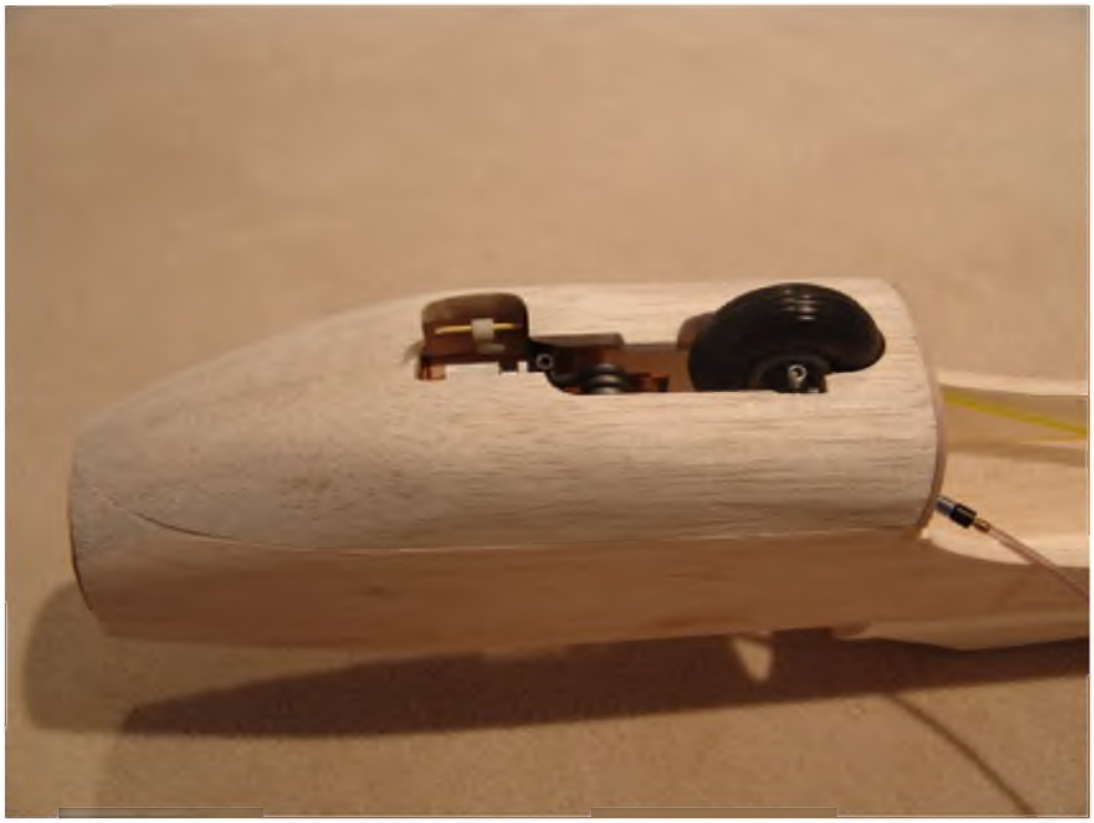



NBU 3
NBU 4
M 3

To be continued…

After repositioning the nose gear I cut out the bottom of the fuselage for the nose gear opening. When I fiberglass the fuselage I'll be able to cover about half of the cutout for the steering arm. After the bottom of the fuselage is glued on the nose gear can be removed or installed through the former hole for the back of the fuel tank. I need to fuel proof the inside of the lower fuselage that covers the nose gear with thinned epoxy.





To be continued…

View of the inside of the lower front fuselage block that covers the nose gear.

To be continued…

This is looking great. Incredible work! Is that a nylon bolt holding the gear in place? I'm new to retract installations, but it makes sense to have a breakaway point like that.
--
Thanks rainedav, it is a fun build.

Yes. I use 4-40 nylon bolts to hold the gear in place with blind nuts. On this build, like my Tiporare and Kwik Fli III I'll use 4-40 socket head bolts for the nose gear because I'll need to use a ball driver to reach the bolts. I've never had a nylon bolt break loose and they seem to work well.
--
8178, you might want to consider using nylon pantyhose for your fuse. I used it on my Dirty Birdi, and it not only worked great it seems to be very durable. It turned out a lot lighter than standard fiber glassing does. I applied it with thin CA and then used one coat of finishing resin on top with a final sanding down to 800 grit. It is very easy to work with due to the fact that it is form fitting. I pulled it on over the nose and pulled it tight to the tail post. I then tacked it to the tail post with thin CA. I then pulled all of the slack to the wing saddle and tacked it there with CA. Then I wicked CA on the rest of the fuse. I then lightly sanded it with 800 grit sand paper. After this I applied a second layer of pantyhose in the same manner and lightly sanded it again just to remove any ridges. After this was done I used a coat of epoxy finishing resin with a squeegee. to fill the weave of the nylon. I would think you could do the same thing with polyester resin. It turned out tough as nails and has been very durable. I used pantyhose that my wife was going to throw out because they had holes in the toes. I wish I could take credit for this one, but my wife came up with the idea.

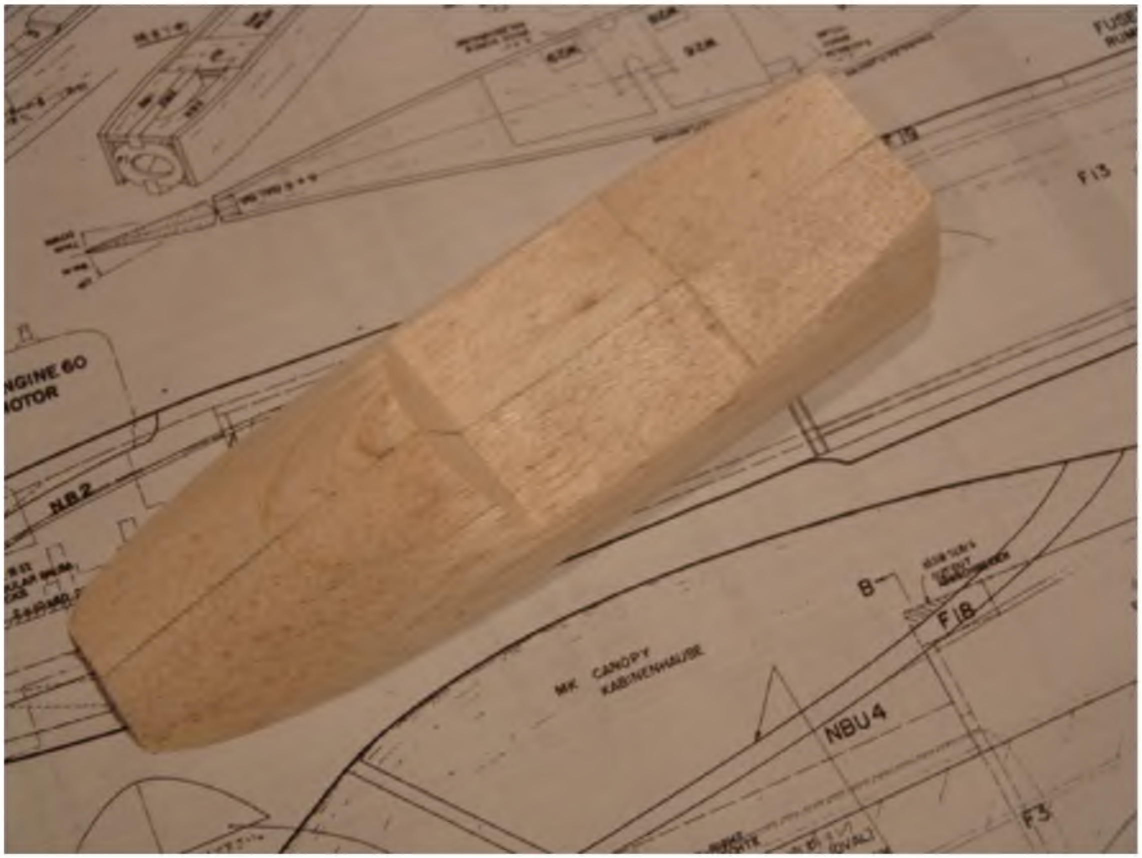
Thanks for the idea Paternguy. I'll give it a try on some scrap balsa.

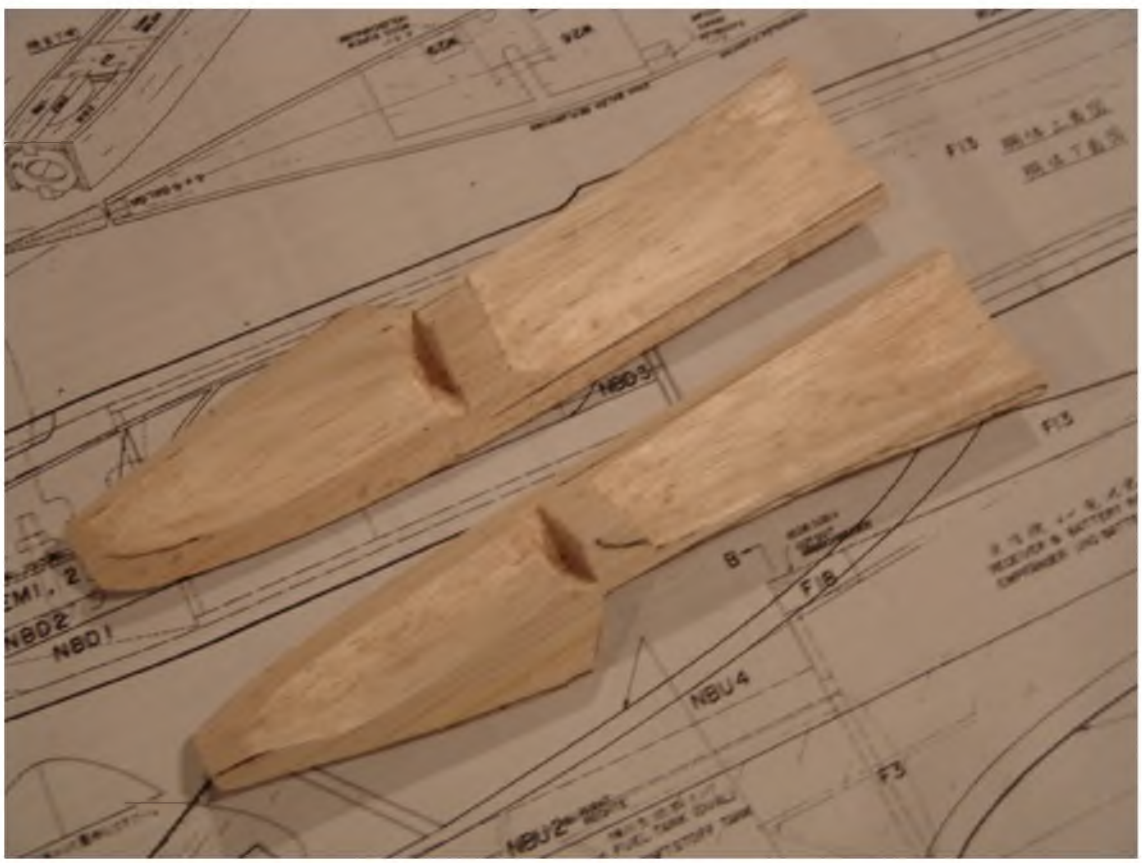
I glued on the lower front fuselage piece today and cutout the four pieces that I'm using to make up the upper front of the fuselage. Before doing that I added plywood rings around the holes in the former in front of the wing that is used for the wing dowels. The added rings provide a full ¼" bearing surface for the wing dowels.

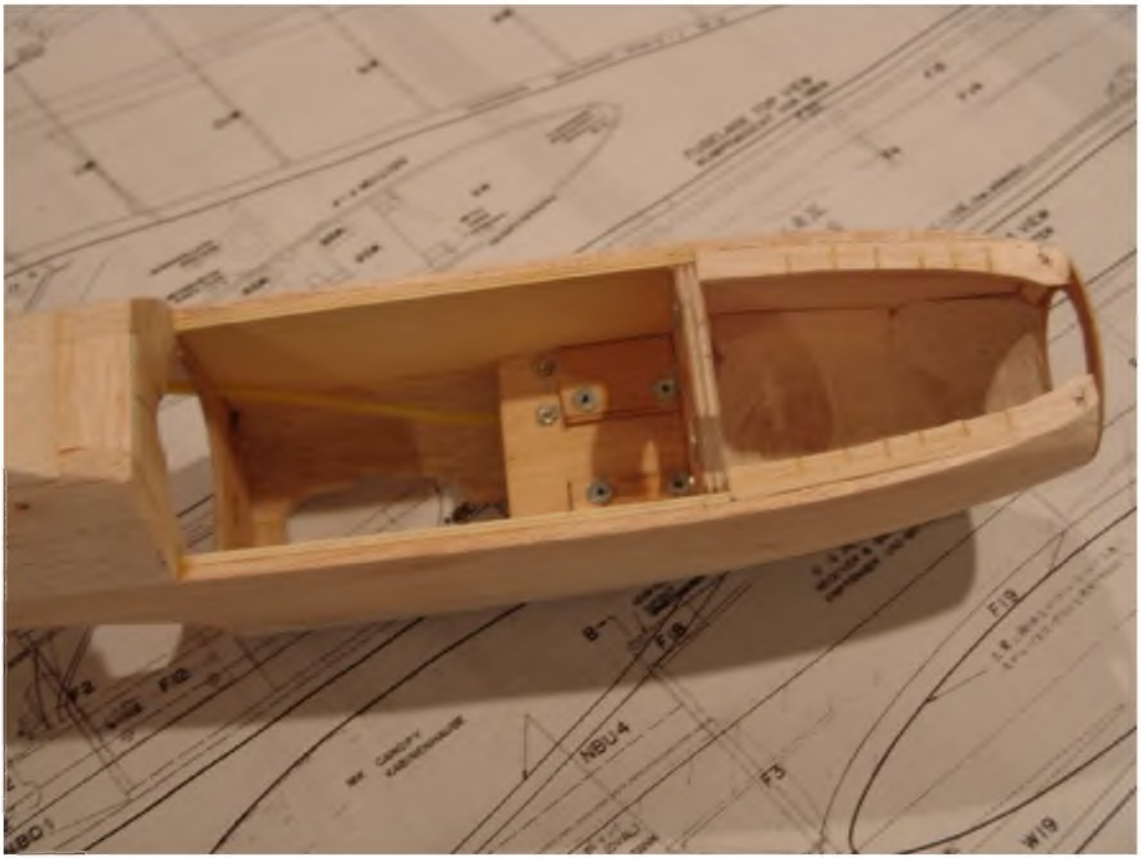
As usual I put the fuselage front top pieces on the fuselage and rough shaped them and then carved out the inside area. Tony is working on the canopy so I only roughed in the outside shape until the canopy is available for final fitment. I don't want to take off too much balsa and not have the canopy fit correctly.

The completed weight of the fuselage is less than 13oz.

It's beginning to look like a Blue Angel!


F13
NB2
B
F18
MK CANOPY
KABINENHAUBE
NBU4
F3

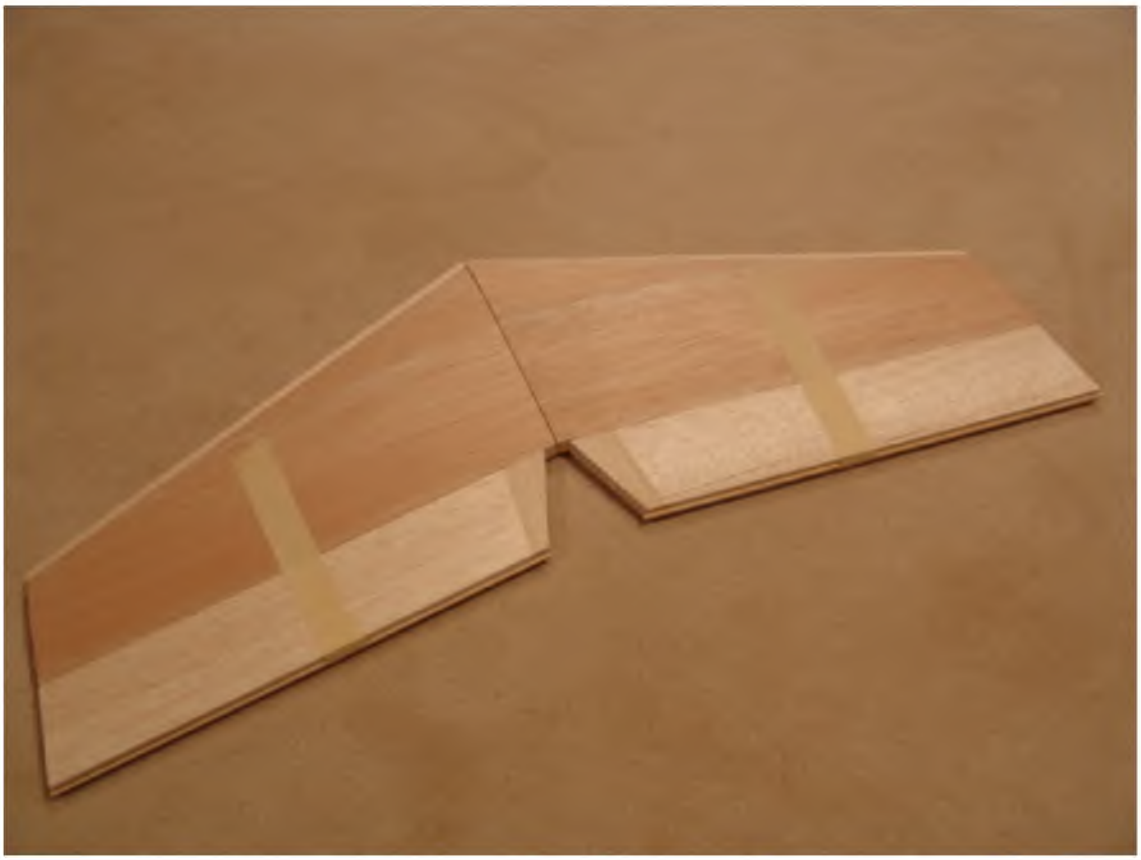

F13
NBD3
F13
B
F18
NBD2
NBD1
NBU4
F3


F19
F3
W19
NBU4


F19
F3
W19
NBU4

To be continued…

Started work on the elevator shaping. I make the hinge slots with my Du-Bro hinge slot tool and use 1/32" thick plywood tabs to insert in the slots to keep the elevators aligned. I used rubber glue to hold the elevators in place. The elevator stock is a smidge thicker than the trailing edge of the stabs so I'll be able to make a prefect line from the stab to the elevators.



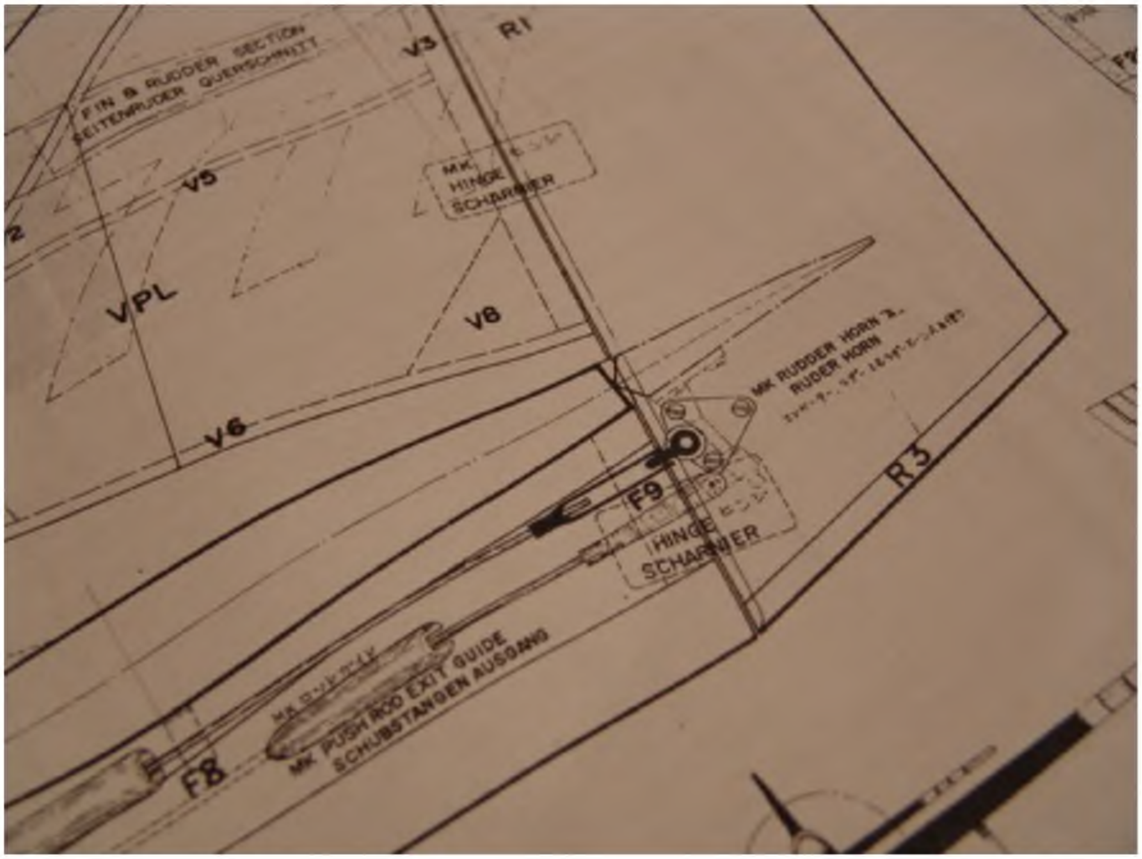
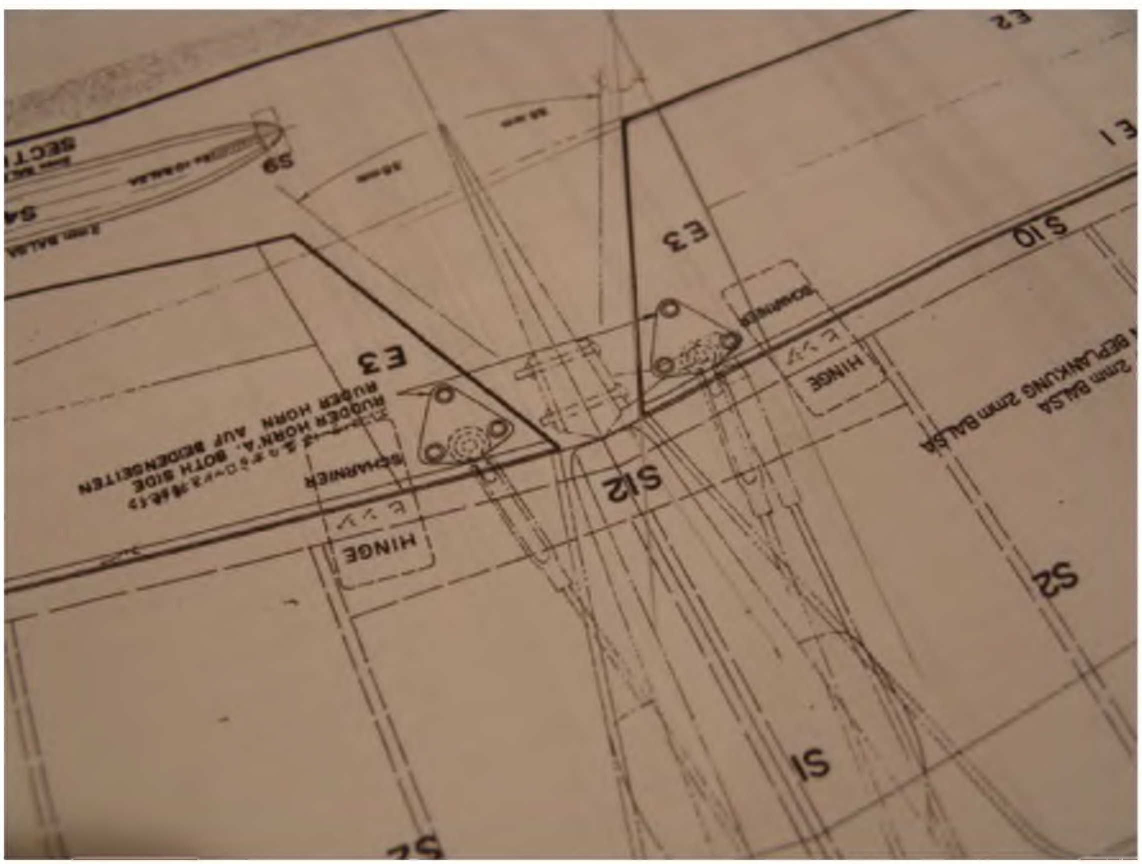
To be continued…

The before and after view. Some quick razor plane work and sanding results in a great looking elevator. The balsa at the trailing edge tip of the stab was added because the foam core was about 1/8" short. Dan has corrected that on the next run of cores.

To be continued…
More views of the stab and elevator.

To be continued…

I've been studying the control arm connections for the elevators and rudder and it looks like the rudder and the left elevator will interfere with each other. It must be a drawing mistake and the rudder control arm should be below the elevator arm.


FIN & RUDDER SECTION
SEITENRUDER QUERSCHNITT
V3
R1
V5
VPL
V8
V6
MK HINGE
SCHARNIER
MK RUDDER HORN 2
RUDER HORN
R3
F9
HINGE
SCHARNIER
MK PUSH ROD EXIT GUIDE
SCHUBSTANGEN AUSGANG
F8

E3
S10
S12
S2
S1
HINGE
SCHARNIER
2mm BALSA
BEPLANKUNG 2mm BALSA

To be continued…

I decided this rocket machine deserves some digital servos, so I ordered two Futaba S9252s for the elevator and ailerons and a S3151 for the rudder. For power I ordered a Futaba 1500 mAh battery to go along with the Futaba PCM 1024 receiver.

To be continued…

View of the completed elevators still rubber glued to the stabs.

To be continued…

Not only is the craftsmanship a real pleasure to view, the quality of your balsa seems first rate, too. Are you getting balsa that uniform and nice mail order? Or are you hand picking it at the LHS?
--
Thanks rainedav!

All my balsa came from Dynamic Balsa at http://www.dbalsa.com/ . I asked for the lightest balsa they had and worked with them on the sizes of the blocks. In some cases I accepted larger blocks to get lighter balsa. The folks at Dynamic Balsa are wonderful to work with and I'm amazed that they would take so much time to get my order just the way I wanted it.

I used their balsa on my Cold Duck build
http://www.rcuniverse.com/forum/m_3092876/tm.htm and it came out very light at 5 lb 7.5 oz. That is awesome for a 650 sq in 61 size rocket ship pattern aircraft! Dynamic Balsa has been making foam wings for the Cold Duck for decades and produce wings for many other designs.

Wow! Kato must have stayed up all night figuring out the design of the vertical stab! Some clever wood cutting required. It could have been done easer but it is more fun following the plans.

To be continued…

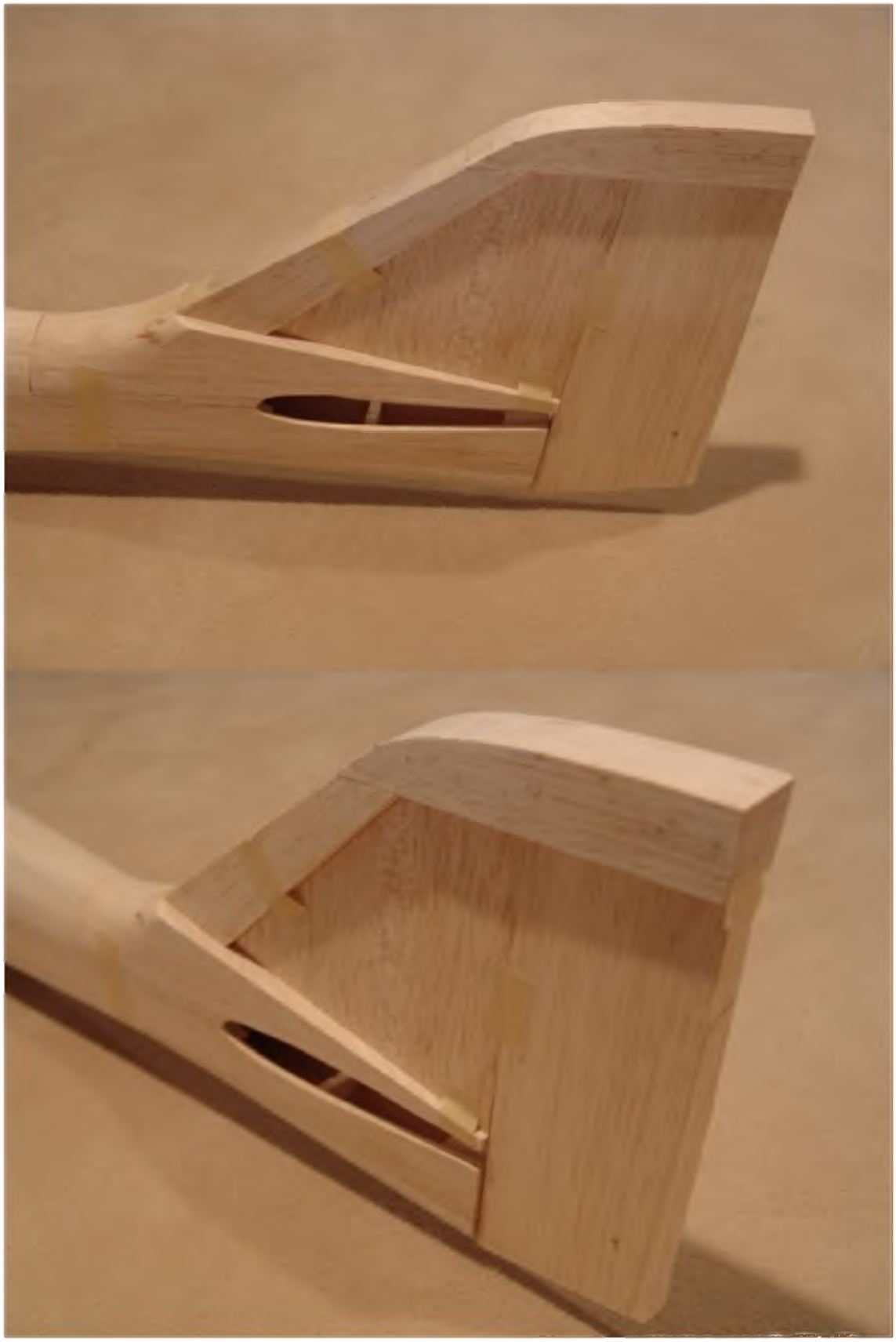
Forgot to show the rudder.

To be continued…

Some expensive radio toys! I already had the Futaba FP-R138DP PCM1024 eight channel receiver, heavy duty switch harness and Futaba S3001 servos. All I needed to complete the flight pack was some expensive digital servos, two S9252s and one S3151, a Hobbico heavy duty aileron extender cable and a Futaba 1500 mAh battery. I would have used a Futaba extender cable but they did not have a 6" one in stock. I'll be using a single S9252 for the ailerons per the original design and using very heavy torque rods for aileron connections.

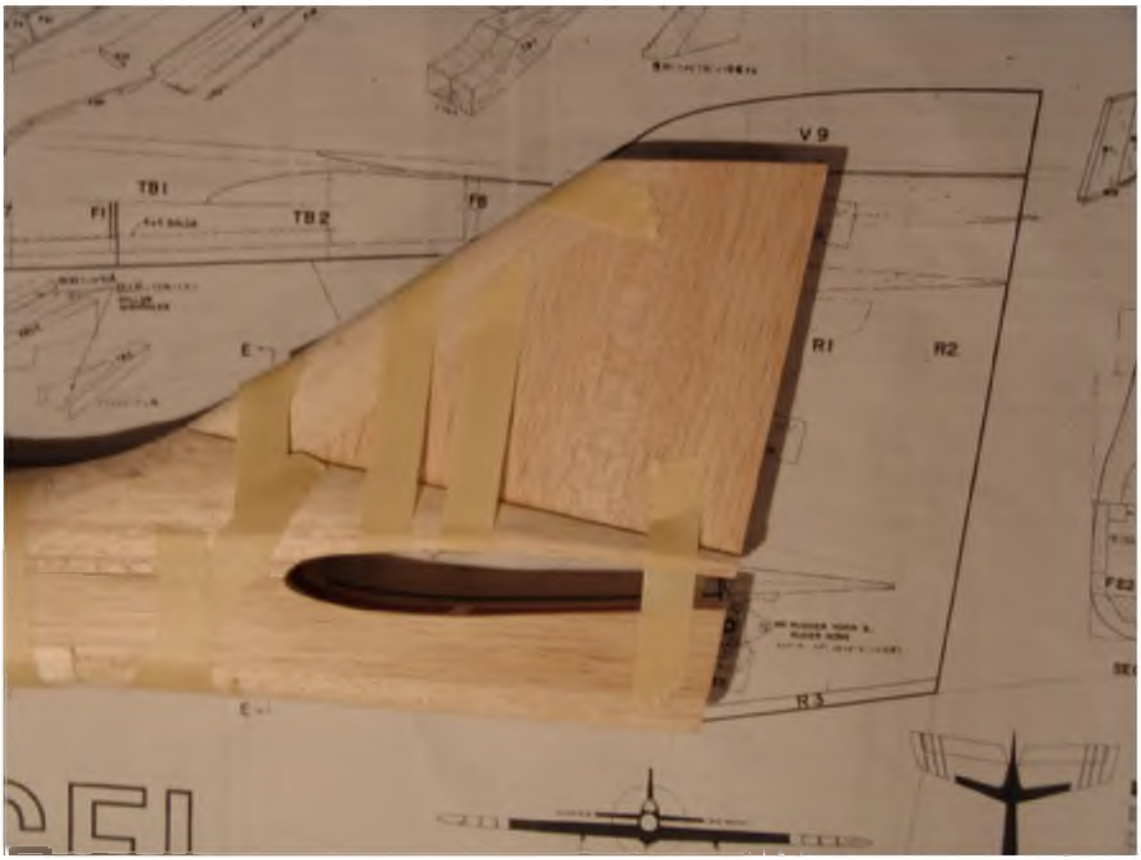
To be continued…

I completed more work on the vertical stab assembly. The stab frame had been covered on both sides with 1/16" balsa sheets.



To be continued…

After the main part of the vertical stab was complete, I shaped the leading edge and the marked the top of the block that is under the stab so that I could carve away some balsa. This carving was done to start the shaping of the block so that the shape will flow into the bottom edge of the stab. The shape is very complex and is dictated by the taper of the fuselage tail and the shape of the vertical stab. After some rough shaping I decided to glue the stab onto the block so that I could sand the final shape. Before gluing the stab to the block I did a lot of checking to make sure that the stab was exactly aligned to the nose of the fuselage and 90 degrees to the fuselage wing mount.

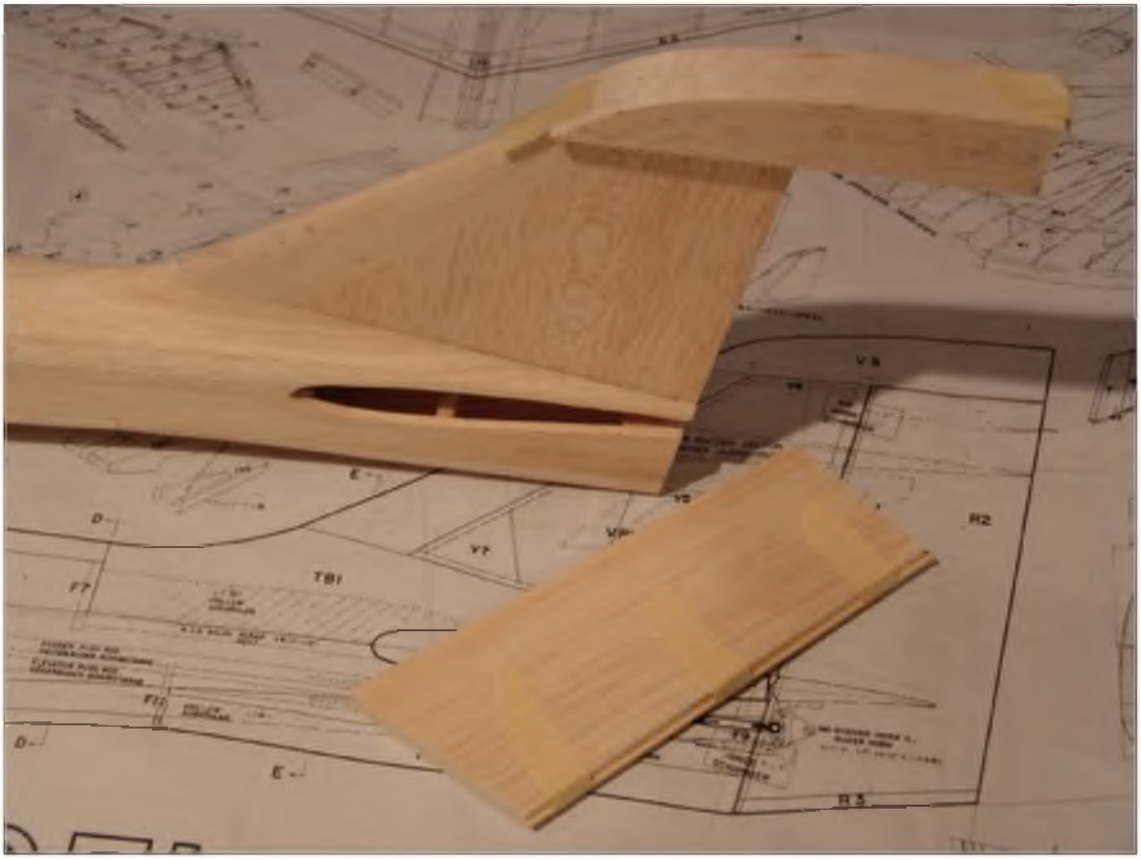


To be continued…

The sides of the block must be sanded so that it makes a transition to the stab at the same angle as the stab sides but also continue the taper of the fuselage top and sides. To keep from sanding away the bottom sides of the stab, the front of the block where it meets the fuselage and the sides of the block that will hold the horizontal stab, I used masking tape on the edges. Still more sanding to do but I'm making progress.

To be continued…

I did some more finish sanding on the vertical stab base block and then started on the stab top and the rudder. The first step was gluing the hardwood edge on the rudder and the trailing edge of the rudder top piece.



To be continued…

More work was completed on the rudder and vertical stab top. It's odd that when Yoshioka modified the tail on the original Kato Blue Angel design to make it narrower he made the back of the fuselage wider than the lower part of the rudder. The very back edge of the fuselage is still squared off and the edges will be rounded as per the plan.

To be continued…

More images of the tail assembly. What an amazing bit of design work!


UE ANGFI

To be continued…

Like many R/C builders I always love it when I get to the point that I can tape parts together to see the big picture and make OS 61SF ABC-P running with a tuned pipe sounds.

To be continued…

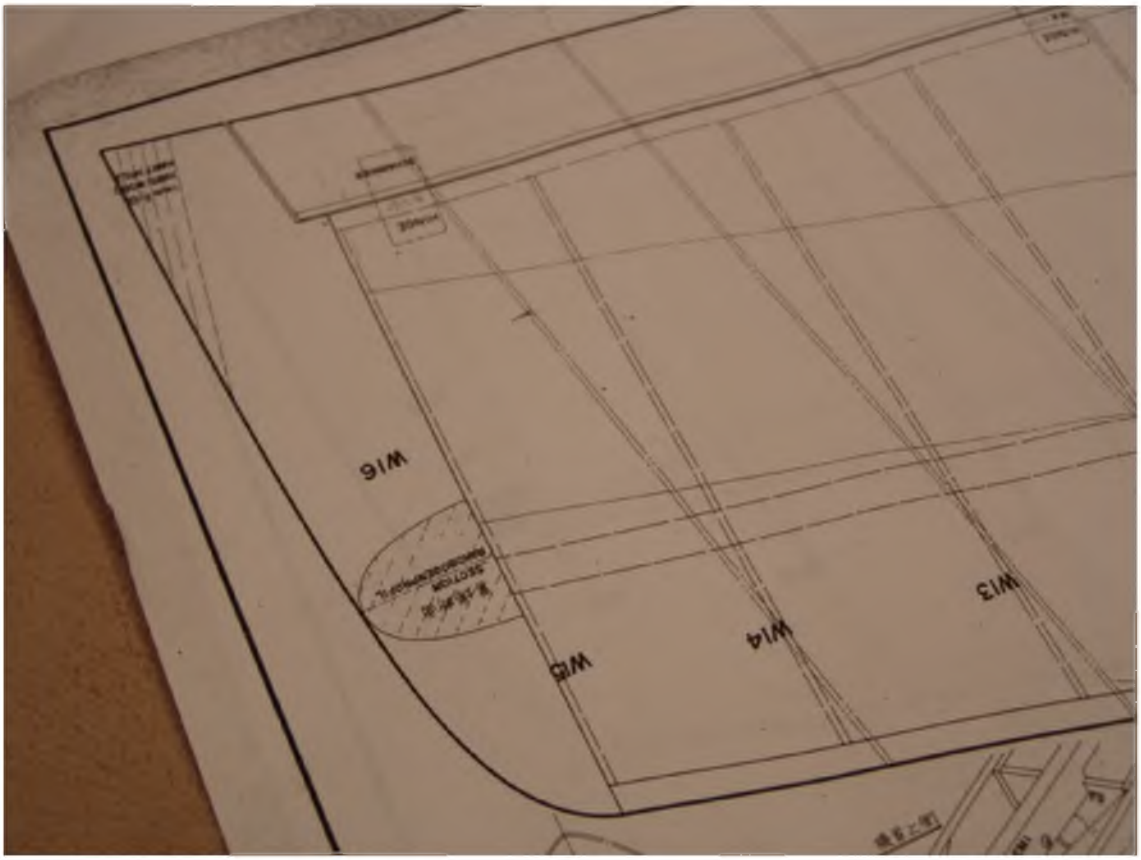
Great news! Tony has the canopies done and I should have some in a few days! It was quite a project and Tony will be updating the Blue Angel canopy thread soon at http://www.rcuniverse.com/forum/m_4107817/tm.htm .

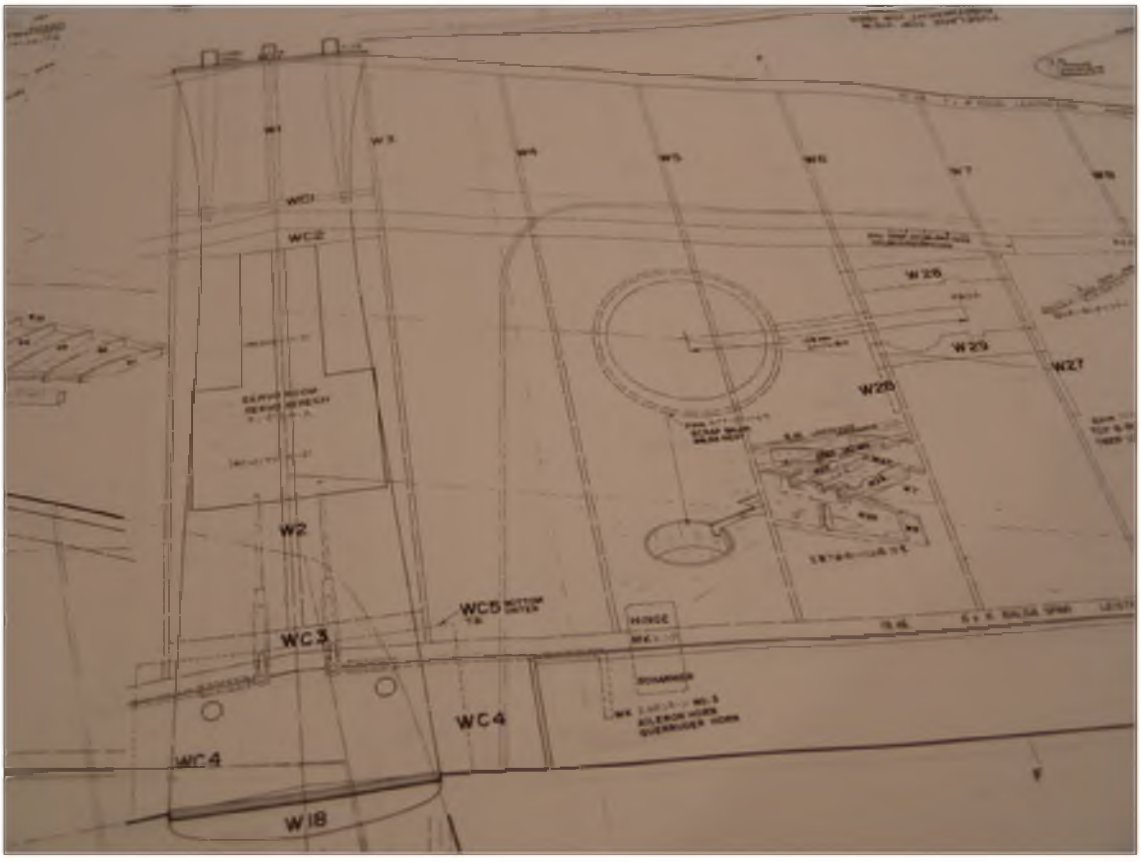
To be continued…

While I'm waiting for the canopies I started some planning work on the wing. The wing airfoil is about 15.5% at the root and tip making it very thin compared to the typical 1974 pattern ship. Originally I hoped that Dan could cut the wing cores so I could cover the wing and cutout the ailerons but the wing shape is too thin at the tip and root so Dan had to cut the trailing edge off. The taper of the wing and sweep back makes the cutting process very complex. Dan's cutoff location prepared the wing so I could easily add the ¼" balsa cap that goes in front of the aileron hinge line.

Because I could not use the foam trailing edge for ailerons I ordered custom cut balsa aileron stock from Dynamic Balsa. The stock will be 1 1/2" wide and the length of the wing panel. The leading edge of the taper will be 5/8" and 1/8" at the trailing edge. Those measurements take care of the wing root with a little extra to be planed off. At the tip, the leading edge will be planed down to less than 3/8". The 1/8" trailing balsa edge will have my usual hardwood and will be planed down to a fairly sharp edge. I'm really impressed that the folks at Dynamic Balsa would take time to cut some custom ailerons for me. Only $10 each plus shipping.

I found an interesting note in the Blue Angel article that impactiq sent me. Yoshioka said that the thin ailerons were designed to flex a little at the tip at high speed, reducing the aileron sensitivity. Sounds like a formula for aileron flutter to me. To reduce the flex I ordered medium weight balsa for the ailerons.


W16
W15
W14
W13


WC1
WC2
W25
W26
W27
W2
WC3
WC4
WC4
W18


BLUE ANGEL
WING CORE
LEFT


STANLEY

To be continued…

8178, why did you go with the foam cores as opposed the the built up wing?

I enjoy building built-up wings but this Blue Angel will be much faster than the original that was powered with an un-piped lower power engine so I wanted a really strong and true wing. I also wanted the lightest wing structure possible. Dynamic Balsa has some good comparison information on wing construction http://www.dbalsa.com/foam_wings/foamwingmain.htm .
--
Now that's cheating! With the excellent kit parts and your way excellent wood working evident I guess its OK to go with foam cores .(I assume it is a full kit for your "Blue Angel" build. another question any planed finish technique for the wing yet ?

I have the wing tip and root tracing from Ron's kit so I could have projected the ribs and do the built up wing but the foam wing will be a lot stronger and lighter.

I plan to MonoKote the wing so it will be covered with light 1/16" balsa glued on with Southern's Sorghum contact cement. The center section will be glassed and painted with MonoKote paint. The process results in a very light and strong wing.

When I do painted wings I glue the 1/16" balsa on the wings with epoxy otherwise the balsa seams will eventually show through the finish but that is not a problem when using MonoKote.

THEY ARE HERE!!!! Awesome work by Tony Howard!

I could hardly wait to do some rough cutting of the canopy and trial fitting. I somehow avoided cutting my fingers in my excitement! It is really looking like a Blue Angel now!

The canopy started out as a flat .030 sheet of special high impact strength PET-G made by Vivak. It is tough as nails! I put some 15% nitro fuel in the cupped area of a scrap piece and it has absolutely no affect on the plastic.

To be continued…
More checking the shape of the nose pieces under the canopy before gluing.

To be continued…

Gluing the nose blocks that are located under the canopy.

To be continued…

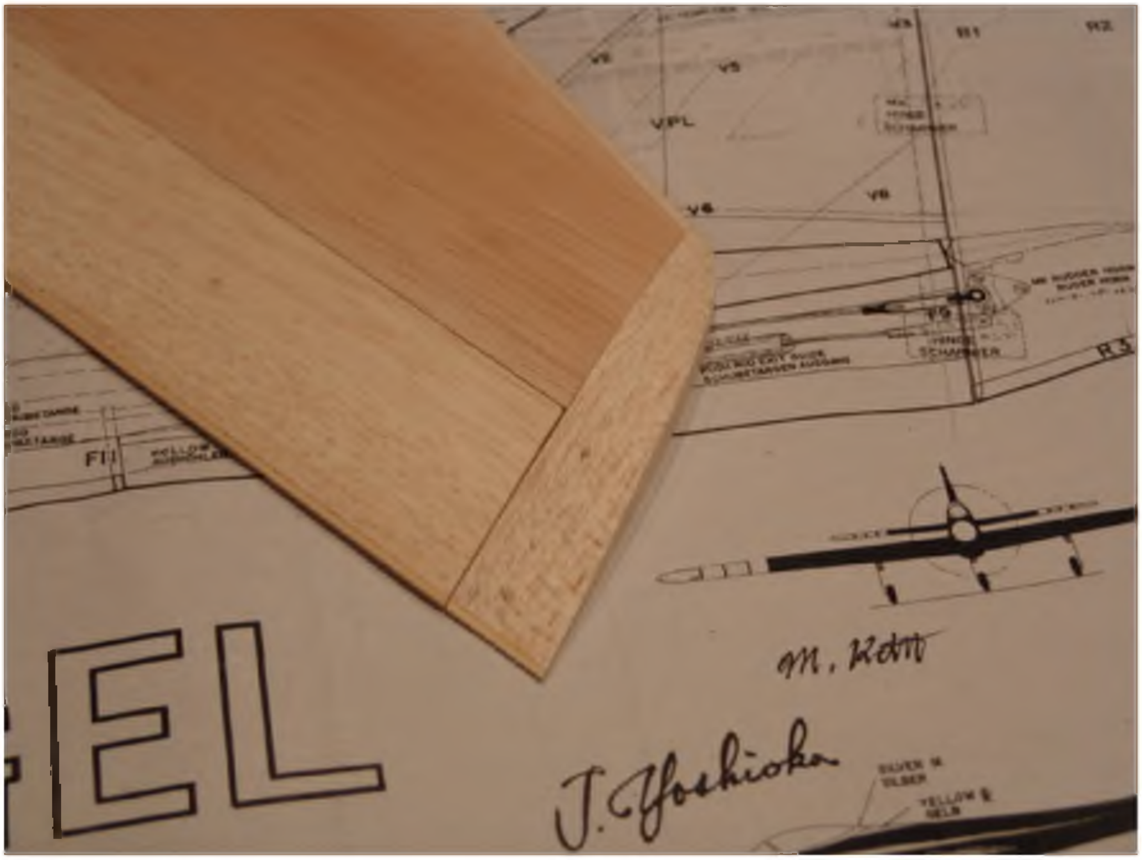
After the glue was set I did a lot of sanding to shape the nose and the area under the canopy. I need to do more trimming on the canopy now that the wood is taking shape.

In these views the fuselage is just sitting on the uncovered wing cores and they are missing 1 ¾" on the trailing edge, ¼" on the leading edge, and of course the wing tips.


JANE'S
DEFENSE

To be continued…

The horizontal stab tips were glued on, planed and sanded to shape.


R1
R2
V5
VPL
V6
EL
J. Yoshioka

To be continued…

The original Blue Angel did not use a completely round plywood nose ring because it had to be thick to support the front of the original wood beams for the engine mount. The thickness of a round nose ring would have made it difficult to shape the fuselage to the ring and keep it round to match up with the spinner.

I elected to use a thinner round nose ring to pull and glue the front of the fuselage together and to give a rough guide the build up of the front of the fuselage. But because of the sharp angle of the fuselage line as it curves to the nose I added a second 1/32" thick nose ring that was slightly larger than the spinner back plate. I cutout the fuselage so I could install the engine on the mount and put the 1/32" nose ring on behind the spinner. I then moved the 1/32 nose ring around behind the spinner until it was exactly centered, and then spot glued it from behind to the thicker nose ring. I then removed the engine and glued the ring all the way around on the outside and on the inside of the ring. This process left a small gap between the balsa and the nose ring that needed a little filler. I'm going to be glassing the fuselage with fiberglass cloth and polyester resin so I mixed up a small amount of resin with micro-balloons and filled in the gap. After it setup I sanded it smooth.

There is not much prop clearance with the 12 -10 prop but I only fly off tarmac.

To be continued…

My aileron stock arrived from Dynamic Balsa today and it looks good!

After giving more thought to the single aileron servo used in the original Blue Angel, I decided to add a second servo and move them out in the wing to reduce aileron flexing. I'm using Futaba digital S9252 servos so the second servo added $75.00 to the project. I really didn't want to spend more money on the project but with the piped OS 61 SF ABC-P engine this Blue Angel will be flying much faster than the original and I don't want to take a chance on aileron flutter.

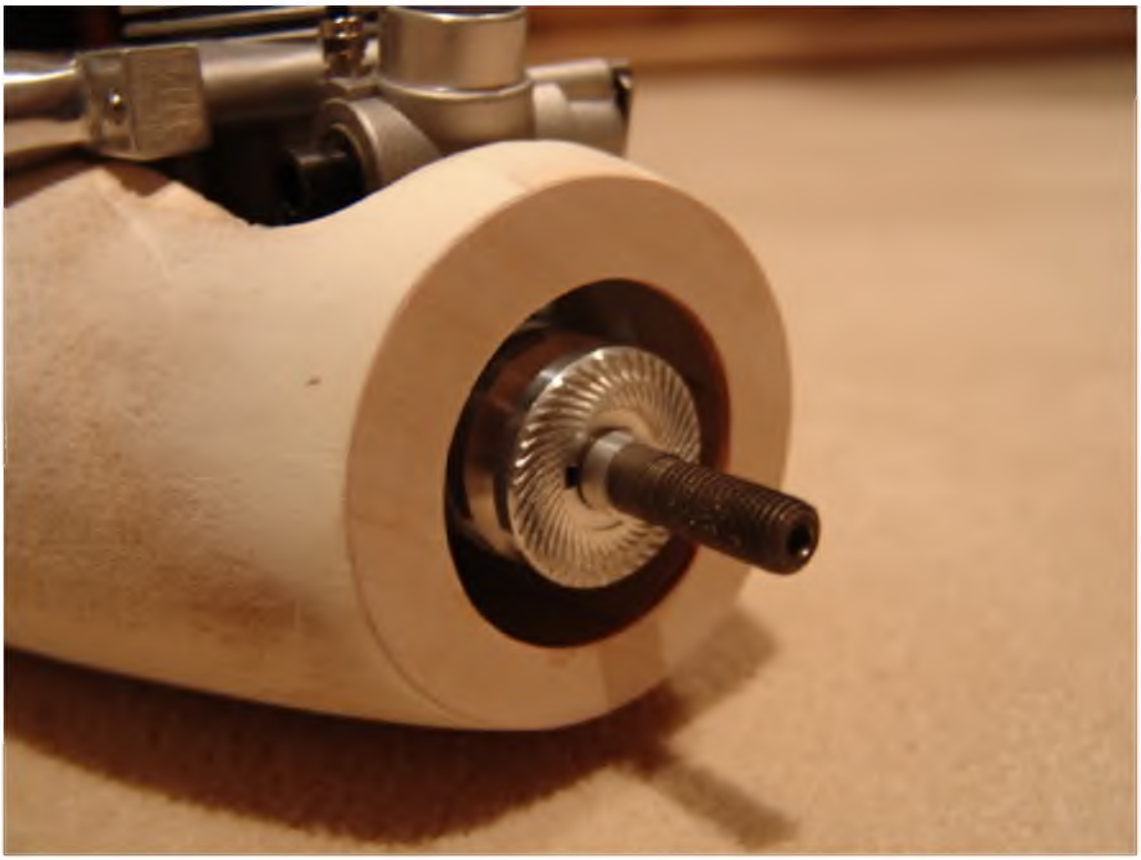
To be continued…

The engine was positioned on the mount with the required spinner back plate clearance and the mount scribed for the engine mounting holes. The engine mount was drilled and taped with a 6 - 32 tap.

The clearance for the pump lines on the back of the engine are pretty close so I added a little more gap between the front of the nose and the spinner back plate. The clearance is a little over 1/16" and I usually like to have it less than 1/16".

I laid the fuselage over the plans to check the header and tuned pipe fit and it looks great. Macs must have made this pipe header for the Blue Angel. The pipe will fit neatly and tightly up under the wing and fuselage perfectly.

View of the engine bolted to the mount, the pipe header and the view of the nose without the spinner.



To be continued…

That looks great 8178. I'm amazed at how little you had to cut away for the engine. I'm guessing you have to take the carb off to shoehorn it in, especially with the pump protruding out the back. I'm a bit annoyed at how much I had to cut away on my UFO's nose last night to get my engine in and out. Even more so seeing the awesome job you did!

--

Thanks rainedav! Interesting that you would mention the engine opening in the fuselage. When I first started building I'd just hack out what ever I needed to get the engine in. Then I started building Howard Engineering fiberglass and foam kits and looking at Tony's work. I realized that the opening around the engine really impacts the overall look of the aircraft. Fiberglass fuselages are especially nice to work with because the fiberglass construction provides a lot more space inside the engine compartment.

Some close-ups of the engine area.

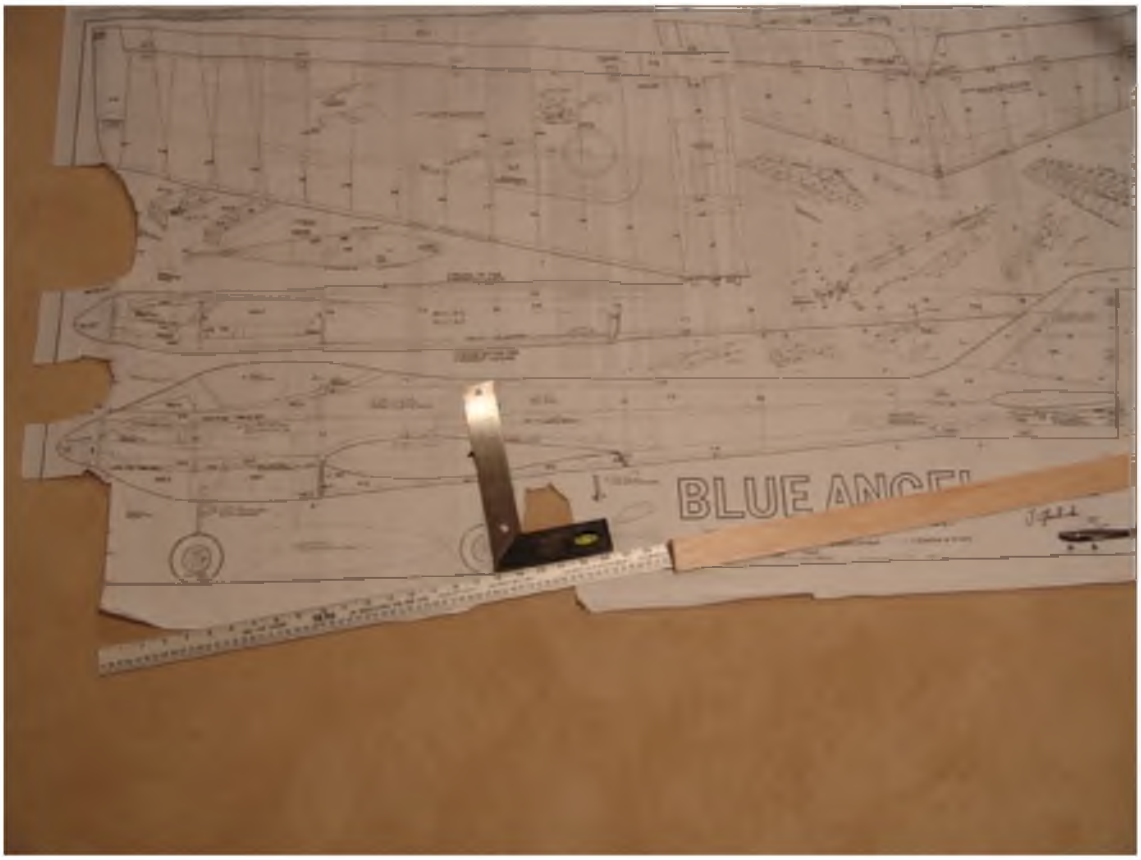
To be continued…

I did some more trimming and fitting of the canopy. From its current rough cut state I taped it down in position with a short piece of masking tape on both sides. I then used masking tape along the lower edge of the canopy to mark the edge where I needed to trim. I put the masking tape on the canopy so that the top edge would be the trim line and of course I could see through the canopy to see the wood to know the trim location. The masking tape overlapped on to the fuselage. When I was done I cut the masking tape loose along the bottom edge of the canopy so I could remove it from the fuselage. Then I cut along the top edge of the remaining masking tape to trim the canopy.

To be continued…

I started work on the wing with planning for the landing gear position. The position of the main gear in relationship to the projected aircraft center of gravity (CG) is really important to optimize ground handling and aircraft rotation on take off and landing. I like my aircraft to be fairly light on the nose gear but not so light that it is hard to taxi in cross winds or if you hit a bump on the tarmac the aircraft with rotate and the tail hits the ground. On the plans the main gear wheel strut angle is drawn very close to 90 degrees in relationship to the ground line making the wheel too close to the CG point for my liking. I'm not sure why it is drawn that way because by default the gear strut will be 90 degrees to the mounting area on the bottom of the wing making the gear strut angle back. This moves the wheel position back about 3/8" to an acceptable position.

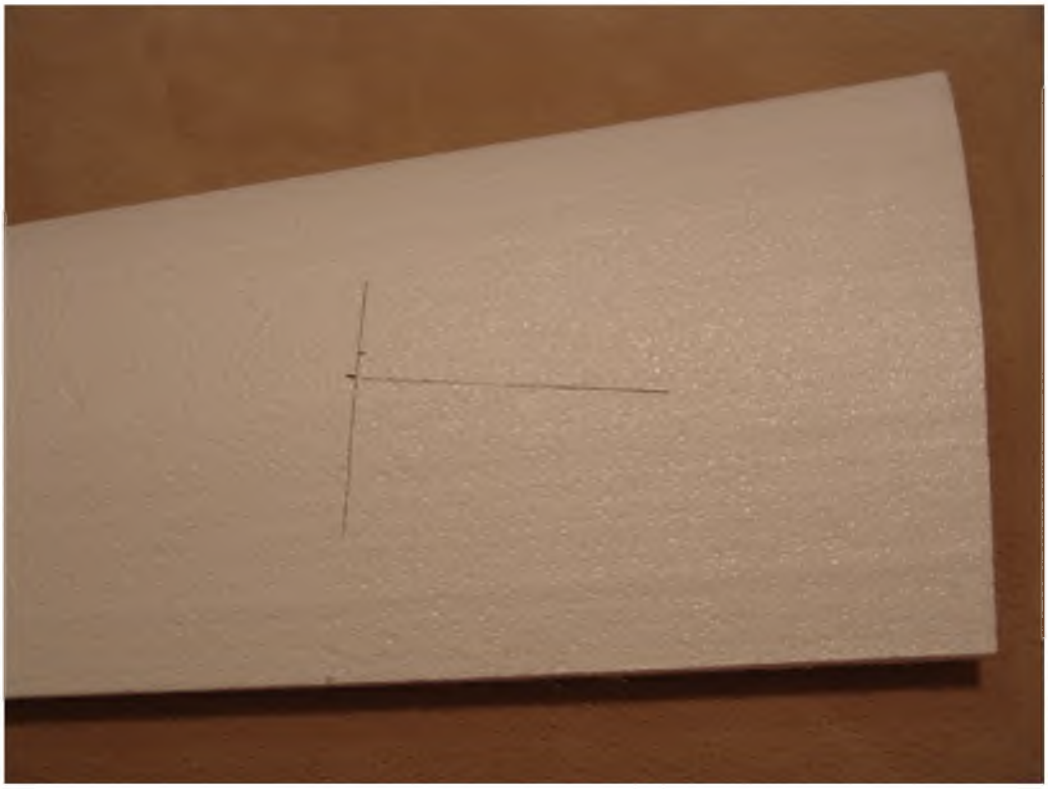
By using a straight edge and a square you can project the rotation point that the CG will pass over the wheel contact point on the ground. See image below.

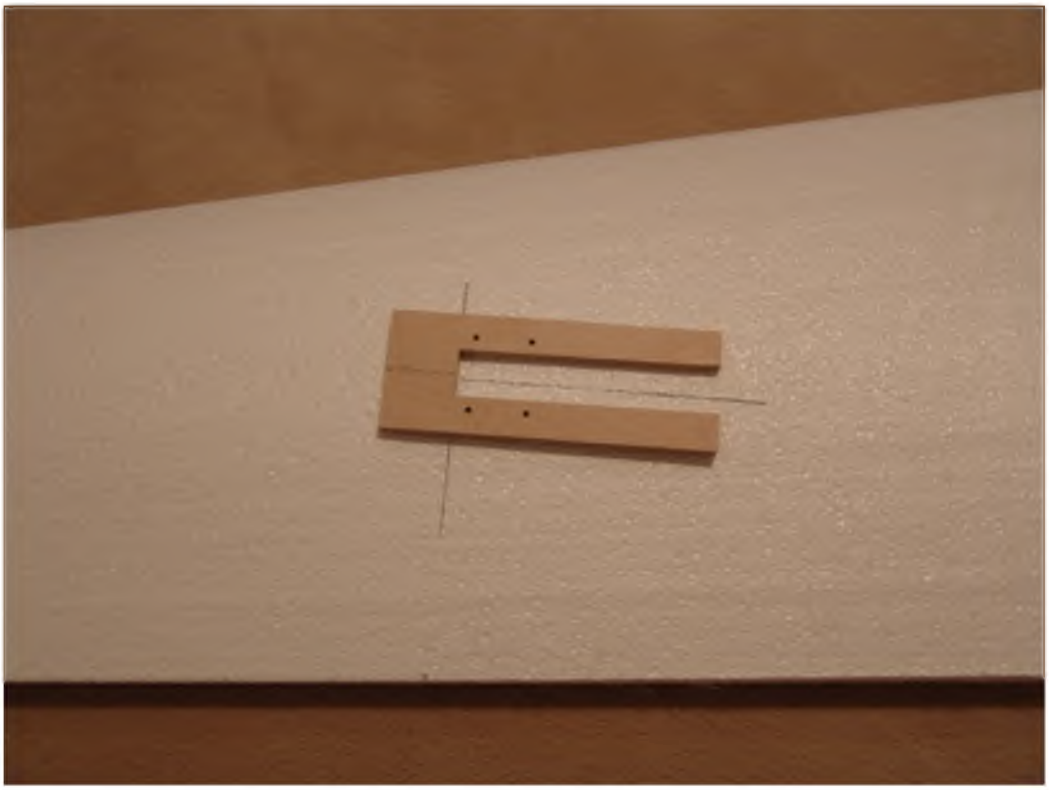


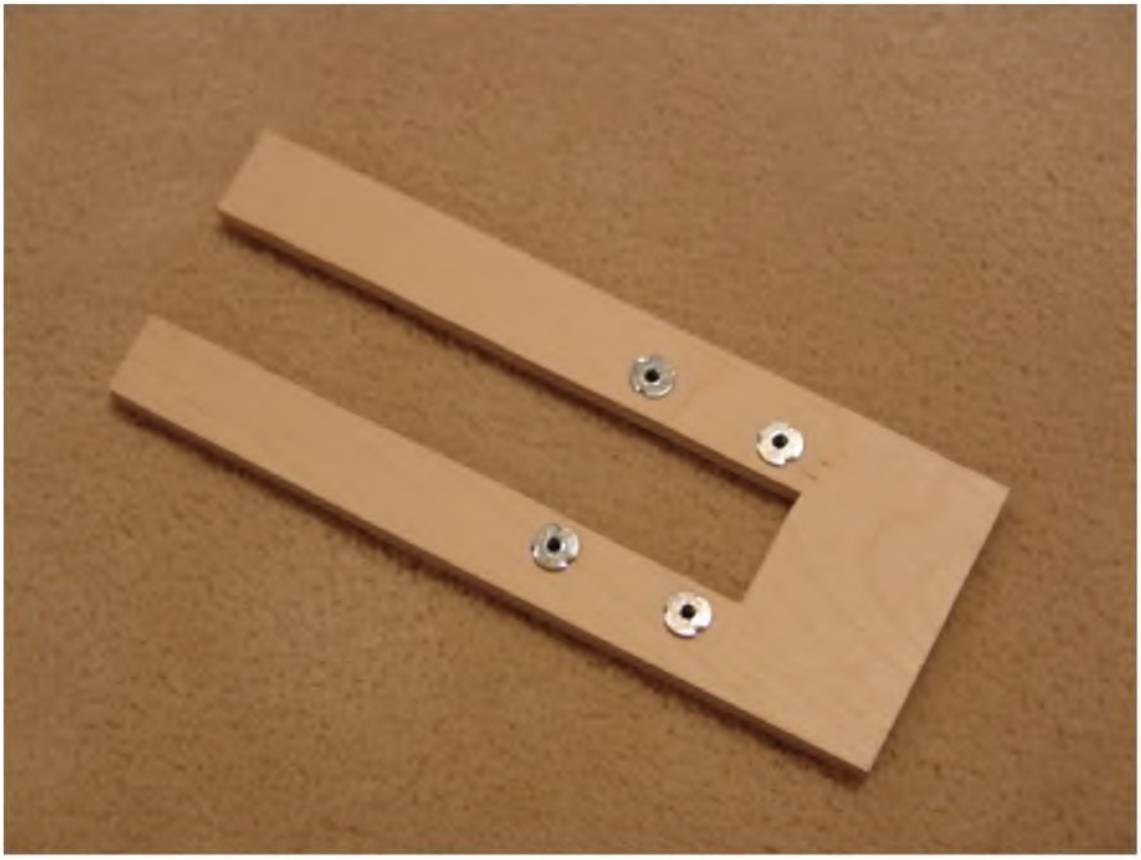
To be continued…

I transferred the gear mounting position from the plans to the foam wing and marked the center line and the outside mounting point for the retract unit. I'm using ¼" plywood for the gear mounts with 4 - 40 blind nuts for the 4 – 40 nylon bolts that I like to use for my gear attachment. I'll cover the bottom of the blind nuts with a round piece of masking tape before I epoxy the mounts into the wing. I will be cutting part of the inner gear mount off because it is too long to be mounted crossways along the curved part of the wing. The gear mount must be set at an angle because of the wing sweep back.

In the first image, the camera distorted the lines a little. The line marking the outside edge of the retract unit is actually parallel with the root line of the wing.

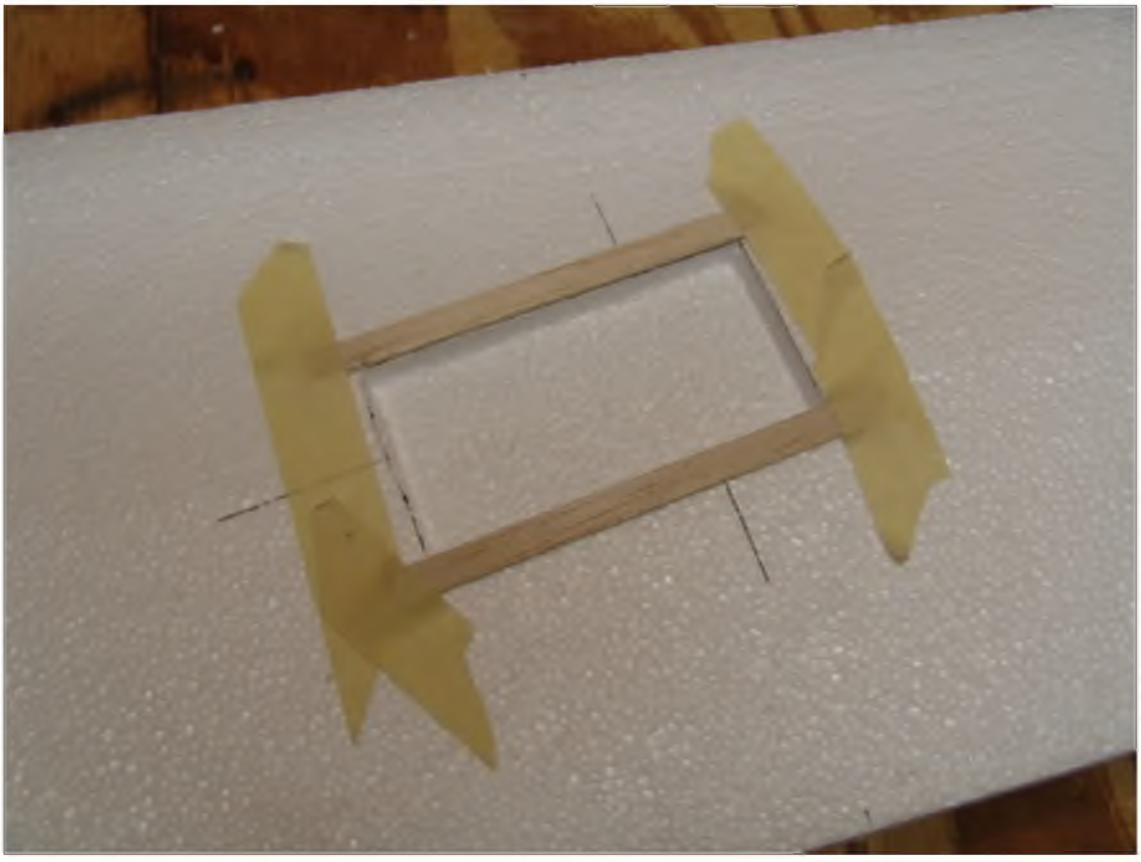


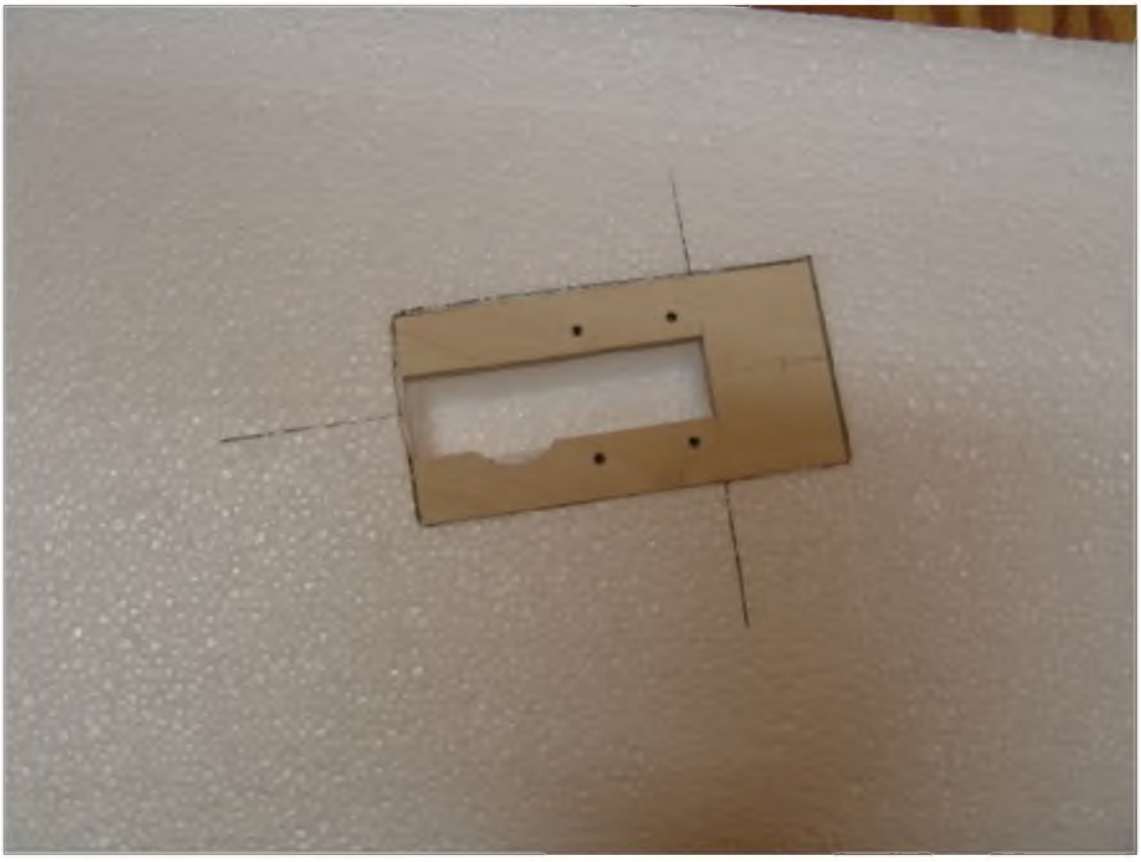


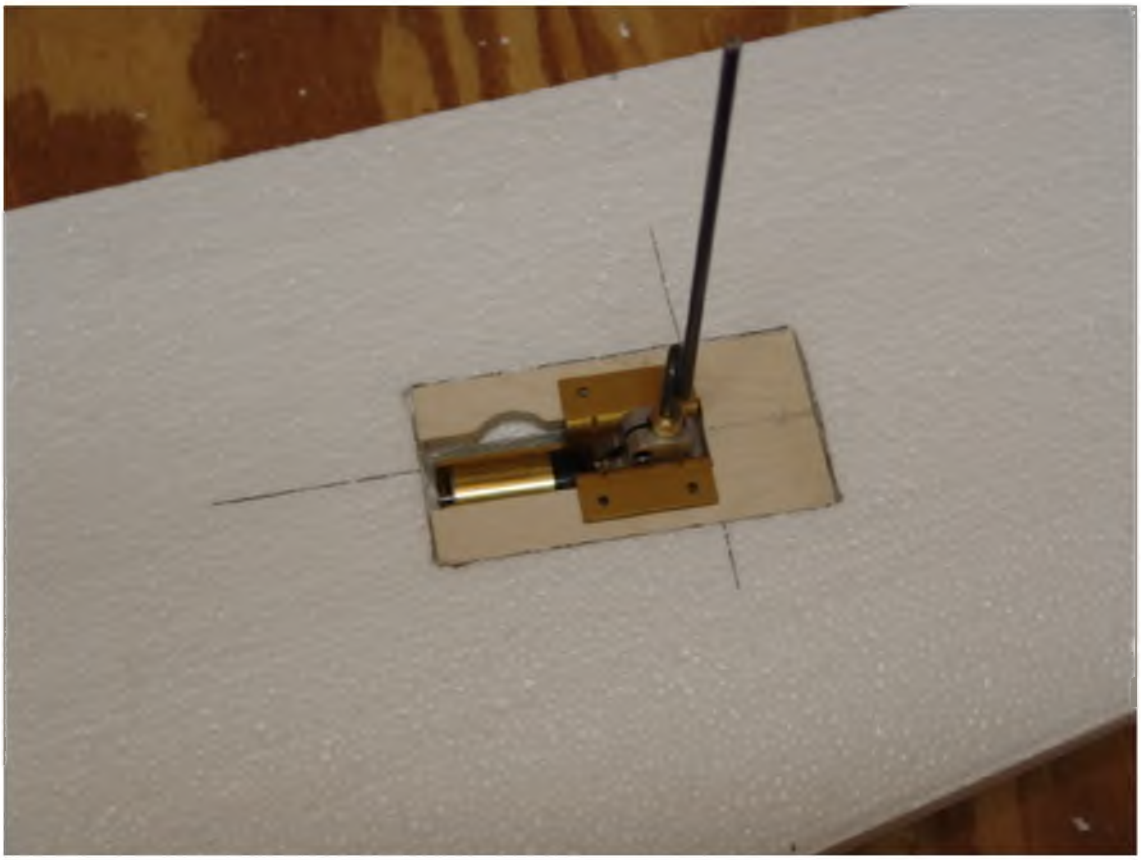


To be continued…

After cutting off some of the gear mount and marking the wing I did my usual foam cutout using a bent #14 copper wire and my soldering gun. The balsa strips taped to the wing help guide the wire. I always end up needing to bend new wires for each aircraft I build!







To be continued…

The Blue Angel has legs!!

When I do a build there is always a peak of satisfaction when I get to the point that it can sit on its landing gear. The satisfaction is significantly higher when I build them from plans.

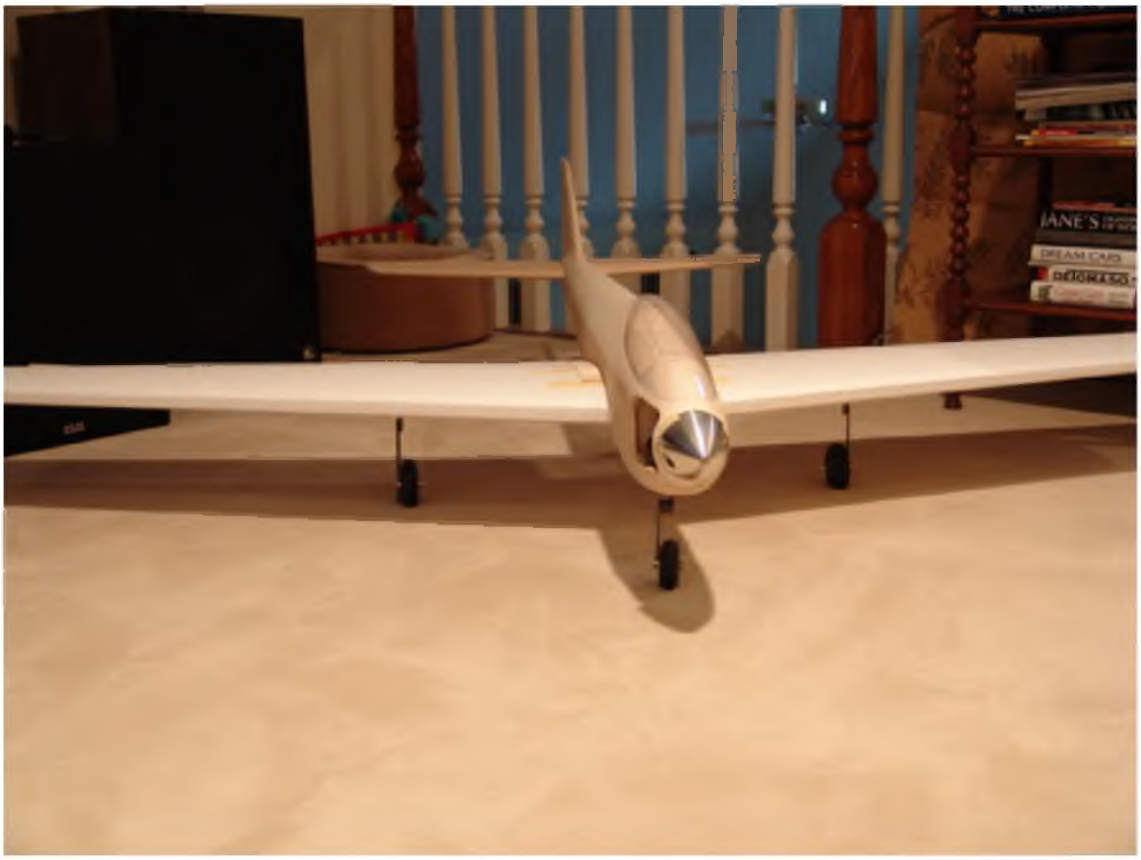
The process of turning a flat piece of paper with a bunch of lines on it into a beautiful three dimensional object always makes me feel like I have accomplished something super special.


JANE'S


THE COMPLETE FERRARI
JANE'S


JANE'S


THE COMPLETE FERRARI


JANE'S
DREAM CARS

To be continued…

Looks like nicely oversized gear plates, 8178.

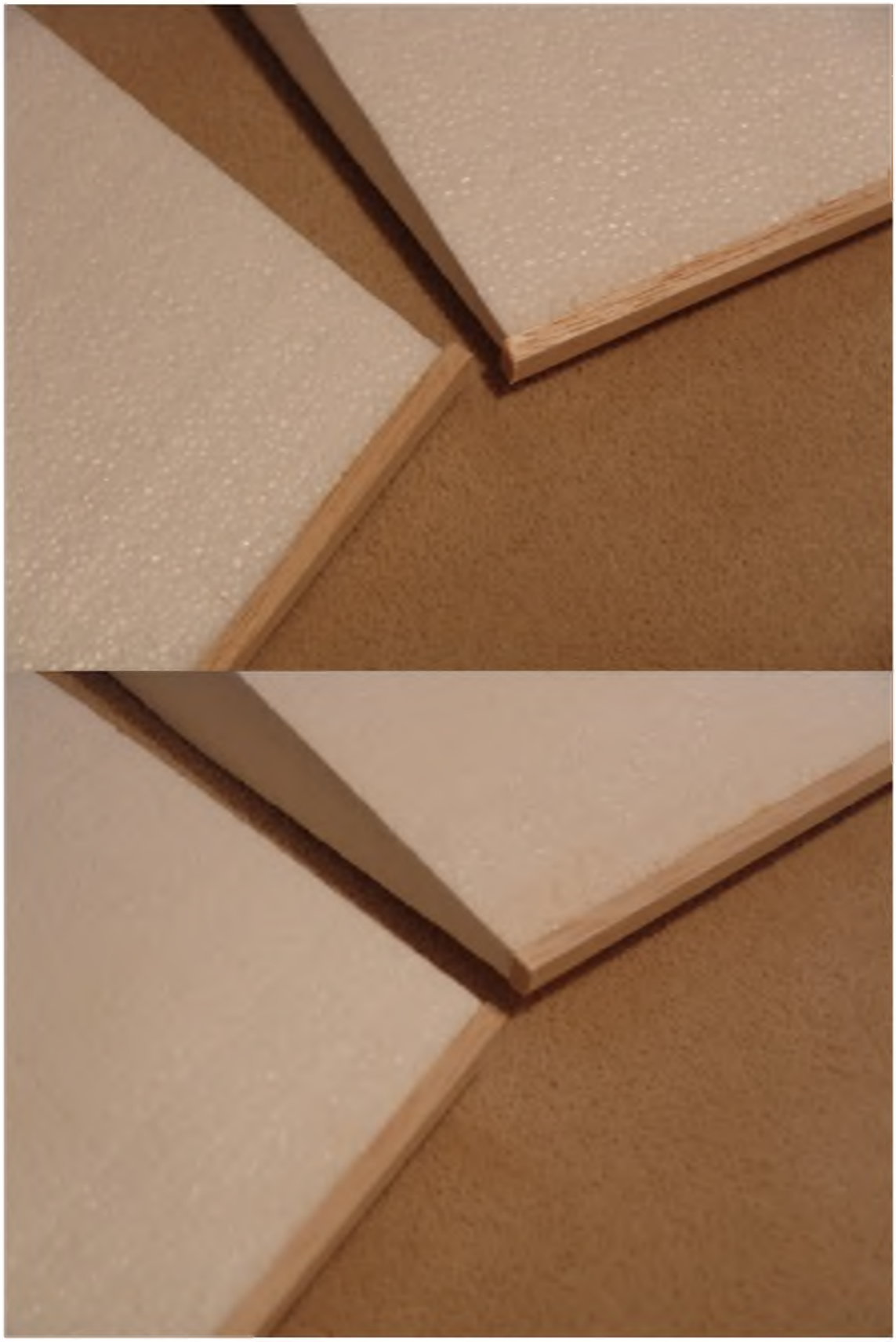
Do you plan on using epoxy to glue them to the foam?

Yes, they will be glued in with slow setting epoxy. I'm also going to pin them into the foam with four small dowels on the corners.

I completed more work on the wing by gluing the ¼" balsa strips on the back edge of the wing. To make sure the wing edge is straight I put the wing back into one side of the foam block that it was cutout of and position it so the trailing edge was hanging over the edge of the block. I put some light weights on the wing core and sighted down the trailing edge to make sure it was straight. I then glued the ¼" balsa on and tape it with masking tape.

To be continued…

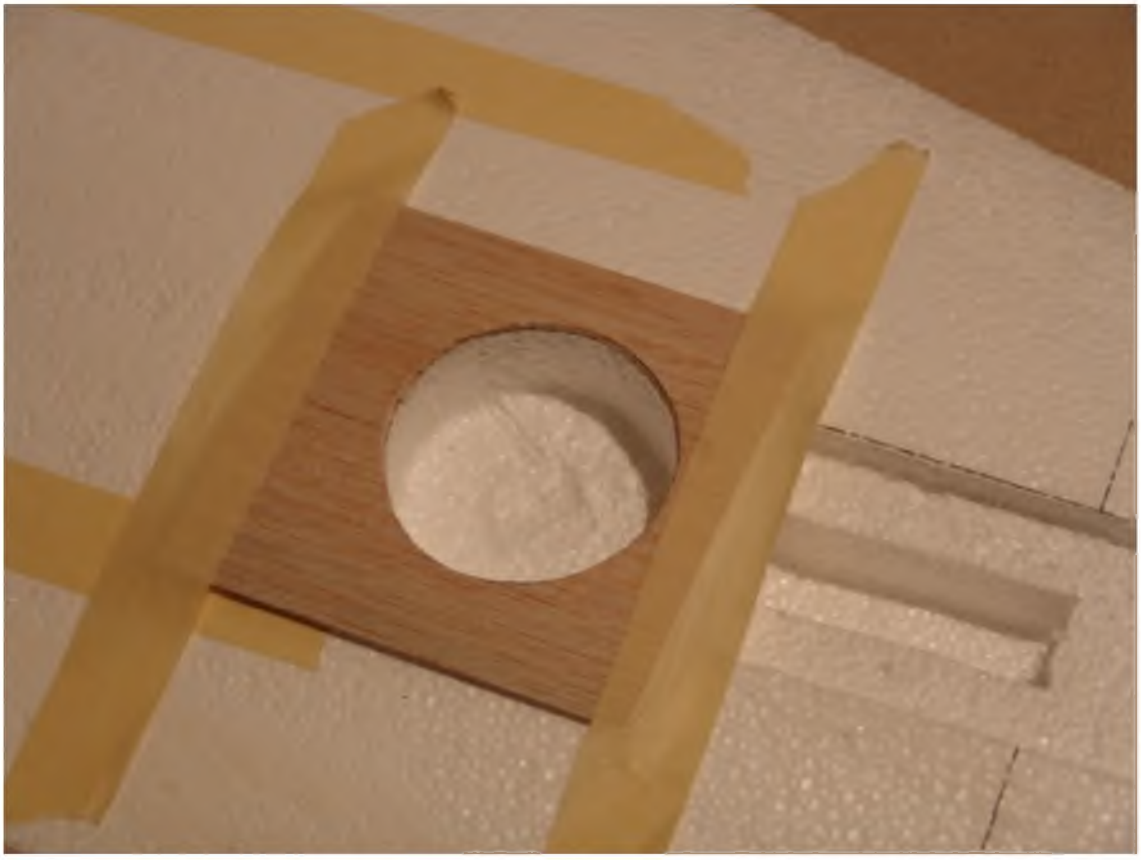
The ¼" balsa strips had been rough cut to fit so they required a little work with the razor plane and then final sanding. While I was sanding I gave both sides of the core surfaces a light sanding.

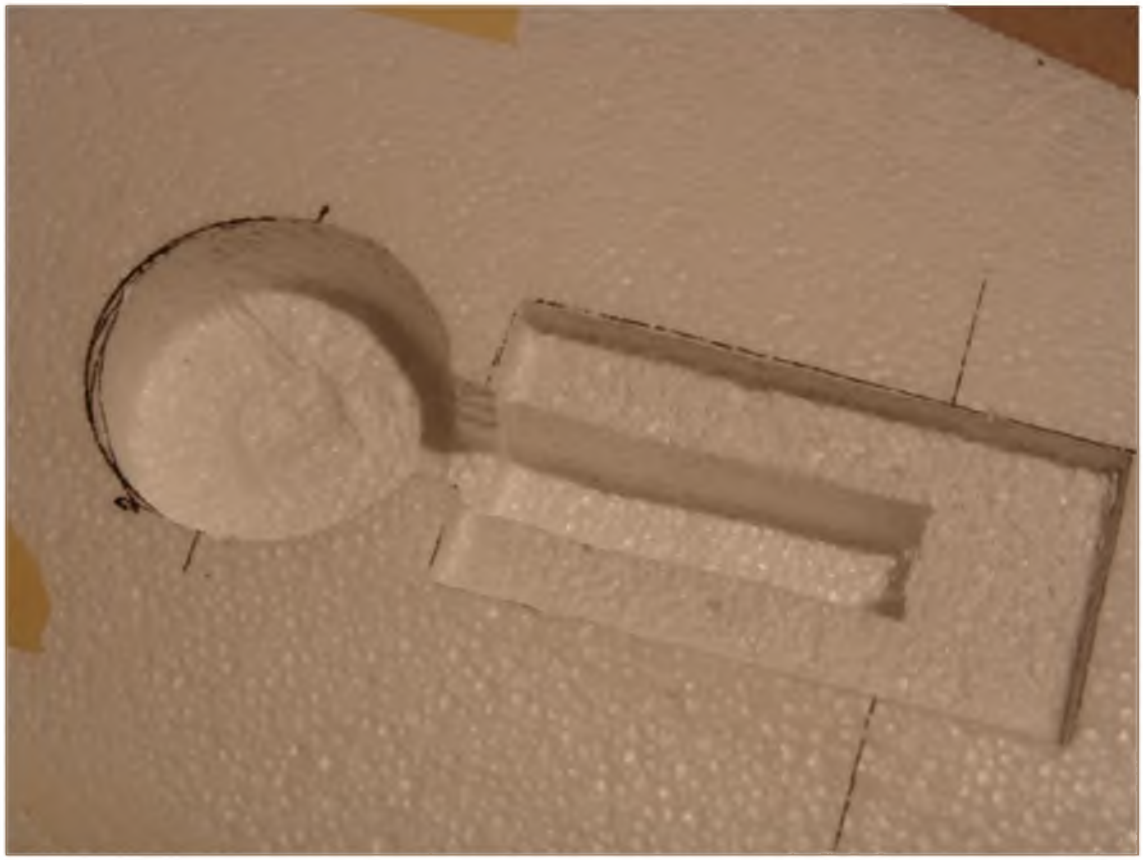


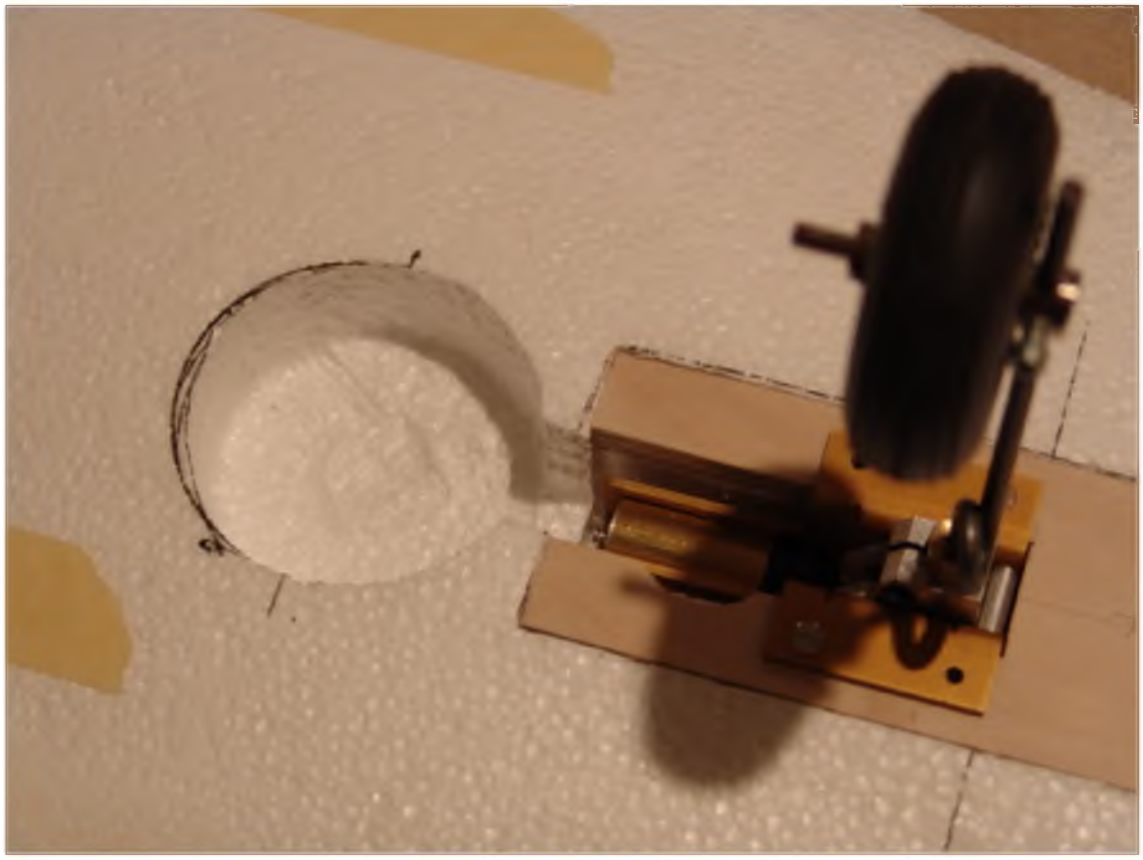
To be continued…

To determine the wing wheel well positions I set aircraft on a flat surface with the gear down. I then adjusted the length of the main gear struts by moving the adjustable axels and measured water line at the tail and nose of the aircraft. I like to have about 1/8" of nose down rake between the tail and nose. After this adjustment I checked to make sure the right and left gear struts were the same length.

I used a piece of balsa as a template to rough cut the wheel wells out using my usual hot wire method. I made the first cut smaller than the final size so I can adjust the size later after the wing skins are glued on. Notice that I have not cut the struts off yet so I can make fine adjustments on the final fit.







To be continued…

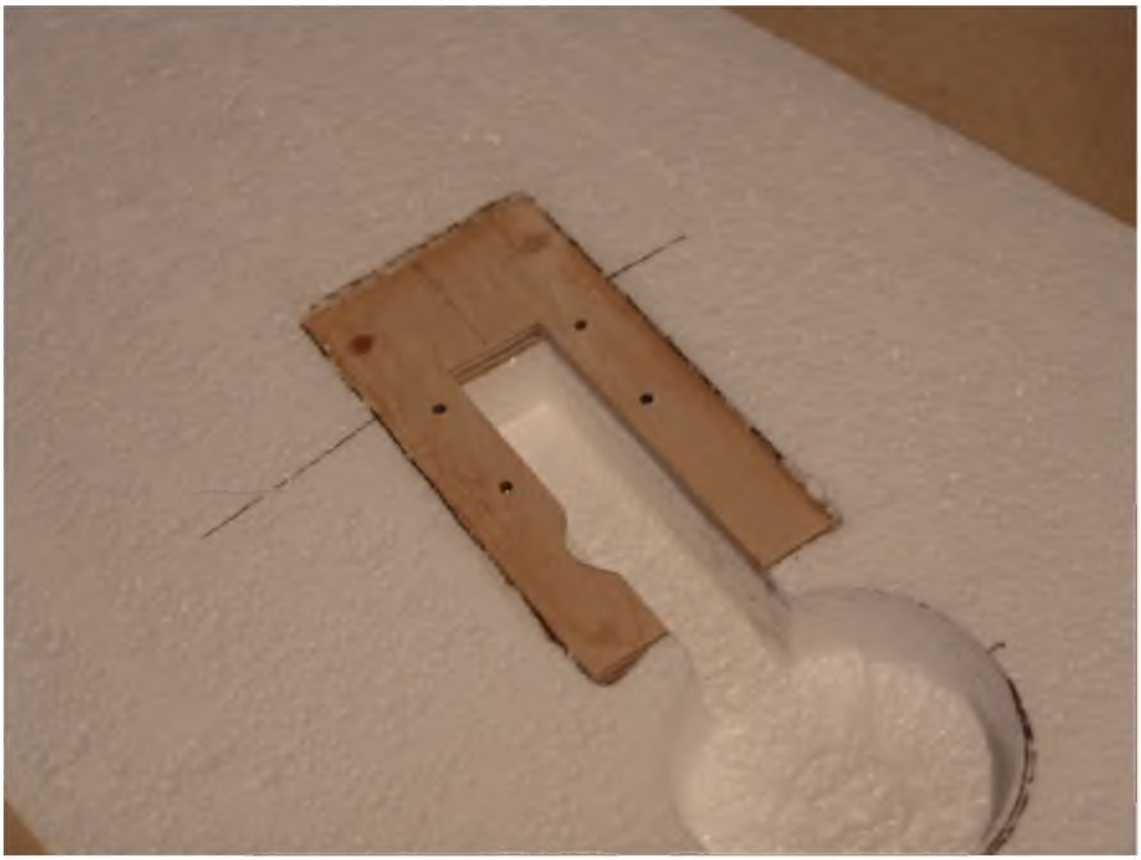
My Tower order arrived with my third Futaba S9252 digital servo along with a Sullivan cable for my nose gear steering and throttle connection. I'll be using S9252s on the ailerons and elevator and a S3151 for the rudder.

To be continued…

ORIGINAL: rainedav

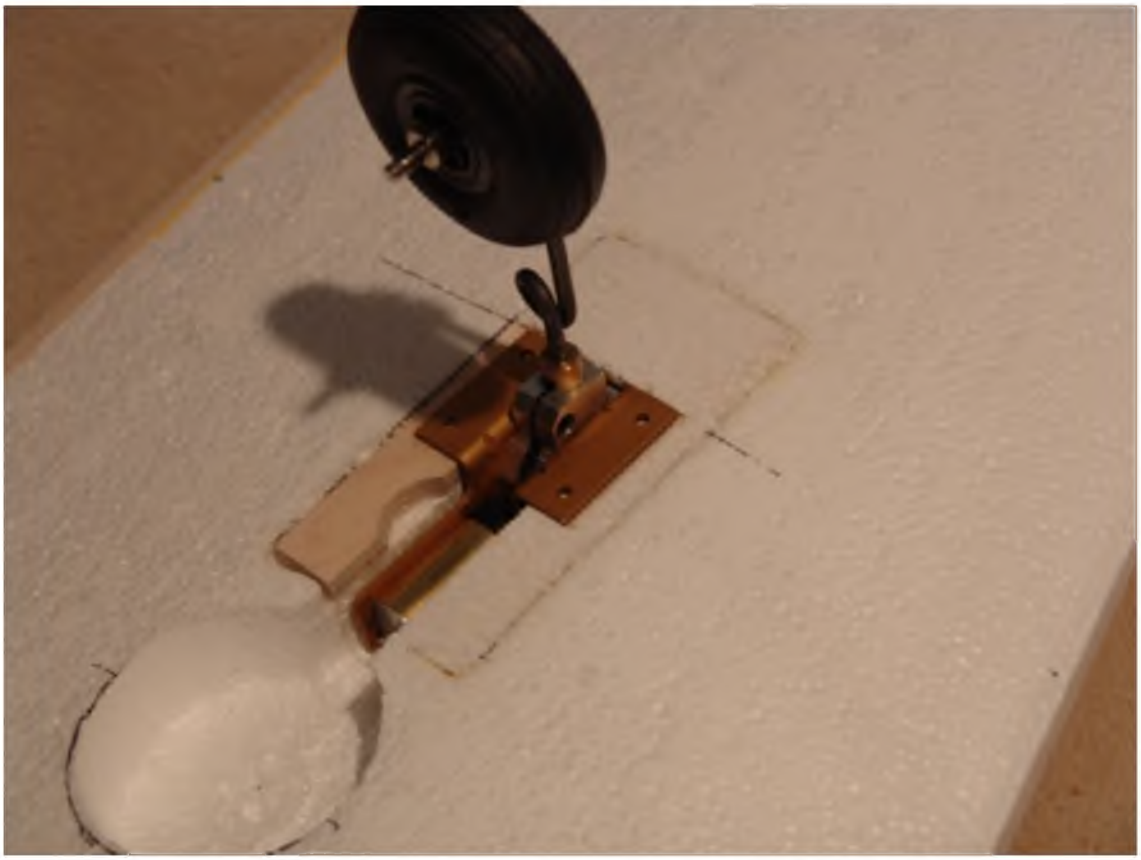
The gear wells look great. I have a couple questions about your servo choices. Why the 3151 for rudder? It puts out less than half the torque of the 9252s. I was of the understanding that rudders usually demand greater torque; but maybe that's only the case with contemporary 3-D models, and not with vintage pattern designs. Are you choices based more on the precision of the servos than their muscle? I can see that the 9252s would definitely give you more precision for ailerons and elevator.
--
It was my way to save $40 on the project! Not that the Blue Angel doesn't deserve a $75 rudder servo. I'm using one on my Tiporare and it seems to work fine. Remember that digital servos put out FULL torque on the very first step of movement unlike analog servos. They hold their position with full power too if a force is placed on them. You must be careful that any linkage attached to them is free of binds because they will use full power (and your battery) to move to the commanded point of movement.

Before gluing the gear mounts into the wing with epoxy I drilled 3/16" holes for dowels that project into the foam to help lock in the mount. The dowels project so that they stop just under the top surface of the foam. They are glued into the wing and mount with epoxy. I decided that two would be enough for each mount.



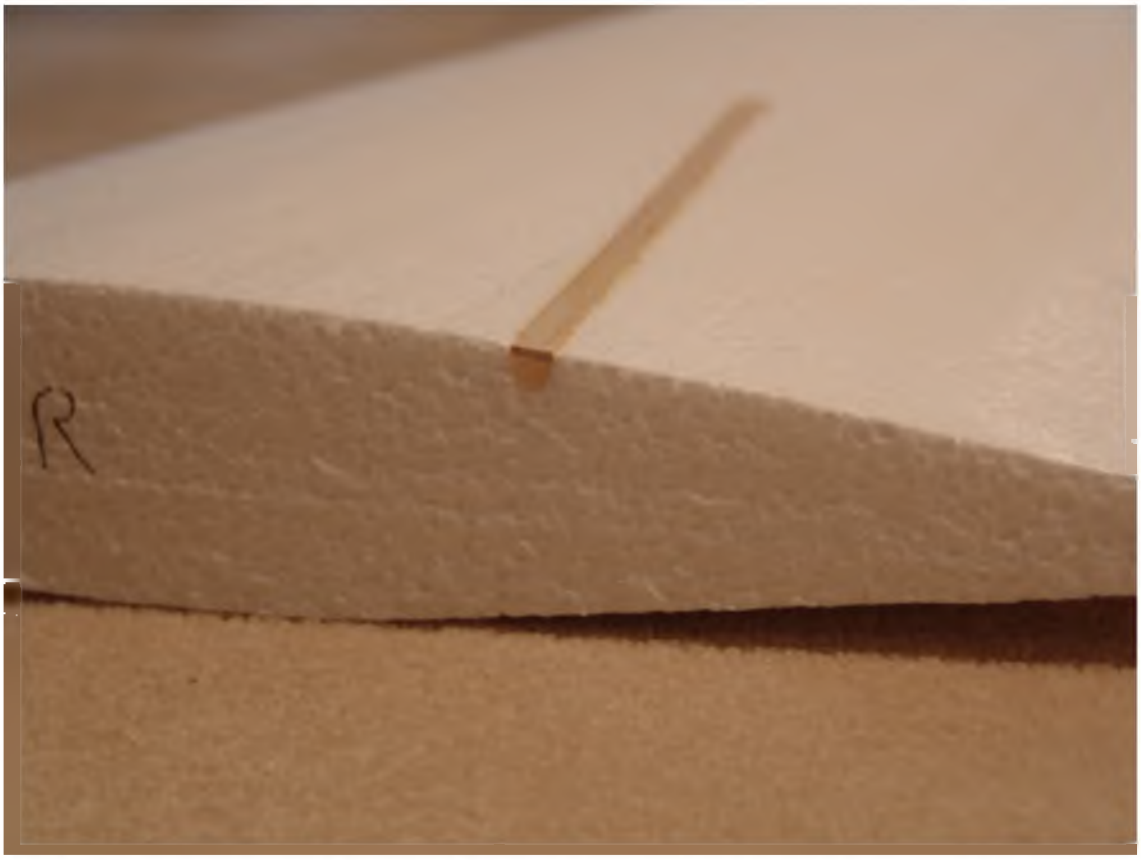
To be continued…

Because of the swept wing and the way the mount is installed at an angle to the airfoil, the mount had to be countersunk into the foam. This left a space that was filled in with scrap foam. I then sanded the foam to the shape of the airfoil.



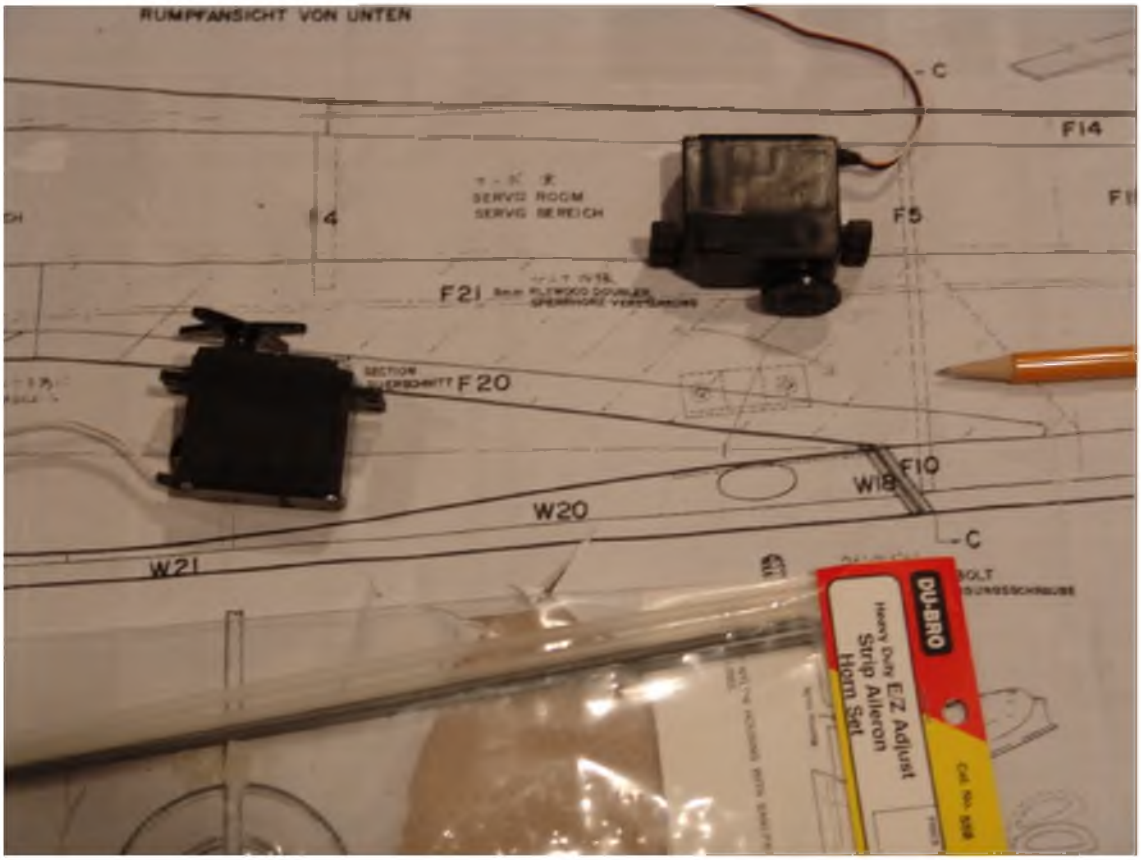
To be continued…

I cut the slot in the wing for the retract gear air line using my usual hot wire. I normally fill in the top edge of the slot with 1/16" balsa.


R

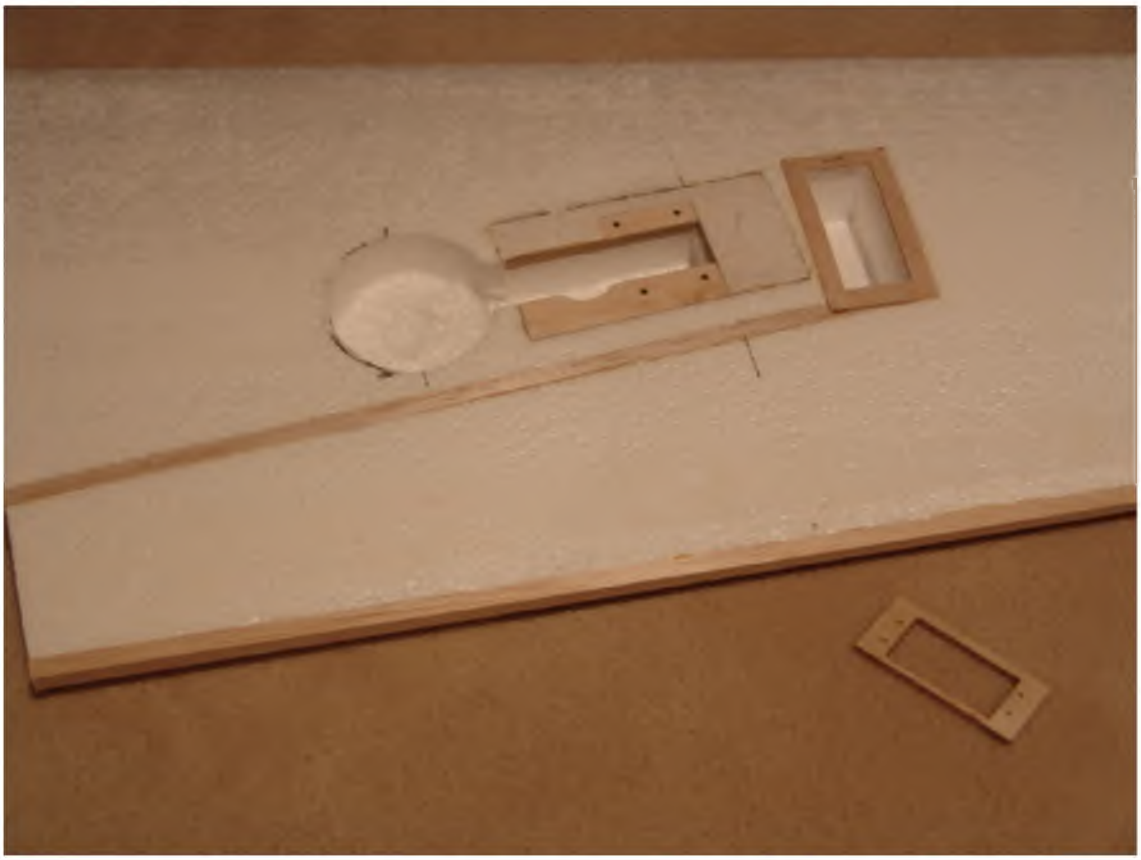
To be continued…

Before hacking holes in the wing for individual aileron servos I recheck how a single servo would work in the center of the wing. Not much room so I'm going to use two servos in the wing outboard from the retract units.



To be continued…

I cut out the servo openings and servo lead pathways to the servos using the usual hot wire method. A 1/32" countersink in the foam around the servo opening provides space to glue in a 1/32" plywood frame. The plywood servo mount has been cut and drilled but not installed yet. Because I've made the large cutout for the servos so close to the retract mount I'm going to add some more dowels to the retract mounts for strength.



I completed the gluing of the 1/16" X 4 " X 36" balsa sheets together for the wing skins. I use Titebond glue. I weighed and sorted the sheets before gluing so could use the lightest sheets on the right wing to help compensate for the right mounted engine. There was not much difference in weight between the sheets but every bit helps the weight management.

The Dynamic Balsa sheets are cut clean enough that no trim work is needed on the edges before gluing. I usually just sort through the sheets and find sheets that will fit together without gaps. The sheet seams are pulled together very tightly using masking tape and then I add a full piece of masking along the seam. I always stretch the masking tape slightly as I tape so it pulls the seams together tightly. After all three sheets are taped together on one side I turn the sheet over and open the seam slightly and run a small bead of glue in the seam then close the seam by laying the sheet on a flat surface. I then wipe away the excess glue and tape the seam very tightly in about 5 or 6 places along the seam. The idea is to have very little glue at the seam edges.

The side that has the full length tape will be the outside surface because the other side always ends up with a little glue residue from wiping away the excess.

To be continued…
The wing sheets cut to size and ready to be glued to cores.

To be continued…

I used Dave Brown Southern's Sorghum contact cement to glue the balsa wing skins to the cores. I brush it on the balas sheet and core as thin as possible and let it dry for about ½ hour. Needless to say I do one side of the wing core at a time. I find it helpful to mark the inside of the balsa sheets so I don't get them mixed up and brush the glue on the wrong side. The balsa tends to curl from the glue so I lay it on a flat surface next to a wall and put one end my steel three foot straight edge in the middle of the sheet and lean it against the wall to hold the sheet flat.

After the glue is dry, I lay the balsa sheet on my flat building board, line up the front edge of the core with the front of the sheet and press it down and then roll the core onto the sheet. I then turn the core over and rub down the sheeting tightly. At this point, I always sight down the leading and trailing edge of the wing to make sure it is true. If not the wing can be carefully bent a little to make sure it is true before the balsa skin is glued to the other side. Once both sides are glued on the core it is pretty hard to make any adjustments but it can be done before the contact glue is fully cured.

I use Sorghum on wings that will be MonoKoted and epoxy for wings that will be painted. The Sorghum works well with MonoKote and holds up excellent in our hot and cold southeastern weather.

To be continued…

After the wing sheeting was completed I cut out the retract gear area and installed the ¼" leading edges on the wing.

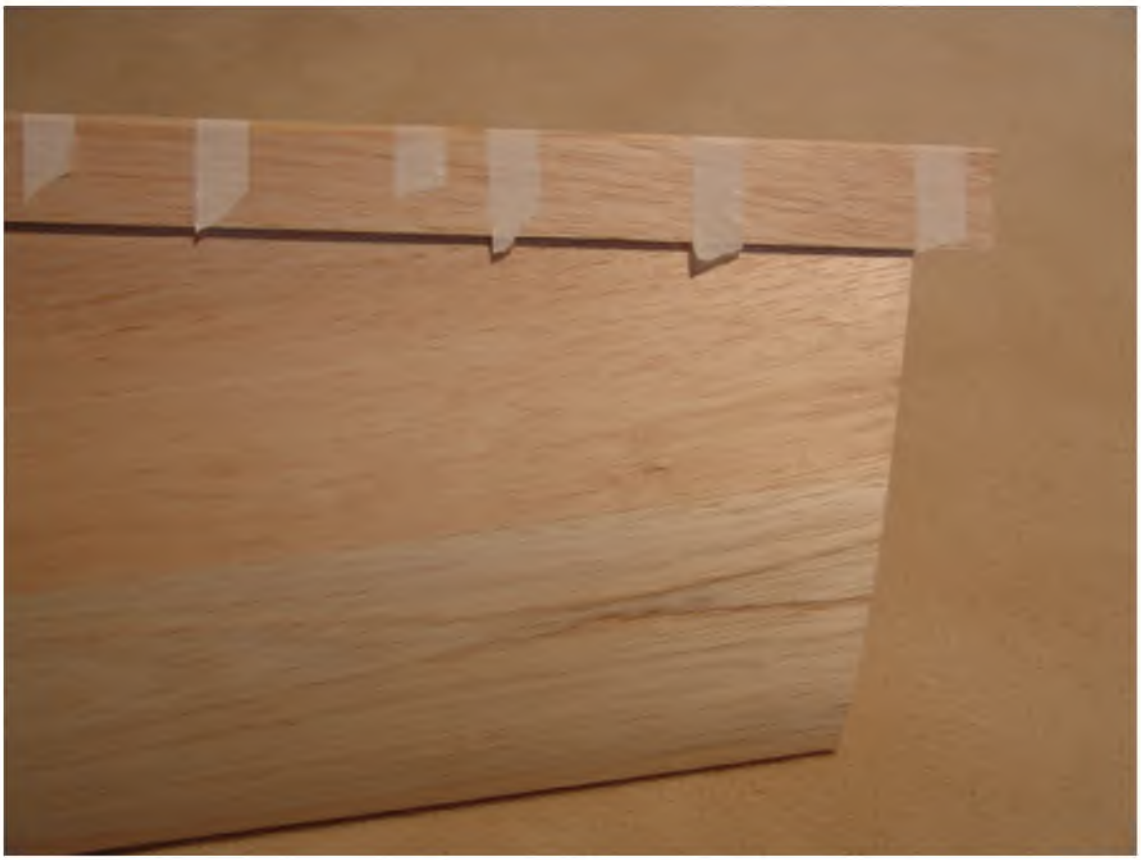
To be continued...

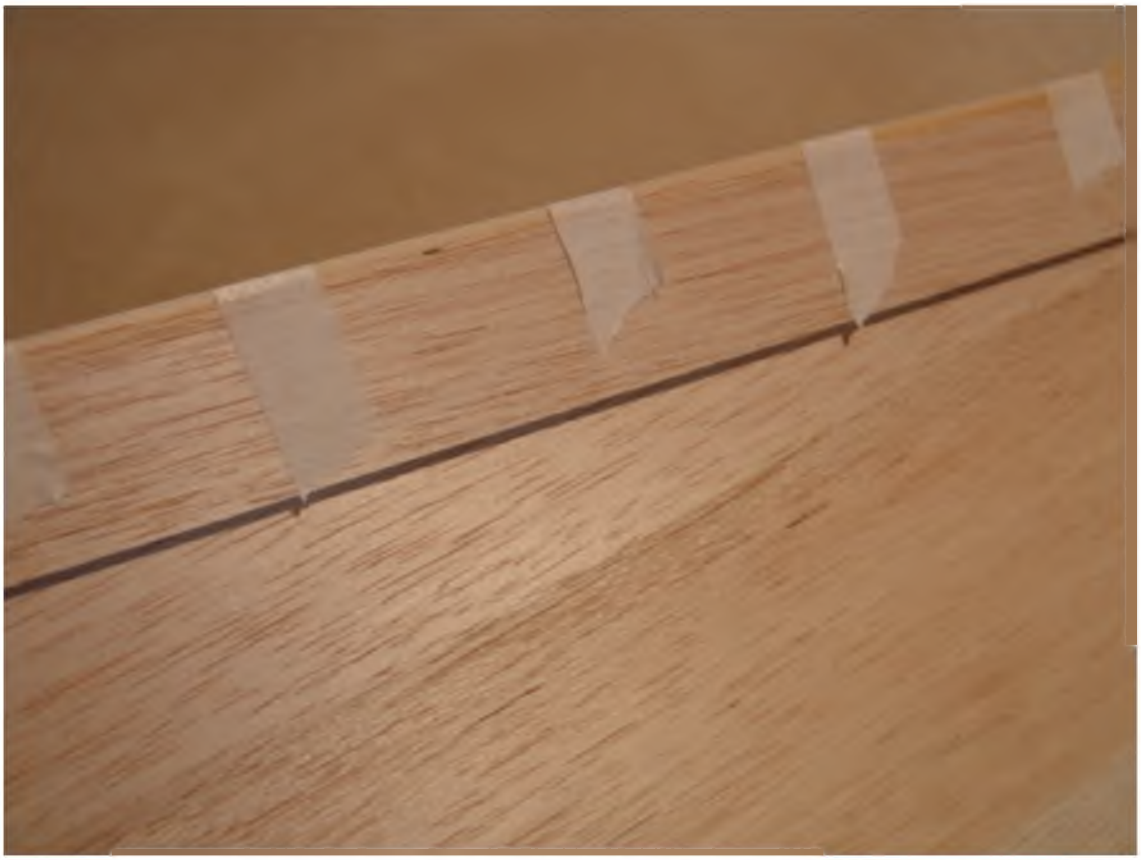
After the glue setup I razor planed and sanded down the leading edge. The final rounded shape will be done soon but I find it works best to do the shaping one step at a time. The very leading edge is flat at this step.


JANE'S

To be continued…

I started work on the ailerons. I cut the hinge slots first and then inserted 1/32" thick plywood tabs in the slots and glued the aileron stock to the trailing edge of the wing with rubber glue. After the glue set, I glued the 3/32 basswood trailing edge on the aileron stock making sure the trailing edge was straight. The tip of the Blue Angel aileron extends past the end of the wing and into the wing tip block. The basswood can also be used on trailing edge of sheet stock and used as a guide to plane the balsa to a tapered aileron.



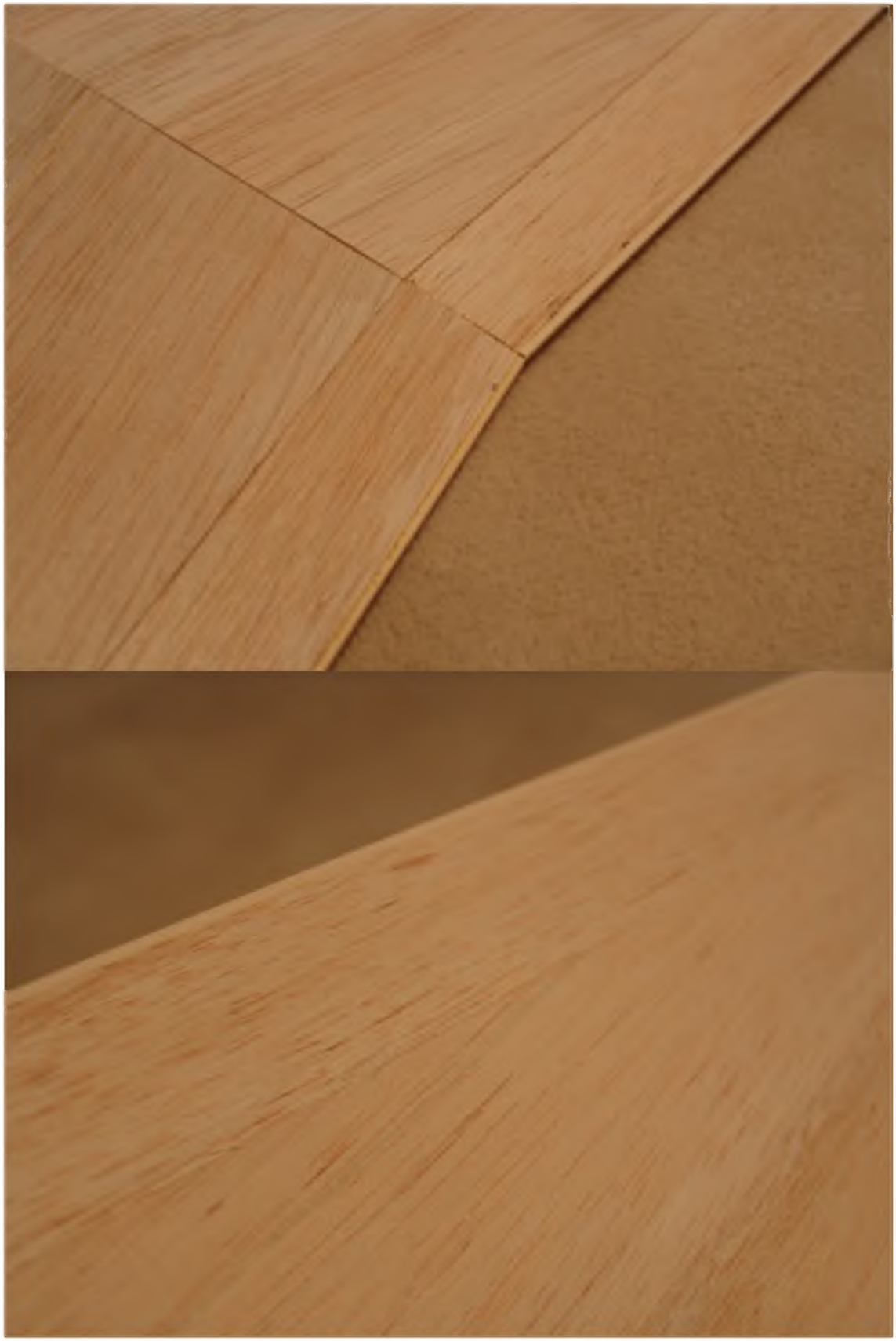


To be continued…

Using my Little Giant razor plane I made fast work of rough cutting the ailerons to shape. I think I bought my Little Giant razor plane in 65 but I'm not sure they still make them. They are a very awesome tool. This one has a lot of old Ambroid glue on it.

To be continued…

The rough cut aileron is on the left and the aileron on the right has been sanded to the final finish. The second image shows the completed aileron still rubber glued to the wing.



To be continued…

Flawless work and some ingenious methods, too. I really like your idea of using 1/32 ply tabs and rubber cement to hold the ailerons in place. The ailerons appear to be part of the airfoil itself. One thing I didn't like about the Kaos I built was that the ailerons were just balsa strips attached onto the trailing edge of the wing and not really part of the airfoil contour. Have you weighed your wing at it's current state with the retracts and servos in place? I'd be really curious to know where it's at before covering.
--
Thanks for the comments raindav! I started building my ailerons as part of the airfoil many years ago; because that's how the Howard Engineering kits were built and I liked the way it looked. I expect it helps the aileron control function a little as well.

The 700 sq in Blue Angel wing without retracts, servos or wing tip blocks is about 21 oz. Although I selected the lightest wood available I think it will come out a little heaver for its size than my usual wings. The Spring Air retracts are 8 oz and have the heavy brass adapter fitting for the strut. The wing should have a total weight without covering of about 33 oz.

Here are some wing weights and total weights of my other aircraft for reference.

Tiporare, 720 sq in, two digital servos, Spring Air retracts, painted center section and MonoKote, 35.5 oz. Total weight 7.78 lbs and is beyond ballistic.

Howard Engineering Kwik Fli III, 640 sq in, one servo, Rom Air retracts, painted center section and MonoKote 35 oz. Total weight 7.42 lbs and is ballistic.

Cold Duck, 650 sq in, one servo, fixed gear, painted center section and MonoKote 29.75 oz. Total weight 5.46 lbs and is ballistic but is almost too light in windy conditions.

Lanier Jester, 630 sq in, one servo, fixed gear, all plastic covering, 37.25 oz. Total weight of 7.37 lbs and flies fine.

The Tiporare wing for its size is one of the lightest I've built. If the Blue Angel comes in under 8 lbs I'll be happy.

View of the right and left wing panels with the aileron stock on both wings sanded to shape. The trailing edge strip is 3/32" square bass wood. Due to the airfoil shape of the wing, the sanding of the aileron surface works the back edge of the bass wood down to less than 1/16" making a nice sharp edge. When the sanding is done the surface of the bass wood has a seamless flow into the balsa aileron.

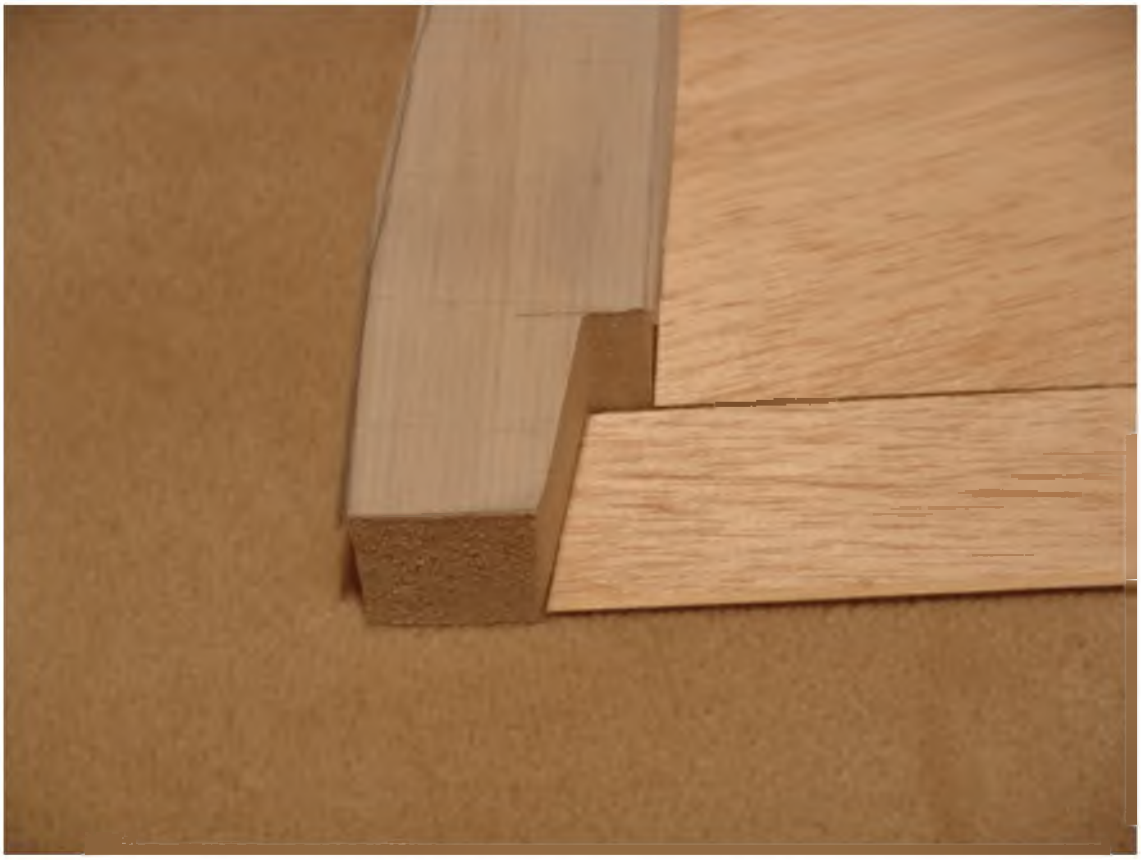
I'm having so much fun building the Blue Angel I feel like I do not want the process to end!

To be continued…

View of the wing tip block and templates ready to be cut.

To be continued…

Test fitting the rough cut wing tip blocks. The block was a tad narrow but that is not a problem because as per the plan the very back and outside tip will have a piece of 1/16" plywood glued into a slot to forum a sharp tailing edge for the tip. Note how Kato designed the ailerons with an angle cut and extending into the tip block area. Kato must have stayed up late figuring out all this fine detail stuff.



To be continued…

The wing tips were rough cut and a slot cut for a 1/16 piece of plywood at the trailing edge. The inside of the tips were marked and hollowed out with my router tool. I then glued on the wing tips, taped them with masking tape and let the glue setup. After the glue was set I sanded the tip smooth with the wing skin and sanded a little on the top plan view. View of the rough cut tip is on the left and the sanded one on the right. After both tips are sanded I'll compare the top plan view before starting the rounding process. When the finish sanding is done the sharp edge of the plywood will flow into the rounded tip.

To be continued…

Now that the wing tip blocks are on I did some weight checking with the following results:

1. The wing with retracts and no servos is 30.75 oz.
2. The fuselage with the tail assembly, nose gear, fuel tank, canopy and spinner is 25.5 oz.
3. The radio gear (six servos), engine, engine mount, prop, pipe header and pipe is 48 oz.

The total weight is 104.25 oz or 6 lb 8.25 oz.
Glassing and painting the fuse will add a little weight and glassing the center section and MonoKote on the wing will add a little weight. I still have push rods and servo mounting and linkage weight to add but it is going to come out lighter than my Tiporare and maybe my Kwik Fli III.

To be continued…

I finished the rough shaping and sanding of the leading edge and wing tips. I discovered that because of the grain direction of the angle cut in the wing tip that I had to add a small piece of balsa to the inside of the wing tip keep a straight line for the aileron cut out.

To be continued…

The 1/16” plywood wing tip edge was a little tricky to install but it turned out really well and allows for a nice sharp strong edge.

To be continued…

Because the aileron has a constant cord for its full length and the wing has a double taper plus sweep back there is a very slight angle change in the top and bottom of airfoil at the wing tip where the aileron connects to the tailing edge of the wing. I’ve checked and re-checked the plans and wing template and everything is the size shown on the plan and the kit wing tip tracing. The trailing edge of the wing tip template would need to be about 1/32” thicker on the top and bottom to make the airfoil not have an angle change. I can’t tell from the Blue Angel kit pictures for sure but from the change of angle of the red wing stripes it looks like it might have the angle change at the tip. It is equal on both sides of the airfoil and wings so it is not a problem.

To be continued…

Started work on the wing fitment to the fuselage by making the angle cut opening in the fuselage for the trailing edge of the wing.

It is great to have the wing completed enough to be able to see the wing platform and fuselage together.

To be continued…

After the wing tip sanding was completed I marked the aileron cut at the wing root. The cuts run parallel with the aircraft center line. I removed the ailerons that were held with rubber glue and made the cuts. View of the root parts that will be glued to the wing trailing edge before the wing panels are joined.

To be continued…

View of the completed wing tip showing the piece added on the tip block to keep a true edge along the aileron gap. The piece was needed because I was having a hard time keeping a good edge with the cross grain cut in the tip block. Also an updated overall view.

To be continued…

Worked on the ailerons today to shape the leading edge and test install the Du-Bro hinges. I did my usual countersinking of the hinges to create a zero gap at the hinge line. I don't like the way sealed hinge lines look with extra MonoKote or clear tape so I make them fit tight without an air gap. I also completed gluing the cut off part of the aileron root to the wing and sanded it smooth.

To be continued…

ORIGINAL: 8178
I don't like the way sealed hinge lines look with extra MonoKote or clear tape so I make them fit tight without an air gap.
--
raindav
Well, that's easy for you to do! That aileron looks like the same piece of wood as the wing with a small groove cut in it. The grain even matches! What will be the next phase? Will you start working on the pushrods/servos next?
--
8178
It really isn't that hard to do rainedav! I'm sure that many on the forum will argue that hinge lines must be sealed with tape or MonoKote but I've found that will a little extra work with the zero gap control surface fitment that it is not necessary to fiddle around with a tape or MonoKote sealing process. The control surface is sealed by the zero gap tight fit. In order to use the tape or MonoKote seal, the aileron must be beveled back much further than I like. I don't like the look of the big gap or the look of the tape or MonoKote in the joint.

On super fast aircraft like the majority of the classics the control surface throws are very small so you do not need to hack a lot away from the control surfaces. I covered how to do the zero gap surfaces in my Howard Engineering Kwik Fly III build at http://www.rcuniverse.com/forum/m_2434444/tm.htm on page 2 and 7.

I'm not sure if I've explained my reasoning with the appropriate finesse but It's my story and I'm sticking with it!

I'll be finishing the tail assembly hinging next and then the push rods.
--
rainedav.

The recommended Tiporare high rate throws are 3/8" total aileron, elevator total ¾" and rudder total 3". The recommended Blue Angel throws are 9mm up and 7 mm down aileron, 20mm up and 15mm down elevator and 35mm ruder right and left. I'll use the recommended Blue Angel settings for my high rate because its flight speed will be way faster than the original.
--
Thank you so much 8178. That info was a great help. By measuring the width of my UFO control surfaces and using a protractor in relation to your numbers I was able to work out throws for my plane.
--
rainedav
The other thing you may need to know to convert them for use on your UFO is the width of the control surface. The Blue Angel ailerons are 1 1/2", the elevators are 2 7/16" and the rudder is 3 1/8". The Tiporare ailerons are 1 3/8", the elevators are 2 1/8" at the widest part and the rudder is 4 1/8".
--
Thanks 8178 for taking time to get those measurements. It's a real help. David.

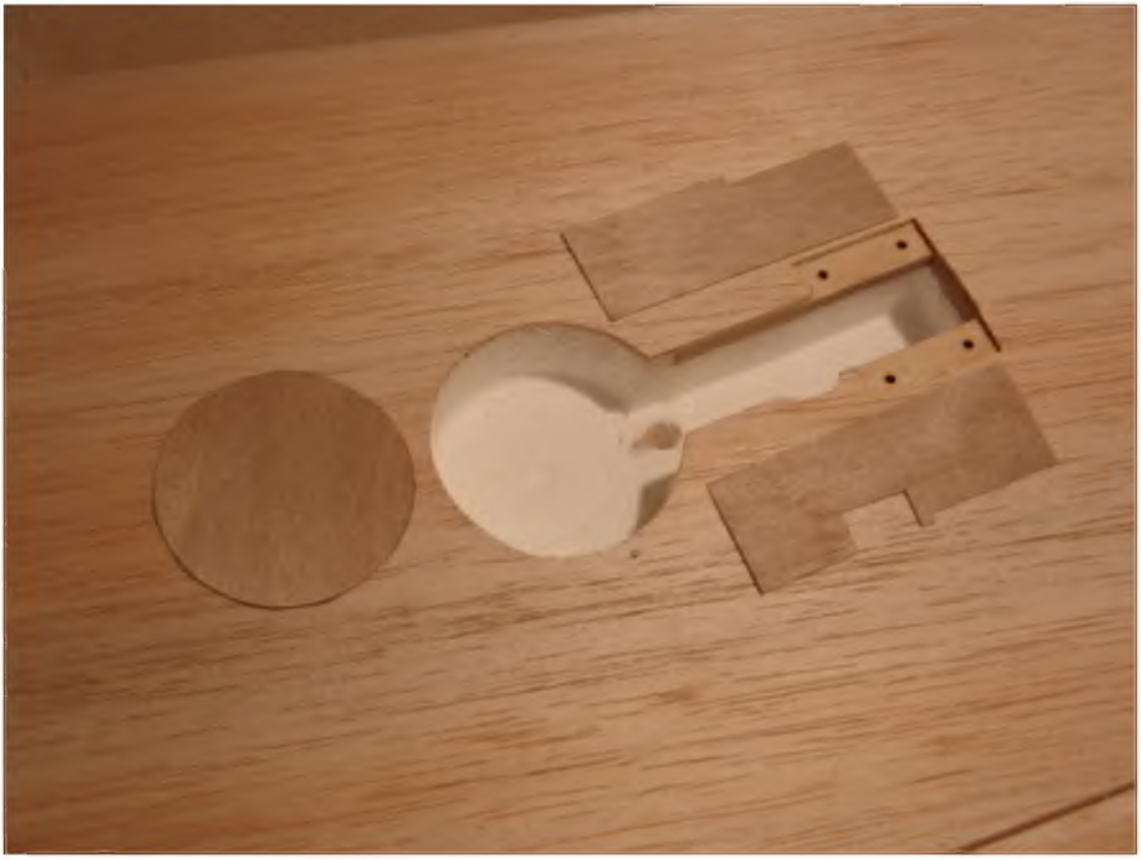
I completed the beveling of the elevator and rudder leading edges and test installed the Du-Bro hinges.

To be continued…

I've been working on finishing the wheel wells. I used a paint can top with sandpaper glued to it and a small sanding block to sand the foam smooth. View of the wheel well and the tools I used.

To be continued…

I use 1/64” plywood to line the wheel wells because it is thin, light and takes paint easily. View of the wheel well bottom and side pieces cut to fit. Need to cut more parts for the side areas.



To be continued…

Gluing in the 1/64” plywood parts in the wheel well, held by masking tape and balsa sticks.

To be continued…

View of the completed wheel well with a small fillet of epoxy and micro balloons at the seam between the bottom and side pieces.

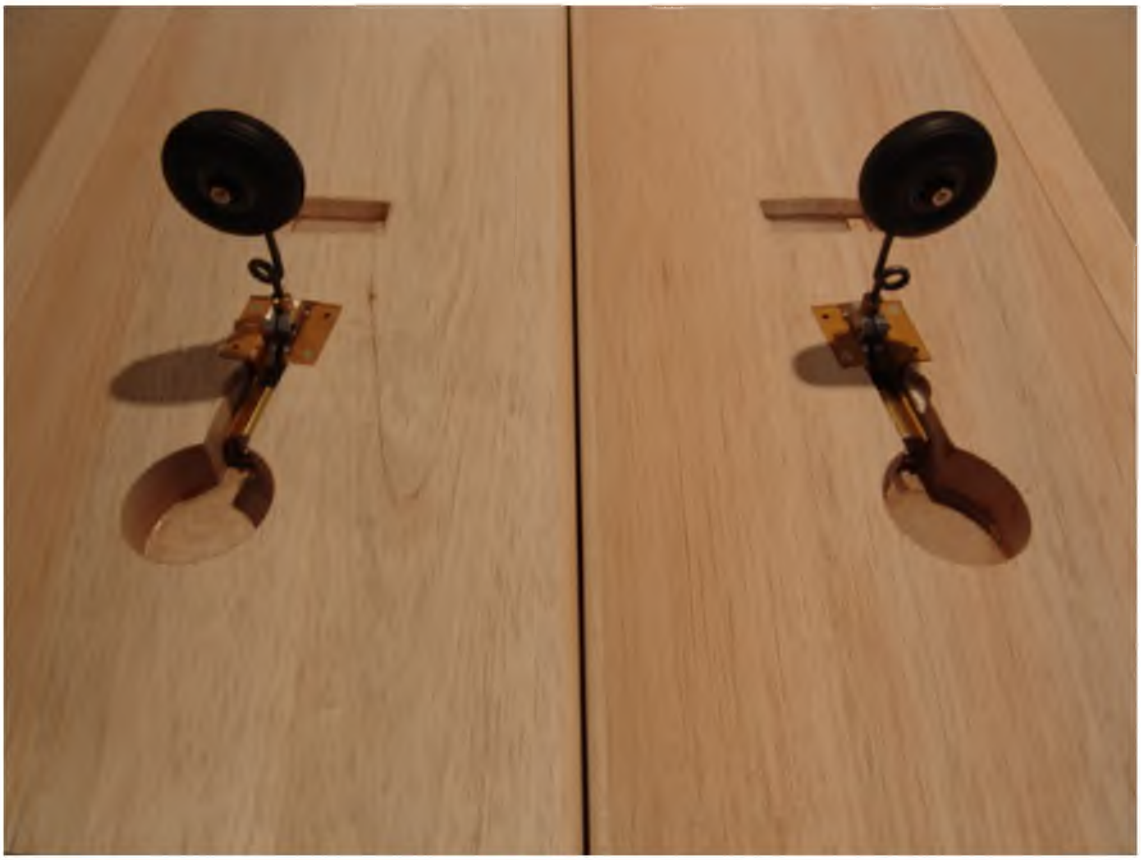
To be continued…

I cut out the balsa wing skin that was covering the servo well and glued in the plywood servo mount with epoxy. As you may recall there is a 1/32" plywood window around the opening that is under the wing skin. After the epoxy set I glued in 1/16" balsa around the opening between the mount and the wing skin. The 1/16" balsa liner helps minimize the open space around the servo. After the glue dried I sanded the balsa liner edge flush with the wing skin.

I really do not care for the look of the servos mounted on the bottom of wing even though they fit flush with the wing skin. But the room inside the fuselage is very tight for servos so it was best to hang them in the wing.

To be continued…

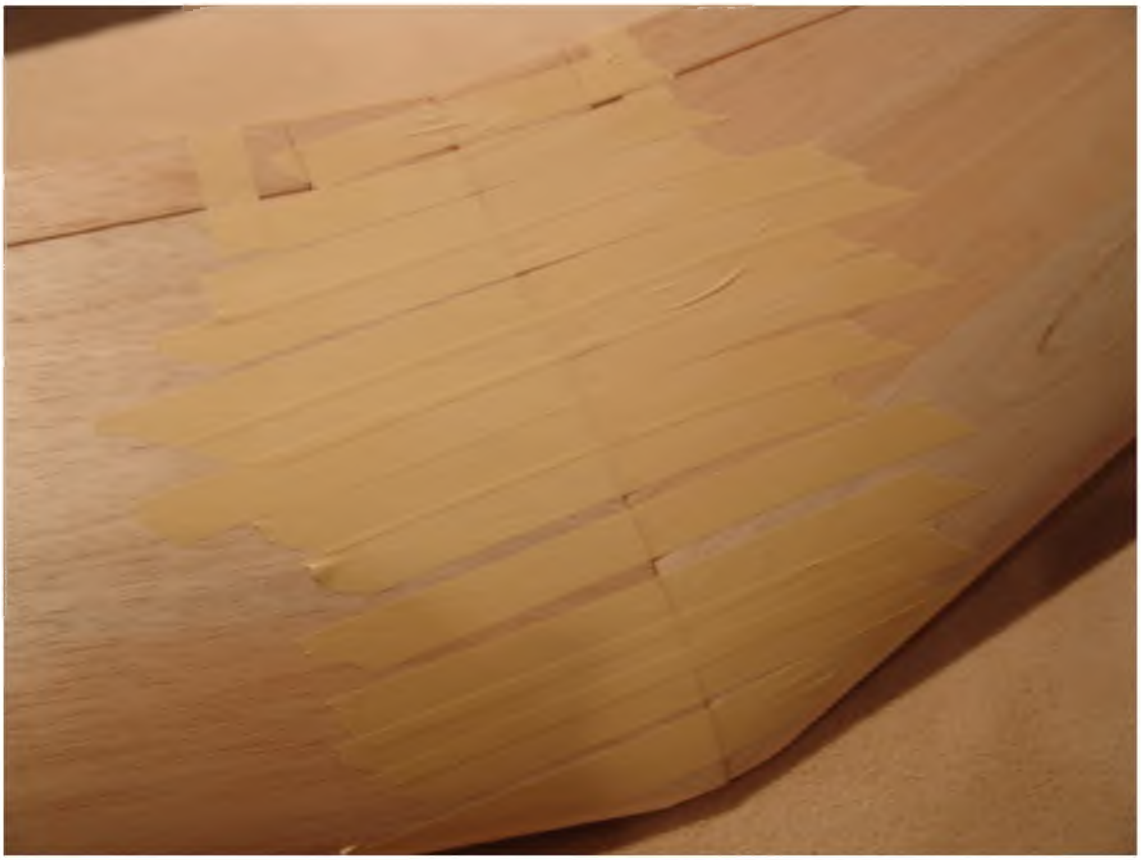
View of both wing halves showing the completed wheel wells and servo mounts. The servo mounts are cut 90 degrees to the trailing edge of the wing panels because the aileron linkage will be at 90 degrees to the aileron.



To be continued…

I completed the gluing of the wing halves together with 30 minute epoxy. I use masking tape that I stretch tightly between the wing halves to hold it together. The stretched masking tape puts a lot of pressure on the glue seam and holds the joint together very tightly.

I always find this task a little daunting because just a tiny misalignment of the wing panels really messes up the flight characteristics. The swept wing was a little hard to hold on to compared to the conventional straight wing.



To be continued…

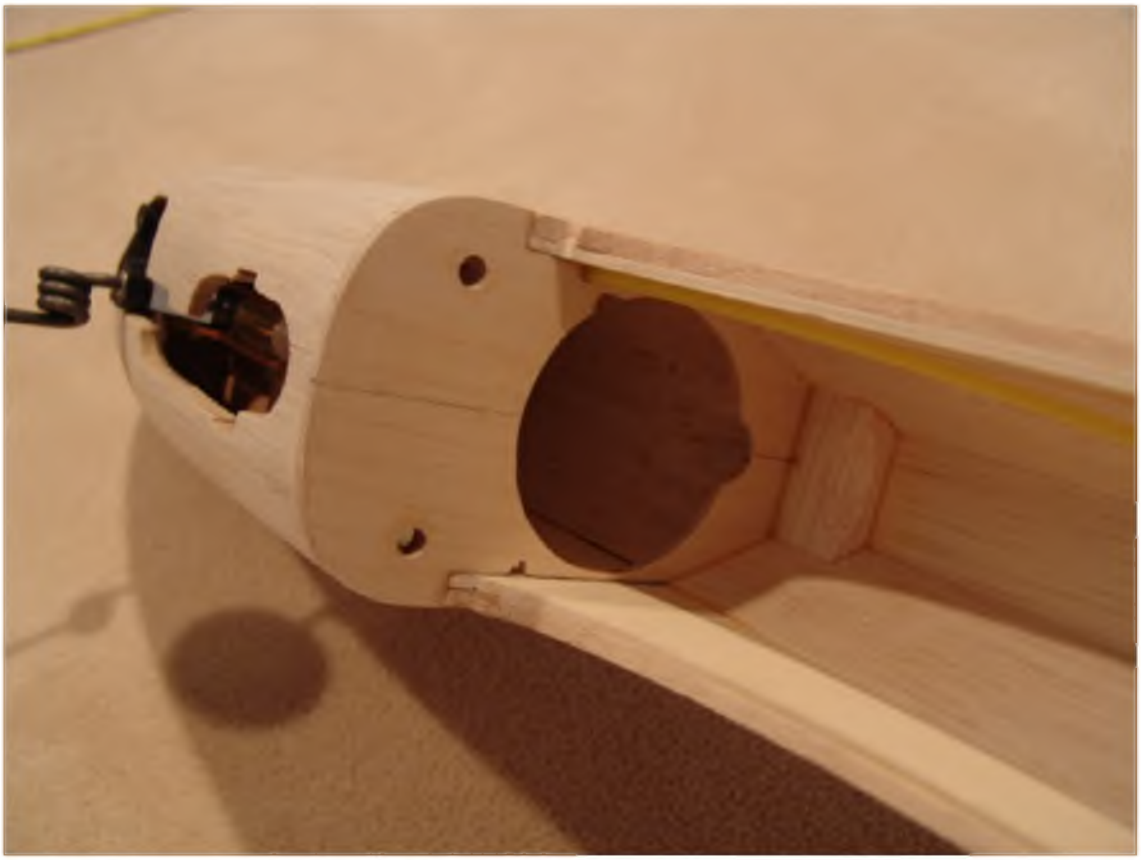
As you may recall before I sheeted the wing cores I sanded them lightly to make sure the root and tips of both wing panels were identical in shape and size. By spending a little time to make sure the airfoils were the same on both wing panels the glue seam at the root matches very closely.

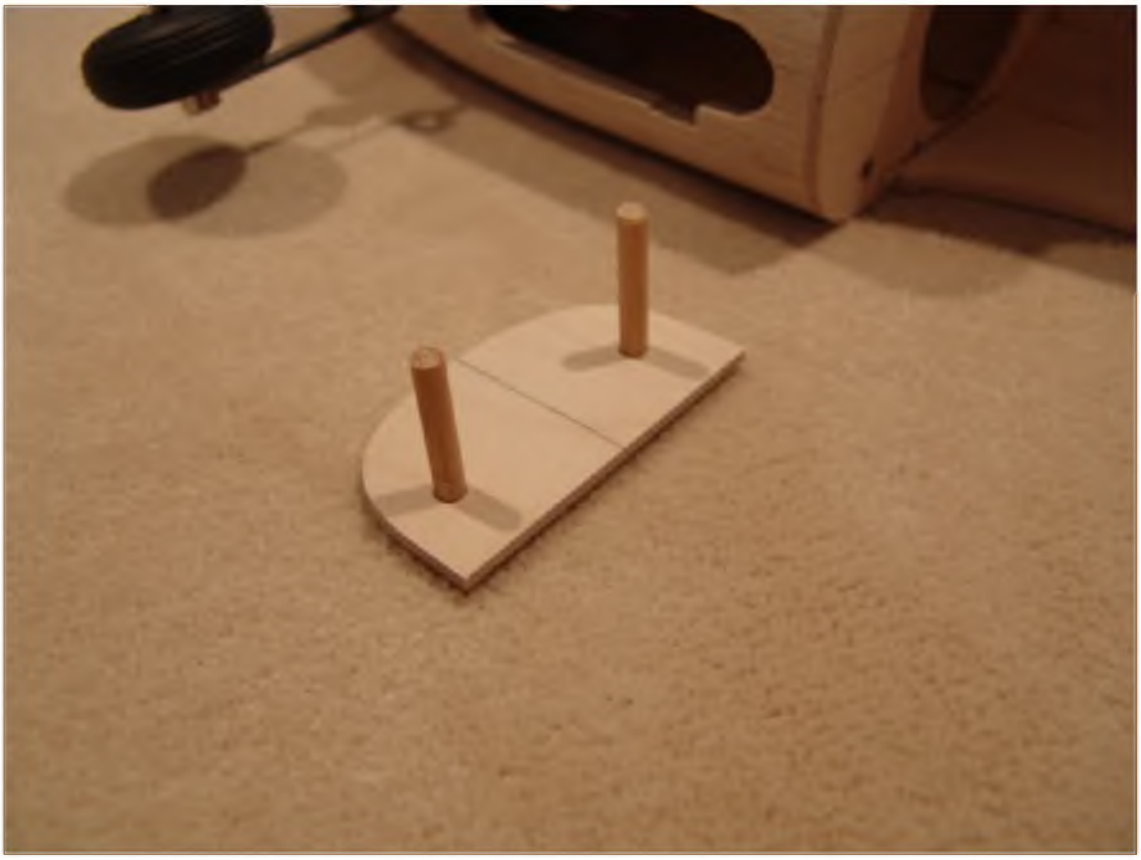
When Dan cut the wing cores he pre-cut the dihedral angle saving a lot of sanding of the wing roots. The dihedral is set up so the top of the wing is flat and only a little dihedral is formed by the wing taper. Swept back wings create a dihedral effect so it is best that the wing has little built in dihedral.

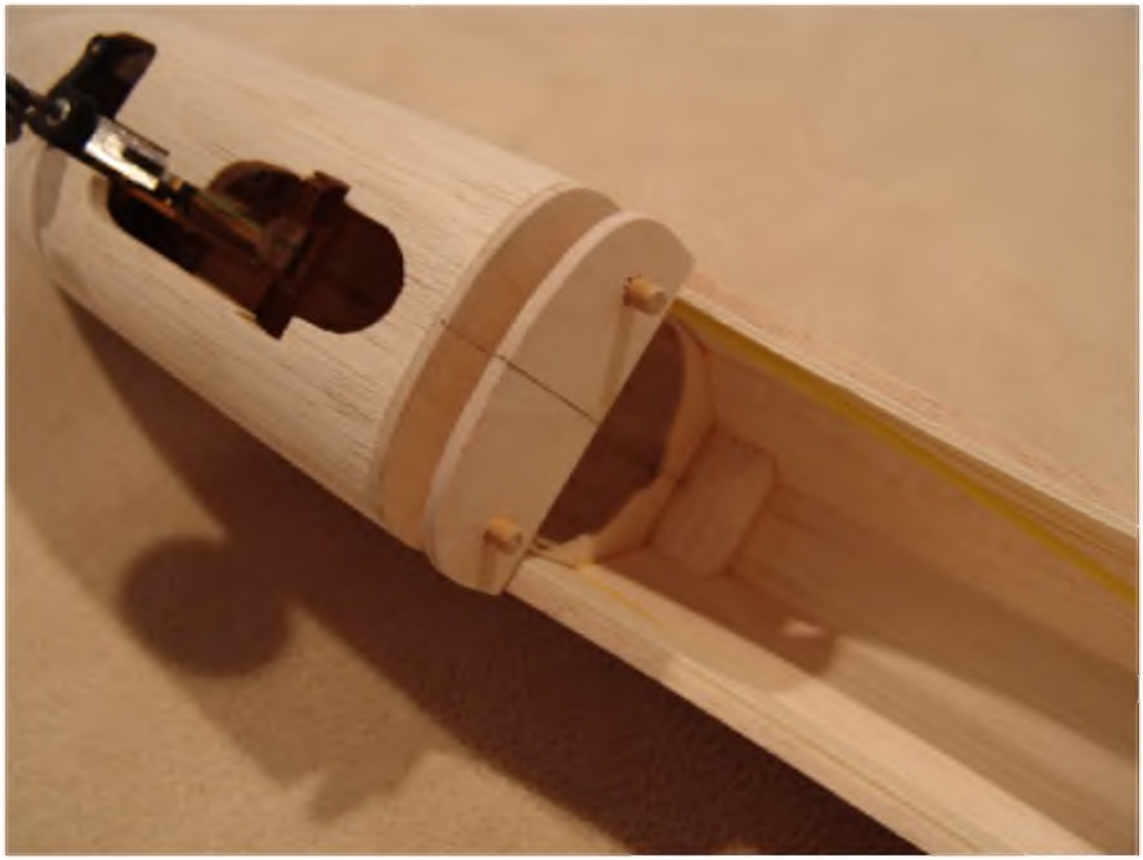
Views of the wing root epoxy glue seams are below. The black dots on the top of the wing are marks so I can find and cut holes for the servo lead and retract gear air line holes.

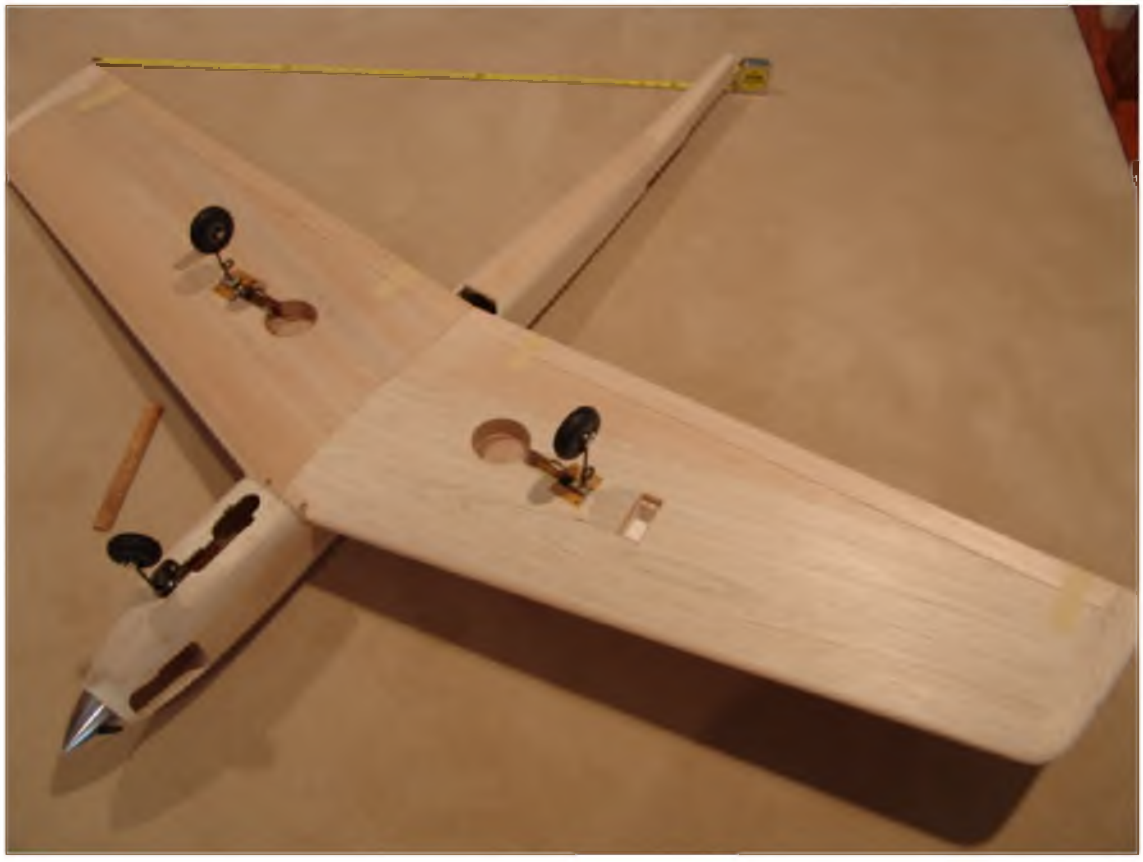
To be continued…

I started work on the wing center section and wing mounting. I cut the front former out of regular plywood that mounts on the front of the wing. I needed to do this so I can test fit everything and mark the wing for fiber glassing of the center section. I used some short ¼" dowels to test the fitment. Interesting that with the root center line of the leading and trailing edge of the wing aligned with the fuselage center line marks the wing is perfectly aligned with the tail. All of the center lines that I laid out on the fuselage formers to jig build the fuselage are coming in handy. There are a number of balsa wood and other light plywood parts that need to be cut to fill in the area under the wing after the fiber glass work is complete.









To be continued…

I marked off the center of the wing for the width of the fuselage plus the added width of the fuselage fillets. I then put masking tape along the line and worked it down so it was taped down tightly. I'm using six ounce tight weave fiberglass cloth with two layers on each side of the wing. I lay down a 2" wide piece and then a second wide piece. Before I put the cloth down, I brush the balsa with resin, lay down the first piece, resin the piece, lay down the wide piece and then brush more resin on.

Years ago I always used polyester resin to glass the center section and somehow in the last ten years started using thinned epoxy glue. I decided to go back to polyester because I haven't been happy with the epoxy. I think the polyester bonds to the balsa better and makes a stronger joint.

To be continued…

OK, back to the build and continued work on the wing center section. The first image shows the masking tape under the edge of the fiberglass cloth and resin. The second image shows the edge of the masking tape and how it was used as a sanding guide to sand down the edge with 60 grit sandpaper and cut loose the extra scrap cloth and resin. The third image shows the cut loose cloth removed.

To be continued…

After sanding along the edge of the fiberglass and the masking tape line was done the tape was removed. Next I'll put new tape down located out about 1/8" from the edge of the sanded fiberglass and add another coat of resin. See image below of the center section with the masking tape removed.

To be continued…

View of the second coat of resin after sanding and feathering along the tape line and then removing the tape. I didn't need to sand to the center of the wing but it gives it an overall finished look. Returning to my old method of using polyester resin instead of epoxy turned out pretty well. After a little sanding the fiberglass makes a smooth transition to the balsa wing skin and the polyester seems to absorb into the balsa skin deeper than the epoxy.

To be continued…

8178,
very nice!
what kind of poly are you using?
--
Thanks vasek! It is just standard sandable all-purpose polyester fiberglass resin purchased from Lowe's Home Improvement. They were stocking Bondo brand but the can I got for the Blue Angel is Elmer's brand.

Now that the center wing section is fiber glassed I've been working on the wing fitment to the fuselage. I've made some small adjustments by sanding the wing opining in the fuselage to make sure the wing fits in the opening with minimal gaps.

The lower line of the Blue Angel fuselage extends below the curve of the lower side of the wing root. Because of this, a balsa and plywood assembly is added to the bottom of the wing to that extends the lower fuselage line along the bottom of the wing.

I cannot tell from the plans if this assembly was meant to be removable but it kind of looks like that was the plan. There are two wing dowels that glue into the front of the wing and then a third dowel that is glued into the plywood piece that is at the front of the wing that apparently slid over the two wing dowels. The setup doesn't look like it would be very strong way to hold the front of the wing in negative Gs so I've decided to make the assembly fixed to the wing.

Because of the wing sweep back there is not a lot of surface to glue the front plywood plate to the wing so I've added two small dowels to pin it to the front of the wing. Below are three images showing the front plywood plate of the assembly with the dowels that I added for pinning and then the last image showing the third wing dowel hole drilled and a test dowel in place. The two other short wing dowels are there just to hold it in alignment while I'm working on the fitment. Expect you all are totally confused by now!

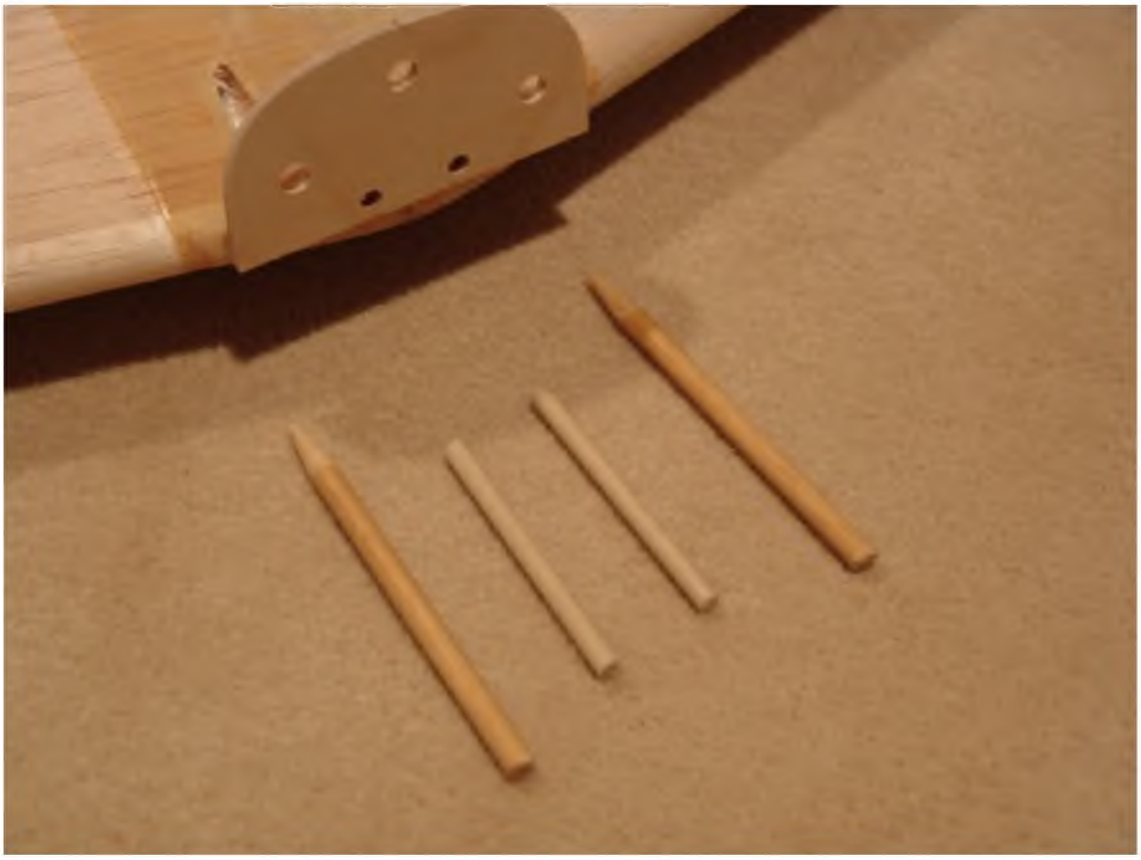
To be continued…

View of the front plate attached to the front of the wing with the epoxy glue. Three layers of masking tape were used to space the plate back to make a small gap.

To be continued…

Hopefully the following images will clarify how the wing dowels and front plywood plate attaches to the wing. The first view shows the wing dowels (with points ground on them, as per the plans) and the dowel pins to lock the plate to the wing. The dowel holes in the wing were drilled after the plate was glued in place. The dowels were glued in with epoxy glue.

Kind of strange they way Kato designed this part of the wing. I would have designed the wing dowels to be at the center of the leading edge of the wing, but I'm building from the plans so I didn't change the mount.

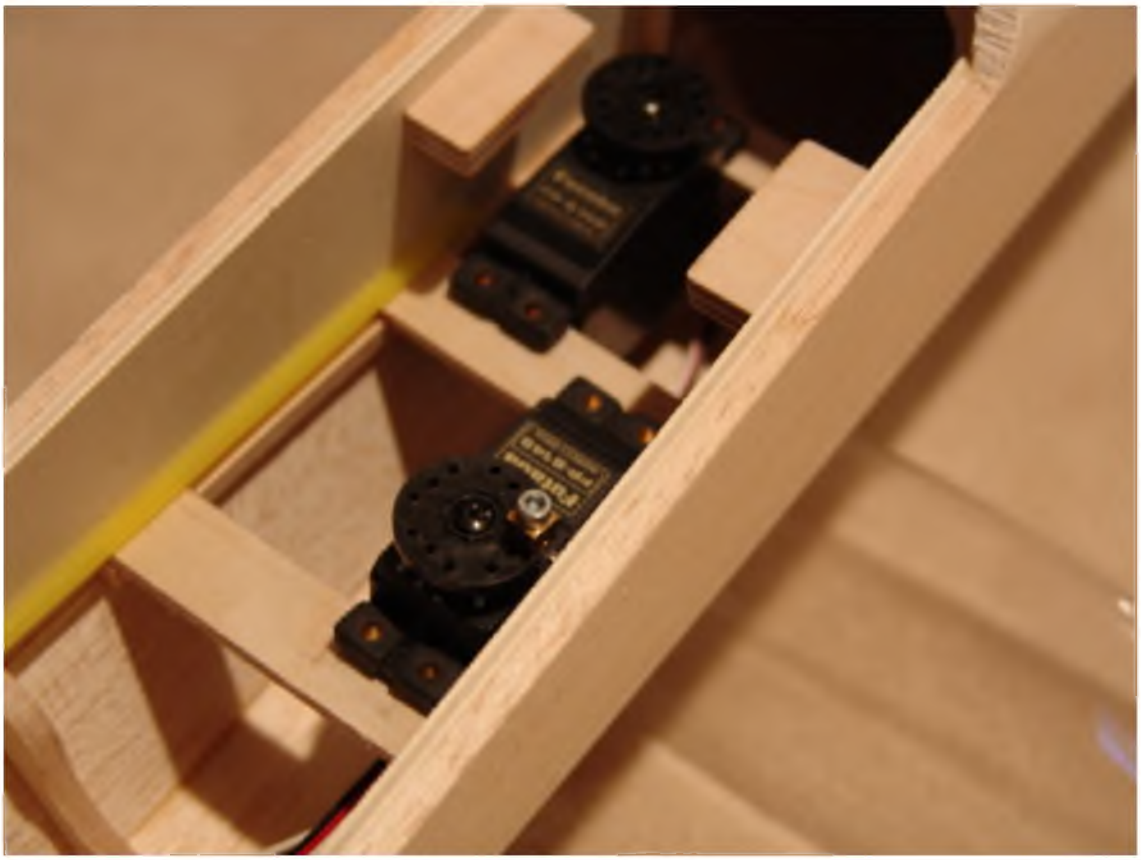


To be continued…

After taking the wing off and on the fuselage a few times, I think Kato positioned the wing dowels well below the wing because of how they must engage the fuselage wing dowel holes as the wing is installed. It's a good that I followed the plans! Very smart Kato!

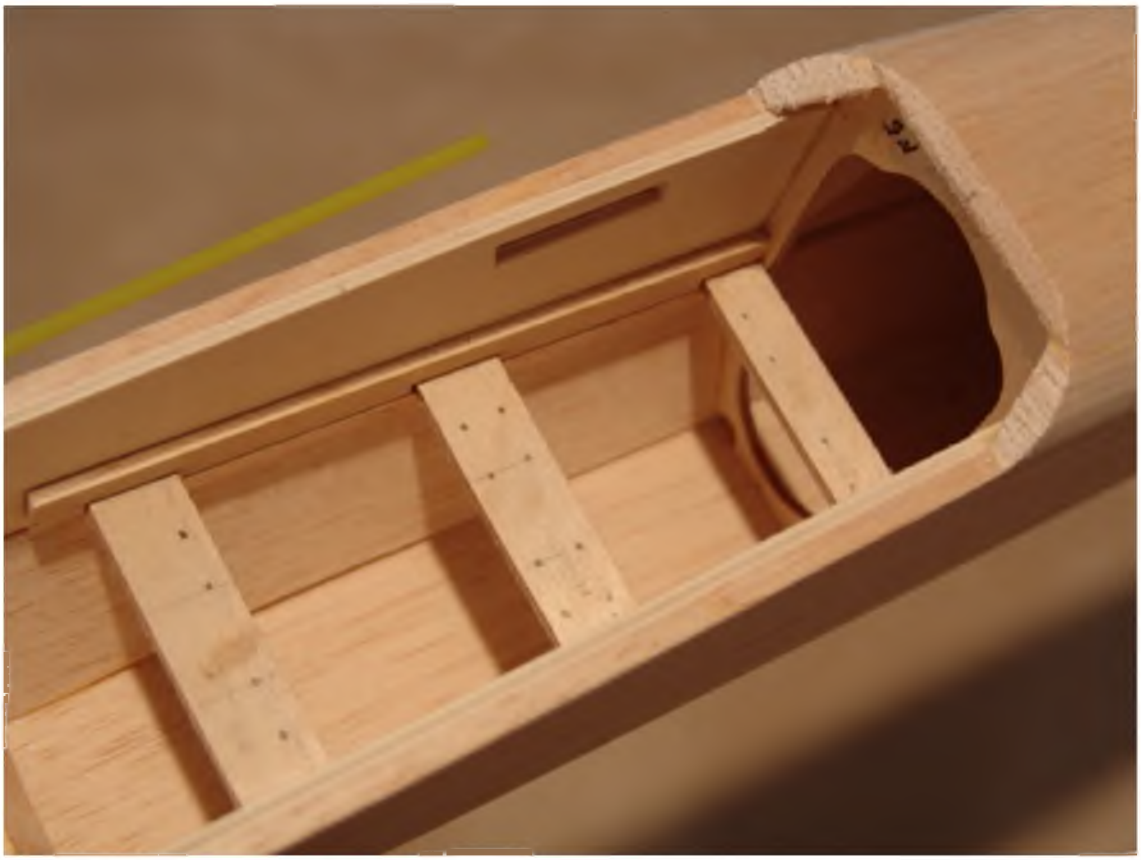
To be continued…

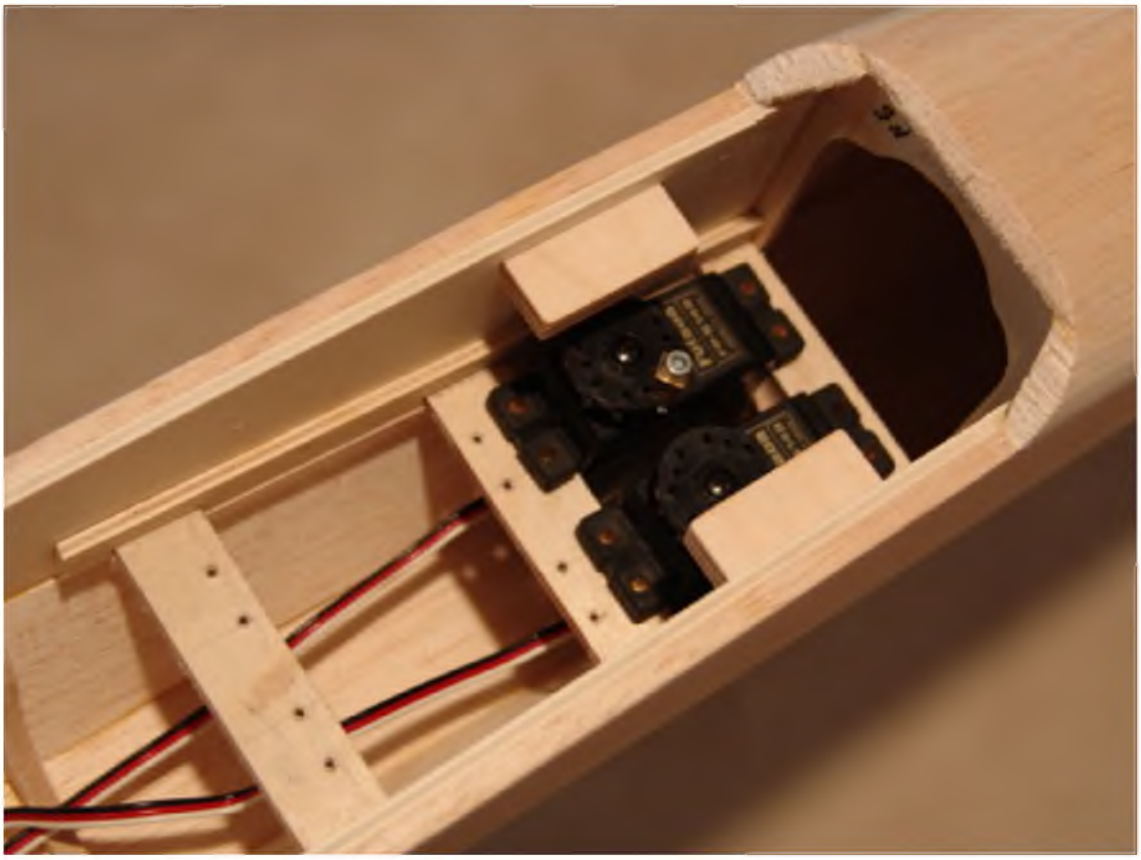
Working on the plan for the servo mounts and positions so I can glue in the wing hold down blocks and complete the wing mounting.



To be continued…

I used some balsa strips glued to the fuselage sides to position the height of the servo mounting plywood cross pieces. I tacked the servo mounting plywood pieces in place on the balas strips with super glue. I then cut 1/8" light plywood pieces that were notched for the servo mounts and glued them in on the top of the cross pieces with epoxy. After the epoxy set I marked the servo mounting holes and drilled the plywood. The servos in these images are old servos I've been using for test fitting. Now I'm ready to glue in the plywood wing hold down blocks.





To be continued…

As you may recall the 1/8" light plywood fuselage side doublers were cutout for a snug fit to receive the wing hold down plywood blocks. The blocks were glued in with epoxy and clamped to the fuselage sides. On the original Blue Angel kits pre-drilled and threaded plastic fittings were provided to be bolted to the fuselage doublers.

To be continued…

View of the blocks glued in place. They feel pretty stout without a connection between them but I may add some triangle plywood pieces under them to further tie them into the fuselage sides. I cannot position a cross piece brace between them because the servos must pass between them for removal.

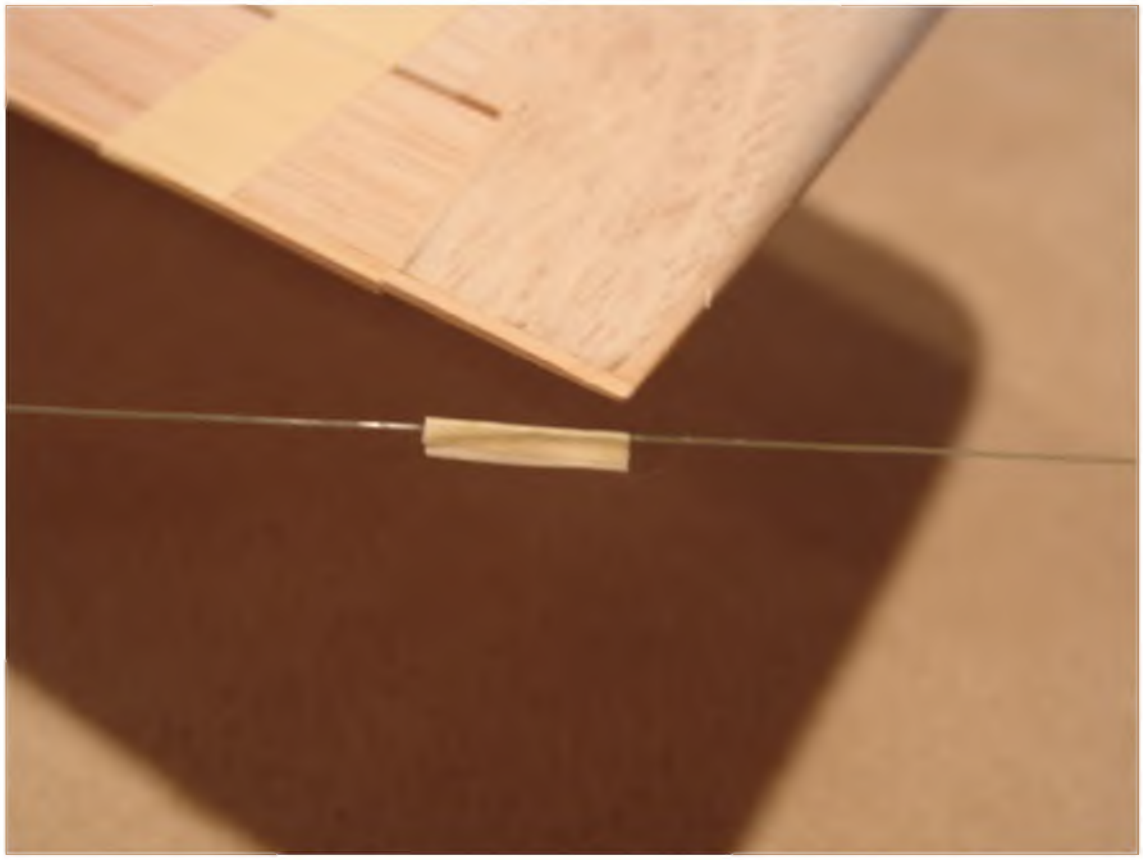
To be continued…

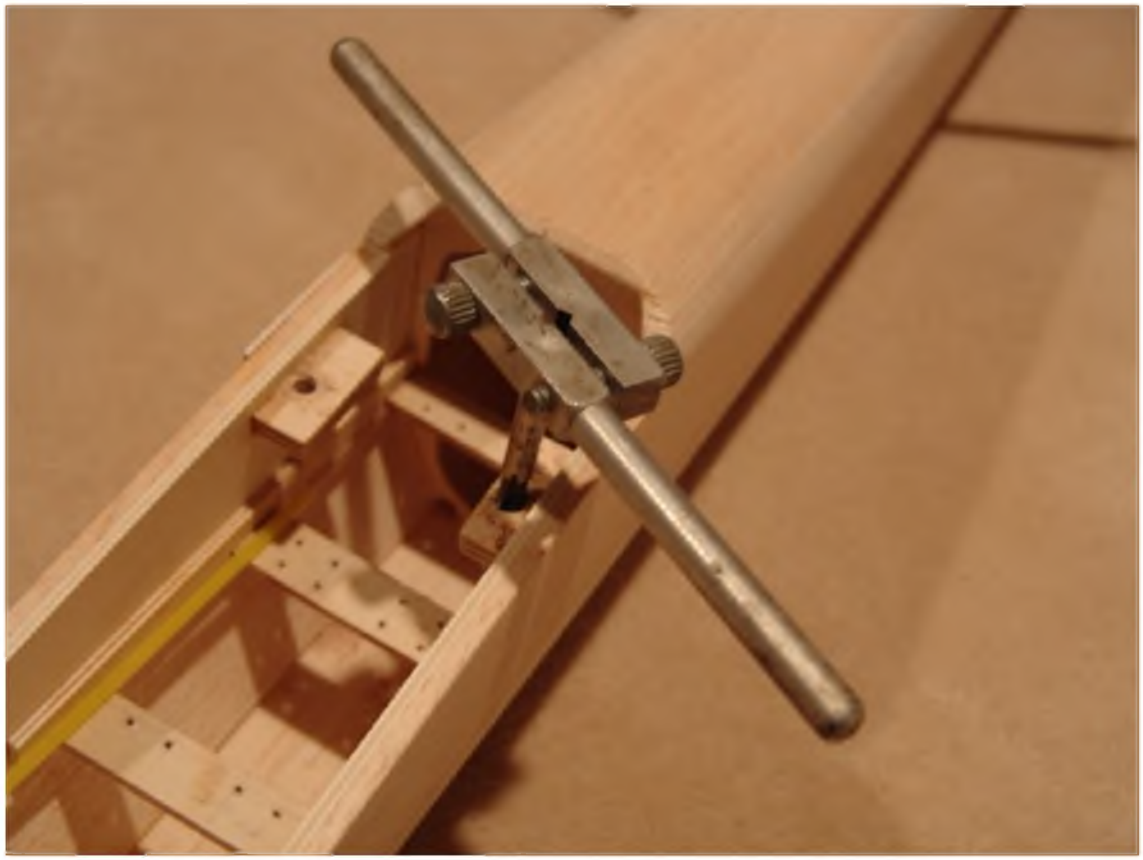
I completed the installation of the wing hold down ¼ 20 nylon bolts. I tried Richard McFarland's solution for holding the wing in position for drilling by tack gluing small balsa blocks to the wing. The idea works great!

I used the typical string (fish line) line to line up the wing tips with the tail. After I had the wing lined up I tacked the balsa blocks in place and rechecked the alignment. I laid out the position of the wing hold down blocks on the bottom of the wing and marked the spot to drill through the wing and hit the correct spot on the hold down blocks. I always worry about missing a block so I double and triple check the measurements.

I drilled through the wing and into the blocks and then removed the wing and used a ¼ 20 tap to tap the threads in the blocks. Then I usually remove the tap and flow some CA into the treads, let it set well and then run the tap through a few more times. After the taping was done, I drilled out the wing holes a little larger so the ¼ 20 nylon bolts could slide through but were snug. I also use CA in the bolt holes and re-drill them. In this case the holes to not pass through the foam part of the wing.

I removed the tacked on balsa blocks and re-sanded the area to smooth out the remaining CA.





To be continued…

8178,

Your building methods and workmanship are absolutely superb and inspirational. I want you to please illustrate on how you glue the plan on wood to cut to size. What type of glue do you use? You mentioned rubber glue, what brand? How to remove the paper from the wood afterward? Should I cut the plan to size exactly or rough cutting will be fine? Do you finish your cuts by sanding with the paper attached to the wood? When you cut or sand the wood with the plan attached to it, do you leave the line completely uncut or do you try cutting through the line or do you completely cut inside? It would be great if you do some picture illustrations as well.

Wow! It seems I asked a lot of questions for one post I hope you don't mind.

Thanks in advance.

Azzam
--
Thanks for your wonderfully comments Azzam, and I'm glad you find the thread interesting.

The rubber glue is plan old rubber glue used for gluing paper in scrap books, etc. There are a lot of brands and the last bottle I bought was made by Ross. I'm not sure about your country but in the US you can find it in school supply section of drug stores or hardware stores. I usually buy a small bottle because it tends to dry up in the bottle in a few months. Most bottles come with a brush built into the cap.

I usually use transparent drawing vellum to trace over the parts on the plan. The vellum has a 1/8" light blue grid printed on it with bold lines on 1" centers. The grid was used for drawing reference and would not show up in the olden days when blue prints were made of the drawings. See image below of part of the fuselage sides and front top tracings. You can find the drawing vellum at drafting supply stores. For the large parts on the Blue Angel I used the vellum and I sacrificed sections of a plan copy and cut out around the more complex parts drawings like the formers.

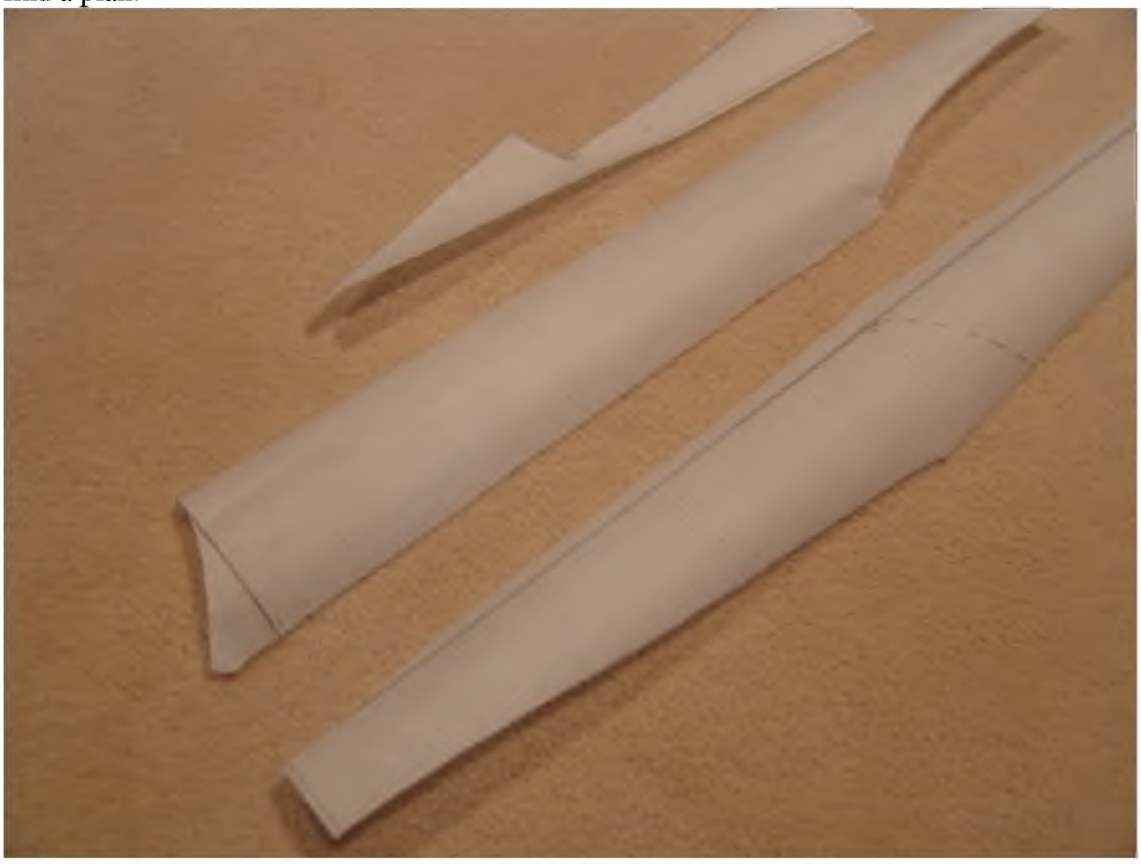
On the large parts like the fuselage sides and large balas block parts I laid the vellum over the plan part and use one of the bold lines to line up on a straight edge of the part if there is one. Then I take a straight edge and trace the other edges of the part. If the drawing lines are bold I trace to the outer part of the line or the side that will be scrap to provide some wood for sanding cleanup. If the part has a curved part I hand trace over that area. In some cases the large block parts have a side and top view and then you need to make two tracings. I cut the paper plans and or vellum so there is about 1/8" extra paper around the outside of the part tracing.

Next I select the wood piece and give it a light coat of rubber glue and the back side of the paper and stick them together. For the fuselage sides I actually spot glued the two pieces together with rubber glue and cut them at the same time. I use a Dremel Moto Shop jig saw to cut most of the parts but it will only take wood about 1 ¾" thick, so for thicker wood I use a band saw. Parts that have a top and side view take a little planning with the cutting so you end up with a surface to attach the second tracing.

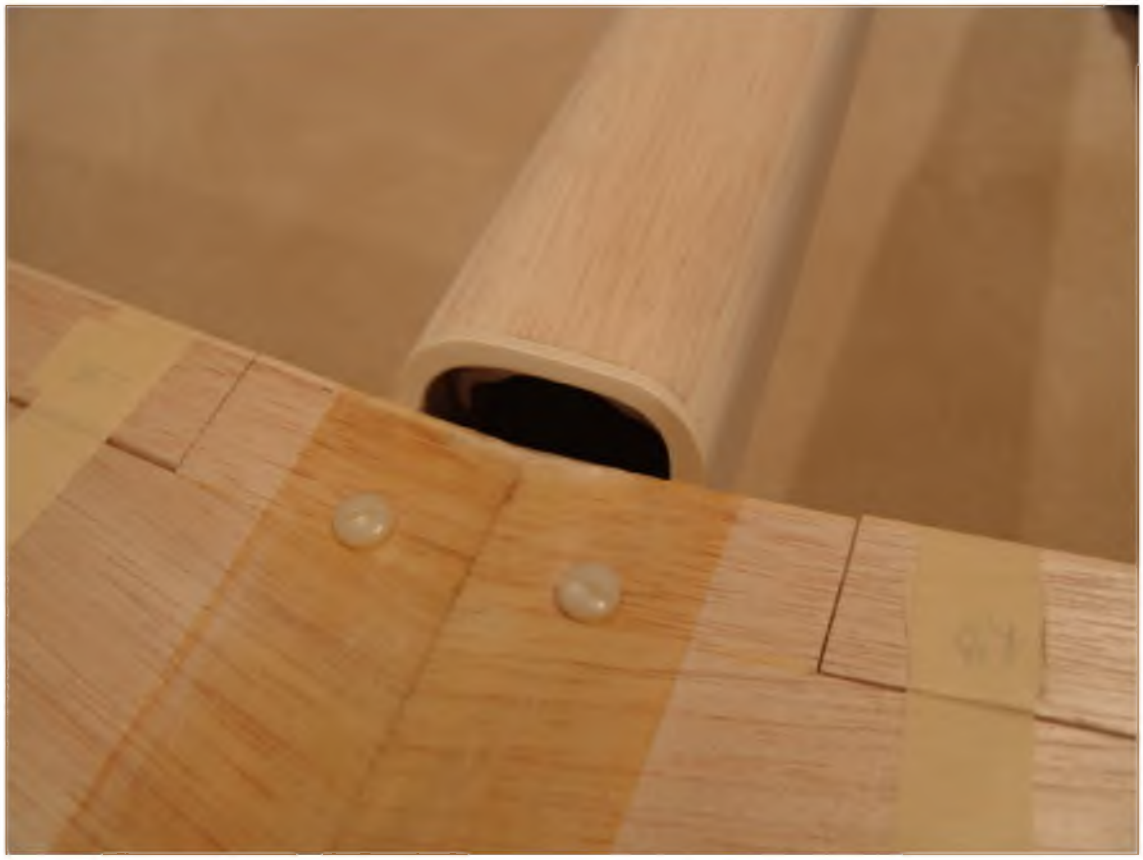
Whatever you use to do the cutting, make sure the blade is square with the table before you start cutting.

After the parts are cut I do light sanding of the part edges to clean them up. If the parts drawings have center lines on them I transfer the lines to the parts edges so I can draw the lines on the part after the tracing is removed. After the parts clean up sanding you just peel the paper off and sometimes you will need to rub the wood part with your finger to remove the rubber glue residue. I usually trace and cutout the parts as I need them during the construction so I don't end up with a lot of loose parts floating around.

It is all pretty easy and gives you the ability to build the aircraft of your dreams if you can find a plan.



For months the angled fuselage opening behind the wing has been unfinished rough cut balsa. Today I shaped and installed the light plywood C shaped piece that covers that area. I rough cut the plywood, glued it in place and then sanded the outside edge so it matches the fuselage balsa bottom. The next piece will be similar but will be attached to the trailing edge of the wing and will form the back edge of the belly area under the wing.



To be continued…

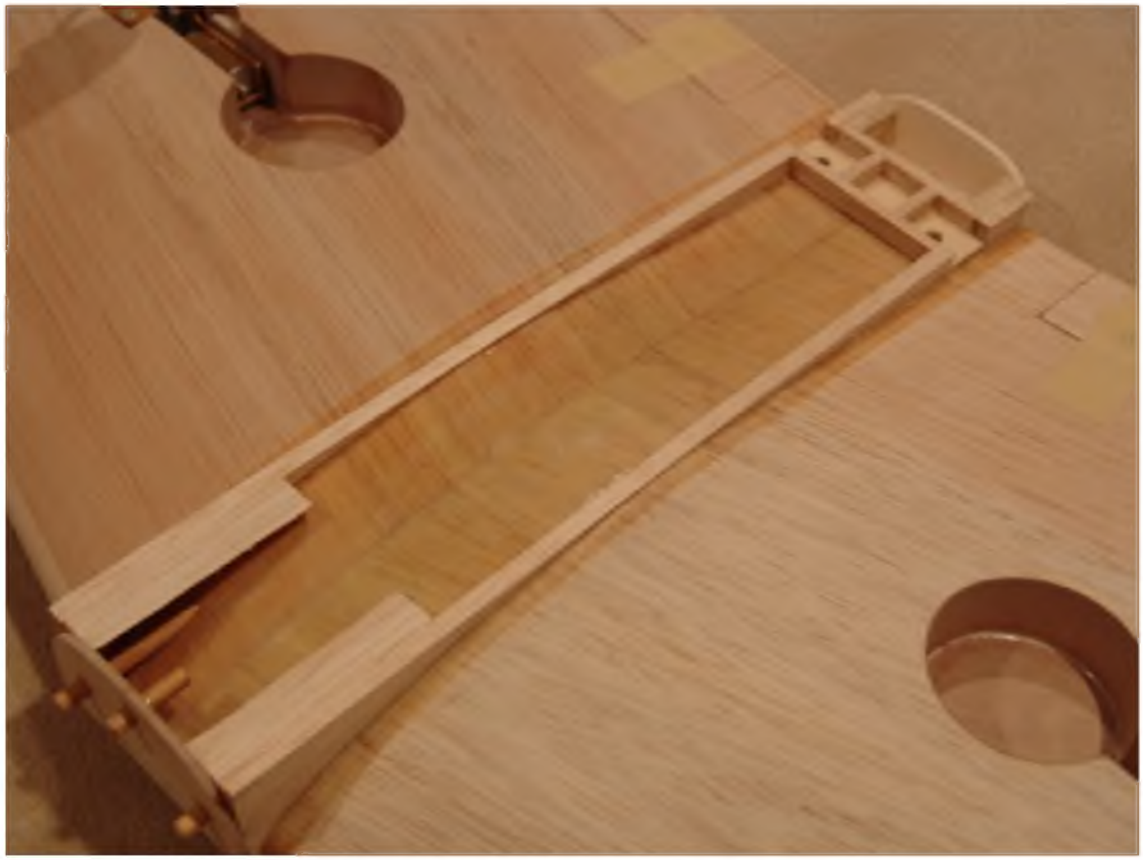
View of the light plywood piece that is attached to the back of the wing that will form the back edge of the belly area.

To be continued…

Still working on the wing belly area.

To be continued…

More progress on the wing belly area. Some fairly complex wood cutting and shaping! Need to razor plane and sand it next.



To be continued…

More razor plane and sanding work done on the wing belly area and more to go! There is a distinct angle change at the back of the wing edge as the belly line flows forward and down, and curves to meet up with the bottom of the fuselage.

To be continued…

I've completed more sanding work on the wing belly area. There are some interesting compound shapes designed into the belly area to make the front of the fuselage and the back part flow together under the wing. The installation of the wing belly area completes the wood cutting phase on the build.

To be continued…

During this phase of the project I've been amazed at how much effort Kato put into the Blue Angel design and the design improvements made by Yoshioka. It is one thing to design a pattern aircraft that has a certain wing area, airfoil, wing span, moment arm, thrust line, etc., but it is a totally different thing with the Blue Angel.

This is a machine that is filled with so many amazing little details, shapes and contours that it makes you smile as you discover how Kato and Yoshioka did their design work. I've tried my best to build exactly to the plan, sometimes unsure why they designed certain parts the way they did. But now that it is together and I can take in the beauty of it all, it is very clear that Kato and Yoshioka were on a mission and they were not messing around with the machine that would take them to their goals. They are world champion flyers, but also they are incredible designers and builders that knew exactly how they wanted the Blue Angel to look and perform and took no short cuts.

TBC …

I ordered the fiberglass cloth that I'll be using to cover the fuselage, vertical stabilizer and wing belly area today. I'm planning on using .73 oz/sq yd cloth from Thayercraft Industries at http://www.thayercraft.com/Style%20106.htm and polyester resin.

For the last few days I haven't done much work on Blue Angel other than making sure that everything is sanded and ready for the fiberglass cloth. I like to put the aircraft together and then let it sit for awhile and then come back to it in a few days to get a fresh prospective. Sometimes you will see little details that need attention that you hadn't noticed before.

To be continued…

Don't forget the wing fillets! That's a required part of any classic ship.
--
Absolutely, got to have them! After conferring with my friend Tony at Howard Engineering (manufacturer of my canopy) I have my plan worked out on how I'm going to do them. Stay tuned for the details! They are less than 1/4" wide BTW.

ORIGINAL: jpurcha

How much glass cloth did you order Mike to cover the fuselage?
Jim
--
I ordered the minimum three yard package. Hopefully that should be enough for a single layer on the fuselage. I was thinking about glassing the wing and stab but decided it would add too much weight by the time I painted it.

I seldom have problems getting dings in the MonoKoted wings and stabs and I like using MonoKote. But on the fuselage it can easily get dents and dings if you lay it down with the weight of the engine and radio gear. The glass and pant will solve that problem.

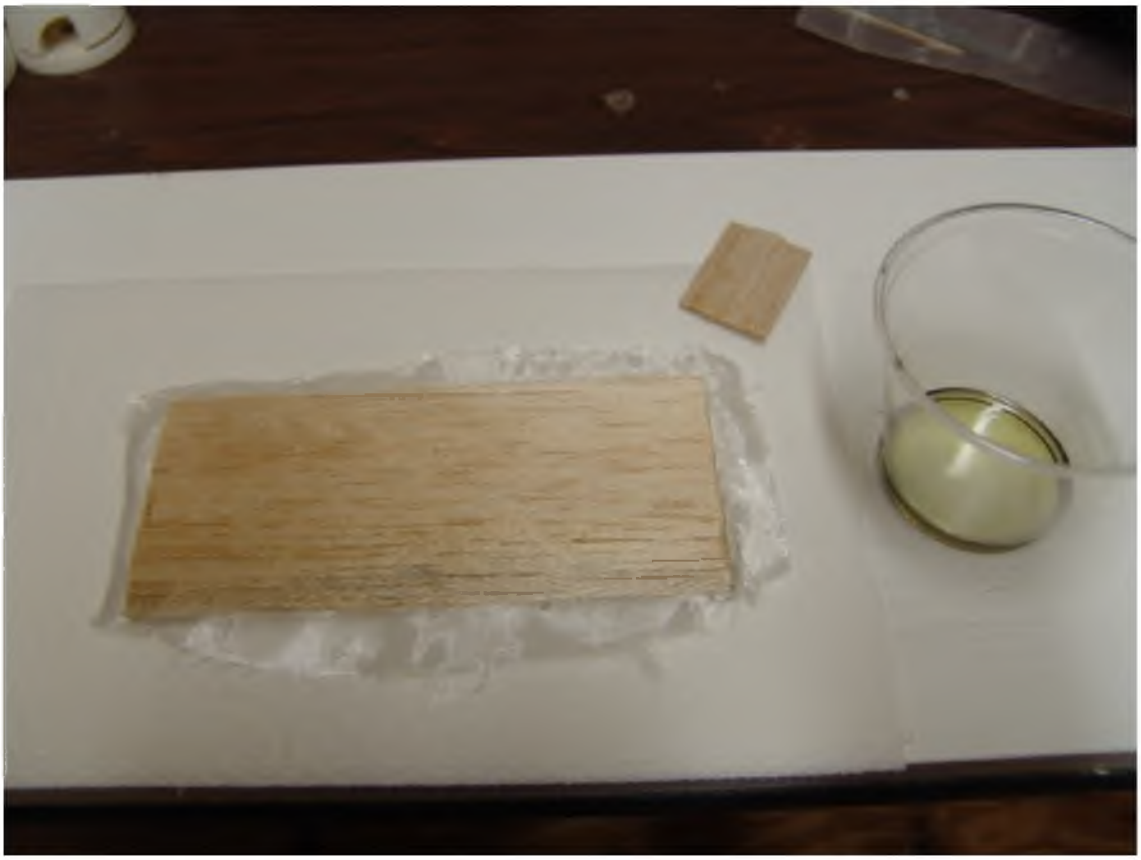
The fiberglass cloth arrived. Priority mail included in the price too!


PRIORITY
MAIL
FOR PICKUP CALL 1-800-222-1811
PRIORITY


Fiberglass Cloth
0.73 oz/sq yd
Clear Silane finish
Use with any resin
3 linear yards
(41" wide x 108" long)
Thayercraft Industries
710 W Green Drive
High Point, N
USA

To be continued…

I decided to try the fiberglass cloth process on a scrap piece of balsa to test my process because it has been awhile since I used glass cloth on a fuselage. I mixed the resin with a small amount of catalyst (hardener) to test the extended resin working time I will need. I used the small piece of balsa with smooth sanded edges as a squeegee to minimize the resin left in the cloth.



To be continued…

My glass work was delayed while I checked and rechecked my sanding finish work on the fuselage, vertical stab and the bottom of the wing belly area. After the glass is on it will be too late to change any shapes or contours. I also had to make sure that the vertical stab was absolutely square with the wing. It needed a very slight adjustment and I corrected that by sanding the bottom of the base that attaches to the fuselage.

I decided that the cockpit area would be a good area to start the fiberglass process. The balsa squeegee seems to work very well to spread the resin around and to remove any excess. I just position the cloth in the area with minimum overhang, pour on a little resin, squeegee it around so the cloth is wetted to the balsa and squeegee off any excess. The cloth tends to float in the resin a little and the squeegee does a good job of pressing the cloth down on the balsa at the same time that it removes excess resin. I use a paper towel wipe the squeegee off after each pass. More resin is added in areas as needed. So far so good! The fuselage and vertical stab assembly weight was 13.75 oz before I started the glass work.

To be continued…

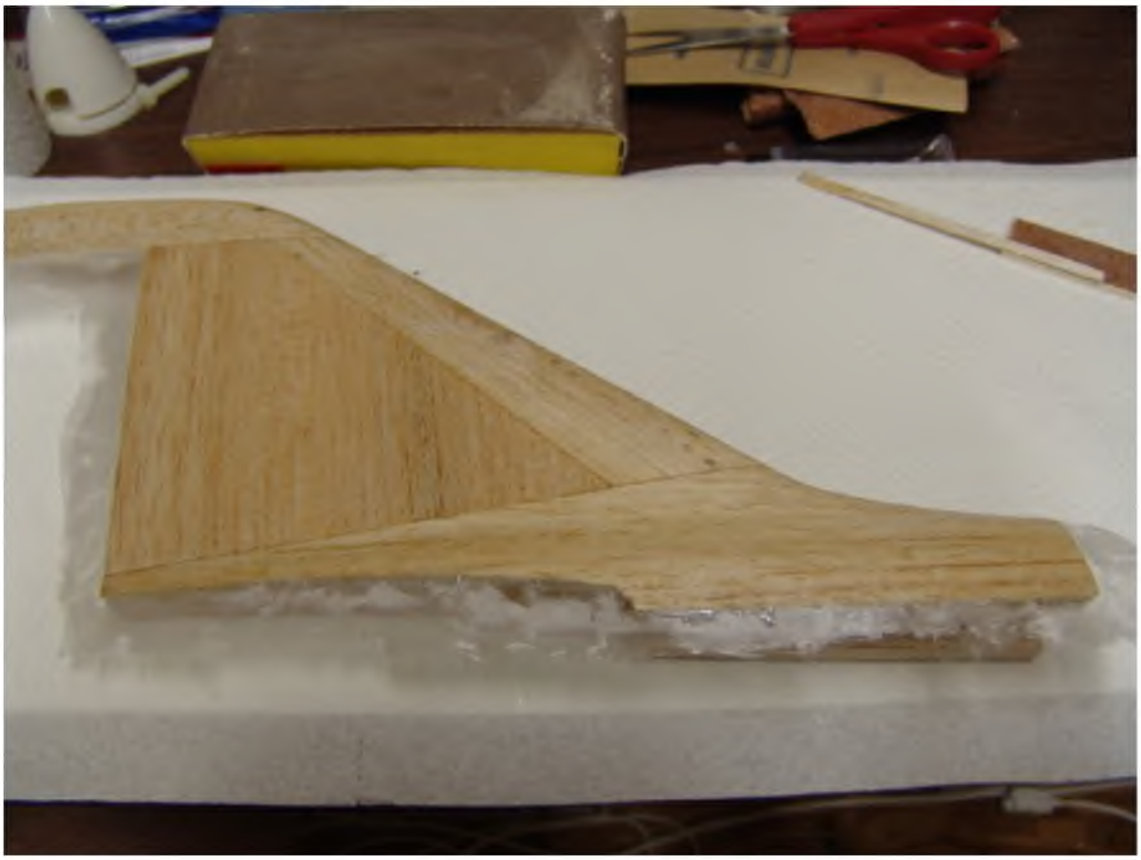
The first side of the vertical stab.

To be continued…

Wing belly area.

To be continued…

Before glassing the other side of the vertical stab assembly I sanded the edges of the cloth that were wrapped past the center line of the leading edge and tip. View of the fiberglass after applying the resin.



To be continued…

View of the vertical stab assembly with the fiberglass cloth on both sides and a light sanding around the edges completed to remove any cloth overhang. At this point it looks like the fiberglass on the vertical stab assembly and fuselage cockpit area has added about 3/16 of an ounce.

To be continued…

View of the right side of the fuselage with the fiberglass cloth on and resin applied with a squeegee to minimize the resin left in the cloth.

Before glassing I went over the fuselage very carefully to make sure everything was shaped and sanded that way I wanted it. This was my last chance to make the shapes flowed correctly especially the area behind the canopy. I found a few small dents in the balsa and I popped them out with a spot of water and my MonoKote iron. A couple had to be filled with light spackle and sanded out.

I started by cutting one piece of cloth that covered the complete right side. I laid the cloth on the fuselage and mixed up a very small batch of resin (about 1/4" in the bottom of the cup) and started working the resin on the side near the wing opening and worked to the top and bottom and front and back. When that batch in the cup started to jell, I made sure that I had the current batch of resin on the fuselage worked out all directions. The resin in the cup kicks off well before what is on the fuselage because of the larger volume and the heat created. I then mixed the next batch and moved on toward the front and then the back of the fuselage. It took three very small batches to complete the fuselage.

It is easer to handle the fuselage using small hot batches of resin because the resin jells fast and the cloth says stuck down well, e.g. the front of the fuselage can be handled while you are working on the back area. How fast the batch gels and hardens is controlled by how much catalyst is used. I'm using about 10 to 15 drops per batch.

To be continued…

One of the many things I like about using polyester resin is that the fuselage can be handled so soon after the resin is applied. While the resin was still curing I took a razor and trimmed the overhang off by cutting a line from tail to nose on the center line and then trimmed the other areas.

So far the fiber glassing has added about 1 oz total to the fuselage and vertical stab assembly but no sanding has been done yet.

To be continued…

Now that the glass surface is on one side of the fuselage it is much easer to see how the shapes flow on the fuselage and around the canopy. It's hard to see the flow of the shapes with the non-reflective bare balsa to see if you've got it right. Of course at this point it's a little late if it isn't! So far so good!

To be continued…

I completed laying down the glass on the left side of the fuselage. Total weight gain for the fuselage and vertical stab assembly is 1.75oz. No sanding has been done yet and I have some overlapped cloth to remove. I expect it will come out closer to 1.50oz or less after some sanding. Total fuselage and vertical stab assembly weight at this point is 15.5oz. Pretty light for such complex construction!

To be continued…

As expected after sanding the fiberglass overlap seam on the top and bottom of the fuselage it lost 1/4oz. The total weight gain for the fiberglass process at this point is 1.5oz. Some of the loss may be related to the curing process of the resin.

To be continued…

I am intrigued by the polyester resin because i am alergic to epoxy.
8178 can you pls indicate (or direct me to the post#) for more info on the Brand name etc.
Also, how would the polyester compare to the polyurethane finish?

Thanks V.

--

V,

Some people do have bad allergic reactions to epoxy and get terrible rashes. It seems to have a delayed accumulative reaction in that they can use it for awhile and then once it starts any exposure after that is terrible. I remember one of the guys in our club that was making epoxy fuselages and had to stop working with epoxy completely.

I've used different polyester resin brands over the years. I usually buy whatever brand my hardware store has in stock. The last can I purchased at Lowes is the Elmer's brand. The main types are finishing and casting. Hardware stores like Lowes usually only stock the finishing type. The casting type cures with a sticky surface so you do not want that.

I've only used polyurethane for painting so I do not know how it would work for fiberglassing. Typically polyurethane would not harden like polyester or epoxy.

In preparation for glassing the center section of the horizontal stab I glued the two halves together with epoxy. As usual masking tape was used to hold them together tightly. The sweep back and double taper of the stab halves made it a little tricky to make sure that it was perfectly flat. I adjusted the alignment by sanding the root joints. I also made sure that no epoxy got on the outside of the balsa sheeting because it would interfere with the curing of the polyester resin that I will be using to glass the center section.

The double taper of the stab halves and sweep back prevented sheeting them as one piece.

To be continued…

View of the stab seam. Next, I'll be adding fiberglass to the center section and gluing it and vertical stab assembly to the fuselage.

To be continued…

Fiberglassing the stab with 6 oz cloth and polyester resin. As usual I put masking tape down first to define the edge of the area to be glassed and pulled the cloth down tight at the front and back with tape.

To be continued…

View of the horizontal stab after sanding the fiberglass overhang off. The masking tape acts as a guide so the fiberglass can be tapered down to the tape line without damaging the balsa.

To be continued…

View of the horizontal stab after removing the masking tape. The dark area to the outside of the cloth pattern is resin that was under the cloth and absorbed by the balsa. The area is hardened by the resin. The process makes a very nice taper from the fiberglass to the balsa sheeting surface.

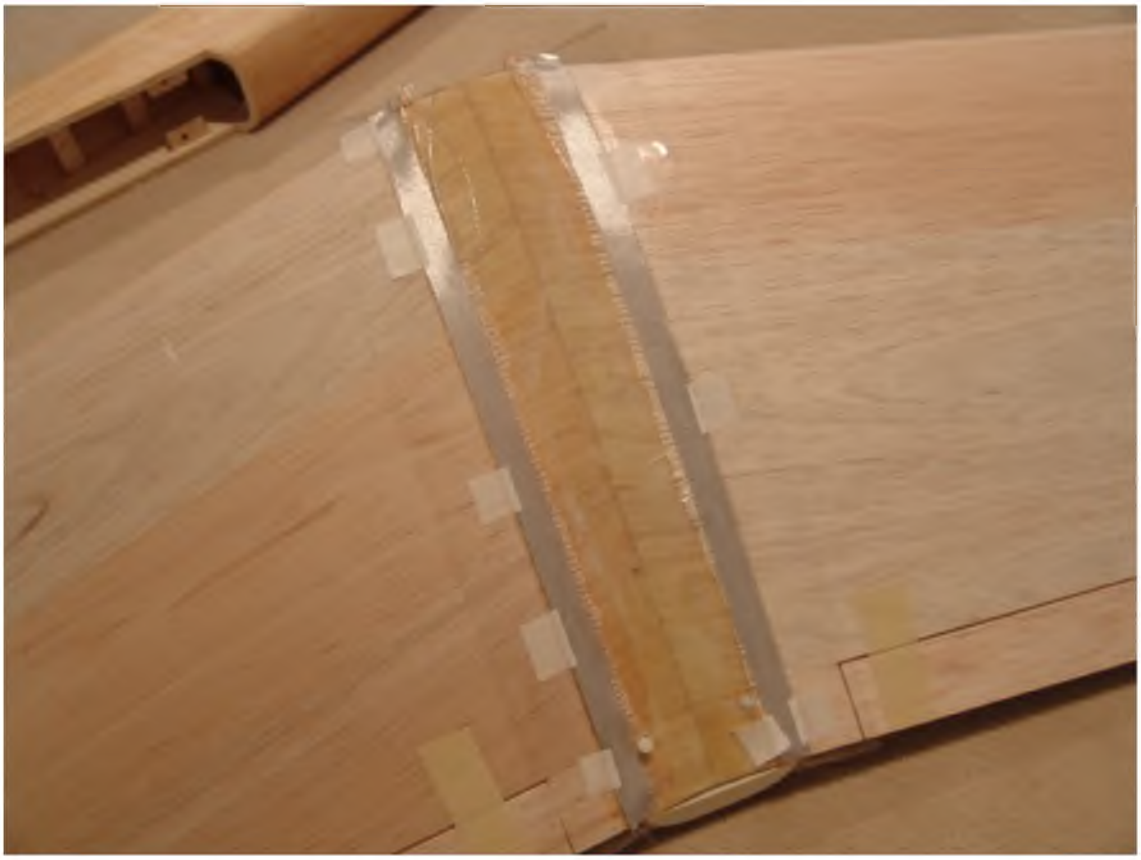
To be continued…

Started work on the fuselage fillets and decided to use fiberglass cloth for the fillet base and to form a hard surface for the fuselage wing saddle.

First I marked a line on the top of the wing along the fuselage sides to represent the outside edge of the fillet. Then I put clear packaging tape on the top of the wing so it spanned the sides of the fuselage. Then I cut some 6 oz fiberglass cloth strips and taped it down along the line on the wing. I cut the cloth so that the finished edge of the cloth would be on the outside edge. Next I put the wing on the fuselage and bolted it down. I put some masking tape on the sides of the fuselage to keep the resin contained along the lower edge of the wing saddle.

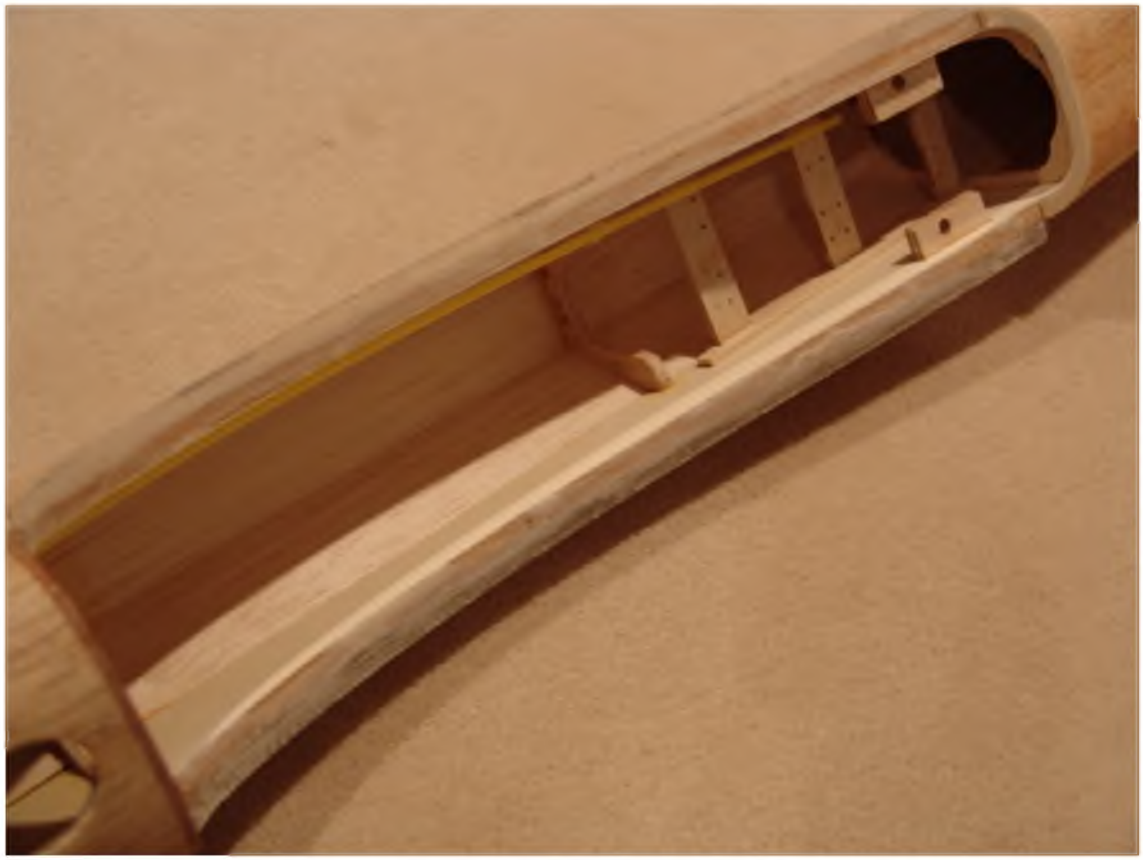
Polyester resin was then brushed on the cloth so that it filled the weave and hopefully wicked under the edges of the fuselage. When the resin tacked up some I removed the tape on the edges of the cloth.

Hopefully I have not permanently glued my wing to the fuselage!!!



To be continued…

The wing and fuse parted company with a little pulling and tugging but was not a big problem. The resin wicked fully under the fuselage edges in all but a couple of spots. The clear packaging tape wrinkled in a few places so next time I'll need to use something that is more resistant to the resin. I filled in the areas where the resin did not wick and the areas that had lines from the tape wrinkling with resin and sanded it out. I have a little more to sand off the outside edge of the fiberglass to bring it down to the 3/16" width I need for the fillet base.



To be continued…

View of the first coat of micro balloons and resin. Next, I need to sand off the extra width of the fiberglass base so the width is 3/16” and add another finish coat of micro balloons.

To be continued…

---

quote:

ORIGINAL: Sport_Pilot

I have a Koas which has some large gaps between the saddle and wing. I was going to put Saran wrap on the wing and bolt it down, then fill the gaps with microballons, maybe add a small amount of fillet while at it. Should this work, or do I need some of these fancier methods?

--

Actually, that is pretty much the proceedure used to "pot" at wing in place. You can start off putting a bit of the fillet material on the wing saddle first - helps assure a surface - then bolt the wing in place (Saran wrap [or I prefer monokote backing] on the wing of course). Bolt the wing down - the excess fillet/potting material will ooze out. You can then fill from the outside and build a fillet as desired. This results in a wing that fits perfectly when done. This proceedure is something we find pretty important with pylon planes - if the wing does not fit well, it will vibrate in the saddle, bolts with come loose - and sometimes the wing rubbing on the fuselage will actually burn the wing mount area.

View of the fillet after the final coat of micro balloons and resin. True to the MK plan shape but not balsa.

To be continued…

View of the front lower wing fillet completed and sanded so it blends with the fuselage fillet.

To be continued…

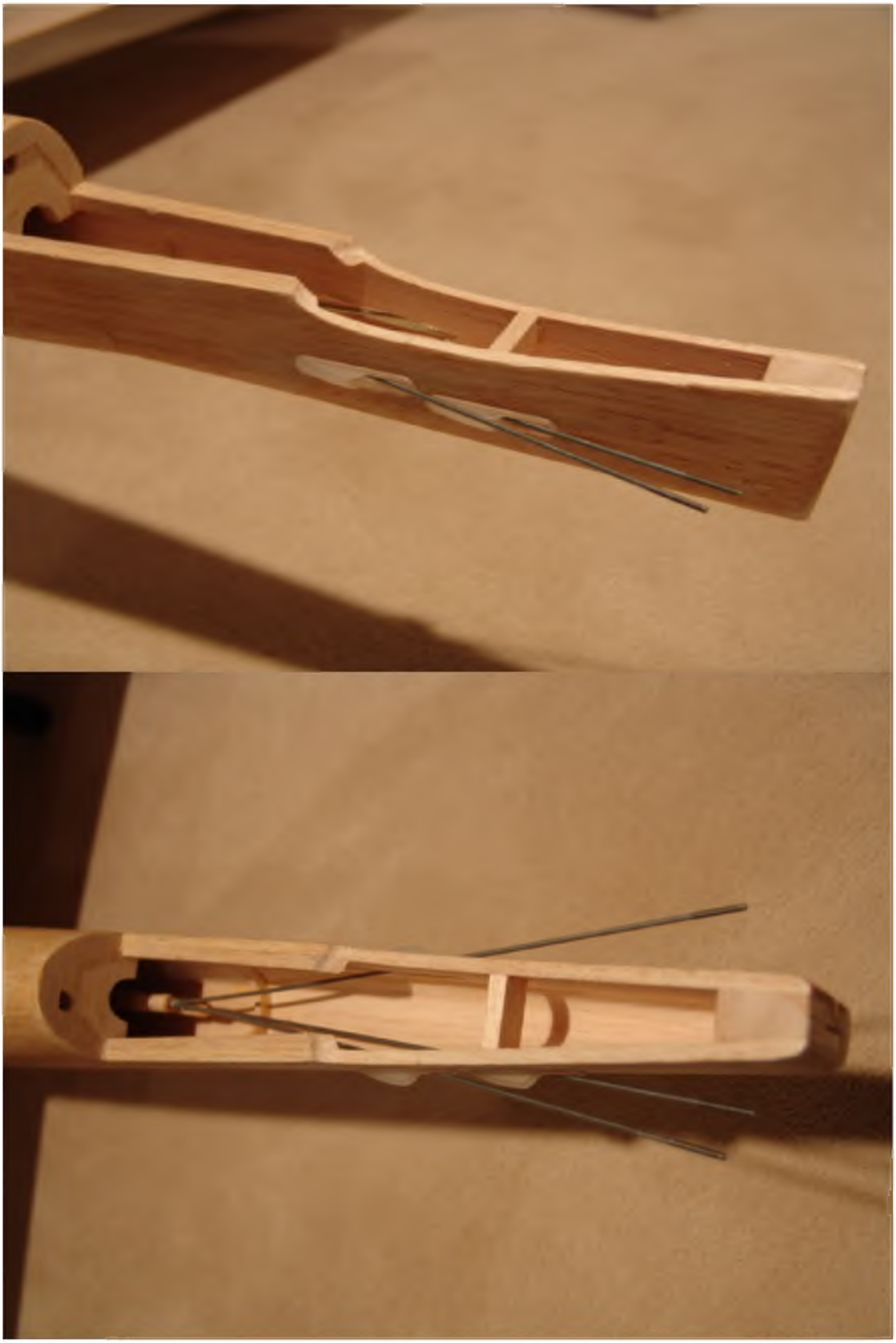
After some final light sanding on the fillets I glassed over them with a narrow strip of cloth.

To be continued…

After the resin set I sanded the cloth overhang off and blended the cloth edge into the side of the fuselage.

To be continued…

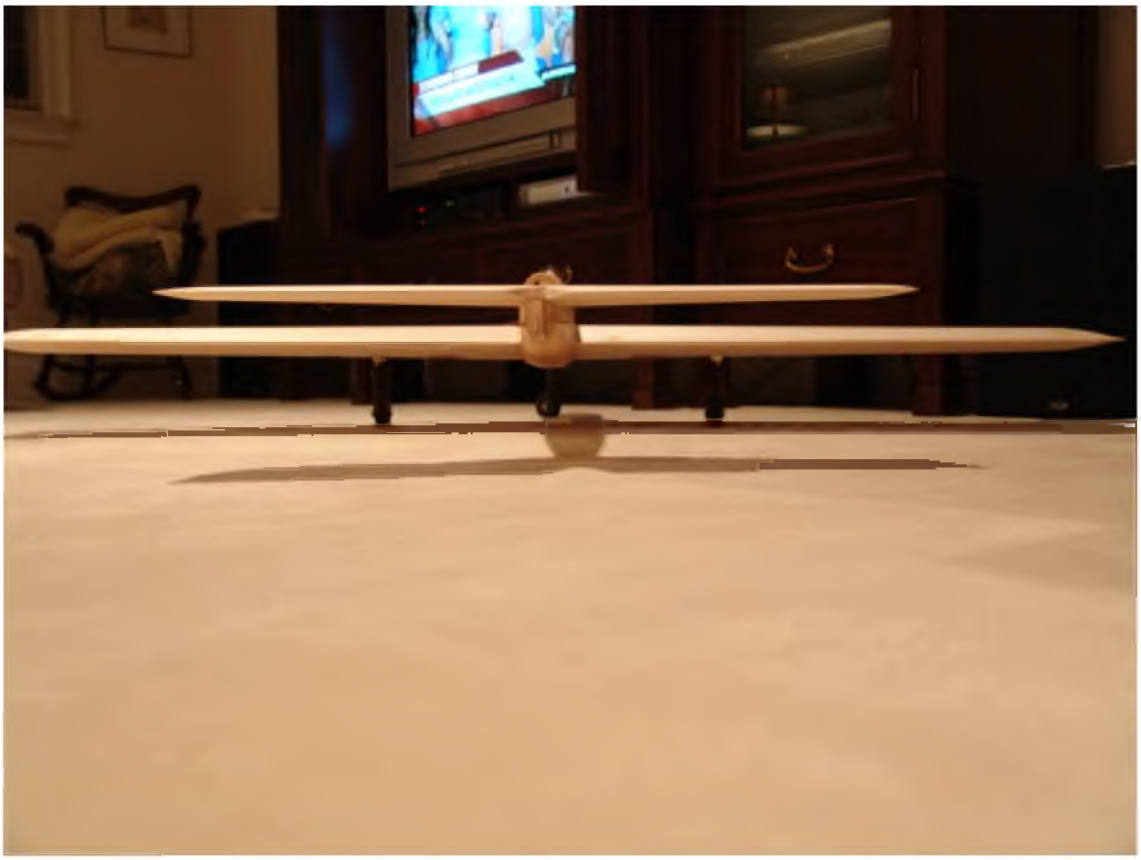
In preparation for gluing on the horizontal stab I calculated the dual pushrod exits for the elevator and the exit for the rudder. I wanted to get this done while I had open access to the tail area. The exit guides are a Great Planes item.



To be continued…

Wow! More than 20,000 hits on this thread.

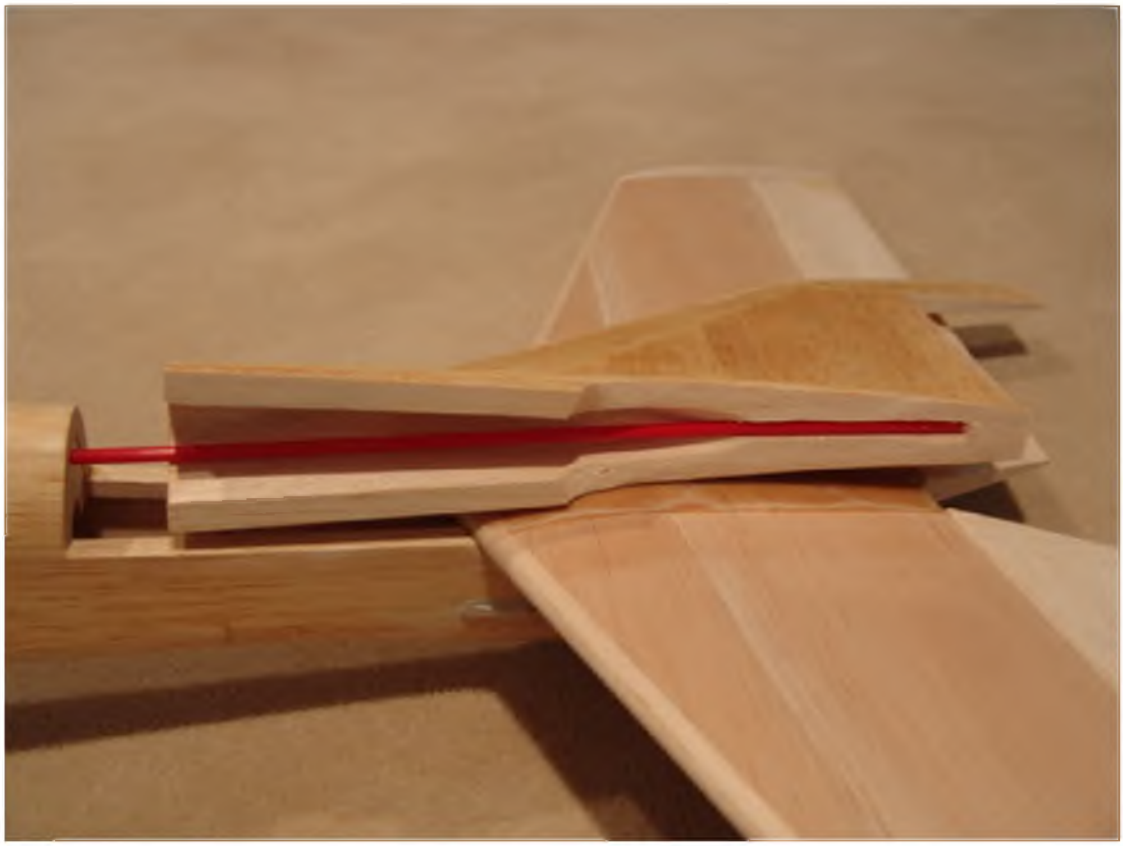
After checking the horizontal stab alignment with the wing and fuselage I glued it on and carefully rechecked the alignment.



To be continued…

Before gluing the vertical stab assembly on, I cut a slot in the base for the antenna tube.

To glue the stab assembly onto the fuselage I used a slurry mix of micro balloons and polyester resin under the vertical stab base and Titebond on the area in front of the stab. I used masking tape to hold it place while the glue set.



To be continued…

View of the tail after the tape was removed. No fillets are shown on the plans for the root of the horizontal stab. All the main components are glued together now.

Next, I need to start the finishing work on the fuselage, mount the canopy and the finishing work on the wing center section.

To be continued…

That whole tail section is incredible. It almost looks like the wood grew into those forms it's so fluid.

--

You are correct rainedave , there are some very complex shapes in the tail area because there are so many different lines converging and flowing around the base of the vertical stab and the tail of the fuselage. Because of the way that the horizontal stab mounts I chose to glass the fuselage and vertical tail assemble before I glued them together. I was hoping that I had the shapes correct! It is very hard to see the trueness of complex shapes like these when you are working with the bare balsa that in so non-reflective. After the glass is on it is a little late to make changes in the shapes.

It all worked out pretty well with just a little filler needed to blend the joints except for one low spot on the top right section of the joint that needed more filler. For the joints and this area I used micro-balloons and resin for filler because it is light but hard and strong. It also sands well reducing the possibility of sanding through the cloth around the filler.

To be continued…

I spent some time today preparing the cockpit area for the canopy installation. Winds gusting to 35 MPH tend to keep you away from the flying field!

Yoshioka used white paint in the cockpit and a plastic pilot figure. I prefer black cockpits because it blends into the paint scheme better so I'm deviating from the plan and using flat black Krylon paint. I held the canopy in position and traced around the bottom edge with a pencil and then masked off the area. I wanted the view of the cockpit to be completely black so the paint goes down to the bottom edge of the canopy.

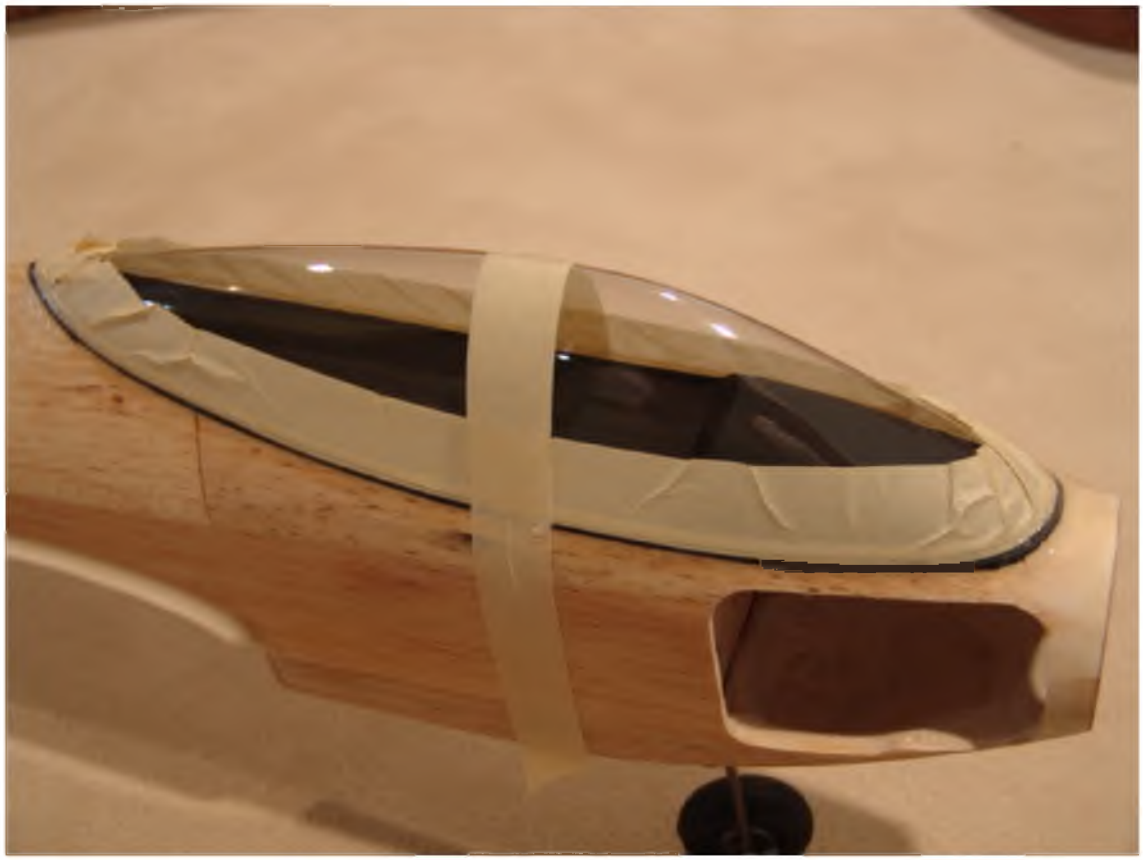
I haven't drilled the vent hole in the cockpit yet but it will be at the very back edge of the cockpit floor so it will not be visible. Next, I'll be glassing the canopy onto the fuselage with fiberglass cloth and epoxy.

To be continued…

I started the canopy installation by drilling a 1/16" vent hole in the cockpit floor at the very back. The vent hole is drilled into the fuselage so the pressure changes inside the canopy can vent into the fuselage.

Next, I masked off the canopy leaving about 3/16" around the bottom edge. Then I sanded around the exposed edge to create a tooth for the epoxy to bond to the plastic. I washed the inside of the canopy well with dish soap and dried it with a lint free cloth. The canopy was positioned on the fuselage and taped down with a single piece of masking tape.

I cut some 3/4 oz fiberglass cloth into 3/8" wide strips and mixed up some 30 min epoxy. I applied the epoxy around the base of the canopy that extend to a narrow band on the fuselage, then laid the cloth on and smoothed it out. I'm using epoxy on the canopy because the polyester resin will attack the plastic.



To be continued…

After the epoxy set I removed the tape that was holding the canopy down. I added epoxy and fiberglass cloth in the area that the tape was covering on the bottom edge of the canopy on both sides.

To be continued…

After the epoxy setup well I sanded around the bottom edge to start the fairing and fillet work. Micro balloons, mixed with 30 min epoxy were used to form the rough shape of the fillet between the canopy base and the fuselage. The epoxy does not sand well in this application until is set for 24 or more hours.

To be continued…

View of the canopy after sanding of the micro balloons and removal of the masking tape. The uneven edge of the epoxy along the canopy will be taken care of when the priming work is done by extending the primmer up over the epoxy edge. I had a little disappointing bleed through under the masking tape an a few places. I've never had that happen before so I'm not sure if it was the type of masking tape I used or I didn't have it pressed down hard enough.

To be continued…

As posted earlier in the thread I'll be using Top Flite LustreKote paint on the fuselage that matches the insignia blue MonoKote that extends out from the root area of the wing and stab. I've used LustreKote on other aircraft with good results but find the LustreKote primmer does not fill and sand as well as high-build automotive lacquer primmer. LustreKote paint is acrylic lacquer.

For the LustreKote paint color to match the MonoKote color you must use LusterKote primer that is white. Also the LustreKote primer and colors are fuel proof up to 15% nitro making for a complete fuel proof paint system.

I would like to use automotive primer because it sands well and makes a great base for the color coat. My experience using automotive primers with fuel proof top color coats has been good as long as you do not use it around areas that get a lot of fuel and oil soaking. It works fine until you get a small dent or nick in the fuel proof paint covering and then the fuel can migrate down to the primer, attack it and cause the paint to come off.

I wanted to see if it would be possible to use automotive primer on the low fuel soak areas of the fuselage and then cover it with LustreKote primer for the color coat base. I did a test by spraying the side of a plastic cup with Dupli-color automotive high-build primer. After 15 min I sanded one spot and then sprayed it with LustreKote primer. It covered fine and after 30 min I put masking tape on it and pulled it off to test the adhesion. The LustreKote stayed firmly bonded to the Duli-color and there was no paint reaction.

Time to get sanding!

To be continued…

Good news! I called Dupli-Color and they told me that the primer I'm using, part number FP101 is acrylic lacquer.

View of the round wing cutouts for the Spring Air retract air lines and the wing servo cables. I marked passageways at the root of the wing on the top of the wing sheeting before I joined the wing.

To be continued…

I started sanding work on the lower fairing of the wing. After a little sanding I decided it would look better to extend the fillet at the leading edge of the wing along the edge of the wing fairing.

To be continued…

While I was mixing resin, I coated the inside of the engine compartment with resin to seal the wood and fuel proof it.

To be continued…

While I was doing some final sanding on the wing center section I decided that the square cutouts for the wing bolts looked really lame (I thought you guys were going to tell me if I did something lame). To fix my screw up, I made some cardboard tubes from file folder paper and tacked them in place with CA. I then filled the square opening with micro-balloons and resin. After it setup I sanded it smooth with the wing fairing.

To be continued…

View of the first primer coat on the wing center section.

To be continued…

View of the bottom wing fairing after applying some Bondo brand lacquer glazing and spot filler putty on a few low spots. I like to put the glaze on the low spots, sand them well and then recheck them to see if the spot is filled. After I'm sure that the low spots are filled and smooth then I'll sand most of the primer off getting ready for the next primer coat. The fillets need a little more sanding to take down some high spots.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To be continued…

View of the wing center section with the first and only coat of grey primer sanded down and the first coat of the white primer.

To be continued…

With the white primer on I rechecked the fitment of the wing to see how the seams looked.

To be continued…

I completed some wet sanding on primer coat.

To be continued…

A couple of weeks ago after I thought the primer coat was looking pretty good I shot the first color coat. It looked great until the paint dried. View before the paint was fully set.

To be continued…

When the paint dried I could see a very slight cloth pattern under the paint. I let it set for a couple of weeks and then wet sanded all of the cloth pattern out.

To be continued…

Today I shot a new color coat and it looks pretty good this time, but I think I'll wet sand it down one more time. Apparently even though the primmer coats looked smooth I didn't do enough primer to create a good base for the color coat. I've never had that happen before so I was puzzled, but you learn something new every day!

To be continued…

It's been too cold to do much paint work so I spent a little time converting the OS 61 SF ring pumper to an ABC engine. The engine had little run time so I just ordered an ABC liner and piston set from Tower. I also ordered an extra liner/piston set and a rod for spare parts. Tower is showing low stock on these items so I thought it would be good to buy them now.

I had a little trouble getting the rod to slide far enough over on the wrist pin to get the rod off the crank pin. I'd remembered that someone had posted a RCU thread about the problem and I revisited the thread. Their solution was to heat the piston, rod and wrist pin from the back of the engine with a heat gun and use solvent to free it up. I don't have a heat gun so I used a high wattage hair dryer and it worked great.

With this conversion I now have two NIB OS 61 SF ABC-P engines plus three like new used engines and spars to support my growing fleet of ballistic pattern aircraft.

To be continued…

For those of you that might be interested in a close up of the OS 61SF ABC-P piston and liner. See the view below of my spare set. Note the narrow line around the top area of the piston.

To be continued…

All of my NIB ABC engines have the arrow pointing toward the exhaust port and that is how I installed the new ABC set in the ringed engine. You would think that because the piston and liner are a matched set the arrow keeps the piston in the correct position for how the set was matched up. As you may know, new un-run ABC engines have a very tight fitting piston as the piston moves to the top of the liner. The piston also has an extra amount of aluminum on the bottom of the piston top (up inside the piston) on the tail side of the arrow. I'm not sure why the extra material is there but possibly could be related to the balance of the piston. The ring engines also have the arrow and those pistons are not matched to an individual liner so it is a bit of a puzzle.

I forgot to add that I also bought a spare rod. The only rod listed for the SF and RF is also called the Hano II. The Hano II rod that I received has the lower end ground to a rounded airfoil shape apparently to reduce drag. The original rod has the typical square corners.

Question to the OS support team:

Why does the OS SF ABC and ring piston have an arrow on top that is positioned to the exhaust port?

Response:

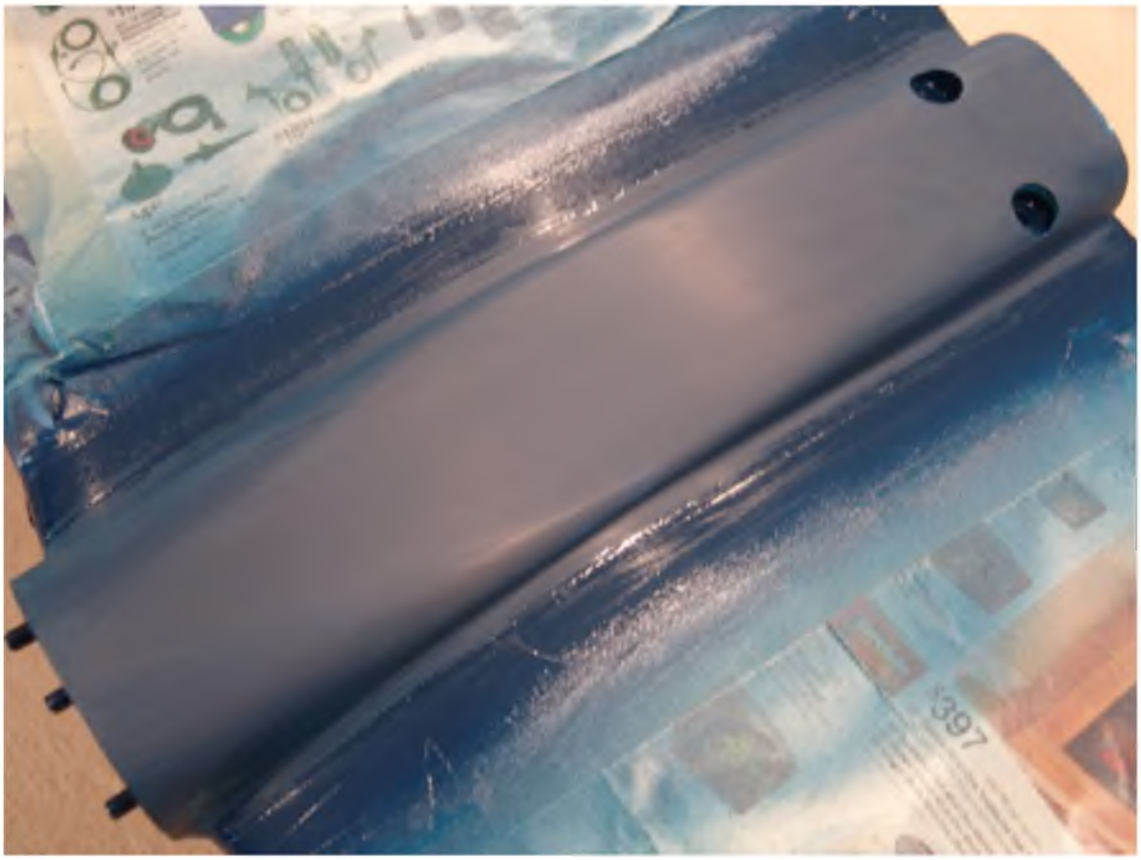
Thank you for your recent e-mail.

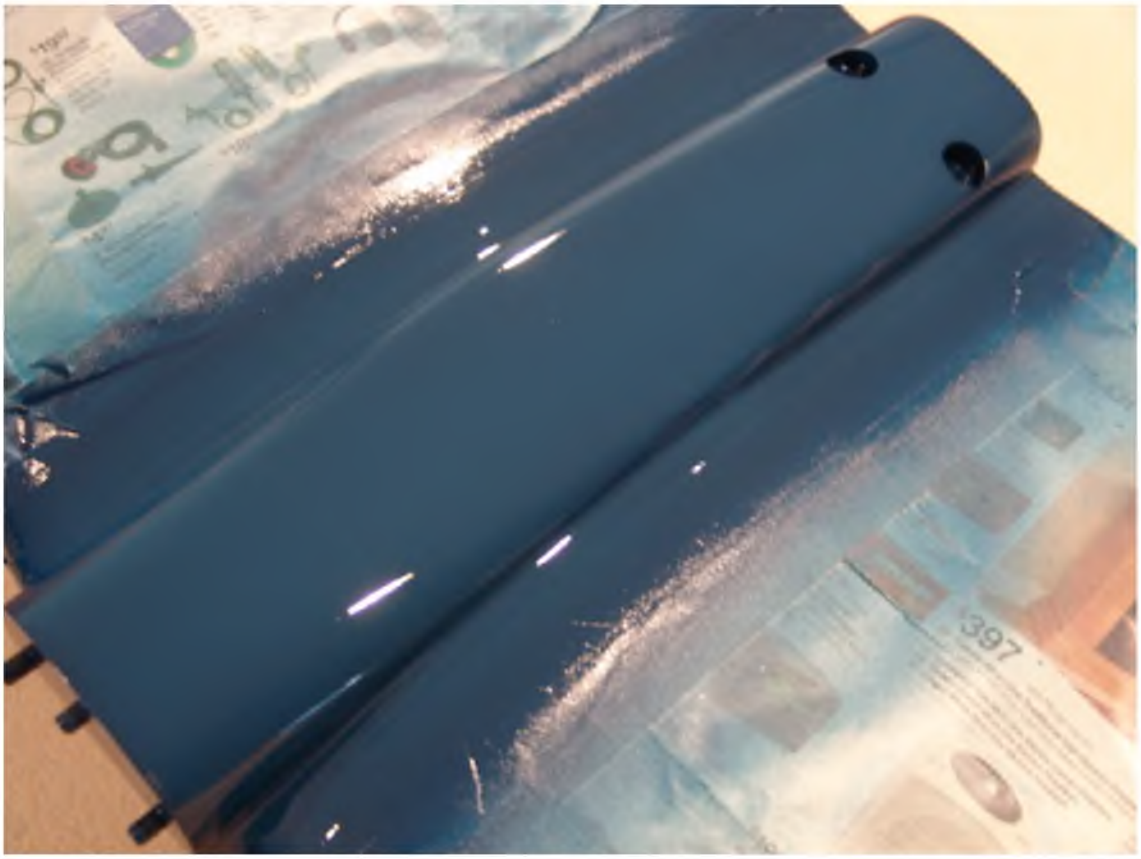
The arrow lets you know how the piston needs to go in so the hole in the piston lines up with the channel in the crankcase. It also lines up the short piston skirt with the crank weight so it does not bind or jam.

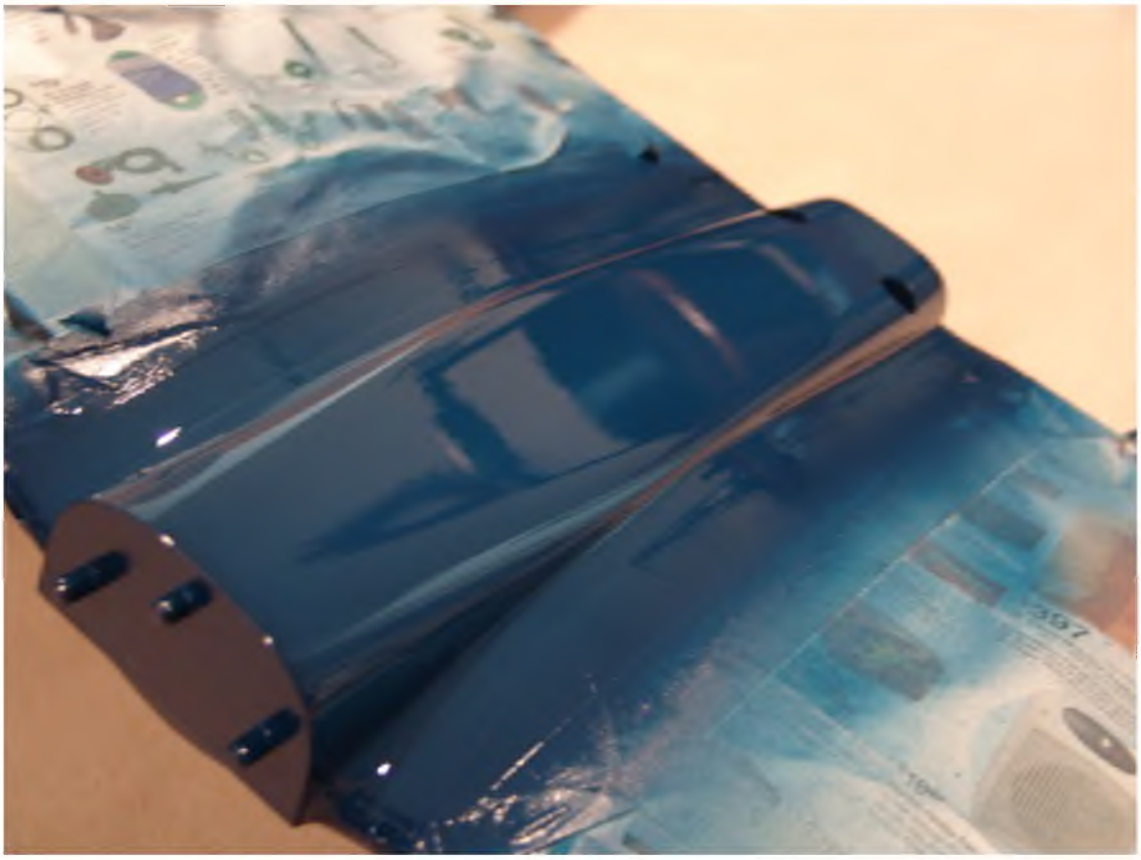
Sincerely,
Product Support Lead Technician
Futaba Programming Technician
Great Planes Model Distributors

TBC …

OK, OK, I give! I do my painting outside and it's been too cold to paint. Warm enough to fly though! I hate to keep showing the same wing center section over and over but I wet sanded it down again. It was warm today so I did what I hope will be that last color coat before the clear coat.





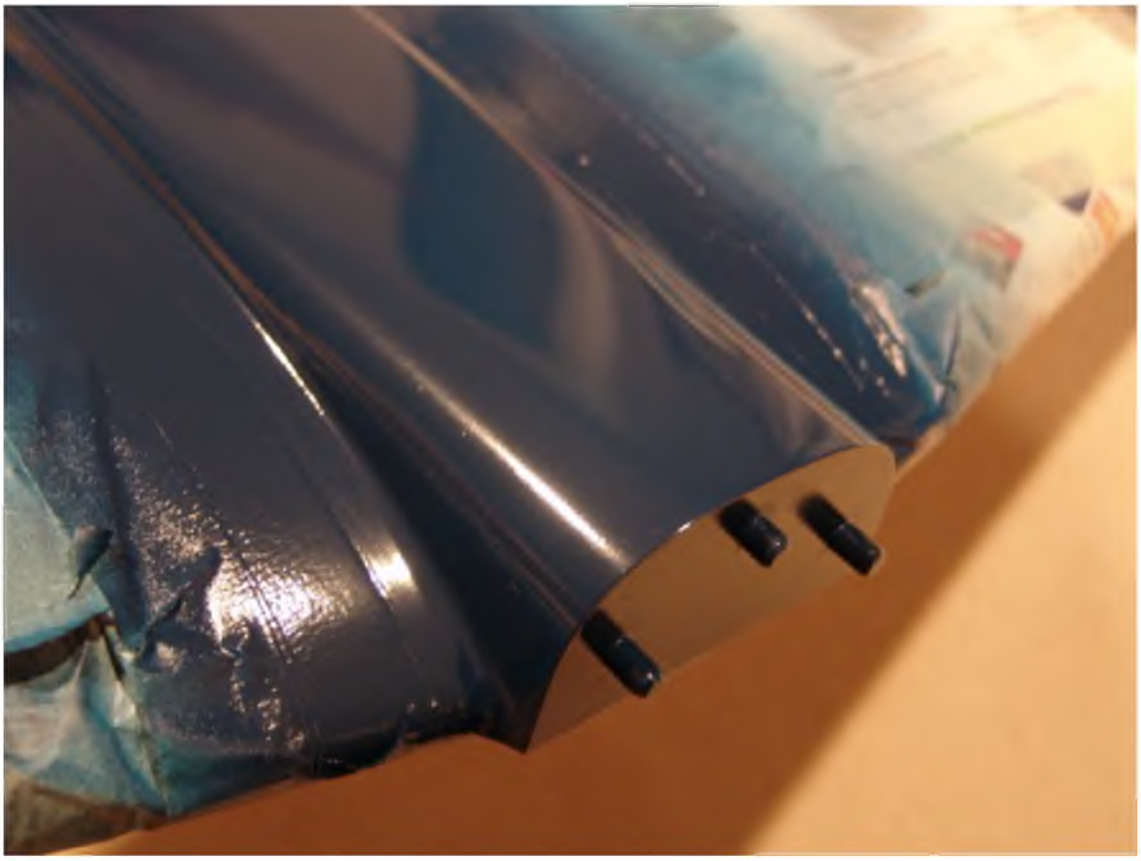


To be continued…

The last coat looks really good but there two spots where you can faintly see the cloth weave under the paint if the light reflects off of it at the right angle. It is really not noticeable but I want a good finish so I looks like I'll be wet sanding again! I've learned that the MonoKote brand LustreKote paint will need more resin on the cloth than I used to form a better base before putting the primmer down. If not I'll need to do a lot more primer work before the color coat. Even though I used Dupli-color acrylic lacquer automotive high-build primer first on the wing center section to fill the cloth weave and provide a base for the LustreKote it apparently did not fill well enough. What is most strange is that it looks smooth when wet sanded but when painted again it shrinks down and shows the weave when it dries.

I've never had this happen before but in the past I've always used standard automotive lacquer primer not acrylic lacquer. The problem with using standard automotive lacquer is that it is not fuel proof like the acrylic primmer. Thus if the fuel proof top coat gets chipped or scratched the fuel will attack the primmer.

The good news is that I held off premiering the fuselage until I got the wing center section to look good. Now that I understand what base I need I'll be putting a second resin coat on the fuselage and then sand most of it off and then start the primmer work.



To be continued…

I received my Blue Angel lettering today. Dan, (deltron) that is a contributor to our forum has a friend that did a set for his Sig Kobra. He had him do a custom set for me and they look pretty neat! The lettering is covered with a cover sheet that is used to hold the letters in place as you attach them. I peeled back one corner and it looks like the yellow is a prefect match to my cub yellow trim color. Thanks Dan!

Hopefully it will warm up soon so I can get more paint work done.

To be continued…

The weather has finally warmed up so I'm back on the finishing work. After my experience with the primer fill on the center section I decided to use more resin on the fuselage to reduce the amount of primer needed to fill the cloth weave. I'm doing the fuselage resin work in two steps, the back area and then the front. That provides a good size dry area to hold on too while applying the resin. I'm brushing it on and working it out to make the coat as thin as possible.

To be continued…

Too windy for flying today so I managed to get a coat of resin on the front part of the fuselage.

To be continued…

Can’t believe I got so distracted with other stuff and have neglected my Blue Angel project for two months. The center section paint is done and the wing is now ready for MonoKote. Still working on getting the fuselage ready for paint.

To be continued…

Sand, sand, sand and sand, sand!

To be continued…

I expect most of you hate sanding as much as I do. It's going to take awhile to sand out the glass so I thought I'd add more info about the sanding process I'm using. I'm using Gator Grit 100 grit aluminum oxide sandpaper from Lowes. The 100 grit is pretty aggressive so you need to be careful that it doesn't cut too fast and go through into the cloth. But it would take forever with lesser grits. The idea is to sand off the high areas using the gloss visible in the low spots to measure your progress. In the image below you can see the light reflected off the glossy low spots as I've been sanding it down.

To be continued…

The idea is to sand it down so you just touch the low spots and make one smooth surface. Once I get it all down to that point then I'll switch to a finer grit to start the finishing process. I use a scrap piece of ¼ ply to backup the sand paper to keep the paper flat. The image below shows what I'm trying to achieve over the complete surface.

To be continued…

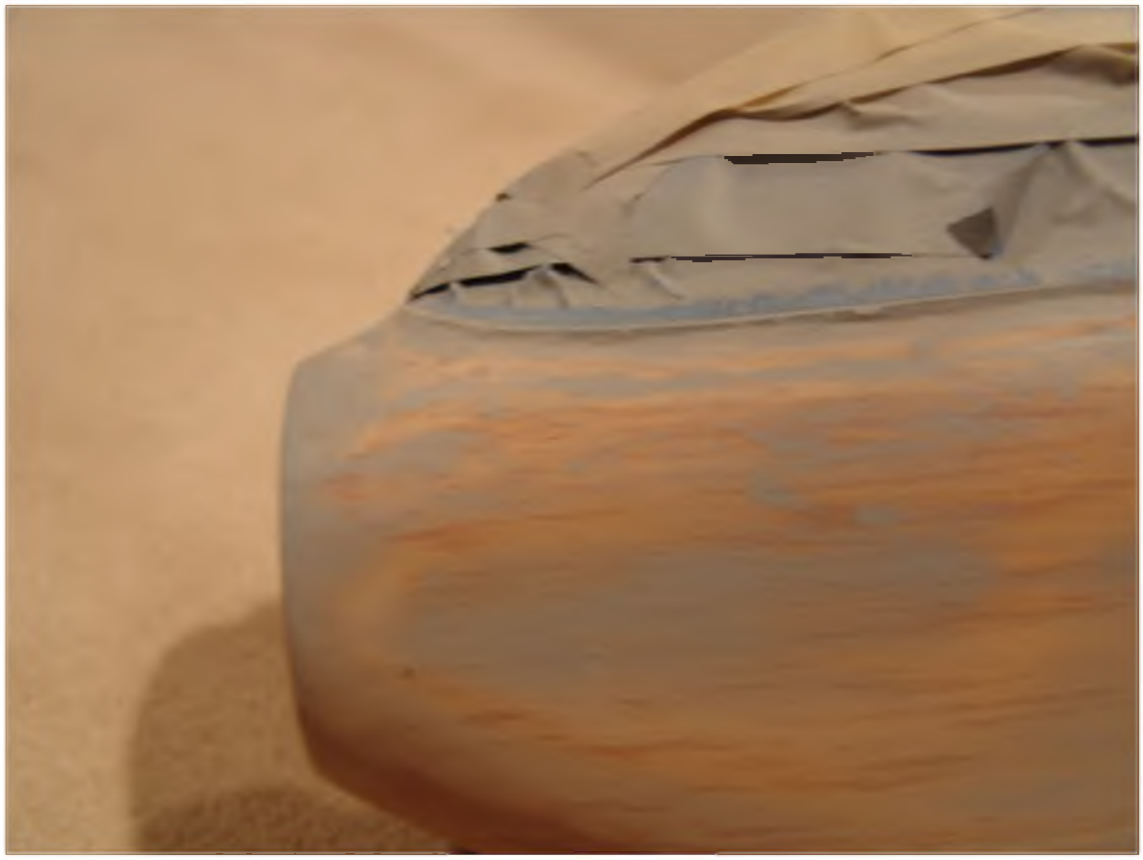
It was a fantastic day for flying in the Southeast but I decided to stay home and do more sanding. I think that one more sanding session and I should be ready for primer. Here is a progress image including sanding dust!

To be continued…

Started the primer work on the fuselage. I prefer to start around the canopy, get that area primed and sanded well for a good flow into the canopy and then move on the remaining fuselage.

To be continued…

I let the primer dry for 24 hours to make sure it was well set and then I started working on the edge of fuselage where it overlaps the plastic canopy by block sanding with 150 grit. The primer makes it easier to see the sanding progress. The goal was to work the fiberglass edge down even with the blue masking tape edge and remove any of the excess primer further out around the canopy. After getting it pretty close I switched to 220 grit to smooth it out. In the images you can see the dark fiberglass areas along the canopy edge. Next, another primer coat and see how it looks. This process usually takes a few coats and sanding to get it fair.



To be continued…

I sprayed on the second primer coat and it is looking OK. A little more sanding and another primer coat and it should be good.

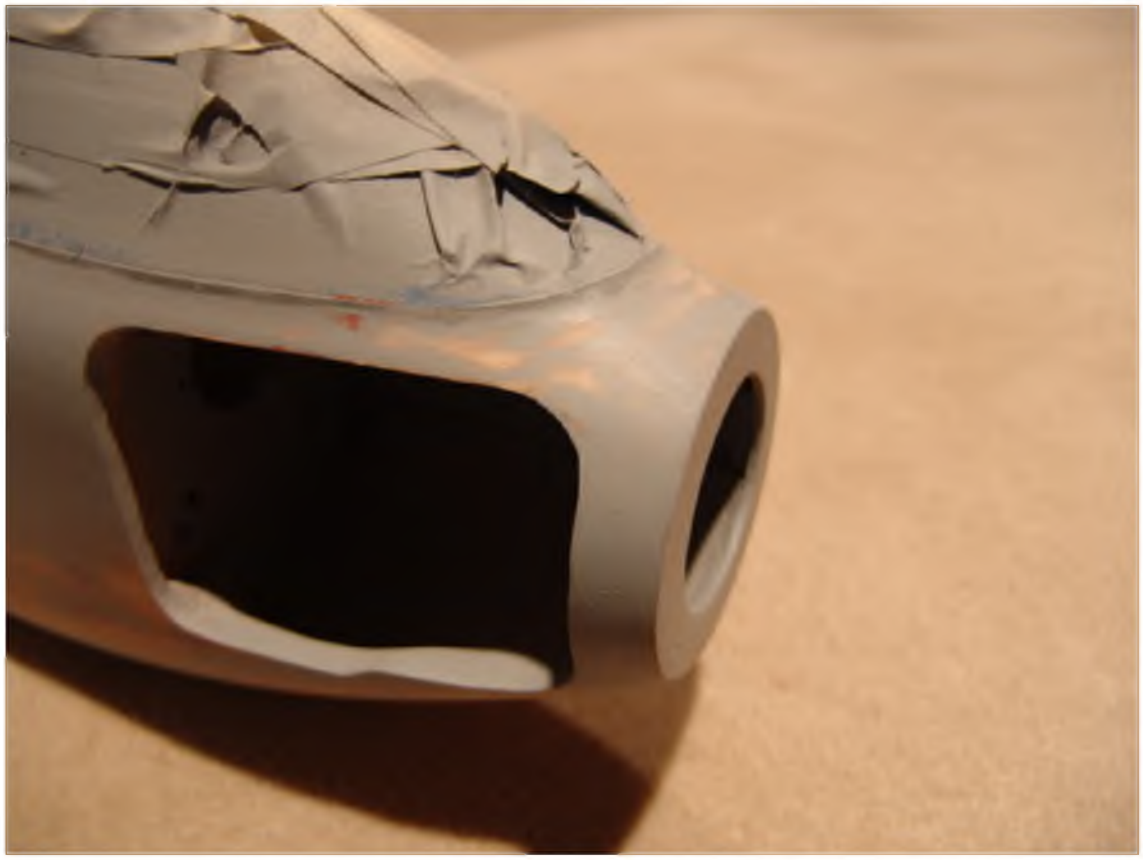
I forgot to mention that I'm keeping the masking line low on the edge of the canopy so that the gray primer will not be visible along the bottom edge from inside the canopy. If the edge is visible you would want to use black primer for the first coats.

To be continued…

I've added more primer to the front area of the fuselage and started filling a few low spots with glaze. I find that a thin flexible palette knife works well to spread a thin coat of glaze on the low spots. I let the glaze setup well and the sand it down the area with 220 grit. The glaze area above the engine opening has not been sanded. In the area low and behind the engine opening you can see small traces of glaze in low spots in the sanded area.

To be continued…

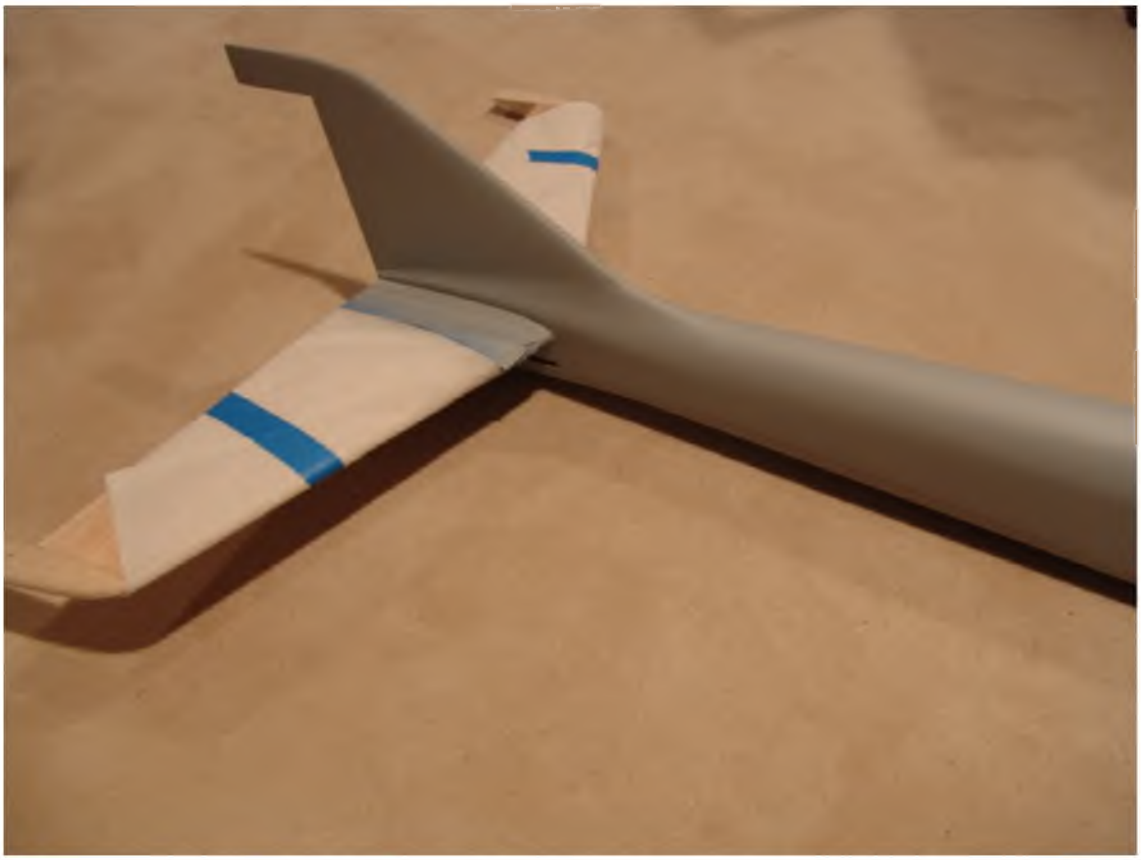
Sand, Sand, Sand!



To be continued…

I can't believe that the end of February will mark the second anniversary of my Blue Angel project. I've been distracted with other stuff for the last year so there hasn't been much time to spend on the project.

I'm still working on the fuselage primer and have been slowly working my way back to the tail section. The front half looks real good now after a few sessions of sanding and primer. I prefer sanding and painting outside so now that the weather is warmer I'll do more work on it today.



To be continued…

After spraying the primer on the tail I discovered a couple of low spots in the complex fillet area at the front of the vertical stab. The area got a little over sanded. It is hard to see these imperfections when you are working with the balsa and sometimes don't show up until the primer coat. My first screw up! I've filled the area with some glaze and will re-sand.

Decided that the area where the horizontal and vertical stab meet at the tail needed more work so I filled a small gap with a scrap of balsa and sanded it smooth.

To be continued…

Much better!

To be continued…

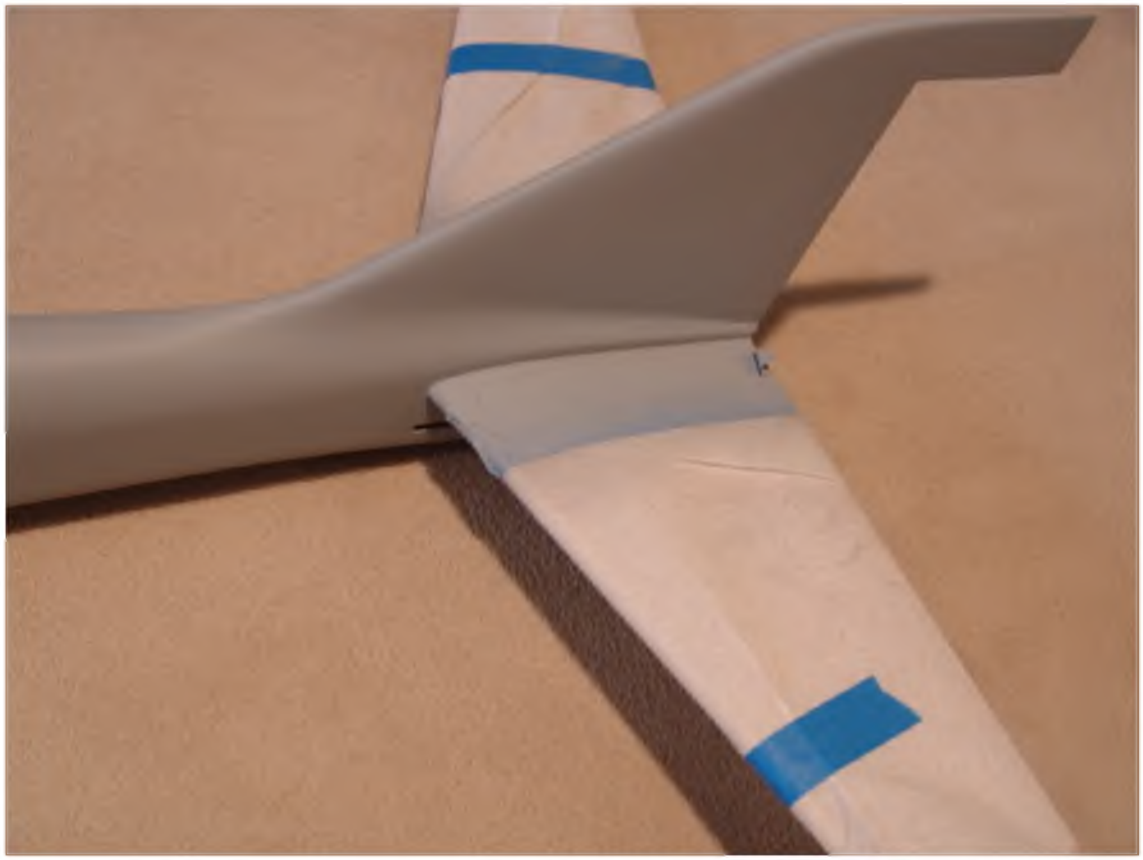
OK, screw up fixed!

To be continued…

Don't you just love it when a plan comes together!

To be continued…

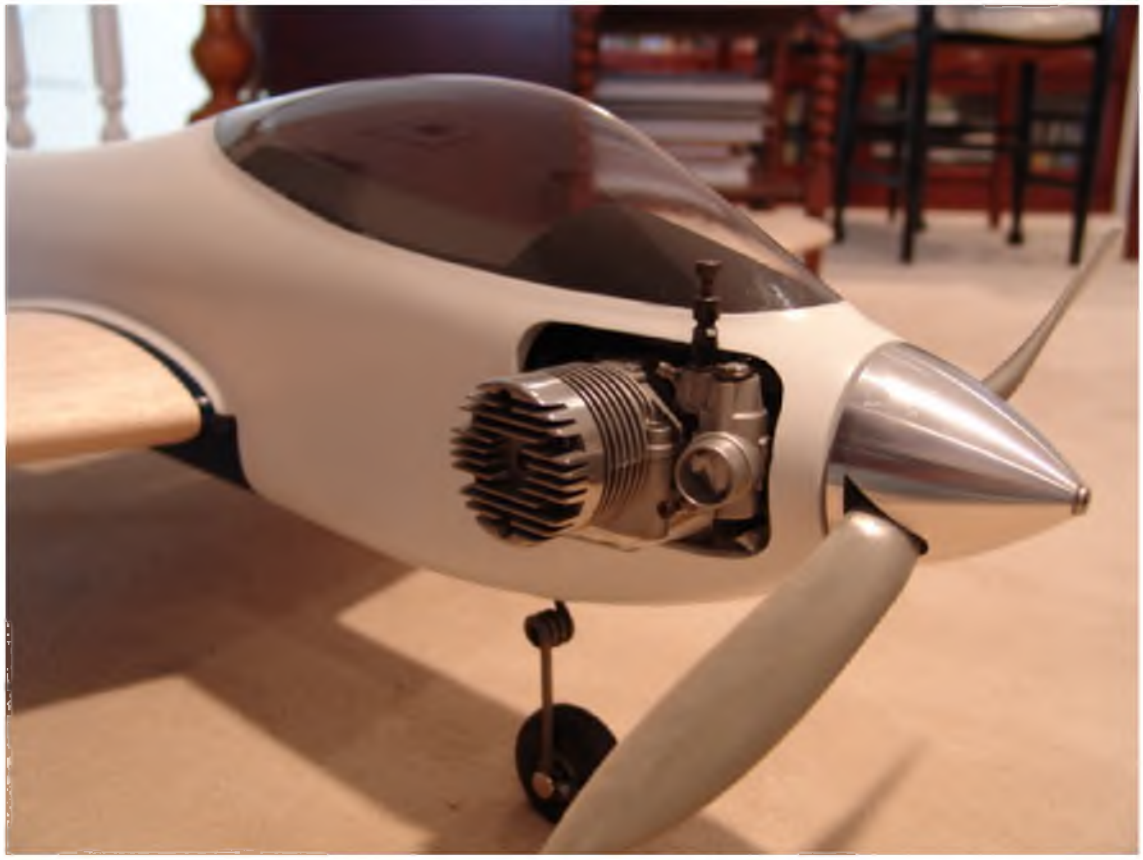
Inspired by the video of Yoshioka flying the Blue Angel I've been working on my Blue Angel. Today I did more dry sanding and gave it another primer coat. It looks pretty good and will be ready for wet sanding soon.



To be continued…

It was a perfect day for outside painting so I finished the final sanding of the gray primer and put on the first coat of white Monokote primer. All of the Monokote colors require the white Monokote under coat for the best color match with Monokote. The Monokote primer does not sand very well so I use the gray high build primer first for the base finish.

I decided to take a few minutes to assemble everything to get a little inspiration for the painting and Monokote work ahead. The canopy line turned out pretty well and because the paint line is so low you cannot see the gray primer line from inside the canopy.

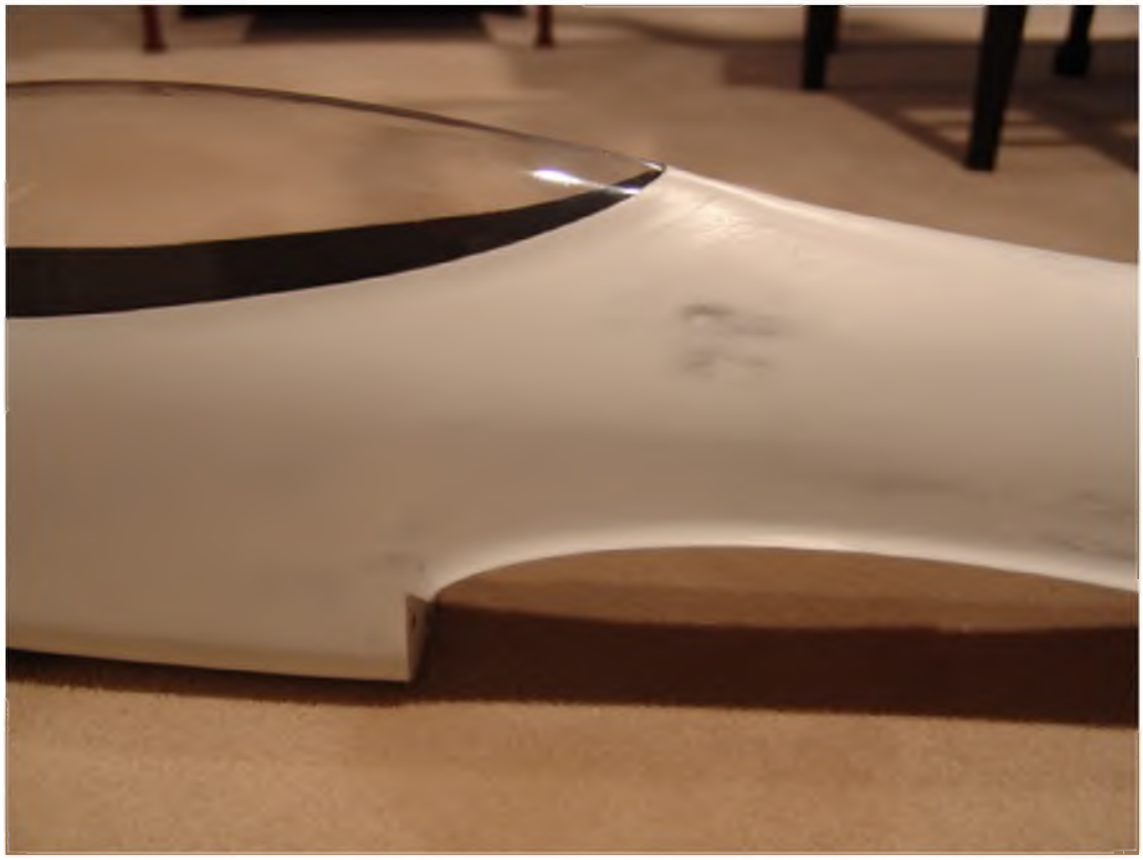


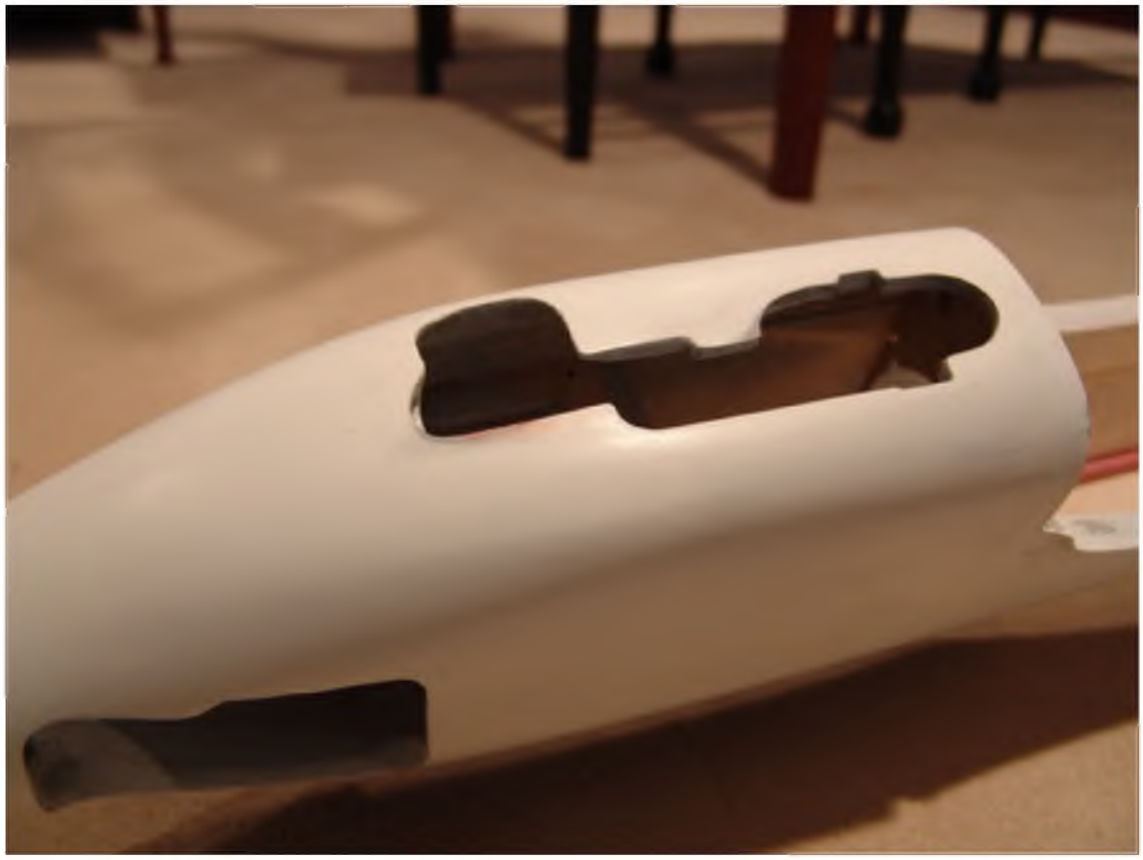
To be continued… More pics

With my inspiration at a high level, I enthusiastically spent a few hours today disassembling the Blue Angel and wet block sanding the fuselage with 400 wet sand paper. I use one area of a small piece of paper for the complete job, going lightly while the entire tooth is on the paper and then more aggressive after the paper smoothes out some. I found a few problem areas that were highlighted by the semi-gloss MonoKote white primer and used Bondo glaze putty on them. After the glaze dried, I wet sanded the defects out. The 400 wet sanding gives the primer a slight sheen that helps show the problem areas. It takes a lot of sanding and viewing the surface at different lighting angles to show up areas that need more sanding.

Next , I'll need to tape it off again and spray another coat of MonoKote white primer. After that, hopefully a light wet sanding and start spraying the color coats.

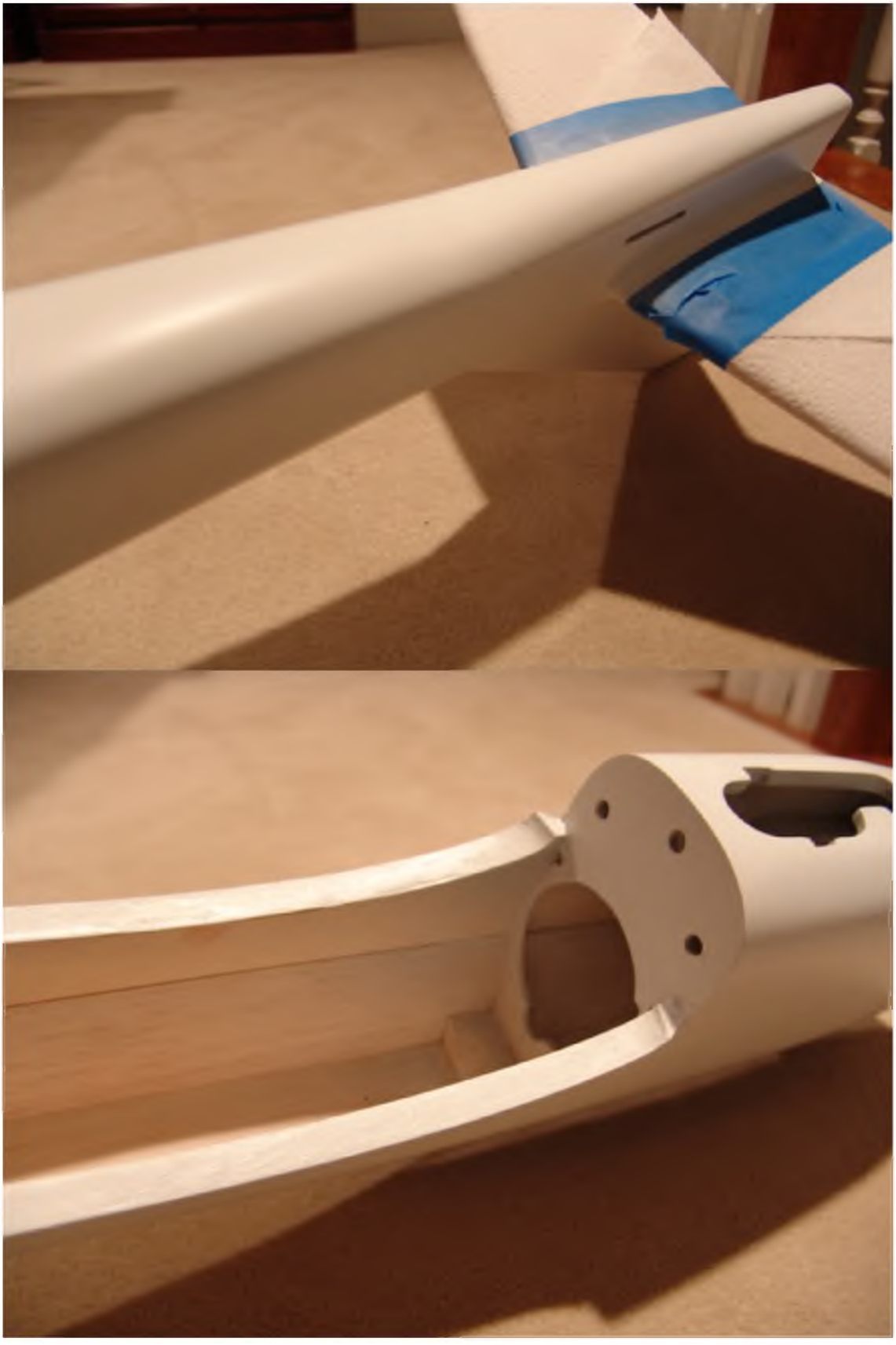
I've been researching my trim colors and the many different Blue Angel versions and color schemes for each type. This Blue Angel is the copy of last kits produced that represent last version of the design. My Blue Angel will follow that color scheme. I will have more on that later.

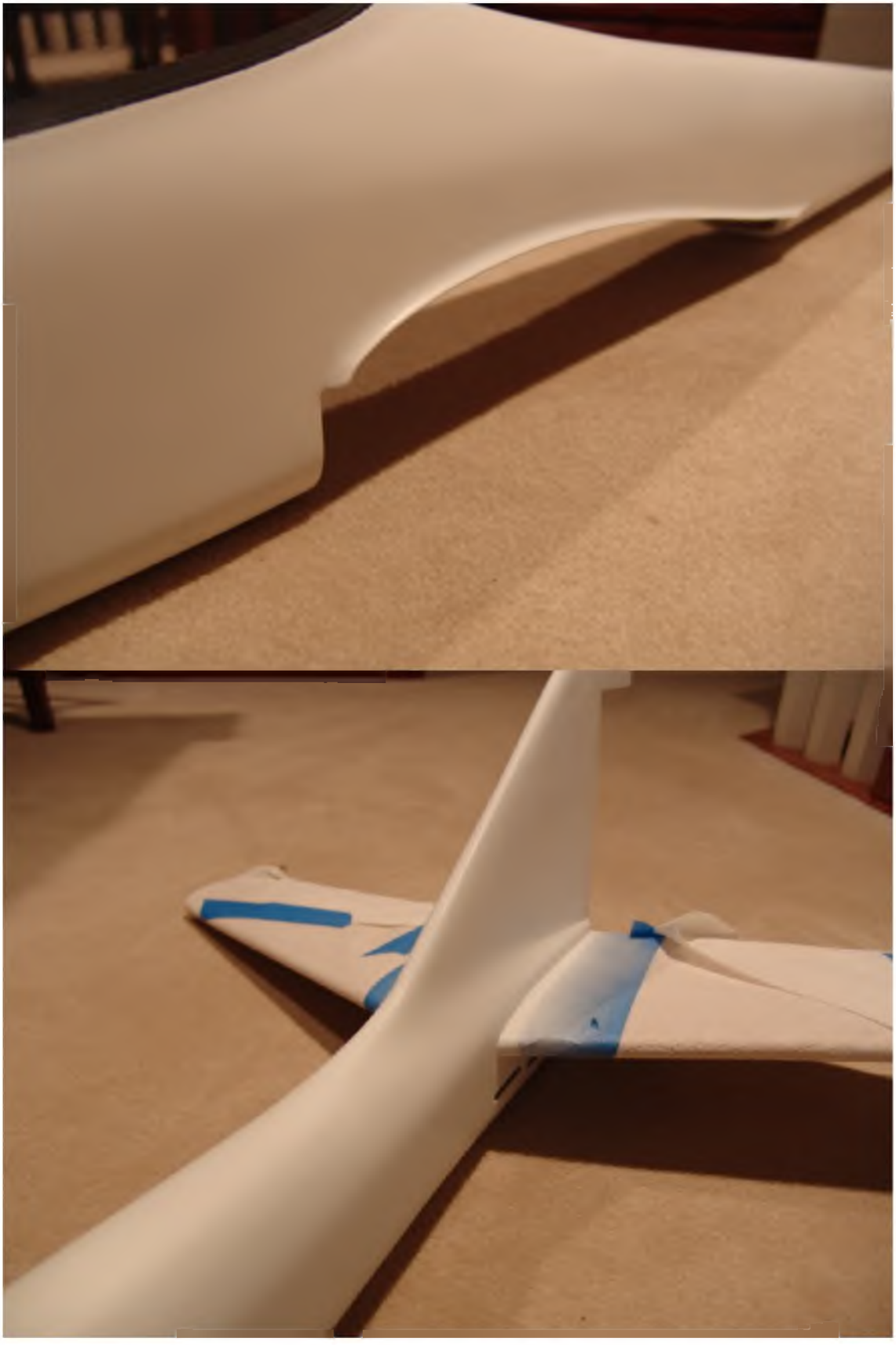




To be continued…

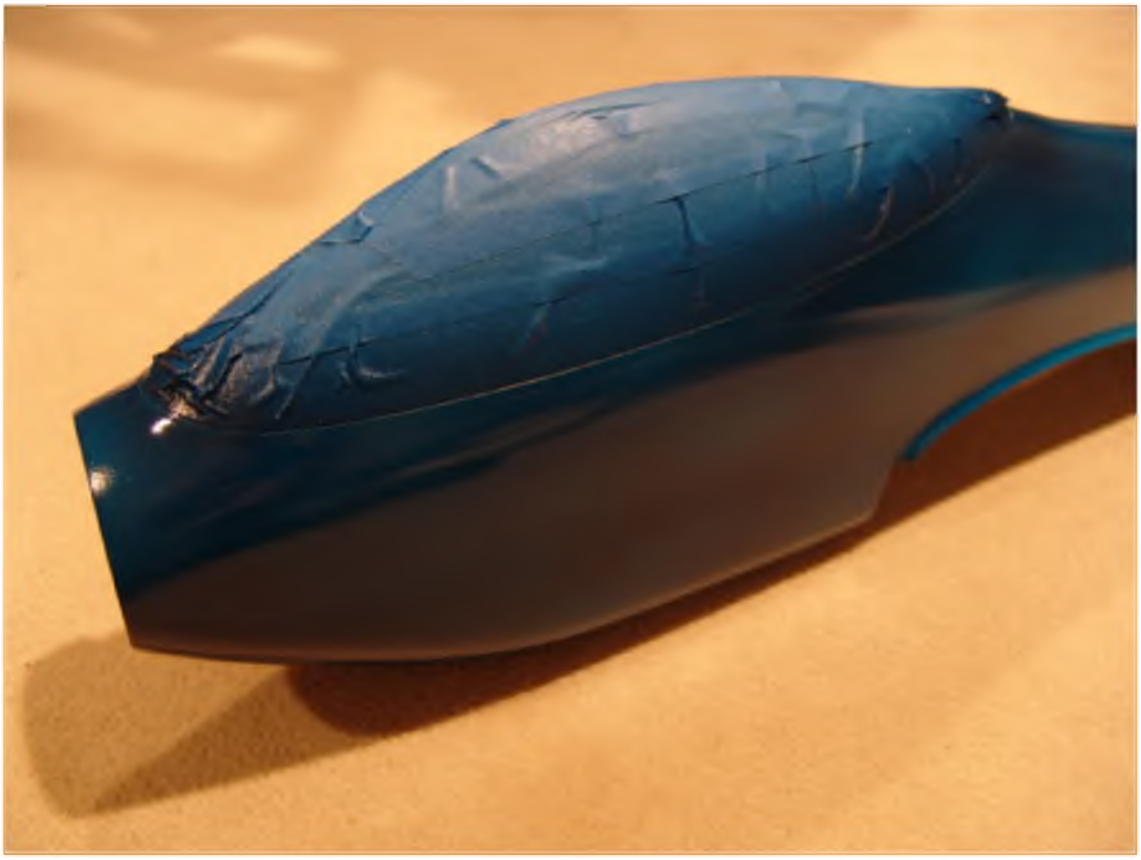
Sprayed on another light coat of primer today and it is looking pretty good now. Think I'm finally ready for color!





To be continued…

We have color!!! This is the first light coat and did not flow it on heavy, just a light cover coat. I'm hoping the problem I had with the center section showing the cloth weave though when I sprayed the color on will not be a problem on the fuselage. The blue paint requires many coats to cover the white base with light wet sanding in between coats.



To be continued…

I remember the common practice is to start spraying with the lighter pigment colours initially and finish with the darker colours? Aren't you going to have problems applying the white colour coat last. Or is your white base a gloss finish coat?

Jim

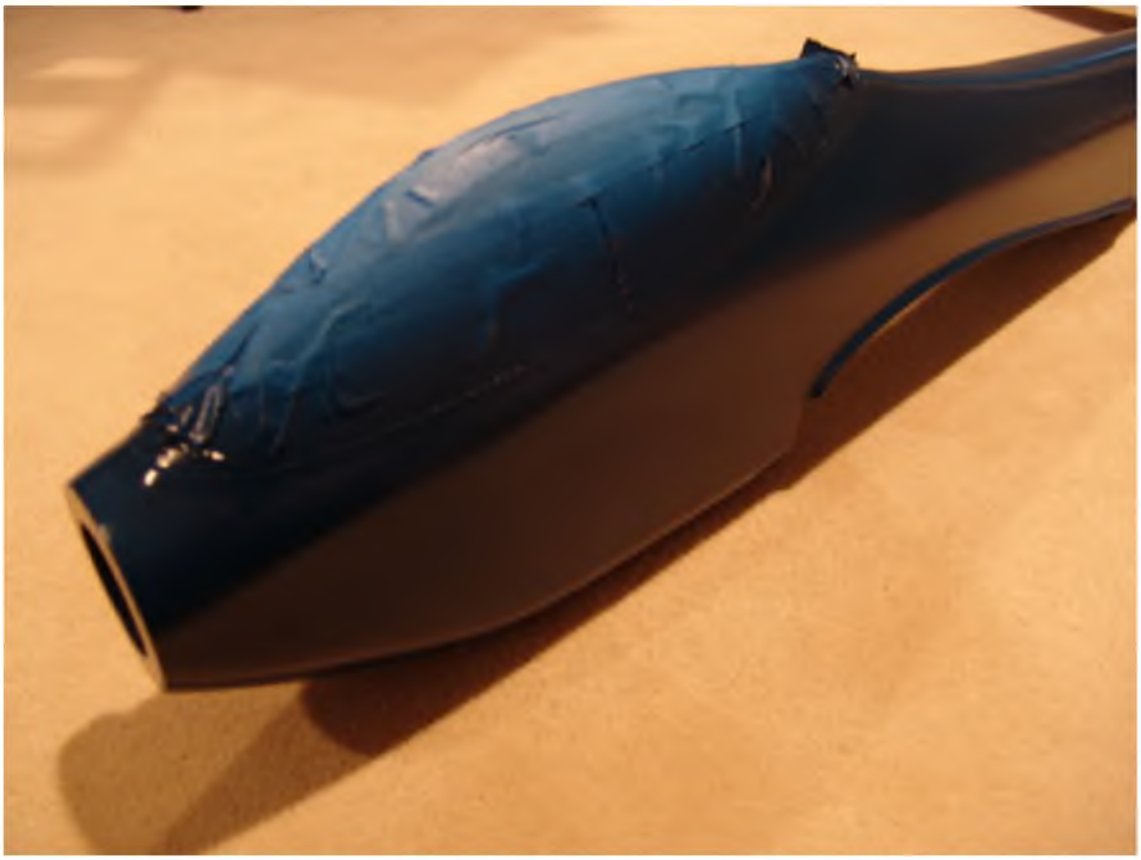
--

Not sure with this paint. I may need to give the white and yellow areas a dusting of white primer before the white and yellow paint. The white under the blue is Monokote white primer that must be used to make the colors match Monokote.

--

Monokote paint is acrylic lacquer so using it is a little like the good old days. Get to wet sand between coats too!

After light wet sanding with a well used piece of 400 I sprayed another light coat. I'm not flowing on the paint heavy to get a smooth finish, just working on getting even coverage over the white base.



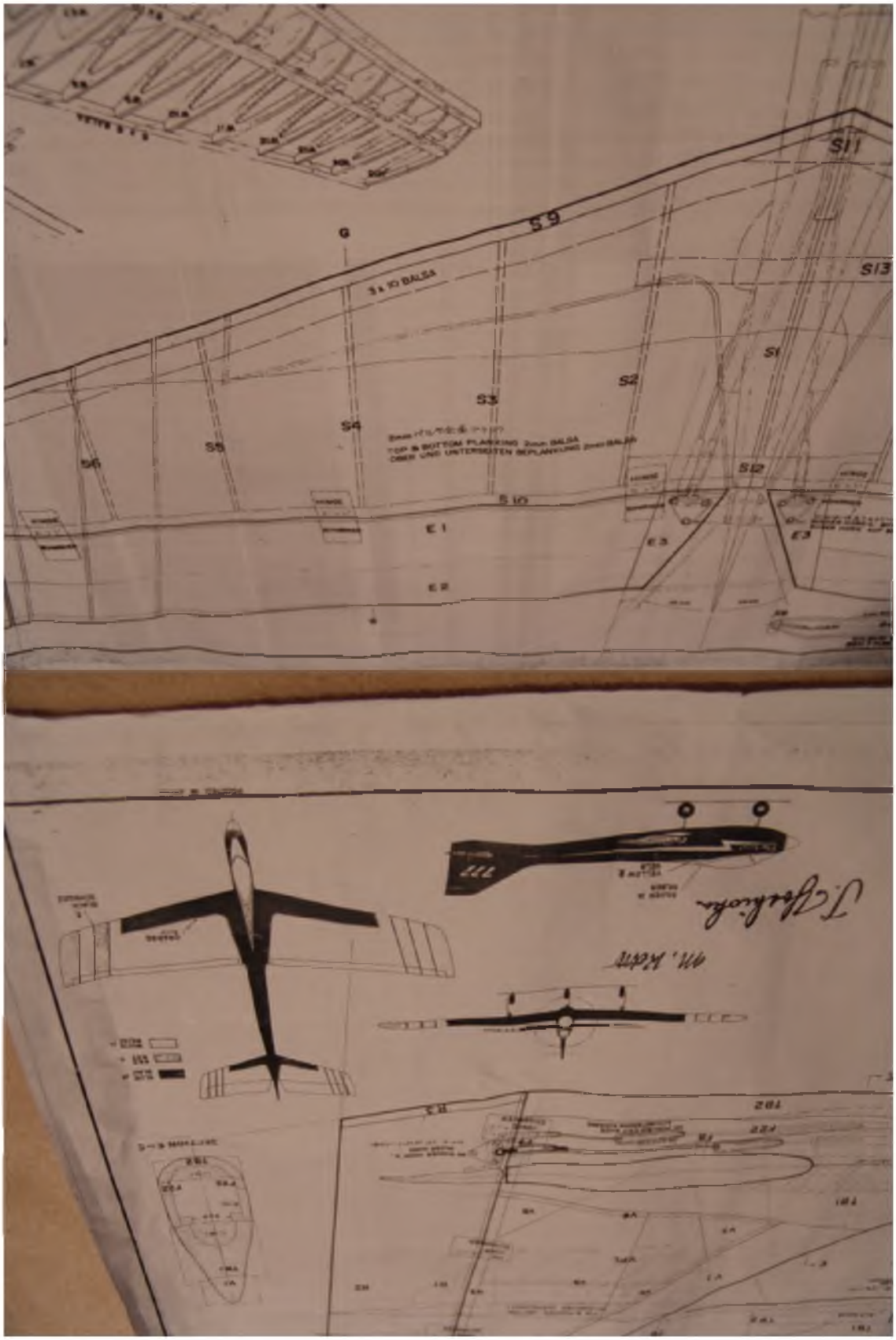
To be continued…

In preparation for my paint and covering work I've been researching the various Blue Angel color and trim design schemes. There were a number of versions so it is a little complicated.

The most famous picture of the Blue Angel is the one used in the February 1974 MAN Radio Control Speed and Sport section taken after Yoshioka won the world championship (see first image below). The Blue Angel shown in MAN picture is slightly different than the version of the MK kit that my Blue Angel represents. Note how narrow the fuselage is in the area front of the horizontal stab.

Apparently when MK decided to reissue the original kit designed by Kato (see second image below for the first kit with the short rudder) with Yoshioka's modifications (known as Blue Angel Modified), they also widened the aft section of the fuselage and changed the color scheme to represent colors that Yoshioka used in later builds. They must have thought that the tail was too weak and making it wider gave the stab more support. The blue color was changed from the metallic light blue to dark blue and the Japanese flag symbol was removed from the side of the fuselage (see third image below). See 1975 Bern World Championship video on Jon Wold's website at http://jonwold.blogspot.com/ for views of the later color scheme. The plans have a section that shows all the colors and luckily show all of the trim lines (see images below).

I'm still working through how I'm going to translate the trim layout on the plans to my Monokote application but my first thought is to make some poster board templates and see if that will work. It is going to be complex but I think worthwhile to duplicate the colors and trim so that I can capture full essence of the Blue Angel.


S11
S9
S13
S1
S2
S3
S4
S5
S6
S12
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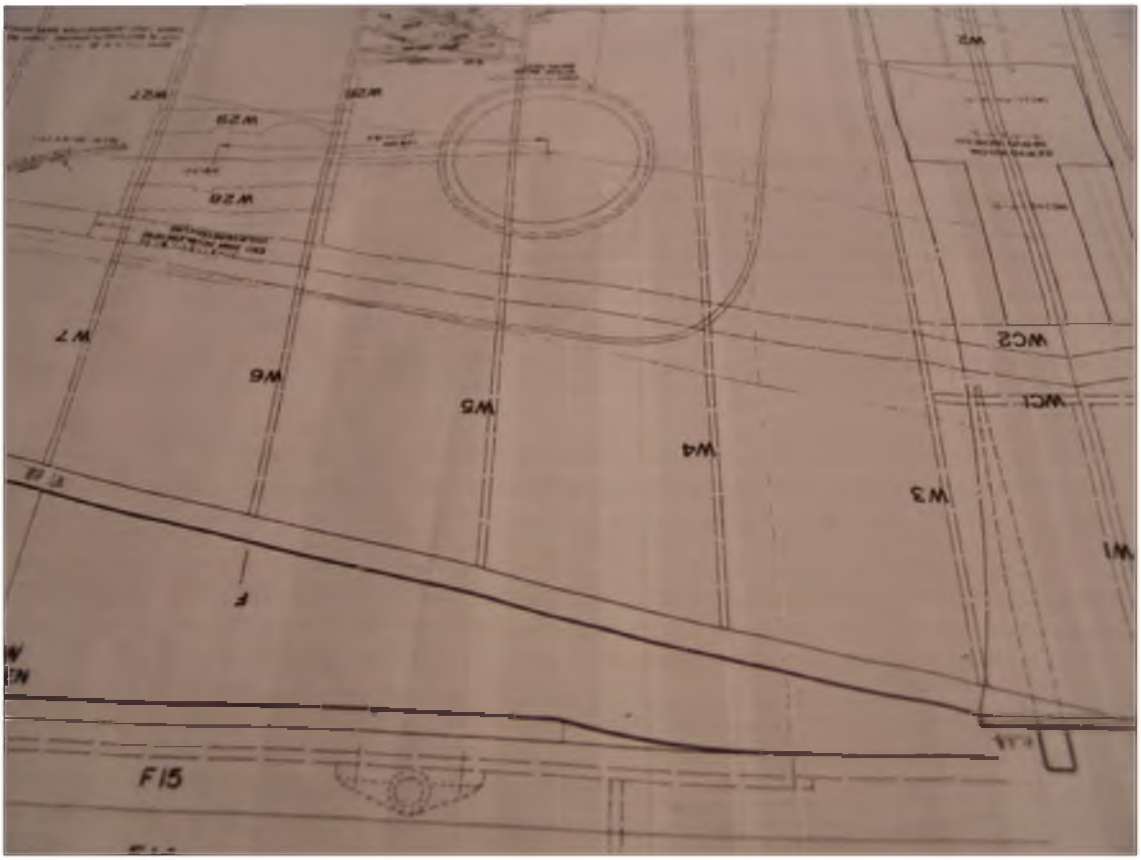
E1
E2
E3
TOP & BOTTOM PLANKING 2mm BALSA
OBER UND UNTERSEITEN BEPLANKUNG 2mm BALSA



To be continued …

I imagine at this point the thread is like watching paint dry but after another light sanding with 400 wet I sprayed on another light color coat. Notice that as I add coats the color is changing to the dark insignia blue color.

To be continued…

It's been raining all weekend so I couldn't do any painting but I did get the fuselage wet sanded for what I hope will be the last coat of insignia blue. I'm trying to decide if I should clear coat it after I get the trim colors on. I want to make sure that LustreKote clear does not yellow or brown out after a few years of sun exposure.

To be continued…

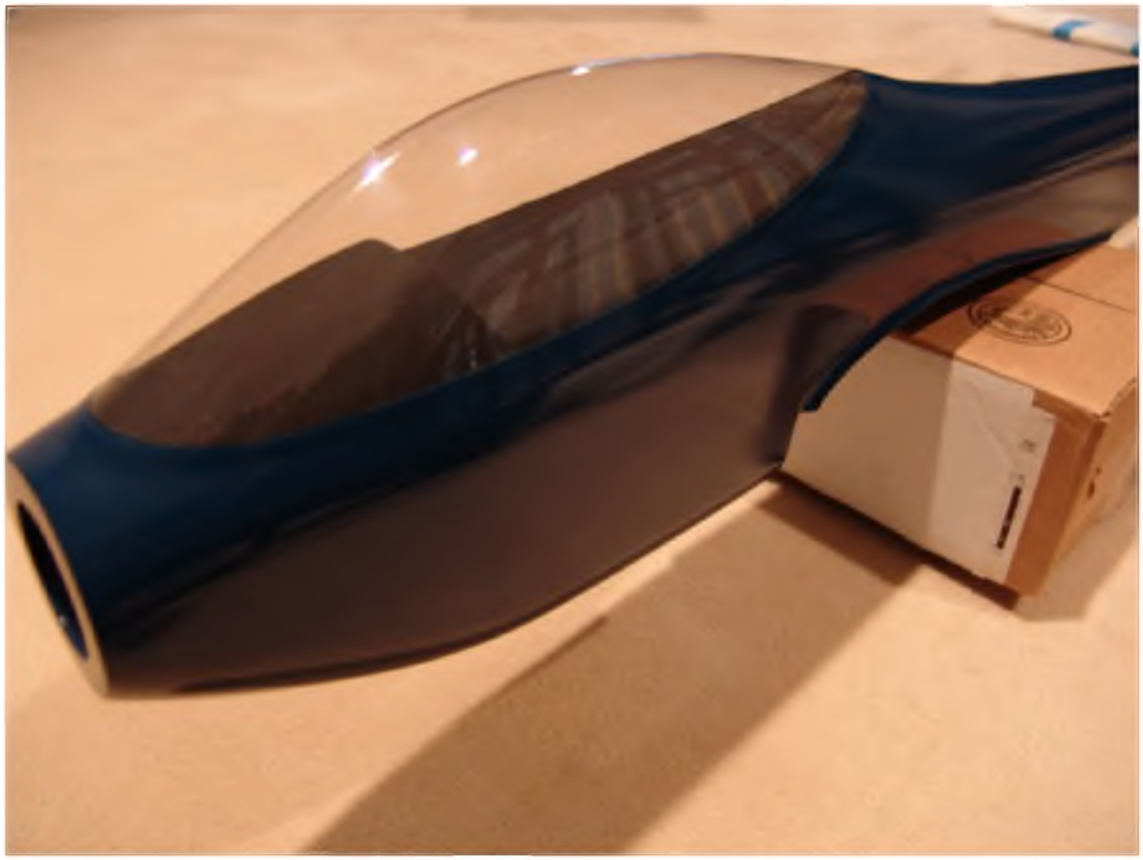
Hi all ,

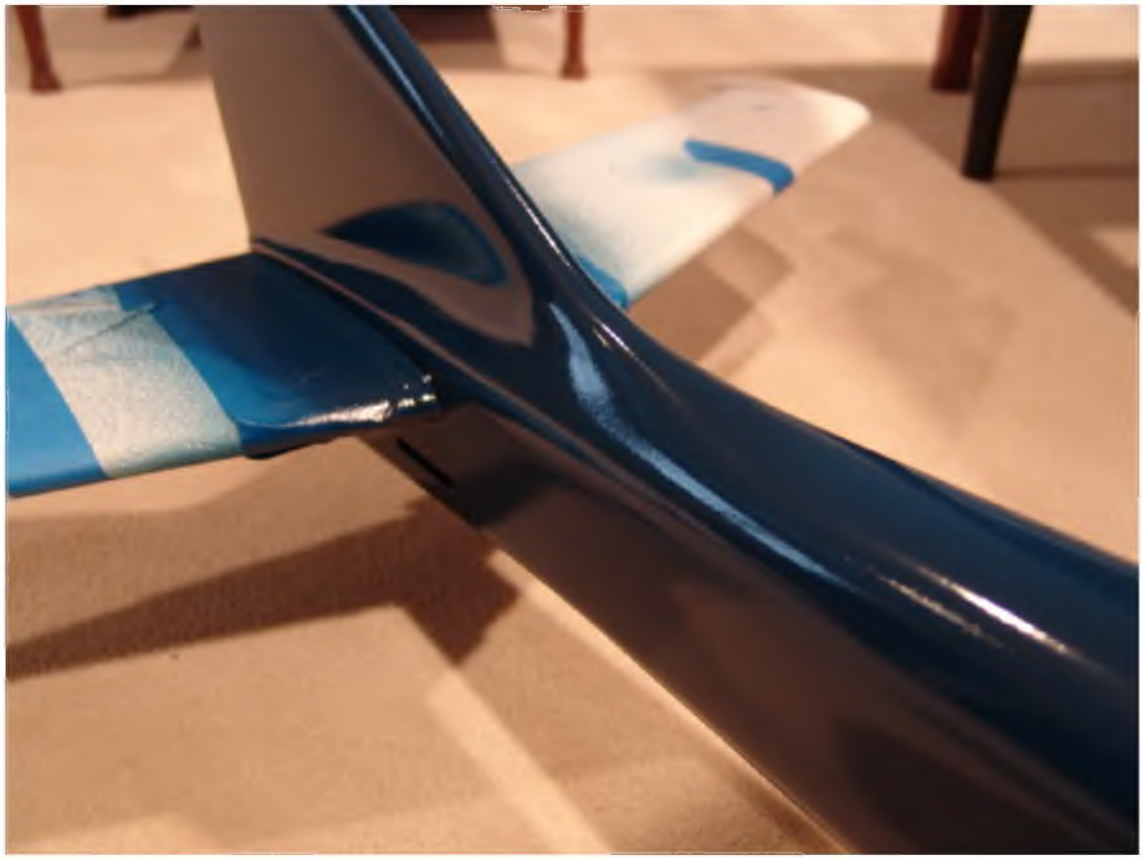
My Tipo was painted five years ago with LustreKote and still white as can be. So i would say no to your question but it is always nice to see a plane with a clear cote,you can't beat it

Phil

Not sure of your paint configuration. Are you saying the paint is white with clear coat over it? If that is the case I'll clear coat it.

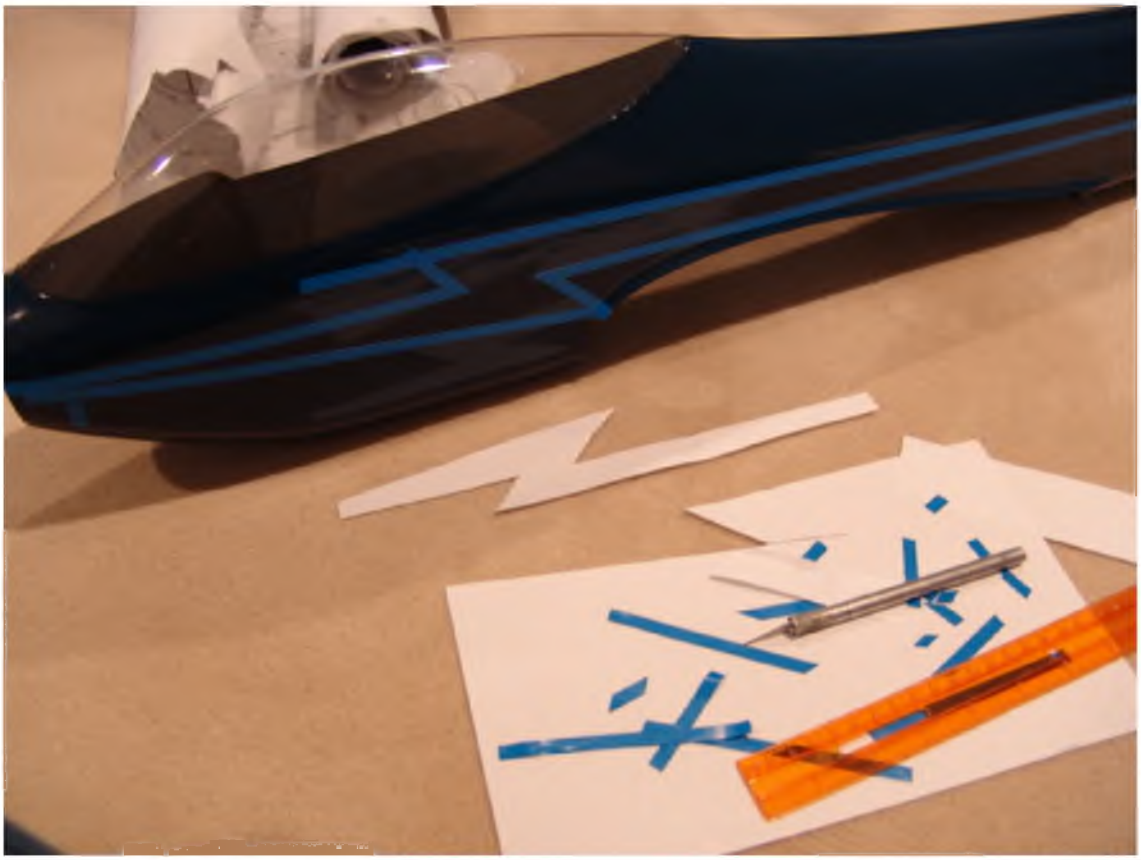
Looks like the last insignia blue coat has been sprayed! We will see how it looks like after it sets up for a couple of days.

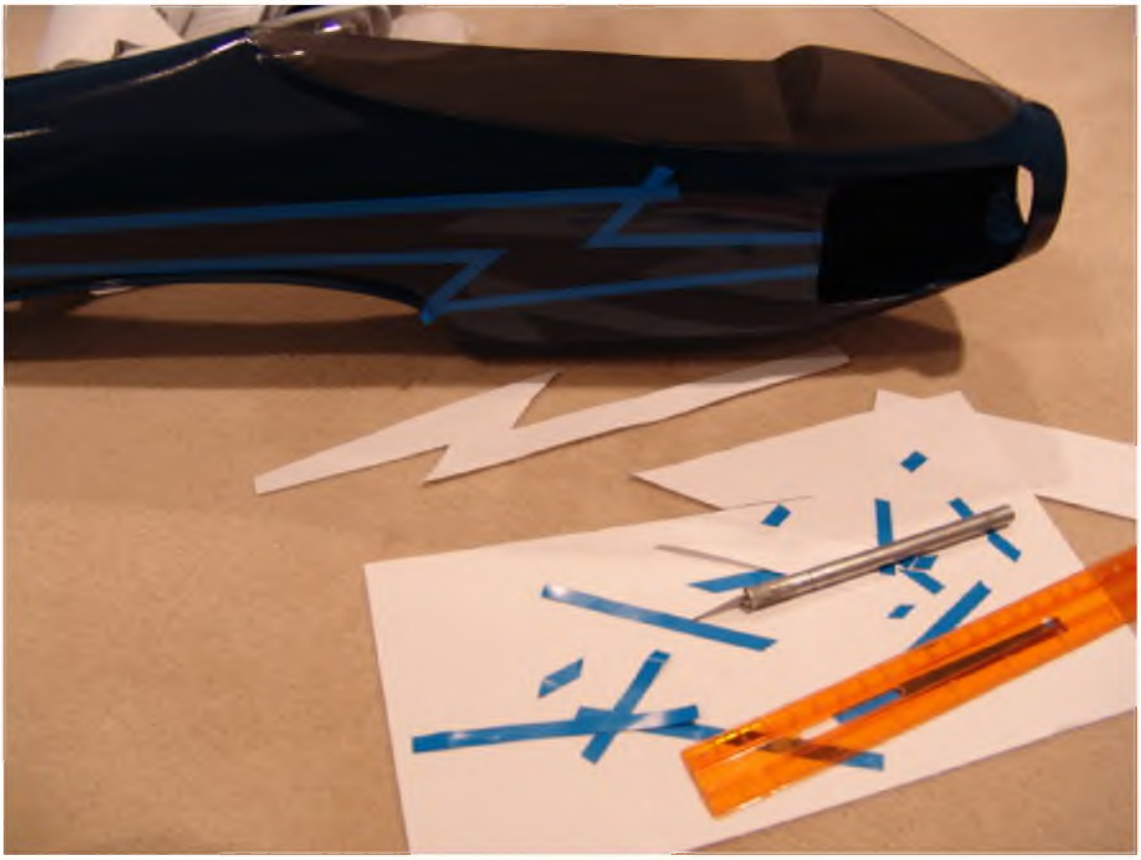




To be continued…

Referring to the lightening bolt layout on the plans I marked some of the key measurements and made a paper template to correctly duplicate Z in the lightening bolt. Using Scotch Plastic Masking tape that I purchased at an automotive paint supply store I taped off the lightening bolt trim on both sides of the fuselage. Next, I used newspaper and blue masking tape to cover the complete airframe exposing only the area to be painted. I used LustreKote primer for the first light coat and let it dry for fifteen minutes. After the primer set I sprayed it with a couple of coats of white to get a good bright smooth white.





To be continued…

My absolute favorite part of pattern ship painting, adding the trim. I see you used the Blue, which does curves, there is however the tan also by 3M which I might 'try' this time around along with the blue, using it for running relative straight lines as you so nicely have done on the fuselage of your Blue Angel build.

--

Richard, thanks for the info on the masking tape. I'll keep that in mind next time. The Blue did work fine though, I stuck the end down at the tail and then using a mark I made at the front (using a small piece of tape) just lined up the tape and put it down on the mark. The lines came out very straight. Getting the trim lines in the same place on both sides of the fuselage was a little more difficult.

Continued work on the trim by taping off the yellow area and spraying the yellow trim. I sprayed a light coat of the white LustreKote primer and then the yellow. I had to put the yellow on pretty heavy, waiting between coats to get a good solid yellow color. The heavy paint coats seemed to attack the tape some leaving some of its sticky residue on the blue paint when I removed it. Cleaned the stick stuffy off with paint thinner.

To be continued…

I debated some if I should clear coat the paint or just rub and polish it out. After studying it for awhile I decided that it would look better if I wet sanded the fuselage so that the edges of the trim paint was blended some with the base blue, e.g. a smother edge and clear coat it. After getting the sticky residue left over from the trim tape off, I lightly wet sanded the complete fuselage and wing center section with 800 wet/dry paper. While wet sanding I paid particular attention to the edges of the trim paint to lower the paint edge left from the masking tape edge. After the sanding was done I flowed on a couple of clear coats, not waiting for it to set between coats.

Looks like it is time for the Monokote on the wing and stab and I have no clue how I'm going to duplicate the complex paint scheme used on the originals with MonoKote! I did buy some poster board to use as templates though. So we will see!

To be continued…

It has been awhile since I've laid down MonoKote so I did the rudder first.

To be continued…

Making progress on the horizontal stab. Now, I've got to duplicate the trim exactly the same on the right side. Should be a challenge!

To be continued…

Spending break time away from the MonoKote work to relax and rub out the fuselage. I'm using Turtle Wax white Polishing Compound to smooth out the finish and then Meguiar's Cleaner Wax for the finish work. The image below doesn't show the finish off very well but it is looking pretty smooth and shinny.

To be continued…

One side done! Ten pieces of Monokote on the stab half and eight on the elevator!

To be continued…

Decided to add a blue piece at the elevator root so the blue line flows better.

To be continued…

It is an official Blue Angel now! Now, back to the Monokote work!


BlueAngel


BlueAngel

To be continued…

I bought poster board to make templates for the Monokote sections but found for the small stab pieces, photo copies of the plans worked fine. See templates below. Note that each template had to be made from a separate photo copy so I could allow for the blue and white Monokote overlap.

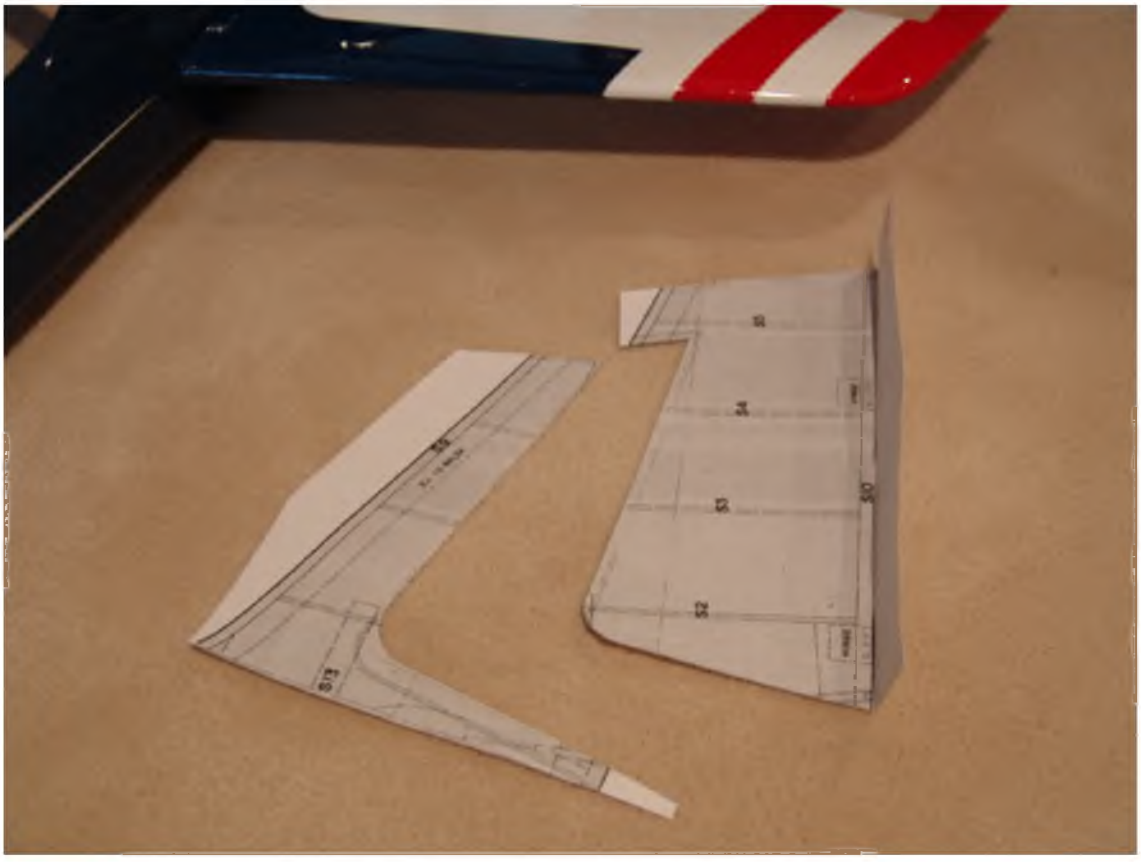
For each stab side I cut the white and blue pieces, two layers at a time. I taped a large piece of poster board to the top of my building board. I then laid a folded over piece of Monokote down on the board and taped it down, laid the template over the Monokote and then cut through both pieces at the same time. I used a straight edge and a #11 blade for the straight cuts and free handed the curved section using the template line.

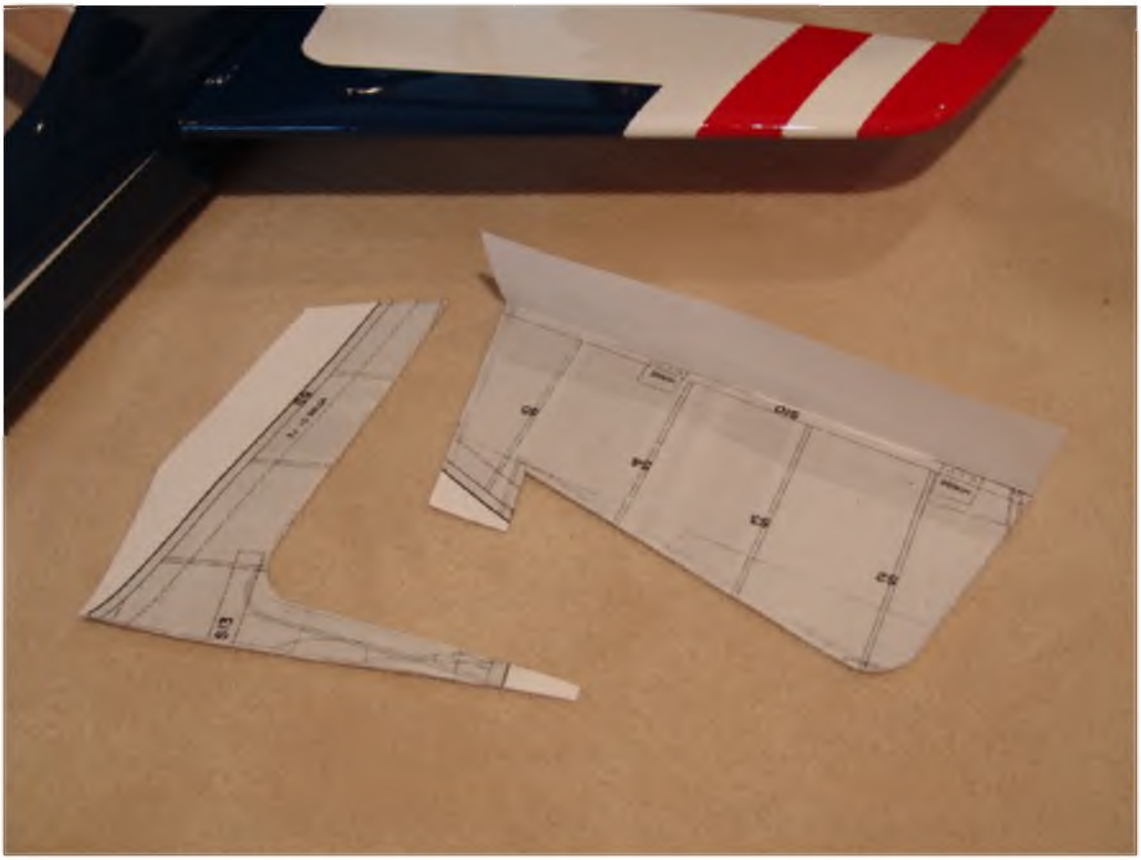
I used the templates and plans to determine where to position of the Monokote and then used small pieces of blue masking tape to mark the two edges on the stab so I could position the Monokote after I removed the template. The white and red stripes were cut using the plans to determine the overlap and the plans to determine the position. I did the left stab first and then used that as a template for the spacing of the pieces on the right side so they would match. So far so good!

The application sequence is:

a. Lower inner white
b. Top inner white
c. Lower outside white stripe
d. Upper outside white stripe
e. Lower red inner red stripe
f. Upper red inner red stripe.
g. Lower red wing tip
h. Upper red wing tip
i. Lower blue section.
j. Upper blue section.

The Blue Angel logo was custom made for the Blue Angel and came from a fellow RCU member. He was trimming out a Sig kit to have Blue Angels markings and had a friend with a store that makes lettering. I saw his build and thought with some size changes and dropping the “s” they would work. Their source is buried somewhere in the build pages.





To be continued…

Fuselage is done!!!

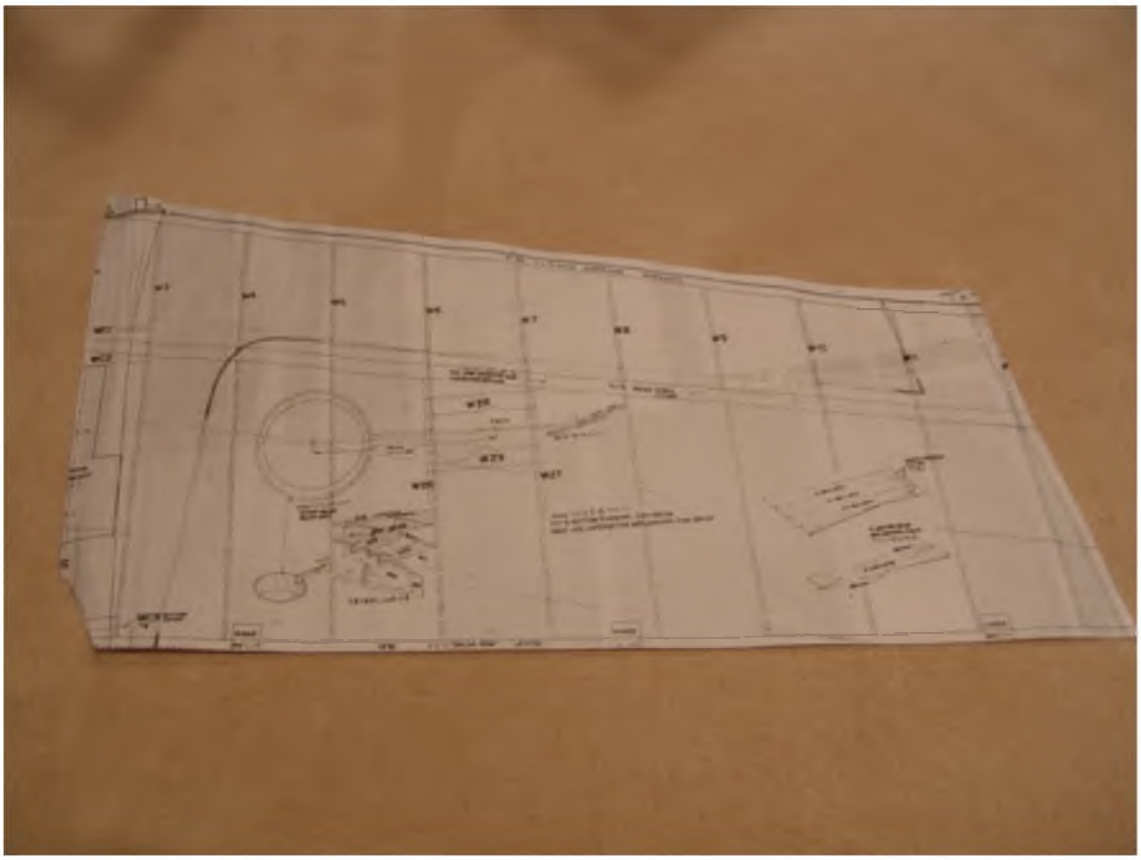
To be continued…

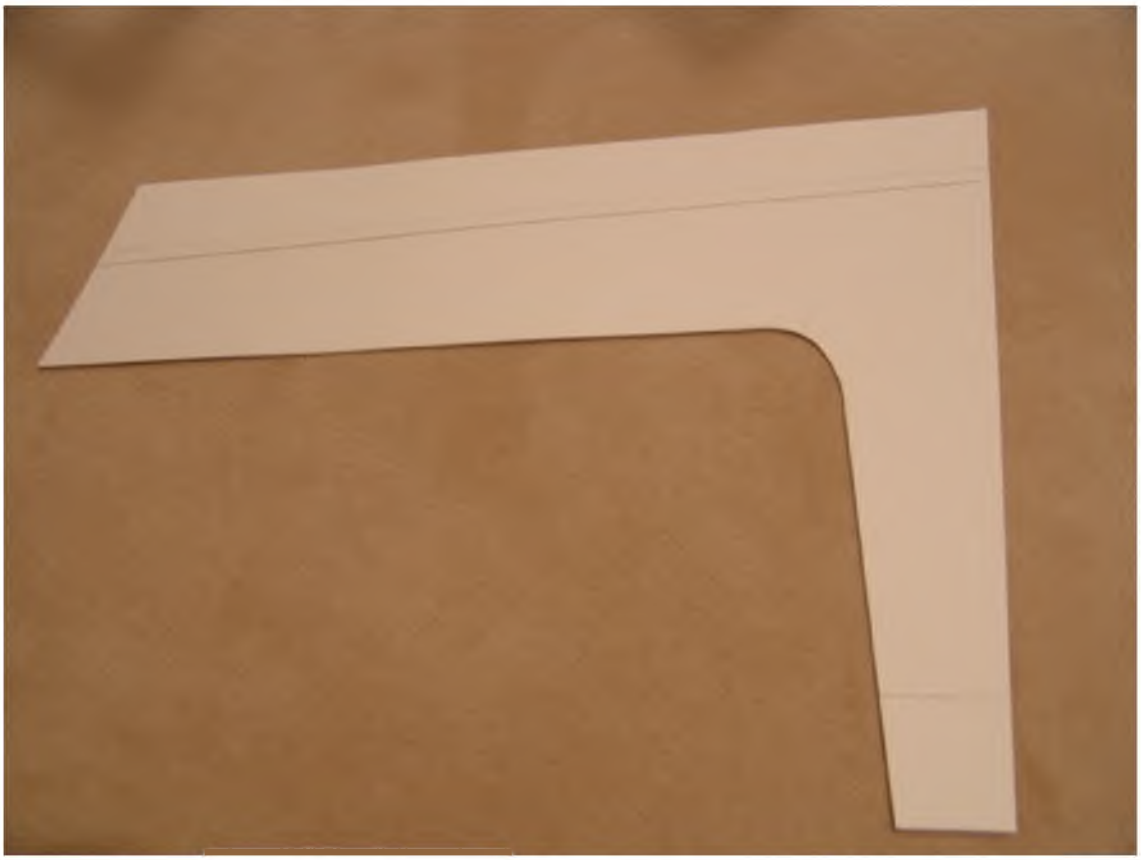
I'm going to go into more detail on my Monokote work on the wing because some of you have asked about my process. For the wing I determined that I needed some heaver templates and decided to make them out of poster board from Office Depot.

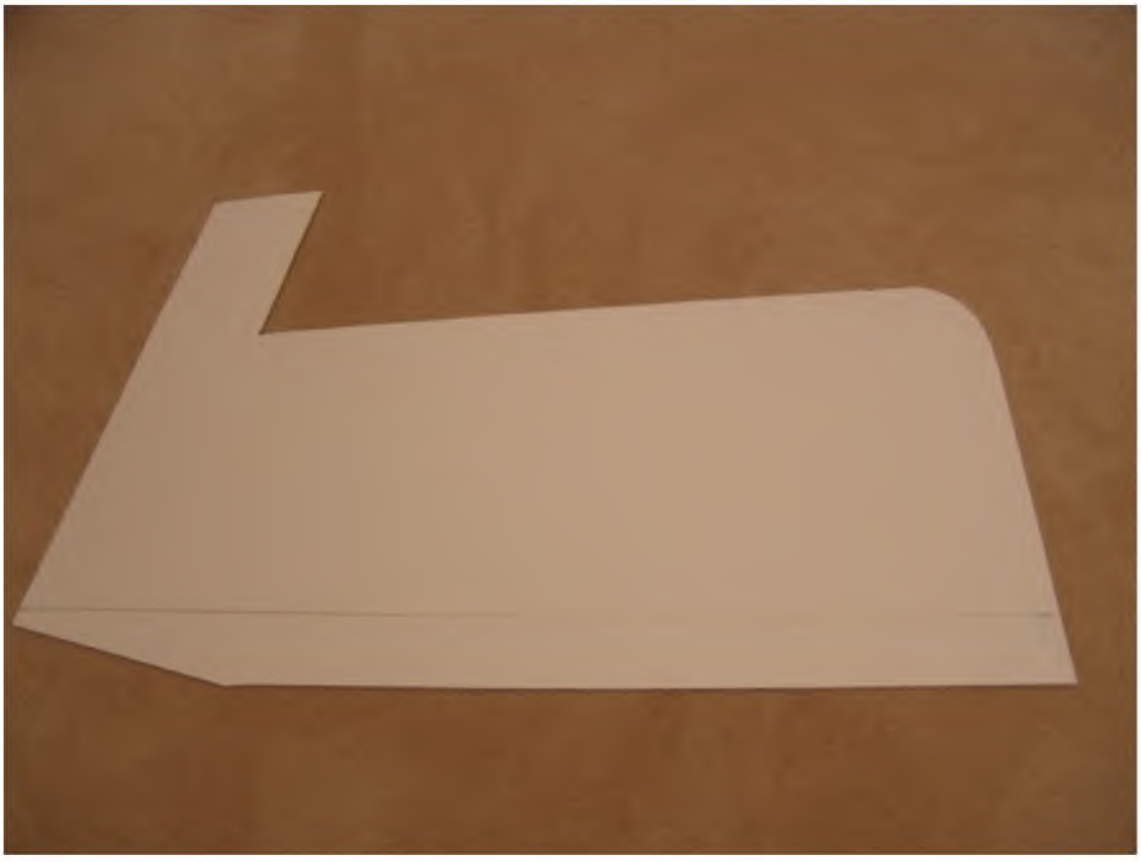
I marked the key points on the plans that showed the trim design with a 9B soft lead pencil. I then turned the plans upside down on the poster board and transferred the pencil marks to the templates by rubbing the areas with rounded tool. I did this process twice because I needed to make the template for the white section and one for the blue section so they would have about ¼" overlap to allow the Monokote to seal well.

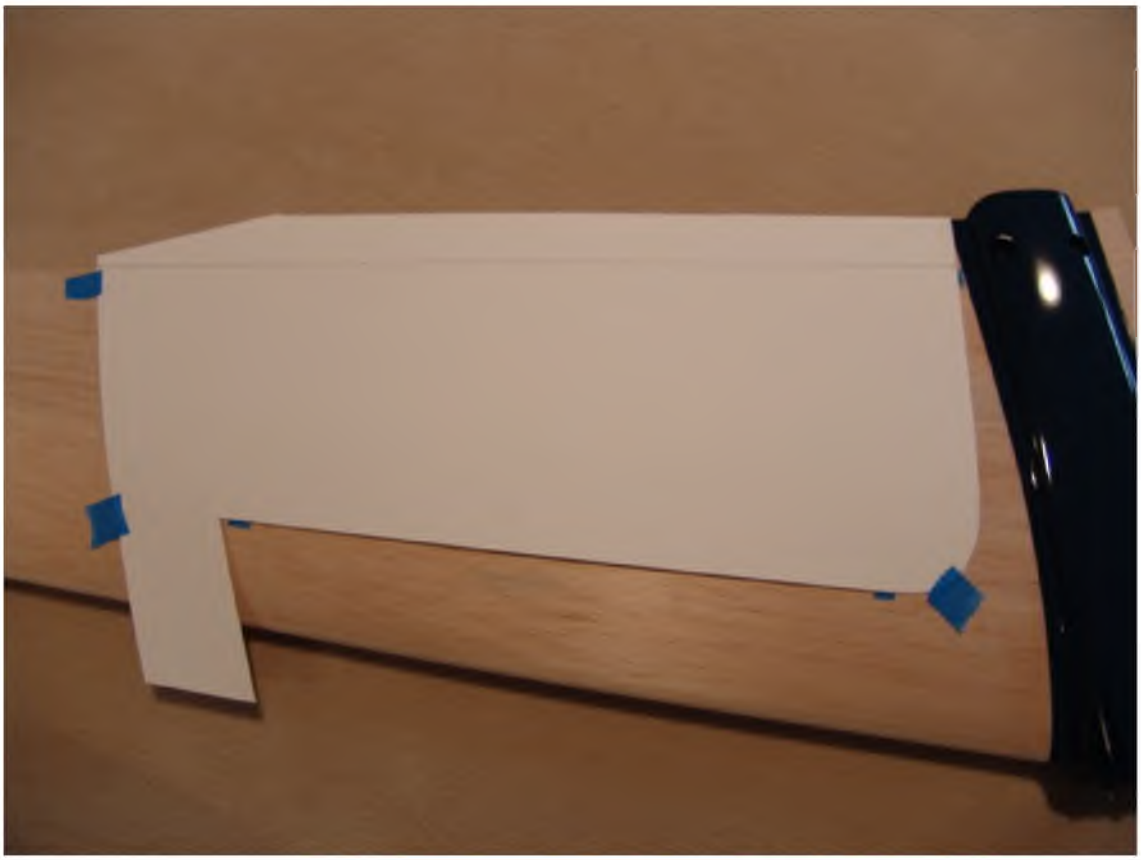
I then used the template to cut the white Monokote on my building board. In the images below you can see how I also used the template to mark the wing for positioning the Monokote. I used small pieces of blue tape to mark the key spots. I then followed the steps outlined in my previous post. For the white and red stripes I used the plans to measure the widths I needed plus the ¼" overlap for the edges of the white stripes. The red wing tip Monokote must be heated and stretched an inch or more ahead of the area that you are sticking down to the tip. It takes a good amount of heating and pulling to get it to lie down around the tip. I find that I can handle the process best if I sit on a carpeted area so I can thrash around with the wing and not damage it.

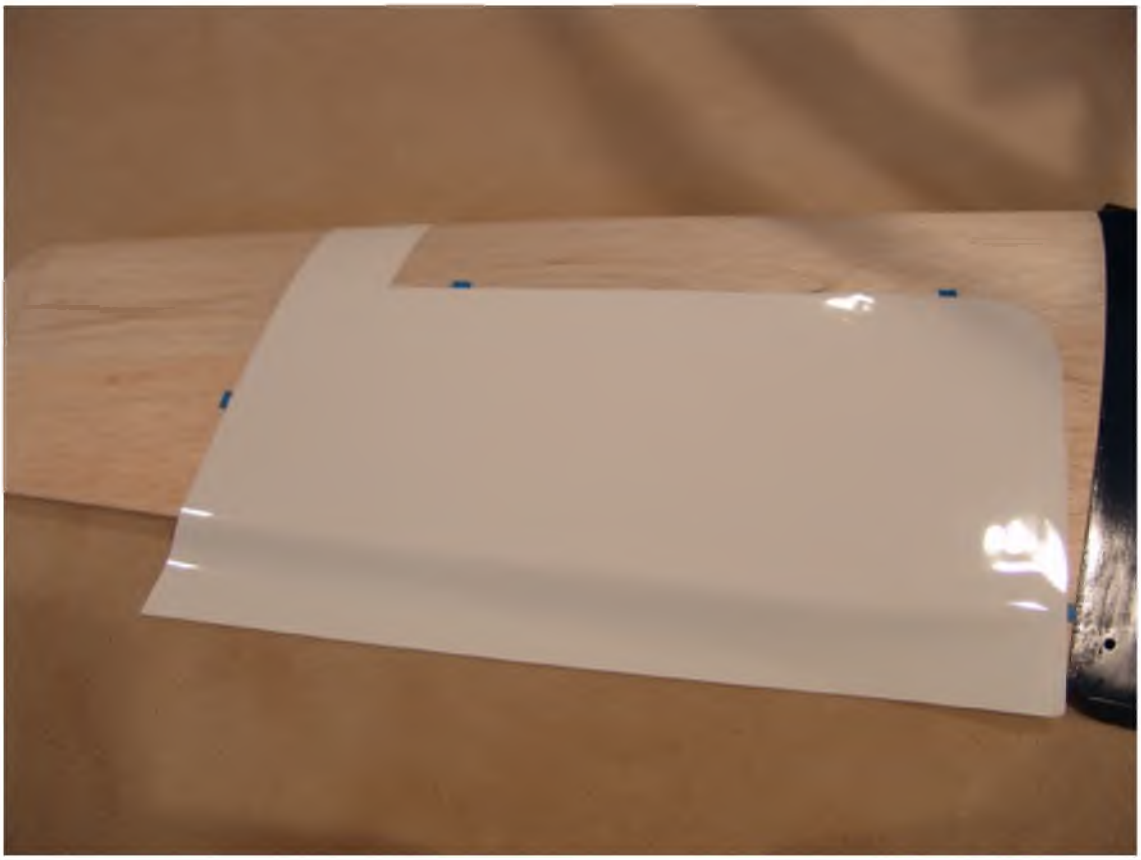
The images below show the step-by-step process.

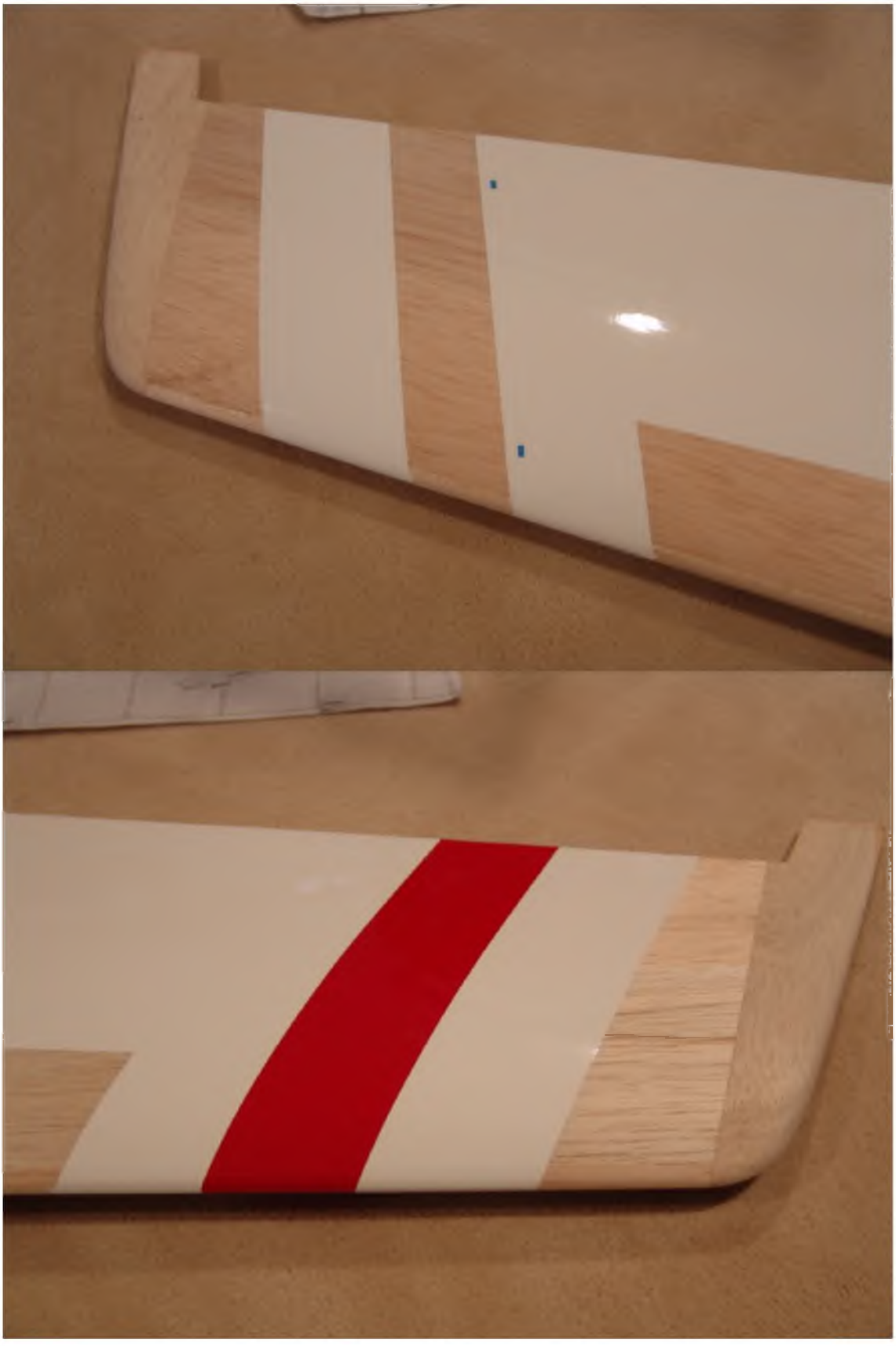






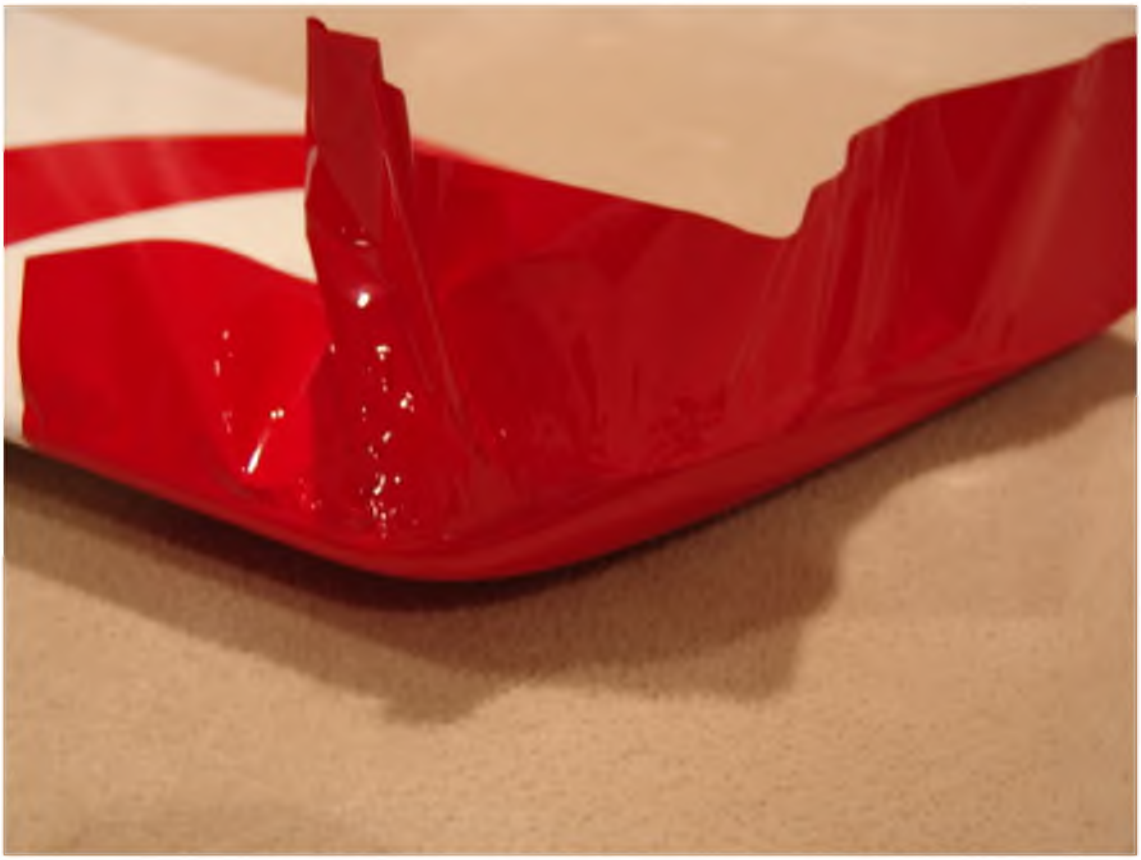






To be continued…

More.




Blue Angel

To be continued…

Of course the most important cut line is the final one for top covering that comes down along the wing tip although some of the underling cut edges might show through the top covering so they need to be fairly straight too. I keep pulling and stretching the covering down over the end of the tip until it is well past the center line of the airfoil. I keep working it so there is a straight path for a cut line from the trailing edge to the leading edge. Then using a single edge razor blade I start the cut at the front and pull off the cut part at the same time. At this point the Monokote along the cut line is pretty brittle because of stretching. By holding the blade fully against the cut line I find that it cuts pretty easily as I move the blade along the cut line and pull the Monokote at the same time. The razor blades only work for a few cuts and they get dull. In one of the images that shows the cut line before the top covering was done the line is straighter that is looks because some red in the picture is the Monokote glue.

The lower blue color on the left wing. The Monokote over the retract gear mount and servo bay are not cut out yet.

To be continued…

I use Monokote Trim Solvent to clean any Monokote glue off. You need to be super carful that you do not get it on the painted parts because it will take the paint off. It does not evaporate very fast so you need to be careful that it does not get on your fingers and then touch the paint parts.

Left side of the wing is done. The templates are working pretty well and really helps to get the Monokote on in the right place but it is still a tricky process. Will do the aileron next.

To be continued…

View with the wing on.

To be continued…

Question Mike? How much did you overlap the blue monokote film over the edge of the lusterkote paint?
Jim
--
Jim,
1/4" to 3/8” should do. On the lower side of the wing I ran it to the start of the fillet on the wing belly piece. On the wing top I made sure it was covered by the fuselage fillet.

Aileron done!

To be continued…

More progress.

To be continued…

Thanks for the nice comments guys.

As you know from the preface at the beginning of the thread I've wanted a Blue Angel since the 80s. It is so wonderful to see it at this point in the construction with its beautiful shiny colors designed by Yoshioka. Knowing I built it from a pile of balsa and plywood does my heart good!

Many thanks to all the people below that made the project possible for me and for other RCers that would like to build a Blue Angel in the future.

Ron Ellis, plans, wing temples and canopy
Tony Howard canopy plug and canopies
Dan Hines wing and stab cores

And all the folks that provided background documentation, e.g. history, variants, color schemes.

More images.


777


777


777


777


Blue Angel

To be continued…

More images.


777

To be continued…

Now that the covering and paint work is done I got the scales out to see how the weight looks. Loaded with everything ready to fly (except fuel) it looks like it will be a smidge over 7.6 lbs. Of course they always seem to gain a few ounces during the radio install, so we will see.

As expected with swept wing aircraft it is looking a little nose heavy with the big 61 SF pumper up front. Hopefully my far aft servo mounting position and some work with battery placement will negate any tail ballast.

With a 700 sq. in. wing it should have a wing loading of 25 oz per sq foot. Sounds like a ballistic rocket to me!

To be continued…

ORIGINAL: bob27s

You illustrated something important here others should not overlook.

Back when these aircraft were designed and flown, most of the engines were ring construction, fairly light weight by today's standards. Rossi and early YS were exceptions as ABC. A late 80s or current ABC engine tends to weigh more because of the brass liner. So it is very important recognize that and to plan ahead when building older designs with modern power plants.

--

Thanks for the nice comments Bob.

You are correct on the engine weight. Back on post 353 when I was planning my servo mounts I installed them as far aft as possible and cut out extra space in former F5 so I could position the battery pack behind the servos if needed. On post 353 I didn't explain why I was mounting them so far aft but I should have. The other thing that impacts the weight and balance is the swept wing because the MAC is moved back and therefore the CG point. The nose on the Blue Angel is about 1" shorter than my Tiporare so that helps some, but I'm sure the tail is lighter on the Blue Angel so it is a balancing act.

I made the triple “7s” for the tail from wet trim MonoKote. I cut one of the “7s” from the plan and then transferred the shape to poster board and then cut it out with a 11 blade. I used super glue on the edge of the template to harden the edge and then sanded it smooth. Found that I needed to darken the edge with a pencil lead so the edge would stand out on the white MonoKote while I was cutting with a 11 blade. After I cut out the “7s” I measured their placement from the plans and used a thin piece of tape along the top part of the vertical stab for an aliment reference for the number tops. On the right side of the stab I had to adjust the fore-aft position to compensate for the sweep of the stab and numbers.

To be continued…

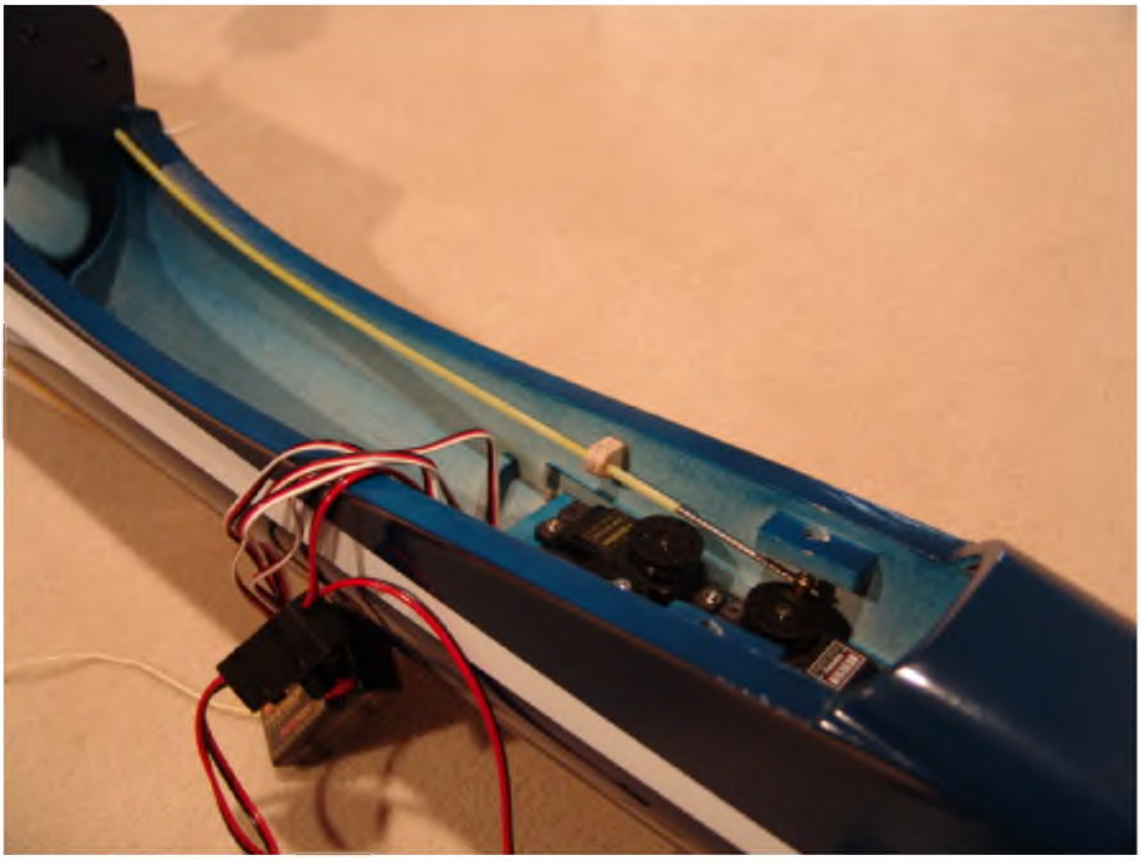
When I finished my right wing tip and cut MonoKote trim line I cut it too low and ended up with some small wrinkles above the cut line. They were not very noticeable but it bugged me that they were there. I know from past experience that you are better off to leave it alone because once you cut the trim line and cannot pull the MonoKote when you heat it you will have more wrinkles not less. At any rate, I tried to heat the wrinkle out and of course it got worse and ended up with a pile of them. So I peeled off the MonoKote and recovered it. No wrinkle this time!

To be continued…

I had originally planned to use the standard 1500 MAH battery pack that comes with the Futaba digital servo radios shown below. The pack is quite small (1 11/16" X 2 5/8") for a 1500 MAH pack and using ¼" foam padding it would fit in the upper fuselage just behind former F5 that is located at wing tailing edge. After checking the balance I decided I would order a custom made 1500 MHA battery pack from Batteries America http://www.batteriesamerica.com/ that will be two sticks of two batteries. The custom pack will have the same Sanyo batteries as the Futaba pack but will be long and narrow allowing the back to be placed all the way back to F6. I've used Batteries America for a number of radios with good results. The new pack should be shipped Friday.

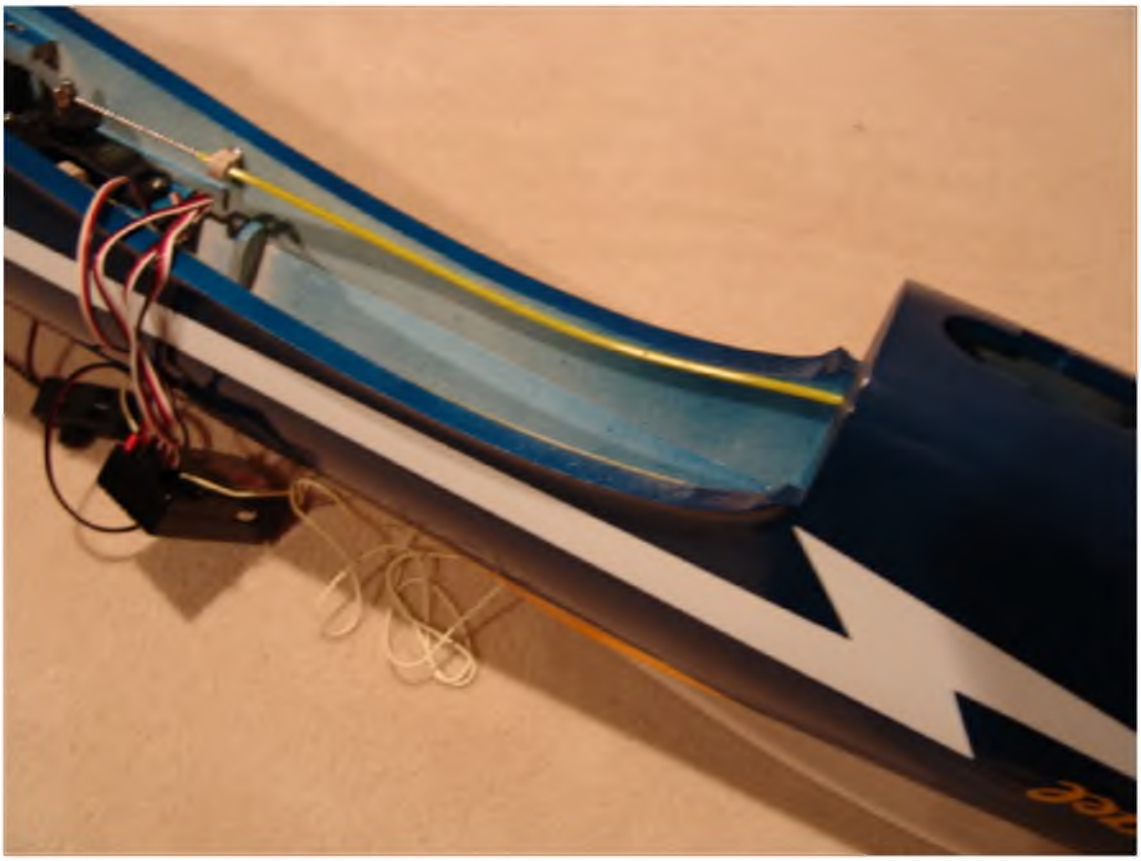
To be continued…

Started work on the installation of the servos starting with the rudder and nose gear steering. I'm using digital servos on the control surfaces, a ball bearing servo on the throttle and a plain servo for the retract control valve. The rudder and elevator servos are located in the back of the servo mounts and the throttle and retract servo are in front of them.



To be continued…

Continued the pushrod installation work with the installation of the throttle cable. Received the new battery pack that will make it easier to locate the battery aft of the wing.



To be continued…

Competed some work on the installation of the pushrods guides and the control surface arms. I covered the installation of the control surface arms in the Kwik Fli III and Cold Duck build including how strong they are. Gives a nice clean look as well.

To be continued…

The Blue Angel plans show the rudder pushrod above the elevator pushrod. It is apparently misdrawn because the control arms would interfere with each other. I installed the push rods (and fuselage cutouts) like I normally do with the rudder below the elevators.

To be continued…

I glued the Du-Bro hinges in with 30 minute epoxy and taped the elevators in place while the epoxy set. I showed how I make zero gap control surfaces in my Kwik Fli III and Cold duck build threads. I prefer counter sinking the hinges to achieve the zero gap rather than sealing the gap with tape or MonoKote. It just looks cleaner to me. I'm not going to glue the rudder hinges in until I'm completed with the CG balance so I have access to the back end of the fuselage to insert ballast.

To be continued…

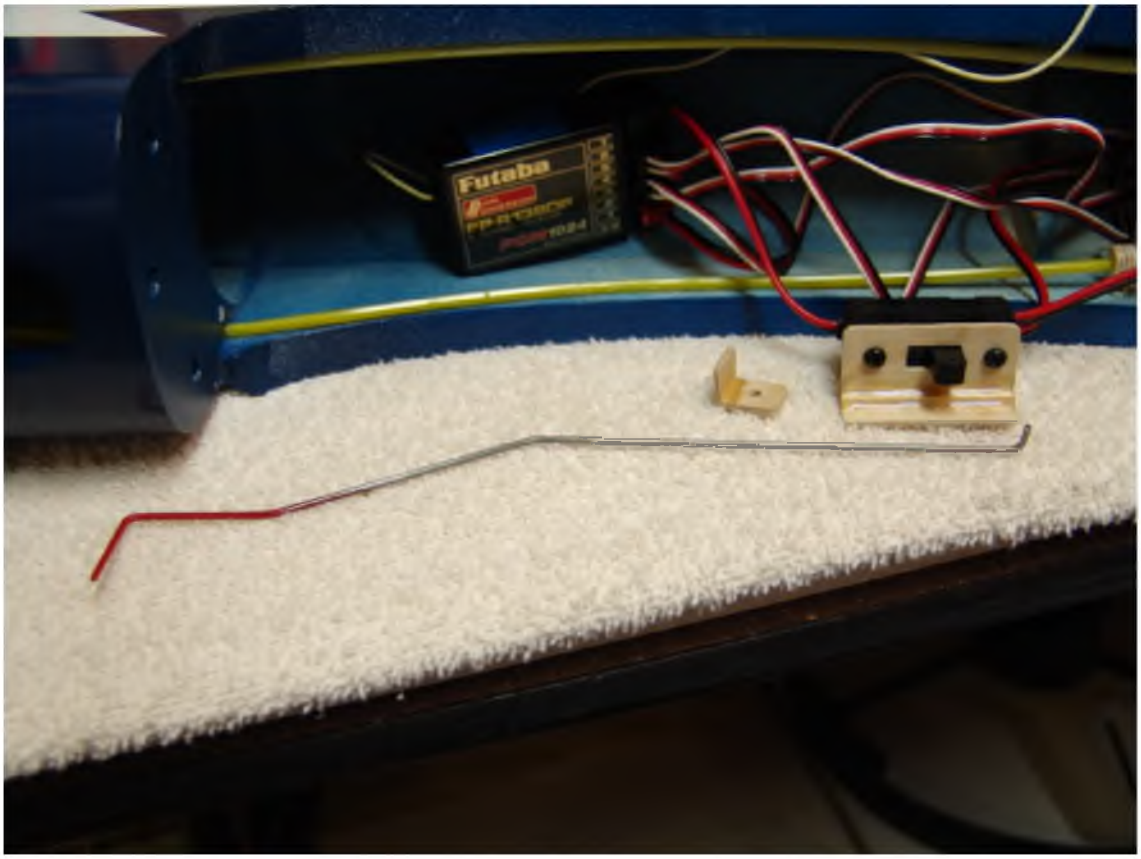
Received some great news in the mail today from the wonderful folks at Spring Air! I contacted Spring Air last week to see if they had any of their older air fill valves left that use the push in probe rather than the new type that use the screw on fitting. They said that they would take a look and see. Today I received what looks like a custom made version of the new valve that uses the old push in probe. I need the push in probe type so I can mount the valve in the front wheel well along with the push-pull lever for the radio off/on switch. There is not enough room in the wheel well to get your fingers in to turn the screw in valve but the push in works great with two fingers while the aircraft is sitting on the ground. So there will be no antenna, air fill valve or off/on switch visible on the outside!! Thank you Spring Air!

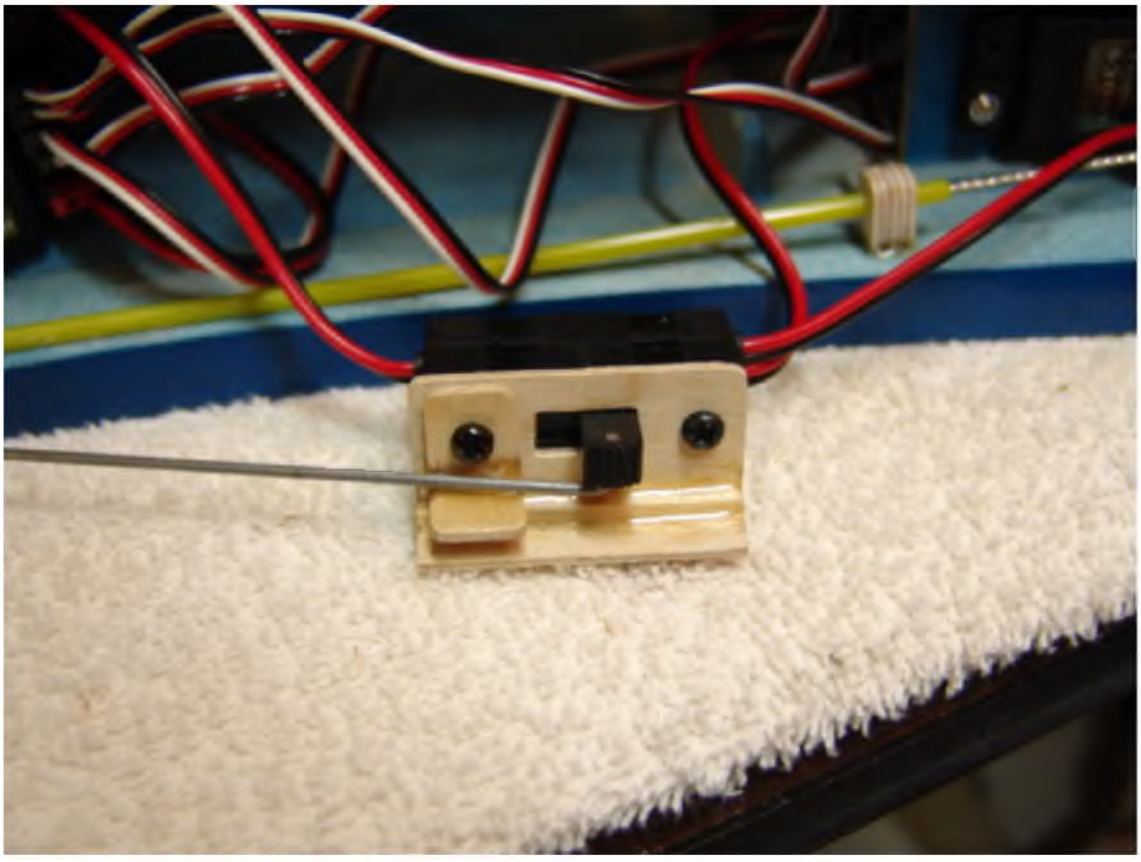
To be continued…

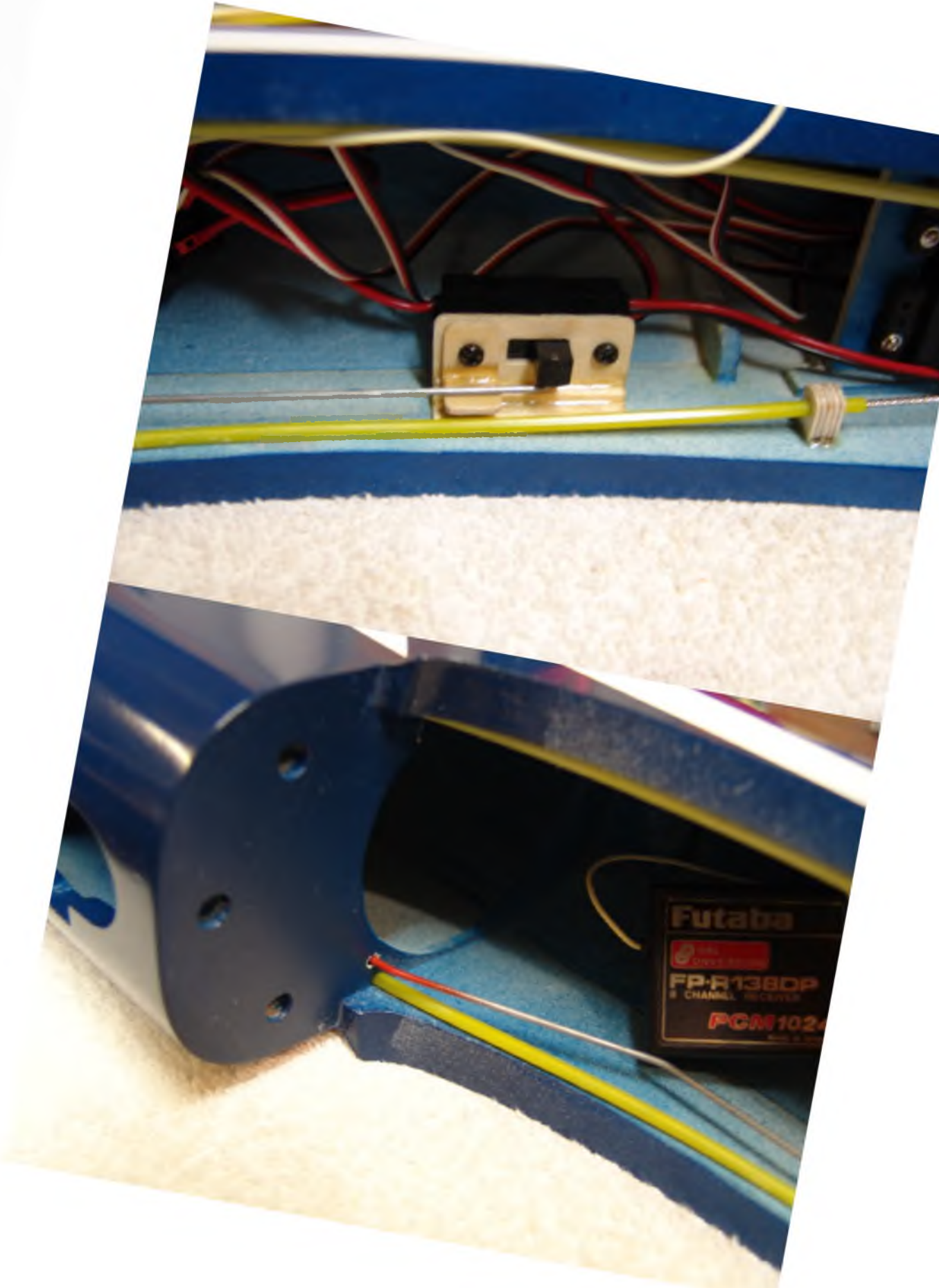
After wrapping the new battery pack in foam I install it so it was all the way back against F6 and glued some ¼" X ¾" balsa cross pieces to the fuselage sides to hold it in place. Next I installed the pushrods for the rudder and elevator. I used the hardwood dowel arrangement that I covered in the Cold Duck build. There are some images of them in post #478 of this thread. I bought the piano wire for the servo end of the pushrod from a hardware store and is a true 1/16" so it fits the servo output arm without drilling. I first installed the rudder pushrod and then discovered that I could not get the elevator pushrod in the correct position above it. So I removed the rudder push rod and then reinstalled after installing the elevator rod and it worked perfectly. The rudder push rod is positioned beside the elevator on the front end and is slight below it where it exits the fuselage at the back. The push rods seem to work very well and because of the way the elevator rods exit the back end of the fuselage they are held in position firmly without side play so the elevators are locked together in their movement.

To be continued…

Spent some time working on the remote off/on wheel well linkage to the power switch. I did a similar switch installation on my Tiporare and it works pretty cool.


Futaba




Futaba
FP-R138DP
8 CHANNEL
PCM1024

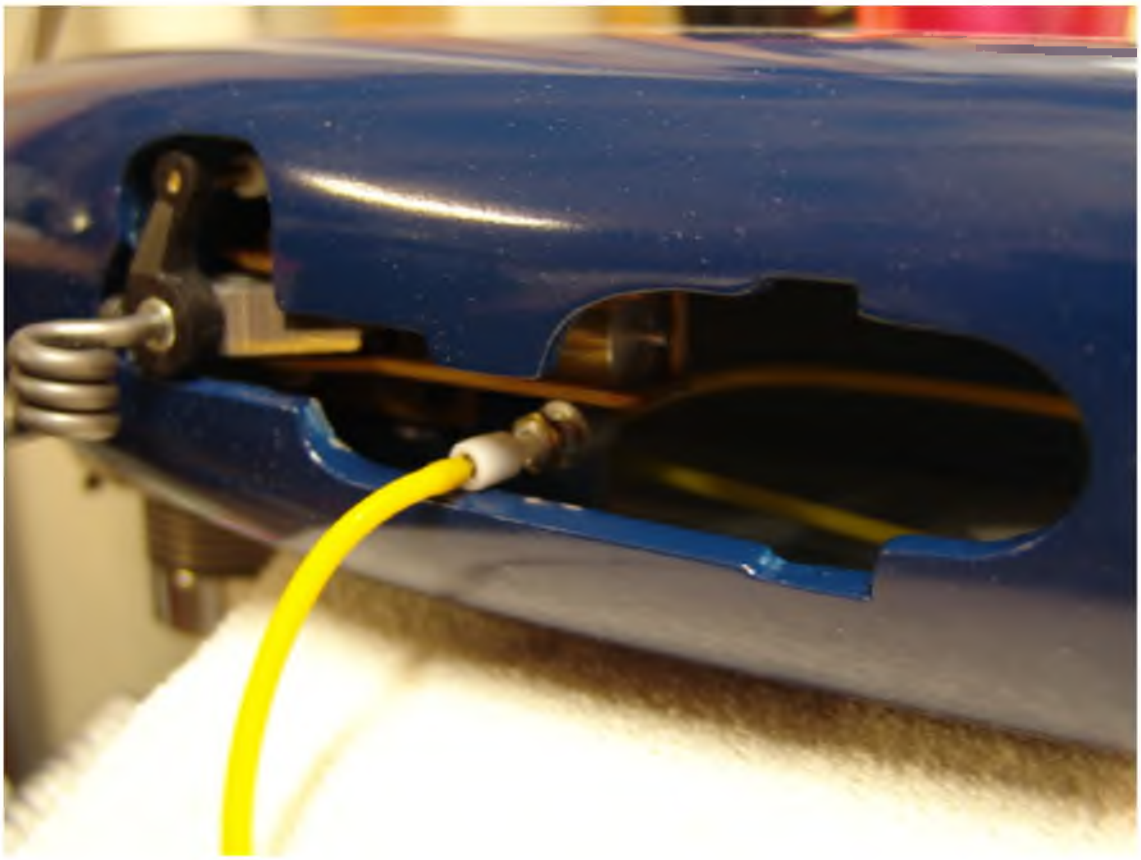
To be continued…

I decided to use one of my low run time used OS 61SF ABC-P engines in the Blue Angel rather than going through the break in of one of my new engines. I have two ABC-P used engines plus the one in the Tiporare so I decided to build a test stand and run a couple of them to make sure that they ran OK including the pump system. I kludged together a test fixture that bolts to a heavy outdoor chaise. I selected one of the engines and test ran it with good results. From the tachometer you can see it turns 10.1K using an APC 12 X 10W. It idled well and responded smoothly to 10.1K. I think 10.1K on 15% nitro should be pretty close RPM wise so I didn't mess with the pipe length. I also test ran a ring SF-P and turned 10.1K with the same pipe set up. Not sure what I'm going to do with the ring engine, might put it in the RCU market place.


OS
MAX
SF

To be continued…

I started some planning work on the placement of the retract gear air fill valve.



To be continued…

8178, a few questions about your engine setup: what brand of header and pipe are you using, is it a muffled, quiet or regular pipe? Also, other than the #86 carb and the pump backplate, are the SF-P and the SF the same internally?

Thanks,
David

--

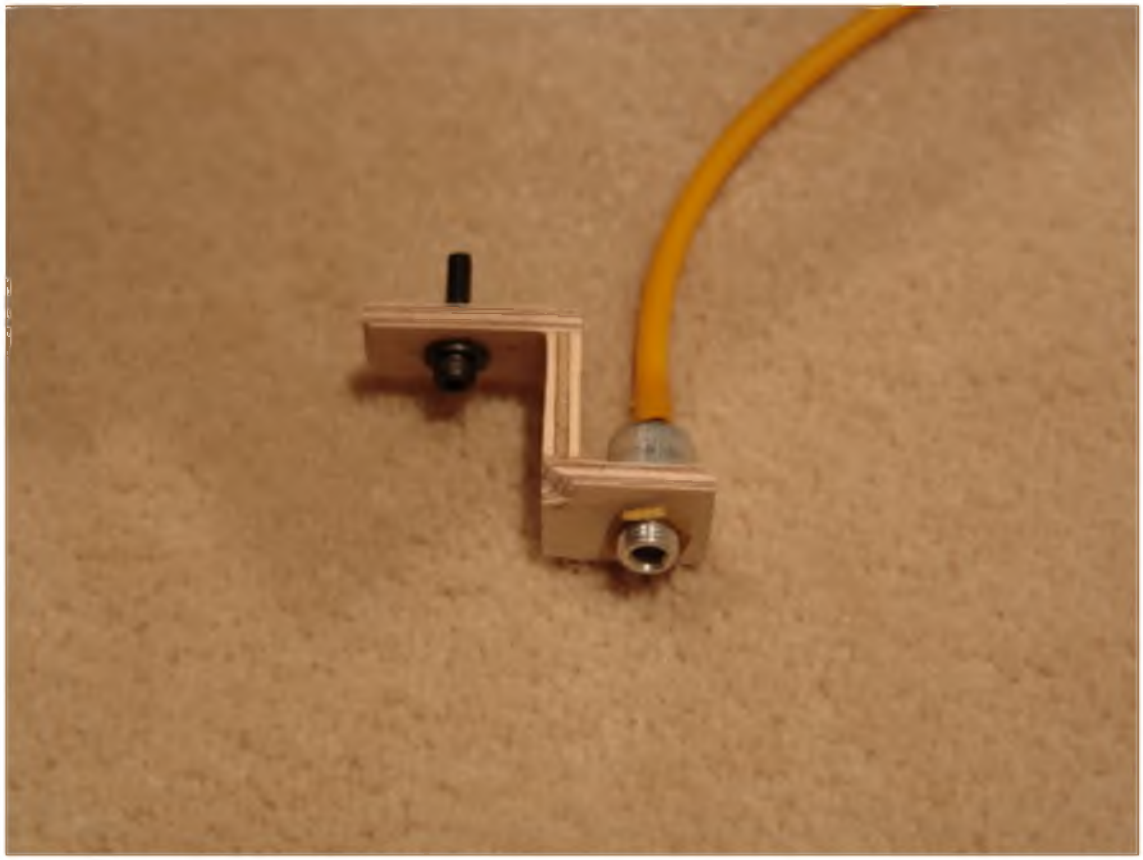
David,

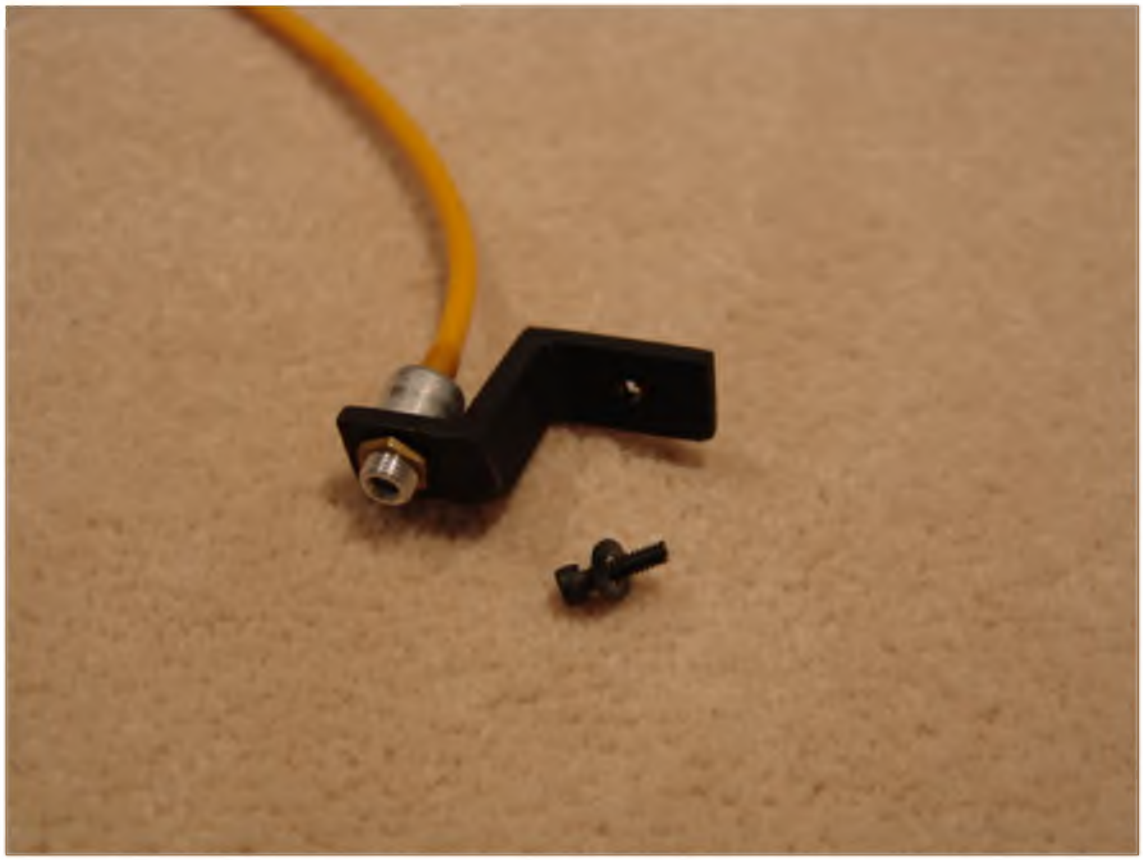
It is a Mac's pipe #1260 and a Mac's header. It is the muffed pipe. The headers come in three different lengths to use depending on the engine and wing placement so you can get the pipe lined up under the wing.

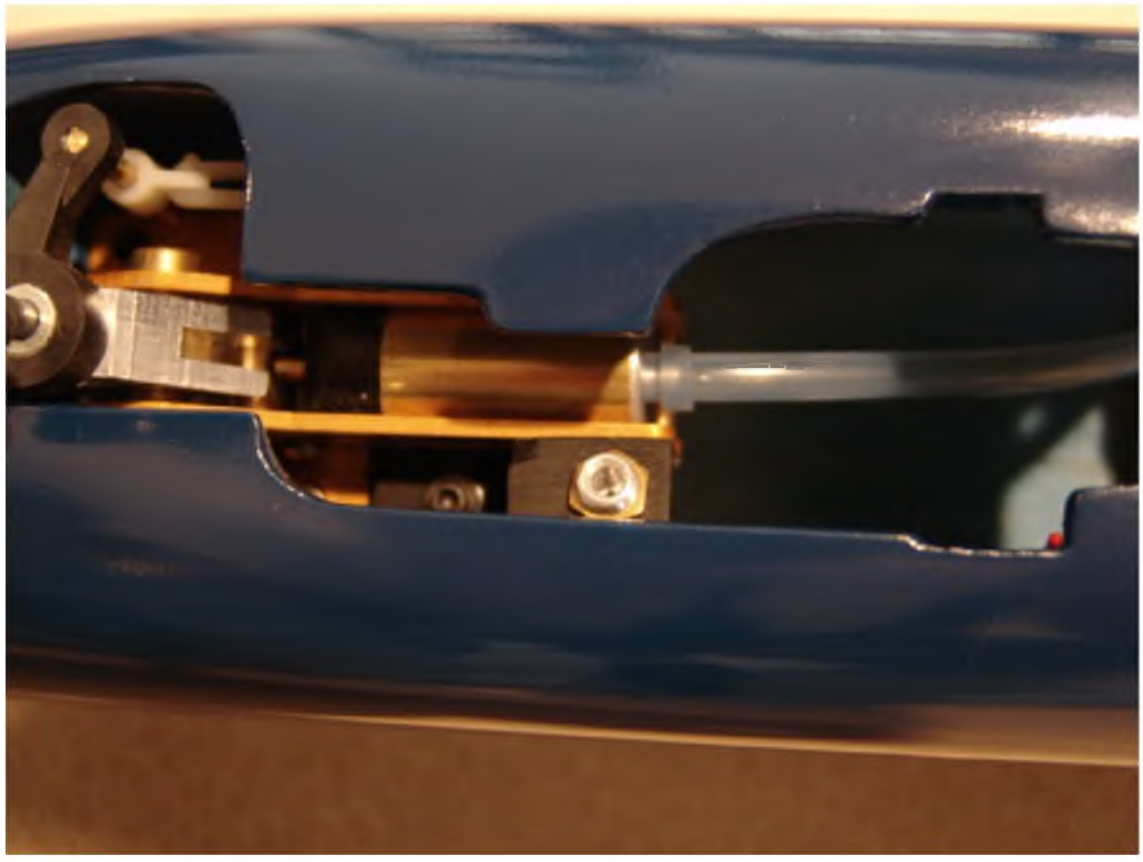
As far as I know the pumped version and the SF is the same basic engine as the non-pumped SF. You can also convert a ringed SF to an ABC engine by replacing the sleeve and piston. The pump and carb system is pretty unique in the RC world. It is sort of like fuel injection in that the pump pulls fuel from the tank to pressurize the carb, the carb bleeds off the fuel it does not need and it returns to the pump that pumps it back to the tank on a separate fuel feed.

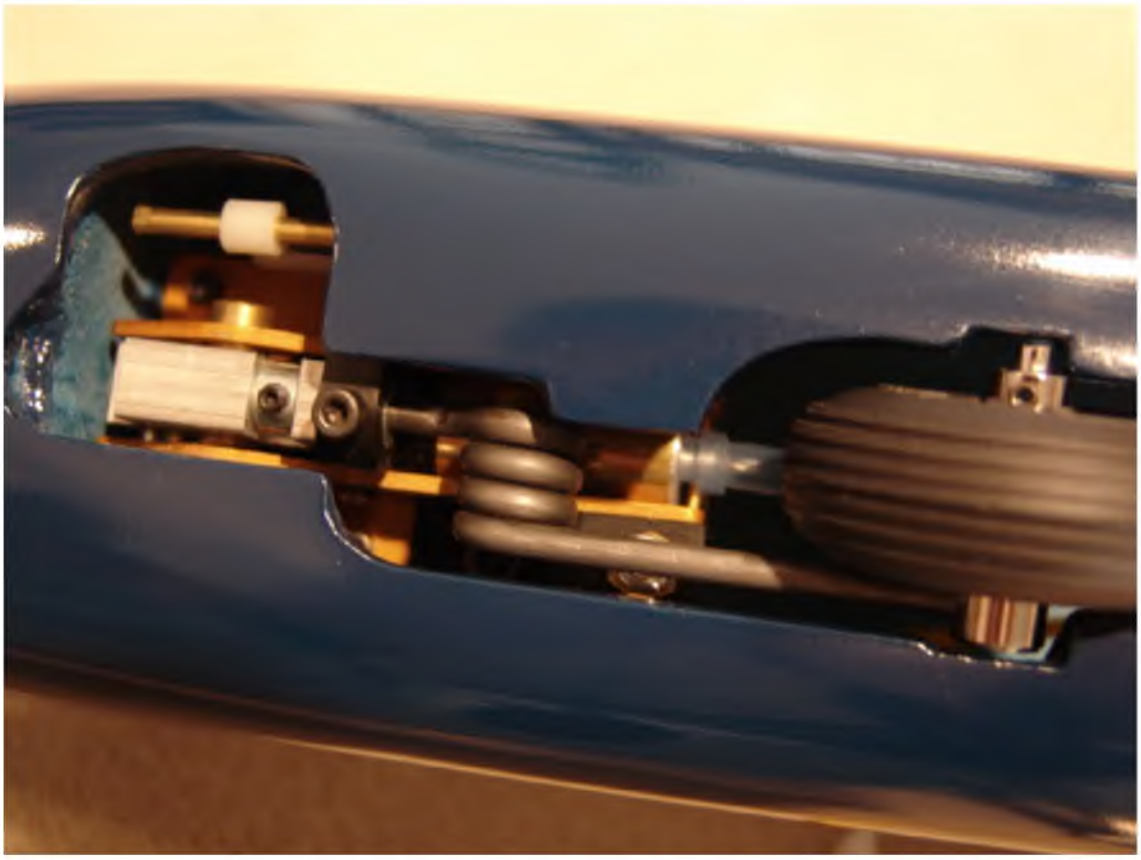
After some planning I decided how I was going to install the air fill valve in the wheel well (should have planned this before now but I didn't have the custom made valve!). I made a removable bracket from plywood that holds the valve at a slight angle to make it easier to

insert the probe. The bracket had to be removable so the retract unit could be removed. Not sure if I mentioned it but the retract unit is installed and removed through the fuel tank opening in the fuselage. By using the fuel tank opening it allowed me to keep the cutout for the nose gear minimal without using a separate cover on the lower nose area. It looks clean but the engine and fuel tank must be removed to take the retract unit out although the strut can be replaced without taking the unit out. I painted the bracket with flat black Rust-oleum like I used on the wheel wells. I think I'll see if I can find a removable cover for the valve because the valve is more exposed than others I've installed.





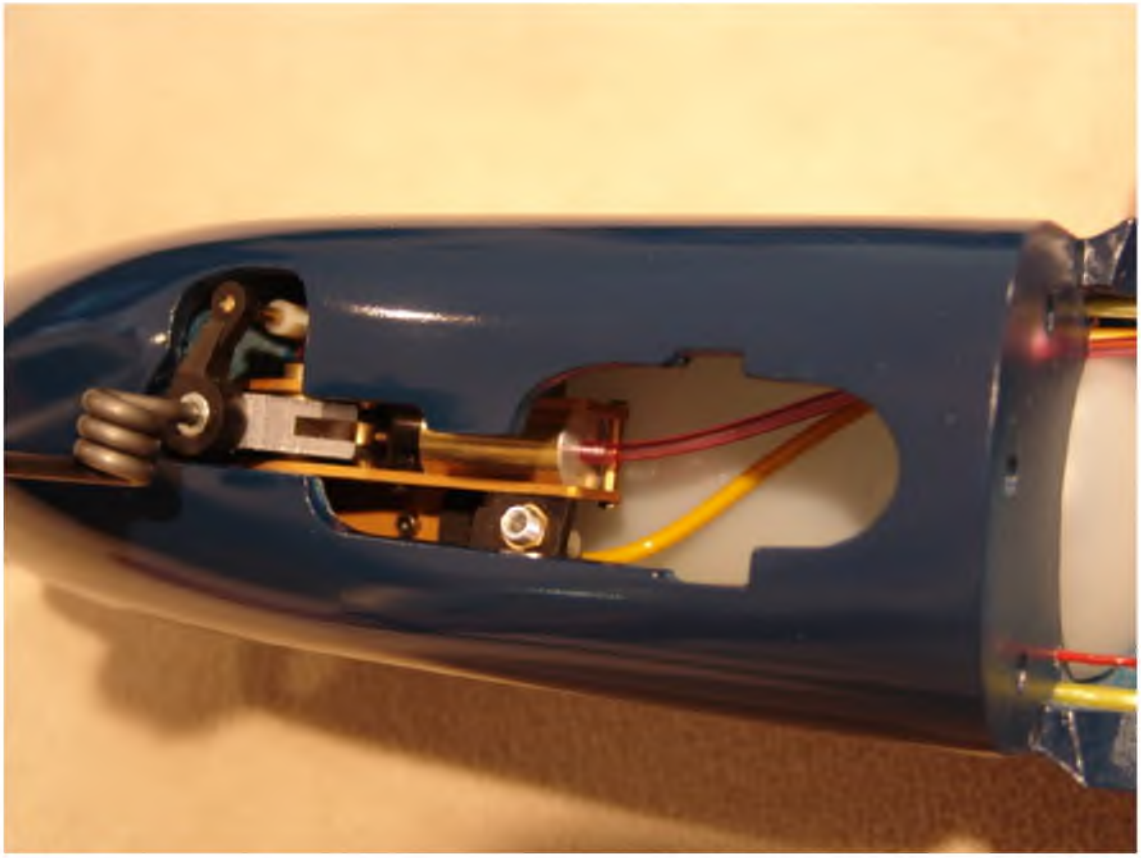


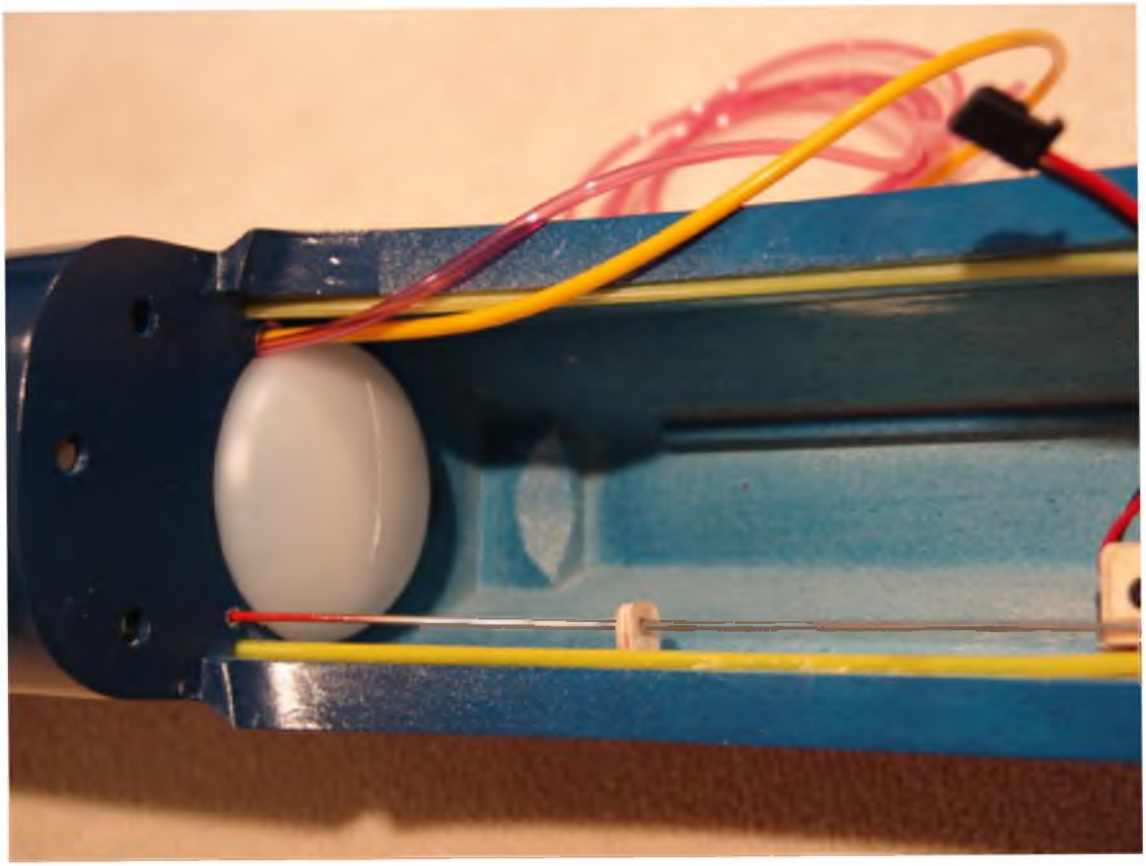


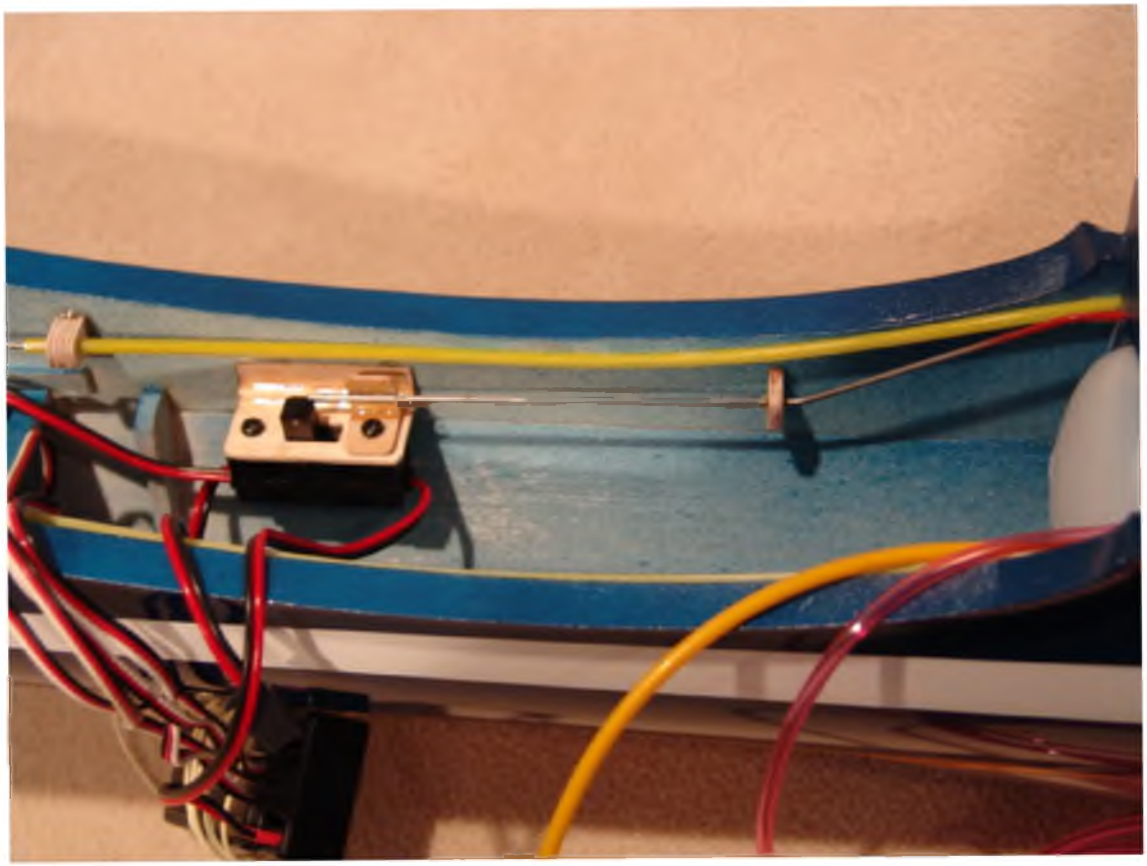
To be continued…

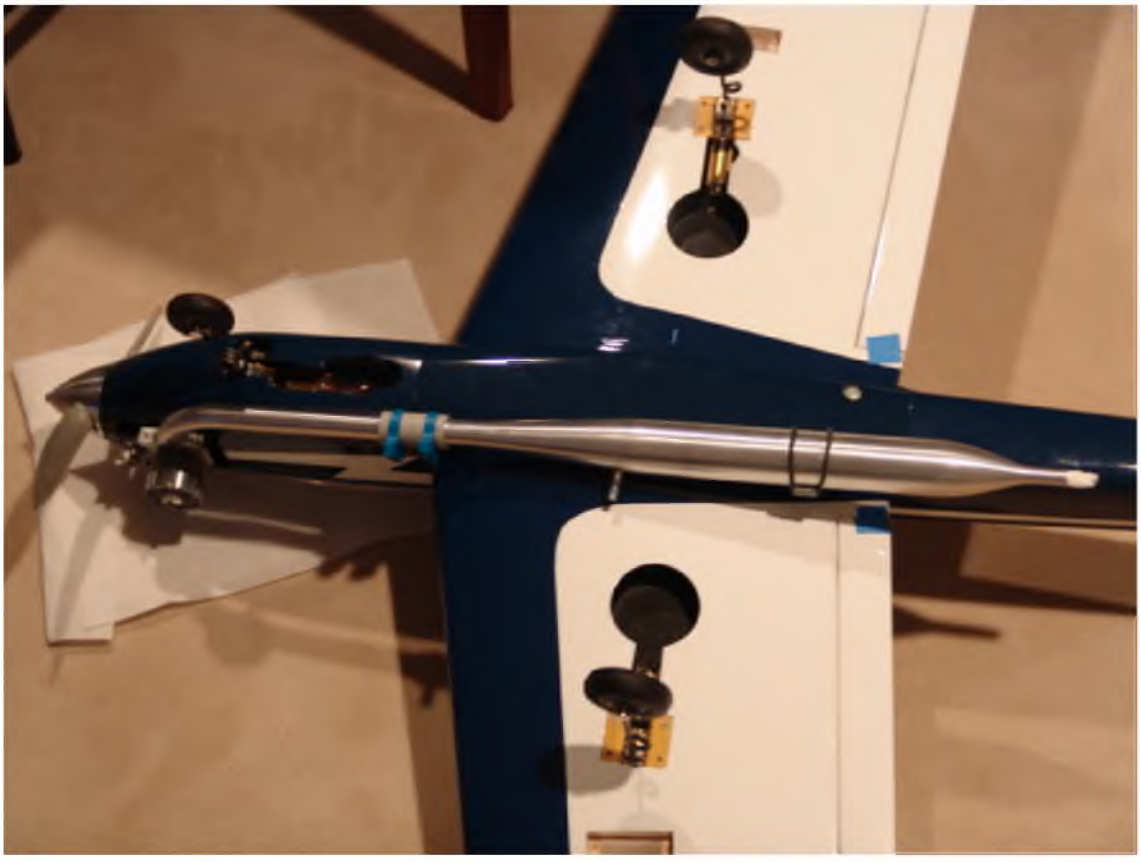
More progress today. Air valve and nose gear air line connected, fuel tank plumbed and installed, off/on switch mounted and pipe test fitted with the back pipe mount. Before I MonoKoted the wing I installed a ½" flush fitting hardwood dowel hard point into the wing root for a Dave Brown rubber insulated pipe mount. The hard point was drilled and tapped for the 10/32 mount bolt. I've got to order some better looking hose clamps like available from OS.

It's looking pretty cool with the pipe slung under the wing. I wonder what Yoshioka would think about a piped OS 61 ABC-P powerhouse crammed into the front of his dream machine?










BlueAngel

To be continued…
---
mike,

do you think i could use a RF - pump on its side in my build? i really need to find a SF, it is holding me up big time.

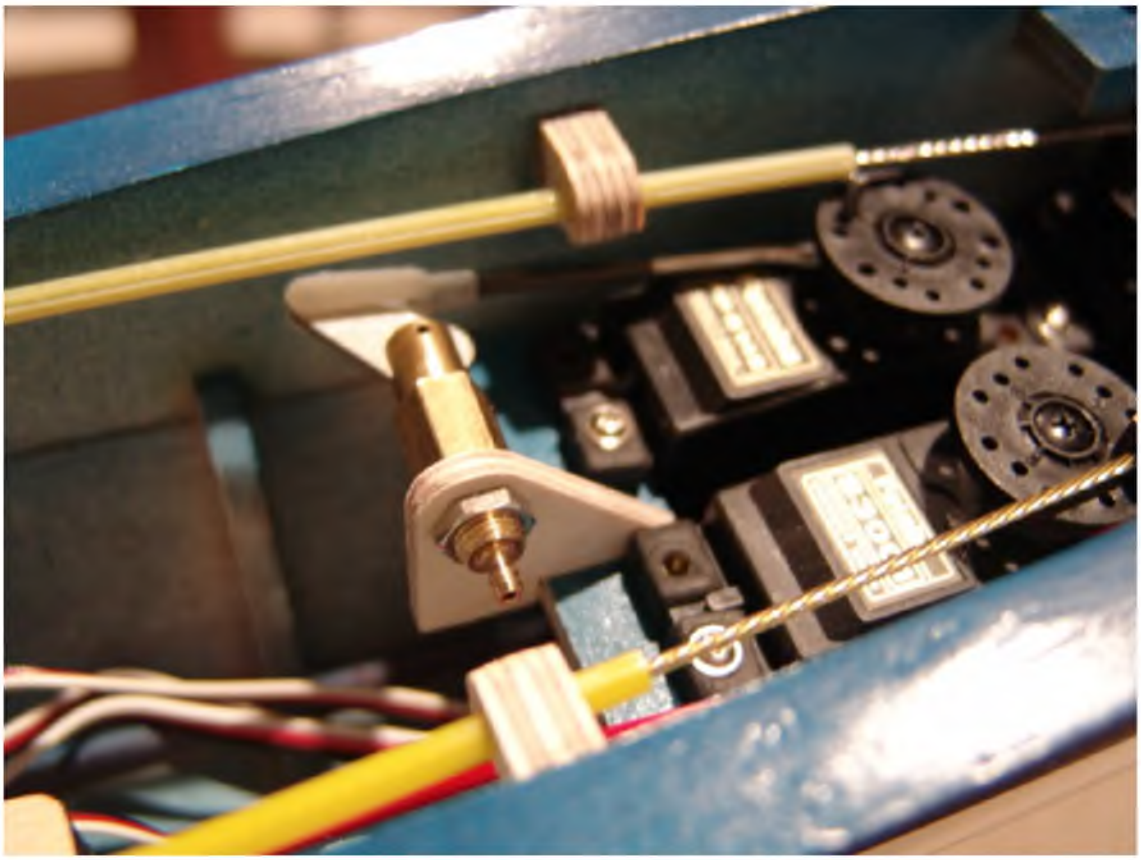
David
--
Meuler (SP) can make you any header you need just give him your measurements. I don't have the web site but he is reasonable on price.

Gary
--
David,

I think the exhaust port is at the same height as the SF and when I visualize the RF rear port on my Blue Angel it looks like it would require a lot of modification to the fuselage side for clearance. I think you could use a RF to setup the motor mount and nose ring position and shape most of the nose blocks until you find one. I'm done buying them, honest! There is NIB ringed one eb*y now.

Tonight I completed the throttle cable installation. Made the linkage for the air control valve and made and glued in the mounting bracket. I also put together a "to do" list for my remaining items. The list is getting pretty short!!

To Do List
• Install aileron control arms.
• Glue aileron hinges.
• Install aileron servos and linkage.
• Grind flats on struts.
• Install air lines, air tank and check gear.
• Install fuel lines, filter, vent check valve and fueling U tube
• Wrap and install receiver.
• Do final balance check and add ballast. :-(
• Glue rudder hinges.
• Check control surface throws and final trim.



To be continued…

8178 Just a question did you installed 3003 servos on this beauty ? if yes, wasnt this master piece worth digital servos ?

Outstanding plane !!!!!!

Regards.
Rafa

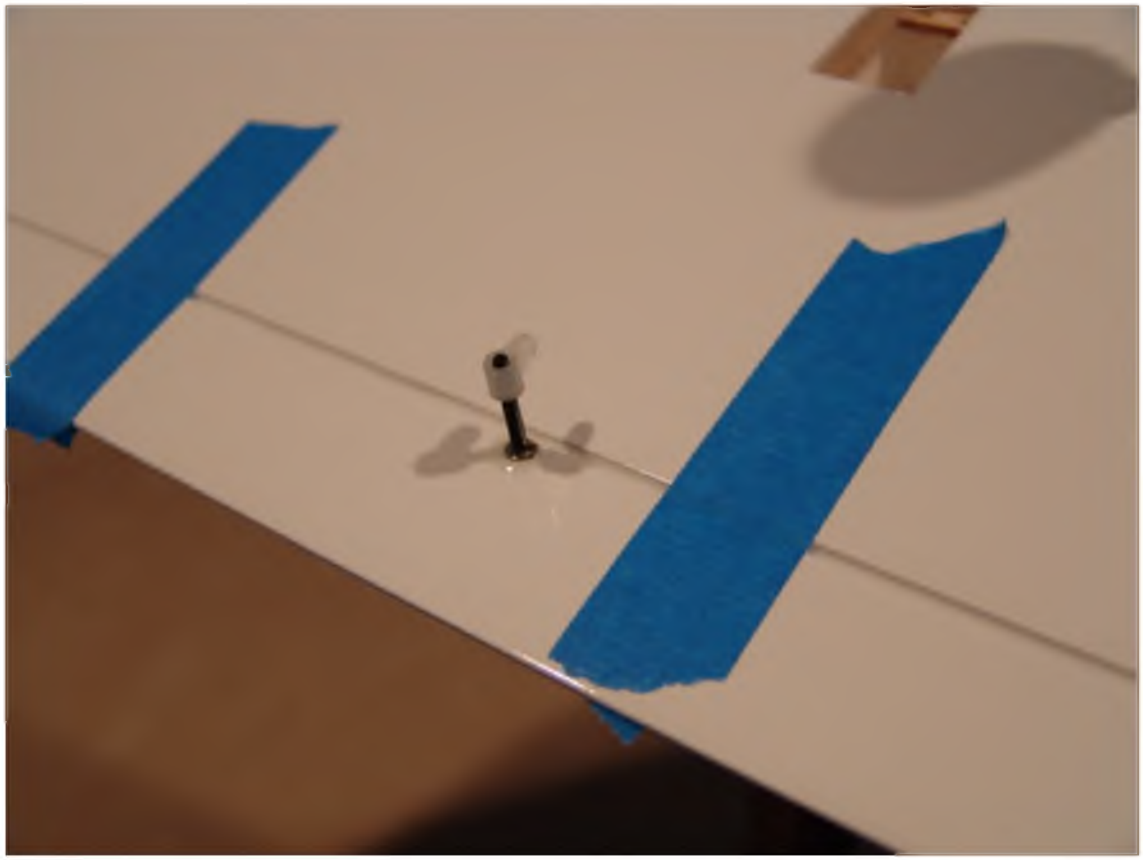
--

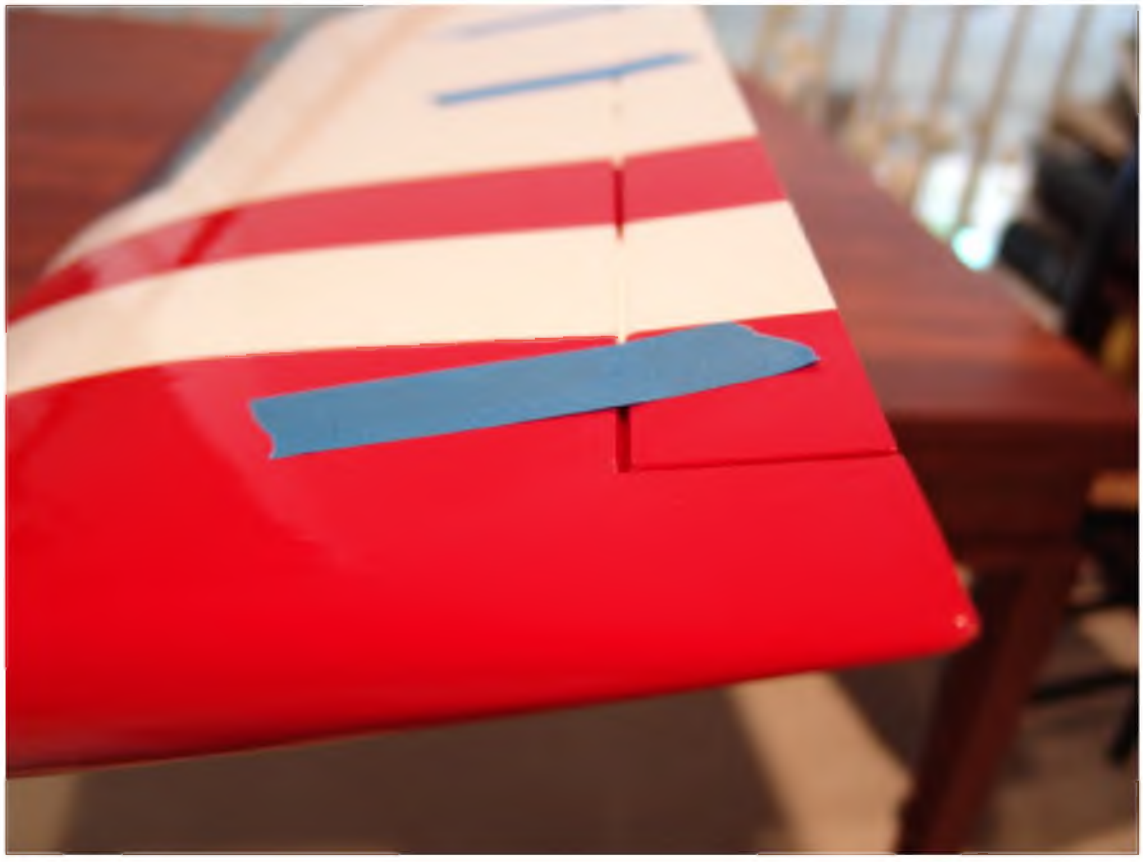
Thanks for comment. This thread has gotten so long it's hard to find stuff. I covered the flight pack back on post #164.

"I decided this rocket machine deserves some digital servos, so I ordered two Futaba S9252s for the elevator and ailerons and a S3151 for the rudder. For power I ordered a Futaba 1500 mAh battery to go along with the Futaba PCM 1024 receiver. "

The throttle is a ball bearing 3003 and the retract servo is a 148. I modified the aileron setup from the original plan design and will be using two S9252 servos rather than the torque tubes.

The aileron control arms and hinges are glued in with epoxy.





To be continued…

8178,

Would you please post a close-up picture on the top side of the Aileron control rod in picture 1 in your last post? Keep up the inspiring work.

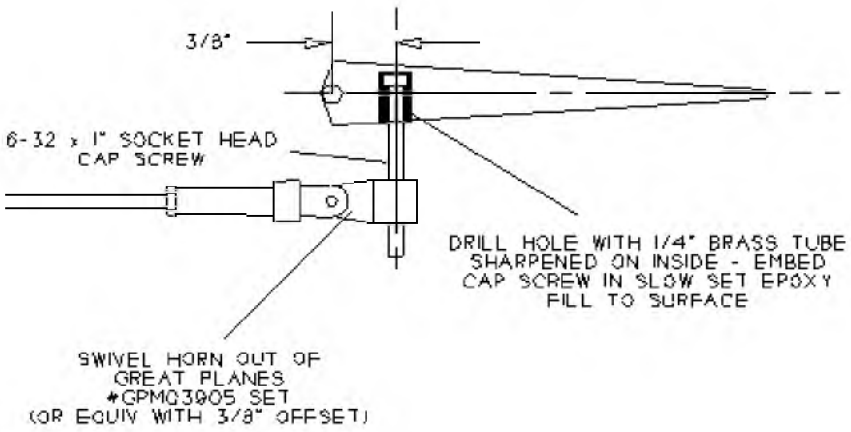
Thanks
--
David,

I didn't take pictures of how I do the control arms this time but I covered it in detail on my Howard Engineering Kwik Fli III build. It starts on post #145 including some stress testing I did on the arms. The link is http://www.rcuniverse.com/forum/m_2434444/mpage_6/key_Howard%2CEngineering/tm.htm They have worked out really well for me and the beauty of them is there is nothing showing on the top of the control surfaces. On larger aircraft you may need to go to larger size studs so you can use a larger plastic fitting to get the eye directly over the hinge line.

I should add that I keep them aligned with a 5" piece of narrow masking tape across the top while the epoxy sets. It is a good idea to keep an eye on them while the epoxy sets up. It would not be good if the tape slips and stud became misaligned. That almost happened to me today.

Forgive me for butting in, but I thought this sketch might help illustrate Mike's horn installation. (It's from my Kwik Fli III plan set - when I upgraded the original hand drawn plans to CAD I used Mike's suggestion for the horn installation).

"and now back to our regularly scheduled program"...



CONTROL HORN INSTALLATION

Thanks Tony! Your reprint from the Kwik Fli III plans makes it very clear. On my 60 size aircraft I've been using 4-40 hardened cap bolts and putting the hole closer to the hinge line but the 6-32 works very well too.

Sorry...But skipping back to painting with LusterKote for a minute...I remember reading a suggestion in another thread to heat the can of LusterKote in water prior to painting....I believe it was you who suggested it...Is that correct...Do you do that?? The reason I'm asking is I just ordered some cans to paint a few airplanes...I don't believe I've ever used LusterKote before and for some reason the "heat the can" thing kinda stuck in my mind...

Thanks...

Chuck

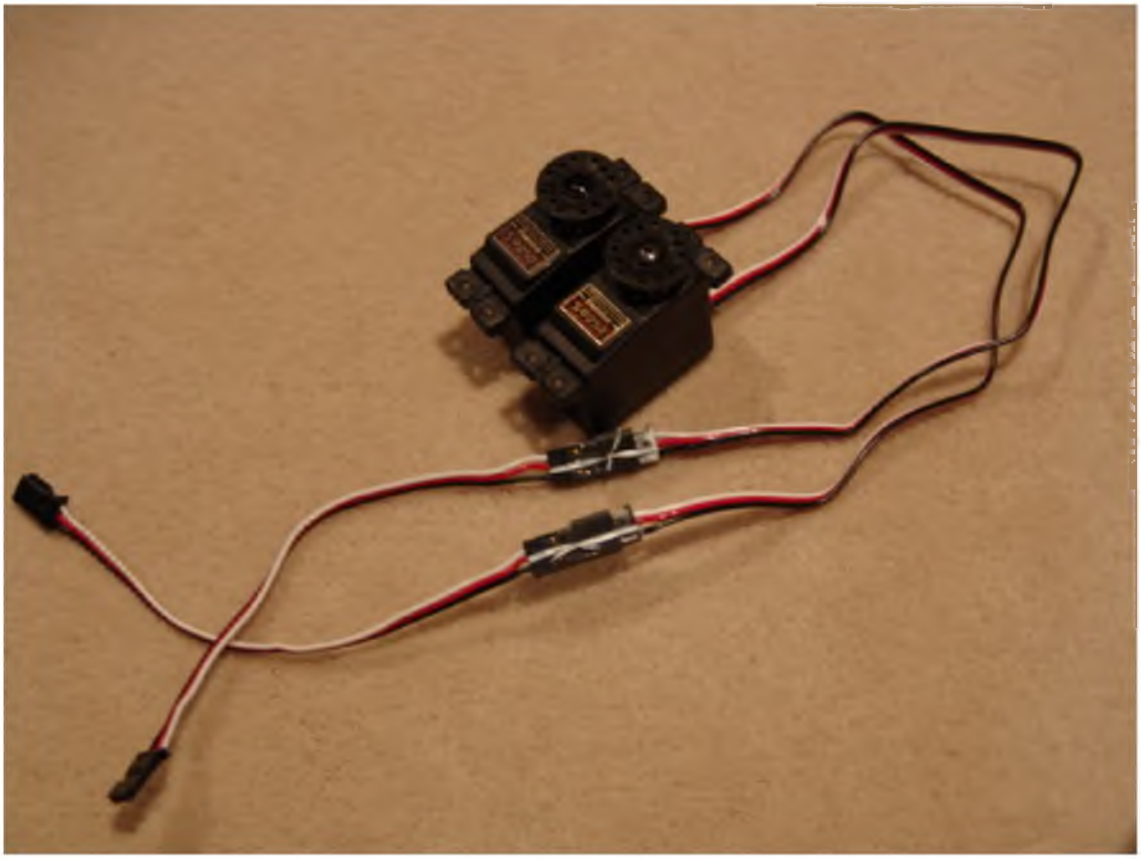
--

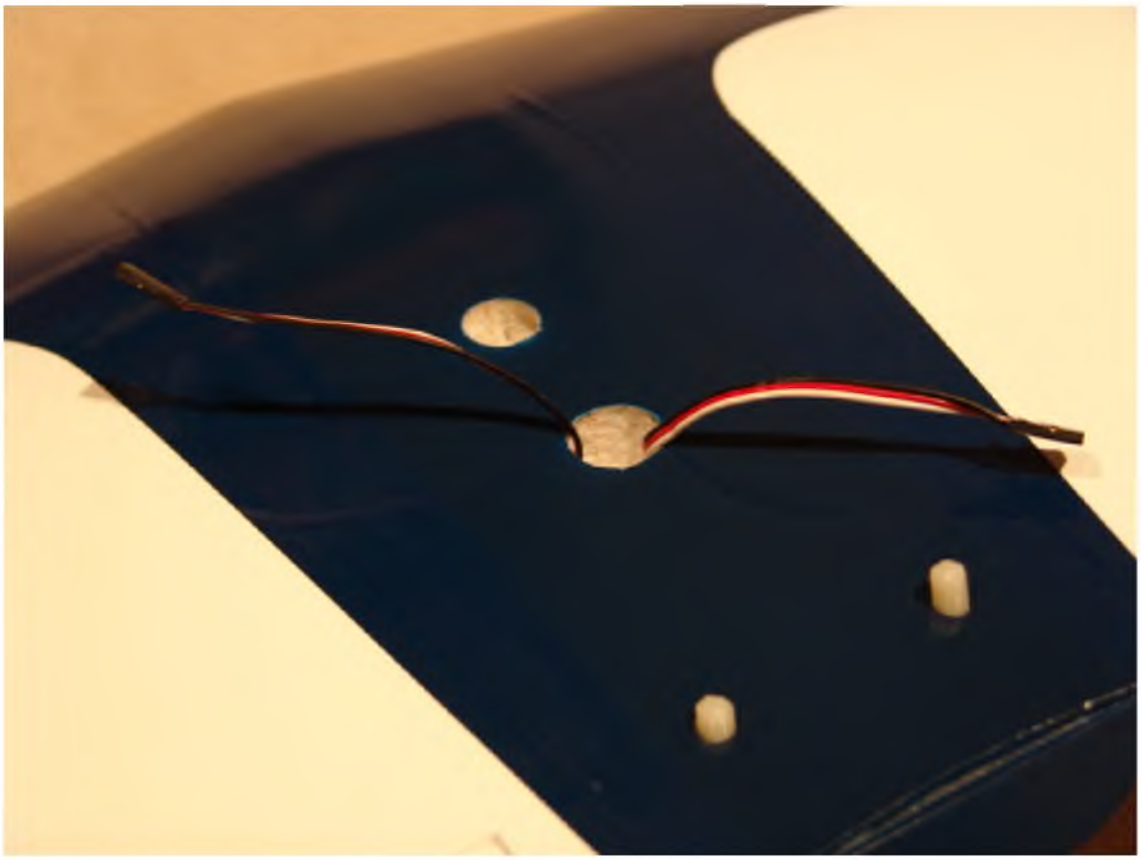
Yes, I heat the can because it seems to spray better. I've been wrapping the can in a hot pad lately and find it easier than messing with hot water. Needless to say don't forget that can is in the hot pad and check the can often! You must use the white primer under the color coat or the color will be completely wrong.

More progress on completing the ailerons. I tie the plugs on the extenders together with dental floss. Some RCers like to cut the cable and solder on an extender cable but the plug type extenders have worked fine for me. A large size ball chain is used to drop through the wing channel for the aileron cable. I then attach the plug to the chain with masking tape and using the chain, pull the cable through the wing. Digital servos use a extra heavy wire so you

need to use the heavy duty extender. For all of my control clevis, I like the Sullivan units with the locking clip and I also use a jam nut to lock the clevis. A small thing, but I polish all of the push rods that are external giving them a nice clean shiny look.

As luck would have it, the aileron servos are behind the CG helping the balance some.

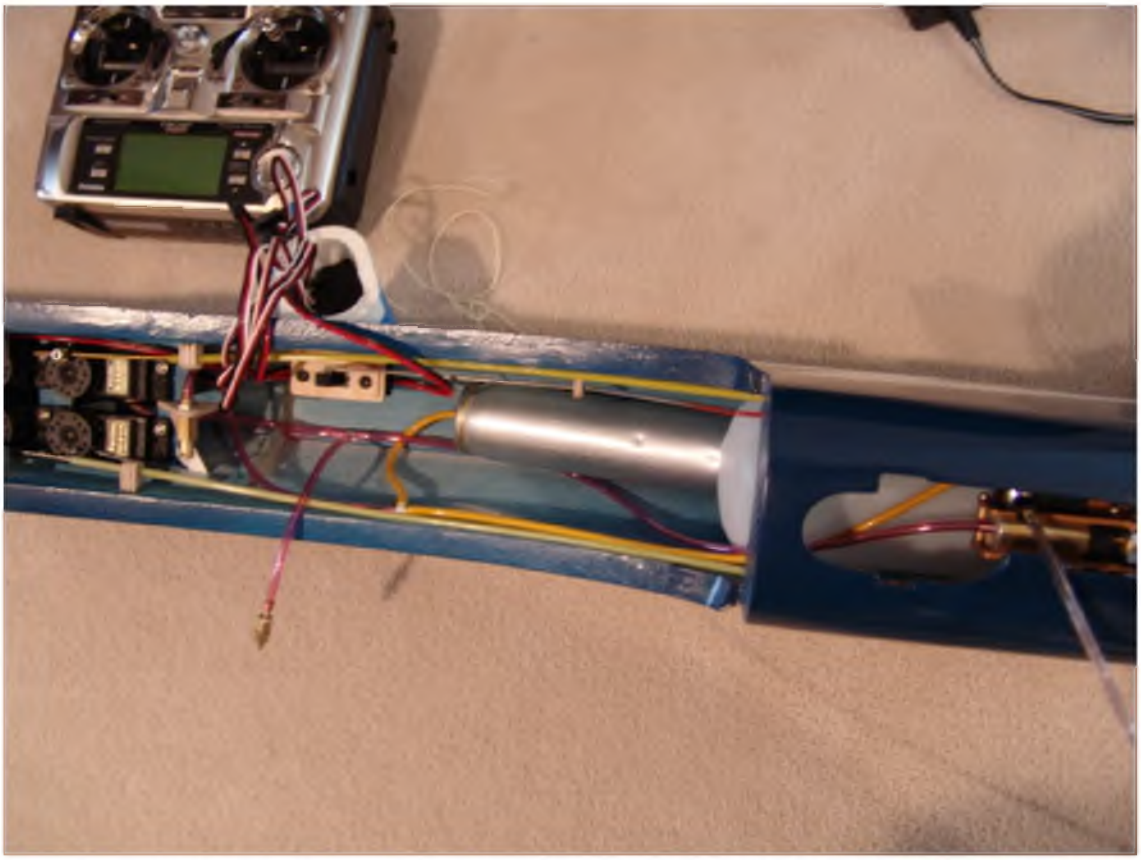


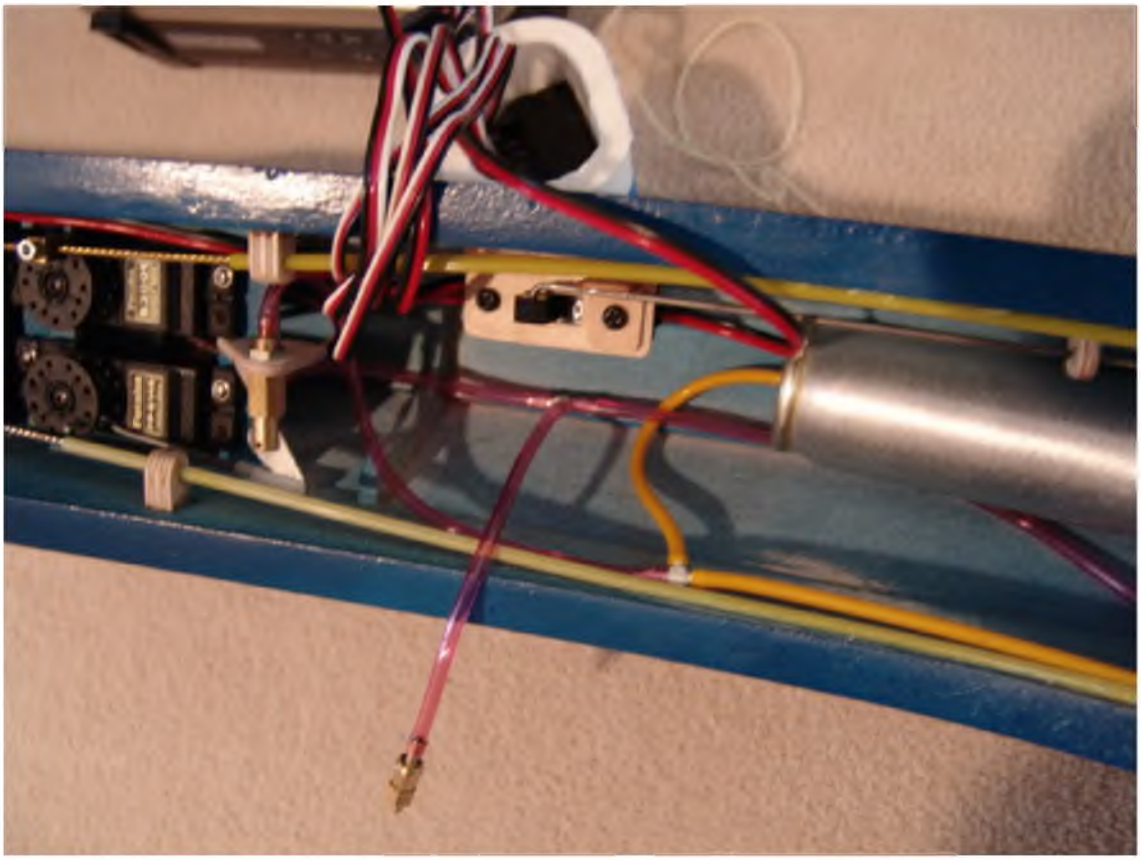



Blue Angel

To be continued…

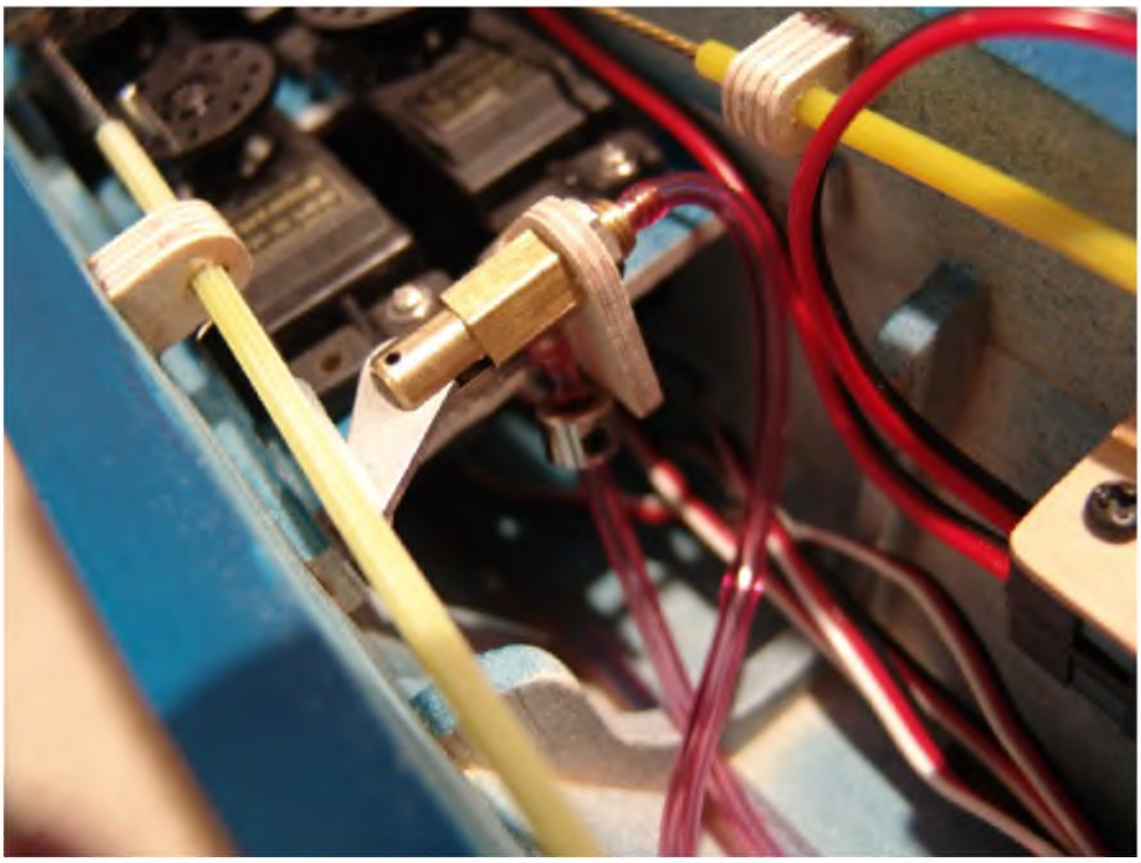
The retract gear is plumbed and operating!





To be continued…

Forgot to show the "old school" wheel collar method for an adjustable air restrictor for slowing the retraction and extension time. I don't slow it down real slow just enough that it doesn't slam super hard when it moves. Before installing the collar I grind the end of the set screw so it is smooth and round reducing the possibility of the screw cutting the air line. I believe that Spring Air sells a nifty adjustable valve to slow the air flow.



To be continued…

After giving the engine choice more thought I decided to tear down the engine that I tested for the Blue Angel and install one of my Nelson liners and pistons. The aluminum chrome Nelson liner is almost two ounces lighter than the stock ABC OS liner and has improved porting. That may result in an ounce or so less tail ballast too! While I had it apart I decided to replace the bearings because even though they felt and sounded good they didn't look very good on the outside.

I expect most of you following this thread are very experienced at doing engine rebuilds but I thought I'd share my approach to the process.

My usual process is to remove the head (need to use an Allen wrench that is in like new condition to fit the bolts), remove the pump and drive washer. If the sleeve is stuck tight leave the drive washer on and install the prop. Insert a small piece of plywood between the top of the piston and the exhaust port. Turn the prop with a light force so the piston contacts the plywood and gently push the sleeve up.

After the sleeve is out turn the crank to top dead center and pull back on the rod with your finger. The piston should move to the back of the case, the rod should slide back on the connecting rod and the rod should almost fall off the crank shaft crank pin. Sometimes gunk can build up on the connecting rod preventing the rod from sliding all the way to the inside of the piston. Believe it or not, the professional engine rebuilders that I have talked to use a little heat from a propane torch on the bottom side of the piston through the back of the engine to free the rod. It sounds brutal but it has worked for me many times without any negative results. Just be careful with the heat.

Next I put the engine in an oven set to 350 degrees and let it heat for ten minutes or less. I remove the engine and hold it in a small towel and slap the back of the engine down on a block of would that is covered with a towel. Be careful. 350 degrees is darn hot!! With a good hard rap the crank should move back taking the back bearing along with it. Once the crank gets to the back of the case it should easily slide out with the bearing and you should be able to slide the back bearing off the crank shaft with a little force. I accomplish this by tapping the nose of the crank shaft on a piece of wood.

While the case is still hot I use a ½ inch dowel to push the front bearing out by tapping the case down with the dowel held against a hard surface.

After I get everything apart I clean up the case and head with Dawn Power Dissolver. Be careful that you do not leave the Dawn on the parts very long or it may tarnish the aluminum. At any rate, if it does get tarnished you can use Twinkle brand copper cream and a tooth brush to gently scrub the case and it will look like new. It takes a good bit of scrubbing and washing with hot water but the results are pretty impressive.

I do not mess with the pump other than clean it with fuel.

See images below to view the process and the images of the Nelson piston and liner kit. Unlike the OS piston the Nelson piston does not have an arrow on top pointing to the exhaust port and can be installed on the rod either way.

My new bearings are on their way from Boca Bearing and I will cover the assembly shortly.


OS
MAX
5F

To be continued…

The weight is as follows with everything installed and if it turns out I do not need to add tail ballast:
7.5 pounds complete without pipe and header.
7.9 pounds with header and pipe

It should come out almost 2 ounces lighter when I install the engine with the Nelson liner set.

The Boca bearings arrived today so I reassembled the engine. The engine with the Nelson liner/piston installed is a little over 1.5 ounces lighter than the stock ABC liner/piston configuration. Pretty decent for a used engine.


OS
MAX
SF

To be continued…

OK, aircraft weight and balance exercise. My pipe is 27.5" long from the header to the tip of the pipe and weighs 7 ounces. The pipe spans the desired CG point on the aircraft. I installed the header and pipe and marked the aircraft CG point on the pipe and then removed the pipe from the aircraft. I then found the balance point on the pipe and header and discovered that it is 2" forward of the desired aircraft CG I marked on the pipe. So the pipe is exerting two inches more of its weight ahead of the aircraft CG. 7 ounces divided by 27.5" = .2545 ounces per inch. The pipe has 2" of its weight ahead of the desired aircraft GC resulting in .5090 ounces of weight ahead of the aircraft CG. Does that sound correct?

To be continued…

Got the gear strut flats ground for the axel and strut bolts. For some reason I just hate doing it but it is a must do to keep the strut parts locked together in the correct position.

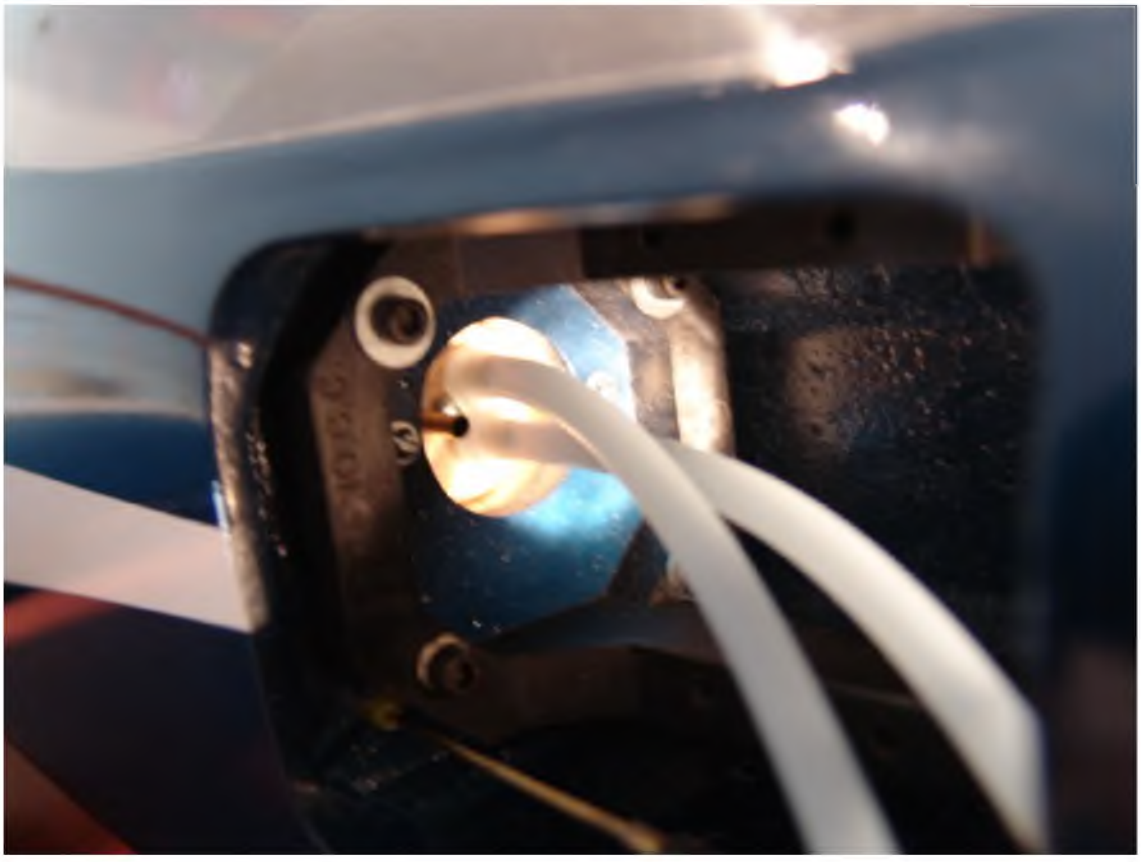
I'm just a tad nose heavy on the recommended CG point and I'm not going to change it with tail ballast. From my calculations on the swept wing the recommended CG point is at 33% of the Mean Aerodynamic Cord (MAC). My CG will be at about 30% of the MAC and I'm OK with that rather than adding ballast. I may change my mind after I fly it for awhile.

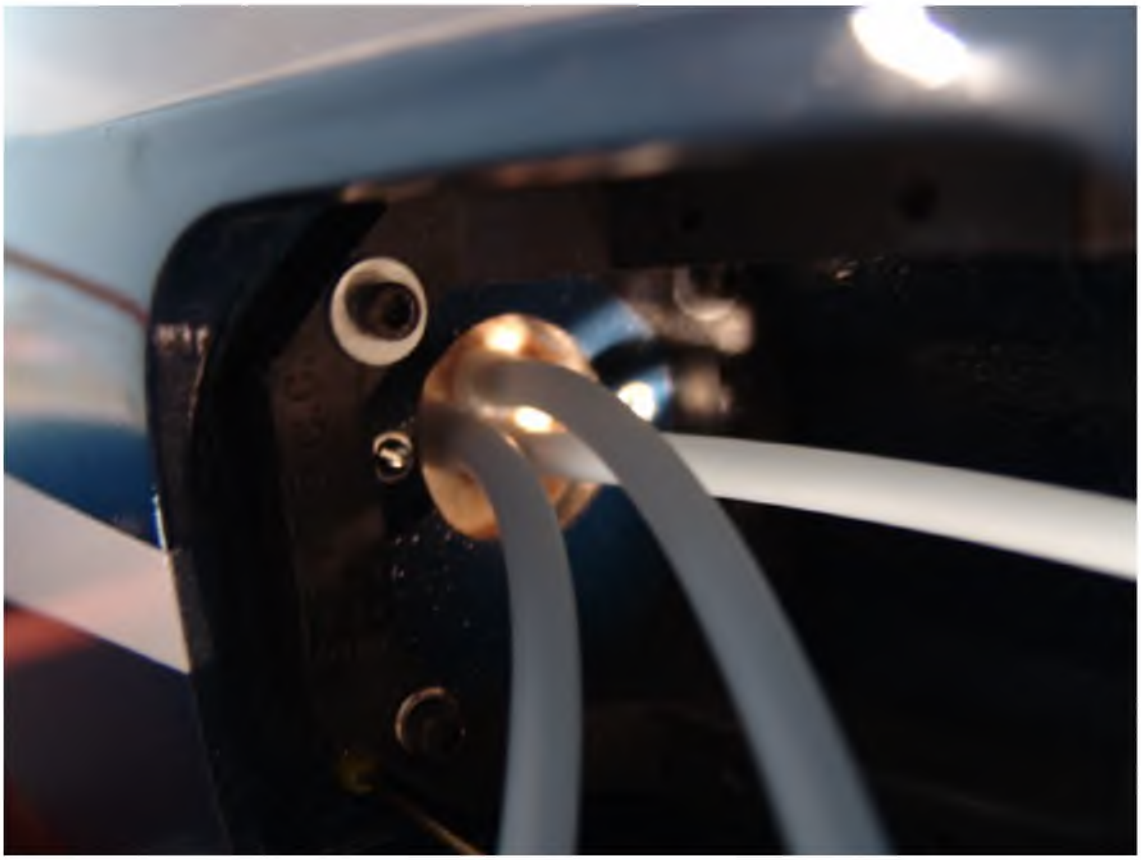
To be continued…

I test ran the rebuilt engine today and after about 16 oz of fuel it was turning 10.4 K RPM a couple of times when I leaned it out a little. Didn't want to peek it up too much but also not run it rich with a new AAC liner and piston. My pipe length is 18" from the center of the glow plug to widest spot in the pipe which I believe is a good starting point for the pipe length when running an APC 12 -10W. Looks like I picked up 300 RPMs with the new bearings and Nelson sleeve/piston set. The pump and carb are working great with a good idle and smooth transition to full RPM. I expect with some more running the RPMs will pick up some as the engine still has a pretty good squeak as the piston moves through the upper part of the cylinder. The only significant event during the test was when a curious wasp got a little too close to the front of the prop and I got a face full of wasp parts! Ugh!!

Next step was setting up the fuel lines. I like to put a piece of fuel tubing over the end of the lines to keep them in place. I open the loop with a hemostat and slip the line trough the loop. It's kind of tricky process but not bad after you figure out how to do it. It is pretty tight behind the engine for the lines but I think I got everything in without any line kinks. We will know soon! The brass U is a part I made for the Tiporare so I borrowed it for the Blue Angel. The top line is removed for fueling along with the vent check valve on the vent line. The black thing on the engine fuel supply line is a fuel filter with a piece of heat shrink on it to prevent it from making metal to metal contact on the engine. The check valve keeps the vent line from dribbling fuel and loss of fuel at various flight attitudes and keeps the airframe a little cleaner.

Not much left to do now. It is a little heavy on the right side even though I used my heaviest balsa on the left wing to offset the weight of the side mounted engine and pipe. I'm going to add a smidge of lead in the left wing to fix that. Got to glue the rudder hinges and check and adjust the control throws for final trim.





To be continued…

Making good progress. Glued the rudder hinges and added a little over ½ ounce of lead to the left wing tip to offset the weight of the pipe and side mounted engine.

To be continued…

The Blue Angel is ready to fly! Just need some good weather and it will fly soon.

Everything checked and rechecked and ready to fly!

Has anyone tried using plastic wire ties to clamp the silicone pipe joiner?

To be continued…

If you mean tie wraps, yes, we used to do that all the time. Look closely at the photo. Not only the silicone joiner, but the pipe itself (Magic Muffler, to be exact)

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Thanks for the response, I bought a package of black ones to try. They look a lot cleaner than clamps.

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quote:

ORIGINAL: bob27s

I used cable ties almost exclusively.

The Hatori "squeeze" clamps were handy when you have to remove the pipe frequently. Im not sure if you can still find them. Similar products around I would imagine.

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I'm thinking that the ties are so cheap that I'll just install a new one each time I fly.

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This place sells the clamps:
http://www.tokyo-hobbies.com/hatoriparts.html

They also sell five different Hatori sixty-size pipes, #601 - #700:
http://www.tokyo-hobbies.com/hatoriair.html

I have not bought from them, but they take Paypal and ship to the US:
http://www.tokyo-hobbies.com/pay.html

David
--
The Blue Angel flies!!!

It was pretty windy today and probably not a good day for my first test flight but I couldn't wait. The two guys flying before me were having problems landing in the wind gust so I made just one flight.

It flies great! No trim was needed but I made the flight short so I'll have a better idea when I fly it again. It feels very stable even in the windy conditions. Seemed to fly right through the turbulence without bouncing around but doesn't feel heavy. I think my wing loading is about right. My landing was a little hot but I didn't want to slow it down too much with the wind gusting.

The video guy did a pretty good job of tracking it but the guy with my camera couldn't track it in the air. I put a short 25 meg video on Putfile here http://media.putfile.com/The-flight-of-the-MK-Blue-Angel-60

Hope to get some more video on my next flights.

Think I'm going to love this machine!

Many thanks to all the people below that made the project possible for me and for other RCers that would like to build a Blue Angel in the future.

Ron Ellis, plans, wing temples and canopy
Tony Howard canopy plug and canopies
Dan Hines wing and stab cores
And all the folks that provided background documentation, history, variants, color schemes, and the nice comments about the build.

To be continued…


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Thanks guys! After working on this for more than two years there was a lot on the line, but I like it best that way because the "rush" of success is most intense. There's always those few seconds of anxiety just as it becomes airborne for the very first time, those first inches of altitude, what is it going to do? Being ready for the unexpected and then the joy of not needing to be! Then after the flight is over and you put it back on the bench, then the "rush" hits. Man it is the best and takes your breath away! What can I say I'm an adrenalin junkie! Now that it has flown I can fly it and relax. (5/26/2008)